

Food habits of pinnipeds in the Japanese waters: A review



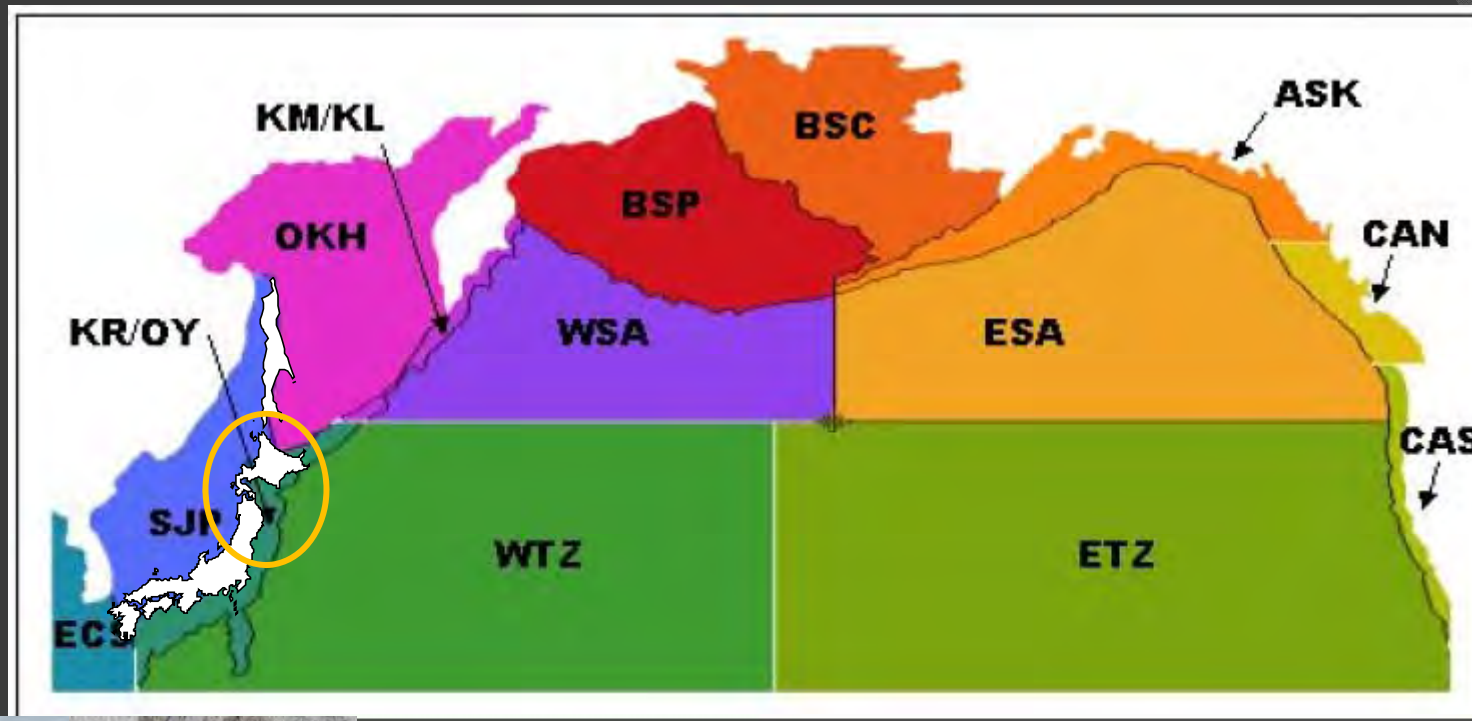
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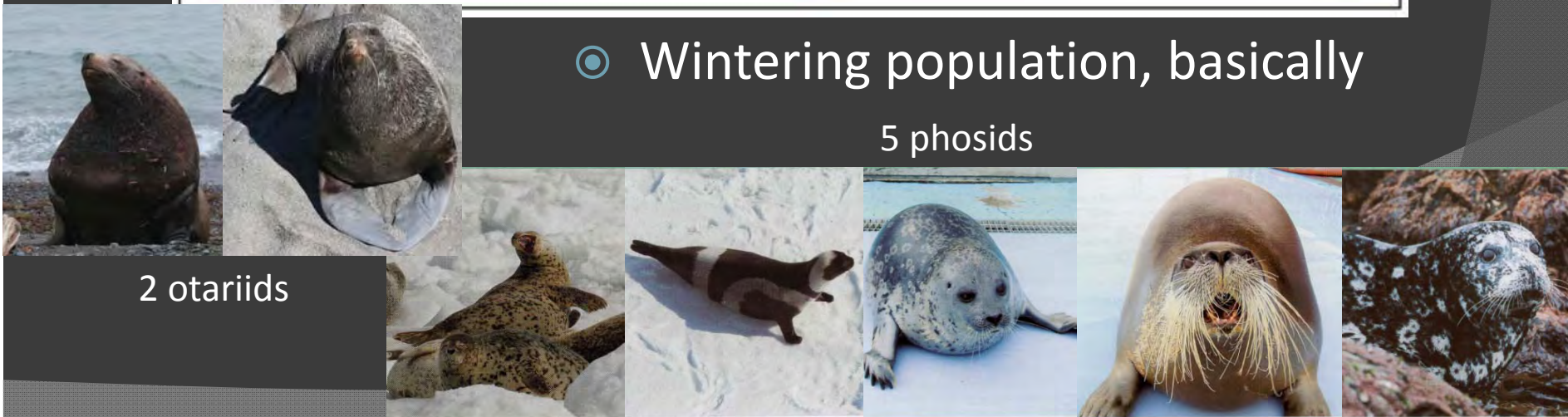
Pinnipeds in the northern Japanese waters



◎ Wintering population, basically

5 phosids

2 otariids



©Photos of phosids from "The Wild Mammals of Japan"

Prey composition and variation : A review

Contents and data availability

(#; available, n/a; not available, -; absence or rare)

	<i>Regional</i>					<i>Temporal</i>		
	Japan Sea	Nemuro Strt	Okhotsk	Oyashio	KR/OY	Seasonal	Inter-annual	Decadal
Steller sea lion	# ¹	# ²	n/a	n/a	-	n/a	# ¹	# ¹
Northern fur seal	# ³	n/a	n/a	n/a	# ⁴	n/a	n/a	# ⁴
Spotted seal	# ⁵	# ^{6,7}	#	#	-	# ⁵	# ^{8,9}	#
Ribbon seal	-	#	n/a	n/a	-	n/a	n/a	n/a
Harbor seal	-	-	-	#	-	n/a	#	#
<i>Interspecific</i>	n/a	# ^{6,7}	n/a	# ¹⁰	-			

References

¹Goto et al. 2011, ²Goto and Simazaki 1998, ³Horimoto 2009, ⁴Yonezaki et al. 2004, 2008, ⁵Shitamichi and Kobayashi unpublished, ⁶Goto 1999, ⁷Deguchi et al. 2004, ⁸Hirata and Kobayashi unpublished, ⁹Watanabe and Kobayashi unpublished, ¹⁰Nakaoka et al. 1986,



North Pacific giant octopus
(*Octopus dofleini*)

Pacific cod
(*Gadus macrocephalus*)



Japanese sand lance
(*Ammodytes personatus*)

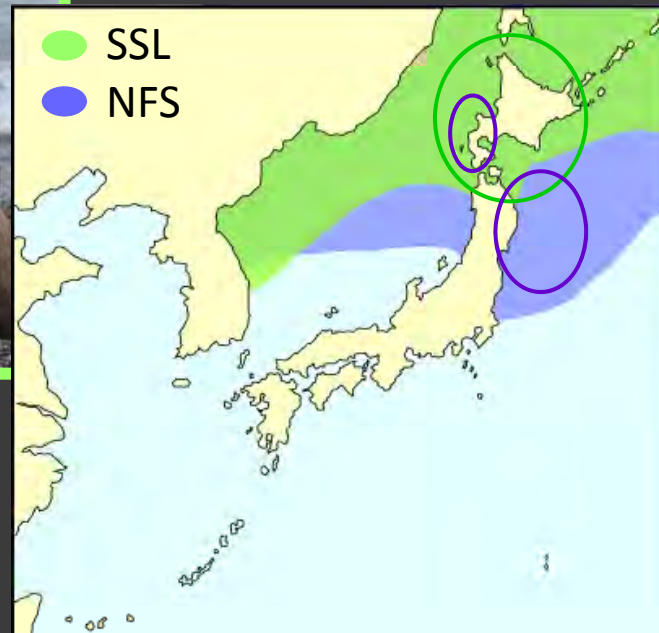
Japanese flounder
(*Paralichthys olivaceus*)



◎ Direct analysis of stomach contents

Otariids in Japanese coastal waters

- Steller sea lions seals (SSLs, *Eumetopias jubatus*)
- Northern fur seals (NFSs, *Callorhinus ursinus*)

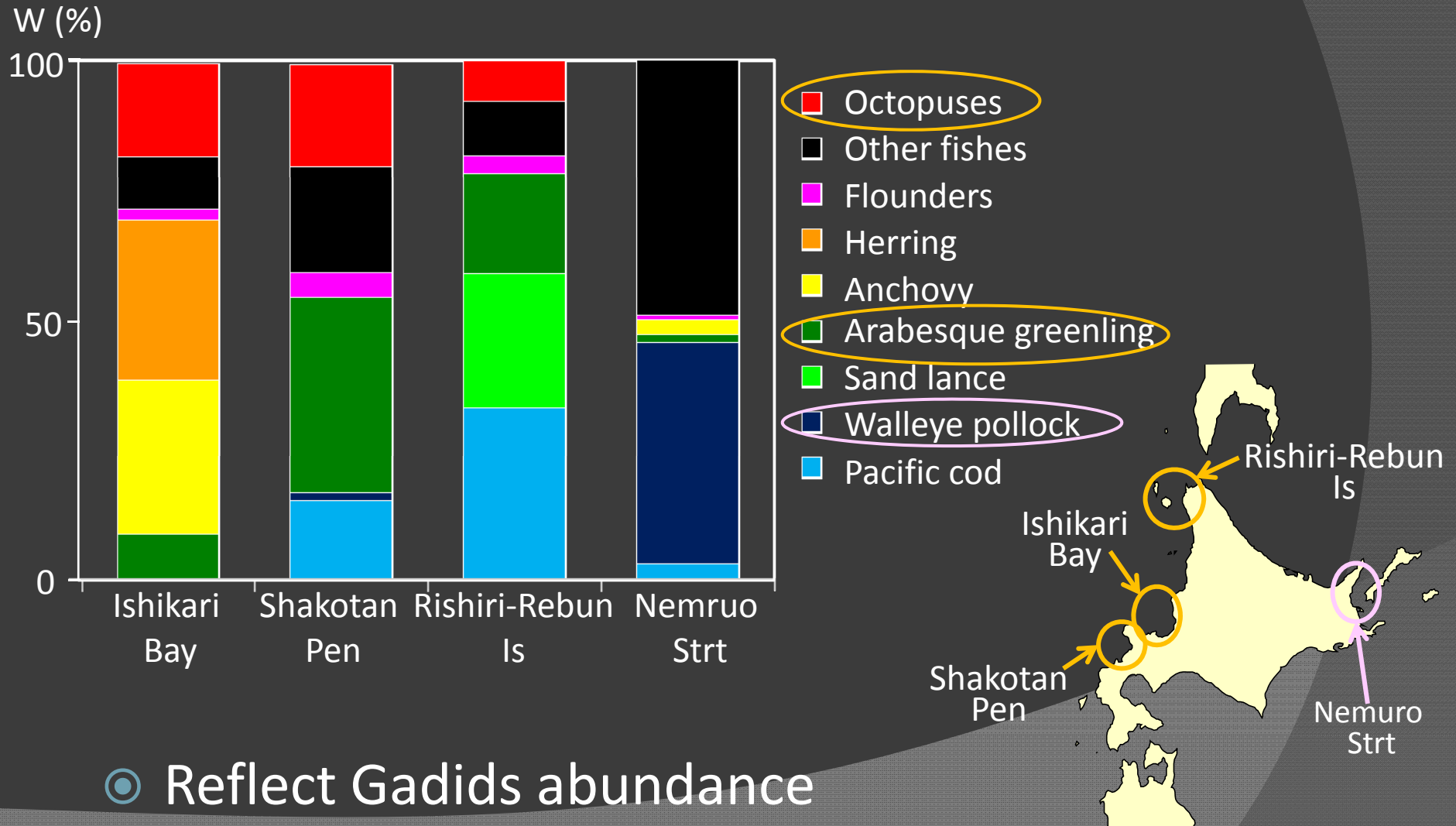


- ◎ Winter migration (non-breeding season)
 - From Oct. to Jun.

Prey composition; regional variation

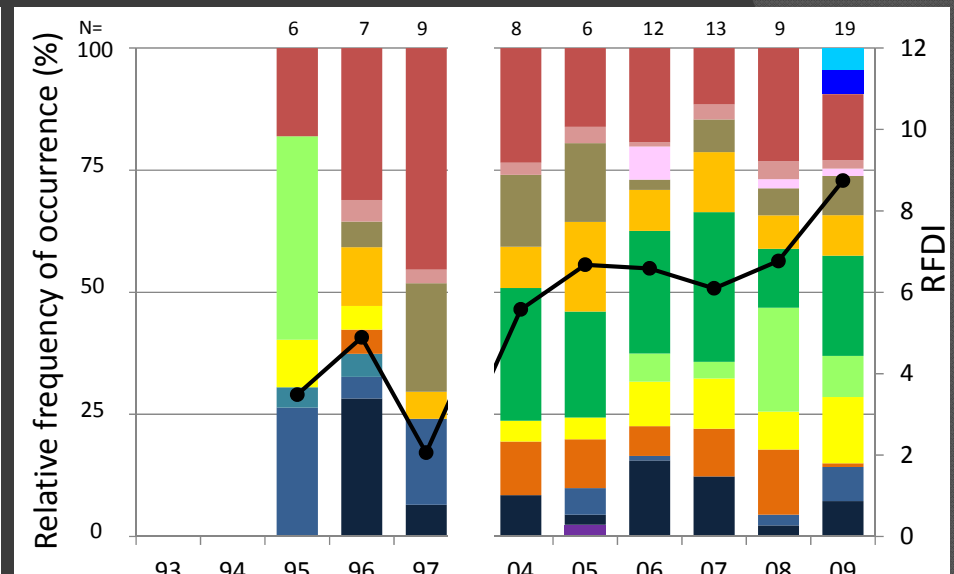
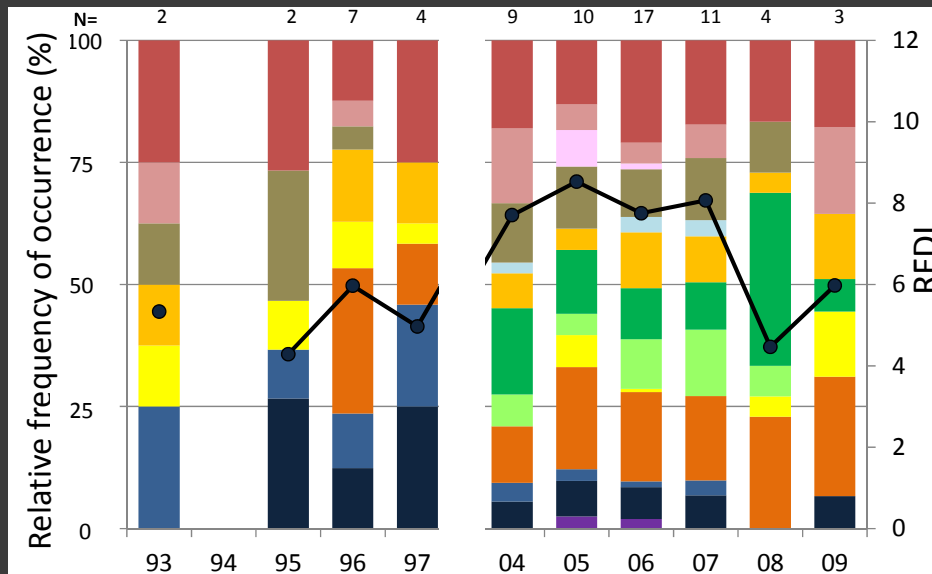
-SSLs-

Goto unpublished data

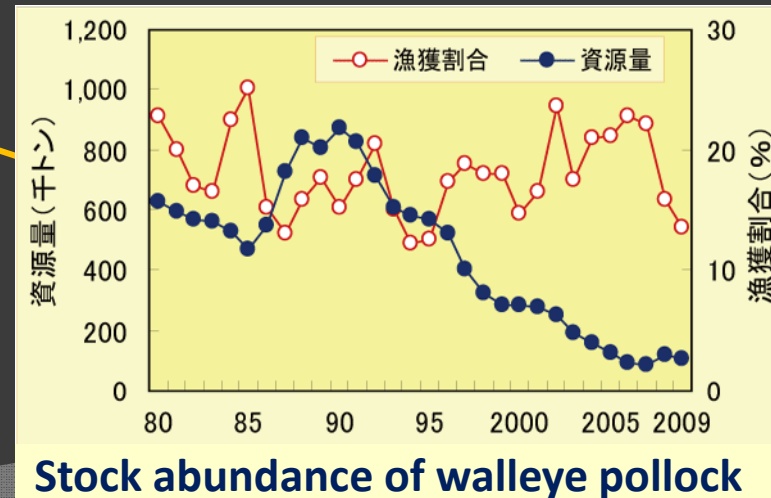
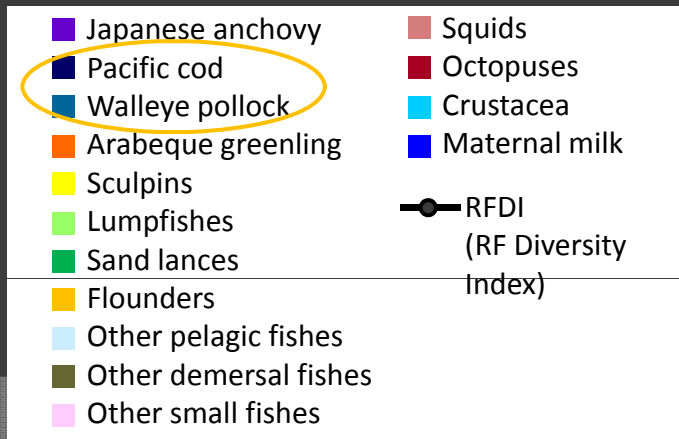


Decadal change -SSLs-

Goto et al. 2011



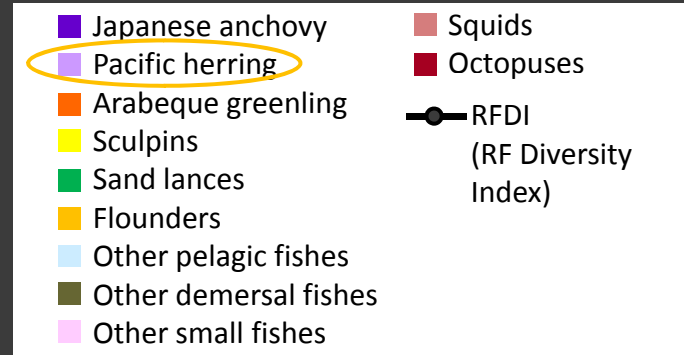
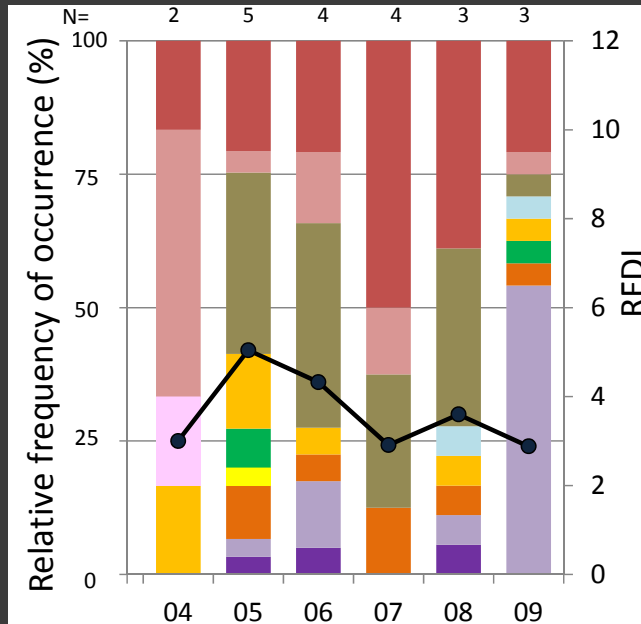
Shakotan Pen



<http://abchan.job.affrc.go.jp/digests22/html/2210.html>

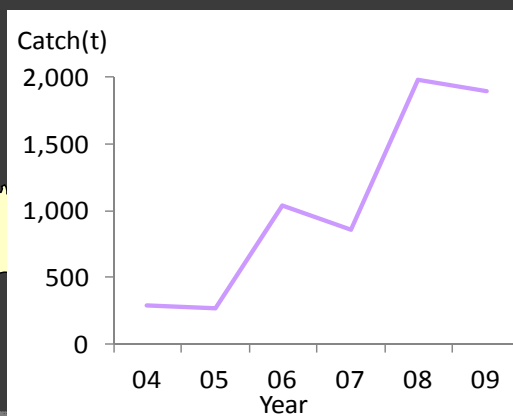
Inter-annual variation -SSLs-

Goto et al. 2011



⊙ Schooling fish; easily available

Ishikari Bay



Fish haul of herring



Decadal change

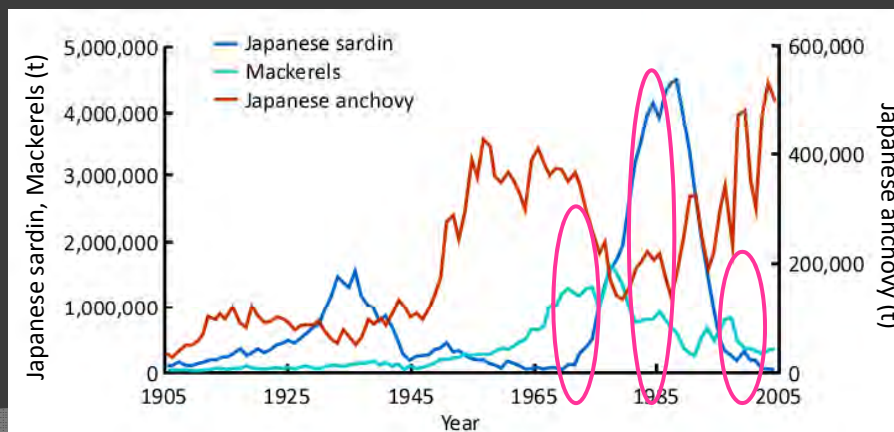
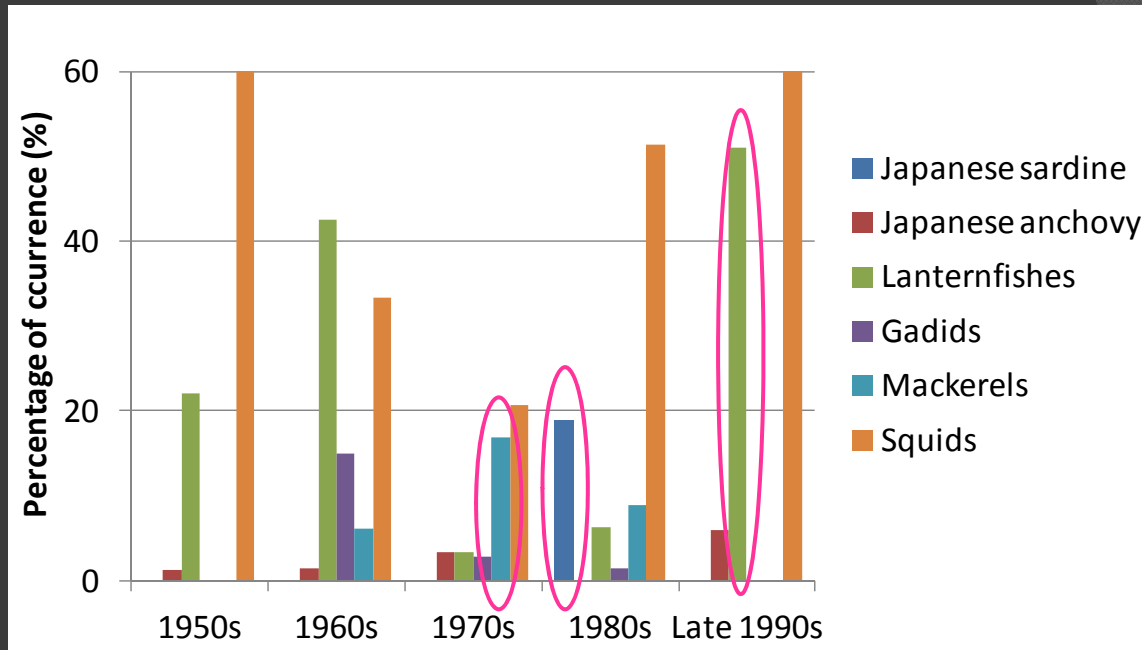
– NFSs –

Yonezaki et al. 2004, 2008



- 150,000 seals
- Winter migration

⊙ In parallel with decadal alternation

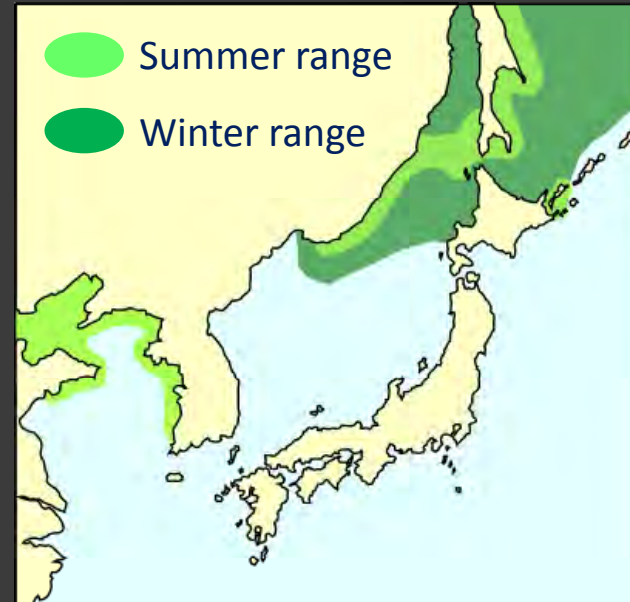


<http://tnfri.fra.affrc.go.jp/kaiyo/POMALweb/index-fish.html>

Phocids in Japanese coastal waters

Ice seals

- Spotted seals (SSs, *Phoca largha*)
- Ribbon seals (RSs, *Histiophoca fasciata*)
- Ringed seals (*Pusa hispida*)
- Bearded seals (*Erignathus barbatus*)



Phocids in Japanese coastal waters

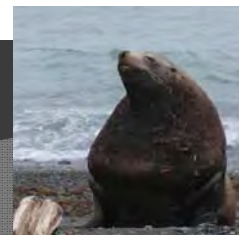
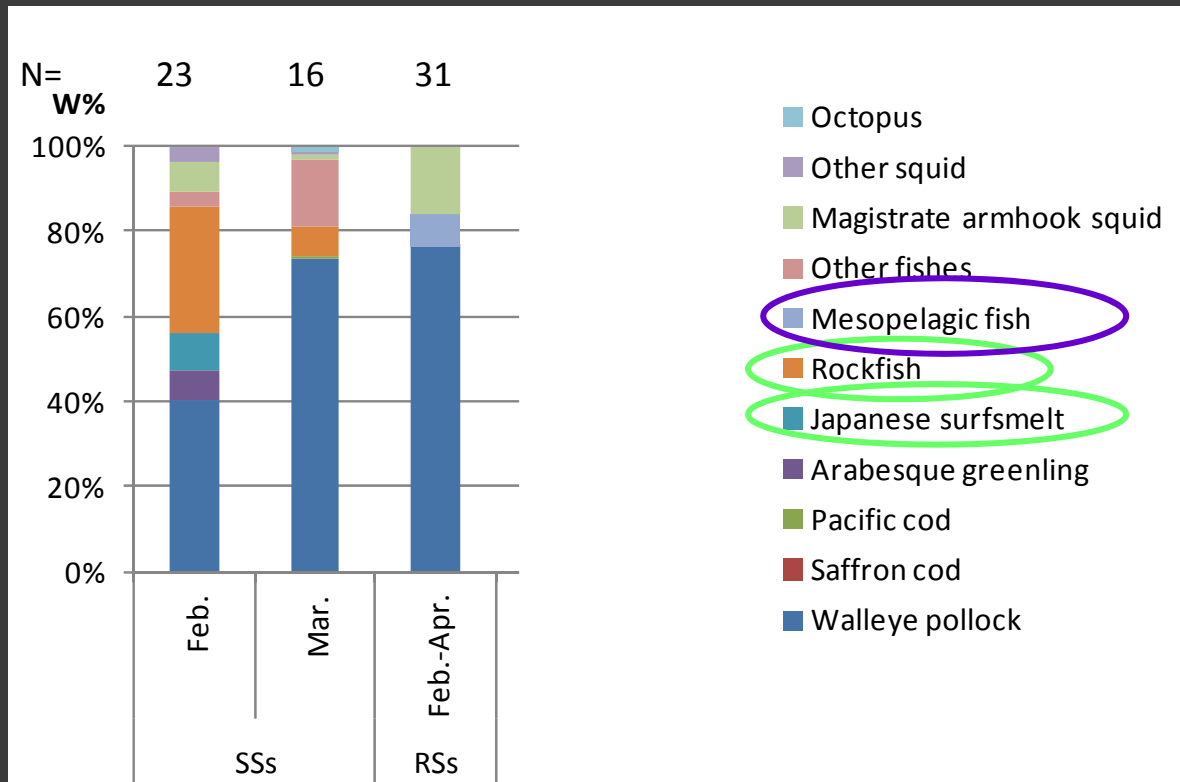
Harbor seals (HSs, *Phoca vitulina*)



- ◎ Residents all year round
 - Breeding at rocky coast from May to Jun.

Interspecific variation - Nemuro Strait -

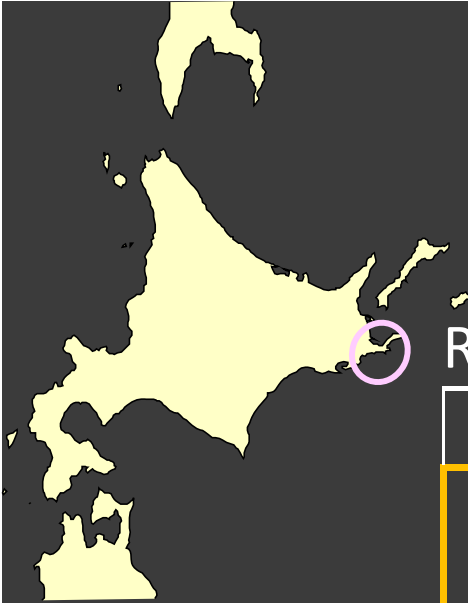
Goto 1999, unpublished data; Deguchi et al. 2004



Interspecific variation

- HSs vs. SSs -

Nakaoka et al. 1986



Rank by Index of Relative Importance (IRI)

		HSs	SSs
Demersal Rocky	Pacific giant octopus	++++	++++
	Saffron cod	+++	+++
	Sculpins	++	+
	Pricklebacks	+++	++
	Greenlings	++	+
	Rockfishes	++	+
Demersal Sandy	Flounders	++	+++
	Sand lance	-	+++
Coastal Epi, meso-pelagic	Smelts	-	++
	Squids	-	+
Migratory Epipelagic	Salmonids	+++	+
	Sardin	+	++
	Saury	-	+++
	Mackerels	-	+

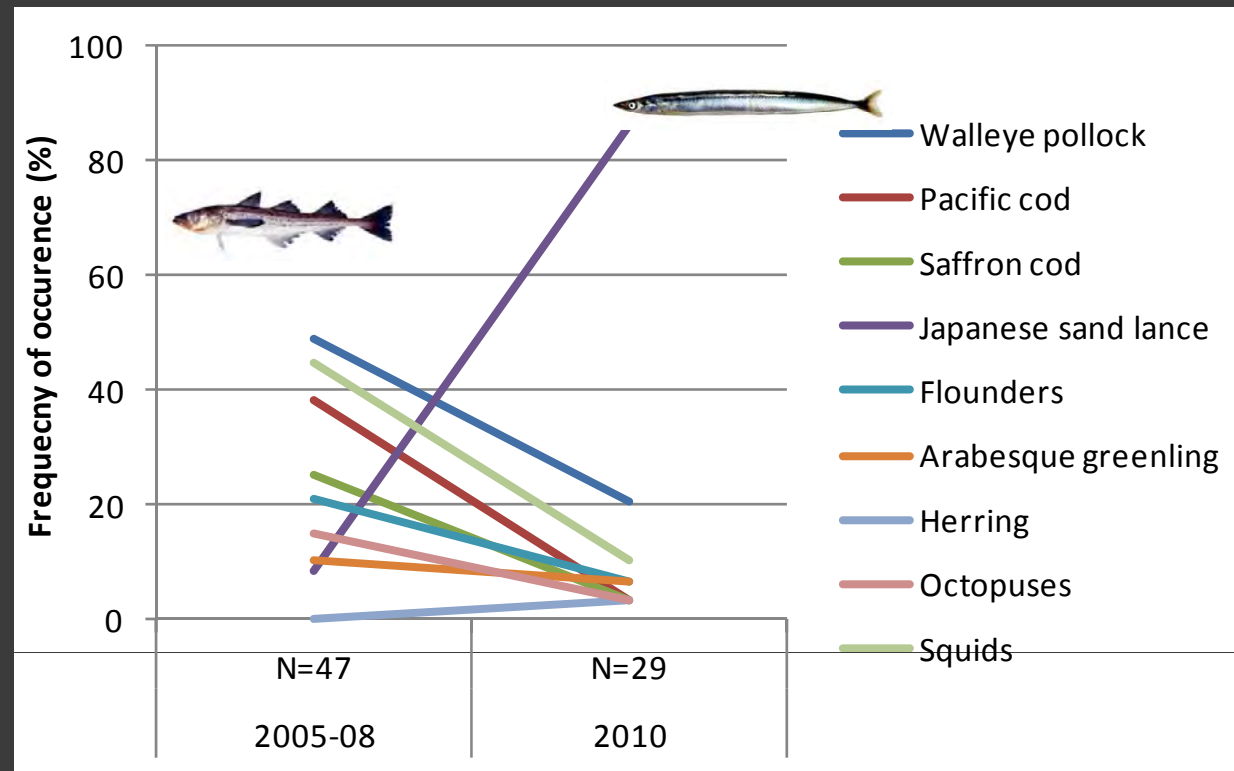
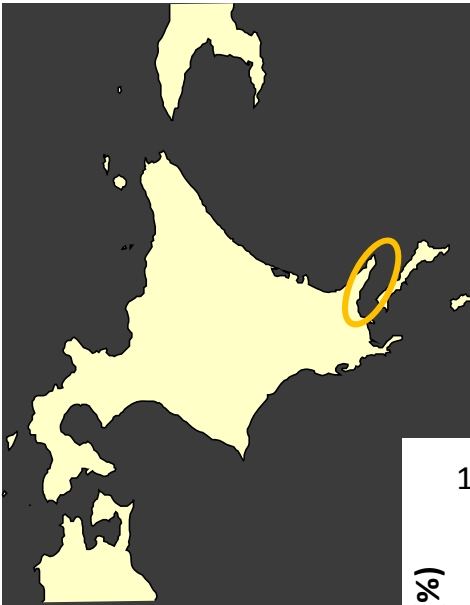


(++++; 1st, +++; 2nd -5th, ++; 6th -10th, +; >10th, -; none)

Interannual variation

- SSs -

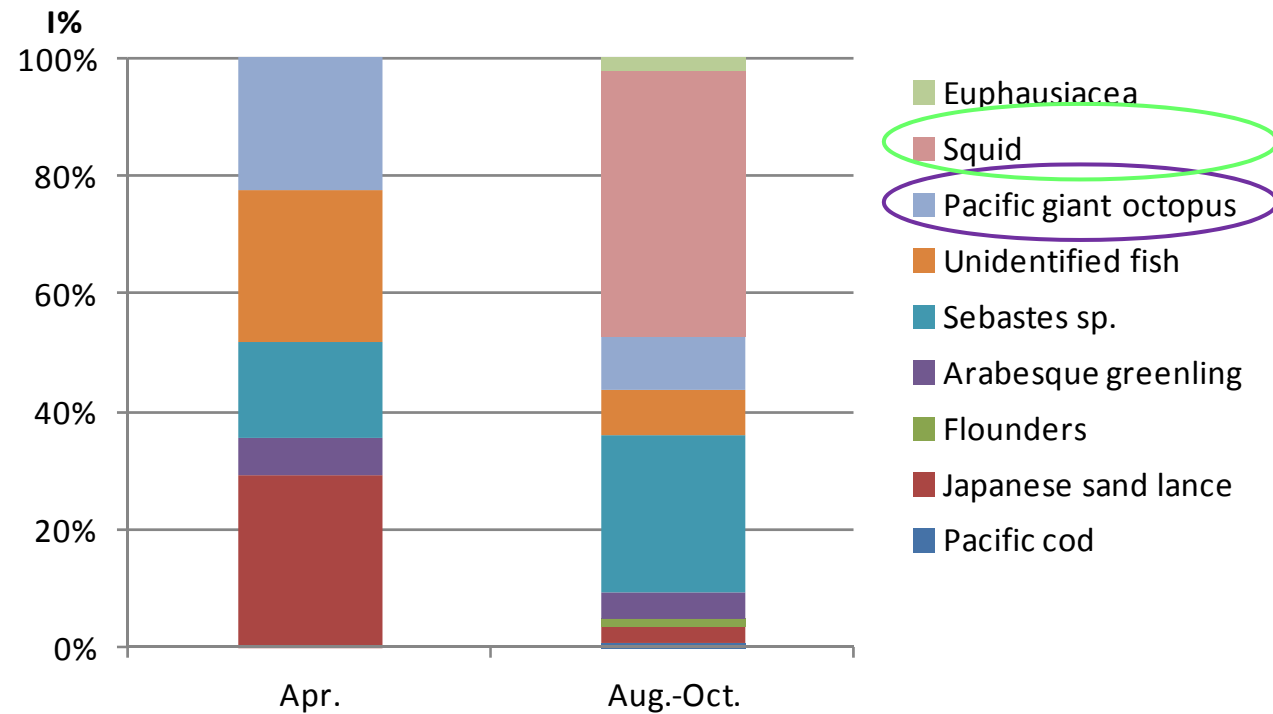
*Hirata and Kobayashi, Watanabe and Kobayashi;
unpublished data*



Seasonal change

- SSs -

Shitamichi and Kobayashi, unpublished data



Depredation

Dip nets



Gill nets



Set nets



Summary

- ◎ Opportunistic feeders, basically
- ◎ Primary preys; demersal and pelagic fishes and cephalopods
- ◎ Major prey
 - SSLs, SSs, HSs; coastal demersal fishes, Gadids, Octopuses
 - RSs; Gadids, mesopelagic fishes, Squids
 - NFSs; mesopelagic fishes, Squids
- ◎ Sift in major prey and feeding mode in response to change in prey availability as a result of environmental regime shift
- ◎ Prey composition of wintering pinnipeds well known in the Japanese waters