

Report from the IWC Vessel strike Data Standardization Group

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Background

During the IWC/58 Annual Meeting in St.Kitts&Nevis, the Scientific Committee established a group to prepare a standardized database template to record vessel collisions with cetaceans, with the ultimate aim of developing a global data repository. The Commission also endorsed the recommendation from the Committee. KVV was appointed convenor of the “Vessel Strike Data Standardization Group”, an intersessional Email group that would report back to the SC at IWC/59 (the present report).

Although there have been previous attempts to draw together international data on collisions between whales and vessels (e.g. Laist *et al.* 2001; Jensen and Silber, 2003; Van Waerebeek *et al.*, 2006) these authors had to spend considerable effort in collating information from varied sources, interpreting differing definitions for apparently the same variables. Current sample sizes are also small and biased towards those areas and countries where reporting systems currently exist (e.g. Weinrich, 2005; Félix and Van Waerebeek, 2006). Laist *et al.* (2001) and Jensen and Silber (2003) combined found 294 records of collisions between vessels and large whales of which 47 provided information on the vessel speed estimate and the severity of injury to the whale (Vanderlaan and Taggart, 2006). Van Waerebeek *et al.* (2006) in a preliminary review identified 78 collision records with small cetaceans worldwide.

The obvious utility of a global database of vessel strike events has been raised in several technical papers (e.g. ACCOBAMS, 2005; Van Waerebeek *et al.*, 2006). The CMS/ACCOBAMS Workshop on Large Whale Ship Strikes in Monaco in November 2005 made a specific recommendation for the development of an international database. Currently available estimates of collision rates are thought to not reflect true incidence of mortality and severe trauma, both due to significant underreporting but also because hits by large vessels often remain unnoticed by crew members (Panigada *et al.*, 2006; Félix and Van Waerebeek, 2005). A comprehensive database with both biological and vessel information could hopefully be used to model specific probabilities of collision and of bow-draping (where the whale becomes stuck on the bow), hence allow better estimates of true mortality rates, as well as point to causative factors and unsuspected global hotspots of collisions.

The SC considered that in the first instance, particular attention should be given to the standardisation of variables and data quality control before proceeding with a discussion of organisational issues like how an actual database would function, its access and overview.

Terms of reference

The Vessel Strike Data Standardization Group’s terms of reference were “to develop a process by which data provided from a range of sources could be stored in a database in a standardised way that clearly identifies the level of (un)certainty in the data. However, there is at this stage no decision on how and by whom such a database would be operated. A report will be available for review by the SC at IWC/59 and this will include a proposal for a draft structure of a ship strikes database”.

Methodology

Initially the work of the group consisted in drafting and agreeing on a set of necessary parameters that can accurately document both biological and maritime aspects of collision events. A list was compiled containing 143 variables arranged in ten categories (status, specimen onshore/at sea, collision time/space, incident at sea, environmental conditions, vessel information, navigation info at collision, general navigation info, whale stuck on bow, report vessel) that typify each vessel strike record. The group recognized that in the majority of cases, data on many of these parameters would be incomplete. However, it was felt useful to maintain a comprehensive list to ensure that as much information as possible was recorded. Leaper created an initial relational database

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design in Microsoft Access based on this list of parameters for consideration by the group. Comments from group members were incorporated into the version now available from the Secretariat and on the web site at [...]. The main focus of the design was on collecting and storing information in a way that would allow easy extraction of data relevant to the priorities of the IWC in the future.

Database design

A key element of the MS Access database design is the use of standardised lookup tables wherever possible to allow for simple queries based on these categories. An important consideration is also that there may be multiple reports of the same event. For example an incident may be reported at sea, the carcass may be subsequently spotted by a passing ship and later strand on shore. In some circumstances such duplicates may be identified with certainty, in others there may only be weak evidence linking different observations. The thinking behind the database structure is that each incident at sea resulting in a reported interaction between a whale and a vessel has a unique record number. This is linked to other records with particular information according to the structure in figure 1. For the sake of a simple database design it was assumed that a specimen stranded on shore would only be entered into the database once and that an incident at sea would also be entered only once. However, the database allows for multiple reports of floating carcasses or injured animals seen at sea.

There still remains an issue of assigning links where these are not certain. For example, if several strandings occur in a period following an observation of a carcass at sea there may be some uncertainty which, if any, of the strandings resulted from the at sea carcass. If the database is to be used to estimate total mortality from vessel collisions then these issues will need to be addressed. The problem is somewhat similar to mark-recapture estimates with uncertain matching. Where there is any doubt that separate reports were from the same incident, the user is asked to create a new record. If subsequent examination shows these records to be duplicates then that is easily handled in the database. The opposite case of reports being incorrectly included as the same incident is much more difficult to unravel.

The database consists of five separate raw data tables plus some lookup tables for contact details, vessel details and species names. The raw data tables are *Record Manager* which contains a unique record for each potential incident with links to other reports in *Incident at sea*, *Specimen on shore*, *Specimen at sea* and *Whale stuck on bow* tables.

The current complexity of the data entry forms may be off-putting to people without a scientific background. However, if desirable, it would be possible to generate simpler versions of these forms that still fed into the same main database structure. Further work is also planned to generate additional pop-up guidance notes for each data entry field. An example of one of the data entry forms (Specimen on shore) is shown in figure 2.

Global database

Obviously a discussion at some point should evolve (involving e.g. IWC, CMS-ACCOBAMS, IMO, SPREP,³ etc. as well as individual IWC Parties) on whether a centralised global database will be established, or whether there should be a series of regional, or even national, compatible databases. Either way, combining data sets will be greatly facilitated by using the same basic design. Nonetheless, the most appropriate approach appears to be having an intergovernmental organization to act as a formal repository for a global database. The main argument for the IWC to assume this role is its specialist Scientific Committee. However, not all maritime nations are IWC Parties and non-members may not be able, or willing, to contribute with vessel strike data. The International Maritime Organization (IMO) as a UN convention has the advantage of global membership but does not have a scientific committee nor a tradition of managing similar databases. CMS would also be hampered by the fact that some of the most important maritime nations with large fleets are not CMS Parties. National data subsets of incidents in EEZ zones could be compiled in the internationally agreed format ensuring full compatibility between subsets, and checked for accuracy by respective national authorities or regional IGOs (eg. ACCOBAMS for the Mediterranean). The subsets could then be submitted to be added to the global database after its managers have verified standardization and general compatibility.

Acknowledgements

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³ SPREP: South Pacific Regional Environment Programme (See <http://www.sprep.org/sprep/about.htm>).

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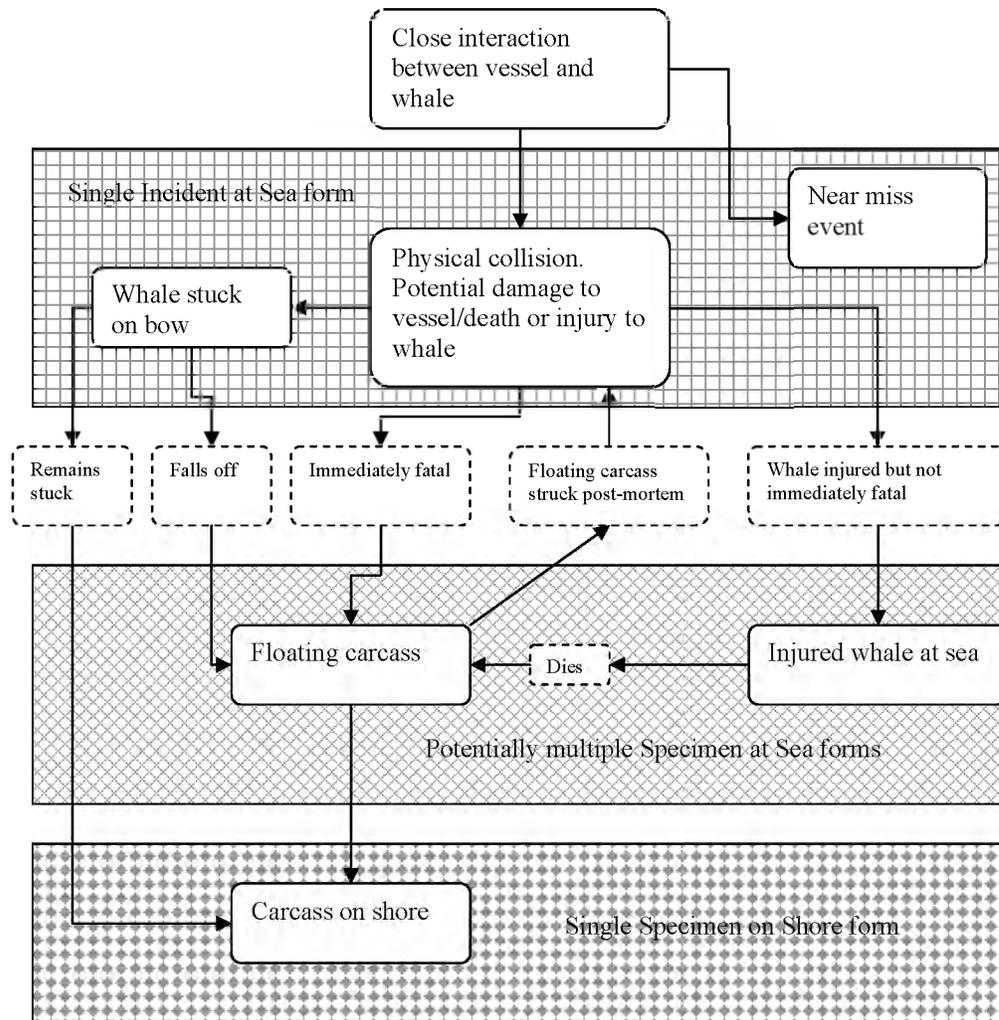


Figure 1. Flowchart of events following initial interaction with vessel which may be recorded in different tables in the database.

The screenshot shows a data entry form for a specimen on shore. The form includes the following fields and values:

- Date:** 25/03/1996
- Date (descriptive):** (empty)
- Condition:** Fresh
- Large area:** NE Atlantic (Senegal)
- Small area:** Dakar port
- Latitude:** N/S
- Longitude:** E/W
- Origin of carcass:** Recovered from bow
- Tissue sample available:** Yes
- Estimated body length (m):** 12
- Estimated by whom:** Dr Papa Ndoye
- Age class:** Immature
- Age class determination:** (empty)
- Sex:** (empty)
- Standard body length (m):** 0
- Species (scientific):** *Balaenoptera borealis*
- Species (local name):** sei whale
- Species identification:** Confirmed
- Identified by:** K/VW
- Diagnostic morphological characteristics:**
 - arched rostrum with downturned tip
 - single rostral ridge
 - two black baleen plates with very fine, white bristles (samples)
 - high falcate dorsal fin
 - dark grey coloration (Félix and Van Waasbeek, 2005)
- Traumatic evidence of collision:** Unreported
- Evidence of propeller hits (antennae):** apparently none
- Evidence of post-mortem collision:** A very fresh dead baleenopterid carcass is supposed to sink, so scooping up from surface is unlikely
- Photographic evidence available:** Yes
- Photo contact details:** Van Waasbeek
- Necropsy detail:** visual inspection
- Necropsy report available:** No
- Necropsy report contact:** (empty)
- Any other data:** see Félix and Van Waasbeek (2005)

Figure 2. Example of data entry form.

Appendix I – User guide

The Access database will be further improved until the SC meeting convenes. Therefore some details of certain instructions for the current version may slightly differ from what is indicated in the user guide below.

The data entry forms appear to require huge amounts of data, but don't worry if you only have very limited information. In most cases there is an option for 'Not known' and it is very helpful if you use this to show that the information is not available rather than just leaving the field blank.

When the database is opened the Record Manager form will appear. This is the starting point for all data entry. Each individual incident should have one record in Record Manager. If there is uncertainty whether two reports are of the same incident then these should be entered as separate records with appropriate comments. It is intended that data entry will be done through forms to allow lookup tables to be used wherever possible.

There are several places where the user is asked for contact details. This has to be done from a lookup table of contacts. If the contact you are needing is not in the table then there is a button to add details to the contacts table. You can then select this contact in the drop down box. Please pay particular attention to email address – the email address is used as the unique identifier for each contact. Similarly, vessel details are stored in a separate table. If you do not have these details then please just enter enough to allow the vessel to be uniquely identified (usually name and port of registry is sufficient).

Specimen forms

Specimen condition codes are given on a five point scale (see Geraci and Lounsbury, 1993), briefly: alive (1), freshly dead (2), early decomposition (3), advanced decomposition (4), bare bones or mummified (5).

Latitude and longitude should be entered according to the mask as degrees, minutes and decimals of a minute. Use leading zeros for longitude where appropriate.

There are two descriptive categories for area if you are not able to give Latitude and Longitude. These categories are especially useful for strandings. Large area refers to the general geographic location and is intended to allow anyone without local knowledge to identify the approximate location that is being described (for example: south of St.-Louis on the northern coast of Senegal). When describing an offshore event, provide the appropriate ocean province (e.g. SE Pacific, Mediterranean). Small area can be a local description that identifies the site as accurately as possible, such as the local name for a beach, inlet, cliff formation, etc., or if at sea, the small-scale name of a bay, strait, sound (e.g. Bosporus, Skagerrak, etc.). However, please note that latitude and longitude should be given wherever possible even if only approximate.

For species, the scientific name is a lookup table which also includes categories according to the level of uncertainty in identification (e.g. Unidentified baleenopterid whale). This table is a lookup to allow queries by species. The Species (local name) field is descriptive and can contain additional information such as local name or suggest possibilities for identification.

For age class determination, physical maturity (degree of fusion in vertebral epiphyses) or sexual maturity (presence/absence of corpora in ovaries, sperm in testes or lactation) categories should only be used if a sufficiently detailed examination has been possible.

Incident at sea

The date field should include a date and time according to the mask in the form dd/mm/yyyy hh:mm

If in waters within an EEZ enter the name of the country. Use "Int" for international waters. "Unknown" if not known.

Visibility. This can either be entered in the drop down Visibility box or as a rough category: Good > 5nm, Moderate 2-5nm and Poor <2nm, or as a more precise estimate of the visibility in nm in the Visibility (nm) box.

Sea state should be according to the Sea State Codes of the World Meteorological Organization (Douglas scale).

Code Figure	Descriptive terms	Height* (in meters)
0	Calm (glassy)	0
1	Calm (rippled)	0 - 0.1
2	Smooth (wavelets)	0.1 - 0.5
3	Slight	0.5 - 1.25
4	Moderate	1.25 - 2.5
5	Rough	2.5 - 4
6	Very rough	4 - 6
7	High	6 - 9
8	Very high	9 - 14
9	Phenomenal	Over 14

Whale stuck on bow

The intention with this form is to record information specific to whales that become stuck on the bows of ships in addition to the detailed information on other forms. So if information about the actual collision event is available then an Incident at Sea form should also be filled in. If the carcass is subsequently recovered for necropsy then a Specimen on Shore form should also be completed.

References

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