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Stranding record activities at the Institute of Cetacean Research

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ABSTRACT

The Institute of Cetacean Research (ICR) has been engaged in collecting and analyzing cetacean stranding records along the coast of Japan for a number of years. Stranding records are reported to the ICR voluntarily by the general public as well as staff from local governments, universities, aquariums and museums. In this document, the stranding record activities of the ICR are described briefly. A total of 4,275 individual records involving toothed and baleen whales were made during 1996–2015. Of these, 297 related to baleen whale species and 3,943 to toothed whale species. In 35 cases the species could not be determined due to insufficient morphological information or evidence from genetic analysis. When possible, samples and data have been collected from stranded cetaceans and used in different studies.

INTRODUCTION

Cetaceans can become stranded along the coast line due to a variety of reasons. They can be stranded alive or found dead after drifting to the shore. A mass stranding is defined as two or more individuals (excluding parent-calf pairs) stranded in the same location at the same time (Geraci and Lounsberry, 2005). This kind of stranding is common in a few species of toothed whales that strand in groups of 15 to 100 or more (Geraci and Lounsberry, 2005). There are records of at least 19 species of toothed whales and four species of baleen whales related to mass stranding events (Martin et al., 1990). While mass stranding is generally rare in baleen whales, one exception is the mass stranding of sei whales that occurred in the Chilean Central Patagonia region in early 2015 (Häussermann et al., 2017).

As a review study by Sergeant (1982) shows, there are a variety of possible reasons for stranding. Cetaceans can drift to the shore as a result of natural death. In many cases, calves separate from their parents and become stranded. In other cases, animals can be stranded due to weakness or diseases. Some of the diseases are caused by virus (Hinshaw et al., 1986; Groch et al., 2020), bacteria (Guzmán-Verri et al., 2012), or parasite infections (Bowater et al., 2003). In addition, whales may become lost due to the influence of wind, tide, or ocean currents and become beached or drift into harbors. In some cases, whales have been stranded because of man-made causes, such as entanglement or ship strike. The mass stranding of beaked whales has been related to mid-frequency active sonar (Piantadosi and Thalmann, 2004; Bernaldo de Quirós et al., 2019). Further, some mass stranding events have been related to the geomagnetic field.

Cetacean stranding provides biologists with a wide range of information. This includes genetic samples for addressing taxonomic questions (Wada et al., 2003; Yamada et al., 2019; Rosel et al., 2021), and biological samples for pathological (Hinshaw et al., 1986; Bowater et al., 2003; Guzmán-Verri et al., 2012) and environmental pollutant studies (Law et al., 2012; Bowater et al., 2003; Garcia-Cegarra et al., 2021). Also, data and samples have been used in population studies (Peltier et al., 2012; 2013). Necropsies provide information to ascertain possible causes of death. A recent study based on stranding investigated microplastics ingestion (Burkhardt-Holm and N’Guyen, 2019). Analyses of stranding data allow the assessment of the impact of human activities on cetaceans (e.g., fishing gear entanglement, ship strikes, etc.).

In this document, the stranding record activities of the Institute of Cetacean Research (ICR) are described briefly.

STRANDING RECORD HELD AT THE ICR

Network

ICR has been collecting whale stranding records along the coast of Japan for a number of years. Stranding events can be reported by volunteers from the general public, local governments, universities, aquariums and museums. There is an established protocol and as well as a data sheet form available for providing stranding information to the ICR.
Protocol for data recording and species identification

The objective of this protocol is to facilitate and standardize the collection of data and samples from stranded animals. Such samples and data can be useful in understanding the reasons for the stranding as well as being useful in different research activities. The data sheet in Appendix 1 is a key part of the protocol, and show the basic items on data and samples to be collected. This form should be completed for each stranding event. Collection of samples are avoided when animals are found alive or when there are any safety concerns (Ishikawa and Ogino, 2001).

The collection of genetic samples is important because subsequent genetic analyses allow the confirmation of the species identity of the stranded animal. Furthermore, such genetic samples can be added to a larger collection of samples at the ICR, contributing to other studies such as taxonomy and stock structure of the species involved.

Database

The basic information of stranding events recorded in the form in Appendix 1 is stored electronically in an Excel file. When the exact location in terms of latitude and longitude is not provided, geographic coordinates are assigned using geocoding from the address submitted. Only the cases where the species identity has been confirmed are added to the Excel file. The Excel file is updated annually and is uploaded to the ICR site https://www.icrwhale.org/zasho2.html (accessed 2021-09-30).

Sample storage

Samples for genetics analysis are kept in 99% ethanol in a sealed bottle that is pre-labeled and stored at room temperature (Figure 1). Other types of samples are kept in a frozen state.

NUMBER OF STRANDING EVENTS

Between 1996 and 2015 a total of 4,275 cetacean individuals were recorded in the ICR database related to stranding events (Table 1). Most of the cases corresponded to toothed whales.

EXAMPLES OF STRANDING RECORDS

The first example is on a large baleen whale found stranded on 1 April 2003 at Hitachi City, on the Pacific coast of Ibaraki prefecture, Japan (36°39ʹN, 140°42ʹE). Local authorities towed the carcass (via sea) to a sandy shore area within the Kawajiri Harbor, where the whale was buried. Prior to burial, however, biological research was conducted by staff of the Ibaraki Prefectural Oarai Aquarium, Ibaraki Nature Museum, National Museum

![Figure 1. Storage samples for genetics analysis.](image)

Table 1

<table>
<thead>
<tr>
<th>Suborder</th>
<th>Family</th>
<th>Events</th>
<th>Individuals</th>
<th>Genetic samples (percentage of individuals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mysticeti (Baleen whales)</td>
<td>Balaenidae</td>
<td>7</td>
<td>7</td>
<td>6 (85.7)</td>
</tr>
<tr>
<td></td>
<td>Balaenopteridae</td>
<td>264</td>
<td>264</td>
<td>115 (43.6)</td>
</tr>
<tr>
<td></td>
<td>Eschrichtidae</td>
<td>4</td>
<td>4</td>
<td>2 (50.0)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>22</td>
<td>22</td>
<td>6 (27.3)</td>
</tr>
<tr>
<td>Odontoceti (Toothed whales)</td>
<td>Delphinidae</td>
<td>577</td>
<td>1,357</td>
<td>86 (6.3)</td>
</tr>
<tr>
<td></td>
<td>Kogiidae</td>
<td>143</td>
<td>156</td>
<td>24 (15.4)</td>
</tr>
<tr>
<td></td>
<td>Phocoenidae</td>
<td>1,763</td>
<td>1,777</td>
<td>161 (9.1)</td>
</tr>
<tr>
<td></td>
<td>Physeteridae</td>
<td>123</td>
<td>139</td>
<td>27 (19.4)</td>
</tr>
<tr>
<td></td>
<td>Ziphiidae</td>
<td>259</td>
<td>265</td>
<td>75 (28.3)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>235</td>
<td>249</td>
<td>15 (6.0)</td>
</tr>
<tr>
<td>Unknown 1)</td>
<td>35</td>
<td>35</td>
<td>1 (2.9)</td>
<td></td>
</tr>
</tbody>
</table>

1) The cetacean could not be identified to the family level because extreme decomposition and/or lack of genetic samples.
of Nature Science and ICR. The procedure followed the protocol and the Stranding Recording Form (Appendix 1) was used to take photographs and collect biological tissue samples (Figure 2).

The whale was morphologically identified as a male North Pacific right whale with a body length of 12.95 m and body weight of approximately 33,000 kg. Three years after its burial, the carcass was cleaned, and the skeleton, together with relevant information, were displayed for educational purpose at the Ibaraki Prefectural Oarai Aquarium in January 2006.

The second example is that of a whale found stranded on 14 May 2015 in a decomposed state in the city of Taka-hagi (Figure 3). Ibaraki Prefectural Oarai Aquarium investigated the carcass and completed the sheet in Appendix 1, which was sent to ICR together with a skin sample for genetic analysis. The length of the whale was 4.6 m. Due to the advanced state of decomposition, only subsequent mitochondrial DNA (mtDNA) analyses were able to identify the animal as a North Pacific common minke whale.

Genetic analyses on stock structure have been conducted based on genetic samples from stranded whales. For example, Pastene et al. (in review) used mtDNA analyses for investigating the stock structure of western and eastern North Pacific right whales. The western samples included a number of stranded whales along the Japanese coast. Results of the analyses were consistent with the hypothesis that separate populations inhabit the eastern and western North Pacific Ocean respectively.

As shown in these cases, genetic samples from stranded animals make valuable contributions to the genetic analyses for species identification/confirmation, and to studies on stock structure.

![Figure 2](image1.png)  
**Figure 2.** Investigation of a stranded North Pacific right whale.

![Figure 3](image2.png)  
**Figure 3.** A stranded baleen whale. Subsequent genetic analyses identified the animal as a North Pacific common minke whale.
ACKNOWLEDGEMENTS

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REFERENCES


Appendix 1.

Stranding Reporting Form

* This form is designed to record one whale per sheet.
To record multiple individuals at the same time, please use separate sheets.

OBSEVER NAME ____________________________________________

AFFILIATION ____________________________________________

ADDRESS ____________________________________________ TEL________

STRANDING TYPE  1. Beached / Drifting at sea  2. Bycatch  3. Entering river or harbor
* Please fill in the applicable number.

COMMON NAME ____________________________________________ No. of Whales________

* If you have determined the species, please describe the distinctive features.

SEX  1. Male  2. Female  3. Unknown________
* Please fill in the applicable number.

DATE Year_______ Month_______ Day_______ Hour_______
1. Sighting  2. Observation
1. Alive  2. Dead  3. Unknown________
* Please fill in the applicable number.

LOCATION ____________________________________________

STRANDING SITUATION
* Please provide any additional information on the situation when the animal was found.
In case of death, please describe the condition of the corpse.

ANIMAL INFORMATION
Body length (Measurement 1 on the reverse side. Measurement method used) __________
Body weight (Measurement method used) __________
External features
1. Body color  2. Baleen plate/ tooth  3. Snout (Shape of the tip of the head)  4. Dorsal fin
5. Notch of flukes (Presence / Absence of the notch; reverse side of the page)
6. Throat / Ventral grooves (reverse side of the page)  7. Color pattern of flipper  8. Other features

PHOTOGRAPHS TAKEN
1. Full body  2. Head  3. External genital organs  4. Other
* Please fill in the applicable number. If possible, attach any photographs.

SAMPLES COLLECTED ____________________________________________ * Yes / No

Detail (Organ / Storage / Owner) ____________________________________________

REMARKS ____________________________________________

CARCASS DISPOSAL ____________________________________________


MORPHOLOGICAL MEASUREMENTS
* Please use this side as an aid when the observer makes measurements.

The ownership of the measurement data belongs to the measurer and the Institute of Cetacean Research. If the data recorded by the Institute of Cetacean Research are used by other researchers, the consent of the measurer must also be obtained.

1. Tip of snout – Notch of flukes
2. – Base of beak
3. – Angle of gape
4. – Blowhole
5. – Center of eye
6. – Center of ear
7. – Base of flipper
8. – End of ventral grooves
9. – Posterior tips of dorsal fin
10. – Umbilicus
11. – Center of reproductive aperture
12. Tip of snout – Notch of flukes
13. Dorsal fin, length of base
14. Dorsal fin, vertical height
15. Flipper, boundary length of lower border
16. Flipper, boundary length of posterior
17. Flipper, maximum width
18. Width of flukes
19. Flukes, width at insertion
20. Girth of buttock, half
21. Girth of abdomen, half
22. Baleen plate / Tooth, maximum height
23. Baleen plate / Tooth, maximum width

* Please indicate all length measurements in centimeters. Please measure parallel to the body axis.

24. # Tooth
Upper left
Upper right
Lower left
Lower right

25. Body weight

Toothed whales, dolphins, and porpoises

Baleen whales

* Be aware of the possibility of an impacted tooth.