THE WHISTLES OF HAWAI'IAN SPINNER DOLPHINS (*Stenella longirostris*): DESCRIPTION AND GEOGRAPHIC VARIATIONS

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ABSTRACT

This dissertation discusses the study of geographic variations in spinner dolphin whistles, which may provide information of the Hawai'ian spinner dolphin society. Spinner dolphin whistles were recorded throughout the main Hawai'ian Islands and in Midway Atoll and Mo'orea, French Polynesia. This project is the first to encompass more than one region of the Hawai'ian Archipelago and to include different populations of spinners. Whistles were described and analyzed to understand how they varied in each Island. Hawai'ian spinner dolphins emit high pitch whistles (average mean frequency=12.90 kHz) that often sweep up in frequency (47%) and are relatively short (average=0.493 s). Whistles did not vary due to location, day, year, or time. The concept of whistle-specific subgroup was created to explain similarities in whistle characteristics between groups of spinners recorded in different locations and days. Recorded whistles were assigned to whistle-specific subgroups within each of the main Hawai'ian Islands. These subgroups presumably consist of spinners that may spend time together and/or are kin related. Whistles varied due to activity state and group size. Traveling groups used different whistles than social groups, and larger groups used different whistles than groups of smaller sizes. Macro- and microgeographic variations exist in the whistles of spinner dolphins, but differences are very small. More than 75% of the whistles were shared between geographically separated areas. Macrogeographic variations were larger than microgeographic variations, suggesting that spinner dolphins may develop more changes in their whistle

characteristics as a result of isolation due to geographic barriers or due to adaptations to their habitat. In addition, the whistles of specific-subgroups from the main Hawai'ian Islands were more similar, suggesting that individuals frequent the waters of several Islands. Spinner groups may have home ranges that involve several Islands, and all individuals may be part of a single spinner population for these main Hawai'ian Island groups. The results of this study indicate that the use of an acoustic approach to gain insight on some aspects of the population structure of Hawai'ian spinner dolphins is possible. Future studies are needed to investigate these aspects of the spinner society in order to validate those proposed here. With the current development of recording and signal processing techniques, the use of an acoustic approach to gain detailed information on the population structure of delphinids is very promising. Collection of acoustic data is much easier and less invasive than data for genetic and photo-identification methods. A deeper understanding of these animals, their environment, and their acoustic communication is necessary in order to protect and manage this valuable resource of the state of Hawai'i.