

Site choice depends on group type for endangered humpback whales occurring off the Pacific coast of Nicaragua, Central America

De Weerd Joëlle¹, Calambokidis John², Vanschoenwinkel Bram³ and Kochzius Marc¹

¹ Marine Biology, Ecology and Biodiversity, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium
E-mail: joelle.de.weerd@vub.be

² Cascadia Research Collective, 218½ W 4th Avenue, Olympia, Washington 98501, USA

³ Community Ecology Lab, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

Previous research has shown the presence of an endangered humpback whale population breeding off the Pacific coast of Central America. However, little is known about the density, size, social structure and habitat use of this subpopulation. To fill this knowledge gap, boat-based surveys were conducted between November and April at two study sites along the Pacific coast of Nicaragua between 2004-2008 and 2016-2020. Whenever a group was encountered, the number of animals, geographical position (determined by a GPS unit), SST and group composition were assessed. Photo-identification (hereafter photo-ID) allowed us to identify individual whales, with the method developed by (Katona *et al.* 1979), using natural marks on the ventral surface of flukes as well as the shape, size and scarring patterns of the dorsal fin. Our main objective is to define the primary characteristics of this humpback whale population, including abundance, encounter rates, group composition, distribution, and habitat use patterns. First, we estimated population size and density through abundance estimates and encounter rates. Second, we analyzed group size and composition, behaviors and spatio-temporal distribution patterns to infer whether the observed sites likely represent breeding areas. Third, we assessed the impact of environmental parameters on observed distribution patterns. Last, we compared our findings between northern and southern Nicaragua to see if humpback whales were using the areas in the same way. For instance, due to previous observations of feeding behaviors it is possible that there is a differential habitat use for each location. Humpback whale groups with calves, singers and competitive groups were detected from January to April confirming that Nicaragua is a breeding area. This study shows the presence of a rather small breeding population (estimated at 167-236 individuals). Different habitat use patterns exist between northern and southern Nicaragua, suggesting that Central American humpback whales might use different breeding areas within the broader Central American breeding ground according to their needs and activity. Future research should include a focus on the ecology of groups with a calf and without a calf to understand specific habitat use patterns

Keywords: Abundance estimate; Breeding ground; Distinct Population Segments (DPS); Habitat use; Northern Hemisphere; Occurrence; Photo-identification