

The interaction between
northern shrimp (*Pandalus
borealis*) and cod (*Gadus
morhua*) in inshore and offshore
areas off Iceland

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Outline

- Introduction

- Inshore
 - Area + survey
 - Shrimp stock
 - Cod
 - Prey

- Offshore
 - Area + survey
 - Shrimp stock
 - Cod
 - Prey

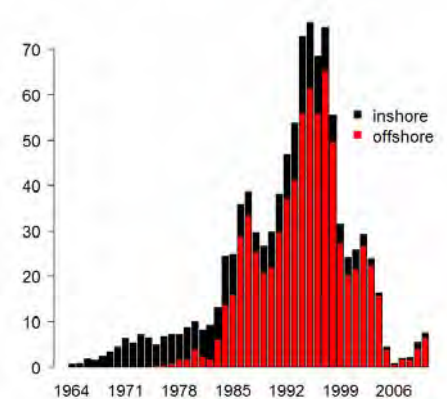
- Summary and comparison of areas





Introduction

- Northern shrimp is
 - targeted by commercial fisheries
 - of great importance as prey in the marine food web
- Predation of cod can have strong effects on the development of shrimp stocks
- The biological interaction between cod and shrimp are poorly understood
- The goal was to compare the feeding ecology of cod, with emphasis on northern shrimp, in two different areas, inshore and offshore shrimp grounds around Iceland

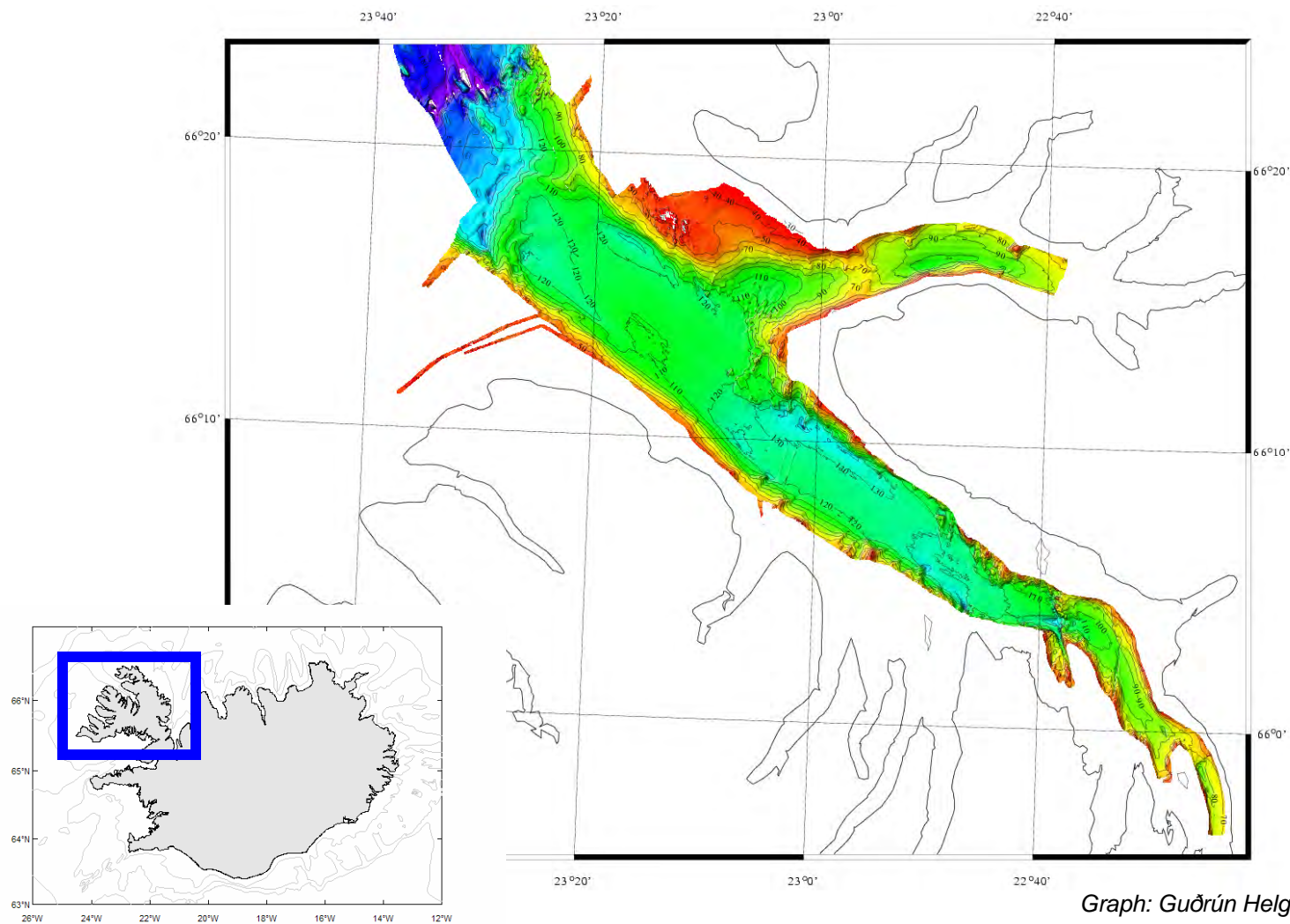




Inshore



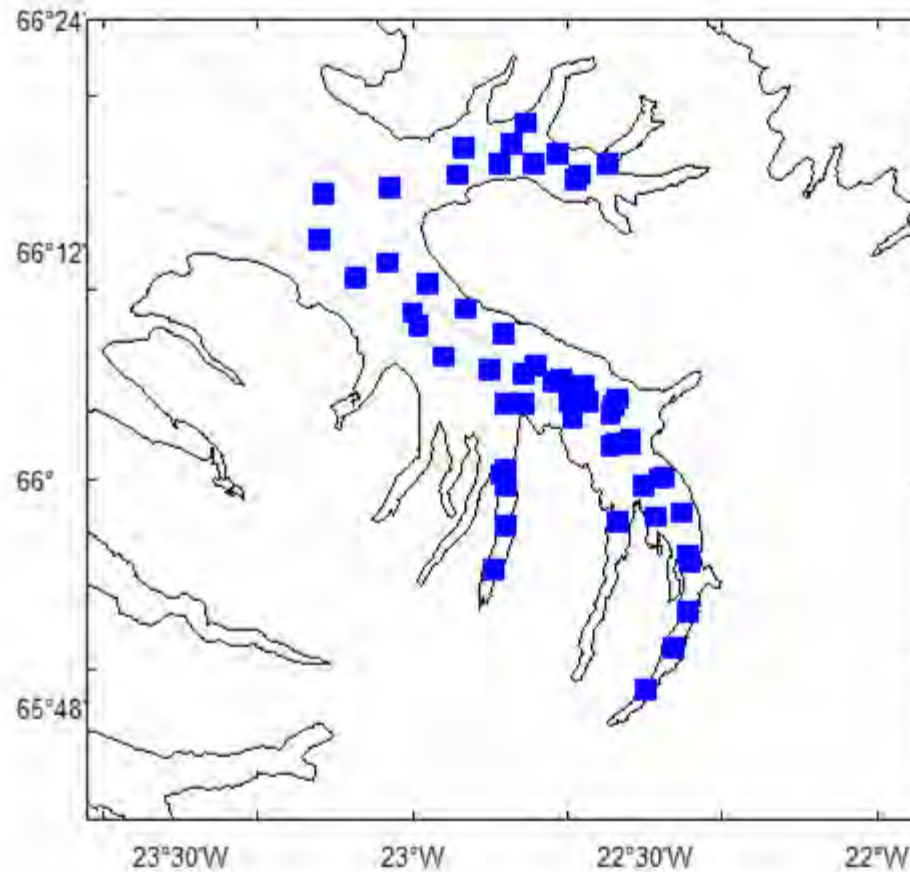
Inshore: Ísafjarðardjúp



Graph: Guðrún Helgadóttir

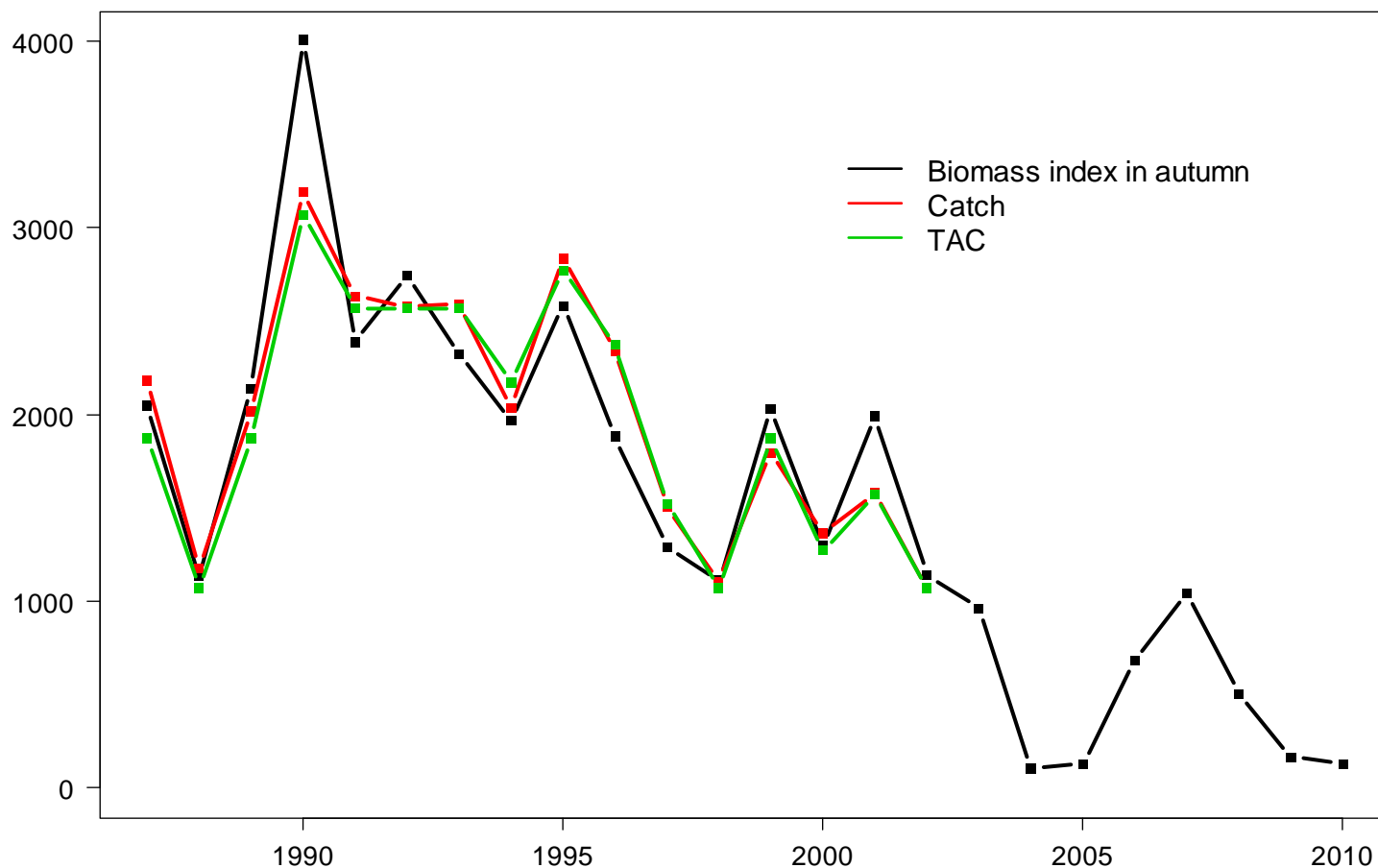


Research survey





Shrimp: biomass index, catch, TAC



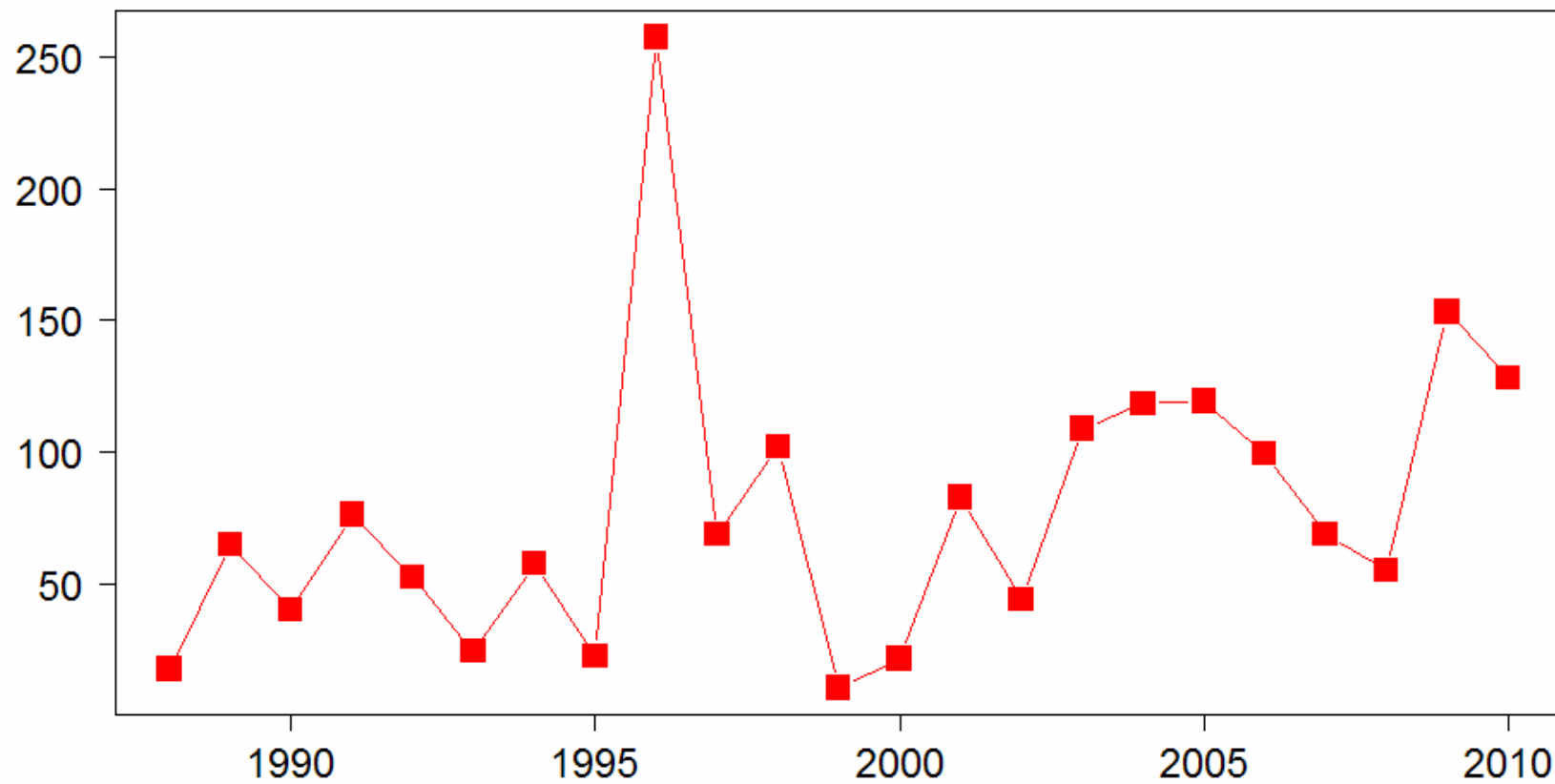
Sample size



	N	% of empty stomachs
1999	78	31
2000	163	34
2001	178	20
2002	150	19
2003	165	33
2004	247	25
2005	181	32
2006	108	25
2007	205	16
2008	231	16
2009	133	25
2010	134	22

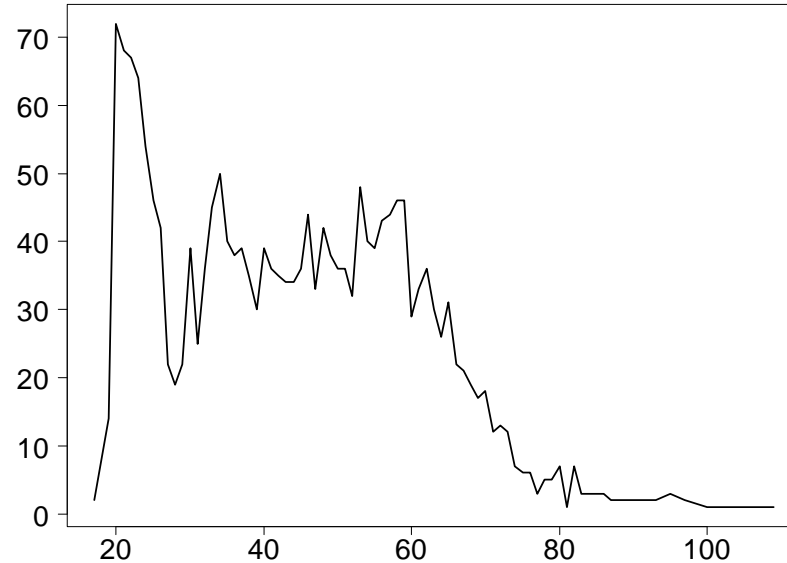
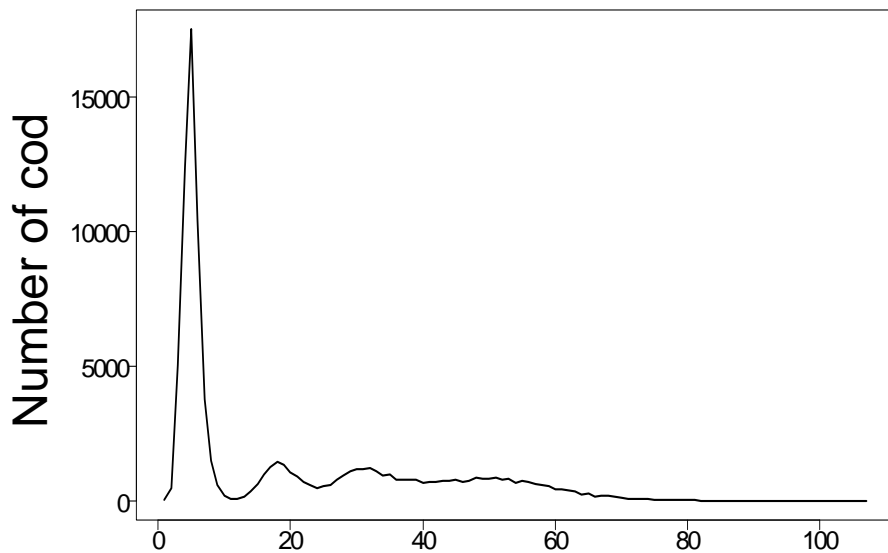


Cod abundance



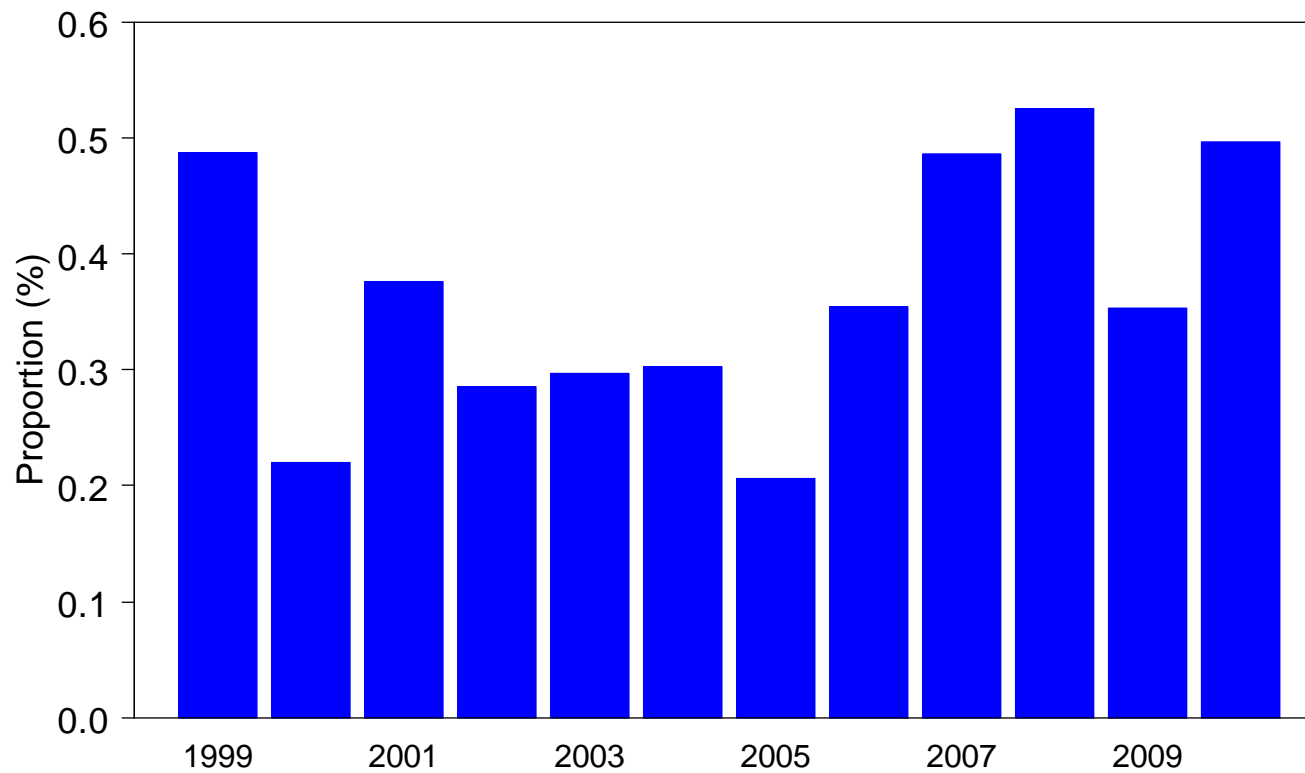


Length distribution



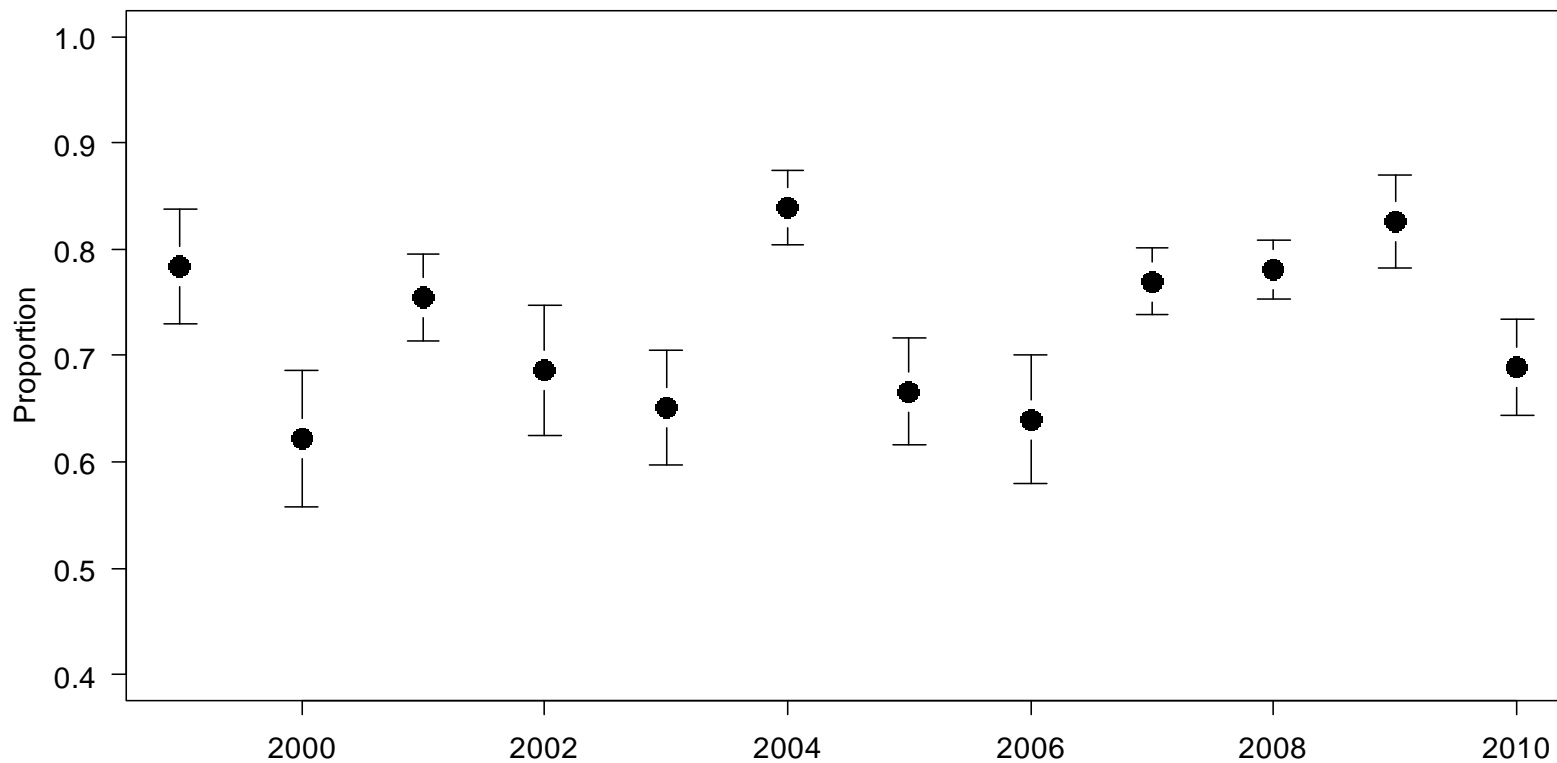
Length (cm)

Proportion of cod consuming shrimp



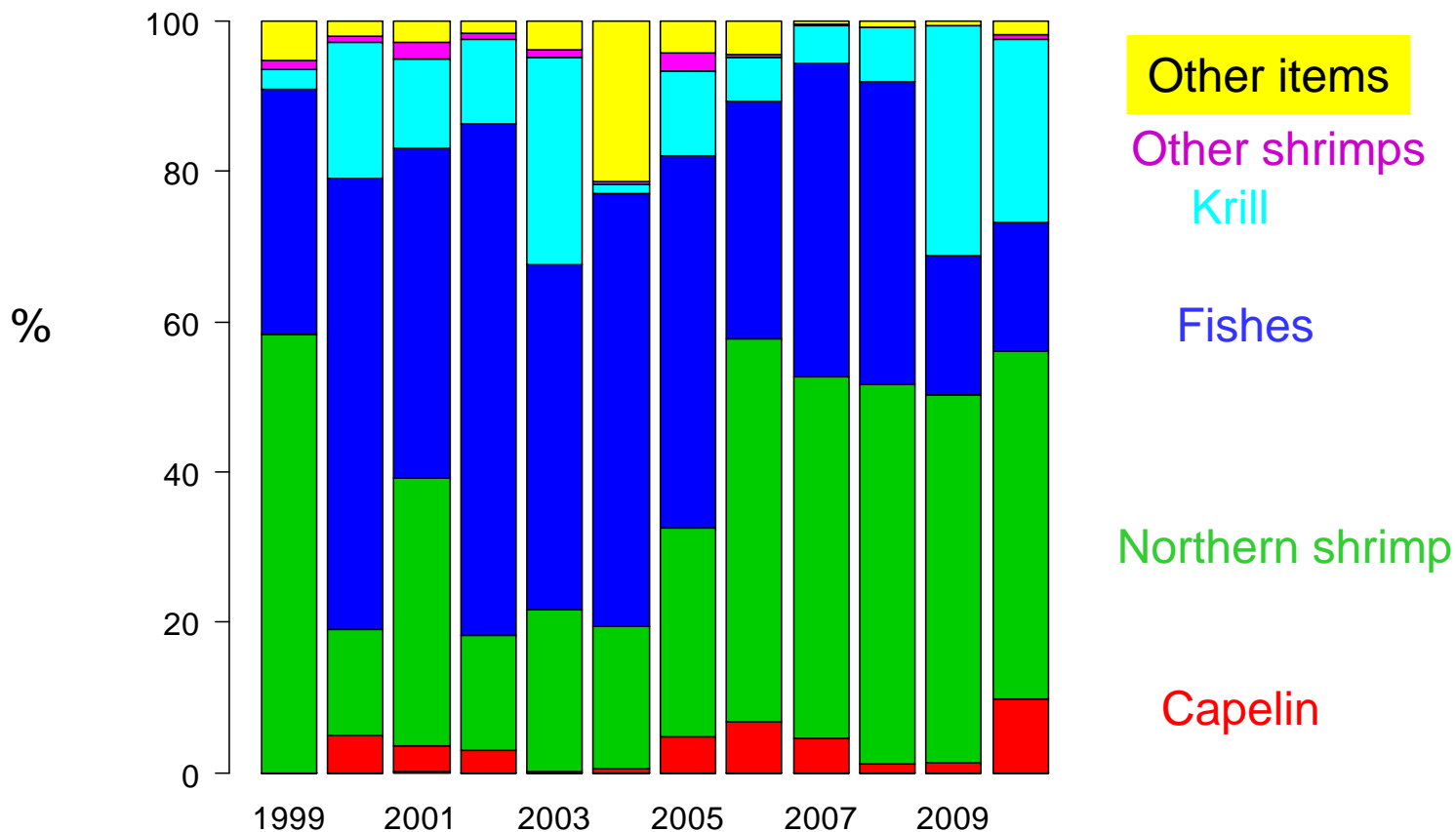


Proportion of shrimp





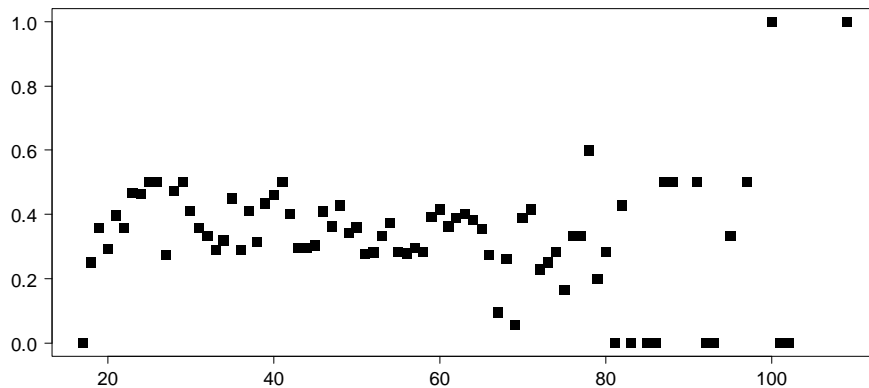
Prey groups



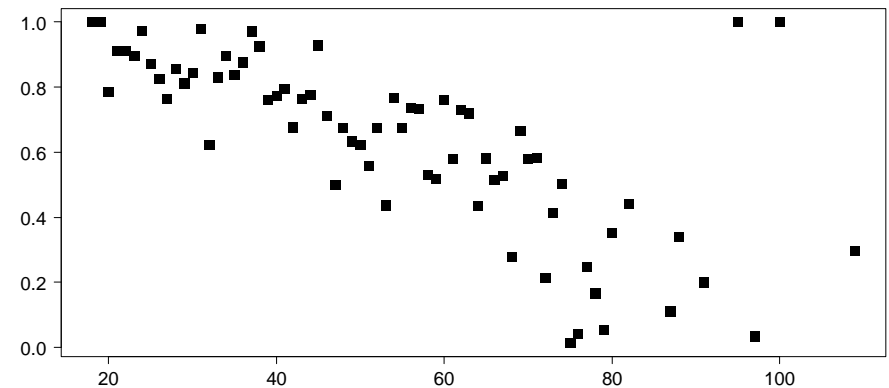


Cod length vs shrimp consumption

Proportion with shrimp



Proportion of shrimp



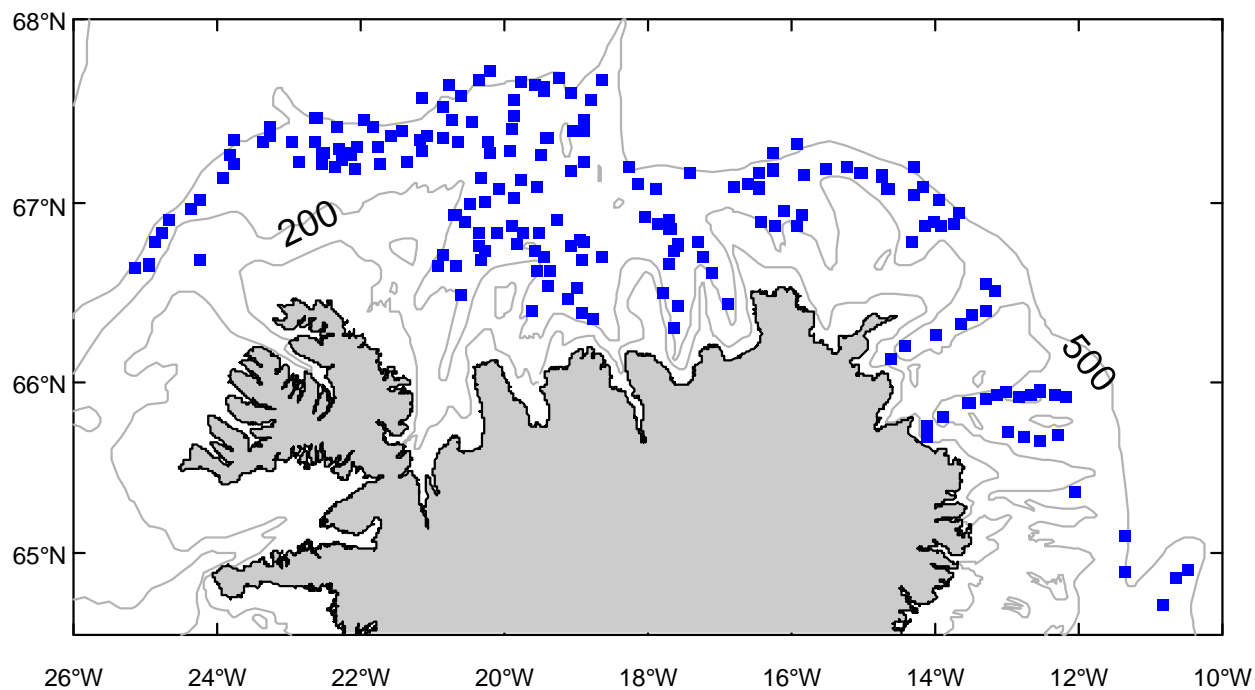
Cod length (cm)



Offshore

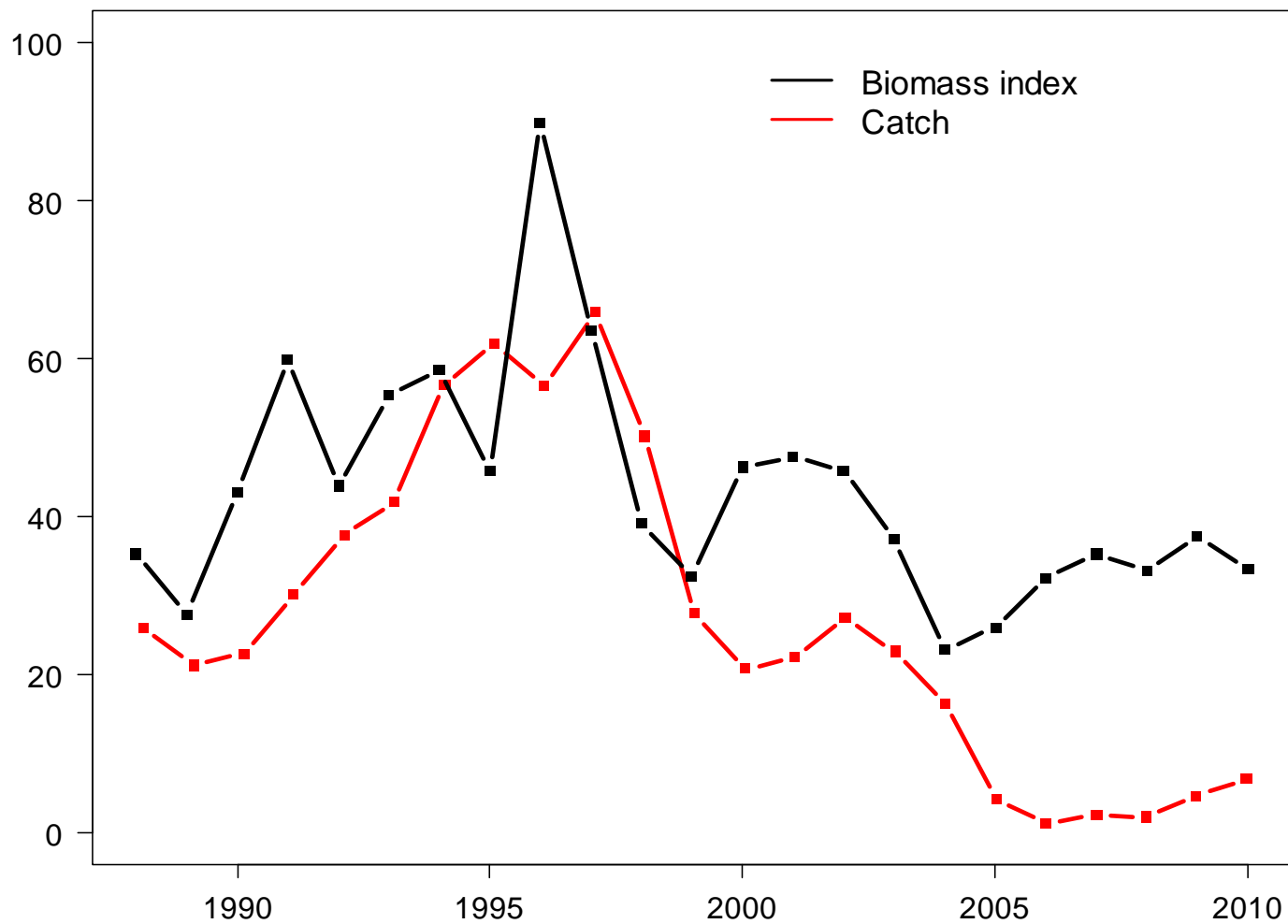


Offshore





Biomass and catch



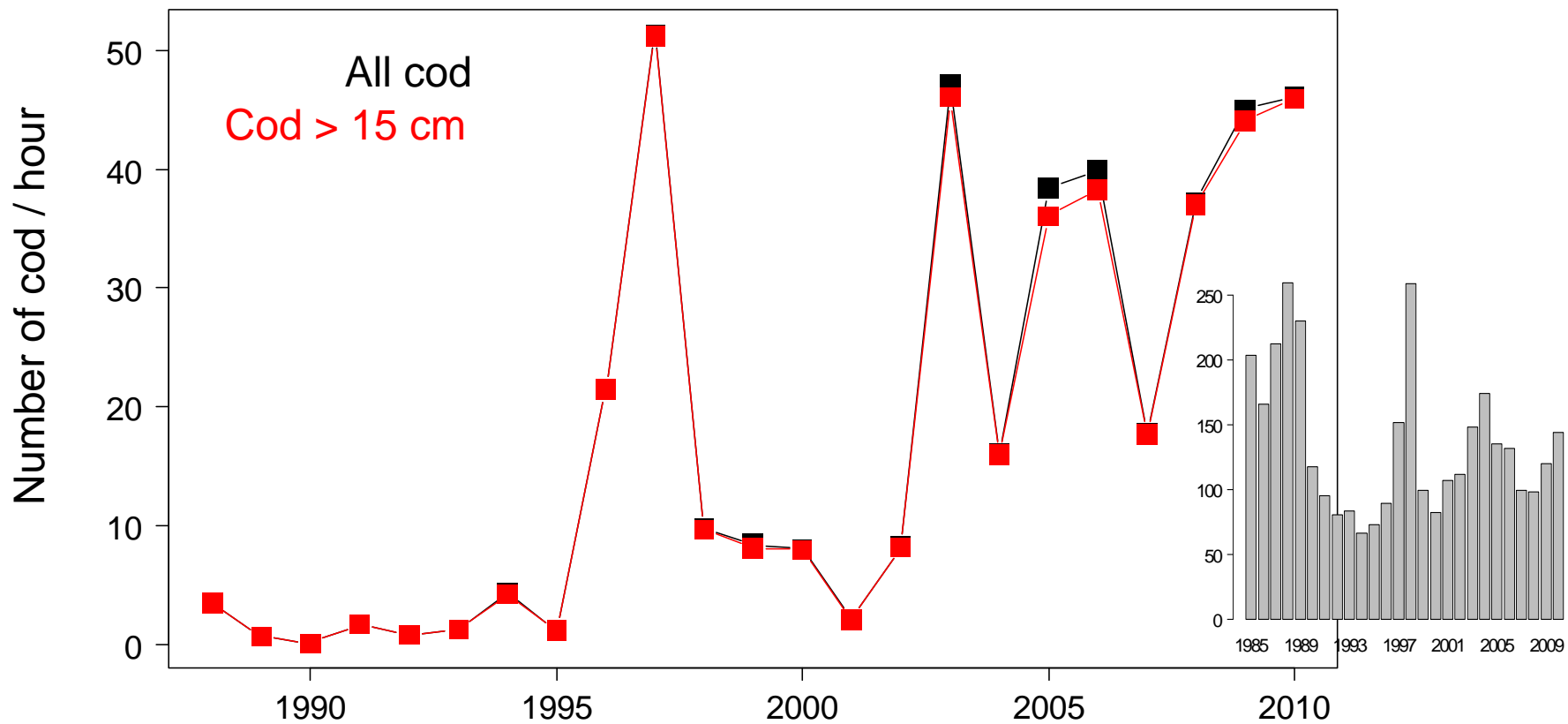
Sample size



	N	% of empty stomachs
1999	417	6
2000	335	13
2001	253	8
2002	348	8
2003	722	12
2004	550	13
2005	514	15
2006	367	8
2007	304	15
2008	349	16
2009	339	17
2010	343	15

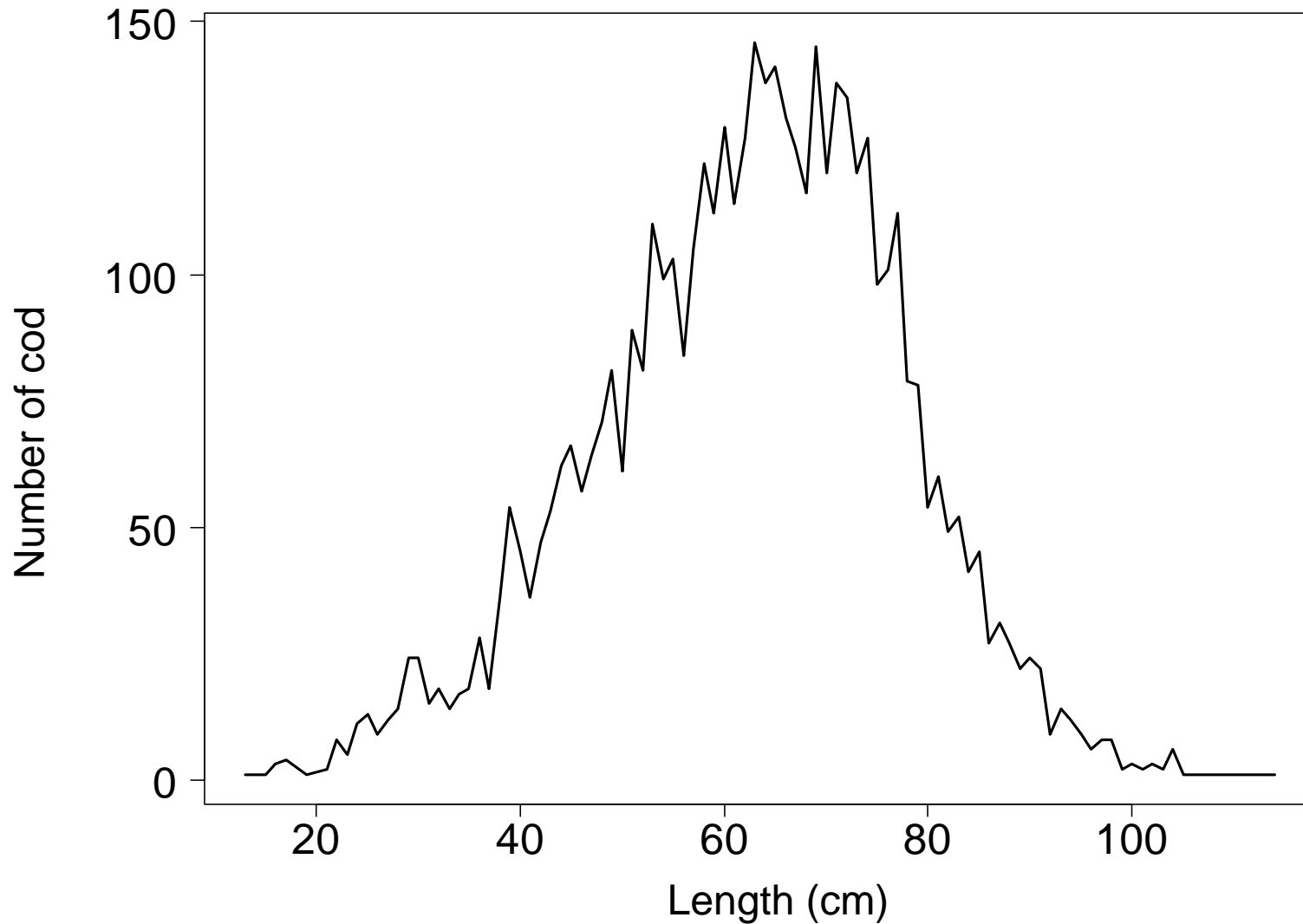


Cod abundance

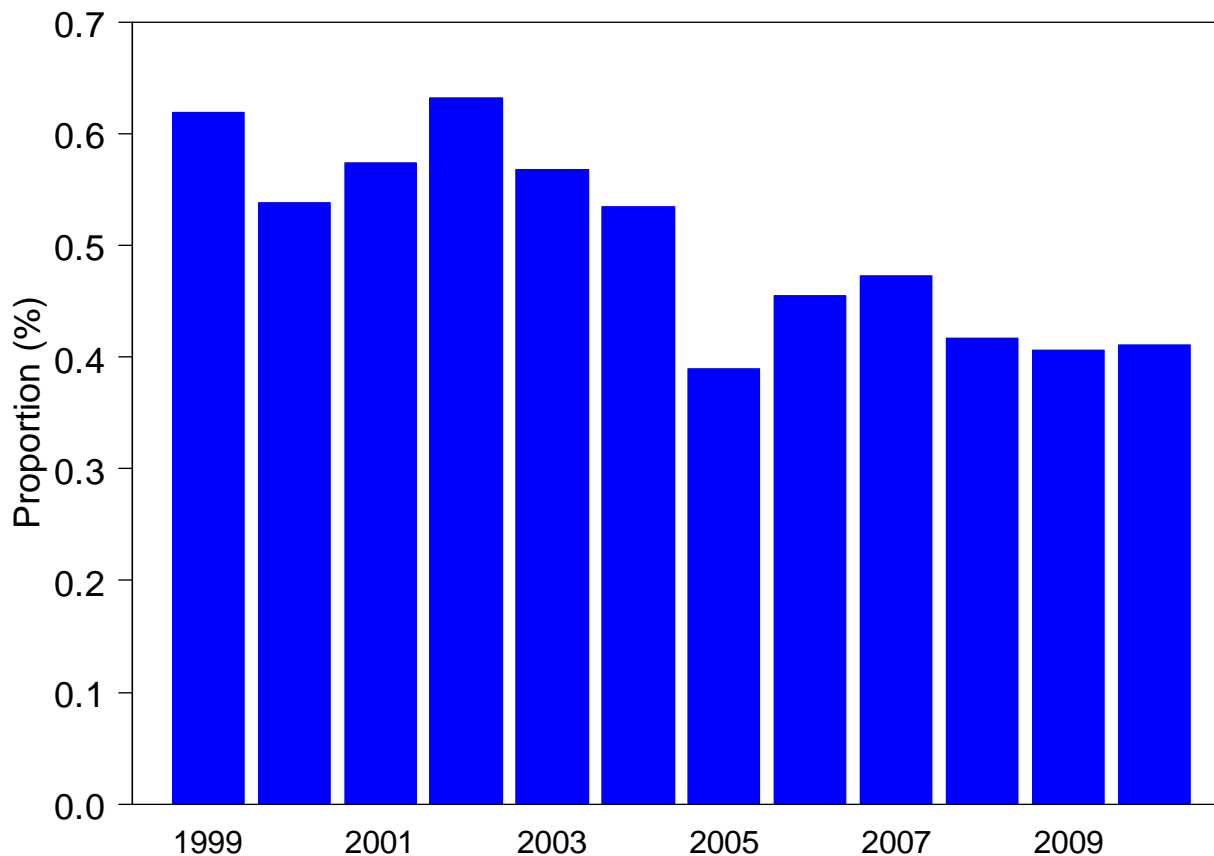




Length distribution

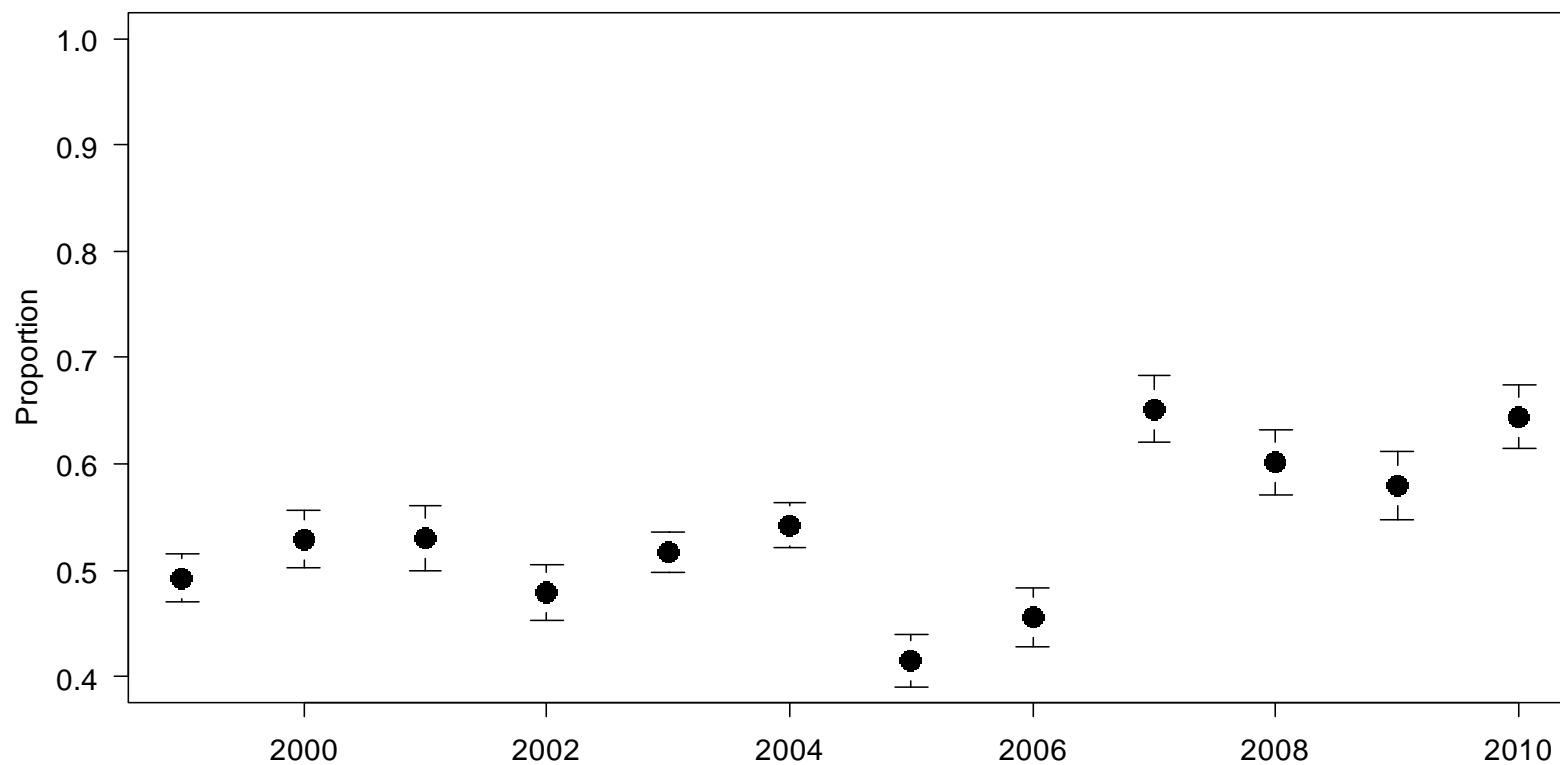


Proportion of cod consuming shrimp





Proportion of shrimp





Prey groups

%

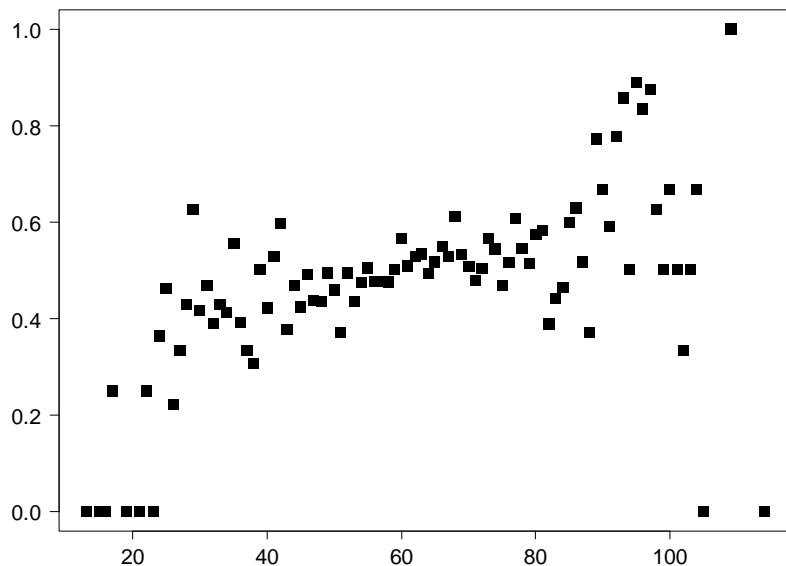


Offshore

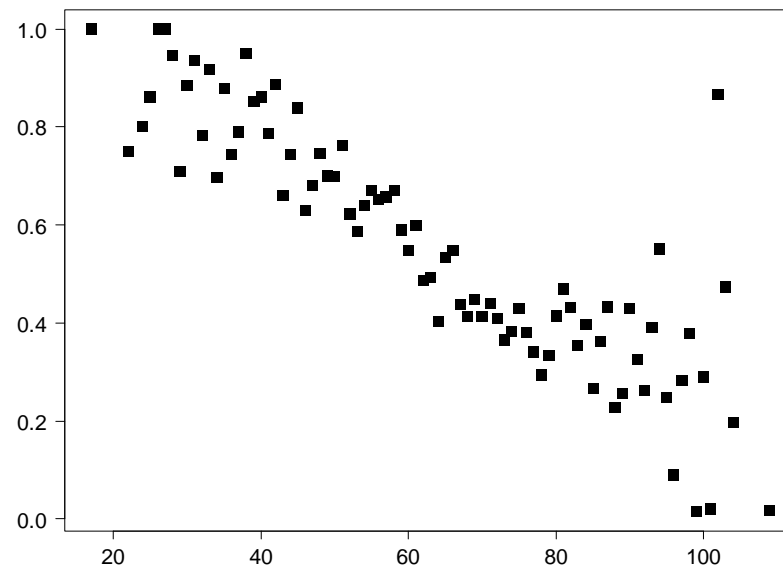


Cod length vs shrimp consumption

Proportion with shrimp



Proportion of shrimp



Cod length (cm)

Summary

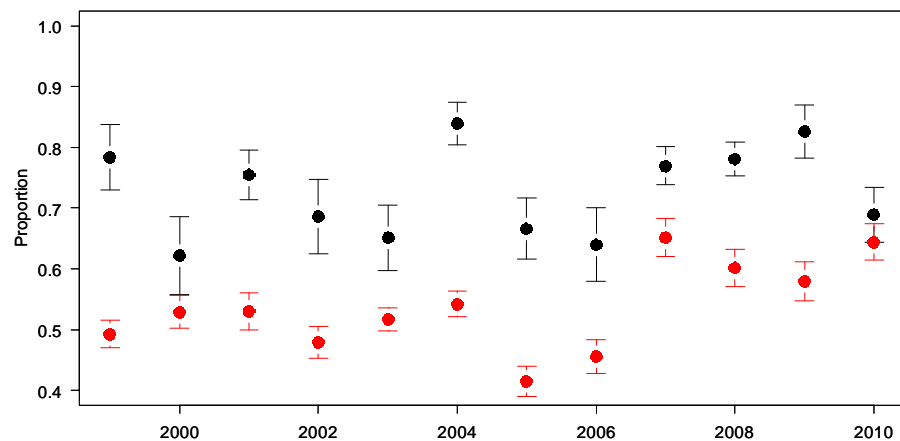
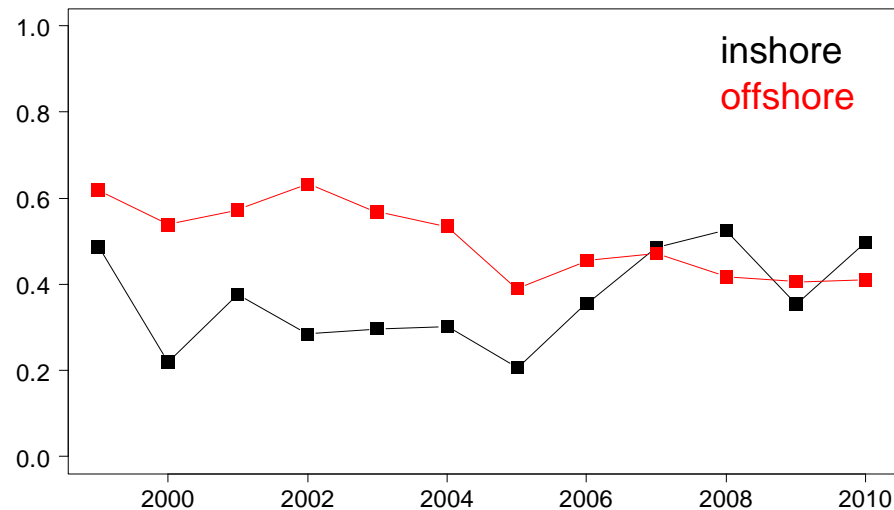


	Inshore	Offshore
Depth	< 155 m	< 700m
Bottom temperature	4.2 – 10.6	-0.8 – 7.4
Mean cod length	23 cm	57 cm
Mean % of empty stomachs	25 %	12 %
Main prey of cod	Shrimp, fishes, krill	Capelin, fishes, Hymenodora, shrimp



Summary

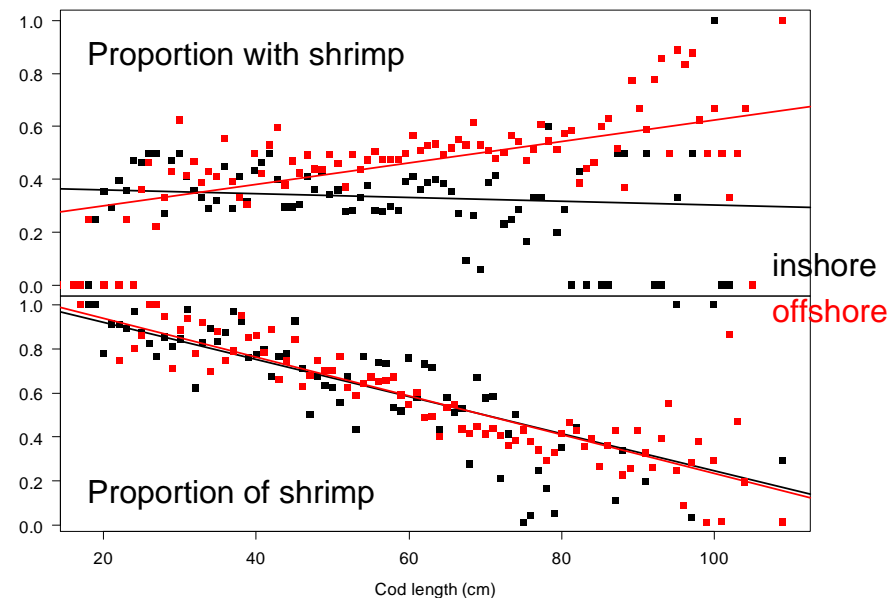
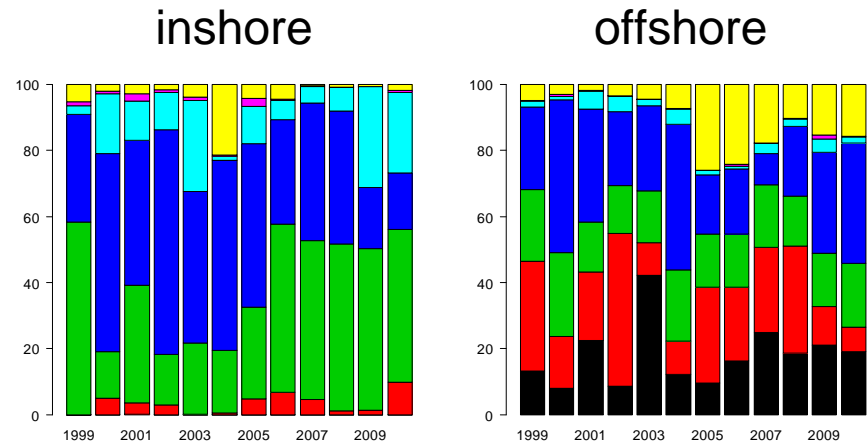
- The proportion cod eating shrimp was higher in the offshore area but has been similar since 2007
- The proportion of shrimp (of the total stomach content weight) was higher in the inshore area.





Summary

- Shrimp was of greater importance in the inshore area
- The proportion of cod feeding on shrimp increased with length in the offshore area but not in the inshore area
- The proportion of shrimp decreased with length in both areas





Thank you for your attention.



Pandalus borealis