IWC SOWER Cruise 2008/09
Information for Researchers

Contents

I. INTRODUCTION

The objectives for the 2008/09 cruise are to:

(1) The main objective is to investigate temporal changes in the spatial distribution of minke whales in relation to the pack ice recession;

(2) continue research on blue whales (identification of sub-species; biopsy sampling, photo-identification and acoustics), fin, humpback and southern right whales (biopsy sampling and photo-identification). Priority will be given to blue and southern right whales during the early part of the cruise, with additional priority allocated to humpback whales later in the cruise;

(3) collect information that could be valuable in assessing the feasibility of attaching telemetry devices to Antarctic minke whales from large vessels such as Shonan Maru No. 2, to the extent that this does not interfere with the primary work of the cruise.

The research area will span longitudes 105°-115°E and from the ice edge north to *ca* 60 n.miles from the ice edge.

A total of 27 days has been allocated to research in the Antarctic, including up to a total of 2 days has for biopsy and photo-identification of the priority species including blue, fin, humpback and southern right whales.

The itinerary of the cruise is as follows:

Event	Dates
Depart Shiogama	22-Dec-2008
Pass Lombok Strait	-
Arrive homeport	4-Jan-2009
Depart homeport	6-Jan
Pass latitude 32°S (Fremantle)	12-Jan
Start survey (105°E)	20-Jan
Finish survey	12-Feb
Pass latitude 32°S (Fremantle)	20-Feb
Arrive homeport	26-Feb
Depart homeport	1st-Mar
Arrive Shiogama	14-Mar

Researchers must attend the pre-cruise and the post-cruise meetings. The post-cruise meeting may be held on the vessel prior to the return to Benoa; if not completion of the meeting in Benoa will be necessary.

Private communications
You may send and receive private communications, including e-mails, at your own expense. Accounts must be paid by researchers upon leaving the vessel at Benoa. Payment for e-mails is required in US dollars. Telephone and faxes may be paid for by credit card. Researchers are requested to make payment as soon as possible after entry of the vessels to port in ? and at the latest on the day following port entry.

Photographs
IWC equipment is not to be used for private photographs. Researchers may take photographs with their own cameras when the vessels are off-effort. Permission **must** be given by the Cruise Leader for private photographs to be taken during research time.

Behaviour on board
The Cruise Leader is responsible for all scientific decisions affecting the conduct and strategy of the cruise and will assign duties to the other researchers. *You must follow these instructions and use the designated equipment and protocols at all times.*

All researchers represent the International Whaling Commission and effectively are guests of the crew and, as such, should behave with dignity and courtesy at all times. Alcohol is available on board, however, for safety and other reasons, consumption of alcohol should obviously be restricted to an appropriate level. The vessels will provide alcohol to the researchers at cost price. Expenses thus incurred by the researchers must be paid in the same manner as the costs for communications (see above).

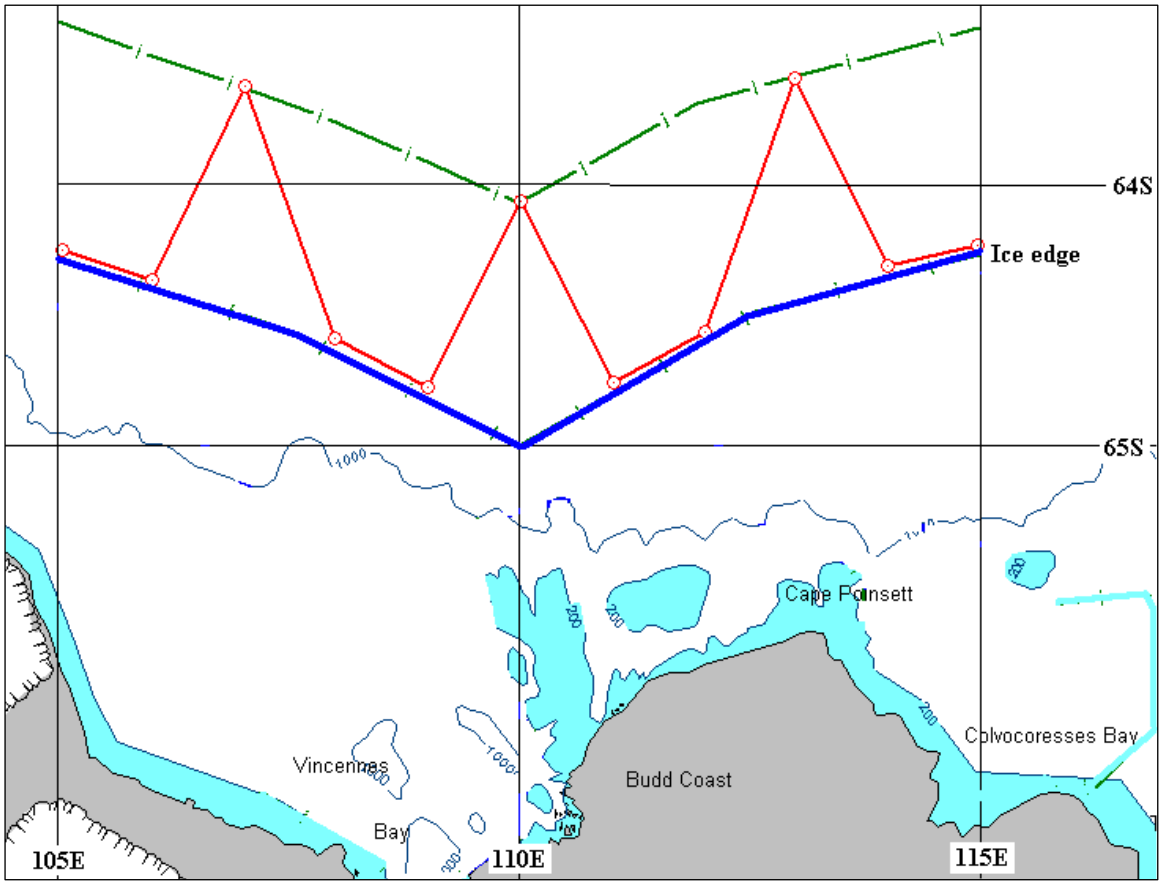


Fig.1. Provisional cruisetrack design for the *Shonan Maru No.2* during the first survey. The pattern of mode alternation is not indicated.

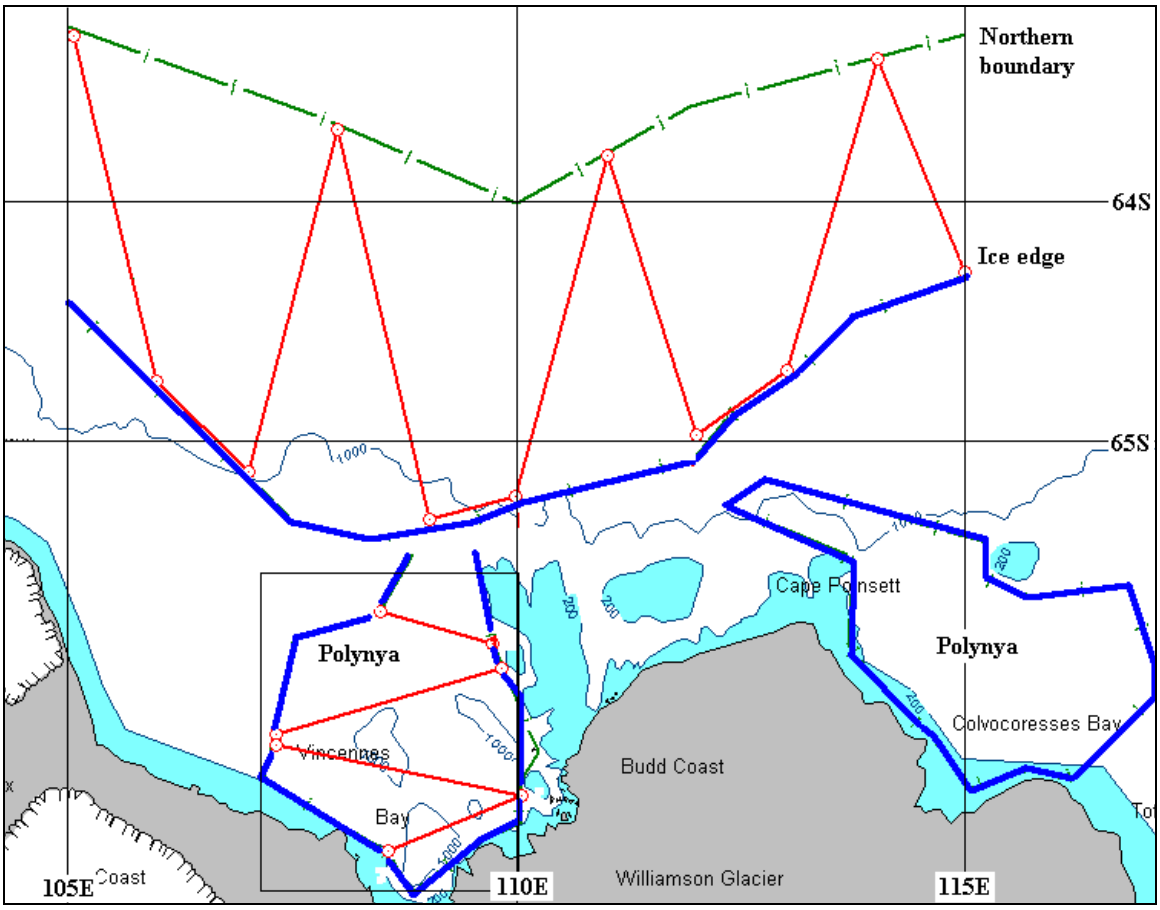


Fig. 2. Provisional cruisetrack design for the *Shonan Maru No.2* during the resurvey and coverage of a polynya. The pattern of mode alternation is not indicated.

II. RESEARCH ITEMS

A. ANTARCTIC MINKE WHALE COMPONENT

1. Objectives

The aim of this part of the cruise is to investigate the changes in Antarctic minke whale density with respect to pack ice recession in the area between longitudes 105°E and 115°E. The objective is to combine some feasibility aspects (especially with respect to the biopsy/mark-recapture effort) with the ability to undertake combined analyses with data collected the previous year and to develop a targeted plan for the future.

The Antarctic minke whale research will involve a combination of line transect survey and the collection of individual identification data (biopsy/mark-recapture). The biopsy/photo-identification work of minke whales will also provide an opportunity to carry out some preparatory work with respect to assessing the practicality of telemetry studies.

2. Priority of research items during the minke whale component

Priority will be given to the minke whale survey involving a combination of line transect survey and the collection of individual identification data (biopsy/mark-recapture). The line transect field effort will focus on BT option II mode and SS-II mode (closure when abeam). and the associated **distance and angle experiments**.

A total of 27? days have been allocated for research in the Antarctic; the minke whale research will take place during 25? days. Up to a total of 2 days have been allocated for biopsy/photo id of the priority species including blue whales (see component B below). Half a day is allocated for the Estimated Angle and Distance Experiment. Training in estimating distance and angle will be given priority near the start of the minke whale research component.

At the discretion of the Cruise Leader, time may be allocated, on an opportunistic basis to the research items discussed below. Normally no more than 30 minutes (after closing) should be spent on each encounter with these species and the amount of time spent should normally not exceed a maximum of 90 minutes per day (12 hours) of completed research.

Photo-identification: In addition to minke whales, target species are blue, southern right and humpback whales with highest priority for blue whales. Photos of killer whales may also be obtained opportunistically without interfering with the priority objectives of the cruise with the aim of beginning to try and develop a visual recognition key for the three killer whale forms known to occur in the Antarctic. .

Biopsy sampling: As well as minke whales, target species are blue, southern right, and humpback with highest priority for blue whales. The collection of biopsy samples from other 'incidental' species such as killer whales is at the discretion of the Cruise Leader, provided that it can be undertaken during normal operations.

Acoustic monitoring: On this cruise acoustic research will normally be restricted to recording undertaken in the immediate vicinity of blue whale sightings (see component B below).

Video taping: This will be undertaken following the protocol developed for the blue whale component of recent SOWER cruises.

Telemetry: Antarctic minke whales have not yet been tagged with telemetric devices. To facilitate the assessment of the practicality of future tagging attempts of this species from the bow of a SOWER-type vessel a series of trials are to be conducted on the 2008-09 cruise. The aim will be to gather data to assess the practicality of being able to reliably close, at relatively slow speeds on Antarctic minke whales to such a distance that the deployment of tags from the bow of the vessel was likely to be possible. Whales are to be filmed on video and closest distances estimated or measured using the laser range finder (currently available as part of the Paxarms biopsy equipment).

3. Operational strategy

Survey will commence at 105°E and proceed eastward to 115°E. The vessel will then resurvey the area in the reverse direction. If time allows, a further repeat survey will be undertaken. For each survey, the northern boundary of the research area will be the same and constructed as a line 60 n.miles north of the ice edge mapped during the first survey. The width of the survey area for the second survey (and possible subsequent survey) will be potentially wider than 60 n.miles due to the expected southward recession of the ice edge. Ice recession may also result in polynyas south of the main ice edge becoming confluent with ice-free waters further north and thus potentially accessible to the ship. If accessible for survey, such areas will be covered as separate strata.

The cruisetrack for each of the surveys will be a series of evenly spaced zigzags covering the entire north-south extent of the research area. The zigzags will be interspersed with survey segments parallel to the ice edge. An example of the cruisetrack design for the first survey is shown in Fig. 1. An example of the cruisetrack design for the repeat survey north of

the main ice edge is shown in Fig. 2. Fig. 2 also indicates the occurrence of two polynyas south of the main ice edge, and an example of a cruisetrack design covering one of these if it is assessable to the ship usng the 'box' design developed for the CP3 Ross Sea survey. Due to the limited time available, coupled with the requirement to cover the entire area at least twice, it is likely that gaps in survey coverage will be necessary as the total length of the trackline will be too great to be entirely covered. Survey effort will be distributed as evenly as possible by latitude and longitude. Survey will be in alternating Passing mode (BT option II) and Closing (SS-II) mode. Mode change waypoints on the zigzags will to be constructed to ensure a 2:1 ratio of Passing to Closing modes. Each of the trackline segments parallel to the ice edge will be divided equally by mode. Mode change waypoints on the segments in the polynyas will be constructed to ensure a consistent 2:1 ratio of Passing to Closing mode.

During BT option II mode the duties of the TOP and IOP observers will essentially the same as normal IO mode. Therefore, with respect to the amount of time for continuous survey, normal IO mode guidelines will apply (i.e. no more than 100 n.miles surveyed continuously).

The procedures to be used for these research items are the same as for the recent SOWER cruises. Full descriptions of cruisetrack design procedures, research modes are provided in section III below.

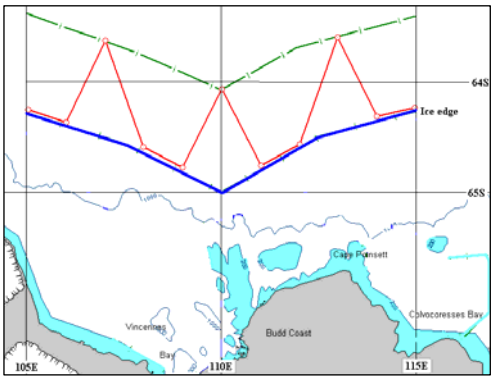


Fig.1. provisional cruisetrack design for the *shonan maru no.2* during the first survey. the pattern of mode alternation is not indicated.

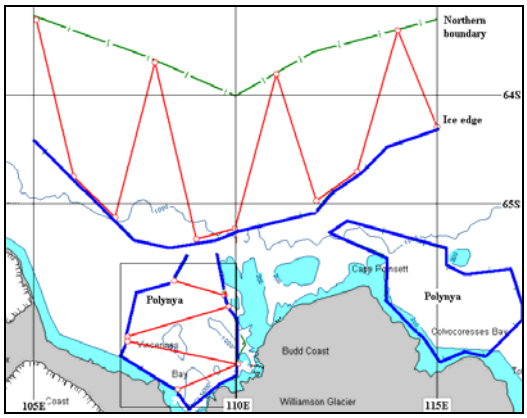


Fig. 2. Provisional cruisetrack design for the *Shonan Maru No.2* during the resurvey and coverage of a polynya. The pattern of mode alternation is not indicated.

B. BLUE WHALE COMPONENT

1. Objectives

The major long-term aim of the blue whale programme is to assess the status of the 'Antarctic' blue whale in the Southern Hemisphere, with initial focus on two aspects: (1) acoustic techniques and surveys; (2) field discrimination of the two subspecies. With respect to the latter, the initial focus of the programme and this cruise is to try to obtain methods for distinguishing between 'Antarctic ' and pygmy blue whales in the field (*Rep. int. Whal. Commn* 46:126-7) and in particular a visual identification key. A variety of techniques will be used - specifically: sightings; biopsy sampling/ genetic analysis; acoustic sampling; and photo-identification.

2. Priority of research items during the blue whale component

It cannot be stressed strongly enough that the work to address the Antarctic/pygmy blue whale differentiation has the highest priority. The primary aim of the cruise is NOT to obtain an abundance estimate for blue whales within the research area, although when searching, the usual data required for line-transect analysis will be collected for all species.

A total of two days have been allocated to research on the priority species, including blue whales. It is anticipated that this time will primarily be used for research on blue whale groups detected during the course of other research (such as the BT mode and SS-II survey).

In the minke whale research area, searching in BB mode may also be undertaken, however, the time used as such will not necessarily constitute part of the two days allocated to research on the priority species.

In general, during searching in BB mode the vessel will use Passing Mode (i.e. the ship remains on the trackline and does not investigate the sighting) unless a target or potential target species is sighted. Closing Mode may also be followed in order to identify accurately large whale sightings to species at the Cruise Leader's discretion. Should large groups of rare or rarely seen species (e.g. pygmy right whales) be encountered, they can be investigated at the cruise leader's discretion.

Where this does not unduly affect the likelihood of reaching the primary aim, southern right and humpback whales can be approached to obtain photo-identification photographs and biopsy samples. Similarly, killer whales can be biopsied. Normally no more than 30 minutes (after closing) should be spent on each encounter with those species and a maximum of three encounters per day should be closed with. If a large group is encountered, the cruise leader may decide to spend up to 90 minutes with that group but normally no more encounters should be closed with that day.

3. Operational strategy

On encountering blue whales, sighting survey mode will cease and the standard blue whale protocol be followed.

As recommended after the 1998-99 cruise, blue whale research will continue until completion of that series of experiments, after which up to one day may be spent searching for further blue whales in the vicinity. Any such time spent on searching for blue whales will not be allowed to interfere with the primary research aims: the minke whale research component.

At the end of blue whale research, the vessel will return to the end position of the minke whale research and resume sighting survey mode. As the vessel approaches the original trackline, the vessel should be off effort to ensure that sightings made when resuming searching on the original trackline are valid primary sightings.

3.1 Blue whale search mode (BB mode)

Primary search effort is only conducted in acceptable weather conditions. For blue whales, these are normally considered as being when a whale blow (or other sighting cue) can be expected to be seen at a distance of at least 1.5 n.miles, with wind speed less than 25 knots and sea state (Beaufort scale) less than 6. The final decision of acceptable is made by the Cruise Leader who takes into account the need to maximise encounters with blue whales AND to obtain the complete suite of data (biopsy, photography, and acoustics). The advice of the topmen and Captain is valuable. Systematic weather records are kept (see Section IV on data forms). Changes of cruise track to avoid early morning or late afternoon glare (or other unfavourable conditions, e.g. localised fog banks) are permitted.

Researchers will be assigned tasks by the Cruise Leader. The major sighting effort takes place from the barrel where two crew men are on watch and from the upper bridge where the helmsman, captain or officer-on-watch, (at least two) researchers, and the chief engineer or deputy are present, except perhaps at meal times.

When a sighting is made, the person who made the sighting provides information on the cue seen, and an estimate of the distance and relative angle to the sighting. If a target or potential target species is sighted the ship then changes course to the appropriate heading to approach the whale. This may also be the case (at the cruise leader's discretion) if a sighting of a large whale needs identification to species or if large groups of rare or rarely seen species (e.g. pygmy right whales) are encountered. Depending on the species involved, acoustic, photographic biopsy and dive time data may then take place. Relevant data are collected and additional data are required for blue whale sightings (see Section IV.1).

3.1.1 IDENTIFICATION OF SPECIES

Positive identification of species usually requires the clear observation of the cetacean's body. Probable identification of species ('like ….' -see below and Section IV.1) is based on several clues, which are nevertheless insufficient to be absolutely confident in identification.

Final decision of the category is made by the CL (or designated researcher). Species codes are discussed in Section IV.1.

With respect to blue whales it should be noted that at present, the identification to species is purely a preliminary field identification expressing the observer's opinion NOT an actual identification (see the objectives of the cruise). With this in mind, the categories in the Fig. below are relevant:

The additional data required for blue whale sightings are given in Section IV.1B.

It is important to begin some training of 'new' observers and to evaluate the success of that training. As a first stage in this process, two researchers should be 'trained' during this cruise. On the sighting of blue whales they should move to the barrel and observe the animal(s) from there. They should also video the animals from the barrel, giving priority to taping from behind the animal.

This exercise should help in refining the key and in particular obtaining video sequences that can become part of a training programme.

It is important to examine the results for as many topmen as possible. Each topman present at the time of sighting a blue whale must *independently* complete the special data form for blue whales.

3.1.2 DETERMINATION OF GROUP SIZE

Accurate determination of school size is not always possible. Researchers must evaluate if the school size has been accurately determined. This may take some time. Schools where the number of animals, or an accurate estimated range of the number of animals, is determined are classified as *confirmed* schools (see Section IV.1).

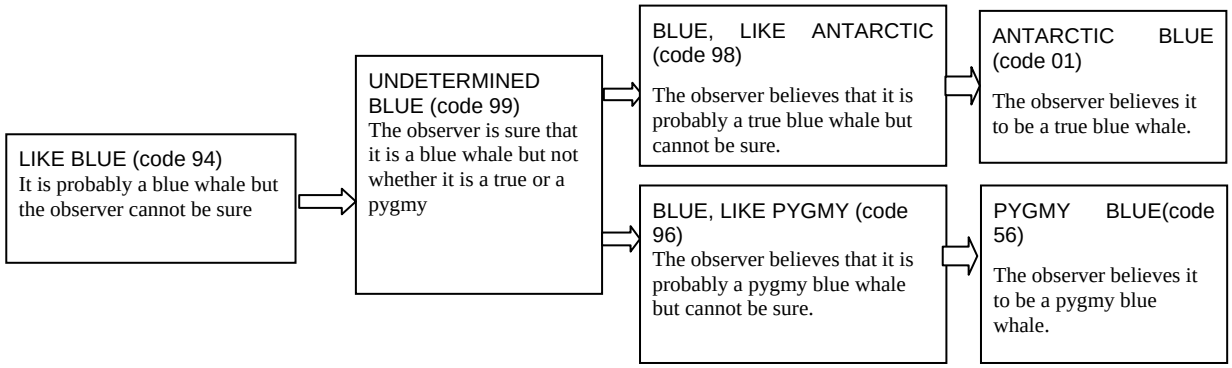
3.1.3RETURNING TO BB SEARCHING MODE

If an encounter is closed with, normally the vessel does not return to the previous cruise track but follows a direct course to the next waypoint, if appropriate, given the overall research strategy at the time.

In the primary minke whale survey area, searching in BB mode will be usually conducted on separate transects from the constructed trackline for the minke whale survey. However, there may be instances when BB mode is conducted on the minke whale trackline. For example, when the vessel is moving along the constructed trackline (to distribute search effort – as occurs in the northern stratum) and conditions are unsuitable for the minke whale survey but acceptable for blue whale searching. BB mode can under these circumstances be conducted on the minke whale trackline.

4. Data forms

See Section IV. 1A and B.



C. PROTOCOL ON SIGHTING A PRIORITY SPECIES

1. On sighting a blue whale

Stage	Ship	Researchers	Experimental details
1	Ship turns towards sighting and closes to about 1 n.mile. Unless the sighting is first made a long distance away and there is a danger of losing the whale, try not to close too fast with the animal.	Collect relevant sightings information. Decide which acoustic equipment to use. Cruise leader/Senior Scientist (Cruise Leader) decide whether to use the inflatable in consultation with the Captain. The two researchers to be 'trained' move to the barrel (with the video).	(1) Sightings (p. 8) (2) Acoustics (p. 17)
2	*On closing to required distance, deploy sonobuoy. Drift. Assist with dive time experiments.*	*Record for at least 30 minutes. Carry out dive time experiment. Obtain information from crew about criteria used in any identification to sub-species*. Complete 'Additional information' form. After about 30 minutes, decide, on the basis of sounds heard, if any, and the behaviour of the animal(s), whether to begin additional work or to carry on with acoustic and dive time experiments.*	*(1) Acoustics (p. 17)* *(2) Dive times (p. 16)* *(3) Sightings (p. 8)*
3	When appropriate, launch inflatable and/or begin work from main vessel. Follow guidelines on how best to approach whales.	Tasks to be assigned by Cruise Leader. It may be possible to biopsy and obtain photo-id and videotape simultaneously. Strategy should be constantly reviewed by Cruise Leader in light of behaviour of whale(s).	(1) Biopsy (p. 18) (2) Photo-id (p. 19) (3) Videotaping (p. 20)
4	If inflatable has been launched, recover it!	Cruise Leader decides when to finish operations, either when all relevant data have been obtained or when the behaviour of the whale(s) suggests it is sensible. Decide whether to continue acoustic recording, abandon hydrophone or recover it.	(1) Biopsy (p. 18) (2) Photo-id (p. 19) (3) Videotaping (p. 20) (4) Acoustics (p. 16)
5	If necessary, steam to within 1 n.mile of hydrophone and drift until told to…..	Continue acoustic recording as long as sensible, then move to stage 6.	(1) Acoustics (p. 16)
6	… recover or abandon hydrophone, then resume searching mode by setting course directly to next way point	Ensure all data sheets are fully completed, equipment checked and ready for next use and samples stored.	(1) Biopsy (p. 18) (2) Photo-id (p. 19) (3) Videotaping (p. 20) (4) Acoustics (p. 16)
*This may not be possible until after stage 3			

2. Other priority species

Normally, acoustic work will not be undertaken and so the above protocol (without the acoustic component) applies. However, normally no more than 30 minutes (after closing) should be spent on each encounter and no more than three such encounters per day should be closed with. If a large group is encountered, the cruise leader may decide to spend up to 90 minutes with that group but only in exceptional circumstances should any more such encounters be closed with that day.

3. Priorities

Scientifically, it is more important to obtain a biopsy sample than a suite of identification photographs for blue whales, given the primary objective of the cruise. For every blue whale encountered, visual identification (forms should be independently completed by each topman and researcher in the barrel) and biopsy sampling should be undertaken as far as possible.

In addition, every attempt should be made to obtain both photographs (including video sequences from the barrel) and biopsy samples.

Common sense is a great virtue when deciding whether to biopsy or photograph a whale first. With blue whales, try to obtain a biopsy sample as soon as the opportunity arises. Depending on personnel available, it may be possible to do both biopsying and photography simultaneously. With right and humpback whales it is generally preferable to try and obtain the photographs first as some studies have suggested that some animals may be more difficult to approach after biopsying (e.g. in the North Atlantic some humpback whales have been found to fluke less frequently after biopsying). However, as for humans, individual whales can behave very differently and it is not possible to lay down hard and fast rules - decisions must be taken in light of experience whilst working with individual whales.

III. DETAILS FOR EACH OF THE RESEARCH ITEMS

A. SIGHTING PROCEDURES

1. Introduction

Activities aboard the ship are classified into two principal groups: On-effort and Off-effort. In the sightings survey portion of the research, On-effort activities are times when full search effort is being executed and conditions (such as weather and sea conditions) are within acceptable parameters to conduct research. Off-effort activities are all activities that are not On-effort. All sightings recorded while the ship is On-effort are classified as Primary sightings. All other sightings are Secondary sightings.

On-effort sightings survey research is conducted in one of the eight survey modes. The two principal modes — SS-II Mode and BT option II mode — are scheduled for this study. BT option II will alternate with SS-II mode and the target coverage by these modes should be in the ratio of 2:1. Although the other standard modes are unlikely to be used during the 2008/09 cruise, for completeness, details of their protocols are included below, as the modes may be initiated due to specific circumstances.

Sighting effort is conducted by the bosun and topmen from the barrel (crow's nest) and the upper bridge where the helmsman, captain or officer-on-watch, researchers, and the chief engineer or deputy are also present. Search effort also takes place from the independent observer platform (IOP) in some search effort modes.

Primary search effort is only conducted in acceptable weather conditions. These conditions are defined as being able to see a minke whale blow (or other sighting cue) at a distance of at least 1.5 n.miles, with wind speed less than 25 knots (in the vicinity of the ice edge) and 20 knots (remote from the ice edge) and Beaufort sea state less than 6. These conditions are used as guidelines; in some circumstances, less severe conditions may still be inappropriate for search effort.

The following sections describe each of the survey modes.

2. Closing Mode

Two topmen observe from the barrel at all times; there is no observer in the IOP. There are open communications between the barrel and the upper bridge. When a sighting is made, the topman (or upper bridge observer) gives an estimate of the distance and angle to the sighting and the ship turns immediately, regardless of the angle to the sighting. The whales are approached and the species and number of animals determined. All subsequent sightings are regarded as secondary until normal search effort is resumed. If the initial sighting distance is more than 3 n.miles (perpendicular distance) from the vessel's trackline and the sighting is thought to be of minke whales, the sighting is passed; if, however, the species is thought to be a large baleen whale, closure to the sighting is attempted. In order to save valuable research time, closure to the sighting position of whales that can be positively identified as long-diving species (such as sperm whales or beaked whales) may be abandoned if it is considered that the animals have dived.

When a sighting is made, the person who made the sighting provides the sighting. The ship then changes course to the appropriate heading to approach the whale, and vessel speed is increased to 15 knots to hasten the closure. Ship speed is decreased when the group is neared, usually at a distance of 0.2-0.4 n.miles from the initial sighting position.

After the whale group has been approached, the species, number of animals in the group, estimated lengths, number of calves present, and behaviour are determined and recorded. After as many data as possible have been collected, other activities might take place, such as natural marking or biopsy experiments. Until the ship resumes the transect with full search effort, any whale sightings made after the initial sighting are classified as secondary sightings.

2.1 Closing while returning to the trackline

This is the same as the standard Closing Mode except that the ship is not on the designed trackline due to closing with a previous sighting while on effort. Sightings that have a perpendicular distance greater than 3 n.miles from the planned trackline (not the return trackline) should not be closed with.

2.2 Closing in high density areas

This mode is initiated when the frequency of whale sightings is so high that effective survey cannot be conducted. It is the same as the standard Closing Mode except that closure is restricted to every nth primary sighting, where n is decided *in situ* by the CL (n is usually 3). The value of *n* must be determined before starting the mode. If the survey still cannot be accomplished, *n* can be increased. If *n* becomes so great that closures do not occur, then the mode should be changed to passing in high density areas.

2.3 Closing with ice navigation

This is the same as the standard Closing Mode except that some search effort might be compromised by the topmen or other observers assisting in the navigation of the ship through areas of sea ice or icebergs. Procedures remain the same as those in Closing Mode but the type of search effort is recorded differently on the effort record. If search effort appears to be

seriously compromised, then the sightings survey should be suspended.

3. Normal Passing Mode (NSP)
This mode is identical to the IO mode except that there is no Independent Observer in place.

3.1Passing in high density area
When the high density of whales in the area causes problems for the observers in discriminating between the same and different schools while conducting IO mode survey, searching mode will be changed to NSP. A special effort code is used to record that the search effort mode was changed due to the high whale densities.

3.2 Passing with ice navigation
If the ship is navigating through ice fields while in IO mode and the topmen are assisting in navigation to the extent that their search effort might be slightly reduced, the search effort mode is changed to NSP. If search effort appears to be seriously compromised, then the sightings survey should be suspended.

4. Independent Observer Mode (IO)
This is in effect Passing Mode Two topmen are observing from the barrel at all times and a third topman is stationed in the independent observer platform (IOP). Communications are essentially one-directional, with the topmen reporting information to the upper bridge observers, but no information being exchanged between the barrel and IOP. The observers on the upper bridge should communicate with the topmen only to clarify information and should not direct the topmen to disrupt their normal search procedure unless directed to do so by the Senior Scientist.

Immediately after a sighting is made from the barrel or IOP, the topman informs the bridge of his estimate of the distance and angle to the sighting (and also, if possible, the species and number of animals present), but does not change his normal searching pattern in order to keep contact with the sighting. The observers on the upper bridge must attempt to locate the sighting made by the topman and decide whether it is possible for them to confirm the species and number before the sighting passes abeam of the vessel. The topman gives no further information to the upper bridge unless the whale group happens to surface again within the normal searching pattern of the topman. A designated researcher on the upper bridge determines which of the sightings made from the barrel, IOP, and upper bridge are duplicates, in consultation with other researchers.

4.1 Resighting
The resighting record is to be used to record resighting data during NSP and SS-II modes. The resighting data are to provide an additional source of information for the estimation of g(0) and for the assessment of duplicate status.

Angles, distances, cue type and times (etc) to successive cues for a sighting which the personnel on the upper bridge are tracking should be either recorded directly on the resighting form or on cassette tape. If information is recorded on cassette tape it should later be transcribed onto the resighting record.

It is not intended that the upper bridge observers do any tracking over and above that normally done for the purposes of identification of duplicate sightings status. Similarly, recording of the resighting data does not involve additional tracking of the sightings by either the IOP or the topmen in the standard barrel. (The topmen relay resighting information to the upper bridge only when the group happens to surface again within their normal searching pattern.).

The resighting times, angles, distances and cue types of all resightings should be recorded only up to and including the time at which the cetacean(s) are judged to have been seen by both the topmen in the standard barrel and the IO or until the cetacean(s) pass abeam of the vessel if the topmen in the standard barrel or the IO do not sight them.

Recording of data should be abandoned if the sighting rate is so high that collection of these data is compromising normal data recording and search effort.

5 SS-II Mode
5.1 Introduction
One of the main complications in analysing existing SOWER minke whale data is that school size estimates in IO mode are likely to underestimate true school size. Experimental trials of abeam closing procedures; SS-II and SS-III modes, were conducted during the 2006/07 cruise and SS-II during the 2007/08 cruise to study the difference between IO-mode and closing-mode estimates of school size. Based on the encouraging results of those trials it was **agreed** to substitute NSC mode with SS-II on this year's cruise. As for last year, SS-II was selected rather than SS-III since, given the current logistics of SOWER, it is not feasible to survey in alternating BT option II mode and SS-III mode. (In SS-III 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)). SS-II is no more difficult than NSC in terms of crew schedules.

SS-II follows normal passing 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 the actual school size. As for the 2007/08 cruise, closing is only to be undertaken for sightings believed to be minke whales.

5.2 Protocol
During SS-II survey, the vessel proceeds in normal Passing mode; for each sighting known or thought to be a minke whale, closing when abeam will be attempted, with the proviso that normally only sightings for which the initial estimates of

perpendicular distance from the trackline is less than or equal to 1.5 n.miles will be considered for closure.

The Top barrel observer making the sighting, and the other Top observer, must maintain their normal searching pattern without directly attempting to keep the sighting in view until it comes abeam - this is the responsibility of the Upper Bridge (i.e. normal NSP mode procedure). An observer may give the Upper Bridge updated opinions of the species and number present in the school sighted if it happens to surface again in their normal searching pattern before being passed abeam by the vessel. Should no one on the Upper Bridge prove able to locate the sighting, the school must nevertheless be closed upon under the best direction of the topman. The SS-II form must be completed for all sightings selected for closure; it augments the normal sighting record which must continue to be completed for each sighting in the normal manner.

After completion of the closure, search effort resumes in NSP mode. However, if there are other minke whale sightings (or sightings thought to be minke whales), the vessel returns to the 'trackline' off effort to join the 'trackline' at a position perpendicular to the sighting furthest along the trackline.

If more than one sighting is judged to be abeam concurrently, during one closing manoeuvre, it may be possible to attempt confirmation of school size for more than one of the sightings. Should any (secondary) sightings be made during closure, sighting records must be completed for each such sighting. However if successful closure is in any way compromised by taking and recording such additional information, such recording may be minimised. If a school so recorded as a secondary sighting is resighted after the resumption of NSP mode, that sighting is to be ignored.

5.3 Data forms

Information on the data format can be found in Section IV.9.

6. BT Mode

Analyses of IO mode data on ICDR/SOWER cruises suggest that estimates of g(0) are positively biased due to unmodelled heterogeneity, and thus yield negatively biased abundance estimates. It has been suggested that a reason for this is that observers on the two platforms used for these analyses (the barrel and the IOP) essentially search in the same area of the sea. BT mode (Buckland and Turnock, 1992) is a possible alternative method of searching that, because it intends to separate the areas searched by the two platforms (‘Tracker’ and ‘Primary’), should reduce the bias due to unmodelled heterogeneity, and thus may yield estimates of abundance with smaller bias.

BT mode clearly has two different possible uses

(1) The potential to affect our interpretation of Antarctic minke whale abundance estimates (by providing independent evidence on g(0) robust to data and awkward things such as responsive movement)

(2) In designing future survey methods

For the former to work, it is crucial not to change the way that the Primary platform operates.

6.1 BT mode – Big Eye

BT mode – Big Eye was tested on the 2005-06 and 2006-07 cruises and until a full analysis of results and an evaluation of the success of the trials has been undertaken, no further trials were planned.

6.2 BT ‘Option 2’

This mode was tested on the 2006/07 and 2007/08 cruises to evaluate issues surrounding potentially lower encounter rates due to primary observers searching with naked eye versus the potential gain in estimating g(0) by achieving a good separation of search areas. Practical issues were also tested, to evaluate potential problems with the protocols (such as data recording difficulties). Based on the encouraging results obtained during 2006-07 and 2007/08, it was decided to implement BT option IIas a survey procol for the 2008-09 cruise. Thus, potentially a more comprehensive data set would be available for evaluation prior to potential implementation of this mode on future abundance estimation surveys.

Protocol

TOP

The barrel (TOP) is the Tracking Platform. Two observers search an area as far ahead of the vessel as it is possible to see whales, both using 7×50 binoculars. They should focus searching far ahead of the vessel, up to 60° either side of the trackline. When a sighting (by either observer) is detected and the sighting is known or thought to be a minke whale, the topman who made the detection commences to track the sighting and the voice recording system should be used to record sightings and re-sightings data; the Upper Bridge observers should attempt to assist to track it. As noted above, tracking should continue until the sighting is adjudged to have passed abeam. The Upper Bridge will determine possible duplicate status as in previous years. The other topman may continue to search for new sightings to track and may adjust his search area accordingly (to attempt to cover the sector that was being searched by the topman who has made a sighting).

If further new sightings are made during the course of tracking, then these sightings should be recorded on the voice recording system and the Upper Bridge should be informed, but the Trackers should not switch attention to the new sighting – they should continue to attempt to track the original sighting(s).

Note that the TOP observers’ main responsibility is to obtain successful tracks of minke whales from as far ahead of the vessel as possible *not* to make as many sightings as possible.

IOP

The IOP is the ‘Primary Platform’. Observers should search the area from -90° to +90° either side of the

trackline with naked eye (each observer covering the area from just the other side of the trackline to the abeam line). Data should be recorded using the voice recording system. The observers should attempt to make as many sightings as possible but individual observers should 'track' sightings if known or thought to be minke whales and record resightings on the voice recording system, with assistance from the Upper Bridge.

UPPER BRIDGE

Upper Bridge observers should behave in a similar way to IO mode, except that sightings should be tracked until they have passed abeam *even if they have been classified as duplicates.* The Upper Bridge is responsible for duplicate identification and for assigning sighting numbers (which should be relayed back to the IOP and barrel observers, for recording by the voice recording system).

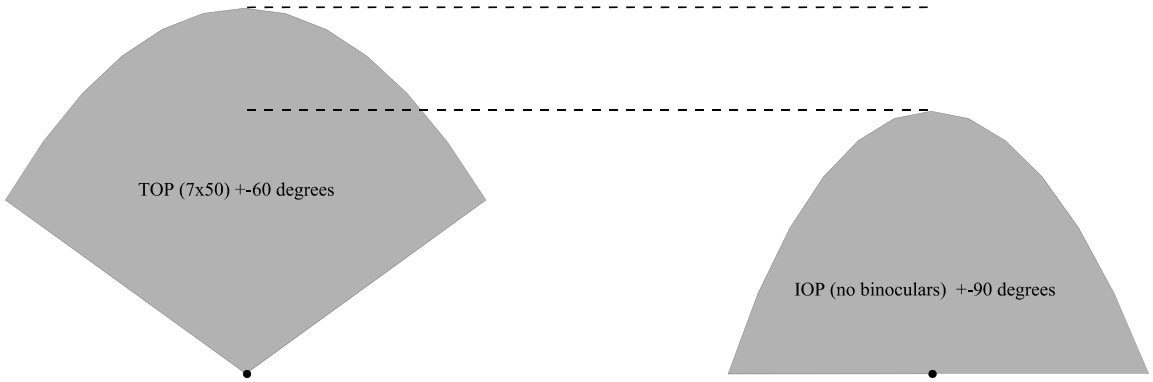


Fig. 3 (option 2)	Platform	Observer	Search area	Observer	Search area
Top	Tracking (Top)	7×50	±60°	7×50	±60°
IOP	Primary (IOP)	Naked eye	±90°	Naked eye	±90°

Fig 3. Schematic representation of the likely separation of searching areas for Option 2 proposed for BT mode trials (separation of forward distance indicated as the distance between the dashed lines).

7. Other general considerations

7.1 Determination of group size

School size determination is critical to make the data useful in population estimation. However, accurate determination of the school size of all sightings is not possible. It is the responsibility of the researchers to evaluate if the school size has been accurately determined. Schools where the number of animals, or an accurate estimated range of the number of animals, is determined are classified as *confirmed* schools. The data from the confirmed schools are used in the analysis to determine a mean school size. Therefore it is critical that the schools that are confirmed are representative in size of the schools that are in the survey area. Normally, schools believed to be confirmed for school size are approached to within 1n.mile for large whales and to within 0.3 n.miles for minke whales. Obviously, there are differences in the environmental conditions and behaviour of the animals for every sighting, however, (with particular reference to minke whale sightings) every effort should be made to be as consistent as possible in regard to the maximum time spent on identification of species and confirmation of numbers. Normally, if the sighting is thought to be minke whales, no more than 20 minutes (after closure has been completed) should be spent trying to complete these tasks. (Otherwise there is the potential for confusion with other sightings in the vicinity).

7.2 Identification of species

Use the following guidelines for classification of identification:

Positive identification of species is based on multiple clues and usually requires the clear observation of the whale's body. Occasionally, repeated observations of the shape of the blow, surfacing and other behavioural patterns may also be sufficient; this judgement should be made only by the Senior Scientist or other designated researcher. Normally, sightings believed to be minke whales should not be identified as positive identification of species unless the sighting has been approached to within 1.5 n.miles.

Probable identification of species is based on multiple clues, which are nevertheless insufficient to be absolutely confident in identification. This usually occurs when blows are seen, the surfacing pattern is correct, but the whale's body cannot be seen or clearly seen.

7.3. Protocol if glare encountered on the trackline

This protocol should be effected when, in the opinion of the Senior Scientist, glare directly ahead of the vessel is sufficiently severe as to compromise the assumption

that all groups on the trackline are detected with certainty.

The vessel should divert from its course by an angle of 20 degrees, in the opposite direction to which the sun is heading. The revised course forms the new trackline and all other protocols (such as returning to the trackline after closing) should be conducted as if the zig-zag trackline is the planned trackline. The vessel should continue on this course for a distance of 6 miles, and should then return to the trackline so as to meet the trackline at an angle of 20 degrees. If, on returning to the trackline, glare ahead of the vessel is still severely compromising detectability on the trackline, the vessel should continue on its zig-zag course for a further six miles (on the opposite side of the trackline), before returning to the trackline as before. This procedure should be continued as long as glare on the original planned trackline is deemed to be significantly reducing the detectability of groups directly ahead of the vessel. At the discretion of the Senior Scientist, the diversion angle may be increased or decreased. It is thought that in most cases, 20 degrees should be sufficient but this would depend on the width of the glare. Similarly the length of each zig-zag may be changed from the standard 6 n.miles (particularly in IO mode in order to minimise problems associated with tracking sightings).

Standardised modifications

There are occasions when conditions require that standardised modifications to the cruise track must be made. Examples of these are illustrated in Figs 2A-C on the following pages. Fig 2A refers to encounters with the ice edge, Fig 2B with peninsulas of ice intersecting the trackline and Fig. 2C with returning to the trackline after confirming sightings (or undertaking experimental procedures).

8. Data forms

More information on data forms is given in Section IV.1A and B, and IV.2A and B (Resightings).

Sighting data are recorded on the Sightings record. The sightings record is designed to contain all the observed information relevant to any cetacean sighting during a cruise - it can also be used for recording off-effort sightings although much of the data may not be obtainable. The record is completed by the researchers.

A single Sightings record is used for each cetacean sighting, regardless of search effort mode or composition of the sighting. A form should be completed for each distinct aggregation of cetaceans seen, eg. a pod of whales with dolphins around them is a single sighting. If a group of animals separates when approached, all subgroups are to be considered part of the original sighting.

In IO, NSP, or any other Passing Mode survey, there is one-way communication concerning observations: the topmen in both the barrel and IOP are **not** informed of sightings made from other platforms but the researchers on the upper bridge are informed of all sightings. Separate records are completed for all standard barrel and IOP sightings whether or not they are duplicates. If the upper bridge makes a sighting prior to the same whale group being observed by the topmen in either the barrel or IOP, then a separate record is completed; otherwise the upper bridge information is added to the sighting record(s) completed for the barrel and/or IOP.

For example, if the observers on the upper bridge are the first to sight a whale group, and subsequently the topmen from both the standard barrel and IOP sight the group, three sighting records will be completed for the same school, with independent estimates of angle and distance for initial sightings from each of the platforms. This is termed a 'triplicate' sighting.

In all Closing Modes there is open communication between the upper bridge and the barrel, so only one sighting form is completed for a single sighting, regardless of which platform makes the initial sighting.

The objective in completing the Sighting record is to record the best information possible. If there is conflicting information from two or more platforms about one school, evaluate what is the most reliable and detailed information and use that to complete the form. It is solely the researchers' responsibility to determine what data are recorded on the sighting record. Whenever a problem is encountered in completing the information, the form should be annotated in sufficient detail that others reading the annotation will understand the circumstances and difficulties involved. If possible, the annotation should include suggestions on how to interpret the information.

NB ANGLE BOARDS WITH POINTERS MUST BE USED FOR ANY ANGLE MEASUREMENTS AND RETICLE BINOCULARS MUST BE USED FOR ANY DISTANCE MEASUREMENTS.

B. GUIDELINES FOR CONSTRUCTION OF CRUISE TRACKS AND STANDARDISED MODIFICATIONS.

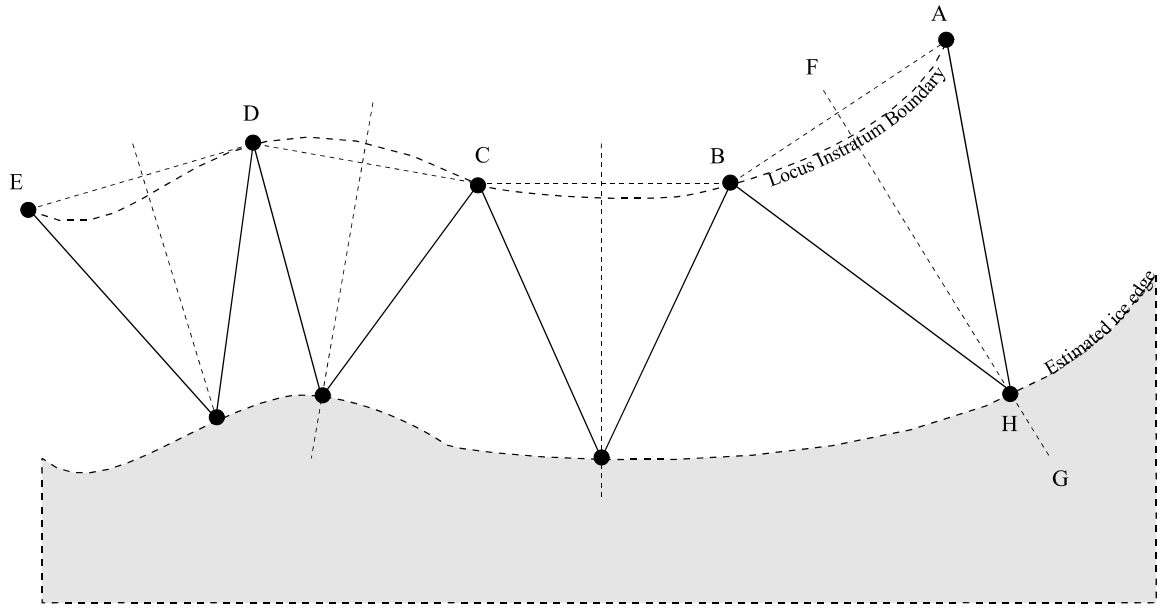


Fig. 1. Cruisetrack constructed in relation to an Interstratum Boundary established as a locus of points equidistant from an estimated ice edge. (Cruisetracks are indicated for the Southern Stratum only).

The research area is normally divided into two strata, a Northern and a Southern stratum. The Southern stratum is usually 60-90 n.miles in width (approximately) and its southern boundary is the ice edge, land, or the 100 fathom isobath (if this extends north of the ice edge). The boundary between the strata is constructed either on a line of latitude or as a locus of positions equidistant from the southern boundary.

The following summary of cruisetrack construction relates to a 'standard' cruise aimed at obtaining an abundance estimate for minke whales. Thus, some aspects may be irrelevant to the research scheduled for the 2008/09 cruise.

1. Cruisetrack based on Locus Interstratum Boundary

1.1 Cruisetrack construction procedure:

(1) Estimate position of the ice edge.
(2) Decide the width of the Southern Stratum and construct the Interstratum Boundary as the locus of points equi-distant from the estimated ice edge. Note this is shown as curve AE in Fig. 1. For simplicity, however it is usually constructed as a series of straight lines.
(3) Decide the number of transects in the Southern Stratum (taking account of the intended coverage intensity and the number of days available for survey). Establish the waypoints on the Interstratum Boundary by dividing the Interstratum Boundary into equal-length segments corresponding to the number of transects desired (waypoints A, - E in Fig. 1).
(4) Construct the perpendicular bisectors of the straight lines joining the waypoints on the Interstratum Boundary and construct ice edge waypoints at the intercepts of the perpendicular bisectors with the estimated ice edge (e.g. in Fig. 1, line FG is the perpendicular bisector of line AB and waypoint H is at its intercept with the estimated ice edge).
(5) Decide the number of transects in the Northern Stratum and establish the southern boundary waypoints of the Northern Stratum on the Interstratum Boundary.

1.2 Modifications to the locus Interstratum Boundary.

Modifications to the locus Interstratum Boundary may be necessary when the position of the true ice edge is substantially different from that of the estimated ice edge.

Examples of modifications to the locus (as well as standard modifications to the cruisetrack) when the true ice edge is substantially farther south of the estimated ice edge are shown in Fig. 2. Fig. 3 shows further examples of modifications to the locus and cruisetrack when the true ice edge is substantially north of the estimated ice edge.

Southern waypoints for the Northern Stratum cruisetracks (not shown) are constructed on the locus. If a Northern Stratum waypoint has already been constructed on the locus, then the locus is fixed and cannot be adjusted.

As for Fig. 2, southern waypoints for the Northern Stratum cruisetracks are constructed on the locus.

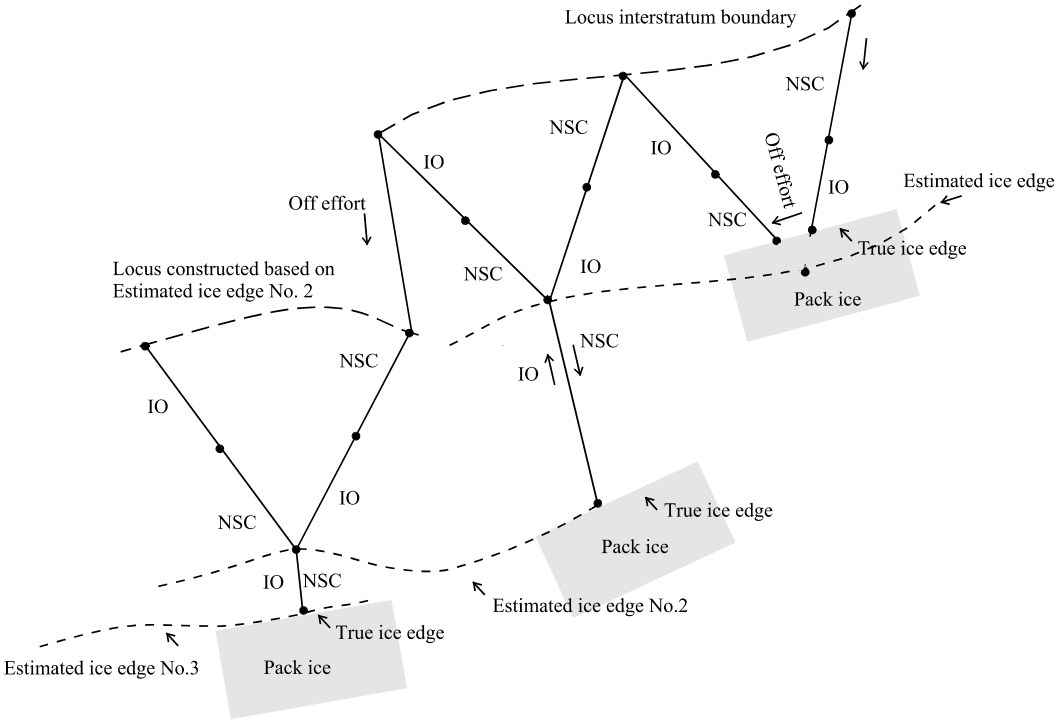


Fig. 2. Examples of standard modifications used with the locus cruisetrack design, in particular, showing modifications to the locus when the true ice edge is located much farther south than the estimated ice edge.

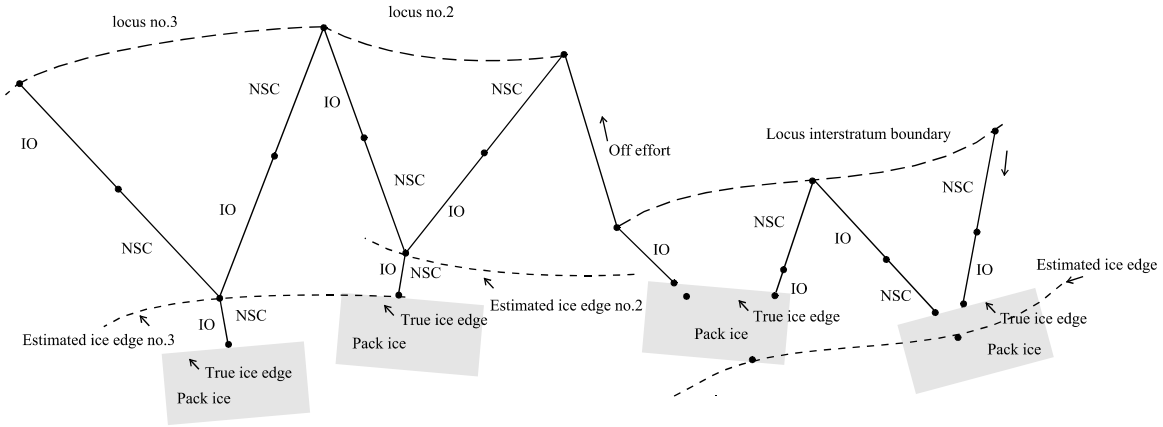


Fig. 3. Examples of standard modifications used with the locus cruisetrack design, in particular, showing modifications to the locus when the true ice edge is located much farther north than the estimated ice edge.

2. Modifications to the cruisetrack

Examples of standard procedures for cruisetrack modifications are shown in Figs 4-8.

Ice edge waypoints are established 2.5 n.miles from the ice edge. If the ice edge is encountered prior to reaching a planned waypoint, 2.5 n.miles from the estimated ice edge, the vessel shall follow the ice edge, off-effort, until survey can be resumed on the planned trackline (as shown in Fig. 4).

If the ice edge is not encountered on reaching a planned ice edge waypoint, research shall be conducted on a bisector. Survey mode is to be changed at the planned waypoint (unless the ice edge is within 5 n.miles of the waypoint), and again on reversing direction when the true ice edge is encountered (Fig. 4). If the constructed cruisetrack intersects a peninsula of pack ice, the vessel will steam around the peninsula until effort can be resumed on the constructed trackline (according to either Fig. 5A or B below). Waypoints are to be established at the positions where the vessel deviates from and rejoins the constructed cruisetrack.

If the constructed cruisetrack intersects pack ice requiring the Topmen to assist with ice navigation, a waypoint is established and the research mode changed to the appropriate ice navigation mode (BA or BI).

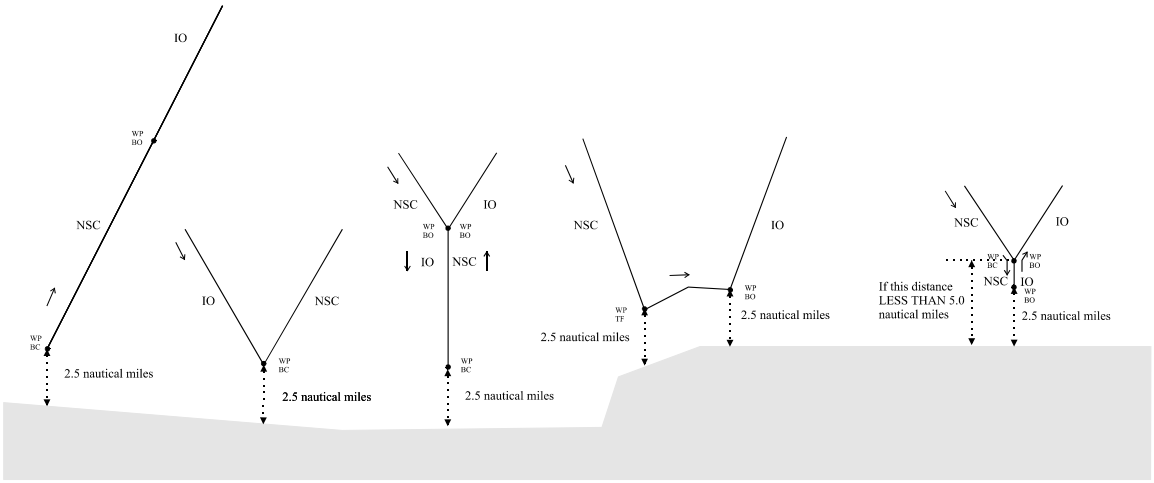


Fig. 4. Standardised cruisetrack modifications in relation to differences between the estimated ice edge and the true ice edge.

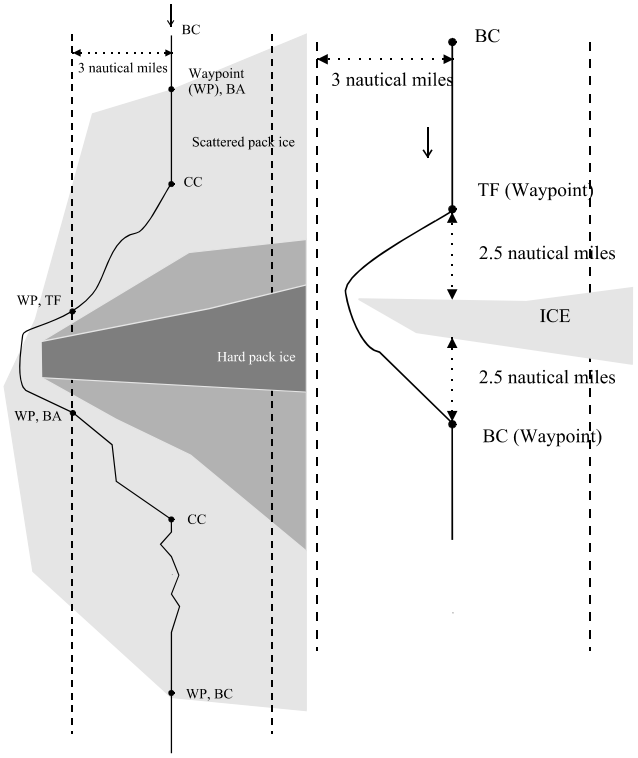


Fig. 5A (Left) and Fig 5B (Right). See text.

During ice navigation, if the vessel moves outside the 3 n.mile bound, the vessel will steam off-effort around the ice to investigate if effort can be resumed on the trackline (either at the 3 n.mile bound, in ice navigation mode, as shown in Fig. 5A or on the constructed trackline as shown in Fig. 5B, if the trackline is ice free).

If the constructed cruisetrack intersects pack ice requiring the Topmen to assist with ice navigation, a waypoint should be established and the research mode changed to the appropriate ice navigation mode (BA or BI). During ice navigation, if the vessel moves outside the 3 n.mile bound, the vessel will steam off-effort around the ice to investigate if effort can be resumed on the trackline (either at the 3 n.mile bound, in ice navigation mode, as shown in Fig. 5A or on the constructed trackline as shown in Fig. 5B, if the trackline is ice free).

Waypoints are to be established at the positions where the vessel deviates from and rejoins the constructed cruisetrack (as well as for major course alterations).

(Note: During research in ice navigation modes, standard return to trackline procedures, as shown in Fig. 6, do not apply).

If the constructed cruisetrack intersects a peninsula of pack ice, the vessel will steam off-effort around the peninsula until effort can be resumed on the constructed trackline. Waypoints are to be established at the positions where the vessel deviates from and rejoins the constructed cruisetrack.

Fig. 6. (next page) shows examples corresponding to the following situations:

• In Closing Mode, after confirming a sighting, the vessel returns on-effort to the planned trackline (BR activity code) on a convergent course making a 45° angle to the trackline. However, if confirming or subsequent experimental activities take the vessel outside a 3 n.miles bound either side of the constructed cruisetrack, it returns off-effort (TF activity code) to a point on the trackline corresponding to the furthermost location in the direction of the trackline reached during these activities.

• The vessel will also return off-effort to this position on the trackline, if after confirming a sighting or subsequent experimental activities, the vessel is still within the 3 n.miles bound but has regressed more than 0.5 n.miles in relation to a point on the trackline corresponding to the initial sighting position.

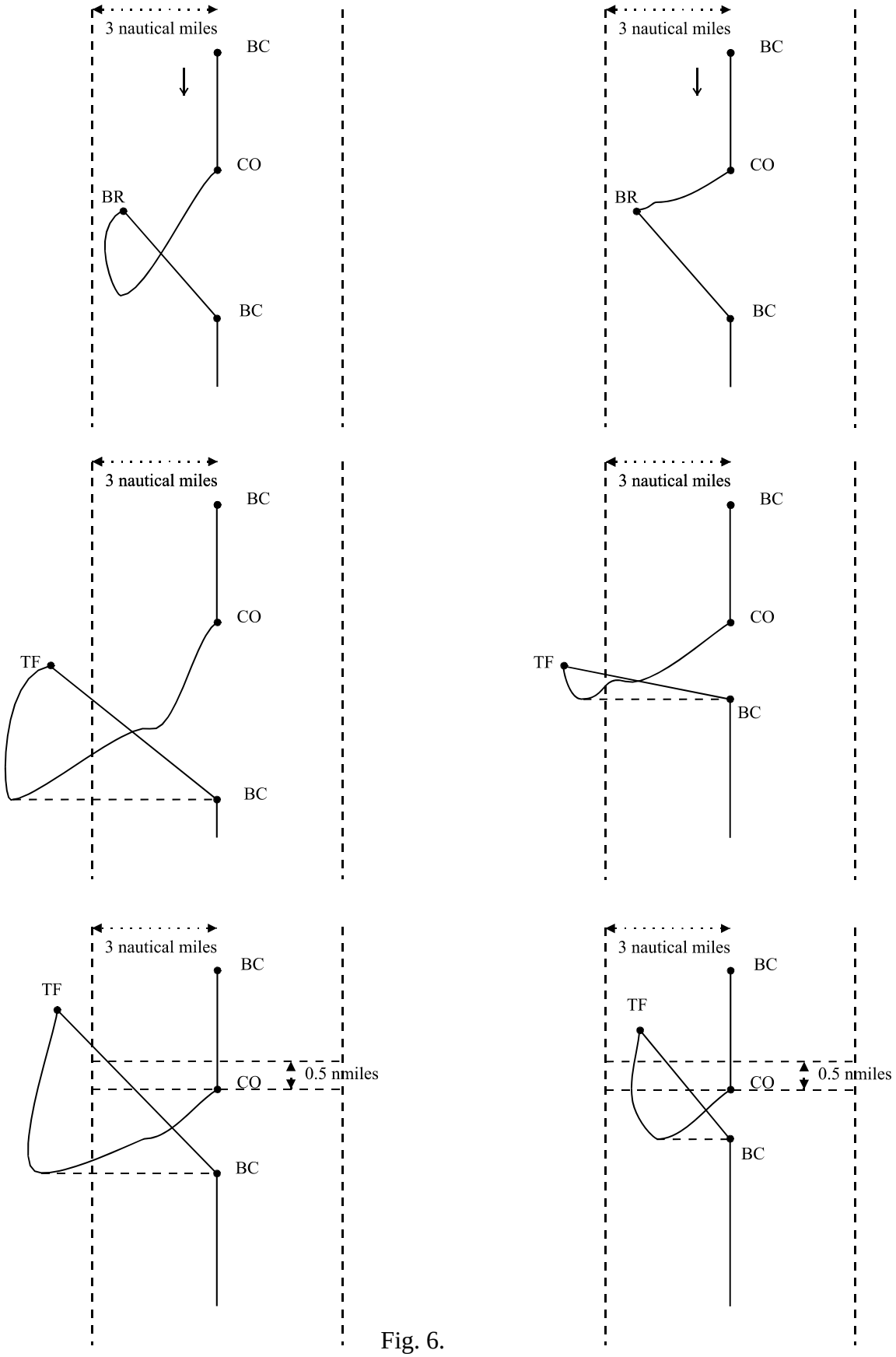


Fig. 6.

Figs 7A and B show examples of the procedure for returning to the constructed trackline if the vessel has

progressed past a mode-change waypoint (NSC to IO mode) during confirming activities in Closing Mode. The vessel returns off-effort (TF activity code) to the constructed trackline as shown in the examples in Figs 7A and B.

When closure to a sighting (for example, a group of blue whales) is conducted from abeam during IO mode, the ship will return (off effort) to the trackline, *normally* to join the trackline at a point corresponding to the furthest along the trackline reached during the confirming/experimental activities (as shown in Fig. 8). However, as each case will different, generalisation is not altogether possible. (For example, if the confirming activities are conducted at considerable distance from the trackline and last for a considerable duration, it may be most appropriate that the vessel returns to the position on the trackline from where primary effort in IO mode was interrupted to commence the abeam closure).

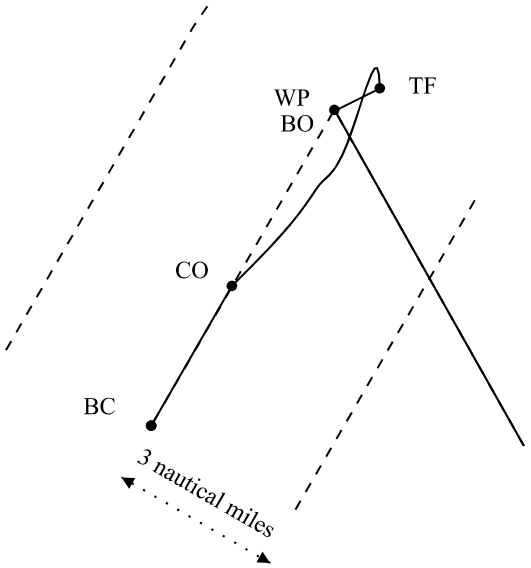


Fig. 7A. If at the completion of confirming a sighting, the ship has passed a mode-change waypoint, but the point corresponding to the furtherest along the trackline reached during the confirming activities is no more than 0.5 n.miles ahead of the waypoint, the ship will return (off-effort) to the waypoint to commence searching in IO mode.

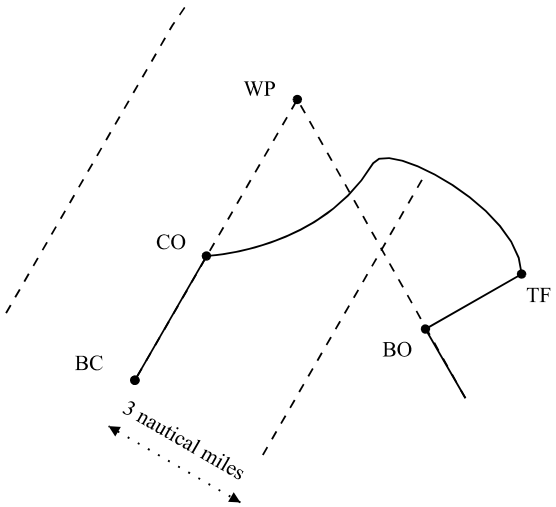
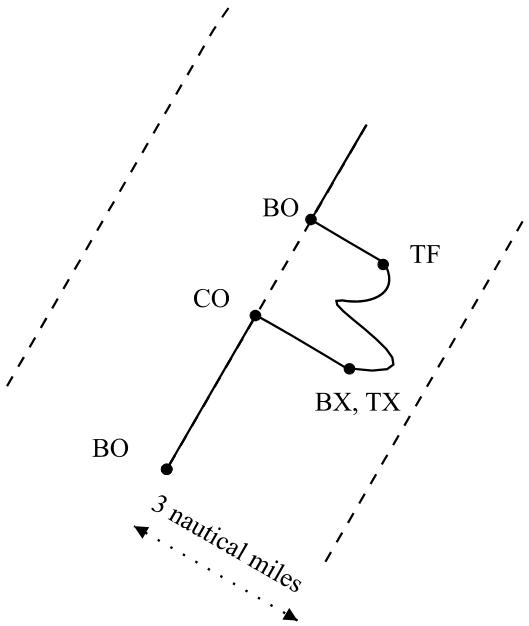


Fig. 7B. When confirming a sighting is completed and the ship has passed a mode-change waypoint and has proceeded more than 0.5 n.miles ahead of the waypoint during these activities, the ship will return (off effort) to the constructed trackline to commence research in IO mode at a point corresponding to the furthest along the trackline reached during the confirming activities.



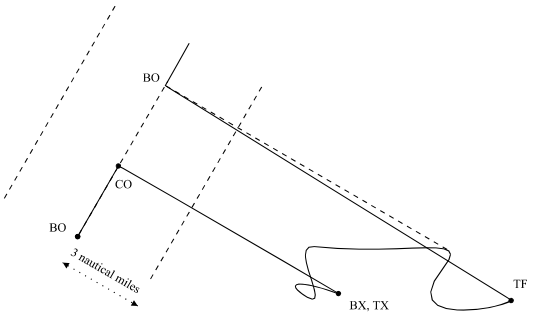


Fig. 8. (lower two figures on right). Examples of return to trackline procedures after abeam closure to sightings from IO mode. Both examples shown return (off effort) to the constructed trackline to commence research in IO mode at a point corresponding to the furtherest along the trackline reached during the confirming activities.

C. VISUAL DIVE TIME EXPERIMENT

1. Minke whales

1.1 Introduction

The purpose of the visual dive time study is to collect data on the surfacing rate of minke whales for use in estimation of $g(0)$. 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 and on school synchrony and dive behaviour. Dive time data collected on the 1980-81 IWC/IDCR cruise (Joyce, 1982) and during the 2004/05 SOWER cruise were restricted to observations in good conditions only. *Priority for this cruise is therefore for experiments in less than ideal conditions - however for solitary animals, for which few trials have been completed, trials are also required in good conditions.*

As with the 2004/05 trials, the visual dive time experiment will be conducted following the protocol developed for the 2003/4 cruise and taking account of the suggested sample sizes.

1.2 Protocol

Equipment required is as follows: Voice recording system; angle boards; reticle binoculars; video camera.

Ideally this experiment should be conducted on undisturbed animals over a relatively long time period for groups of various sizes. The suggested protocols are similar to the dive time experiments for blue whales (IWC SOWER Circumpolar Cruise 2004/2005 Information for Researchers), but unlike the blue whale dive experiment, do not restrict observing to only small groups; observe groups that range from one to many. It might be easier to start observing small groups (1-3 animals), then when comfortable with the data collection process observe larger groups. If available, one observer should use a video camera to provide a continuous recording of all schools observed in the dive time experiment. Although minke whale movement can be rather unpredictable, having a continuous track for each surfacing allows for objective criteria for deciding whether a surfacing is from the same whale. For dive time experiments, be sure to keep the video tape running for the recording duration, and provide voice commentary for the tape. (The tapes provided last for 1 hour).

Try to minimise disturbance to the animals while maintaining contact with them by avoiding rapid engine/course changes. Approach a group to approximately 0.5 n.mile and generally not closer than 0.25 n.miles. The start and end of recording should, where possible, not be determined by the behaviour of the whale, i.e., decide on a predetermined time to start recording, irrespective of the whale's behaviour at the time. The record should be for as long as possible, so that longer dive times are not excluded. As a guideline, the maximum duration of data collection for any group should be 2hrs for good quality data, but taking into account the schedule of the cruise. If the animals appear to be reacting to the vessel, then move farther away from the group, yet not so far that surfacings are missed. If there is frequent ship reaction, then try higher powered binoculars, if available. Describe any reaction to the vessel in the comments field.

Involve as many researchers and crewmen (**especially** topmen) as possible in the experiment to avoid missing surfacings. Remember that whales can surface behind the ship!

Record all data into the voice recording system. It is necessary to have accurate times associated with each recorded event. This may involve holding the microphone button down for the entire duration of the experiment to avoid a small time lag before recording starts for each session. Avoid standing in the wind (to reduce noise). It would also be useful to record periodically the time along with the whale behaviour.

The primary record should contain the number of animals at the surface, the (type and) duration of cues, behaviour, and dive times. When any animal dives or another animal appears, record the new number of animals at the surface and the associated data. Auxiliary data which should also be recorded when appropriate are swim direction, ship reaction, school compactness, school dynamics and general behaviour. The bearing and distance of the animal should be recorded periodically (at least every few minutes) or more frequently. Though it is not necessary to record the location for each event, if there is a change, say in the swim direction, then record the bearing and distance at the time of that change. Note that the sighting conditions (sea state, visibility, etc.) and atmospheric conditions (such as sea and air temperature) should also be recorded during the experiment, as on the weather record.

Record all relevant whale behaviour, especially apparent reactions to the ship. When recording blow duration wear Polaroid glasses. Record "*end of blow*" when the blow becomes indistinguishable from the background.

The researchers should transcribe all dive time data from the voice recording system on to paper forms at the earliest opportunity, preferably on the same day as the data were collected.

Suggested minimum sample sizes are as follows:

Group size 1; 8-10 trials
Group size 2-5; 15-20 trials
Group size6+; 5 trials

2. Blue whales

2.1 Introduction

It has been suggested that the surfacing patterns might be diagnostic of either subspecies and thus dive time/swimming speed experiments may provide useful information. In addition, they can provide useful input for certain population estimation techniques. Ideally such experiments should be conducted on undisturbed animals over a relatively long period (see discussion of such experiments in Donovan, 1984, *Rep. Int. Whal. Commn* 34:473-6). However, this carries an associated risking of losing contact with an animal before the remainder of the experimental programme could be carried out.

In practice therefore, such experiments can best be carried out after the sonobuoy has been dropped.

2.2 Equipment

Tape recorders; angle boards; reticule binoculars

2.3 Research protocol

If the school size is greater than one, try to distinguish between animals. It is not advisable to use schools of greater than three animals as the danger of missing blows increases unless they are behaving synchronously and close together.

Try to minimise disturbance to the animals while maintaining contact with them by avoiding rapid engine/course changes and closing to within 0.25 n.miles.

The start and end of recording should, where possible, not be determined by the behaviour of the whale, i.e. decide on a predetermined time to start recording, irrespective of the whale's behaviour at the time. It is important to record for as long as possible, so that longer dive times are not excluded.

Involve as many researchers and crewmen (**especially** topmen) as possible in the experiment to avoid missing blows. Remember that whales can surface behind the boat!

Record all data into a hand-held tape recorder. Avoid standing in the wind (to reduce noise) and beware the voice-activated button! It is useful to give time checks periodically so that the speed of the tape can be checked on playback.

Record all relevant whale behaviour, especially apparent reactions to the ship. When recording blow duration wear Polaroid glasses. Record end of blow when it no longer becomes distinguishable from the background.

If group size changes during recording, make notes of when and where this happened.

2.4 Data forms

See Section IV. 3.

D. BIOPSY SAMPLING

1. Equipment

The following equipment will be available: the Larsen gun, Paxarms gun and compound crossbow. Also, a Paxarms tethered system and hand-held pole system will be available for ship-attracted individuals when the ship is drifting. Please ensure that all equipment is well maintained.

2.Techniques

When approaching the whales, follow the same procedure as for photo-identification (Section III.5) i.e. avoid rapid engine and direction changes and follow a path convergent with the direction of travel of the whale. While it is possible to collect samples at ranges of up to 50m - normally do not shoot at distances less than 10m. Care should be taken to avoid the head region. Experience on the previous two cruises has shown that it can be difficult to obtain blue whale biopsies, so if a chance arises - take it - even if photo-id shots have not been taken (see 'Priorities' under Section II).

Samples for molecular genetic analyses are to be divided in half, with one half of the sample for Japan and the other half for the IWC. Prior to 2006-07 samples for Japan have been frozen and samples for the IWC have been preserved in DMSO/salt solution, on this cruise all samples will be frozen. In addition, when biopsy samples have a significant amount of blubber attached, the blubber is to be separated from the skin, wrapped in aluminium foil, and frozen.

3. Data forms

See Section IV.5.

E. PHOTO-IDENTIFICATION

1. Blue whales

This section is based on Sears (1990). A copy of *Rep. int. Whal. Commn* (special issue 12) which contains this paper and a number of other relevant papers is part of the reference documentation. The guide by Calambokidis is also very useful and a copy will be available.

1.1 Equipment

Digital SLR cameras equipped with 100-400mm zoom lenses will be the primary equipment for this study.

1.2 Techniques

It is preferable to take photographs perpendicular to the whale. As the identification pattern can be different on both sides of the animal, it is important to try and photograph both sides, but priority should be given to the left hand side, i.e. that side should be attempted first whenever possible. If working a group, try to concentrate on one whale before starting on another and use "marker frames" between animals in order to avoid ambiguities in analysing photographs. It is important to keep detailed notes. The aim is to photograph as much of the flanks as possible. Try to avoid both glare reflecting off the body and backlighting, both of which can result in useless (if artistic) pictures. If the animal is one that shows its flukes on diving then try to photograph this, but only after you are satisfied that the flanks have been adequately photographed.

Note: From the viewpoint of the development of a visual key, *it is particularly important* to try to also obtain photographs from *behind* the animal.

In closing with the animals, it is important not to approach too fast nor change direction or speed frequently. It has been most productive to follow a course almost parallel to the whale but converging slowly with it.

2 Right whales

2.1 Equipment

As above for blue whales.

2.2 Techniques

The key area for identification is the head (callosities and lip patches) and where possible from the top - failing that both sides of the head should be photographed. If only one side is possible, it should be the left hand side. Head photographs should be taken as vertically as possible, i.e. from the barrel (although this is of course not possible from the Zodiac). Other distinguishing or unusual marks or scars should also be photographed, including the flukes of fluking animals. If working a group, try to concentrate on one whale before starting on another and use "marker frames" between animals in order to avoid ambiguities in analysing photographs. It is important to keep detailed notes, especially when working with groups.

A similar approach method to that described for blue whales is recommended.

3 Humpback whales

3.1 Equipment

As above for blue whales.

3.2 Techniques

The key area for identification is the ventral side of the flukes: coloration, scars and the trailing edge outline are all important. Try to obtain a good fluke photograph as highest priority. A good photograph should almost fill the frame. Dorsal fins and lateral colour patterns have also been used in identification, particularly for "non-flukers". Although if possible it is good to photograph dorsal fins/lateral patterns from both sides of the animal, as a rule try to get the left side as a minimum. Remember to photograph the peduncle of the animal (i.e. the ridge behind the dorsal fin) as extensively as possible - 'knuckles' can be very useful. As always, take detailed notes, particularly when relating dorsal fin/lateral patterns to fluke photographs. Obviously, fluke photos are taken from behind the animal. Avoid rapid changes of speed and direction on approaching the animal.

9.4 Data forms

See Section IV.6.

F. VIDEOTAPING AND PHOTOGRAPHY OF BLUE WHALES

1. Equipment
Suitable video and SLR cameras will be available.

2. Videotaping
Videotaping can start either on the initial hydrophone deployment (if the whale is close enough) or after closure for biopsy/photo-identification. It can continue during the subsequent pursuit of the animal, to record a whole suite of behaviour, from undisturbed to full flight. Blowhole views can be obtained at that time, as well as views for individual identification.

Filming should take place from the barrel and be carried out by those researchers undergoing 'training' - see Section III.1A.

Emphasis should be given to videotaping

(1) the relative body proportion of the animals;
(2) the detail of the head with particular emphasis on the blow hole.

Long sequences should be recorded since in the past, analysis of short sequences has proved problematic.

3. Photography
Sequence photographs of surfacings should be obtained with particular emphasis on the head region and particularly the blow hole. Photographs should be taken from the barrel or independent observer platform.

4. Data forms
See Section IV.7.

G. ESTIMATED DISTANCE AND ANGLE EXPERIMENT

This experiment is designed to examine the precision and accuracy of distance and angle estimates to a sighting. A buoy with a radar-reflecting lens is used as the sighting target and distance and angle estimates are made by the observers while the ship is underway at normal searching speeds.

A training exercise should be conducted on a priority basis near the beginning of the cruise to familiarise the observers with distances, angles, and the use of reticule binoculars and angleboards. 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 may be done with the ship underway or stationary. The number of trials conducted is at the discretion of the Cruise leader/Senior Scientist.

A large buoy with a radar transponder is used as the sighting target. At pre-determined distances and angles from the buoy, visual observations by the observers are taken simultaneously with radar readings. Six trials per observer, per sighting platform are scheduled. Primary observers should be tested from platforms where they normally conduct sighting effort and should use the same procedures and equipment used in their normal sighting procedures (including, as for BT option II, trials for naked eye observers in the IOP). The experiment should be conducted during weather and sea conditions representative of the conditions encountered during the survey. It is preferable for the experiment to be scheduled for the middle of the survey period. Since sea conditions near the ice edge are usually less changeable, it is recommended that the experiment be attempted near the middle of the cruise about the time that the vessels swap strata.

The cruise leader/Senior Scientist should select at random, distances from six of the following seven ranges (in n.miles): 0.00 - 0.25; 0.26 - 0.50; 0.51 - 1.00; 1.01 - 1.50; 1.51 - 2.00; 2.01 - 2.50; 2.51 - 3.00.

Similarly the angles should be selected, at random, from six of the following seven trials (in degrees): 00 - 10 two trials; 11 - 20 two trials; 21 - 40 two trials; 41 - 60 one trial.

Any source of bias that is not existent in normal searching should be identified and avoided. To avoid known problems the following procedures should be followed:

- Observers should not know what distances and angles are being examined.
- Observers should not discuss the previous test with other observers.
- Observers should be below deck between trials .
- Observers should not look for the buoy until told to.
- Observers should not be told the results of the test until after the survey.
- Distances and angles should be over a range and not consistently a single value for all observers during a single trial.

Priority is given to the barrel and IOP trials. Trials with researchers as observers have the lowest priority.

The form should be completed by the Senior Scientist, or under the Senior Scientist's direction. The logistics of conducting the experiment will be determined aboard each ship, but the assistance of the chief and/or second officer will be required.

Information on data forms can be found in Section IV.8

H. WEATHER, EFFORT, ICE-EDGE AND MARINE DEBRIS DATA COLLECTION

1. Weather

The weather form (Section IV.10) is the sole record of environmental conditions and data should be collected using a consistent methodology throughout the cruise. The record is a sampling of conditions, rather than a complete weather log. That is, the conditions are recorded at a preset interval (every hour) rather than recorded when conditions change.

The weather record is maintained by the ship's officers and is completed every hour from 0600 hrs to 1900 hrs while in the research zone. During transit the recording should start at the hour prior to the scheduled starting time of research and end at the hour after the scheduled ending time (unless the research begins or ends on the hour—recording would then begin or end on that hour). If research extends beyond the standard schedule by more than 30 minutes, additional weather information should be included on the form.

2. Effort

This form (Section IV.11) is designed to record all the relevant activities of the vessel so that all searched and non-searched transects can be determined in analysis. The form allows the computation of time, distances covered and location of all activities.

The Effort record is completed every day of the research programme. The Chief and Second Officers are responsible for the completion of the daily records. The Senior Scientist should work with the officers, especially in the beginning of the cruise and during unusual activities, to assist in the correct coding of all activities. If uncertainties arise, use the most appropriate coding and then annotate the entry. Provide a full explanation of the problem and the course of action taken.

Research activities are identified by the Effort code. Effort codes are classified into four categories: On-effort, Off-effort, Experiments, and Navigation. The following sections describe these codes:

2.1 On-effort codes

These codes indicate the initiation or termination of full-effort sighting survey.

The codes indicating the start of on-effort work must be used whenever On-effort sighting effort starts or the type of on-effort activities change. Use of the ending codes (those beginning with **E**) is optional in most cases.

Table 1 lists the acceptable On-effort codes.

Table 1. Search effort codes: On effort

Code	Definition
BB	Begin searching in blue whale survey mode (selective Closing Mode)
BO	Begin searching in IO Passing Mode.
EO	End IO Passing Mode
BP	Begin searching in normal Passing Mode (NSP)
EP	End normal Passing Mode
BH	Begin searching in NSP mode in a high density area.
EH	End searching in NSP mode in a high density area.
BI	Begin searching in NSP mode with ice navigation.
EI	End searching in NSP mode with ice navigation
BC	Begin searching in Closing Mode
EC	End searching in Closing Mode
BR	Begin returning to the trackline in Closing Mode
ER	End returning to the trackline in Closing Mode
BL	Begin searching in high whale density area
EL	End searching in high whale density area
BA	Begin searching in Closing Mode with assisted ice navigation.
EA	End searching in Closing Mode with assisted ice navigation
BW	Begin searching in big eye BT in IO mode
BY	Begin searching in big eye BT in BI mode
BZ	Begin searching in big eye BT in NSP mode
BT	Begin searching in BT option II
SS	Begin SS-III experiment
SZ	Begin searching in SS-II mode

2.2 Off-effort codes

All time and major position shifts must be accounted for during the research day. The off-effort codes are used to indicate activities (or lack of) when search effort is not being conducted. The ED code must be entered every day.

Table 2 lists the acceptable Off-effort codes.

The TD code designates the beginning of transit, on the constructed trackline, without full search effort being conducted. The TF code designates the beginning of transit, off the constructed trackline, without full search effort being conducted. The TF code is to be used when the vessel is returning to the constructed trackline, if confirming activities have

Table 2. Search effort codes: Off-effort codes

Code	Definition
TD	Begin transit, on the constructed trackline, without full search effort
TF	Begin transit, off the constructed trackline, without full search effort
DR	Begin drifting
ED	End of the scheduled research for the day
CO	Beginning confirming sighting information
CH	Begin chasing whales
WP	Trackline waypoint

taken the vessel outside the 3 n.mile bound either side of the constructed trackline and when following the ice edge if ice obstructs the constructed trackline.

Navigational and other Off-effort codes should be used to record the activities during TD and TF modes.

The DR code records the beginning of drifting (including waiting, resting, non-experimental photo-opportunity, ice-retrieval). This is the general code to designate that the vessel is not on search effort and that it is not underway. Also use this code when the vessel is hove-to in a storm and when it is returning a short distance, at variable speed and course, to the original drifting position. Do not use this code when drifting after the end of the scheduled research for the day.

The ED code records the end of the scheduled research for the day. This should be the last code on a daily effort record unless the ship is continuing on a predetermined course that will place the next day's starting position distant from the ED position (e.g., during transit).

The CO code designates the beginning of whale confirming activities. Use this code whenever the vessel turns to confirm a sighting regardless of the effort mode (closing, passing, or off-effort). The vessel is considered off-effort during confirming. Additional CO codes are not entered if other schools are observed (and subsequently approached) while confirming a school.

The CH code is restricted to those experiments that require pursuing the animals. Since pursuit of the animals will be conducted only during experiments that have their own codes (ie. biopsy and natural marking), it is unlikely this code will be used. The vessel is considered off search effort while pursuing the cetaceans.

The WP code designates the occurrence of a navigational waypoint. An effort code must immediately follow this entry.

2.3 Experiment codes

All experimental periods must be flagged with beginning (BX) and ending experiment (EX) codes. The BX code must be followed by the specific experiment code to designate what type of activity is taking place. If activities are suspended due to weather conditions or other causes, use the appropriate off-effort codes; when the trial resumes the specific experiment code is again used. The EX code is used only when the entire trial is completed or aborted, or the end of the day has been reached. Conducting some experiments does not necessarily imply that searching effort must be interrupted. For this reason note that the BX code (Begin experiment) is the only one which requires an EX (End experiment) code.

Table 3 lists the acceptable codes.

Table 3. Search effort codes: Experiments

Code	Definition
BX	Begin experiment
EX	End experiment
DX	Estimated distance and angle experiment
PX	Photo-identification experiment.
SX	Dive time experiment
TX	Biopsy tissue sampling experiment.
OX	Other experiment

2.4. Navigation codes

These course and/or speed changes are recorded only when the vessel is in On-effort mode, or steaming with topmen down (TD or TF). Minor changes such as negotiating around ice floes are **not** recorded unless the changes will remain constant for periods greater than five minutes.

Table 4 lists the acceptable codes.

Table 4. Search effort codes: Navigation codes

Code	Definition
SC	Speed change without change in activity or course
CC	Course change without change in activity or speed
CS	Course and speed change without change in activity

3. Ice edge

This form (Section IV.12) is used to record information on the position of the pack ice/open water boundary and should be completed by either vessel that encounters pack ice (the 100 fathom line is also used as a boundary) during the survey (this is usually only the southern stratum vessel).

Data for this form can come from a variety of sources: visual, satellite, and other ship observations, charts (for land boundaries), and interpolations

based on these sources. The Senior Scientist should try to integrate the sources for the most robust estimate of the ice edge.

The data are used to construct a boundary of the survey area and therefore it is important that, when connected, the data points produce a continuous line that is representative of the limits of open water. Whenever possible the data should be entered into the computer and plotted, or plotted on a chart to assure that the line is continuous. The Senior Scientist should also produce separate ice-edge records that are the most reasonable estimates for the best, north, and south extremes of the pack ice edge. If there is no evidence to suggest that the pack ice boundary may be different from the best estimate, then the other estimates need not be completed.

NOTE: Since the three estimates of the ice edge are often composites of existing files (SSM/I, AMSR-E reports, visual observations) and estimates of recession, not all the data may exist on the ice-edge record data form. Do not transcribe the information onto data forms; produce a properly formatted and labelled printout of the file in place of the data forms. Daily visual observations, however, must be recorded on the data forms.

If a discontinuity in the estimated ice-edge line exists (if the ship completes a sector, for example), then 9s should be filled in across one line of the form.

4. Marine debris

Marine debris is an element of concern in all marine environments and could have an impact on the total ecosystem. We have therefore been collecting data on floating marine debris in this program to observe the type and extent of the marine debris in Antarctic waters.

Details are given in Section IV.13.

5. Glare

Glare can affect the ability of observers to make sightings. It is important to collect data on glare as this may be used at the analysis stage.

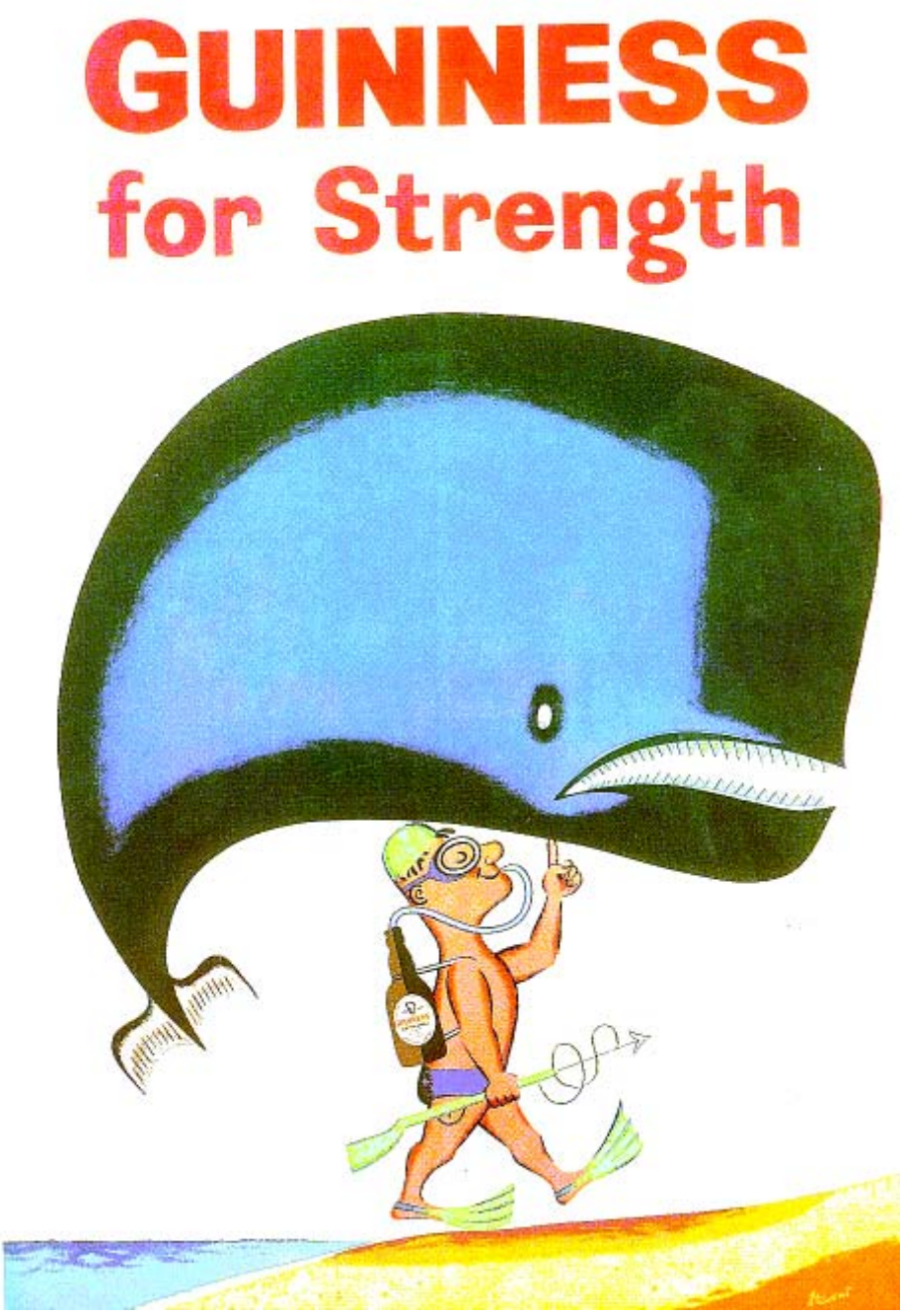
The record (Section IV.14) should be recorded at the beginning of each on-effort period and then at any time conditions change. The glare record is the responsibility of the researchers.

I. TELEMETRY TRIAL APPROACH EXPERIMENT

Antarctic minke whales have not yet been tagged with telemetric devices. On the 2008-09 cruise a series of trials are to be conducted which will assist in the assessment of the practicality of future tagging attempts of Antarctic minke whales from the bow of a SOWER-type vessel.

Tagging of whales is normally undertaken using a small boat as tagging platforms and it is essential to make close approaches to slow-swimming whales. The aim of the trials will be to gather data to assess the practicality of being able to reliably close, at zero or relatively slow speeds on Antarctic minke whales to such a distance that the deployment of tags from the bow of the vessel was likely to be possible. Whales are to be filmed on video and closest distances estimated or measured using the laser range finder (currently available as part of the Paxarms biopsy equipment).

IV. DATA FORM INSTRUCTIONS



1A. SIGHTING RECORD

The following sections describe how to complete the Sightings Record form. The left column shows the data fields on the data form and the right column describes how to complete the form.

Survey Mode

NSC ☐	Place a tick (√) in the box if the sighting was made while in Closing Mode (NSC)
IO ☐	Place a tick (√) in the box if the sighting was made while in Independent Observer mode (IO)
NSP ☐	Place a tick (√) in the box if the sighting was made while in Normal Passing Mode (NSP)
BT ☐	Place a tick (√) in the box if the sighting was made while in BT mode option 2
SS ☐	Place a tick (√) in the box if the sighting was made while the ship was in SS III mode
SZ ☐	Place a tick (√) in the box if the sighting was made while the ship was in SS II mode
BW ☐	Place a tick (√) in the box if the sighting was made while in big eye BT mode with IO
BZ ☐	Place a tick (√) in the box if the sighting was made while in big eye BT mode with NSP
BY ☐	Place a tick (√) in the box if the sighting was made while in big eye BT mode with BI
OE ☐	Place a tick (√) in the box if the sighting was made while off effort. This includes all sightings made during TD, TF, DR, and after ED.

Header

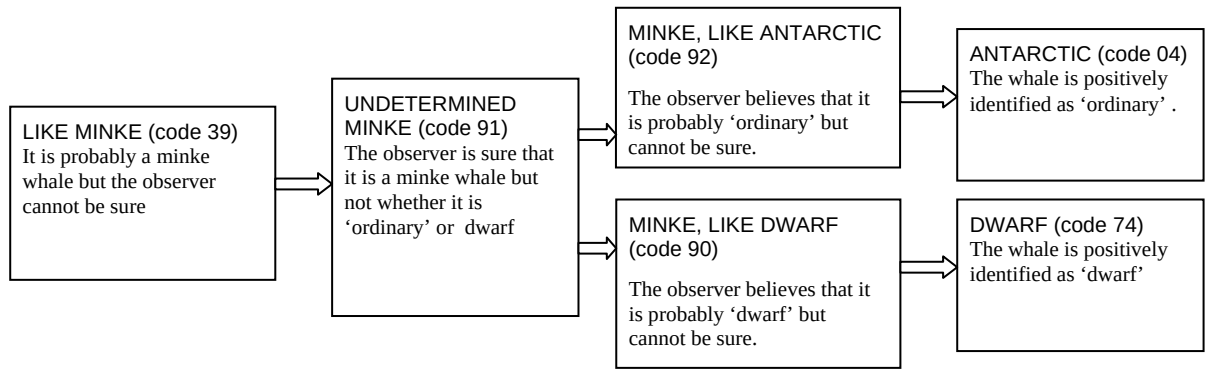
Form Number ☐☐☐☐☐	(Squares 1-5) This is the cruise serial number of the sighting.
Year Month Day ☐☐☐☐☐☐	(9-14) Record as year, month, day in the form YYMMDD. For example, 12 January 2009 is recorded as 090112.
Sighting Number ☐☐☐	(15-17) This is the chronological number of each sighting, each day. Begin with 001 at the start of each day.
Type ☐	(18) This is the description of the sighting type in relation to search effort. Use the codes: 1: Primary - made when the vessel is in searching mode. 2: Secondary, full effort - made while the vessel is confirming another group and the vessel was previously on search effort. 3: Secondary, partial effort - made while on TD or TF (off-effort) steaming. 4: Secondary, no effort - made while drifting or conducting other non-searching activities. Include sightings made while confirming but when the vessel was not previously on search effort.
Event ☐	(19) Record the activity associated with this sighting. Record as: 1: Immediate closure completed 2: Sighting passed, no closure attempted 3: Closure attempted but was not successful 4: Closure completed after delay 5: Closure started but not completed due to easy identification 9: None of the above is appropriate (use Caveat)

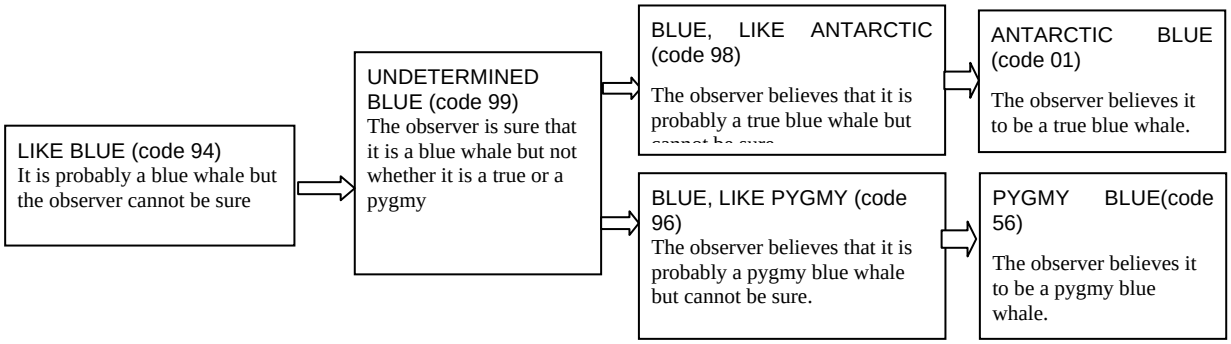
Sighting Time Hour | Minute | Sec.	(20-25) The local ship time at which the sighting was first made. Record to the nearest second. (eg., 171325). If the sighting time cannot be determined within 15 seconds, record the time to the nearest minute and enter "99" for the seconds.
Compass	(26-28) Record the compass heading of the ship. •If a reading of the gyrocompass repeater can be made simultaneously with the estimation of the angle to the sighting, record the gyrocompass reading. •If the compass reading cannot be taken simultaneously with the observation, record the compass bearing being steered. Use the codes: 777: If the ship is stationary 888: If the course is variable or changing when the sighting is made. North should always be recorded as 360 not 000.
C/T	(29) Record if the compass reading was taken from the gyrocompass repeater or was the course the ship was being steered. Record as: C: If a simultaneous compass reading was taken. T: If a simultaneous reading was not taken and the compass bearing being steered was recorded.
P/S	(30) Record where the initial sighting was in relationship to the ship's trackline. Record as: A: If the sighting was observed dead ahead B: If the sighting was observed dead astern P: If the sighting was observed at port side S: If the sighting was observed at starboard side
Angle	(31-33) The estimated angle from the bow of the ship to the sighting. This estimate should be made at the moment the sighting is made and not after the ship has progressed along the trackline or after the ship has turned toward the sighting. Angleboard readings should be used whenever possible.
Estimated Distance	(34-36) Record (in n.miles to the nearest two decimal places) the estimate of the radial distance from the ship to the sighting at the time this was made. Reticule binocular readings should be used whenever possible.
Cue	(37) Record the indicator, or sighting cue, which led to the sighting. Record as: 1: Blow 5: Blow and animal 2: Jump or splash 6: Colour under water 3: Animal 7: Associated wildlife 4: Slick or ring
Swim direction	(38-40) Record the estimated swimming direction at the moment the sighting is made. Swimming direction should be read from the gyrocompass. If the individuals of a group each have a similar but slightly different swimming direction record the mean swimming direction of the group. If individuals of a group are milling or have a substantially different swimming directions record as 888 If swimming direction cannot be determined enter 999. North should be entered as 360 not 000.

Seen By	(41-43) Record who made the sighting, either: 1: Topman in standard barrel 2: Topman in IOP 3: Upper bridge -- primary observer. (Captain and Quartermaster) 4: Upper bridge -- other than primary observer 5: Standard barrel topman and upper bridge simultaneously 6: IOP topman and upper bridge simultaneously 7: Wheelhouse 8: Other In boxes 42-43, enter code for observer(s) who first made the sighting. A list of Codes for each observer on each vessel should be sent to the IWC.

School Identity and Numbers
The following section describes the data fields for the first school observed. If more than one species is present in the group use the next available sighting record(s) to record details of the other species. Use the same sighting number and annotate clearly in the margin.

Code	(44-45) This is the numeric computer code used to identify and classify the species identification. Enter the species code from the table of species categories and codes provided. PLEASE NOTE THE FOLLOWING SPECIAL INFORMATION





ALSO NOTE: Pitman and Ensor (2003; JCRM 5(2):131-9) provide descriptions of three forms of killer whale. If you are SURE which form you see, use the codes 70, 72, 79 – otherwise use code 10 – if you suspect but are not sure, note this in the comments

	Species codes:				
1	Antarctic blue whale	98	'Blue, like Antarctic '	94	Like blue
56	Pygmy blue whale	96	'Blue, like pygmy'	99	'Undetermined blue'
2	Fin whale	66	'Like fin whale'		
3	Sei whale	60	'Like sei whale'		
6	Bryde's whale	40	'Like Bryde's whale'		
7	Humpback whale	71	'Like humpback whale'		
8	Right whale	95	'Like right whale'		
50	Pygmy right whale				
4	Minke whale (Antarctic)	92	'Minke, Like Antarctic'	39	'Like minke'
74	Dwarf minke whale	90	'Minke, Like dwarf'	91	'Undetermined minke whale'
5	Sperm whale	62	'Like sperm whale'		
44	Dwarf sperm whale				
45	Pygmy sperm whale	52	Dwarf/pygmy sperm whale		
10	Killer whale				
70	Killer whale type A	72	Killer whale type B	79	Killer whale type C
24	Southern bottlenosed whale	61	'Like southern bottlenosed whale'	78	'Like northern bottlenosed whale'
25	Arnoux's beaked whale	11	Ziphiidae		
35	Cuvier's beaked whale				
41	Long finned pilot whale	12	Pilot whale	77	'Like pilot whale'
42	Short finned pilot whale				
48	Blainville's beaked whale	38	*Mesoplodon sp*.		
49	True's beaked whale				
33	Pygmy killer whale				
34	Melon headed whale				
36	Gray's beaked whale				
37	Layard's beaked whale				
54	Hectors beaked whale				
80	Tasman beaked whale				
81	Baird's beaked whale				
87	Stejneger's beaked whale				
13	Cruciger dolphin	68	'Like cruciger dolphin'		
14	Southern right whale dolphin				
17	Risso's dolphin				
18	Striped dolphin	43	'Like striped dolphin'		
19	Common dolphin				
21	*Lagenorhynchus* sp.				
22	Dusky dolphin				
23	Bottlenosed dolphin *T. truncatus*				
46	Bottlenosed dolphin*T. aduncus*				
26	Rough toothed dolphin				
27	Heaviside's dolphin				
28	Fraser's dolphin				
29	Spotted dolphin				
30	Long snouted dolphin	20	Spotted/long snouted dolphin		
32	False killer whale				
47	Humpback dolphin				
55	Spectacled porpoise				
58	Commerson's dolphin				
59	Peale's dolphin				
75	Harbour porpoise				
82	Pacific white sided dolphin				
89	Dalli type Dall's Porpoise				
64	Unidentified large baleen whale	73	Unidentified large whale		
63	Unidentified small whale	9	Unidentified whale		
76	Unidentified small cetacean	15	Unidentified dolphin	16	Unidentified whale/dolphin

In the exceptional circumstance that there is no suitable category in which to place a sighting, DO NOT create a new species code. After consultation with the Cruise Leader, enter the species code as XX and ensure that full notes explaining the situation are given. Specific reference must also be made to such an eventuality in the cruise report—for the attention of the IWC Secretariat. NOTE – a species list arranged numerically is given on the final page of this guide

Name	Explicitly record the name of the cetacean species observed using the following guidelines and normally using only the categories on the list provided under species code: Record the common or scientific name (such as "minke" or "fin") for *positively identified* species; **a positively identified species is one for which the diagnostic features have been observed.** Where this is not the case but the observer has seen enough to be reasonably sure of the species identity then record the qualification "like" (eg. use "like minke" if a clear view of the body was not obtained but the observer believed the sighting was *probably* a minke whale). Always record the sighting to the highest taxonomic level that you are confident with, eg. on a scale of uncertainty "fin whale" ⇒ "like fin whale" ⇒ "unidentified large baleen whale" ⇒ "unidentified whale". Where possible, try to include an explanation in the notes if you chose other than a positively identified species category.
Highest Lowest Best	(46-57) Record the highest, lowest, and best estimates of school size. Note that the best estimate is not necessarily the mean of the highest and lowest estimates. All animals and calves must be included. In cases where school definition is problematic, the Caveat square should be completed and a description (eg., illustration) of the distribution of cetaceans should be entered on the form.
Co	(58) This is a subjective assessment **by the researcher** as to whether or not the school size has been accurately and confidently determined. Record as: Y: The final estimate of school size is confirmed. This means that the point estimate or range estimate given was determined with a high degree of confidence. N: If the school size estimate is not confirmed. These are the schools that were inadequately observed to obtain a point estimate or range estimate of school size with confidence.
No. calves	(59-60) Record the number of calves present in the group. Use size and behaviour to determine calves. Code as 99 if the total number of calves cannot be confidently determined.
length	(61) Record whether length estimates have been made. If yes, record the length estimates in the Comments field
+ – Sea Surf. Temp.	(62-65) Enter the sea surface temperature at the time of the sighting, as recorded on the bridge. Enter "+" in column 62 if the temperature is greater than zero. Enter "–" in this column if it is less than or equal to zero. In columns 63-65 enter the temperature to the nearest tenth of a degree Celsius.
Time Left	(66-69) In Passing Mode or cases where the sighting was passed (EVENT 2) this refers to the time when the animals were last seen at an angle less than or equal to 90 degrees. In Closing Mode record the local time (to the nearest minute) when confirmation or chasing of the animals ceased and some other activity began.
Closest Distance	(70-72) Record to two decimal places of a mile when possible. When animal is passed (EVENT 2) this refers to the distance when the animal is seen closest to the vessel. The minimum distance is to be recorded as 0.01, not 0.00.
Squares 73-79	Record the latitude of the ship in degrees and to the nearest hundredth of a minute at the moment of initial sighting. S denotes South latitude.
Squares 80-87	Record the longitude of the ship in degrees and to the nearest hundredth of a minute at the moment of initial sighting. Use E or W to denote East or West longitude.

Rschr	(88) Record the letter code for the researcher who fills out the form. The letter code is usually the first letter of the researcher surname (or given name if duplication occurs).

Behaviour (Completion of these boxes has the **same priority** as other information on the sightings form.)

Rct

(89) Record any observed reaction of an individual or of the entire group to the approach of the ship. Use the following codes (if more than one code is appropriate, record the most obvious and note the other codes with an explanation at the bottom of the form) :

1	No observed reaction	6	Surface activity (e.g. breaching) or swimming speed changed
2	Active avoidance when > 0.5 n.miles away		
3	Active avoidance when <= 0.5 n.miles away	7	Other reaction (record in remarks)
4	Active attraction when > 0.5 n.miles away	8	Undetermined
5	Active attraction when <= 0.5 n.miles away	9	Not recorded

Cpt

(90) Record the compactness of the undisturbed school.

1	All animals within 5 body lengths (BL) of another school member	5	Animals dispersed
2	Most animals within 5 BL of another	6	Animals widely dispersed (>1.0 n.miles^2)
3	All animals within 5 BL of another	7	Animals v. widely dispersed (> 3 n.miles^2)
4	Most animals within 5 BL	8	Undetermined (i.e. unsure what to put)
		9	Not recorded (i.e. you forgot!)

Dyn

(91) Record any observations of the dynamic structure of the group.

1	No change during entire observation period	6	Individual leaves group
2	School disperses into small number of subgroups of large relative size	7	Other
3	School dispersed into numerous subgroups of small relative size	8	Not determined (as above)
4	Subgroups merge	9	Not recorded (as above)
5	Exchange of individuals between schools/subgroups		

Gen

(92) Record the most dominant behaviour observed within the school.

See the codes 1-9 below When more than one behaviour is observed, record the most frequent or significant behaviour. Use remarks section to detail the behavioural information if necessary.

General behaviour codes:

1	Slow travel	Predominantly uni-directional travel at less than about 5 knots for large and medium size whales and about 10 knots for dolphins and porpoises
2	Fast travel	Predominantly Uni-directional travel at more than about 5 knots for large and medium whales and about 10 knots for dolphins and porpoises
3	Milling	Multi-directional travel and/or circling
4	Resting	Individual(s) stationary and not exhibiting any of the social behaviours seen in 6 (eg. sperm whale at the surface after a dive)
5	Feeding	Individual(s) observed swimming in the immediate vicinity of prey, eg. baleen whale(s) swimming through krill patch, killer whales attaching/consuming prey or swimming through characteristic ‘oily slick’ on the sea surface, dolphins swimming through fish schools
6	Social	Individuals within a group engaged in social activity eg. physical contact, chasing and/or exhibiting social behaviours (roll, breach, pectoral slap, jump, leap, fluke slap etc.)
7	Sexual	Individuals engaged in copulatory behaviour confirmed by intromission or a visible penis
8	Undetermined	Behaviour code could not be ascertained after observation
9	Not recorded	General behaviour not recorded

D? Sight. No.	(93-100) Cross-reference any definite, possible, or remote duplicate sightings. Duplicates will occur when the same group is sighted independently from more than one observation platform (the standard barrel, IOP, upper bridge, or any other position on the ship). For a duplicate use the first set of boxes, and for a triplicate also use the second set of boxes. Complete the D? square to indicate the duplicate status. Record as: D: Definite duplicate (90% probable) P: Possible duplicate R: Remotely possible duplicate. The Sight No. square cross-references the sighting number of the corresponding sighting record. The Caveat should be used, and a full description provided when confusion arises because different observers are thought to have identified the same congregation as different number of schools.
Resighting	(101) This box is to indicate the 'completeness' of recording of resightings data during IO mode. Code 1, all observed resightings recorded. This category includes those sightings not seen again after the initial sighting i.e. there were no resightings (and therefore no Re-sightings Records were completed for such sightings); code 2, resightings occurred but not all were recorded.
C	(102) Enter Y if problems were encountered completing the data record or the information may be ambiguous. Use the space to explain the situation, describing in full what happened and, if possible, suggest appropriate corrective actions. Remember this will be the only explanation the analysts will have to account for events that lie outside the validation values.
R	(103) Enter Y if there is additional information. Record ancillary information such as distinctive markings, associated wildlife, complex or unusual behaviours, or if additional behaviours that could not be coded were observed. In particular record any length estimates here and whether a researcher has any photos of unusual species.
Photos	(104-106) If natural marking photographs have been taken, insert the natural marking form number.
Biopsy	(107-109) If biopsy sampling was attempted, insert the biopsy sampling form number.

1B. BLUE WHALE IDENTIFICATION FORM

Form No. B W	Record as same number for each animal, but use one page per observer. Follow the format 001 etc. Thus if the school size is two, use two form numbers.
Year / Month / Day	Record as year, month, day in the form YYMMDD. For example, 12 January 1997 is recorded as 970112
Sighting no.	Use the sighting number as given on the sighting form.
Observer	Insert the code of the person filling in the form
Page	Use one page per observer.
Do you believe that the sighting was:	The observers should tick the boxes corresponding with their opinion on sub-specific identity and body length
Comments	This space is for the observers to record any other factors influencing their decision, e.g. body colour, or any specific difficulties they encountered.
Body proportion; Shape of keel before long dive; Head shape	The observers should ring the number closest to their opinion - if unsure number '3' should be ringed
Head shape	The observers should ring the number closest to their opinion - if unsure number '3' should be ringed
Relative position of tip of central groove to blowhole	The observers should ring Type A, B or C

2A. GENERAL RESIGHTING RECORD

Form No. R E	
Year / Month / Day	Record as year, month, day in the form YYMMDD. For example, 12 January 1997 is recorded as 970112
Page	Consecutive number of pages used for each sighting no.
Sighting no.	This is the chronological number of each sighting, each day. Begin with 001 at the start of each day.
Time: Hour / Min. / Sec	The local ship time at which the sighting was first made, or times of subsequent resightings. Record to the nearest second. (eg. 171325). If the sighting time cannot be determined within 15 seconds, record the time to the nearest minute and enter "99" for the seconds.
P/S	Record where the initial sighting was in relationship to the ship's trackline. A – sighting observed dead ahead; B – sighting observed dead astern; P – sighting observed to port; S – sighting observed to starboard
Angle	The estimated angle from the bow of the ship to the sighting or resighting. This estimate should be made at the moment the sighting is made and not after the ship has progressed along the trackline or after the ship has turned toward the sighting. Angleboard readings should be used wherever possible.
Estimated distance (.)	Record the estimate of the radial distance from the ship to the sighting or resighting at the time the sighting was made. Reticule binocular readings should be used whenever possible.
Cue	Record the indicator, or sighting cue, which led to the sighting or resighting. 1 Blow; 2 Jump or splash; 3 Animal; 4 Slick or ring; 5 Blow and animal; 6 Colour under water; 7 Associated wildlife
Whale heading	Record the estimated swimming direction at the moment the sighting or resighting is made, reading it from the gyrocompass. If the individuals of a group each have a similar but slightly different swimming direction record the mean swimming direction of the group. If individuals of a group are milling or have a substantially different swimming directions record as 888. If swimming direction cannot be determined enter 999. North should be entered as 360 not 000.
Ship's Course	True course the ship is making good, recorded to the nearest degree. If possible do not use the instantaneous heading shown on the gyrocompass, but rather compute from two or more fixes. Ask the crew.

3. DIVE TIME EXPERIMENTS

Form no. D T	This is the serial number for this record. Record using the form DTxxx, where xxx is the consecutive numbering of the dive time experiments.
Year Month Day	Record as year, month, day in the form YYMMDD. For example, 12 January 1997 is recorded as 970112.
Page	Record the consecutive number of forms used for each dive time experiment. Start from 01 each time a new trial begins.
Expt number	Number consecutively from the *start* of the cruise
Latitude N/S	Record the latitude of the ship in degrees and to the nearest hundredth of a minute at the moment of initial sighting. S denotes South latitude.
Longitude E/W	Record the longitude of the ship in degrees and to the nearest hundredth of a minute at the moment of initial sighting. Use E or W to denote East or West longitude.
Start	The local ship time at which the experiment starts. Record to the nearest second. Note: This will normally NOT be the same time that the first blow is recorded.
Finish	The local ship time at which the experiment starts. Record to the nearest second.
W'ther	A description of the general weather conditions. Use the codes:

01	Blue sky (0-20% cloud cover)	05	Rain	09	Drizzle
02	Partly cloudy (21-80%)	06	Mist	10	Snow
03	Cloudy (81-99%)	07	Fog	11	Snow fog
04	Overcast (100%)	08	Fog patches	12	Rain fog

Direction Speed	Record the wind direction to the nearest 5 degrees and the wind speed to the nearest knot.
Sea Surface ± Temp.	Record the sea surface temperature to the nearest 0.1 degrees centigrade. Place a + or - sign in the first box.
Air ± Temp.	Record the air temperature to the nearest 0.1 degrees centigrade. Place a + or - sign in the first box.
Visibility	Record an estimate of the maximum distance a minke whale blow could be seen in n.miles. Record as precisely as possible and reasonable. If the visibility range varies by more than 1.0 n.miles, code as 888. This estimate should be made by the captain in consultation with the Senior Scientist.
Code	This is the numeric computer code used to identify and classify the species identification. Enter the species code from the table of species categories and codes provided.
Name	Explicitly record the name of the cetacean species observed using the guidelines given under Section IV.1 and normally using only the categories on the list provided under species codes listed in that Section.
Highest Lowest Best	Record the highest, lowest, and best estimates of school size. Note that for the experiment to be valid the best estimate, the highest and lowest estimates must be equal. All animals and calves must be included.
Co	This is a subjective assessment by the researcher as to whether or not the school size has been accurately and confidently determined. It must be Y (yes) if the experiment is to be valid

Time (Hr | Min | Sec)

The local ship time at which the event starts. Record to the nearest second.

Event (e.g. start of blow, end of blow, dive)

List here the event you are recording. This will be the start of the blow, the time the blow disappears (be careful how you record when a new blow appears before the preceding one disappears!)

Estimated distance

Give the estimated distance to the event to the nearest 0.01 n.miles

Bearing

Give the bearing to the event

Elapsed time (Min | Sec)

Give the elapsed time (e.g. between blows, length blow visible) making sure to record what it is under the comments section in the next column.

Comments

Insert any comments here ESPECIALLY if you have completed any elapsed time values.

Ship Reaction

Record any observed reaction of an individual (or of the entire group if appropriate) to the approach of the ship. Use the following codes (if more than one code is appropriate, record the most obvious and note the other codes with an explanation at the bottom of the form) :

1	No observed reaction	6	Surface activity (e.g. breaching) or swimming speed changed
2	Active avoidance when > 0.5 n.miles away		
3	Active avoidance when <= 0.5 n.miles away	7	Other reaction (record in remarks)
4	Active attraction when > 0.5 n.miles away	8	Undetermined
5	Active attraction when <= 0.5 n.miles away	9	Not recorded

School Compact

Record the compactness of the undisturbed school.

1	All animals within 5 body lengths (BL) of another school member	5	Animals dispersed
2	Most animals within 5 BL of another	6	Animals widely dispersed (>1.0 n.mile
3	All animals within 5 BL of another	7	Animals v. widely dispersed (> 3 n.mile
4	Most animals within 5 BL	8	Undetermined (i.e. unsure what to put)
		9	Not recorded (i.e. you forgot!)

School Dynamics

Record any observations of the dynamic structure of the group.

1	No change during entire observation period	6	Individual leaves group
2	School disperses into small number of subgroups of large relative size	7	Other
3	School dispersed into numerous subgroups of small relative size	8	Not determined (as above)
4	Subgroups merge	9	Not recorded (as above)
5	Exchange of individuals between schools/subgroups		

General Behaviour

Record the most dominant behaviour observed within the school.

1	Slow travel	4	Resting	7	Sexual
2	Fast travel	5	Feeding	8	Undetermined
3	Milling	6	Social	9	Not recorded

For more information see the codes given for the sightings form

Other comments

Put any additional comments here.

4. ACOUSTICS

Form no. A C	This is the serial number for this record. Record using the form ACxxx, where xxx is the consecutive numbering of the acoustic trials.
Vessel S M	Enter vessel's code as SM2
Year Month Day	Record as year, month, day in the form YYMMDD. For example, 12 January 1997 is recorded as 970112.
Page	Record the consecutive number of forms used for each acoustic trial. Start from 01 each time a new trial begins.
Station number	Number consecutively from the *start* of the cruise
Latitude N/S	Record the latitude of the ship in degrees and to the nearest hundredth of a minute at the moment of initial sighting. S denotes South latitude.
Longitude E/W	Record the longitude of the ship in degrees and to the nearest hundredth of a minute at the moment of initial sighting. Use E or W to denote East or West longitude.
Weather-Beaufort	Give the sea state according to the Beaufort scale
Start	Record the start time to the nearest minute using local time
Finish	Record the finish time to the nearest minute using local time
Tape no.	*Shonan Maru* trials will begin with 001 and *Shonan Maru No. 2* trials will begin with 101
Real time monitoring Y/N	Indicate whether the operator was monitoring sounds in real time as well as recording
Ambient sample Y/N	Indicate whether an ambient sample was recorded
Biosounds heard Y/N	Indicate whether sounds attributable to wildlife were heard
System types used	Indicate which system types were used.
Whales seen Y/N	Indicate whether whales were seen in the vicinity of recording
Est distance	If whales were seen indicate the nearest estimated distance to 0.1 n.miles

If seen during normal searching:

Give sighting no.	If the whales were first seen during normal searching give the sighting number (see IV.1)

If not seen during normal sighting:

Code	This is the numeric computer code used to identify and classify the species identification. Enter the species code from the table of species categories and codes provided.
Name	Explicitly record the name of the cetacean species observed using the guidelines given under Section IV.1 and normally using only the categories on the list provided under species codes listed in that Section.

Highest Lowest Best	Record the highest, lowest, and best estimates of school size. Note that the best estimate is not necessarily the mean of the highest and lowest estimates. All animals and calves must be included. In cases where school definition is problematic, the Caveat square should be completed and a description (e.g., illustration) of the distribution of cetaceans should be entered on the form.
Co	This is a subjective assessment by the researcher as to whether or not the school size has been accurately and confidently determined. Record as: Y: The final estimate of school size is confirmed. This means that the point estimate or range estimate given was determined with a high degree of confidence. N: If the school size estimate is not confirmed. These are the schools that were inadequately observed to obtain a point estimate or range estimate of school size with confidence.

Ship reaction

Record any observed reaction of an individual or of the entire group to the approach of the ship. Use the following codes (if more than one code is appropriate, record the most obvious and note the other codes with an explanation at the bottom of the form) :

1	No observed reaction	6	Surface activity (e.g. breaching)
2	Active avoidance when > 0.5 n.miles away		or swimming speed changed
3	Active avoidance when <= 0.5 n.miles away	7	Other reaction (record in remarks)
4	Active attraction when > 0.5 n.miles away	8	Undetermined
5	Active attraction when <= 0.5 n.miles away	9	Not recorded

School Compact

Record the compactness of the undisturbed school.

1	All animals within 5 body lengths (BL) of another school member	5	Animals dispersed
2	Most animals within 5 BL of another	6	Animals widely dispersed (>1.0 n.miles^2)
3	All animals within 5 BL of another	7	Animals v. widely dispersed (> 3 n.miles^2)
4	Most animals within 5 BL	8	Undetermined (i.e. unsure what to put)
		9	Not recorded (i.e. you forgot!)

School Dynamics

Record any observations of the dynamic structure of the group.

1	No change during entire observation period	6	Individual leaves group
2	School disperses into small number of subgroups of large relative size	7	Other
3	School dispersed into numerous subgroups of small relative size	8	Not determined (as above)
4	Subgroups merge	9	Not recorded (as above)
5	Exchange of individuals between schools/subgroups		

General Behaviour

Record the most dominant behaviour observed within the school.

1	Slow travel	4	Resting	7	Sexual
2	Fast travel	5	Feeding	8	Undetermined
3	Milling	6	Social	9	Not recorded

For more information see the codes given for the sightings form

Other Comments	Give any other relevant information here

5. BIOPSY RECORD

This form is to record results of each biopsy sampling session and should be completed by the researchers. Use one form for each school; use a second page if necessary. MISSES should be recorded.

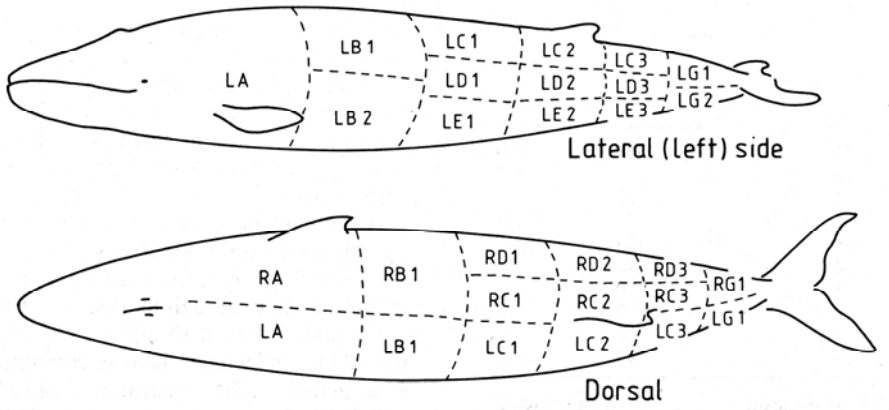
Heading

Form No.: B Y	This is the serial number for this record. Record using the form BYxxx, where xxx is the consecutive numbering of the biopsy trials.
Year / Month / Day	Record as year, month, day
Sight. No	Record the same sighting number that is on the Sighting form.
Name / Code	Record the name of the species. Enter the species code from the table of species categories and codes provided for the Sighting Record.
Best estimate of school size Est. no. animals biopsied	Record the best estimate of school size for the group and your best estimate of the number of animals biopsied at the end of the session
Latitude Longitude	Record the position at which the group was initially sighted (i.e the same position as on the correspoinding Sightings Data form) to the nearest hundredth of a minute
Effort / Hour / Min. / Sec Start Finish	Record the time you begin biopsy attempts and the time you cease the session
System / H/S / H/NS / Stuck / Miss	Summarise the biopsy attempts for the session by system type (1=Paxarms; 2=Air gun; 3=Crossbow; 4=Larsen gun; 5= Other-specify in notes). H/S = hit and sample obtained; H/NS=hit and no sample obtained; Stuck=dart stuck in animal; Miss=miss!

Details

Whale No.	Identify the individual whales, and if possible, **co-ordinate the numbering with the natural marking form**.
Sample No. Year / Sp. / Bt / S/No. 0 8 / / / 1 / /	Year: 08 etc., where 08 = season 07/08 etc. Sp.: species code as in sightings form; Bt: Boat - 0 = SM, 1= SM2 S/No: Serial number - consecutively for the cruise, beginning at 1, whatever the sampling method. Samples from the same animal but obtained by different methods, should all be given the same number.

Position Struck



Whale reaction

Record any reaction the whale may have had to being shot at.

1	No reaction	4	Faster swimming	7	Defecation
2	Skin/muscle twitch	5	Trumpet blow	8	Vomiting
3	Sudden dive	6	Breach or porpoising	9	No record

System

Identify the equipment used:

1=Paxarms 3=Crossbow
2=Air gun 4=Larsen gun
5= Other (specify in notes)

Duplicate?

This refers to the likelihood of an animal being sampled more than once. Use:

1 = definitely resampled 2 = probably resampled

3 = perhaps resampled 4 = definitely not resampled 5 = unknown

Split?

This refers to whether the sample has been split into blubber and tissue. Use 1=split and 2=no blubber

If photo, Form no. ID…

If the animal(s) have also been photographed, give the number of the natural marking form

Comments

Record any additional information. Give a description and size of the sample obtained.

6. NATURAL MARKING RECORD

This form is to record results of each photo-id session and should be completed by the researchers. Start a new form for each new group. If a form is filled before the observations are completed, continue on another form. Remember to shoot "blanks" before and after each group. The "blank" should show the ship, date, and sighting number.

Form No. I D	This is the serial number for this record. Record using the form IDxxx, where xxx is the consecutive numbering of the natural marking sessions.
Year | Month | Day	Record as year, month, day
Sight. No	Record the same sighting number that is on the Sighting form.
Name | Code	Record the name of the species. Enter the species code from the table of species categories and codes provided for the Sighting Record.
Best estimate of school size Est. no. animals photographed	Record the best estimate of school size for the group and your best estimate of the number of animals biopsied at the end of the session
Latitude Longitude	Record the position at which the group was initially sighted (i.e. the same position as on the corresponding Sightings Data Form) to the nearest hundredth of a minute
Effort | Hour | Min. | Sec Start Finish	Record the time you begin photo-id attempts and the time you cease the session

Details

File prefix*	This should relate to the initials of the photographer. The date should also be part of the filename.
Frame Start | Finish	Here add the start and finish frame number, starting at 001 each day. NB Be careful not to start numbering again at 001 on the same day as this can lead to duplicate filenames. An example complete filename could be: GPD070117001
Target	Record as: FL Flukes | RD Right dorsal fin LL Left lateral | HD Head RL Right lateral | DM Distinctive marking (elsewhere) LD Left dorsal fin | OT Other
Whale No.	Identify the individual whales, and if possible, **co-ordinate the numbering with the biopsy sampling form**.

Whale No.	Identify the individual whales, and if possible, **co-ordinate the numbering with the biopsy sampling form**.
Atm.	Put a Y in this box if the photograph includes a biopsy attempt
Sample number	If the whale has been biopsied successfully, insert the sample number. NB do this irrespective of whether there has been a successful photograph of the event, provided you are sure it is a photo of the same whale.
Skinny	Indicate if it is your impression that the whale photographed appears: 1= normal; 2=skinny; 3=very skinny; 4=unsure
Notes	Use for additional comments e.g. if the animals showed any distinctive markings suitable for identification and if these markings were photographed. Provide illustrations if necessary.

7. VIDEOTAPING

Form No. I D	This is the serial number for this record. Record using the form VTxxx, where xxx is the consecutive numbering of the videotaping experiment.
Year Month Day	Record as year, month, day in the form YYMMDD. For example, 12 January 2009 is recorded as 090112
Page	Consecutive number of pages used
Sight. No	Insert the sighting number from the sighting form.
Species Code	Insert the species name and code from the sighting form.
Number	Insert the number of best estimate of the number of animals in the group
Closest distance .	Insert the closest distance of approach to the nearest 0.01 n.miles
Opportunity	This is NOT necessary - sorry!!!
No. photographed	Record the number of whales in the school that were photographed.
By	Record the letter code for the person who took the photos.
Tape number	Give the tape number.
Start Hr Min Sec	Give the time the videotaping *session* begins to the nearest second
Finish Hr Min Sec	Give the time the videotaping *session* ends to the nearest second
Features/behaviour recorded	State what identification features you believe are well shown (e.g. blowhole shape, flanks, dorsal fin, behaviour etc.)

8. ESTIMATED DISTANCE AND ANGLE EXPERIMENT RECORD

One form is completed for each approach to the buoy. If there are more than six trials per approach (a trial being an estimate by one observer from one platform during one approach), start a new form for the additional trials, making sure that the form is appropriately annotated.

Header

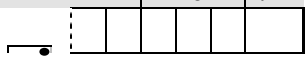
Form No. W	This is the serial number for this record. Record using the form TExxx, where xxx is the consecutive numbering of approaches.
Year / Month / Day	Record as year, month, day
Weather	Record the weather at the beginning of the approach. Use the same codes and methods of evaluation as on the Weather Record:
Wind: Direction / Speed	Record the wind direction to the nearest 5 degrees. Record the wind speed to the nearest knot.
Visibility	Record an estimate of the maximum distance a minke whale blow could be seen in n.miles. Record as precisely as possible and reasonable. If the visibility range varies by more than 1.0 n.miles, code as 888.
Sightability	This is the Sightability, a subjective impression of the conditions for spotting whales. Use the codes: 1: Very poor 4: Good 2: Poor 5: Excellent 3: Moderate
Caveat?	Mark this with Y if there were problems recording information on the form or unusual occurrences during the approach. Detail these situations at the bottom of the form. Leave blank if there were no such circumstances.
Page	Record the consecutive number of forms used in the experiment.

01	Blue sky (0-20% cloud cover)	05	Rain	09	Drizzle
02	Partly cloudy (21-80%)	06	Mist	10	Snow
03	Cloudy (81-99%)	07	Fog	11	Snow fog
04	Overcast (100%)	08	Fog patches	12	Rain fog

Individual Estimate Record

The following describes the data fields for the first individual estimate record. The five other records require the same information.

Time	Record the time, to the nearest minute, that the observer makes an estimate.
Compass	Record the ship's compass at the time the estimate is made.
RADAR: Distance / Angle / p/s	Record the RADAR distance and angle readings taken simultaneously with the observer's estimate. Record the location of the buoy relative to the ship's projected trackline. Use the codes: A: Directly ahead; B: Directly behind; P: to port; S: to starboard.

Estimate Distance | Angle | p/s 	Record the observer's distance estimate. Observers may make estimates in any distance unit (metres, yards, feet, chains, etc.) but the information must be recorded here in n.miles. Record the observer's angle estimate to the nearest degree. Record the location of the buoy relative to the ship's projected trackline as determined by the observer. Use the codes: A: Directly ahead; B: Directly behind; P: to port; S: to starboard.
Observer	Record the observer who made the estimate. Use the topmen codes recorded on the weather record for the boatswain/quartermasters/sailors who participated. Use C to denote the captain and use the letter codes used on the Sighting forms to designate the researchers.
Barrel - IO	Record the platform from which the estimate was made. Use the codes: B: Barrel; I: IOP; F:Front/upper bridge; N: naked eye estimate from IOP
Problem?	Enter Y if the observer had severe difficulties in locating the buoy and the trial may have been compromised. Leave blank if there were no severe problems. If severe problems were recorded, attempt to repeat the trial after all scheduled trials have been completed.

9. SS-II EXPERIMENT

Form No. S S	This is the serial number for this record. Record using the form SSxx, where xxx is the consecutive numbering of approaches.
Year | Month | Day	Record as year, month, day
Sighting number	Record the same sighting number that is on the Sighting form.
Observn	In the first box, record who first made the sighting, either: 1: Topman in standard barrel 3: Upper bridge -- primary observer. (Captain and Quartermaster) 4: Upper bridge -- other than primary observer 5: Standard barrel topman and upper bridge simultaneously 7: Wheelhouse 8: Other In the last two boxes, enter the code for observer(s) who first made the sighting. A list of Codes for each observer on each vessel should be sent to the IWC.
Closure	Record as follows: 1: No-one apart from topmen able to locate sighting and closure not successful 2: Upper bridge also locates sighting but closure not successful 3: Closure is successful (i.e. confident of species and school size)
Topman's view when sighting abeam	In this section, complete the information on species and school size should be filled out for the best information available *at the time the vessel is considered abeam.* Follow the instructions for the normal sighting form for these fields.
Estimate after closing	Provided closure is successful (i.e. a '3' in the Closure field), complete the information on species and school size for the best information available *after successful closure.* Follow the instructions for the normal sighting form for these fields.

10. WEATHER RECORD

The Weather Record is the sole record of environmental conditions. Data should be completed every hour from 0600 hrs to the end of scheduled research for the day in the research zone(normally 1800 hrs for research in Closing Mode or 1900 hrs for research in Passing Mode with independent observer). During transit the recording should start at the hour prior to the scheduled starting time of research and end at the hour after the scheduled ending time (unless the research begins or ends on the hour--recording would then begin or end on that hour). If research extends past the normal research time by more than 30 minutes (that is, starts before 05:30 or ends after 18:30), additional information should be recorded in the greyed lines of the form and a note included on the form.

Header

Form No. W	This is the serial number for this record. Record using the form Wxxx, where xxx is the consecutive daily numbering of the weather records.
Year | Month | Day	Record as year, month, day
Page	The consecutive number of the form for the entire trip. The Weather record for the first day of the cruise will be page 01.

Individual weather record

Time 0 6	The hour for which the data are to be collected. This has already been completed.
Position	Record the latitude/longitude of the ship in degrees and to the nearest minute. S denotes South latitude. Use E or W to denote East or West longitude.
Weather	A description of the general weather conditions. Use the codes:

01	Blue sky (0-20% cloud cover)	05	Rain	09	Drizzle
02	Partly cloudy (21-80%)	06	Mist	10	Snow
03	Cloudy (81-99%)	07	Fog	11	Snow fog
04	Overcast (100%)	08	Fog patches	12	Rain fog

Wind Direction | Speed	Record the wind direction to the nearest 5 degrees and the wind speed to the nearest knot.
Sea Surface ± | Temp. .	Record the sea surface temperature to the nearest 0.1 degrees centigrade. Place a + or - sign in the first box.
Air ± | Temp. .	Record the air temperature to the nearest 0.1 degrees centigrade. Place a + or - sign in the first box.
Visibility .	Record an estimate of the maximum distance a minke whale blow could be seen in n.miles. Record as precisely as possible and reasonable. If the visibility range varies by more than 1.0 n.miles, code as 888. **This estimate should be made by the captain in consultation with the Senior Scientist.**
Ice .	Record the estimated ice cover, in tenths, within the searching area (use a radius of 5.0 n.miles).

Topmen				
Barrel		IOP	Bridge	

Record the numeric code for the observers in the barrel who will be on watch during the next hour interval. If survey is not being conducted when the weather record is completed due to meteorological conditions, but survey is started prior to the next hour, record the codes for the observers who are in the barrel during the hour interval. Leave blank if no survey is conducted during the hour interval.

Record the numeric code for the observer in the IOP who will be on watch during the next hour interval. If survey is not being conducted when the weather record is completed due to meteorological conditions, but IO survey is started prior to the next hour, record the code for the observer who is in the IOP during the hour interval. Leave blank if no IO survey is conducted during the hour interval.

Record the numbers or letter code of the two primary observers who are on watch on the upper bridge during the next hour interval.

Sightability

This is the Sightability, a subjective impression of the conditions for spotting whales. Because sightability may vary between observation platforms, an impression of the average sightability over all platforms should be recorded. Use the codes:

1	Very poor (too poor to survey)	3	Moderate	5	Excellent
2	Poor	4	Good	6	

Sea state

This is sea state as described in the Beaufort scale. Record Beaufort scale numbers 0-7 and use code 9 for Beaufort 9 and above. (If no data are recorded the letter U is used).

0	Flat (wind speed 0 knots)
1	Ripples without crests (1-3)
2	Small wavelets. Crests of glassy appearance, not breaking (4-6)
3	Large wavelets. Crests begin to break; scattered whitecaps (7-10)
4	Small waves (11-16)
5	Moderate (1.2 m) longer waves. Some foam and spray (17-21)
6	Large waves with foam crests and some spray (22-27)
7	Sea heaps up and foam begins to streak (28-33)
8	Moderately high waves with breaking crests forming spindrift. Streaks of foam (34-40)

Swell

This is the swell height as described in the International Scale.

Scale	Swell	Wavelength	Height
0	No swell		
1	Low swell	Short or average	<2m
2	Low swell	Long	< 2m
3	Moderate swell	Short	2-4 m
4	Moderate swell	Average	2-4 m
5	Moderate swell	Long	2-4 m
6	Heavy swell	Short	> 4m
7	Heavy swell	Average	> 4m
8	Heavy swell	Long	> 4m
9	Confused swell	Pronounced swells from two or more directions	

11. EFFORT RECORD

The Effort record is completed every day during the research cruise to record all research activities. The following sections describe how to complete this form.

Header

Form No. E	A cruise serial number. Each daily record has a unique number.
Year / Month / Day	Enter as year, month day (e.g., 070103 for 3 January 2007).
Page	Consecutive number of pages used in one day. Each day the first page will be 01.

Individual effort record

Activity	Activity code. Any change in activity, course, or speed must be recorded. The following are the only acceptable codes (the optional on-effort ending codes are not shown but can be found on pp. 26-7):

BA	NSC, ice navigation	CC	Course change
BC	NSC	SC	Speed change
BL	NSC, high density		
BR	NSC, returning	CS	Course, speed change
BH	NSP, high density	CH	Chasing
BI	NSP, ice navigation	CO	Confirming
BP	NSP		
BO	IO	DR	Drifting
BW	Big Eye BT, IO mode		
BY	Big Eye BT, BI mode	ED	End day
BZ	Big Eye BT, NSP	EX	End experiment
BT	BT option II	OX	Other experiment
BB	Begin blue whale research		
BX	Begin experiment		
SX	Dive time experiment		
PX	Photo-ID session	TD	Off-effort steaming
TX	Biopsy sampling session	TF	Off-effort steaming
SZ	SS IISS SS III experiment		
DX	Est. distance experiment	WP	Waypoint

Time Hour / Min. / Sec	The local time at which each activity begins or changes. Record to the nearest second. Make sure the time on other data forms (particularly the Sighting form) agree. Time is recorded for every entry.
	The latitude or longitude where each activity begins or changes. Record to the nearest hundredth of a minute if available from the GPS. If not available, enter **99** in the last two boxes. Enter **E** or **W** for east or west longitude as appropriate.
Course Degrees	True course the ship is making good, recorded to the nearest degree. If possible do not use the instantaneous heading shown on the gyrocompass, but rather compute from two or more fixes. Do not record changes due to ice navigation unless the changes will remain constant for more than five minutes. Record North as 360, not 000; record variable course (course remains variable for more than five minutes) as 888. Record for the following codes: BA, BC, BH, BI, BL, BO, BP, BR, CC, CS, SC, TD, TF and possibly ED (in transit only).
Speed Knots	Speed the ship is making good recorded to the nearest tenth of a knot. If possible calculate the average speed from two or more fixes covering most of the duration of the recorded activity. Record for the following codes: BA, BC, BH, BI, BL, BO, BP, BR, CC, CS, SC, TD, TF and possibly ED (in transit only).

12. ICE-EDGE RECORD

The Ice-edge record is completed when the ice-edge is observed or other information is obtained that provides the best information on the position of the ice-edge boundary. The form is also used to construct estimates of the continuous landward boundary of the southern stratum. (see the note in Section 4.6 concerning alternatives to this form.)

Header

Form No. I	This is the serial number for this record. Observations will be coded with I001 for the best estimate, I002 for the estimate of the most northern pack ice edge, and I003 for the estimate of the most southern pack ice edge. Leave this section blank for the separate daily observations of the pack ice (these should be incorporated into the best estimate).
Year Month Day	Enter as year, month day (eg., 970103 for 3 January, 1997).
Page	Record the consecutive number of forms used for each record type. Visual observations made on one day should start on page 01 and if additional pages are required to record the observations made that day, number the pages consecutively.

Individual Ice-edge record

	Record the latitude/longitude of the ice edge in degrees and to the nearest minute. Use E or W to denote East or West longitude.
Ice type	This is the type of ice (or boundary) observed at the pack ice edge or reported from other sources. Use the following codes:
Conc-entration	Record the mean ice concentration (in tenths) of the pack ice. Use the following codes in special circumstances 66: Unknown; 77: Not applicable; 88: Too variable to classify
Source	Record the source of the information using the codes:

1	No information	10	Icebergs
2	Grease or pancake	11	Icebergs and brash
3	Brash (barra-barra)	12	Icebergs and first year floes
4	Floes (1st year)	13	Icebergs and multi-year floes
5	Floes (multi-year)	14	Compacted pack ice
6	Rafted floes (1st year)	15	Ice shelf
7	Rafted floes (1st year and multi-year)	16	Land
8	Mixed brash and 1st year floes	17	Shallow water (unsafe for navigation)
9	Mixed brash and multi-year floes	18	Other

C	Navigational charts (land positions)
E	Estimated using data from more than one source
J	Satellite imagery analysis from US National Ice Center
O	Other (explain at bottom of form)
S	Shipboard observations, ship not part of this study
U	Satellite imagery analysis from other sources
V	Visual observations from this ship

13. MARINE DEBRIS RECORD

This form is completed by the researchers, in consultation with the ship's officers. Use one form for each observation of marine debris. Classify the type of debris in the code boxes and then fully describe it in the Description section. Draw pictures if necessary and be as complete as possible.

This form is completed by the researchers, in consultation with the ship's officers. Use one form for each observation of marine debris. Classify the type of debris in the code boxes and then fully describe it in the Description section. Draw pictures if necessary and be as complete as possible.

Form no. **M D** (1–5)	This is the serial number for this record. Record using the form MDxxx, where xxx is the consecutive numbering of the marine debris observations.
Year (9–10) Month (11–12) Day (13–14)	Record as year, month, day.
Time (15–18)	Record the time of the initial observation to the nearest minute. Enter time as Hr Min (Hour Minute). All time is local time.
p/s (19)	Record where the initial sighting was in relationship to the ship's trackline. Record as: A: If the sighting was observed dead ahead. B: If the sighting was observed dead astern. P: If the sighting was observed at port side. S: If the sighting was observed at starboard side.
Angle (20–22)	The estimated angle from the bow of the ship to the sighting. This estimate should be made at the moment the sighting is made and not after the ship has progressed along the trackline. Angleboard readings should be used whenever possible.
Distance (23–25)	Record the estimate of the radial distance (to the nearest 01. nmile) from the ship to the sighting at the time this was made. Reticle binocular readings should be used whenever possible.
Latitude (26–30) N/S: S	Record the latitude of the ship in degrees and to the nearest minute at the moment of initial sighting. S denotes South latitude.
Longitude (31–36) E/W: W	Record the longitude of the ship in degrees and to the nearest minute at the moment of initial sighting. Use E or W to denote East or West longitude.
Code (37–38)	Use the list of codes shown on the next page to classify the type of debris observed.
Description:	Describe the object including total size, condition, any associated wildlife, etc

100. Gillnet
101. Gillnet, small mesh, small fragment
102. Gillnet, small mesh, 1-10 tans
103. Gillnet, small mesh, more than 10 tans
104. Gillnet, medium mesh, small fragment
105. Gillnet, medium mesh, 1-10 tans
106. Gillnet, medium mesh, more than 10 tans
107. Gillnet, large mesh, small fragment
108. Gillnet, large mesh, 1-10 tans
109. Gillnet, large mesh, more than 10 tans
110. Trawl net
111. Trawl net, small mesh, small fragment
112. Trawl net, small mesh, medium size
113. Trawl net, small mesh, large piece
114. Trawl net, medium mesh, small fragment
115. Trawl net, medium mesh, medium size
116. Trawl net, medium mesh, large piece
117. Trawl net, large mesh, small fragment
118. Trawl net, large mesh, medium size
119. Trawl net, large mesh, large piece
120. Unidentified net
121. Unidentified net, small mesh, small fragment
122. Unidentified net, small mesh, medium size
123. Unidentified net, small mesh, large piece
124. Unidentified net, medium mesh, small fragment
125. Unidentified net, medium mesh, medium size
126. Unidentified net, medium mesh, large piece
127. Unidentified net, large mesh, small fragment
128. Unidentified net, large mesh, medium size
129. Unidentified net, large mesh, large piece
130. Longline, small piece
131. Longline, medium piece
132. Longline, large piece
133. Plastic packing band
134. Single fishing float
135. Clustered fishing floats (2-10 floats together)
136. Wood plank
137. Wood crate, 1 side only
138. Wood crate, more than 1 side
139. Wood structure
140. Wood object, unidentified
141. Metal can, unidentified
142. Metal can, 1 litre or less
143. Metal can, 1-50 litres
144. Metal can, 50-150 litres
145. Metal can, 150-250 litres
146. Metal can, 250 or more litres
147. Styrofoam, unidentified
148. Styrofoam board, less than 1 square metre
149. Styrofoam board, 1-3 square metres
150. Styrofoam board, greater than 3 square metres
151. Styrofoam box (at least 2 sides)
152. Cardboard, unidentified
153. Cardboard, less than 1 square metre
154. Cardboard, 1-3 square metre
155. Cardboard, greater than 3 square metres
156. Cardboard box (at least 2 sides)
157. Paper, unidentified
158. Paper, less than 1 square metre
159. Paper, 1-3 square metre
160. Paper, greater than 3 square metres
161. Plastic, unidentified
162. Plastic, less than 1 square metre
163. Plastic, 1-3 square metres
164. Plastic, greater than 3 square metres
165. Plastic bag, small
166. Plastic garbage bag, empty
167. Plastic garbage bag, full
168. Garbage, unidentified
169. Garbage, 1-10 pieces
170. Garbage, 11-50 pieces
171. Garbage, 51-200 pieces
172. Garbage, more than 200 pieces
199. Other

14. GLARE RECORD

Form no. G L 1 2 3 4 5	This is the serial number for this record. Numbering should start at 001, increasing consecutively each day
Year Month Day 9 10 11 12 13 14	Record the date as year, month, day e.g. 6 January 2009 is 010109
Page 15 16	Consecutive number of pages used in one day. Each day the first page will be 01.
Time Hr Min Sec	The local ship time at which glare conditions changed. Record to nearest second (e.g. 171325).
Intensity	The intensity of glare according to the following scale: 0 = no glare; 1 = glare present but with minimal impact on sightability; 2 = glare present but with some impact on sightability; 3 = glare present and substantial or total affect on sightability
Ship's Bearing	The ship's bearing from the gyrocompass.
Left: P/S Angle; Right: P/S Angle	These records refer to the left and right extreme edge of the glare. Record whether on port (P) or starboard (S) and then the angle as read from the angle board.

15. KRILL RECORD

Form no. K R	This is the serial number for this record. Numbering should start at 001, increasing consecutively each day
Year Month Day	Record the date as year, month, day e.g. 6 January 2001 is 010106
Page	Consecutive number of pages used in one day. Each day the first page will be 01.
Sighting number	This is the chronological number of each krill sighting, each day. Begin with 001 at the start of each day.
Hr Min Sec	The local ship time at which the sighting was first made. Record to the nearest second (eg., 171325). If the sighting time cannot be determined within 15 seconds, record the time to the nearest minute and enter "99" for the seconds.
Position	The latitude/longitude where krill was first encountered. Record to the nearest hundredth of a minute if available from the GPS. If not available, enter **99** in last two boxes. Enter **E** or **W** for east or west longitude

Sighting						
p/s	Angle			Distance		

P/S: record where the initial sighting was in relationship to the ship's trackline. Record as: A: If the sighting was observed dead ahead. B: If the sighting was observed dead astern. P:If the sighting was observed at port side. S:If the sighting was observed at starboard side.

Angle: The estimated angle from the bow of the ship to the sighting. This estimate should be made at the moment the sighting is made and not after the ship has progressed along the trackline. Angleboard readings should be used whenever possible.

Distance: Record the estimate of the radial distance (to the nearest 01. nmile) from the ship to the sighting at the time this was made. Reticle binocular readings should be used whenever possible.

Dimension (metres)							
Track				Cross-track			

Estimate the dimensions of the swarm size in meters.

Shape		

Use the following classifications to record swarm shape.

1	elliptical (regular circle or ellipse)	4	annular or 'open' (clear water within outer boundary)
2	ribbon-shaped (width in one direction at least 10x greater than at right angles)	5	amorphous or 'amoeboid' (shape too irregular to fit any of above categories)
3	crescent	6	extensive (swarm too large to be able to discern shape)

Colour		

Record using the following codes:

1	bright red	4	dull orange or orche
2	dull red	5	brown
3	bright orange	6	green/brown – almost indistinguishable

Notes

Record associated wildlife and any other observations here

16. TELEMETRY FEASIBILITY RECORD

Form No.: T E	This is the serial number for this record. Numbering should start at 001, increasing consecutively each day
Year: 0 9 / Month / Day	Record the date as year, month, day e.g. 6 January 2009 is 010109
Sight. No	Record the same sighting number that is on the Sighting form.
Species / Code	Insert the species name and code from the sighting form.
Best estimate of school size	Insert the number of best estimate of the number of animals in the group
No. photographed	Record the number of whales in the school that were filmed/photographed
Latitude: Degrees / Minutes / N/S (. S)	Provide the latitude at the closest approach
Longitude: Degrees / Minutes / E/W (. E)	Provide the longitude at the closest approach
Tape number	Give the video tape number.
Taping: Hour / Min. / Sec — Start / Finish	Give the time the videotaping *session* starts and finishes to the nearest second
Vessel's speed	Record speed of vessel during close approach in knots

Relative heading (| |)

Record heading of vessel relative to whale(s). e.g. record heading: (1) from behind; (2) from side; (3) head-on. If you need more codes then consult with the Cruise Leader

Beaufort ( )

This is sea state as described in the Beaufort scale. I am assuming that 4 represents the very maximum one might even contemplate telemetry work!

0	Flat (wind speed 0 knots)
1	Ripples without crests (1-3)
2	Small wavelets. Crests of glassy appearance, not breaking (4-6)
3	Large wavelets. Crests begin to break; scattered whitecaps (7-10)
4	Small waves (11-16)

Swell ( )

This is the swell height as described in the International Scale.

Scale	Swell	Wavelength	Height
0	None		
1	Low	Short/average	<2m
2	Low	Long	<2m
3	Moderate	Short	2-4m
4	Moderate	Average	2-4m
5	Moderate	Long	2-4m

Closest distance (| |)

Provide the closest distance to which you approached the animal in metres

Distance from ice (| |)

Note the distance from pack ice

Ice type (|)

If appropriate, use the codes given on page 56

Conce-ntration (|)

Record the mean ice concentration (in tenths) of the pack ice.
Use the following codes in special circumstances

66: Unknown; 77: Not applicable; 88: Too variable to classify

Duration of approach (| | |)

Record total duration of research time allocated for the approach. (Minutes and sec.)

Opp.

Record an assessment of the opportunity of approach i.e. your qualitative assessment as to whether you think that the approach might have resulted in a tagging attempt:

1= excellent; 2=good; 3=poor

Ship reaction

Record any observed reaction of an individual (or of the entire group if appropriate) to the approach of the ship. Use the following codes (if more than one code is appropriate, record the most obvious and note the other codes with an explanation at the bottom of the form) :

1	No observed reaction	6	Surface activity (e.g. breaching) or swimming speed changed
2	Active avoidance when > 0.5 n.miles away		
3	Active avoidance when <= 0.5 n.miles away	7	Other reaction (record in remarks)
4	Active attraction when > 0.5 n.miles away	8	Undetermined
5	Active attraction when <= 0.5 n.miles away	9	Not recorded

School compact

Record the compactness of the undisturbed school.

1	All animals within 5 body lengths (BL) of another school member	5	Animals dispersed
2	Most animals within 5 BL of another	6	Animals widely dispersed (>1.0 n.miles^2)
3	All animals within 5 BL of another	7	Animals v. widely dispersed (> 3 n.miles^2)
4	Most animals within 5 BL	8	Undetermined (i.e. unsure what to put)
		9	Not recorded (i.e. you forgot!)

School dynamics

Record any observations of the dynamic structure of the group.

1	No change during entire observation period	6	Individual leaves group
2	School disperses into small number of subgroups of large relative size	7	Other
3	School dispersed into numerous subgroups of small relative size	8	Not determined (as above)
4	Subgroups merge	9	Not recorded (as above)
5	Exchange of individuals between schools/subgroups		

General behaviour

Record the most dominant behaviour observed within the school.

1	Slow travel	4	Resting	7	Sexual
2	Fast travel	5	Feeding	8	Undetermined
3	Milling	6	Social	9	Not recorded

For more information see the codes given for the sightings form

Comments

Put any additional comments here.

Appendix

1 Antarctic Blue whale
2 Fin whale
3 Sei whale
4 Minke whale (Antarctic)
5 Sperm whale
6 Bryde's whale
7 Humpback whale
8 Right whale
9 Unidentified whale
10 Killer whale
11 Ziphiidae
12 Pilot whale
13 Cruciger dolphin
14 Southern right whale dolphin
15 Unidentified dolphin
16 Unidentified cetacean
17 Risso's dolphin
18 Striped dolphin
19 Common dolphin
20 Spotted/long snouted dolphin
21 *Lagenorhynchus* sp.
22 Dusky dolphin
23 Bottlenosed dolphin *T. truncatus*
24 Southern bottlenosed whale
25 Arnoux's beaked whale
26 Rough toothed dolphin
27 Heaviside's dolphin
28 Fraser's dolphin
29 Spotted dolphin
30 Long snouted dolphin (spinner)
32 False killer whale
33 Pygmy killer whale
34 Melon headed whale
35 Cuvier's beaked whale
36 Gray's beaked whale
37 Layard's beaked whale
38 *Mesoplodon sp*.
39 'Like minke'
40 'Like Bryde's whale'
41 Long finned pilot whale
42 Short finned pilot whale
43 'Like striped dolphin'
44 Dwarf sperm whale
45 Pygmy sperm whale
46 Bottlenosed dolphin *T. aduncus*
47 Humpbacked dolphin
48 Blainville's beaked whale
49 True's beaked whale
50 Pygmy right whale
52 Dwarf/pygmy sperm whale
54 Hectors beaked whale
55 Spectacled porpoise
56 Pygmy blue whale
58 Commerson's dolphin
59 Peale's dolphin
60 'Like sei whale'
61 'Like southern bottlenosed whale'
62 'Like sperm whale'
63 Unidentified small whale
64 Unidentified large baleen whale
66 'Like fin whale'
68 'Like cruciger dolphin'
70 Killer whale type A
71 'Like humpback whale'
72 Killer whale type B
73 Unidentified large whale
74 Dwarf minke whale
75 Harbour porpoise
76 Unidentified small cetacean
77 'Like pilot whale'
78 'Like northern bottlenosed whale'
79 Killer whale type C
80 Tasman beaked whale
81 Baird's beaked whale
82 Pacific white sided dolphin
87 Stejneger's beaked whale
89 Dalli type Dall's Porpoise
90 'Minke, Like dwarf'
91 'Undetermined minke whale'
92 'Minke, Like Antarctic'
94 'Like blue'
95 'Like right whale'
96 'Blue, like pygmy'
98 'Blue, like Antarctic'
99 'Undetermined blue'