

# Prey Selection and Plastic Incidence in Pacific Northern Fulmars (*Fulmarus glacialis*) from Mortality

## Events in Monterey Bay, California in 2003 and 2007

Erica Donnelly<sup>\*1,2</sup>, Hannah Nevins<sup>1,2</sup> and James T. Harvey<sup>1</sup>, <sup>1</sup>Moss Landing Marine Laboratories, 8272 Moss Landing Road, Moss Landing, CA 95039 USA, edonnelly@mlml.calstate.edu; <sup>2</sup>California Department of Fish and Game – Marine Wildlife Veterinary Care and Research Center, 1451 Shaffer Road, Santa Cruz, CA 95060 USA



### Introduction

Northern Fulmars are procellariids that forage in Monterey Bay during the winter months. Their diet includes cephalopods, fish, commercial fishery offal, and scavenged marine mammal carcasses. Fulmars are opportunistic feeders that forage at the surface. They ingest plastic and other debris mistaken for prey. A physical constriction between the proventriculus and ventriculus prevents fulmars from expelling plastic and prey hard parts, therefore, these items often collect in the ventriculus.



### Objectives

- Report current cephalopod prey species in Northern Fulmar diet during the non-breeding season
- Examine which cephalopod prey species were dominate in Northern Fulmar diet 2003 and 2007
- Examine the occurrence of plastic in Northern Fulmar diet

### Methods

- Stomachs were collected from beach cast fulmars in 2003 (n = 12) and 2007 (n = 22); all stomach contents were sieved and rinsed
- Prey hard parts were separated from plastics and other debris
- Cephalopod beaks were identified to species using lower rostral lengths (LRL) and physical characteristics
- Plastic items were classified as Industrial Pellet (pre-manufactured) or User Plastic (post-manufactured) and enumerated
- Modified Indices of Relative Importance (mIRI) represent five dominant cephalopod species in the Fulmar samples for 2003 and 2007
- Percent Similarity Index examined the diet similarities between the two years

### Results

#### Cephalopods

Table 1. Identification and number of cephalopod beaks identified in Northern Fulmar stomachs from 2003 (n=12) and 2007 (n=22).

Family	Genus/species	Number of Beaks	
		2003	2007
<b>Gonatidae</b>	<i>Gonatus pyros</i>	28	27
	<i>Gonatus berryi</i>	7	3
	<i>Gonatus californiensis</i>	8	4
	<i>Gonatus onyx</i>	15	13
	<i>Gonatus</i> spp.	5	9
	<b>Octopoteuthidae</b>	c.f. <i>Octopoteuthis deletron</i>	1
<b>Cranchiidae</b>	<i>Taonius borealis</i>	3	1
	<i>Taonius</i> spp.	3	0
	c.f. <i>Galiteuthis pacifica</i>	2	0
	Cranchiid spp.	1	0
<b>Chiroteuthidae</b>	<i>Chiroteuthis calyx</i>	4	2
<b>Cirroteuthidae</b>	c.f. <i>Cirrothauma</i> spp.	1	0
<b>Loliginidae</b>	<i>Loligo opalescens</i>	1	6
<b>Histioteuthidae</b>	<i>Stigmatoteuthis dofleini</i>	0	2
<b>Mastigoteuthidae</b>	<i>Mastigoteuthis pyrodes</i>	0	1
<b>unidentified</b>	n/a	3	9
<b>TOTAL</b>		<b>82</b>	<b>81</b>



Photos: Erica Donnelly and Hannah Nevins

### Results

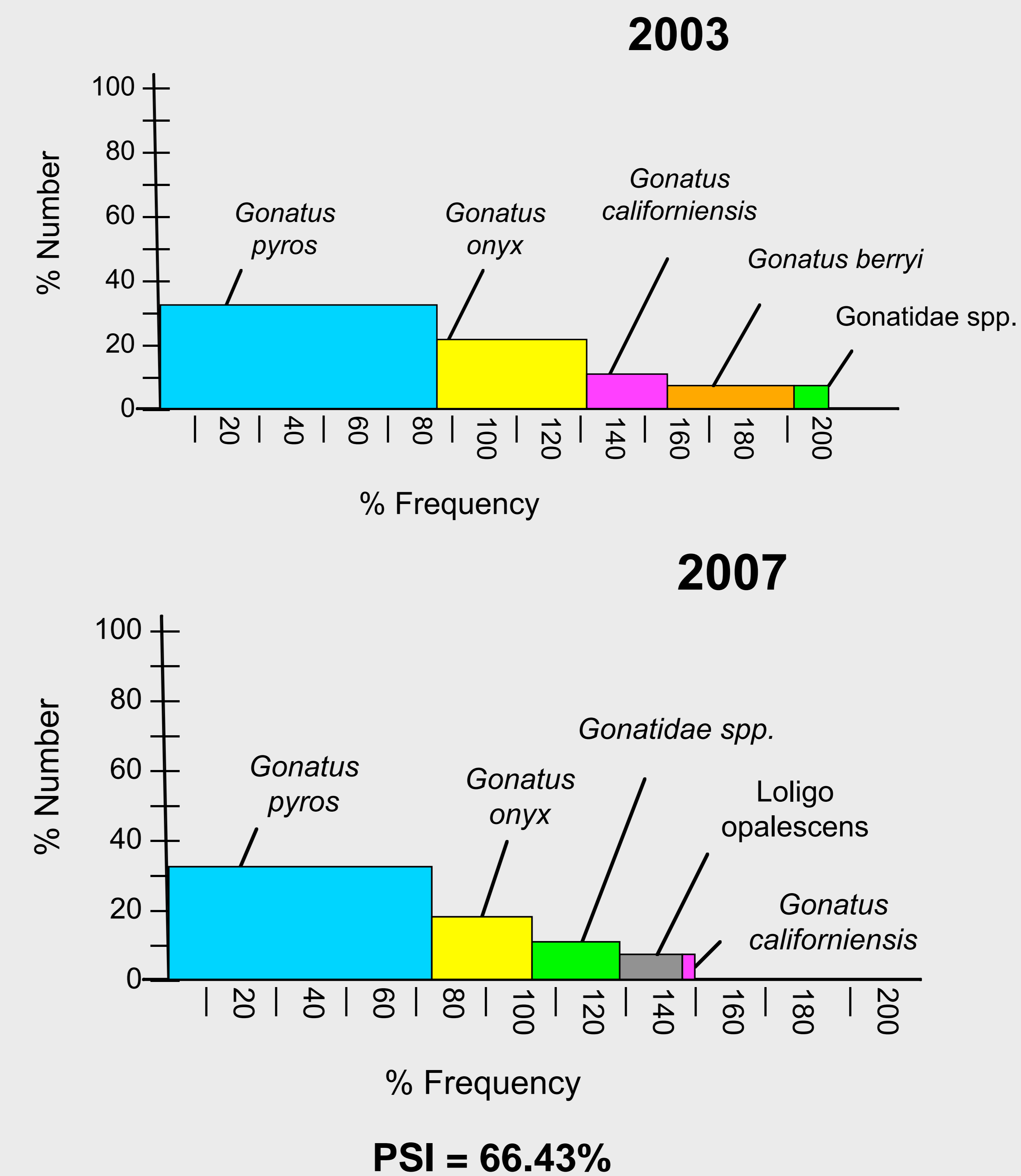


Figure 1. Modified Indices of Relative Importance (mIRI) representing five dominant cephalopod species in Northern Fulmar stomachs from 2003 (n=12) and 2007 (n=22) and Percent Similarity Index (PSI) of the mIRIs.

#### Plastic

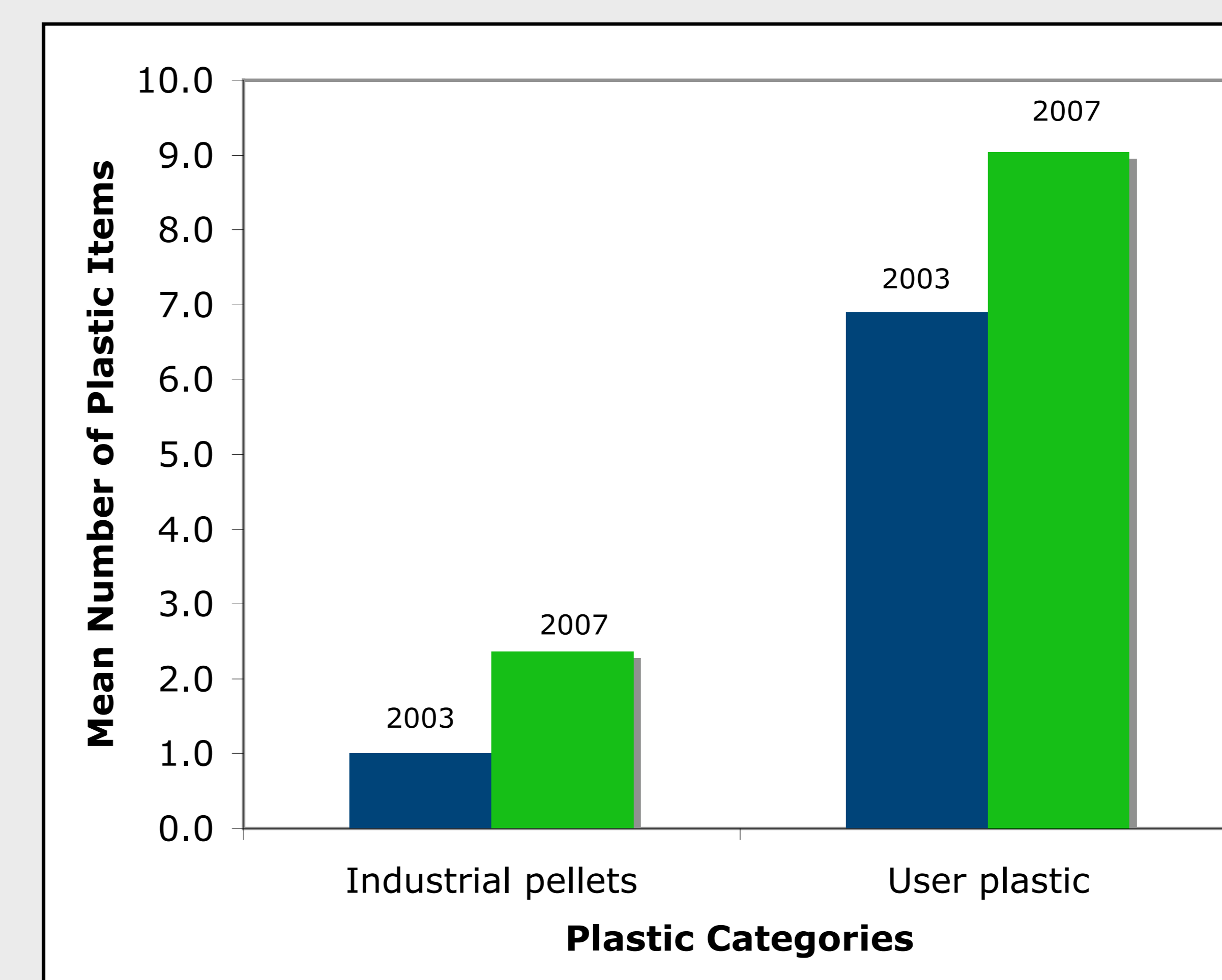


Figure 2. Mean number of industrial pellets and user plastic in Fulmar stomachs from 2003 (n=12) and 2007 (n=22).

Table 2. Percent incidence of industrial pellets and user plastic in Fulmar stomachs from 2003 (n=12) and 2007 (n=22).

	2003	2007
Industrial pellets %	25	50
User plastic %	100	90.9



Figure 3. Industrial pellets and user plastic from a 2003 Northern Fulmar stomach.

### Conclusions

These preliminary results indicate:

- A reliance on *Gonatus* cephalopods during the non-breeding season
- A diet PSI of 66.43 between 2003 and 2007
- A greater incidence of Industrial pellets in 2007
- A greater incidence of user plastic in 2003, but a greater mean number of plastic items in 2007
- A greater incidence of user plastic versus industrial pellets in both years

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