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

A thesis presented in partial fulfilment of the requirements for the degree of

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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 activities 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 heterogeneous 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 (50°42'S, 166°5'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  $\Sigma$ PCB in NZSLs was 0.034-0.192 mg/kg lipids, below the suggested threshold of 17 mg/kg for adverse health effects 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.**

---

<b>Title Page</b>		I
<b>Abstract</b>		II - III
<b>Acknowledgments</b>		IV
<b>Chapter 1</b>	Introduction	1
	References	11
<b>Chapter 2</b>	Variation in blubber fatty acid profiles between two body sites in the New Zealand sea lion ( <i>Phocarctos hookeri</i> )	
	Abstract	20
	Introduction	21
	Materials and Methods	24
	Results	29
	Discussion	34
	Conclusion	36
	References	38
<b>Chapter 3</b>	The stratification of fatty acids in the blubber of the New Zealand sea lion ( <i>Phocarctos hookeri</i> ) and implications for dietary analysis	
	Abstract	43
	Introduction	44
	Materials and Methods	47
	Results	52
	Discussion	61
	Conclusion	64

	References	65
<b>Chapter 4</b>	Polychlorinated biphenyls and organochlorines in the blubber of by-caught New Zealand sea lions ( <i>Phocarctos hookeri</i> )	
	Abstract	70
	Introduction	71
	Materials and Methods	73
	Results	76
	Discussion	80
	Conclusion	84
	References	86
<b>Chapter 5</b>	Discussion	91
	References	94

## LIST OF FIGURES

## PAGE NO.

### Chapter 1

- Fig. 1.* An adult female New Zealand sea lion on the beach, Auckland Islands. 1

### Chapter 2

- Fig. 1.* Location of the blubber samples for the thoracic and pelvic areas from each New Zealand sea lion during necropsy. 24
- Fig. 2.* Cross-section of thoracic blubber from a New Zealand sea lion. 25
- Fig. 3.* Bi-plot of the first two principal components from the fatty acid compositions of thoracic and pelvic blubber samples of 18 by-caught New Zealand sea lions. 31

### Chapter 3

- Fig. 1.* Cross section through the blubber of the thoracic and pelvic areas taken from each New Zealand sea lion during necropsy. 48
- Fig. 2.* Bi-plot of the first and second principal components derived from the fatty acid composition of the inner and outer thoracic blubber layers of 18 by-caught New Zealand sea lions. 55
- Fig. 3.* Mean proportion of polyunsaturated fatty acids, saturated fatty acids and short chain monounsaturated fatty acids and long chain monounsaturated fatty acids in the inner and outer blubber portions of thoracic blubber from 18 by-caught New Zealand sea lions. 56
- Fig. 4.* Bi-plot of the first and second principal components derived 57



from the fatty acid composition of the inner and outer pelvic blubber layers of eight by-caught New Zealand sea lions.

- Fig. 5.* Bi-plot of the first and second principal components derived from the fatty acid composition of the inner and outer blubber layers from the thoracic and pelvic sample sites of six by-caught New Zealand sea lions. 59
- Fig. 6.* Mean proportion of saturated fatty acids, short chain monounsaturated fatty acids, long chain monounsaturated fatty acids and polyunsaturated fatty acids in the inner and outer blubber portions of pelvic and thoracic blubber sample sites of six by-caught New Zealand sea lions. 60

## **LIST OF TABLES**

## **PAGE NO.**

---

### **Chapter 2**

- Table 1.* By-catch year, identification number (I.D. No.), sex and storage temperature of analysed blubber samples from New Zealand sea lions. 26
- Table 2.* Fatty acid (FA) profiles (mean  $\pm$  S.D, % mass total FAs) of blubber from the two body sites (pelvic and thoracic areas) sampled from 18 by-caught New Zealand sea lions. 29-30
- Table 3.* Loadings of fatty acids (FAs) for the first three principal components from the FA compositions of the pelvic and thoracic blubber samples of 18 by-caught New Zealand sea lions. 32

### **Chapter 3**

*Table 1.* By-catch year, identification number (I.D. No.) and sex of New Zealand sea lions analysed with the blubber sample sites collected. 49

*Table 2.* Fatty acid profiles from the inner and outer layers of thoracic (n=18) and pelvic (n=8) blubber from 20 by-caught New Zealand sea lions (% mass of total FAs  $\pm$  S.D). 53-54

### **Chapter 4**

*Table 1.* Identification number (I.D.) and sex of New Zealand sea lions analysed (n= 7) for organochlorines (OCs) and polychlorinated biphenyls (PCBs). 73

*Table 2.* Organochlorine pesticide levels determined in the blubber of seven by-caught New Zealand sea lions. 77

*Table 3.* Chlorinated biphenyl (PCB) levels determined in the blubber of seven by-caught New Zealand sea lions. 78-79