

**Differences in foods and feeding habits
in common minke and sei whales in the
western North Pacific based on samples
under JARPN II survey project**

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Aim of this Study

1.To clarify geographical and monthly changes in prey composition

2.To clarify changes prey prey composition with growth

3.To compare prey among whale species

Feeding habits of minke and sei whale in the PICES area in conjunction with temporal and spatial variation 2006

Common minke whale *Balaenoptera acutorostrata*



Body length : 8 m
Body weight : 6 t

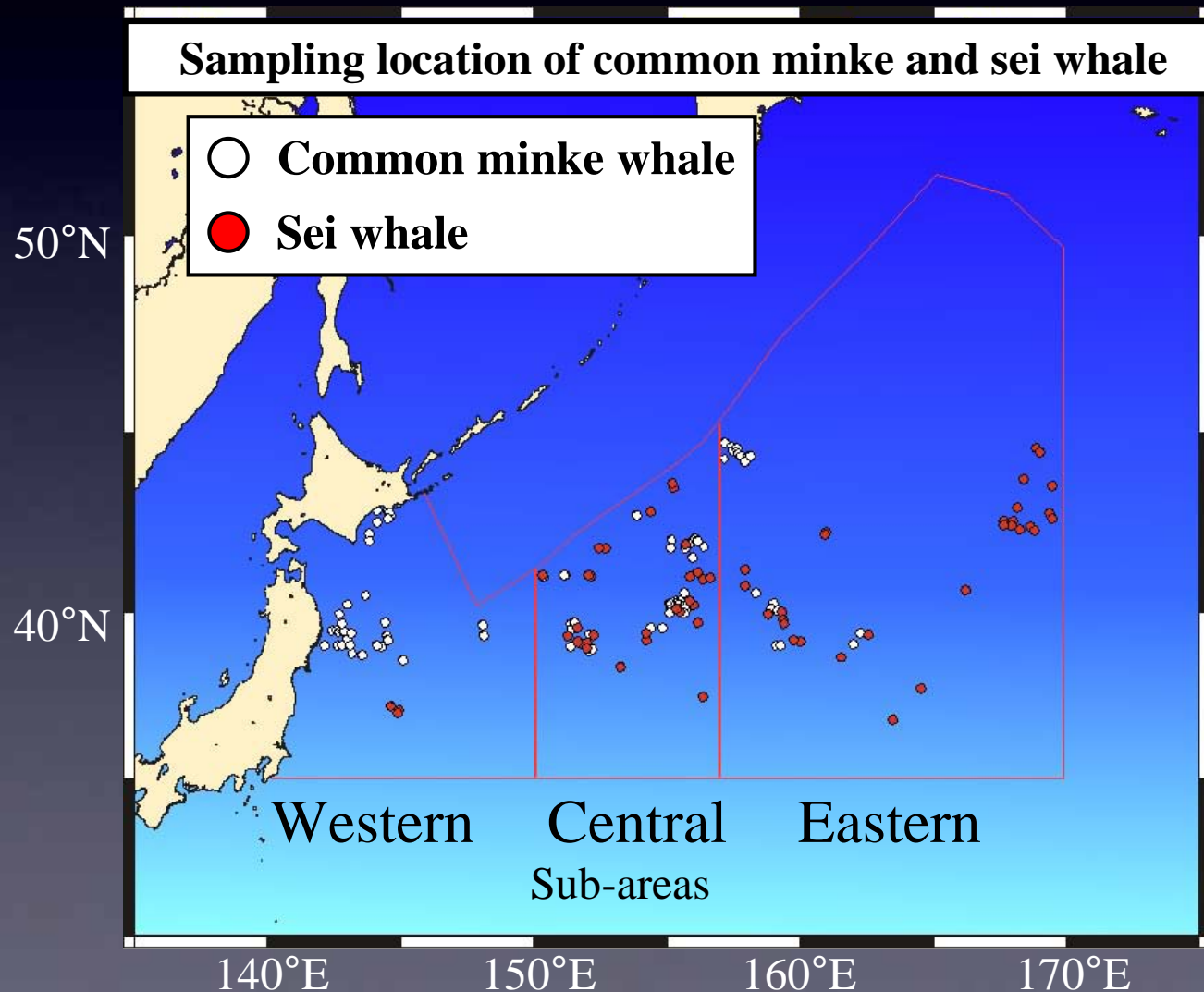
Sei whale *Balaenoptera borealis*



Body length : 14.5 m
Body weight : 16 t

Materials and methods

The Second Phase of Japanese Whale Research Program under Special Permit in the western North Pacific (JARPNII)



JARPN II 2006

- May to August
- From the Pacific coast of Japan to 170°E and north of 35N

Sampling of stomach contents

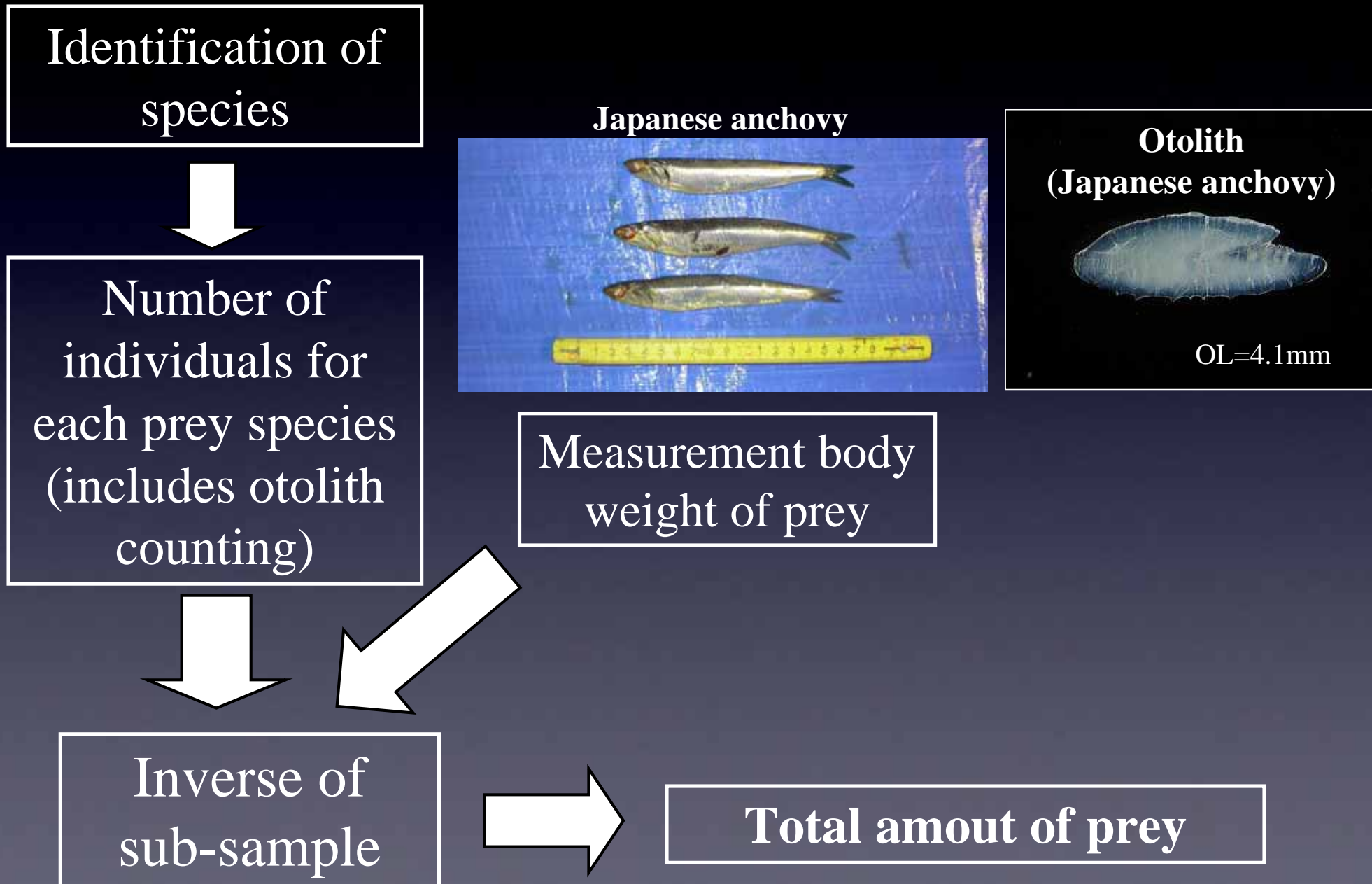
Stomach contents from each forestomach were weighed to the nearest 0.1 kg.

A part of each stomach contents (sub-sample) was taken, weighed and frozen or fixed in 10% formalin solution (for crustacean) for later analyses.

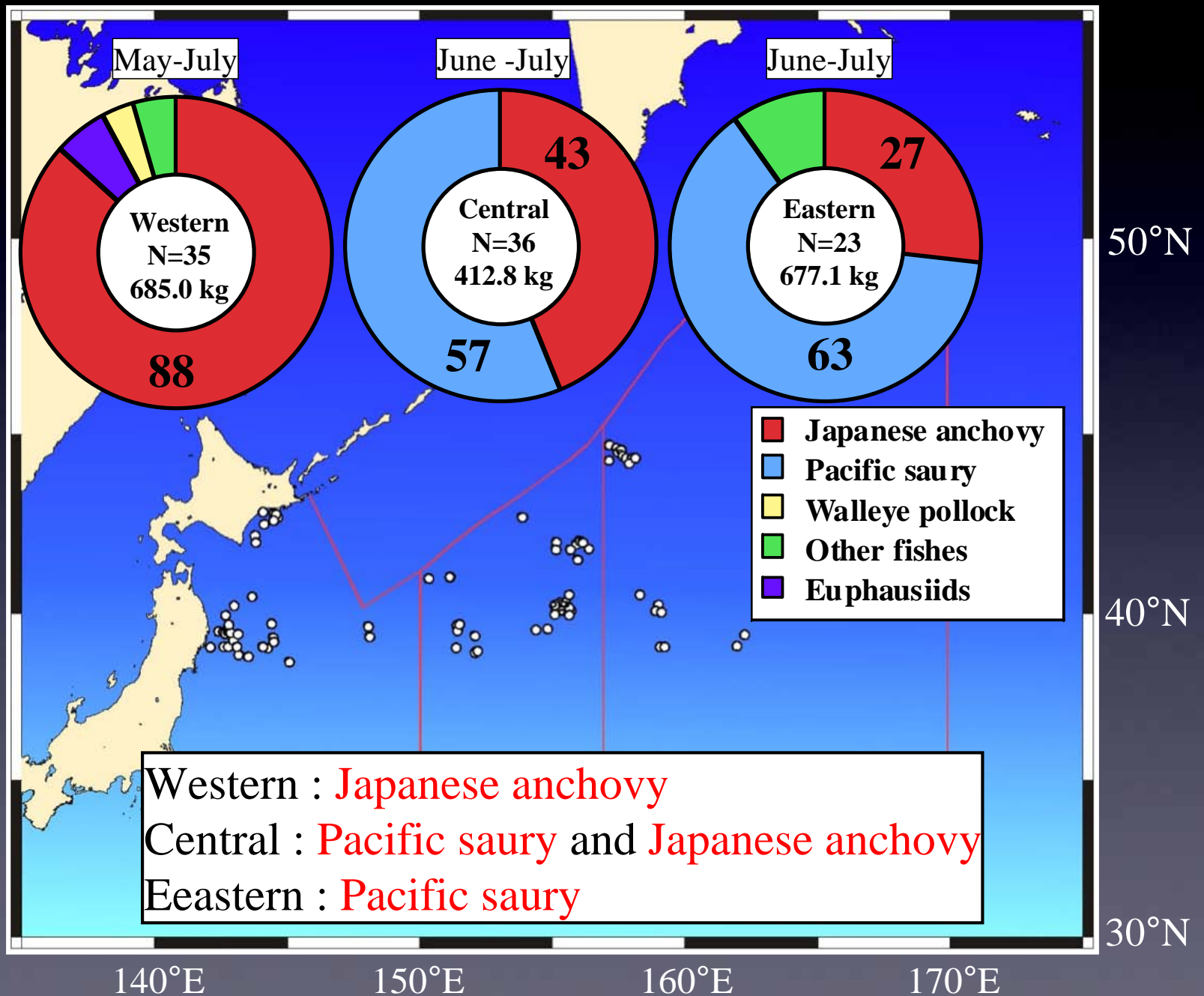


Anchovies from a forestomach of sei whale

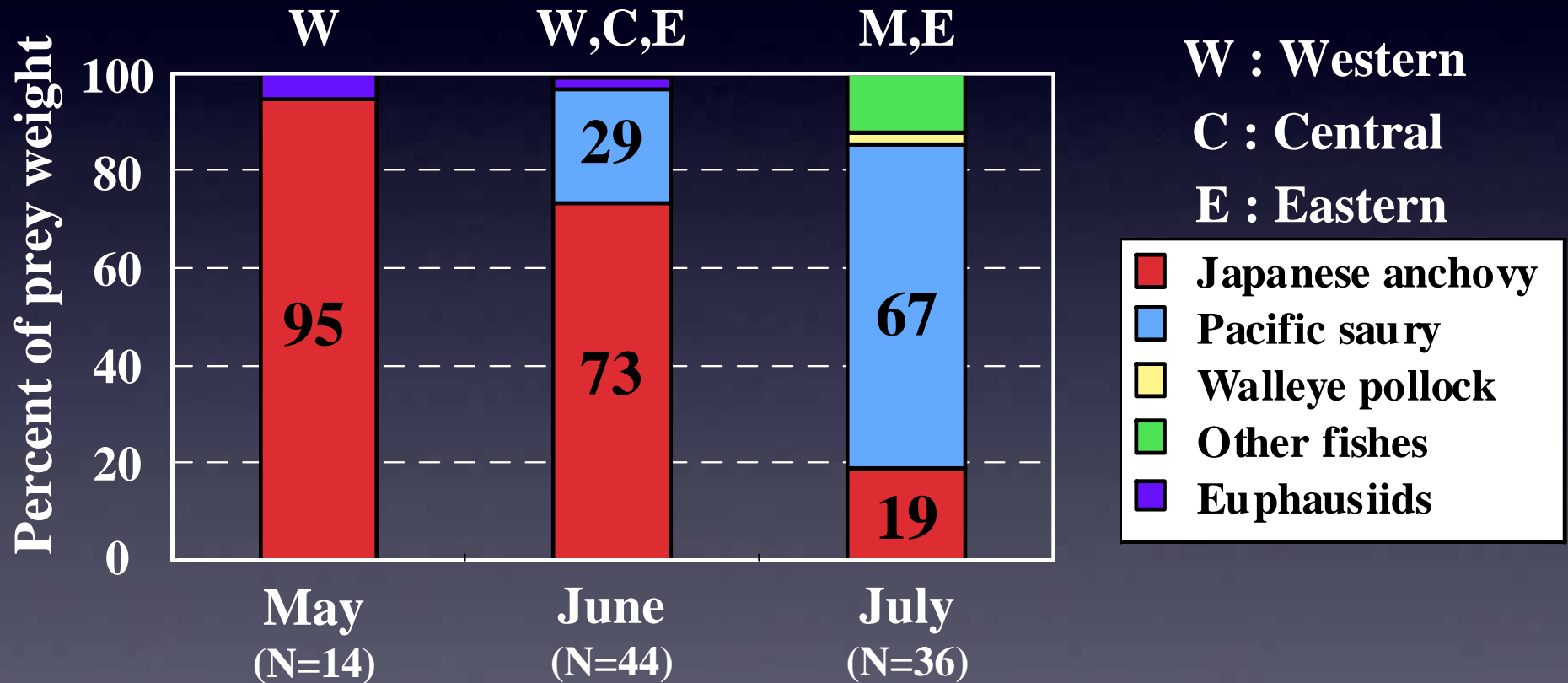
Estimation of amount eaten by whales



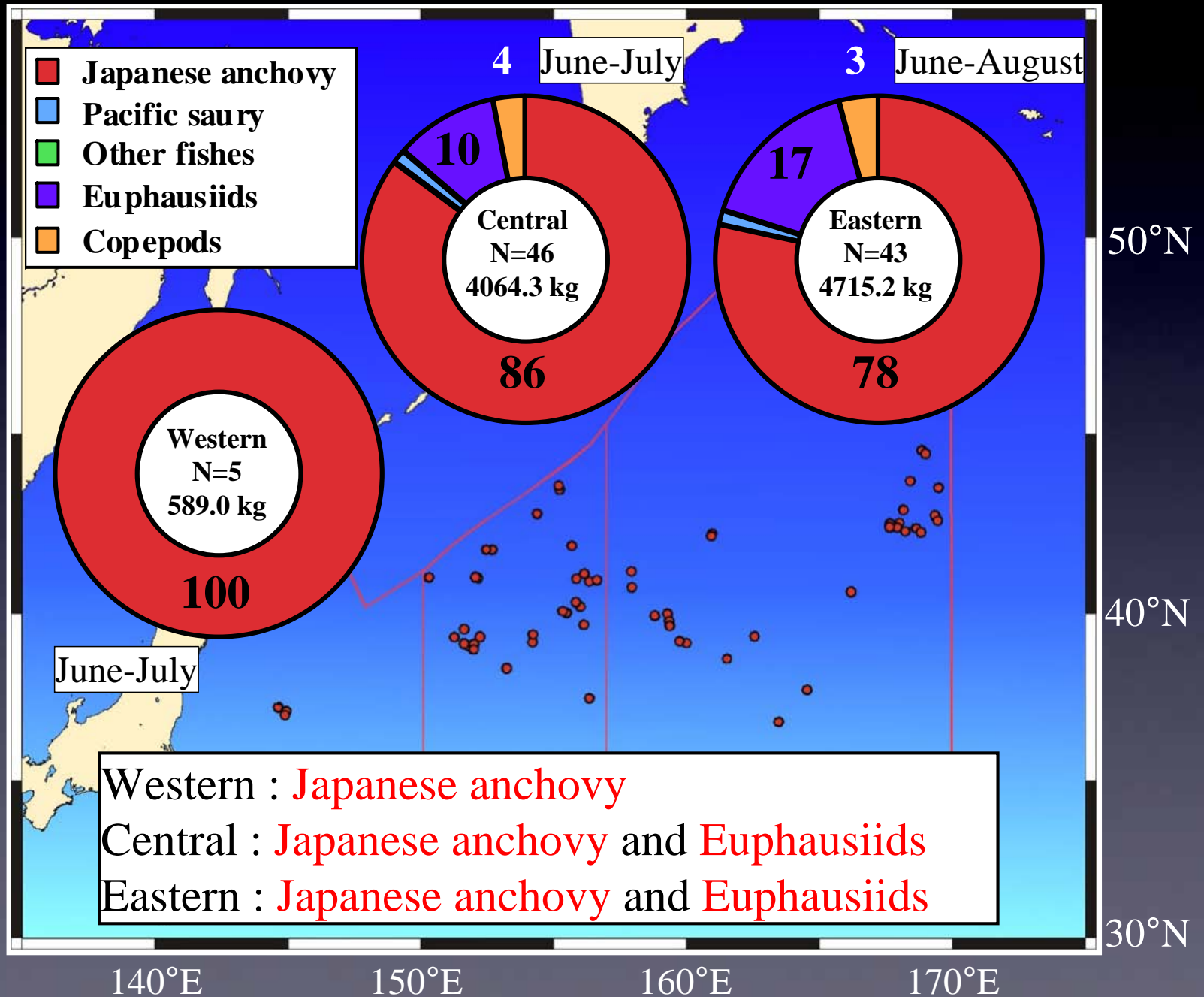
Results : Prey of common minke whale



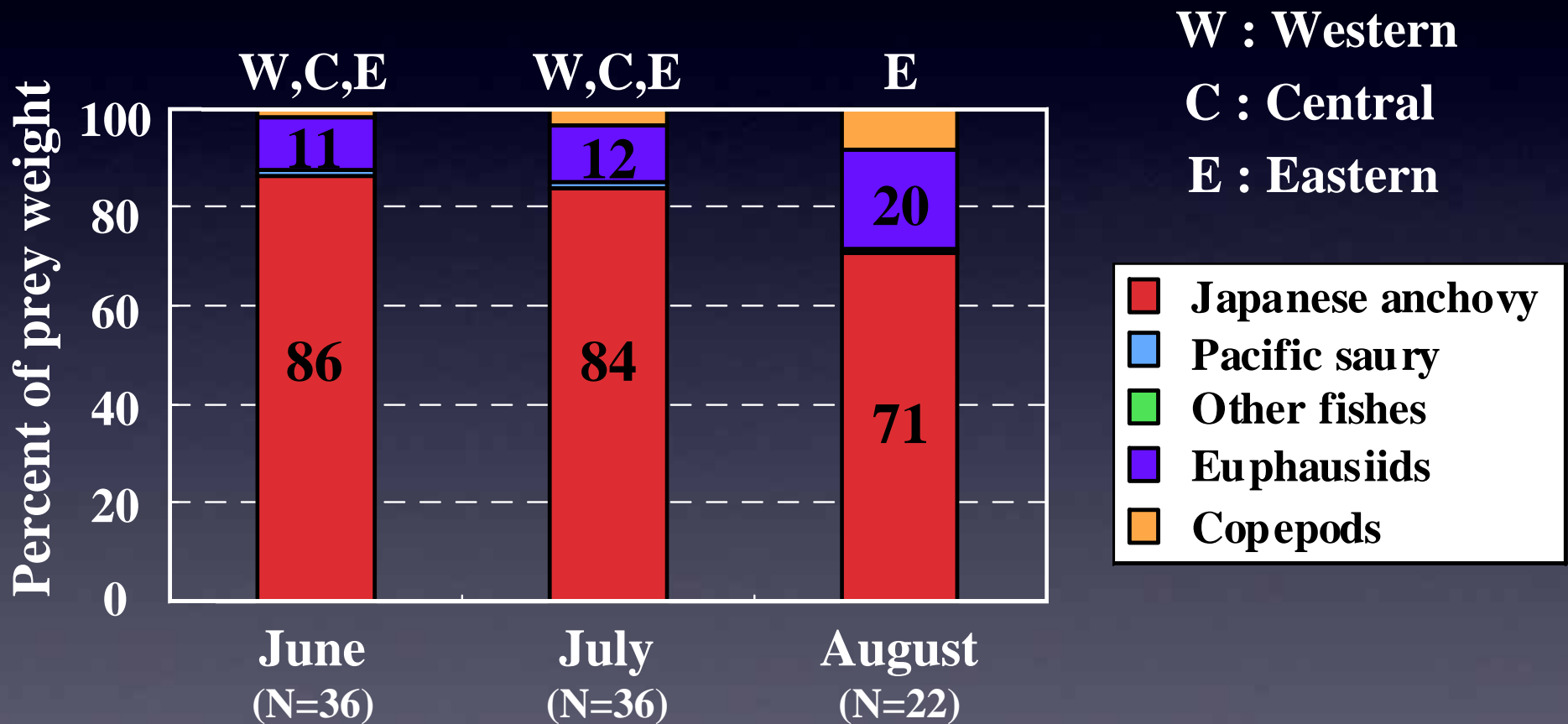
Monthly change of prey species (Common minke whale)



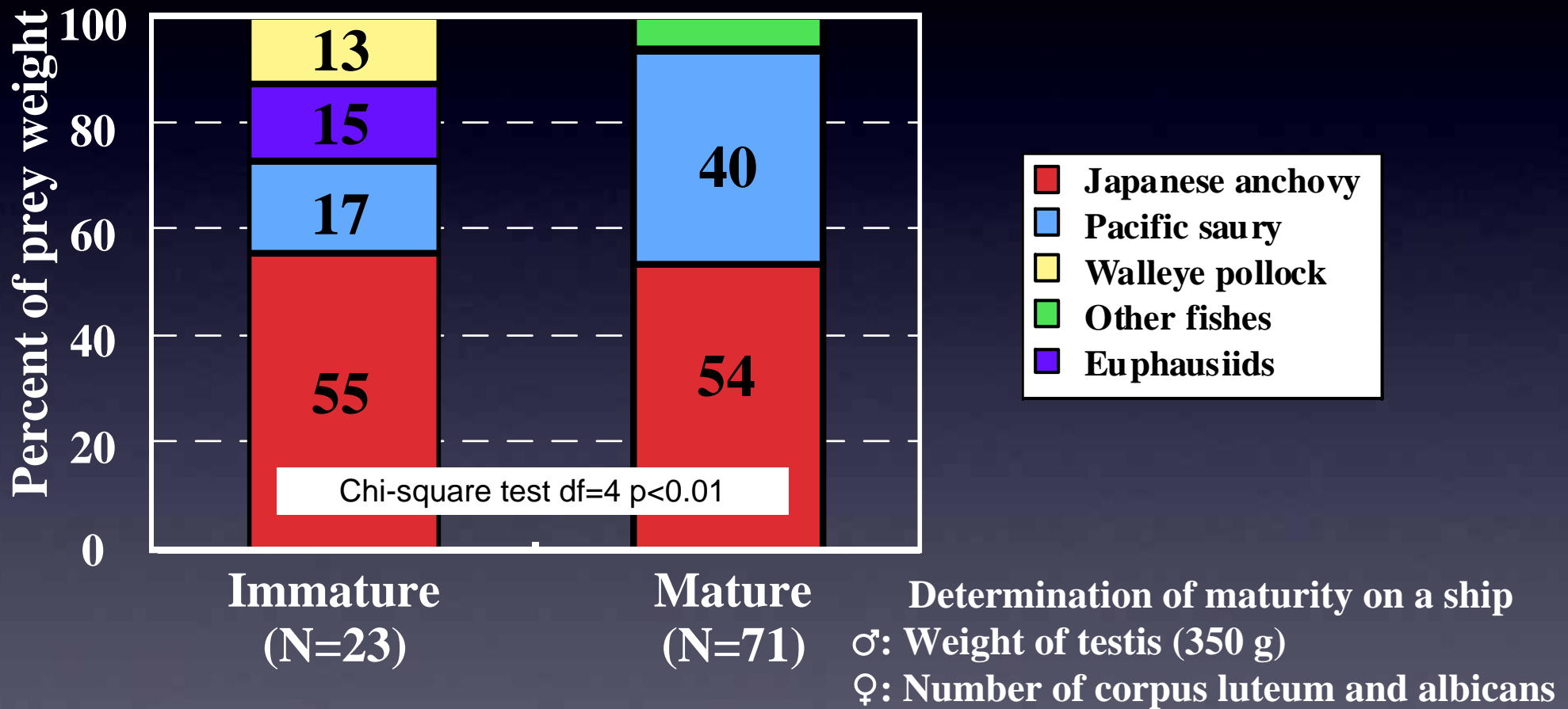
Prey of sei whale



Monthly change of prey species (Sei whale)



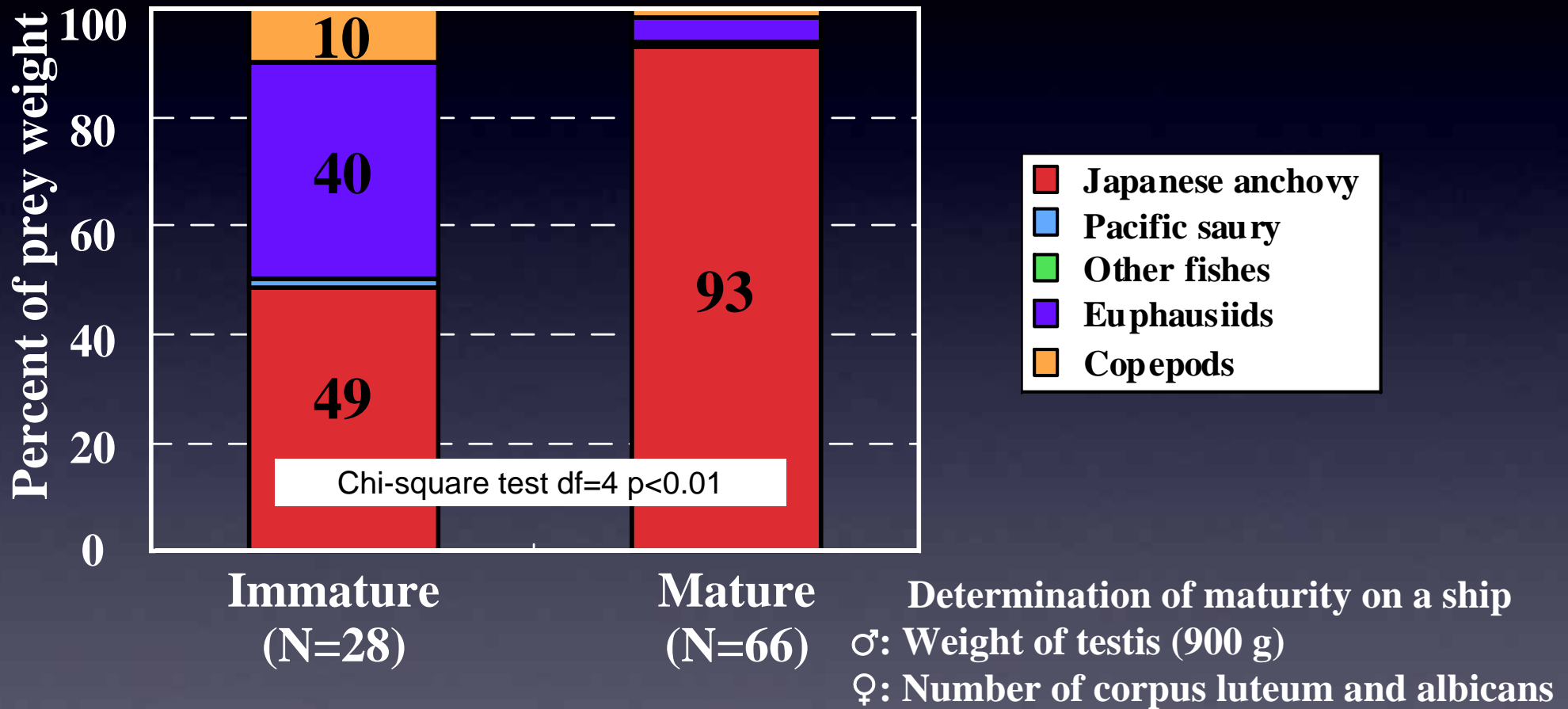
Differences in prey composition by sexual maturity of whales (common minke whale)



Immature : Euphausiids and Walleye pollock

Mature : Pacific saury

Differences in prey composition by sexual maturity of whales (sei whale)



Immature : Euphausiids and Copepods

Mature : Japanese anchovy

Variations in prey composition by maturity

	Minke	Sei
Immature	Japanese anchovy 55% Euphausiids 15% Walleye pollock 13%	Japanese anchovy 49% Euphausiids 40% Copepods 10%
Mature	Japanese anchovy 54% Pacific saury 40%	Japanese anchovy 93%

Energy contents (kcal/ kg)	
Pacific saury	3140
Japanese anchovy	1530
Walleye pollock	1110
Zooplankton (Euphausiids)	850

High

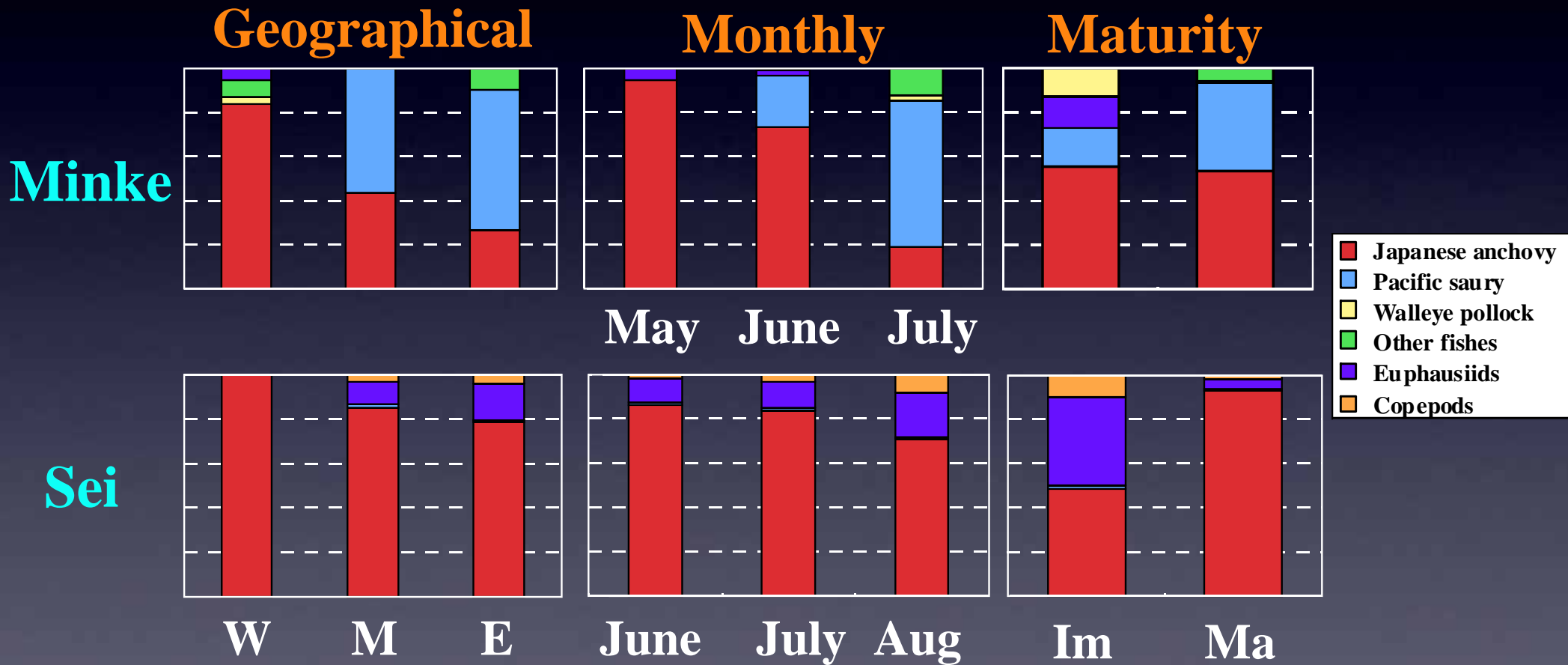


Low

Perez (1994), Tamura (2003)

Mature animals have a clear foraging strategy directed at species with higher caloric content.

Comparison in foods and feeding habits between common minke and sei whales



Comparison in foods and feeding habits between common minke and sei whales

- Common minke and sei whales utilize different prey species in area, month**
- Prey shifts by growth stage in common minke and sei whales**

Common minke and sei whales play different roles on marine ecosystem of the western north pacific.

Thank you for your attention

List of prey species

Common minke whale

Prey species	% occurrence
Japanese anchovy	51%
Pacific saury	37%
Walleye pollock	2%
Brama japonica	2%
Japanese sardine	1%
Chub mackerel	1%
Euphausiid	7%

Sei whale

Prey species	% occurrence
Japanese anchovy	38%
Pacific saury	12%
Japanese sardine	2%
<i>Vinciguerria nimbaria</i>	1%
Euphausiid	14%
Copepod	16%

Daily prey consumption of minke and sei whale

$$D = 206.25M^{0.783}, \quad I = D / E$$

Sigurjonsson and Vikingsson (1998)

D : Daily energy requirement (kcal/day)

M : Body weight of whales (kg)

I : Daily prey consumption (kg/day)

E : Energy contents of prey species (kcal/kg)

Energy contents (kcal/ kg)

Japanese anchovy 1530

Pacific saury 3140

Walleye pollock 1110

Zooplankton (Krill) 850

Average contents 1658

Whale	Maturity	Mean body weight (kg)	D (kcal/day)	I (kg/day)
Minke	Immature	2,603	97,434	59
	Mature	5,165	166,620	101
Sei	Immature	13,709	357,824	216
	Mature	22,685	530,808	320

Differences in prey consumption between minke and sei whale

D : Daily energy requirement (kcal/day) , I : Daily prey consumption (kg/day)

Case 1 : All of prey composition is Pacific saury

Case 2 : All of prey composition is Japanese anchovy

Case 3 : All of prey composition is Zooplankton

Whale	Maturity	D (kcal/day)	I (kg / day) Case 1	I (kg / day) Case 2	I (kg / day) Case 3
Minke	Immature	97,434	31	64	115
	Mature	166,620	53	109	196
Sei	Immature	357,824	114	234	421
	Mature	530,808	169	347	624

Feeding on Pacific saury has the obvious advantages of saving time and energy, and facilitates efficient energy intake.