BIOCHEMICAL ROLE OF THE BLUE WHALE IN THE SOUTHWESTERN GULF OF CALIFORNIA

Cristina Casillas
Centro Interdisciplinario de Ciencias Marinas – Instituto Politécnico Nacional, México
cris.casillaslopez@gmail.com

SUMMARY REPORT

"Whale Pump" is the contribution of fecal nutrients from marine mammals to primary productivity. This contribution has been explored in highly productive regions of the Southern Ocean, but this process is currently unknown in subtropical regions. We investigated the contribution of the blue whales' feces of the Bahia de Loreto National Park, Gulf of California, a known breeding area. An experiment was performed isolating native phytoplankton from the euphotic zone in 10 L containers adding two concentrations of fresh feces (I: 8.38 µM and II: 13.36 µM of NH_4^+) and a control (without feces) incubated at 1.5-2m below the surface. These were sub-sampled for 10 days to obtain concentration of chlorophyll-a, dissolved nutrients (NO_2^-, NO_3^-, NH_4^+, urea, PO_4^{3-} and SiO_4), particulate organic material ($\delta^{13}C$ and $\delta^{15}N$) and estimates of phytoplankton production. An increase in nutrients (mainly NH_4^+ and PO_4^{3-}) was observed from the second day, significantly increasing the chlorophyll-a concentration between the control and the two treatments ($p<0.0001$). The particulate organic material had a fecal nutrient intake increasing the $\delta^{15}N$ 1.50/00. The average phytoplankton production (mg C m^{-3}) of the control (76.1 ± 38.4), treatment I (275.2 ± 237.6) and treatment II (439.4 ± 464.4) showed significant differences ($p<0.0001$). This shows that blue whale feces release nutrients, which are metabolized by phytoplankton increasing the phytoplankton biomass and demonstrates the Whale Pump process by the blue whale occurs in this area.

The small grant given by the SMM was used to pay for the micronutrient analysis for the total of 50 samples ($25 USD per sample) done at the CIIDIR Sinaloa. The

rest of the grant was used to acquire materials and to do a stable isotopic analysis ($10 USD per sample) done at CICIMAR La Paz.

This project was part of the results of my Masters Thesis which concluded on June 2018 an it has been published in the official webpage of CICIMAR. The preliminary results were presented at the Biennial Conference SMM October 2017 in Halifax, Canada and at the Conference of the Mexican Society for Marine Mammalogy May 2018 in Tabasco, México.