

Veterinary Review of Gray Whale (*Eschrichtius robustus*) PTT 197158 “Chocolate”.

March 24 2021.

F.M.D. Gulland Vet MB, PhD., Research Associate, University of California, Davis, CA 95616.

Email: fmdgulland@ucdavis.edu

A gray whale (*Eschrichtius robustus*) identified as “Chocolate” was tagged with a Type C implantable satellite tag (PTT 197158) on September 7 2020. On March 24 2021, a series of photographs of this whale were reviewed to provide a clinical assessment of the animal by a veterinarian. Here I provide a summary of my interpretation of the photographs, and recommendations for future actions.

Photographs were reviewed to assess nutritional status (good, fair, poor or unknown) through body shape (post cranial depression, scapular prominence and visibility of dorsal groove along the vertebral column) as described in Bradford *et al.* 2012. Distribution of cyamids and presence of lesions were assessed. Each photograph with a clear image of the tag site was evaluated and given a numerical score using the criteria in Table 1. This scoring system has been used in reviewing hundreds of images of 79 humpback whales (*Megaptera novaeangliae*) in the Gulf of Maine over five years (Robbins *et al.* 2013 & 2015) and is recommended for tag site assessments in Andrews *et al.* (2019). Photographs of the contra-lateral (left side) of the whale that was not tagged were also reviewed.

Table 1: Scoring system to characterize tag site features.

| Feature | Description | Score |
|---------------------|--|--------------|
| Swelling | Localized, focal, under 30cm diameter | 1 |
| | Regional, focal, over 30cm diameter | 2 |
| | Irregular size and shape, over 30cm diameter | 3 |
| Skin loss | Up to 1 cm greater than tag diameter | 1 |
| | Up to 3 times tag diameter | 2 |
| | Larger than 3 times tag diameter | 3 |
| Exudate | Clear | 1 |
| | Blood | 2 |
| | Purulent | 3 |
| Tissue extrusion | Fresh tissue | 1 |
| | Necrotic tissue | 2 |
| Pigmentation change | Change in color of skin around tag site | 1 |
| Depression/divot | Diameter of tag or less | 1 |
| | Up to approx. 3 times tag diameter, shallow | 2 |
| | Significantly larger than tag diameter, deep | 3 |
| Cyamids in tag site | Within tag site margins | 1 |
| | Patch extending beyond tag site margins | 2 |

Table 2. Scores for photographs of “Chocolate”.

| Date of photograph | Nutritional status | Tag site score | Comments |
|--------------------|---|----------------|---|
| September 7 2020 | Good | n/a | Tag fully inserted |
| September 25 2020 | Good | 2 | Tag fully inserted, no discharge or swelling observed |
| October 4 2020 | Good | 2 | Tag fully inserted, no discharge or swelling observed |
| December 8 2020 | Cannot assess. Only dorsal ridge visible | 2 | Tag slightly extruded, one black ring visible on body of tag |
| March 16 2021 | Good | 4 | Tag further extruded, two black rings visible on body of tag. Tag surrounded by roughly circular discolored tissue, yellowish color, tissue around tag appears necrotic or granulating. |

Assessment

The nutritional condition of the whale does not appear to change from “good” during the series of photographs from September 7 2020 to March 16 2021.

Photographs taken the day of tagging show the tag was inserted into the upper third of the body on a girth approximately around the leading edge of the dorsal ridge, into the longissimus dorsi musculature. There is minimal tissue reaction to the tag deployment (no evidence of bleeding or tissue loss). Between the day of deployment and October 4, there is no obvious tissue reaction at the tag site. On December 8, the tag appears to be slightly extruded, as one black ring marking the body of the tag is evident. There is no evident tissue reaction in the photographs.

On March 16, the tag is further extruded (two rings evident on the tag body), and there is a change in the tissue around the tag. There is an irregular roughly circular patch of discoloured, yellowish skin that appears friable suggestive of necrosis or granulation. One image suggests there is mild localized swelling cranial and ventral to the tag insertion site. These changes are reflected in a change in the objective photograph score from 2 to 4 (higher scores are indicative of more tissue reaction). On the left flank of the animal, there is a swelling and area of skin covered in a yellow purulent material that is approximately opposite the tag site on the right flank. Caudal and ventral to this yellowish material is a clearly demarcated area of skin and blubber loss that is bright red, may be circular but the ventral part is covered by water, and appears to be a fresh wound.

This series of images suggest a change in the tissue response to the tag has occurred in recent weeks. The nature and cause of the lesion on the left flank and its relationship to the tag site are unclear. Several possible explanations for the observed changes include migration of fragmented tag parts across the whales’ body with a foreign body reaction extruding them, fracture of a piece of vertebra that is being extruded, development of a shearing injury at the muscle/blubber interface as described by Moore *et al.* (2013), development of an abscess due to infection of the

tag site, a distinct wound to the left side that has no relationship to the tag, amongst other possibilities.

How these lesions on the right and left side of the body will progress is unclear. The tag could be extruded by a foreign body reaction and the tag site heal, or infection could spread from any of the observed lesions and the whale develop septicaemia that could be fatal (see Figure 6 in Andrews *et al.* 2019 for potential physiological progression of tag site tissue responses). Although tag site responses similar to these observed on the right side of this whale have been observed in humpback whales in the Gulf of Maine that have later extruded tag fragments and the tag site healed, the lesions on the left side of this whale are unusual, and I have not previously observed such lesions when reviewing images of tagged whales. Without further understanding of the nature of the lesions on the left flank, I cannot predict the prognosis for this animal at this point.

Serious Injury

“Serious injury” has a regulatory meaning under the Marine Mammal Protection Act: “any injury that will likely result in mortality”, which is practically interpreted as “any injury known to result in mortality in more than 50 % of the cases”. Criteria for defining serious injuries to marine mammals were developed at a workshop in 2007 (Anderson *et al.* 2007). In this workshop report injuries to large whales that are deep external cuts or lacerations to the body are categorized as “CBD” (Cannot be Determined). If there is a possibility of a hidden injury to a vertebral process, the injury could be defined as “Serious”. Increases in cyamid load and changes in swimming and feeding behaviour are also suggestive of “Serious” injury. In this case, there is no apparent change in cyamid load, the whale is feeding and swimming, and similar tag site lesions have been observed in humpback whales in the Gulf of Maine that did not result in mortality, but in a slow foreign body reaction and rejection of the tag after 3-4 years (Robbins *et al.* 2013). The internal extent and the future progression of the lesions on this whale are currently unknown. Thus at this time (March 24 2021), I recommend classifying the injuries as “CBD” in the “serious injury” determination process. This classification could change depending upon how the lesions progress, and on data from further evaluations.

Recommendations

1. Monitor nutritional condition through photogrammetry.
2. Monitor the tag site and the lesions on the left flank through photography.
 - a. Enhance photographic assessment by using drone mounted cameras to obtain dorsal view images and determine the positional relationship between lesions on the left flank and the tag site on the right dorsum.
 - b. Continue numerical objective assessment of the tag site photographs.
3. Minimize stress to the whale by minimizing approaches for photography (at this stage potential value of collecting blow, feces or biopsies to evaluate hormone levels is unlikely to change any potential mitigation actions).
4. Evaluate the feasibility of administering intramuscular long-acting broad-spectrum antibiotics (ceftiofur) as described in Gulland *et al* (2008)– determine the availability of a PaxArms dart gun and darts, and expertise to administer the antibiotic.
5. Plan for the possibility of health deterioration and mortality by preparing expert necropsy team.

References

- Andersen, M. S., K. A. Forney, T. V. N. Cole, et al. 2007. Differentiating Serious and Non-Serious Injury of Marine Mammals: Report of the Serious Injury Technical Workshop, 10-13 September 2007, Seattle, Washington. U.S. Dep. Commer., *NOAA Tech. Memo. NMFS-OPR-39*. 94 p.
- Andrews, R., R. W. Baird, J. Calambokidis, C. E. C. Goertz, F. M. D. Gulland, et al. 2019. Best Practice Guidelines for Cetacean Tagging. *Journal of Cetacean Research and Management* 20:27-66.
- Bradford, A. L., D. W. Weller, A. E. Punt, et al. 2012. Leaner leviathans: body condition variation in a critically endangered whale population. *Journal of Mammalogy* 93:251-266.
- Gulland, F.M.D., F. Nutter, K. Dixon, J. Calambokidis, et al. 2008. Health assessment, antibiotic treatment, and behavioral responses to herding efforts of a cow-calf pair of humpback whales (*Megaptera novaeangliae*) in the Sacramento River Delta, California. *Aquatic Mammals* 34: 182-192.
- Moore, M., R. Andrews, T. Austin, J. et al. 2013. Rope trauma, sedation, disentanglement, and monitoring-tag associated lesions in a terminally entangled North Atlantic right whale (*Eubalaena glacialis*). *Marine Mammal Science* 29:E98-E113.
- Robbins, J., A. Zerbini, F. Gulland, N. Gales, et al. 2015. Evaluating the effects of satellite tagging on female reproduction in humpback whales. *21st Biennial Conference on the Biology of Marine Mammals*, San Francisco, CA.
- Robbins, J., A. N. Zerbini, N. Gales, F. M. D. Gulland, et al. 2013. Satellite tag effectiveness and impacts on large whales: preliminary results of a case study with Gulf of Maine humpback whales. *Report to the Scientific Committee of the International Whaling Commission*. SC/65a/SH05.