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West Antarctica Cetacean Ecosystem Survey

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ABSTRACT

Taking advantage of the Ponant Science Program, this project is designed to survey cetaceans and the pelagic ecosystem in West Antarctica during the 2024 austral summer on a month-long cruise CC080124 with Le Commandant Charcot from Cape Horn to New Zealand via the ice shelf. This voyage will venture where fewer research vessels operate than in other sectors of Antarctica (namely, Bellinghausen, Amundsen and Ross Seas) before visiting sub-Antarctic Macquarie Island and docking in Lyttleton, New Zealand. In view of post-whaling population recovery and the impact of human induced climate change on the Southern Ocean, baleen whales, especially Antarctic blue and humpback whales, will be surveyed by both visual and acoustic methods for evidence of their feeding grounds in the seldom surveyed soft-ice and pack-ice areas. Acoustic surveys involve sonobuoys and VHF radio receiver hardware and software. Sonobuoys are hand-deployed, disposable, hydrophones with their own VHF transmitters which can be received at distances up to 20 km from the ship. Signals are displayed and stored in the purpose-built recording systems for tracking of underwater noise signals. During real-time acoustic monitoring, signals are processed so that signal levels are presented with an uncertainty of ± 1.13 dB and directional data have an accuracy of ± 12.5°, according to the distance between the sound targets and the sonobuoys. The spectral display of the audio received and the direction from which sounds are detected are both used for whale real-time detection and logging. Listening effort and acoustic detections will be entered into a central database with the bearing, frequency, and duration of all calls detected recorded for each marine mammal. Concurrent with the whale surveys, sampling of the pelagic ecosystem in the deep south will be undertaken to provide key environmental variables and ground truth available satellite observations. Seawater parameters will be derived from the ship's seawater sampling and monitoring equipment and regular surface chlorophyll samples will be taken via the through hull seawater system, filtered and stored at -80°C for onshore processing. When the ship is stationary for tourism activities, it is anticipated to deploy the CTD for vertical profiles of the water column and Niskin bottles to collect water for chlorophyll determinations. Zooplankton, a key component of the Antarctic pelagic ecosystem, will be sampled using the recently developed, small, portable Cruising Speed Net and slowing the vessel to five knots for short periods. Entire cod-end contents will be preserved for onshore metabarcoding of the micro- and mesoplankton assemblages, stored at -80°C and sequenced (v4-region of the 18S rRNA gene) ashore. To understand the pelagic food web in West Antarctica, bulk stable isotope analyses will be undertaken by

onshore spectrometry of fractionated, oven dried CSN plankton samples. The distribution and abundance of the blue and humpback whales and multivariate analyses of the suite of oceanographic and biological variables will provide some assessment of the status of these baleen whales during the 2024 austral summer in West Antarctica which can be compared with historical records.