The distribution of fatty acids and presence of environmental contaminants in the blubber of the New Zealand sea lion (*Phocarctos hookeri*)

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ABSTRACT

The conservation of marine mammals relies on the knowledge of species ecology in order to assess the impacts of anthropogenic activites and make appropriate species management decisions. Blubber biopsies are a relatively non-invasive sampling protocol to provide ecological information; two particular uses are for dietary analysis via fatty acid signature analysis (FASA) and investigating the uptake of organochlorine (OC) and polychlorinated biphenyl (PCB) environmental contaminants. Blubber composition and structure may vary according to body site and depth due to its dynamic functioning. This may result in the vertical stratification and heterogenous distribution of blubber FAs, OCs and PCBs between body sites, giving variable interpretations of diet and contaminant levels depending on biopsy sample site and depth. The aim of this thesis is to determine the FA distribution of blubber from two body sample sites (dorsal pelvic and ventral thoracic) currently used for FASA of the New Zealand sea lion, *Phocarctos hookeri* (NZSL) and to determine the level of OCs and PCBs in the blubber of healthy NZSLs for comparison to diseased NZSLs recorded in the 1997/98 epidemic. Blubber samples were collected from 29 by-caught NZSLs incidentally captured by the squid fishery around the Auckland Islands (50º42'S, 166º5'E) during the years 2005 to 2007 (not all NZSLs were able to be analysed for each chapter). Full blubber cores from both sample sites were collected from 18 NZSLs. Both sites showed a relative homogeneity of FA profiles, indicating the similar deposition and mobilisation of FAs at the two sample sites. To determine if FA stratification occurred, full blubber cores from both sample sites of 20 NZSLs were divided into inner and outer halves. Both sites displayed the same pattern of vertical stratification or biochemical layering of FAs between the two divisions, indicating that stratification of FAs occurs in the blubber of the NZSL. A range of OCs and PCBs were then determined in full thoracic blubber cores of seven NZSLs. The levels were higher than those previously recorded in NZSLs affected by disease during a 1997/98 epidemic. The ΣPCB in NZSLs was 0.034-0.192 mg/kg lipids, below the suggested threshold of 17 mg/kg for adverse health affects in marine mammals. From the results of this study I can support current blubber biopsy sampling techniques for FASA in NZSL. Obtaining full blubber cores from either the thoracic or pelvic sample site will give a comparable interpretation of diet. The low levels of blubber OCs and PCBs suggest a minor role of contaminants acting as a

possible causative agent toward disease outbreaks in the NZSL. This research provides important information for developing correct and consistent blubber sampling techniques for NZSL and other pinniped species. This will ensure more accurate interpretations of ecological information obtained from blubber biopsies and therefore improved species management and conservation decisions that may be based on such research.

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TABLE OF CONTENTS **PAGE NO.**

LIST OF FIGURES PAGE NO.

LIST OF TABLES PAGE NO.

Chapter 3

Chapter 4