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Pacific Whale Foundation Researchers and the Marine Mammal Research Program at University of Hawaii Announce Scientific Paper Documenting Rapid Weight-Loss in Free-Range Pygmy Killer Whales

~ Researchers utilize drone technology to document body size ~

Please find video footage and sound bites here.

MA‘ALAEA, Hawaii (April 14, 2021) – Pacific Whale Foundation (PWF), a nonprofit organization working to protect the ocean and its inhabitants for more than 40 years, led a groundbreaking study employing advanced drone technology that offers new hope in the remote study of marine wildlife in partnership with University of Hawai‘i’s Marine Mammal Research Program (MMRP) and the University of Hawai‘i’s Health and Stranding Lab. Historically, collecting accurate data on the condition and health of marine populations in the wild has challenged researchers worldwide.

On August 29, 2019, 11 pygmy killer whales, a species of dolphin, washed ashore in South Maui in a mass stranding that made headlines and inspired a flurry of scientific investigation. Of the 11, six animals were re-floated and swam back out to sea and the remaining five were

deceased. Although post-mortem examinations revealed underlying health conditions, the reason for the stranding remains unclear.

The collaborative study and corresponding scientific paper on rapid weight-loss in a segment of pygmy killer whales in Maui's Ma'alaea Bay, just published in Scientific Reports, confirm the use of Unoccupied Aerial System (UAS)-photogrammetry, or drones, effective and accurate in documenting body condition and health in free-range species.

On September 13, a few weeks after the August 29 mass stranding, six pygmy killer whales were detected within a few hundred meters of the Ma'alaea Bay's shoreline, well outside of their traditional distribution and habitat. In Hawaiian waters, this species of dolphin is typically found over 40 kilometers offshore in depths of 1,000 meters. Pacific Whale Foundation researchers used photo ID to confirm that these were new individuals not associated with the August stranding. With assistance from NOAA Fisheries Pacific Islands Regional Office's Maui Marine Mammal Response Coordinators, researchers tracked the group in nearshore shallow waters over a 21-day period. Daily monitoring of the animals revealed low energy behaviors (resting, milling, and slow movement) and tight group cohesion.

The body volumes of the six pygmy killer whales were estimated using UAS-photogrammetry over four sampling days: September 16, 23, 27 and October 3. Drone data revealed that all individuals experienced an alarming decrease in body volume over 21 days resulting from a disruption in feeding and subsequent rapid weight-loss. During the observation period, two individuals stranded on shore on September 24 and the remaining four departed the area. Post-mortem examinations of stomach contents from the September 24 stranding confirmed the disruption in foraging with evidence of having ingested a coral reef fish, leafy greens and even terrestrial plant material, an unusual and largely irregular diet for these dolphins.

"We were able to capitalize on the stranding as an opportunity to further science and collect additional research on the use of drones to assess body condition on smaller dolphin species," explains PWF Chief Scientist Jens Currie. "Using UAS-photogrammetry, we were able to document the group's deterioration over 21 days, as they were in an area not suitable for normal feeding activity."

Typically, pygmy killer whales are found in deep-shore water where they feed on deep-shore species. "Eating grass is indicative of not being accustomed to hunting in shallow waters," Currie adds. "They were essentially starving."

The drone technology used to document the group's body size was able to detect a 2% reduction in body weight per day during the observation period, with the smallest individual losing 27% of its body weight in only 17 days.

"This is the first instance in which we've been able to monitor a fasting or starving event in the wild over a three-week period, which really speaks to how quickly dolphins can deteriorate if they have no ability to forage," Currie states. "When we have species that spend a large amount of time foraging because of their high metabolic rates, disrupting their ability to forage and feed,

even in small amounts, quickly has serious implications. Even a one- or two-day disruption can result in a loss of body condition."

After collecting the data, PWF collaborated with MMRP to analyze the findings in an ongoing partnership exploring the use of drones to monitor whales and dolphins on a broad scale in the wild. "This new approach opens up doors to quantify these changes in body condition, in response to not only human activity, but also larger climatic changes that the environment is posing towards these animals," explains Lars Bejder, director of the MMRP unit within the UH Manoa Hawai'i Institute of Marine Biology.

The stranding, which took place the day after UAS-photogrammetry collected a final set of measurements of the group, allowed PWF and UH researchers to compare actual measurements of the stranded animal and those collected using drone technology.

"This was an incredibly rare opportunity to validate the measurements taken by drones with physical measurements from stranded individuals," Currie notes. "The results strongly indicate that UAS-photogrammetry can accurately measure and monitor the health and body condition of free-range pygmy killer whales and dolphins of similar size — technology that can be applied to other species as well. With this piece of the puzzle, we can look at forecasting impacts on populations resulting from human activity and also monitor and compare impacted and non-impacted populations remotely to determine if a population is doing well or in need of intervention."

As an early prevention tool, the use of drones in documenting body condition and health in myriad populations in the wild could effectively inform policy designed to mitigate human-caused disturbances for a variety of marine species.

Rapid weight loss in free ranging pygmy killer whales (Feresa attenuata) and the implications for anthropogenic disturbance of odontocetes, authored by Jens J. Currie, Martin van Aswegen, Stephanie H. Stack, Kristi L. West, Fabien Vivier and Lars Bejder, is published in **Scientific Reports** and available for review here.

About Pacific Whale Foundation

With a mission to protect the ocean through science and advocacy and to inspire environmental stewardship, Pacific Whale Foundation (PWF) conducts Research, Education and Conservation programs. Founded in 1980 as a 501(c)(3) nonprofit organization dedicated to saving the world's whales from extinction, PWF now solely owns social enterprise PacWhale Eco-Adventures, which offers fee-based programs and services to help support the nonprofit. Combined with memberships, donations, charitable grants and a remarkable group of dedicated volunteers, PWF now reaches more than 400,000 individuals each year through its Maui and Australia offices and research projects in Ecuador and Chile.

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