

Field protocols for entanglement scarification studies

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Background

Entanglement in fishing gear is a source of injury and mortality for cetaceans. However, the frequency of events, risk factors, and biological impacts remain poorly understood, especially for large whales. Entanglements produce injuries that can be reliably detected even after gear is removed or shed. By systematically photographing and analyzing the insertion point of the flukes and tailstock, it is possible to estimate the entanglement rate in fluking species such as humpback whales. The following is a description of how to collect the images that are most useful to entanglement scarification studies.

Field protocol

Images should be taken when alongside the whale and ahead of its flukes at the time of the terminal dive. The photograph should capture the insertion point of the flukes, the leading edges and the posterior peduncle (Figure 1). Photographs can be taken during right or left side approaches. Ideally, we would prefer high quality photographs of both sides of each individual. However, an individual can be included in analyses even when there is only coverage available of its right or left side. Images taken when ahead of the whale, such that both fluke blades and insertion points are well-documented, can also be informative (Figure 1c).

Angle, distance, focus and lighting all affect the probability of accurately detecting and interpreting scars and injuries that are present. The best photographs are obtained within a few body lengths of the whale, in good lighting and focus. Images taken from behind the whale, even if the angle is only slight, will be misrepresentative because the insertion point will not be visible. Examples of unacceptable images are provided in Figure 2. As in photo-identification, the quality of the focus can sometimes overcome issues of distance, provided that the features of interest can be adequately enlarged. An ideal enlargement of the leading fluke edge, insertion point and posterior tailstock should together be full frame and in good focus.

The best collection procedure is to take a lateral (dorsal fin) photograph to identify the whale as it prepares to dive and then turn to take the picture of the flukes and peduncle as the tail is raised. A dorsal fin photograph is helpful for confirming a correct link between images collected from the left and right sides of the same individual. Data collection is particularly compatible with flank biopsy sampling, as the photographer is

generally in the proper position. However, the features of interest should be photographed whenever they are available.

It is vital that images be collected whenever the photographer is in proper position to the whale at the time of the terminal dive. Photos should be collected automatically, without any regard for whether or not injuries are observed in the field. An interest in injuries in the field will lead to missed sampling opportunities and a likely bias toward scarred whales. It is inevitable that injuries will be occasionally noticed at sea, and coverage of severe or unusual injuries can be helpful. However, if any preferential efforts are made to document observed injuries or scars, then these must be well-documented in the notes so that the images do not inadvertently bias the sample toward whales with entanglement injuries.




Review of essential points

- 1) Photograph the insertion point of the flukes whenever presented, irrespective of visible scars or injuries.
- 2) Collect the photographs when positioned ahead of the raised flukes, and from both sides if possible.
- 3) Collect a lateral (dorsal fin) shot of the individual for identification purposes, preferably as part of the same sequence.
- 4) Pay close attention to angle, focus, distance and lighting
- 5) Make note of any specific efforts to photograph entanglement-related injuries in the field.
- 6) Contact Jooke Robbins (jrobbins@coastalstudies.org) with any questions.

Figure 1: Examples of images suitable for analysis. These are the perspectives of the posterior caudal peduncle and insertion point that can be documented routinely and systematically. These images are not cropped, but the image size is reduced for presentation purposes.

	<p>a) This is the ideal distance and angle, although images taken by a photographer farther ahead of the whale would also be helpful.</p> <p>Image: PCCS/NOAA permit #633-1778</p>
	<p>b) Images taken at greater distances can be useful, provided that they are sharp enough to be enlarged and at the appropriate angle.</p> <p>Image: PCCS/NOAA permit #633-1778</p>
	<p>c) Images that show the insertion point of both sides simultaneously can be helpful, especially in combination with other images.</p> <p>Image: PCCS/NOAA permit #633-1778</p>

Figure 2: Examples of images that are not suitable for entanglement scar analysis. These images are not cropped, but the image size is reduced for presentation purposes.

 A photograph of a whale's tail fluke as it surfaces, with a large spray of water being thrown from the top edge. The whale is dark, and the water is blue with white foam from the splash.	<p>a) The distance from the subject is adequate, but the photographer is too far behind the flukes to capture the relevant features.</p> <p>Image: PCCS/NOAA permit #633-1778</p>
 A wide-angle photograph of a whale's tail fluke in the middle of the ocean. The whale is small in the frame, and the background is a vast expanse of blue water under a clear sky.	<p>b) This image is too distant from the whale and also taken from too far behind the flukes to be useful.</p> <p>Image: PCCS/NOAA permit #633-1778</p>
 A close-up photograph of the top of a whale's tail, showing the dark, rounded shape of the caudal peduncle. The whale is moving through the water, creating white foam around its base.	<p>c) This image does not show the parts of the caudal peduncle of greatest interest. It might be useful for some purposes, but is not adequate for entanglement scarification studies on its own.</p> <p>Image: PCCS/NOAA permit #633-1778</p>