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**Poor body condition explains
unusual mortality event in gray whales**

Fredrik Christiansen^{1,2,3*}, Fabian Rodríguez-González⁴, Sergio Martínez-Aguilar^{4,5}, Jorge Urbán^{4,5}, Steven Swartz⁵, Hunter Warick³, Fabien Vivier⁶ & Lars Bejder^{2,3,6}

¹Aarhus Institute of Advanced Studies, Høegh-Guldbergs Gade 6B, 8000 Aarhus C, Denmark;

²Zoophysiology, Department of Biology, Aarhus University, C.F. Møllers Allé 3, 8000 Aarhus C, Denmark; ³Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University, Murdoch, 6150 Western Australia; ⁴Departamento de Ciencias Marinas y Costeras. Universidad

Autónoma de Baja California Sur, La Paz, B.C.S., Mexico; ⁵Laguna San Ignacio Ecosystem Science Program (LSIESP), Darnestown, MD, USA; ⁶Marine Mammal Research Program, Hawaii Institute of Marine Biology, University of Hawaii at Manoa, Kaneohe, HI, 96744, USA

*Corresponding author email: f.christiansen@aias.au.dk

ABSTRACT

The Eastern North Pacific gray whale (*Eschrichtius robustus*) experienced an ‘unusual mortality event’ (UME) in 2019-2020, with 313 whales found dead along the Pacific coasts of Mexico, USA and Canada. A similar UME in 1999-2000 was attributed to starvation, however body condition data were not available to test this. Between 2017 and 2019, we used unmanned aerial vehicles (drones) and photogrammetry methods to measure the body condition of gray whales in San Ignacio Lagoon, Mexico. The body condition of individual whales was calculated from the residual of the relationship between body volume and length. The body condition of gray whales was significantly lower in 2018 (-11.1%, SE=1.74) and 2019 (-9.7%, SE=1.76) compared to 2017 for all reproductive classes (calves, juveniles, adults and lactating females). With lactating females being in significantly better body condition at the beginning of the breeding season, the reduction in body condition is unlikely to have affected their survival, but could have reduced their reproductive rate by prolonging the post-weaning recovery time. This explains the low number of mother-calf pairs observed in San Ignacio Lagoon in 2018 and 2019. For juveniles and adults, who began the breeding season with less energy reserves, this reduction in body condition could have pushed many of these individuals below their body condition threshold for survival. This explains the high proportion of juveniles and adults among the stranded dead whales in 2019-2020. Our findings therefore suggest that starvation arising from a lack of prey resources contributed significantly to the gray whale UME.

Key-words: baleen whales, bioenergetics, reproduction, starvation, survival, unmanned aerial vehicles