

A. Applicant Details

Applicant Name (full name of registered company or individual, student or university)		Museum of New Zealand Te Papa Tongarewa			
Legal Status of applicant (tick)	Individual	Registered Company	Trust	Incorporated Society	
Other (please specify full details)		Crown Entity			

B. Title of Research Project

Fish, squid and krill: deep-time evolution of marine tetrapod feeding ecology

C. Details of Proposed Activity

Take Hold Import Export

NB please tick all applicable activities

D. Description of Proposed Research

• Abstract

Provide an abstract of the proposed research project, emphasising the research objectives and the manner in which such activity involves the taking, import or export of marine mammals.

Marine mammals are major consumers, nutrient redistributors, and ecosystem engineers. Their feeding habits are crucial to the functioning and health of the oceans, but – given the remote habitat and cryptic nature of many species – difficult to study directly. Biochemical proxies like nitrogen isotopes have elucidated feeding ecology but are usually derived from proteins that do not fossilise. As a result, the evolution and deep-time ecological impact of marine mammal feeding strategies remain obscure. Our Marsden-funded project “Fish, squid and krill: deep-time evolution of marine tetrapod feeding ecology” (MNZ2201) aims to develop calcium isotopes as a new dietary indicator that can be applied to living and extinct animals alike. Calcium isotopes are measured directly from bones and, as such, can be derived from osteological, historical and fossil collections. As a first step, we will investigate if and how bone-bound calcium isotopes vary throughout the growth of individual marine mammals. This will then allow us to establish a consistent sampling protocol comparing different species without ontogenetic bias. To develop the sampling protocol, we would like to export ten isolated ear bones and teeth, each representing a different marine mammal species, to (i) measure variations in calcium isotopes and (ii) map elemental concentrations across each bone.

• Duration of Proposed Research

Provide a detailed description of the overall duration of the proposed research.

October 2024 – April 2025

• Location of Proposed Research

Provide a detailed description of the overall location of the proposed research. Supply a map detailing the location if appropriate.

- University of Lyon, France
- Australian Synchrotron, Clayton, Australia

- Species Name and Status

Provide a list of all the species (common and scientific names) involved in the research activities. Describe the status and factors that affect the species i.e., incidental bycatch, pollution etc.

Seals and sea lions: NZ fur seal, *Arctocephalus forsteri*; walrus, *Odobenus rosmarus*; leopard seal, *Hydrurga leptonyx*

Baleen whales: humpback whale, *Megaptera novaeangliae*; southern right whale, *Eubalaena australis*

Toothed whales and dolphins: Gray's beaked whale, *Mesoplodon grayi*; sperm whale, *Physeter macrocephalus*; porpoise, *Phocoena* sp.; La Plata dolphin, *Pontoporia blainvillei*; bottlenose dolphin, *Tursiops truncatus*.