

11. Line transect data collection

Study objectives

- Why does abundance need to be estimated
 - Approximate first idea of numbers?
 - Input to conservation/management plan?
 - One-off survey or part of a series?
 - Relative or "absolute" abundance?
- Area
 - Large as possible or specific area (e.g. Marine Protected Area)?
- Species
 - One target species or multi-species survey?

Factors to be considered - 1

- Ship or aircraft?
 - Availability
 - Cost
 - Efficiency
 - Logistics
 - Coastline/islands
 - Other considerations
 - Observers
 - Training
 - Capacity building
 - Towed acoustics
 - Additional data

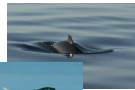
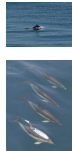
Factors to be considered - 2

- Platform-related
 - Survey speed
 - Altitude (aircraft)
 - Position of observers
 - Equipment
- Environment-related
 - Sea conditions
 - Swell
 - Glare
 - General weather
- Observer-related
 - Experience
 - Fatigue
 - Visual acuity



Factors to be considered - 3

- Animal/sighting-related
 - Animal size
 - Group size
 - Single animals, small groups, large groups, all of these?
 - Group composition/structure - **what is a group?**
 - Speed of movement (random)
 - Relative to vessel speed
 - Movement in response to the vessel?
 - Avoidance or attraction?
 - Cues
 - Highly visible, cryptic, both?
 - Availability on the transect line
 - Perception on the transect line



} Shipboard only

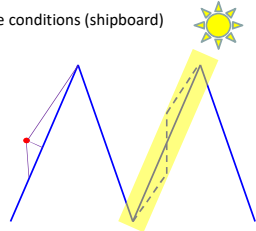
Establishing a data collection protocol

- Searching effort
 - Data to be collected
 - Limits to searching conditions (sea conditions, visibility, etc)
 - Areas searched by observers
 - Observer rotation
- Sightings
 - Passing mode vs Closing mode
 - Minimum data required at each observation
 - Method of distance and angle measurement
 - Additional data (e.g. animal behaviour, presence of calves)
- Ancillary data
 - Non-cetacean observations
 - e.g. birds, fish, turtles, human activities
 - Oceanographic data (shipboard)
 - Photo-id of selected species (shipboard)



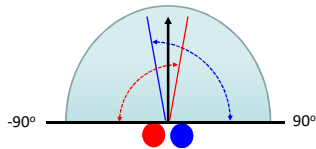
Effort data - survey track

- Follow the designed transects
- Record time/position frequently
- Deviations from the transect lines
 - Closing on animals after detection
 - Return to transect
 - Set course for waypoint
 - Minimising effects of adverse conditions (shipboard)
 - Swell
 - Glare



Effort data - observer search pattern (shipboard)

- One observer
 - Searches ahead of the vessel from -90° to 90° (180° sector)
- Two observers
 - Each observer searches from 90° on his/her side to $\sim 10^\circ$ on the other side of the trackline
 - Ensures good coverage of the trackline



Effort data to be collected

- Vessel/aircraft name/number
- Search platform height (ship) or altitude (aircraft)
- For each effort record
 - Date
 - Time
 - Position (GPS: latitude and longitude)
 - Searching effort mode
 - On/off effort
 - One side only?
 - Single/double team
 - Observer names
 - Searching conditions
 - Beaufort
 - Swell
 - Glare
 - Visibility

New effort record when any of these change

Sightings data to be collected

- Time
 - Angle and distance
 - Position (lat, lon)
- } Immediately

- Cue (splash, fin, blow, etc)
- Observer/position
- Aspect (direction of travel of animals - shipboard)
- Species
- Group size
- Animal behaviour
- Presence of calves

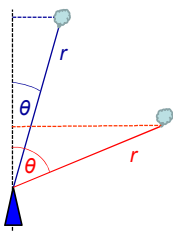


Sightings data collection protocol

- Passing mode
 - Continue along transect line
 - Record species and group size as soon as possible
 - Return to on-effort searching mode
 - Or continue searching throughout?
- Closing mode
 - Approach animals
 - Record species and group size
 - Collect any additional data (animal behaviour, photo-id, etc)
 - Return to on-effort searching mode
 - Either return to transect or towards waypoint

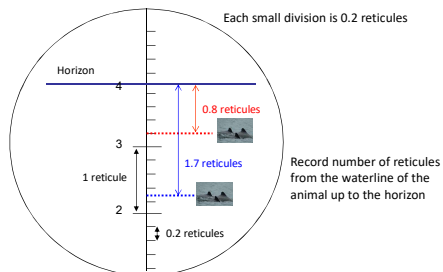
Sightings data – measuring angles (shipboard)

- Very important to collect accurate angle data
 - Angle measurements have biggest effect on perpendicular distance close to the trackline
- Angle boards
- Webcams on binoculars



Sightings data – measuring distances (shipboard)

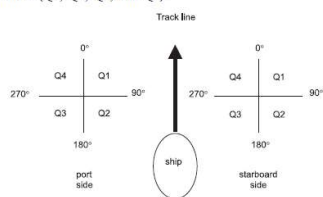
- Also important to collect accurate distance data
- Binoculars with reticules
- Measuring stick



Sightings data – aspect (shipboard)

- Direction of travel of animals when first seen
 - With respect to the trackline
- Potentially useful for exploring responsive movement

Fig. 1. Illustration of definition of swimming directions and quadrants (Q1, Q2, Q3, and Q4).



Palka and Hammond (2001). Can. J. Fish. Aquat. Sci. 58: 777-787

Sightings data - group size

- Consider how best to count animals
 - Depends on species, size of group, etc
- Low – best – high
- Mixed species groups
- Sub-groups
- Age/sex classes
- Number of calves



Data logging software

- Using a data logging program is important:
 - To maintain data collection protocol
 - To ensure accuracy of data
- One program for shipboard data collection is **Logger**
 - International Fund for Animal Welfare (IFAW)
 - Distributed by Marine Conservation Research

<http://www.marineconservationresearch.co.uk/downloads/logger-2000-rainbowclick-software-downloads/>

Summary

- Strict data collection protocol essential
- Data should be as accurate as possible
- Inaccurate data:
 - Decrease precision of estimates of abundance
 - Can lead to bias
 - Species identification
 - Group size
 - Angles and distances

Practical exercise – “real” data collection and analysis

- Practical exercise
 - Data collection in the field
 - Enter data into DISTANCE
 - Analysis of data
 - Interpretation of results
- Estimate the abundance of plastic “wall plugs”
- In a football field