

Presentation Abstracts

Module 3: Tuesday, September 1st | 9:00 am – 12:00 pm

West Coast Entanglement Science Workshop, August – September 2020

<https://www.opc.ca.gov/west-coast-entanglement-science-workshop/>

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Session: Understanding the metrics for entanglement

Documentation of Large Whale Entanglements by Trained Responders – A Rare Opportunity to Learn about the Problem of Entanglement and Inform Management Efforts Towards Prevention and Mitigation

Doug Sandilands¹, John Calambokidis², Kiirsten Flynn² and Jenn Tackaberry²

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Reports of large whale entanglements provide a rare opportunity to gain insight into how whales became entangled, in what gear they became entangled, the effects the entanglement has on large whales including wounds, impediments to normal behavior and long-term health effects. Additionally, documentation collected during a response can identify the whale as an individual providing information on the whale’s life history. This information is rarely collected during public reports. In fact, using scarring images taken during entanglement responses and follow up during large whale research efforts, we know that public reports represent an extremely small fraction of the total entanglements occurring.

There will be a focus on the analysis of gear removed from entangled whales and how systematic documentation of the whale during the entanglement can allow inference of how and in what part of the gear the whale became entangled. In the coming years, these and future case studies will provide data that can inform fisheries and fisheries managers working to modify gear to prevent entanglements and mitigate the severity of entanglements to ensure that their efforts target strategies with the best chance of succeeding.

Re-sight and survival of entangled humpback whales within the California, Oregon, and Washington region using photo-identification and long-term life history data

Jenn Tackaberry, John Calambokidis, Elana Dobson, and Kiirsten Flynn | Cascadia Research Collective, Olympia, WA 98501

The recent uptick of entanglements along the coast of California, Oregon, and Washington (US West Coast) since 2015 has provided an opportunity to assess the re-sight rates of entangled humpback whales. We used photo-identification images collected from entangled animals, to examine sighting history prior to entanglement as well as after entanglement using longitudinal catalogs and life-history data (from both Cascadia and Happywhale). This information can be used to better inform management, models, and estimates of serious injury and mortality unique to the West Coast. We established a group of “control” whales seen in the same region and similar time period as the entangled whale to serve as a basis of comparison for the sighting history of entangled whales.

Key findings included:

1. Resighting of entangled whales were lower than the “control” whales.
2. Resightings of entangled whales were less likely when the region the gear was set were different than where the entangled whale was reported.
3. Entangled whales tended to have shorter histories of sightings prior to entanglement than the “control” whales possibly reflecting that entangled whales tended to be younger animals.
4. The resighting of whales post entanglement generally correlated with the original Serious Injury score assigned by NOAA with more seriously entangled whales less likely to be resighted than those with non-serious entanglements.

While the increase in entanglements along the US West Coast has been fairly recent, these findings show the value of photo-identifications of entangled whales and will dramatically increase our understanding of entanglements and survival with additional years of data.

Analysis of U.S. West Coast Large Whale Entanglement Serious Injury and Mortality Assessments

Dan Lawson and Lauren Saez, NMFS West Coast Region Protected Resources Division

All three U.S. West Coast States that manage commercial and recreational Dungeness crab fisheries are developing Conservation Plans under the Endangered Species Act to guide management of their Dungeness crab fisheries to minimize the risks of entangling ESA-listed species, including large whales. To help States to make informed assumptions about the potential impacts of entanglements on

individuals and on populations, NMFS WCR has conducted analysis of serious injury and mortality (SI/M) assessed to confirmed whale entanglements reported from the U.S. West Coast. These assessments for each entanglement are conducted by NMFS Southwest Fisheries Science Center under national criteria established to support marine mammal stock assessments. In this presentation, we present summary analysis of the SI/M assessments for 219 confirmed U.S. West Coast whale entanglements reported from 2013-2018.

The results of this analysis illustrate expectations for what the SI/M rates of entangled whales may be in the future for use predicting the population-level impacts of entanglements. In addition, these SI/M rates can be used to generate preliminary expectations for outcomes from entanglements, as they occur, to support in-season management actions or spur implementation of new management measures in advance of a formal determination of SI/M by NMFS through its formal evaluation process. These results also offer a baseline of historic impact rates that can be used to monitor the effectiveness of any management measures or changes in fishing practices that are implemented. It may also be possible this information could be used to help design new management measures that may be expected to reduce the number or severity and outcomes for entanglements based on the type/extent of injuries that have been documented in the past.

Session: Social and economic dimensions of entanglement

Social and economic considerations for addressing West Coast whale entanglements

Carrie Pomeroy, PhD, UC Santa Cruz

Fisheries are complex, integrated social-ecological system. Whale entanglements are one example of the way that social – or human – systems and ecological systems interact. Management measures and other efforts to minimize the risk of such entanglements have feedbacks throughout the social-ecological system, at multiple scales and with varying scope. While the economic costs of management measures to, and required adaptations by, fishermen are of central concern, the social and economic dimensions of managing whale entanglements entail other key considerations as well. These extend beyond fishing per se to shoreside support businesses and communities, other fisheries, and the seafood supply system. Drawing on the Socioeconomic Guidance for Implementing the California MLMA Master Plan, insights gained from service on the California Dungeness Crab Task Force, and ongoing research on the human dimensions of fisheries, this brief talk highlights some of those considerations. The questions and information needs that arise from these can be addressed by integrating available qualitative and quantitative data with the knowledge of fishery participants, other fishing community members and managers. Where information gaps are identified, additional data can be collected and “added to the mix” using appropriate qualitative and quantitative methods. Taken together, the resulting information is useful for more fully evaluating the feasibility, efficacy and implications of management for the fishery and for reducing the risk of unintended consequences for social as well as the ecological system.

Economic Impacts from Oregon Department of Fish and Wildlife Proposed Regulations for Whale Entanglement Avoidance

Shannon Davis, The Research Group and Gil Sylvia, Oregon State University

The Oregon Department of Fish and Wildlife (ODFW) proposed regulations in the Spring 2020 to lower risk of whale entanglements from interactions with vertical gear used in the Dungeness crab fishery. The regulations are intermediary until a final suite of measures are approved in an Endangered Species Act Section 10 incidental take permit (ITP) by the National Marine Fisheries Service. A humpback whale distinct population segment that transits the Oregon Coast is an ESA listed species. The Oregon Coastal Crab Association (an industry group) requested the Oregon Dungeness Crab Commission sponsor a study to determine economic impacts from the proposed regulations. We provide impact result information using an already developed interactive bio-economic model for the fishery. We offer discussions about the consequence of the prescriptive regulations given limited information about fleet capacity utilization. Finally, there is discussion about the procedural approach for gaining approval for an ITP. We advise that the approach will benefit from having a decision support tool in-place during ITP preparation and negotiations.

Developing socio-ecological indicators to evaluate management strategies to mitigate whale entanglement risk within the Dungeness Crab Fishery

Rachel Seary, NRC Postdoctoral Research Associate at NOAA SWFSC

Understanding ecosystem dynamics which lead to increased whale entanglement risk for the Dungeness Crab Fishery has benefited from the development of ecosystem indicators (measures of the status or trends in ecosystem attributes) for the California Current Ecosystem (CCIEA Team, 2020; Santora *et al.*, 2020). Management tools used to reduce entanglement risk, for example temporary area restrictions including closures due to harmful algal blooms and marine life concentrations, may have severe socio-economic consequences for stakeholders that must be evaluated at the individual fisher and fishing community level. Our research aims to develop socio-ecological indicators and objectives that could further strengthen the assessment of risk and trade-off of management options if combined with geographic-based ecosystem indicators (i.e., habitat compression and fishing depth limitations). Therefore, we would like to present our preliminary analysis and elicit feedback from the community to aid our progress towards developing socio-ecological indicators for the Dungeness Crab Fishery, specifically related to the state of the whale entanglements issue.

Previous disturbances to the Dungeness Crab Fishery, for example due to the 2015 harmful algal bloom event, demonstrated the large economic and social impacts that temporary closures can have for fishermen and throughout the wider community (Ritzman *et al.*, 2018; Moore *et al.*, 2019; K. M. Moore *et al.*, 2020; S. K. Moore *et al.*, 2020). Thus, this research will begin by investigating whether lost fishing days in the Dungeness Crab Fishery due to closures prompted by whale entanglement risk have an economic impact on the individuals participating in the fishery. This will first focus on direct revenue losses during the 2019 and 2020 crab fishing seasons. Achieving ecosystem-based fisheries management which successfully reduces whale entanglements, while promoting a healthy Dungeness Crab Fishery, along with other West Coast fisheries, will benefit from combining fishery resource databases with socio-economic indicators that derive knowledge from the fishing community.