The value of cephalopods to global marine fisheries

Mary Hunsicker
Oregon State University

Timothy Essington
University of Washington

Reg Watson
Rashid Sumaila
UBC – Sea Around Us Project

Hunsicker *et al.* Fish and Fisheries 2010

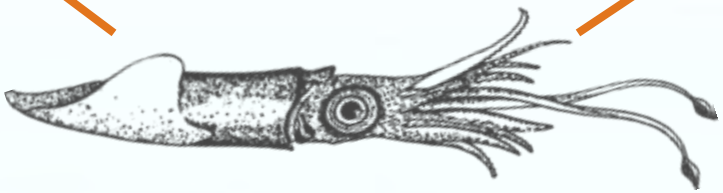
Impacts of harvesting forage species

- Fishing through marine food webs
- Ecological and economic importance of forage species
- Potential trade-offs and conflicts from the simultaneous harvest of predators and prey populations

Marine Mammals

Fishes

Seabirds



Crustaceans

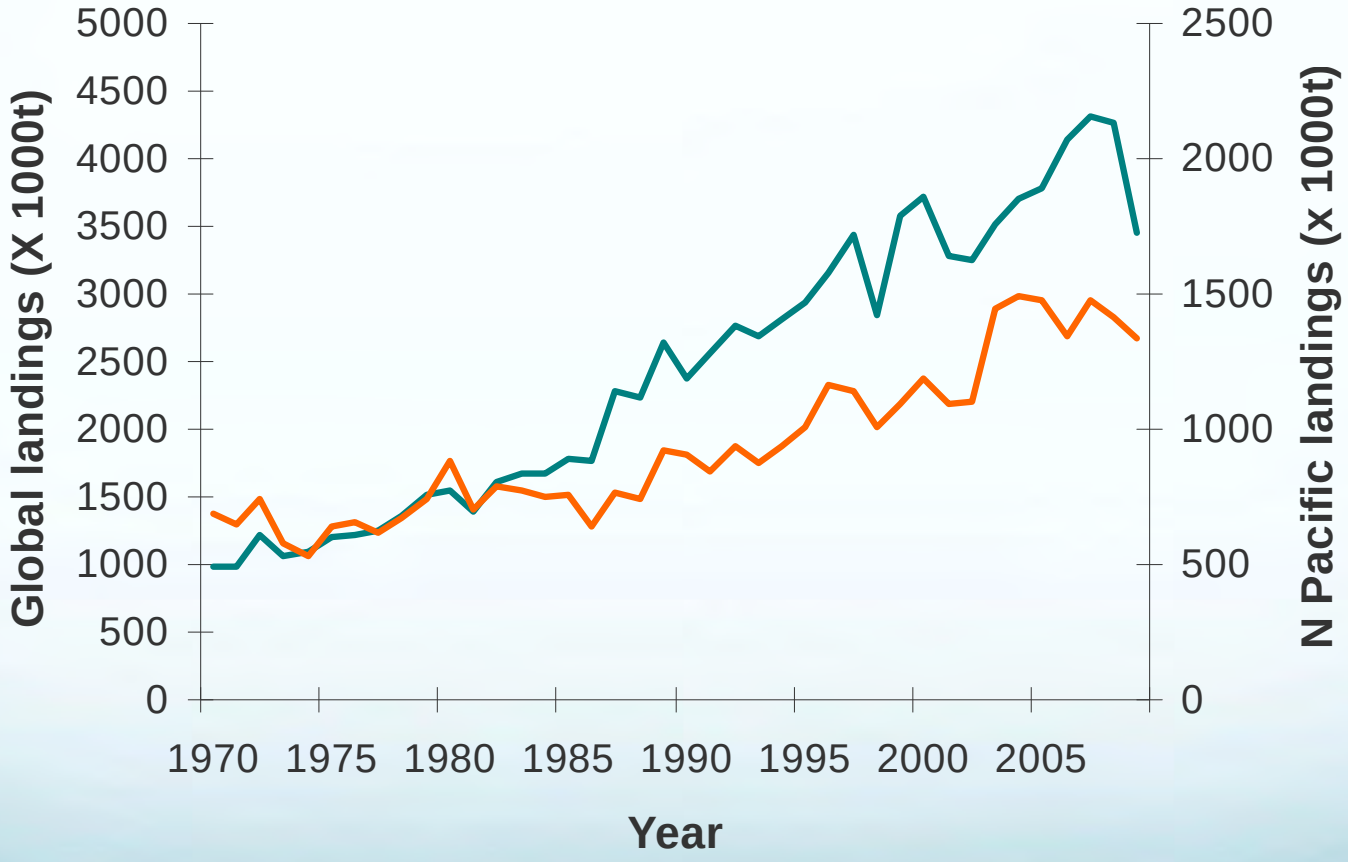
Fishes

Cephalopods

Global Cephalopod Landings

FAO Landings Data

Global Cephalopod Landings



FAO Landings Data

Trade-offs in cephalopod fisheries?

Valuation of cephalopods

Landings (MT)

Commodity Supportive

Landed value ($)

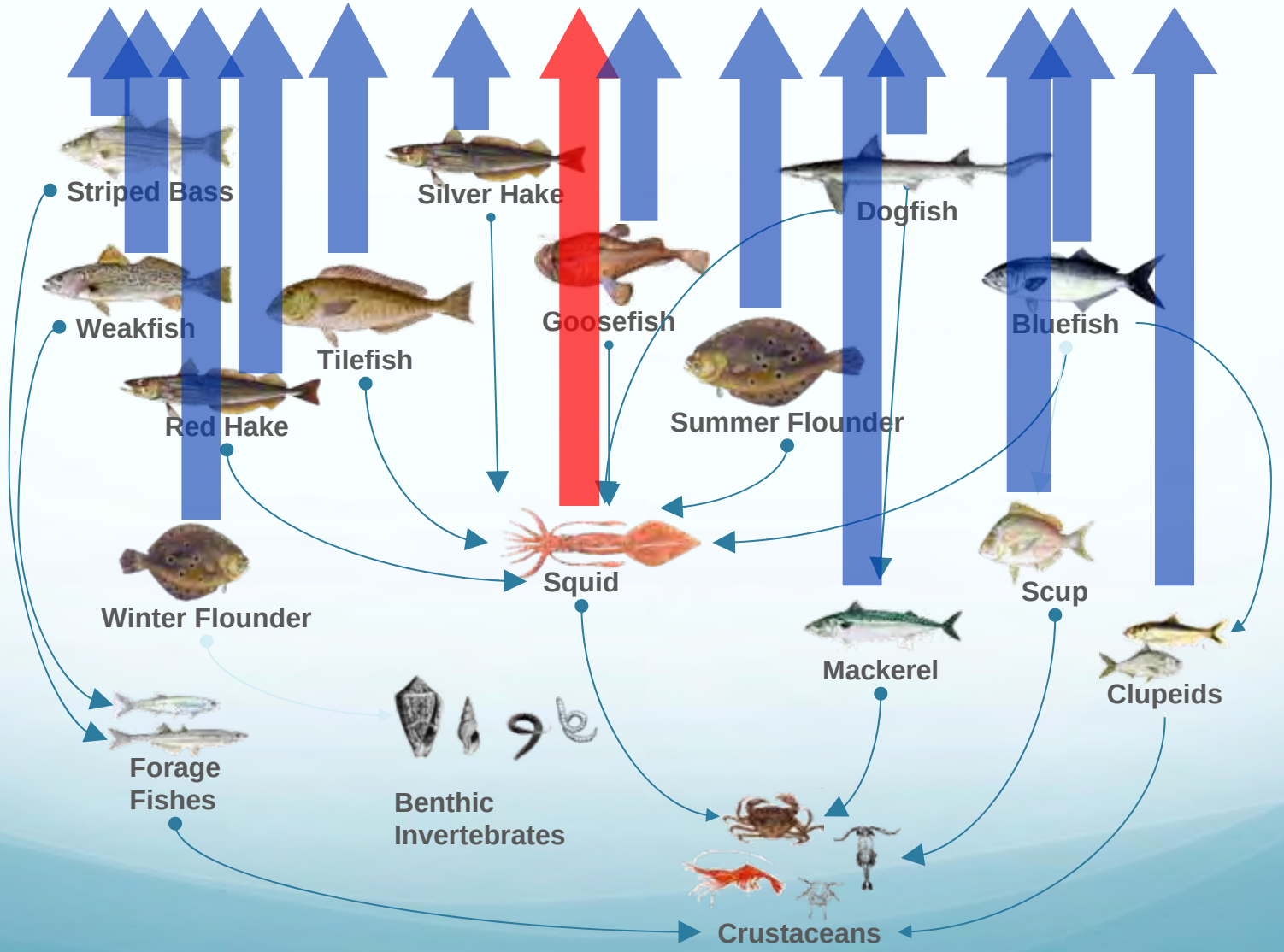
Commodity Supportive

Commodity contribution

Summed tonnage (MT) and monetary value ($USD) of all cephalopods landed in an ecosystem

Supportive contribution

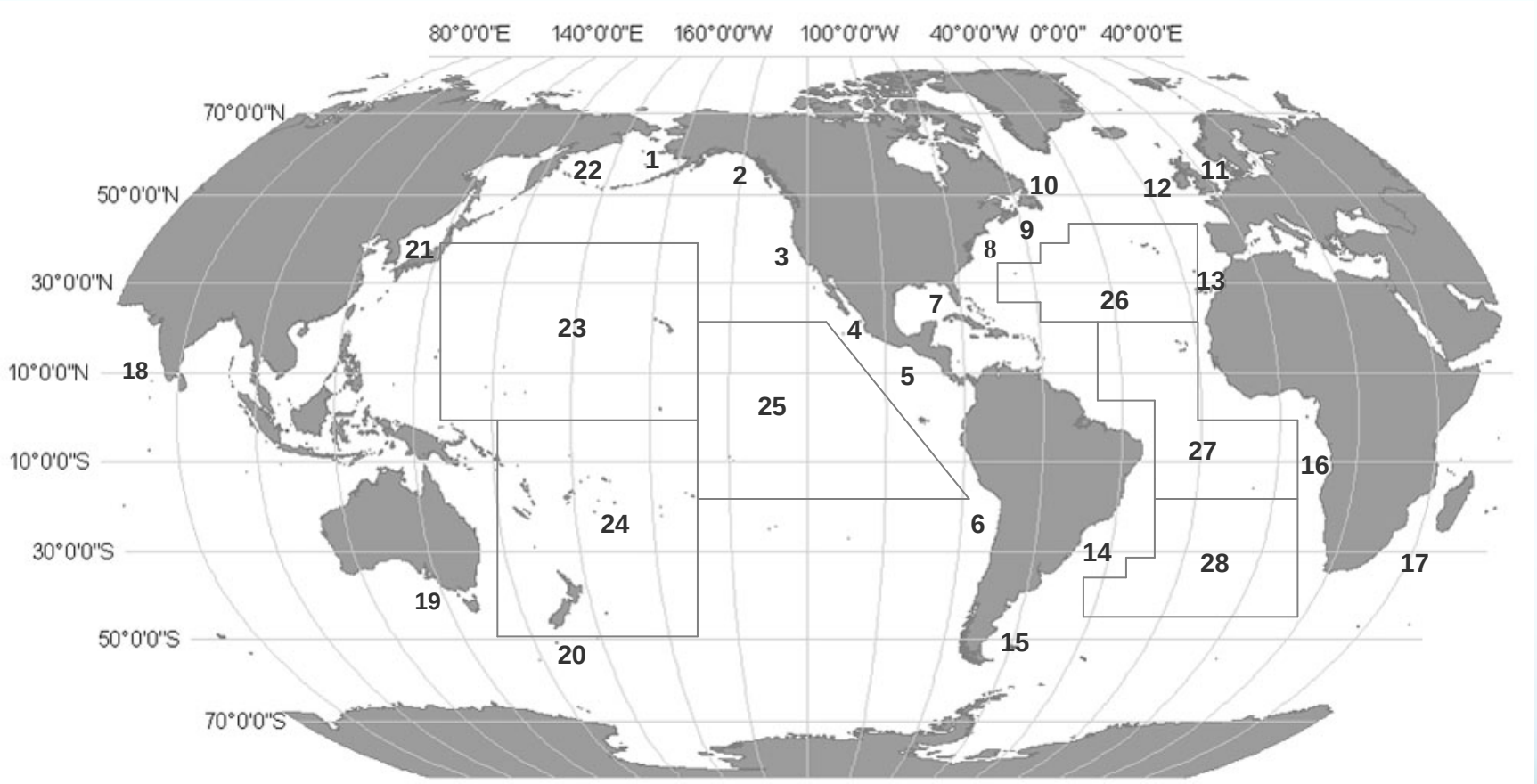
Portion of landings and landed value of other species that rely on cephalopods for their production


Striped Bass
Silver Hake
Dogfish
Weakfish
Tilefish
Goosefish
Bluefish
Red Hake
Summer Flounder
Squid
Winter Flounder
Scup
Mackerel
Clupeids
Forage Fishes
Benthic Invertebrates
Crustaceans

Objectives

- What are the commodity and supportive contributions of cephalopods to fisheries landings and landed values?
- Change in contributions between historical (1960-1970) and contemporary (1990-2004) periods?
- Biophysical factors that dictate the magnitude of their contributions?

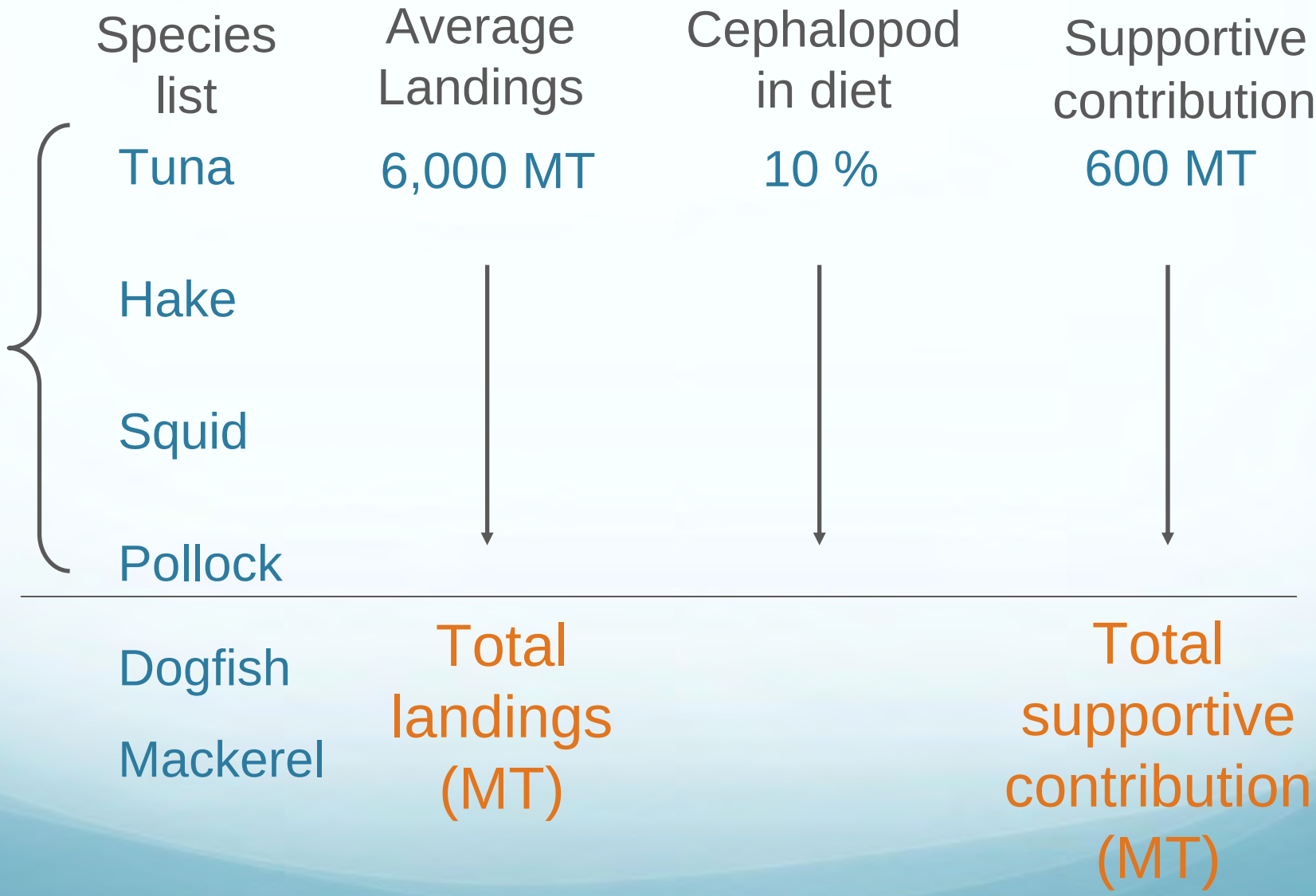
Large Marine Ecosystems



LME landings and market values estimated by Reg Watson and Rashid Sumaila

SEA AROUND US PROJECT

Point Estimates of Supportive Contribution (MT)



Point Estimates of Supportive Contribution ($)

Species list	Average Landed Value	Cephalopod in diet	Supportive contribution
Tuna	$ 2 million	10 %	$ 200,000
Hake			
Squid			
Pollock			
Dogfish	Total landings ($USD)		Total supportive contribution ($USD)
Mackerel			

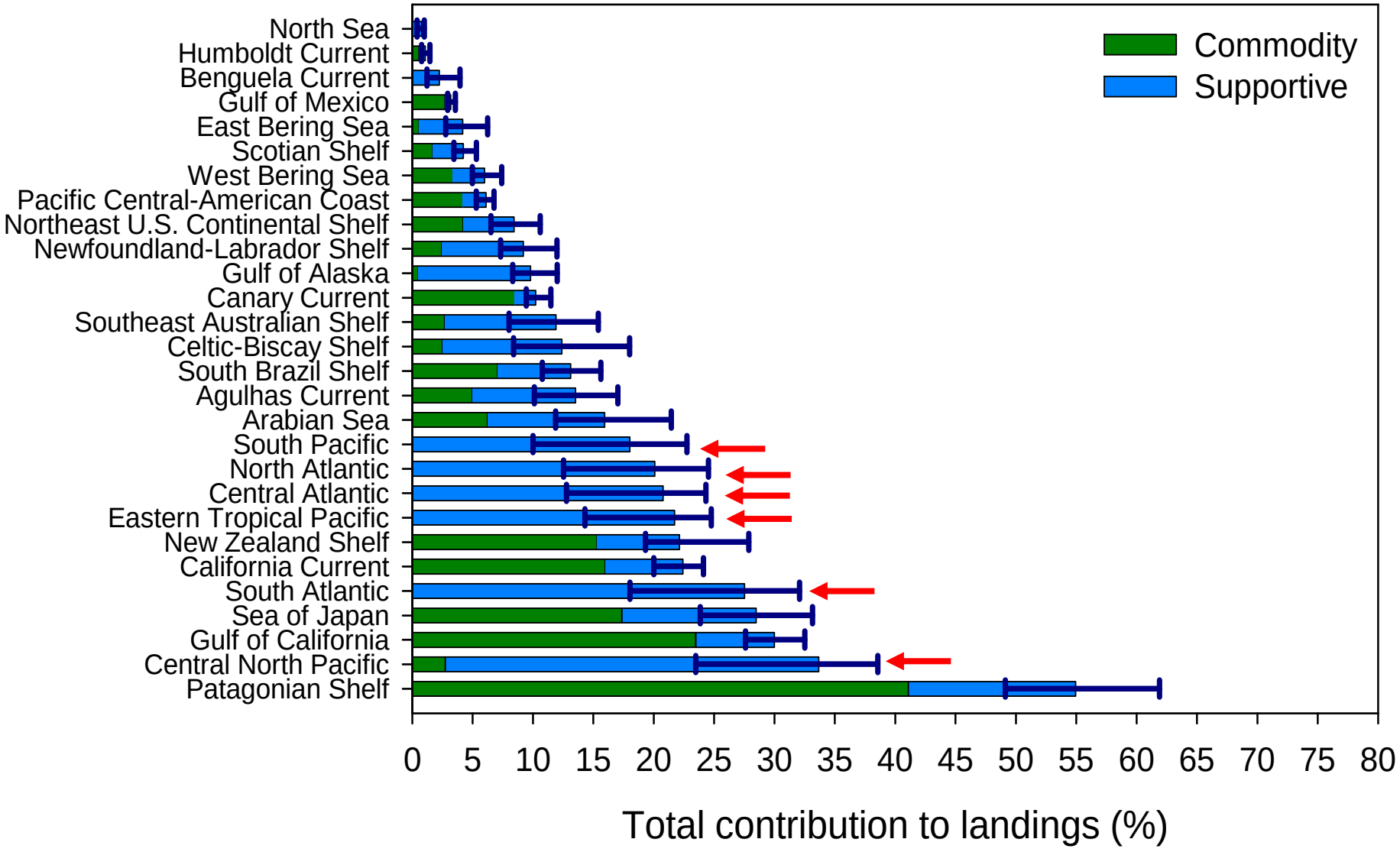
Data

- Food habits data for each taxonomic group (% M or V)
- Diet data for taxonomic groups in the specified ecosystem
- Multiple estimates of the predators' diet composition
- Applied the same diet data for contemporary and historical periods

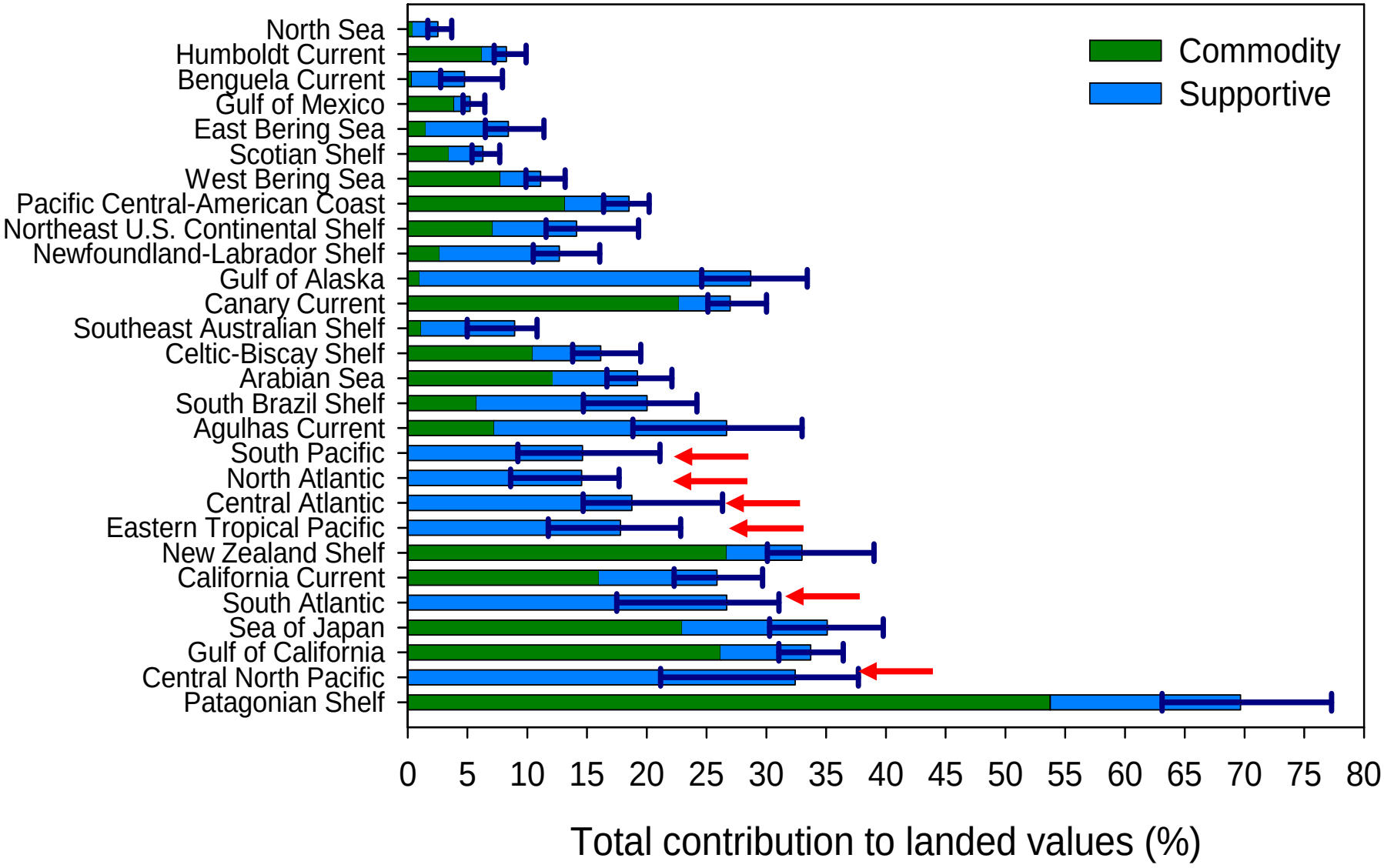
Results

- **What are the commodity and supportive contributions of cephalopods to fisheries landings and landed values?**
- Change between historical (1960-1970) and contemporary (1990-2004) periods?
- Biophysical factors that dictate the magnitude of their contributions?

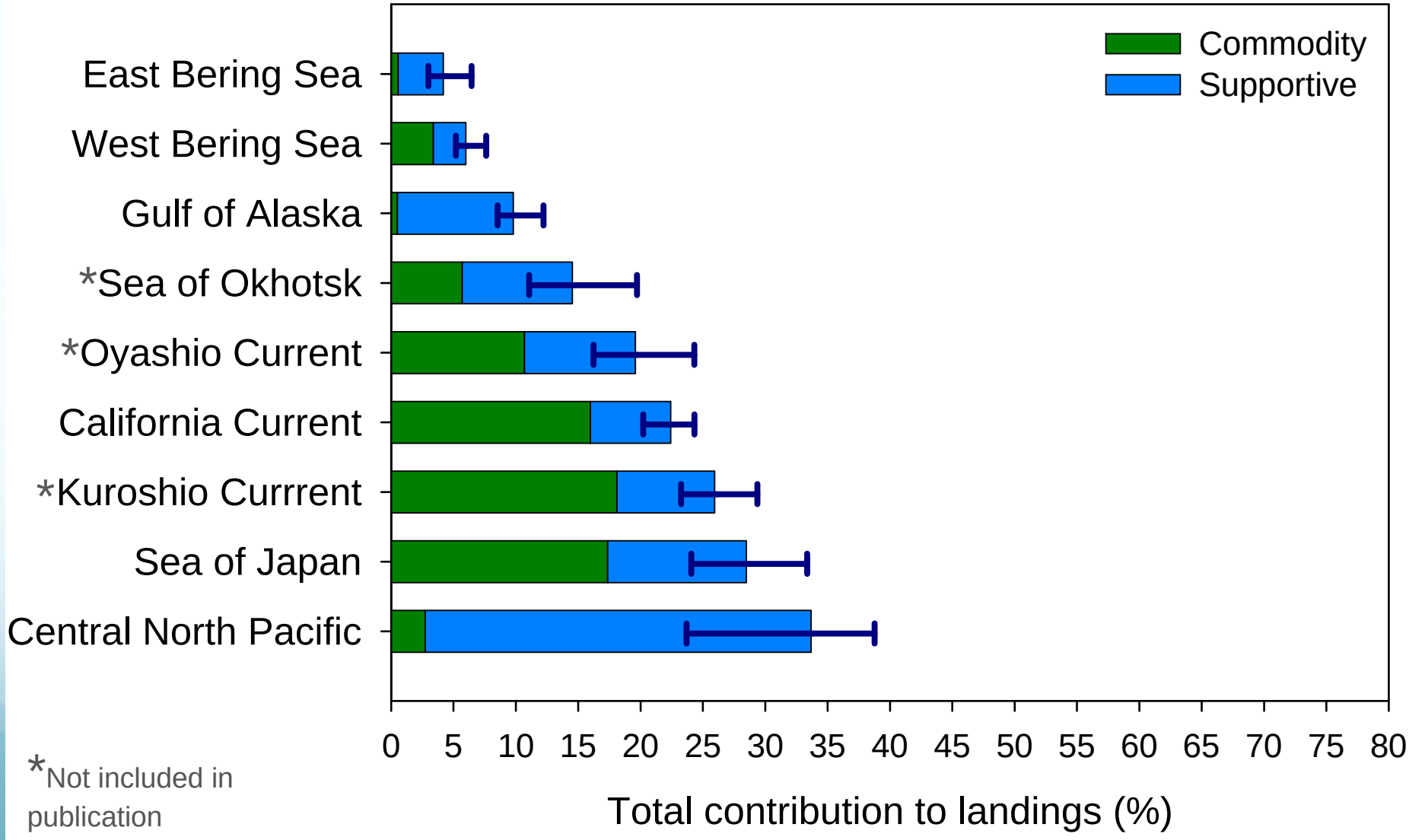
Contribution to Global Landings (%)



Contribution to Global Landed Value (%)

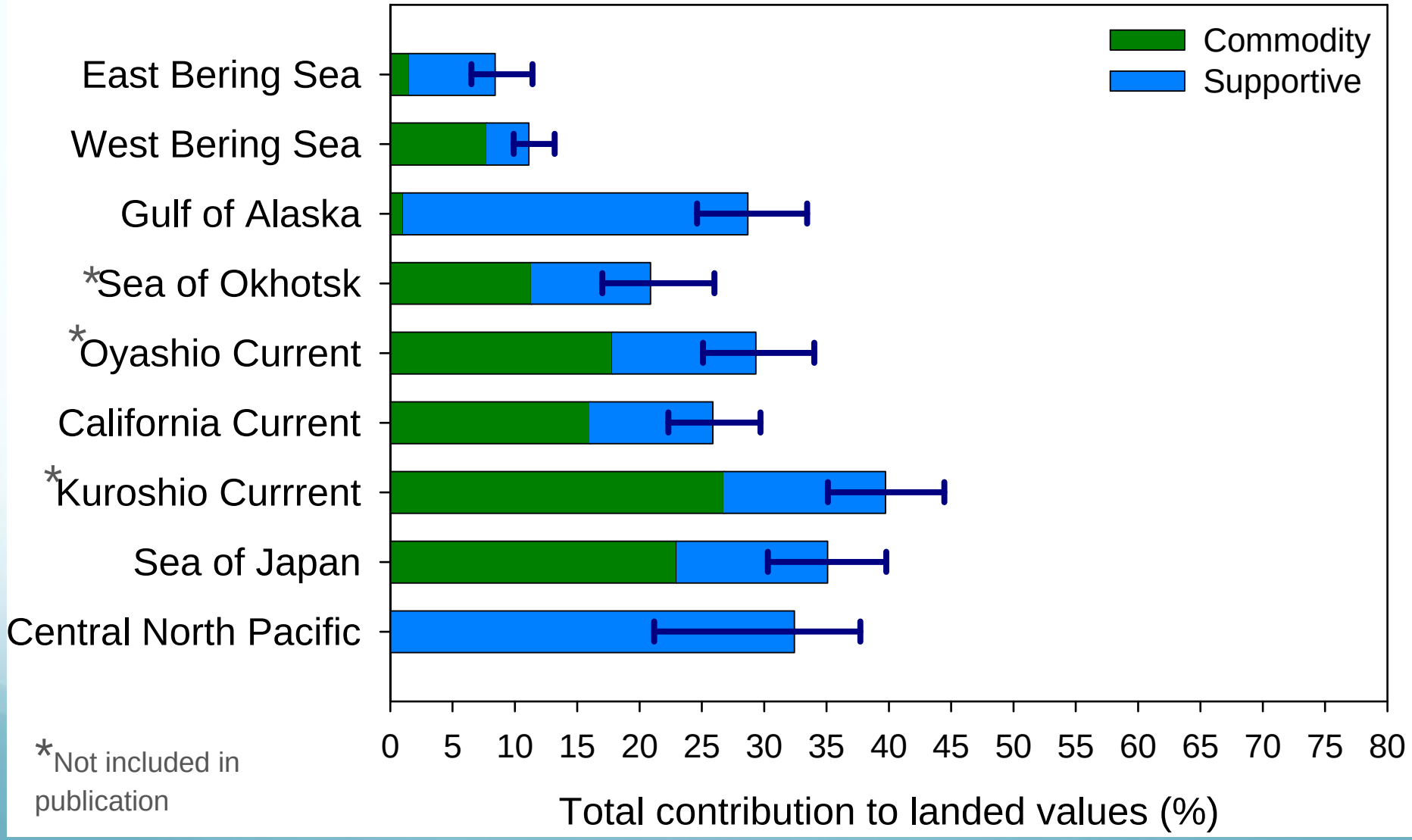


North Pacific Ocean Landings



*Not included in publication

North Pacific Ocean Landed Value

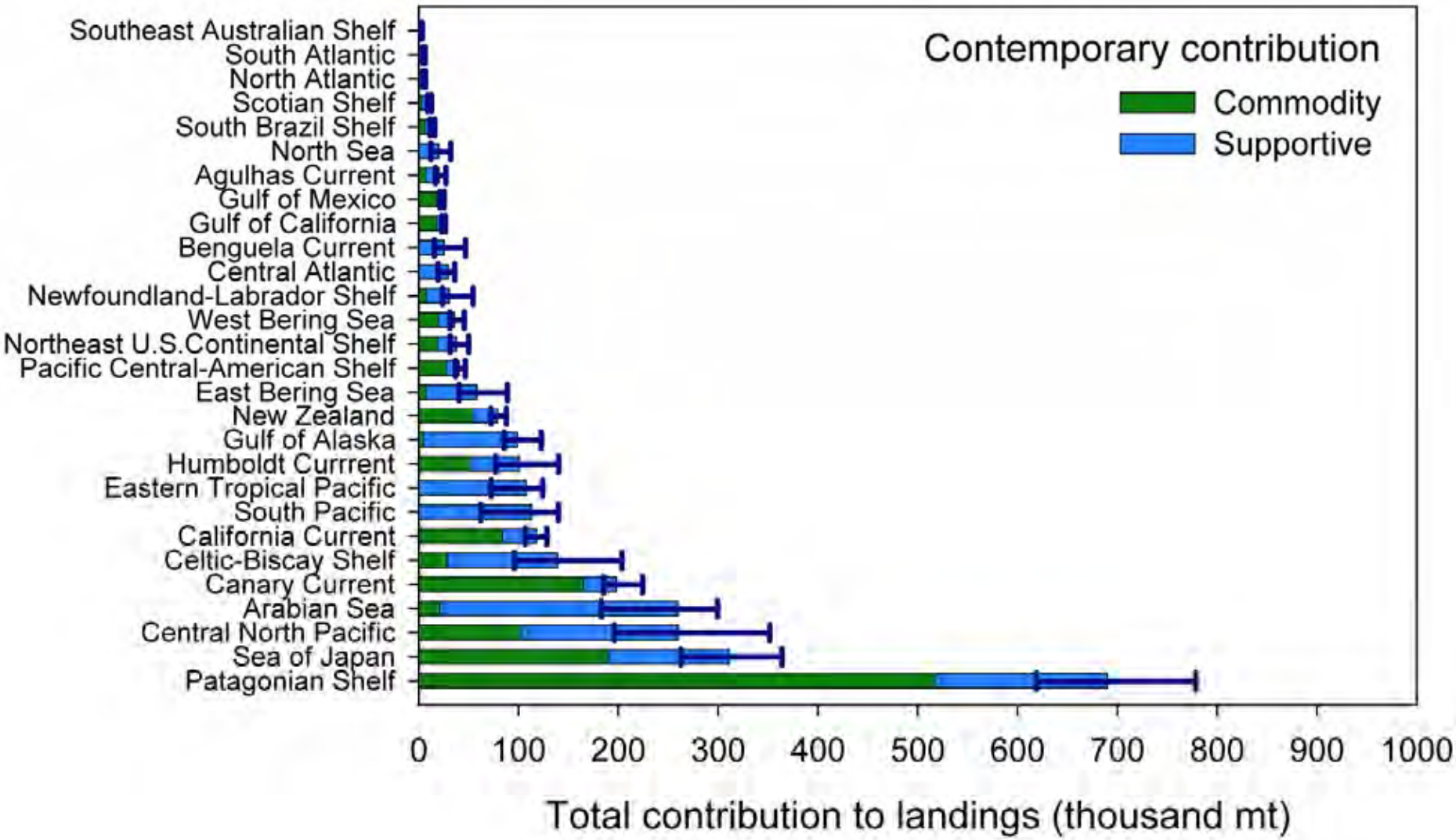


*Not included in publication

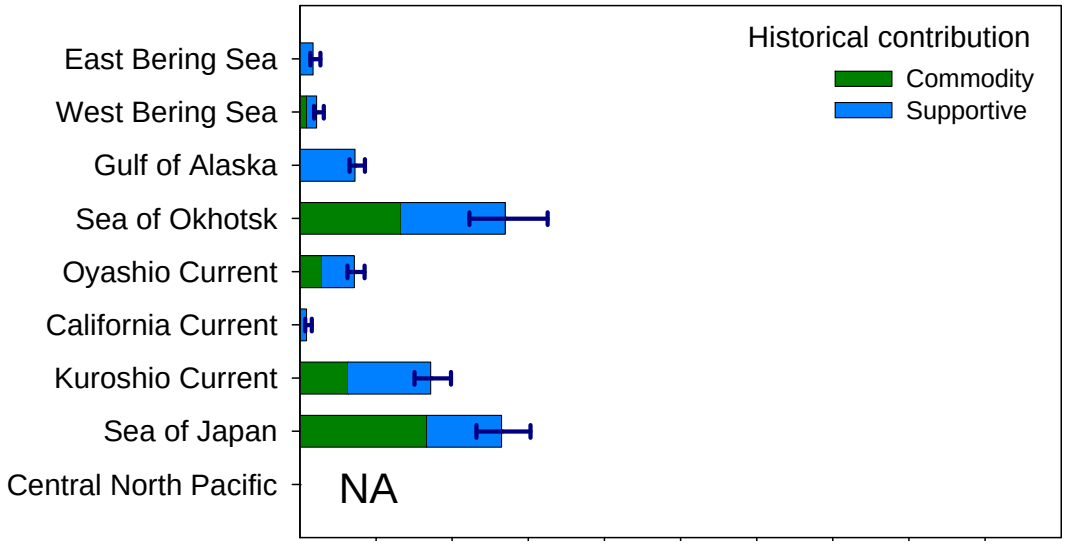
Objectives

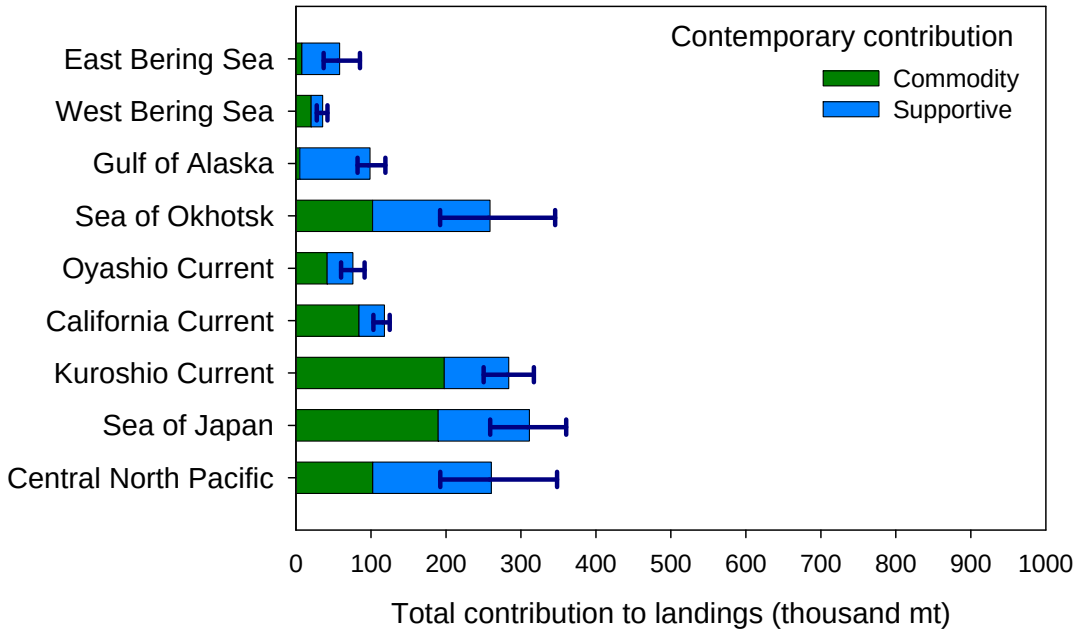
- What are the commodity and supportive contributions of cephalopods to fisheries landings and landed values?
- **Change between historical (1960-1970) and contemporary (1990-2004) periods?**
- Biophysical factors that dictate the magnitude of their contributions?

Historical vs. Contemporary Global Landings (MT)

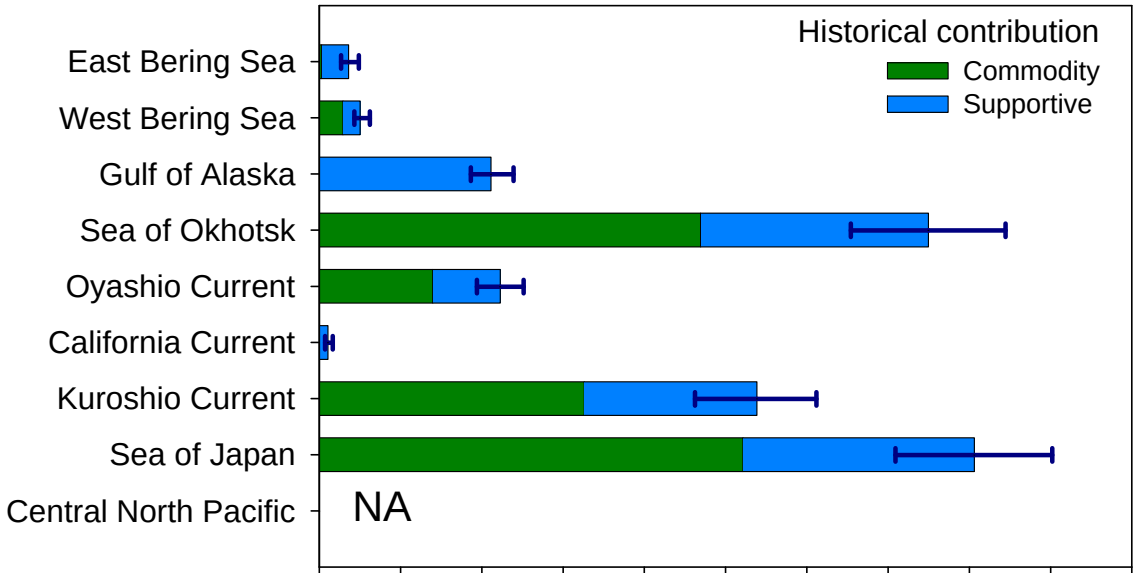


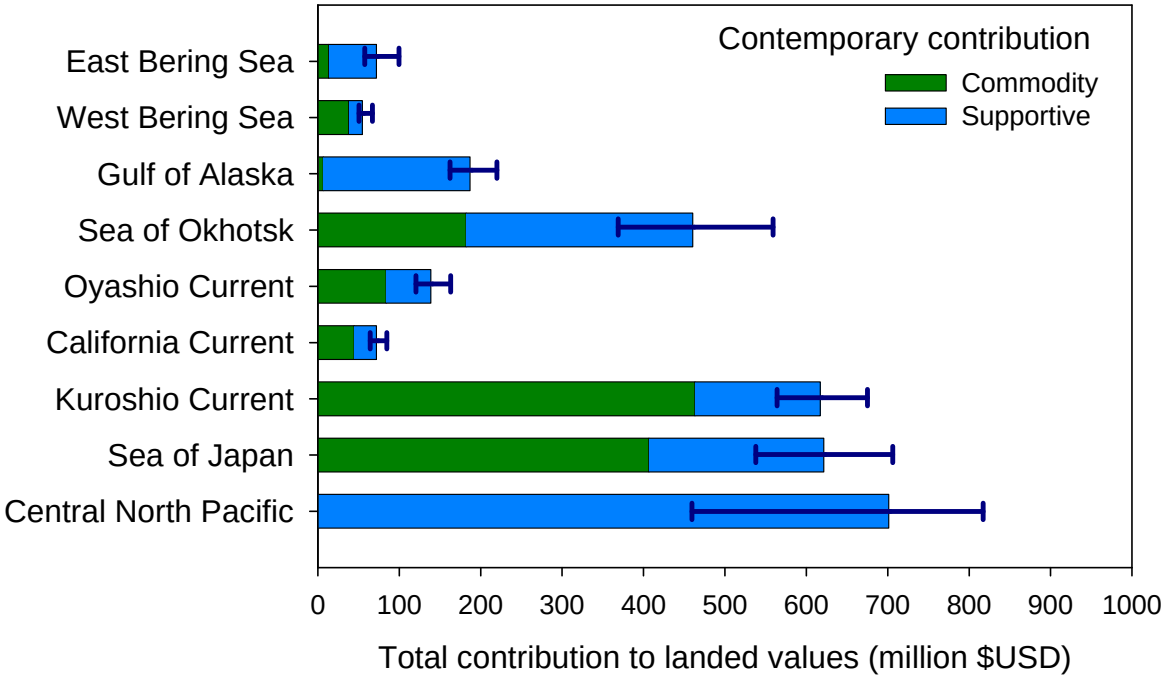
North Pacific Ocean Landings (MT)





North Pacific Ocean Landed Values ($)

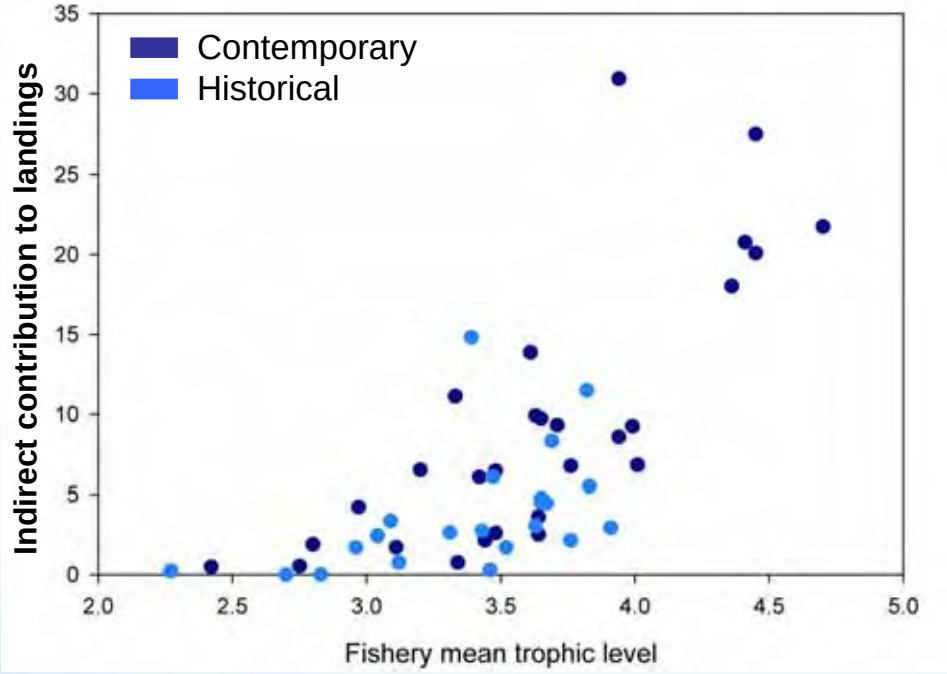


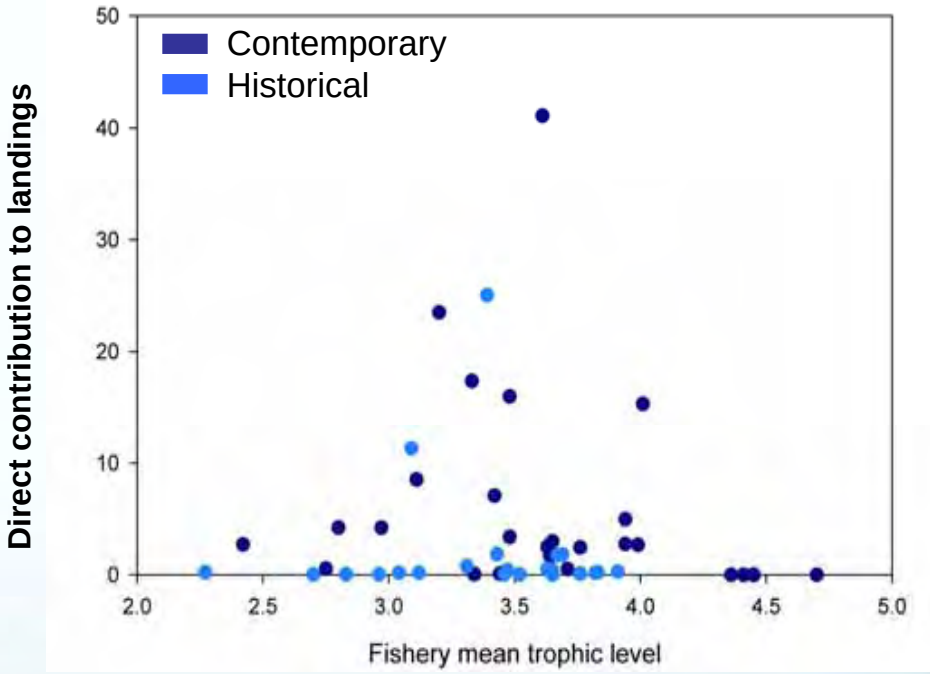


Objectives

- What are the commodity and supportive contributions of cephalopods to fisheries landings and landed values?
- Change between historical (1960-1970) and contemporary (1990-2004) periods?
- **Biophysical factors that dictate the magnitude of their contributions?**
  - Mean TL of ecosystem, Mean TL of catches, Primary production

Fishery mean TL is important driver





Summary

- Total contribution: as much as 55% of landings and 70% of landed values
- Supportive: highest in open ocean systems
  Commodity: highest in coastal systems
- North Pacific ecosystems among the highest in terms contribution to MT and $USD
- In most ecosystems contributions have increased over time, exceptions are seen in the North Pacific systems
- Magnitude of contribution influenced by the nature of the fishery (i.e. mean TL)

Conservation Value

Impact as predator

Concluding Remarks

- In general, current demands have no historical precedent
- Ecosystems where cephalopods are highly exploited as target resource and ecological support service warrant further attention
- Considering the value of cephalopods, in addition to other forage, is important for ecosystem-based management