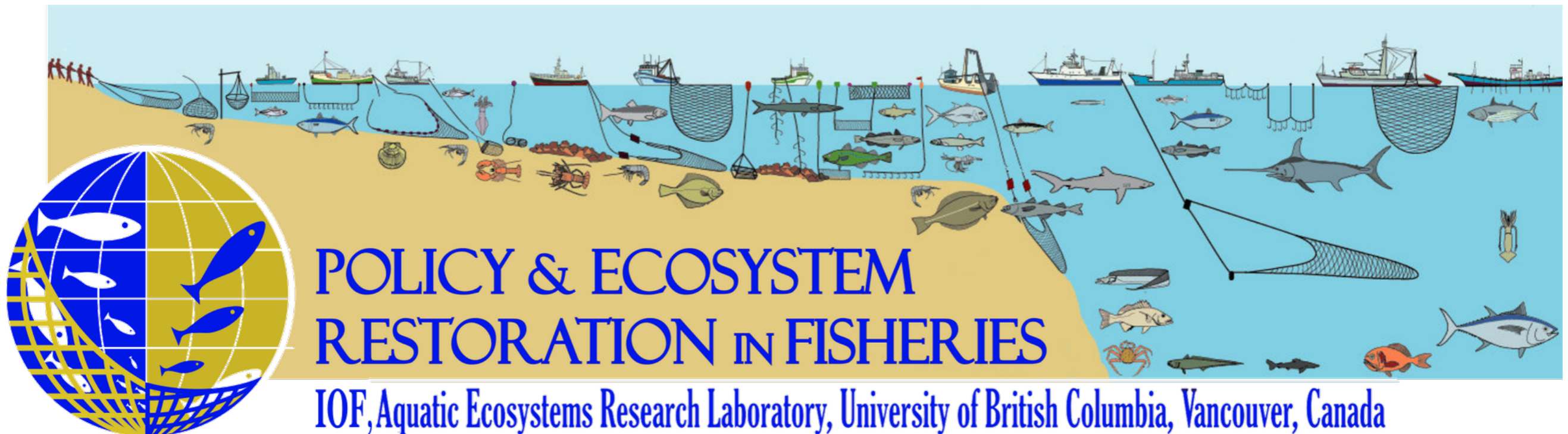


Marine mammal prey consumption and competition with fisheries in the Northeast Pacific

Szymon Surma

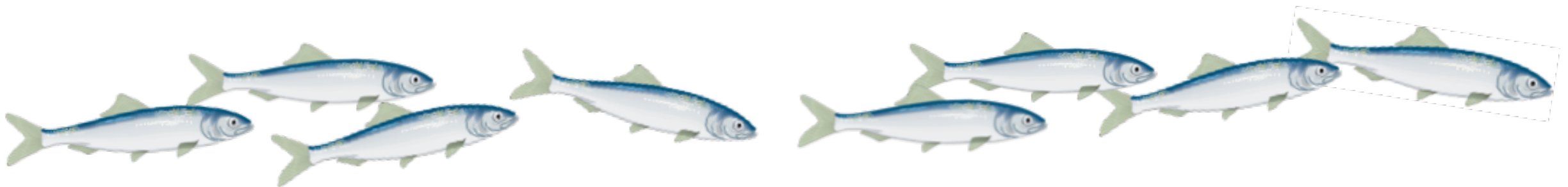
Institute for the Oceans and Fisheries

University of British Columbia



Mammals as consumers

- biomass: function of natural trends and exploitation
- metabolic rate: proportional to size and cost of living
- diet: planktivore (blue whale) to top predator (orca)
- **high consumption -> potential top-down effects**



Then and now

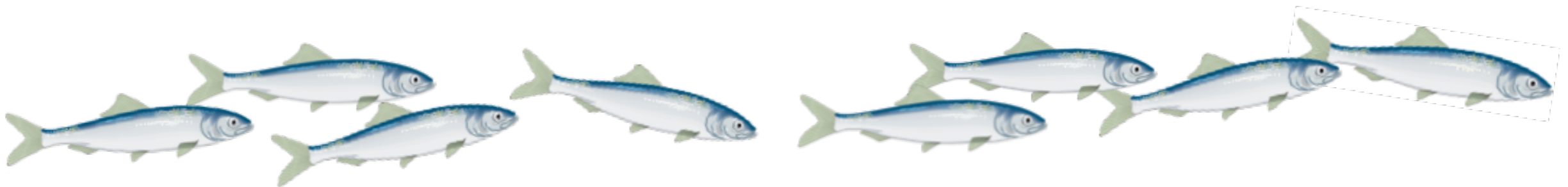
What proportion of prey production did NE Pacific marine mammals consume in:

- 1) 1900 (before industrial whaling)?
- 2) 1950 (whaling, pinniped culls)?
- 3) currently (population recovery)?



Food web modeling

- framework: Ecopath with Ecosim
- fundamental principle: mass balance
- consumption: biomass, metabolism, diet



Food web models

- structure: 80 functional groups (12 mammals)
- study area: N British Columbia, SE Alaska
- ecosystem states: 1900, 1950, current

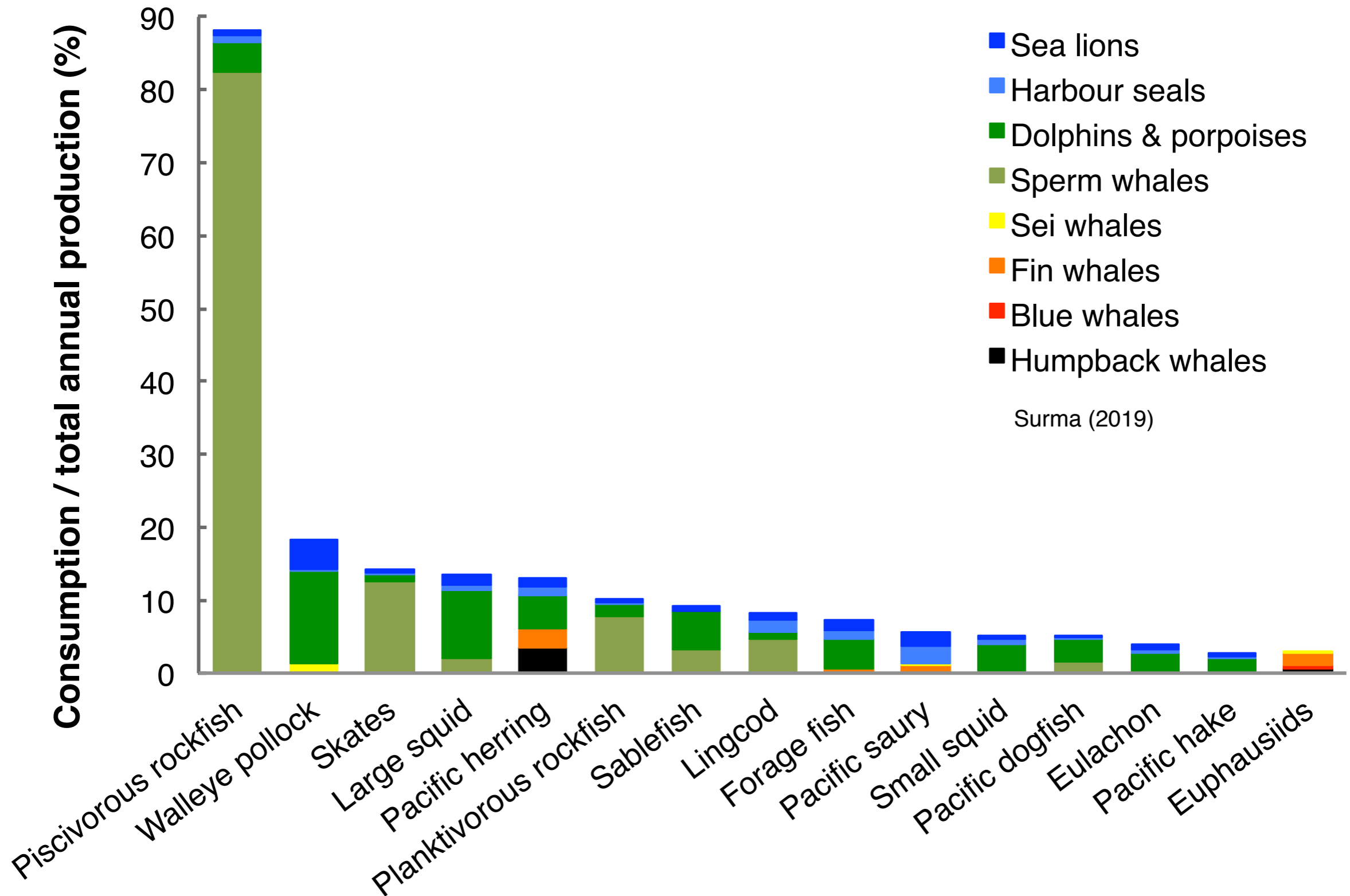


Estimating consumption

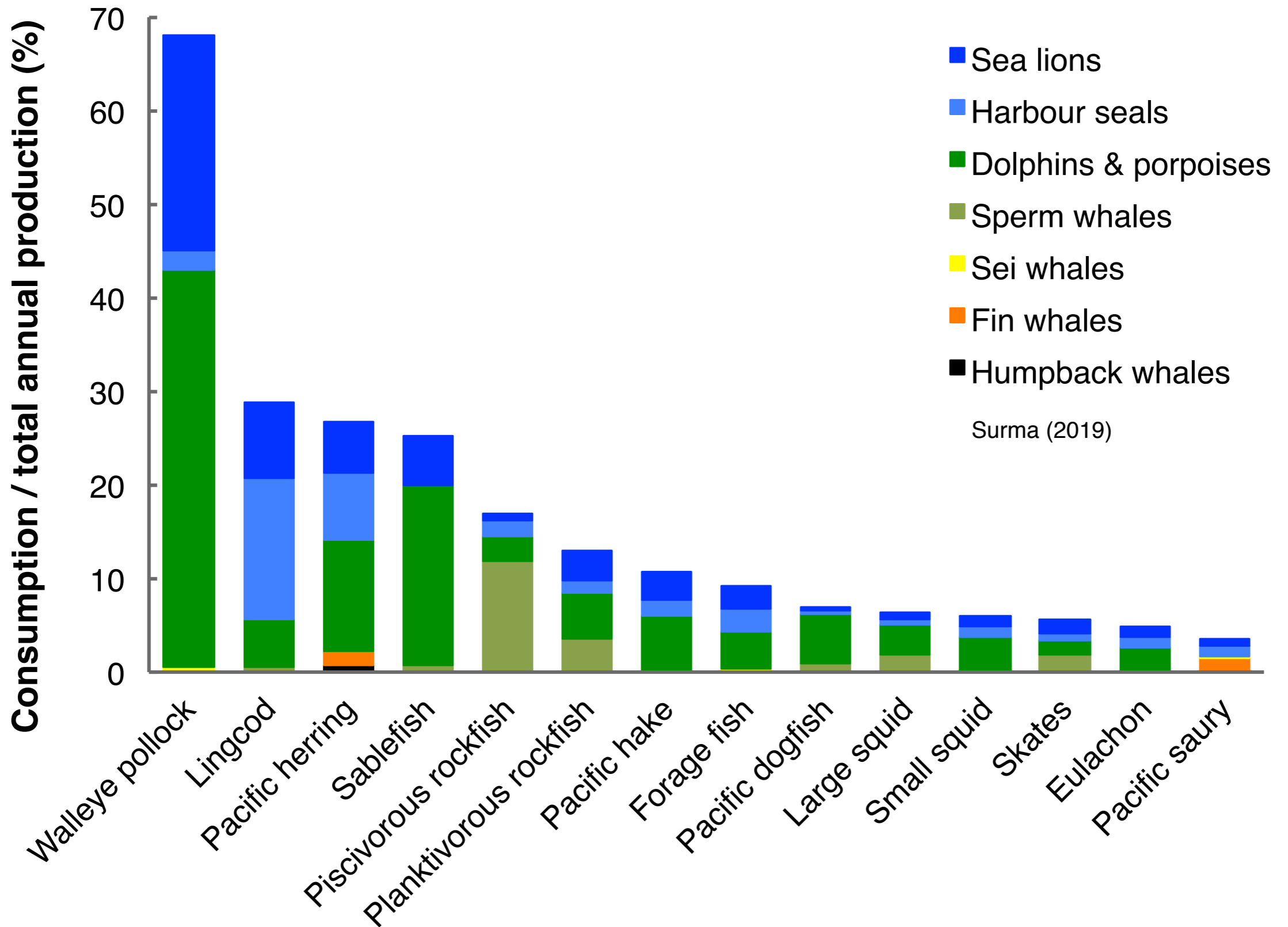
- biomasses: field abundance surveys, mean masses
- metabolic rates: empirical relationships with mass
- diets: stomach contents, field feeding observations



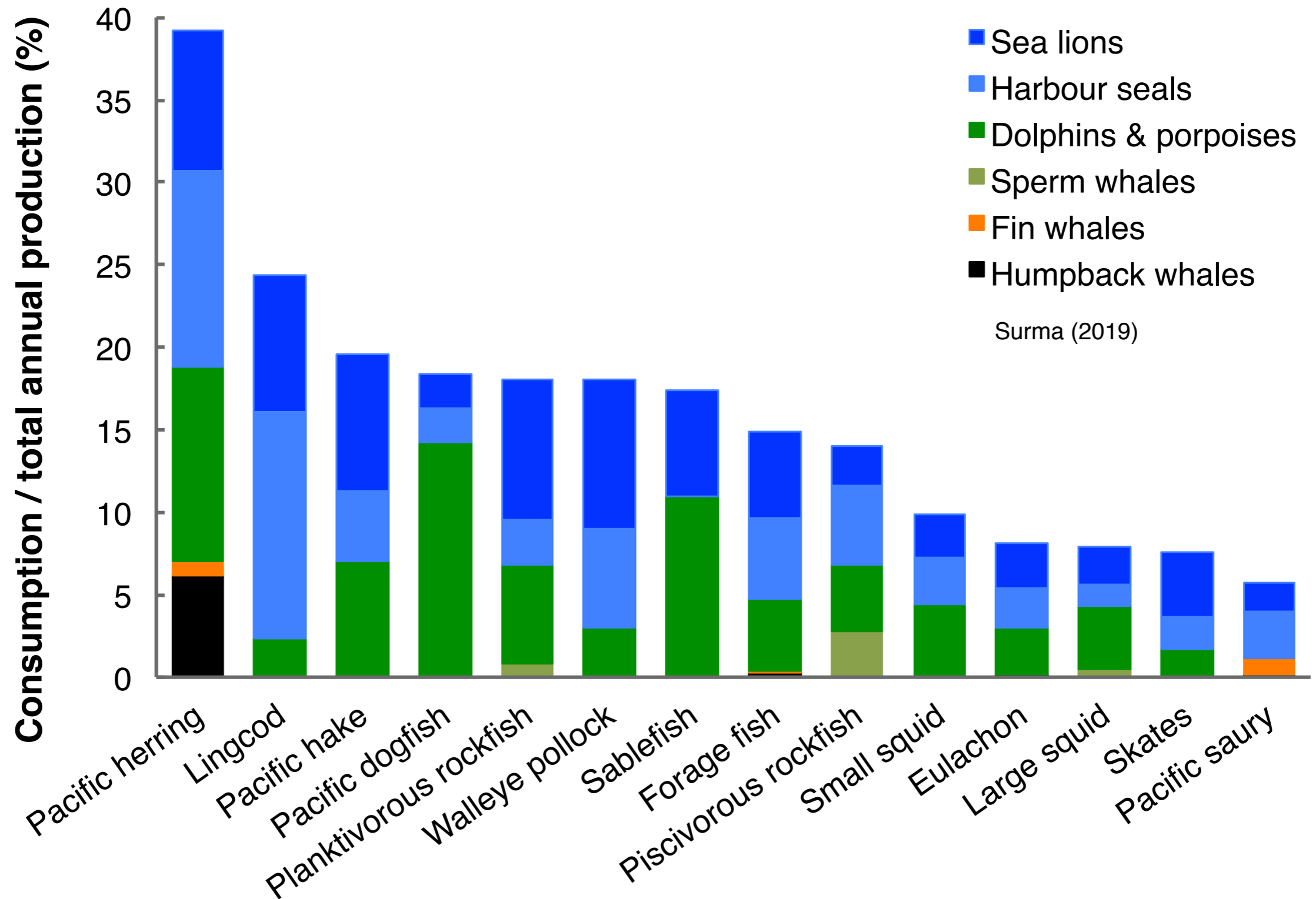
1900 model



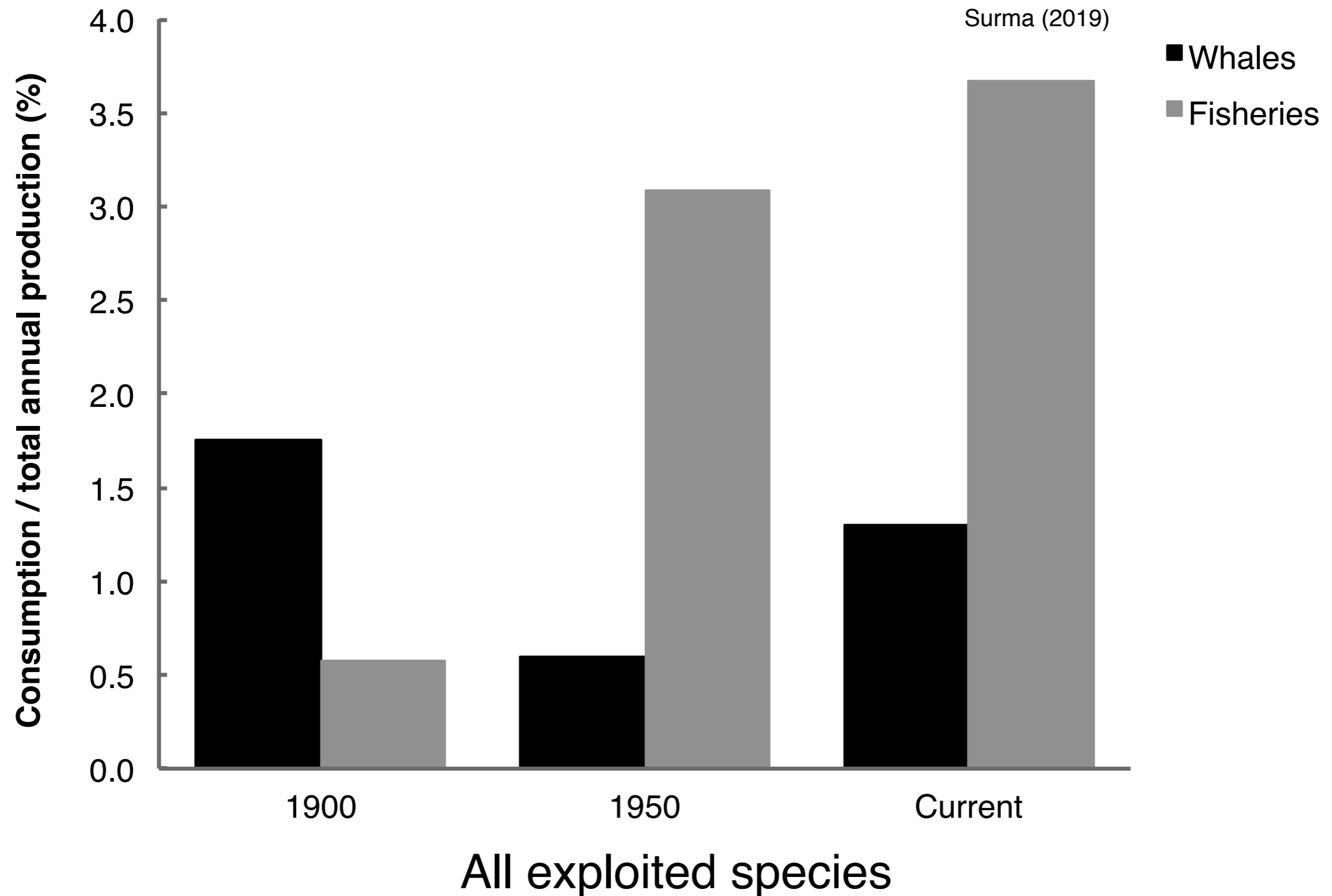
1950 model



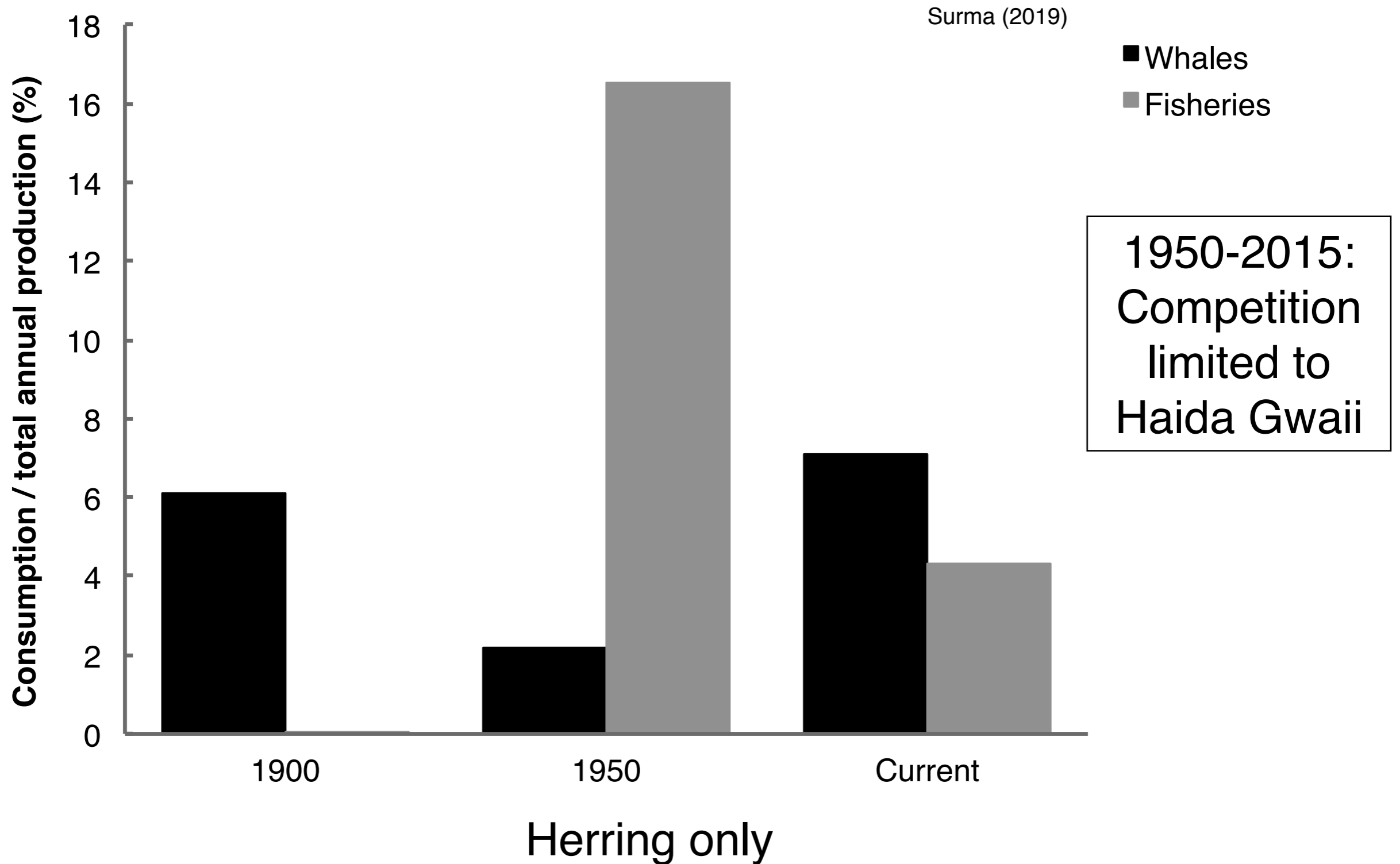
Current model



Whales vs. fisheries (1)



Whales vs. fisheries (2)



Whale recovery

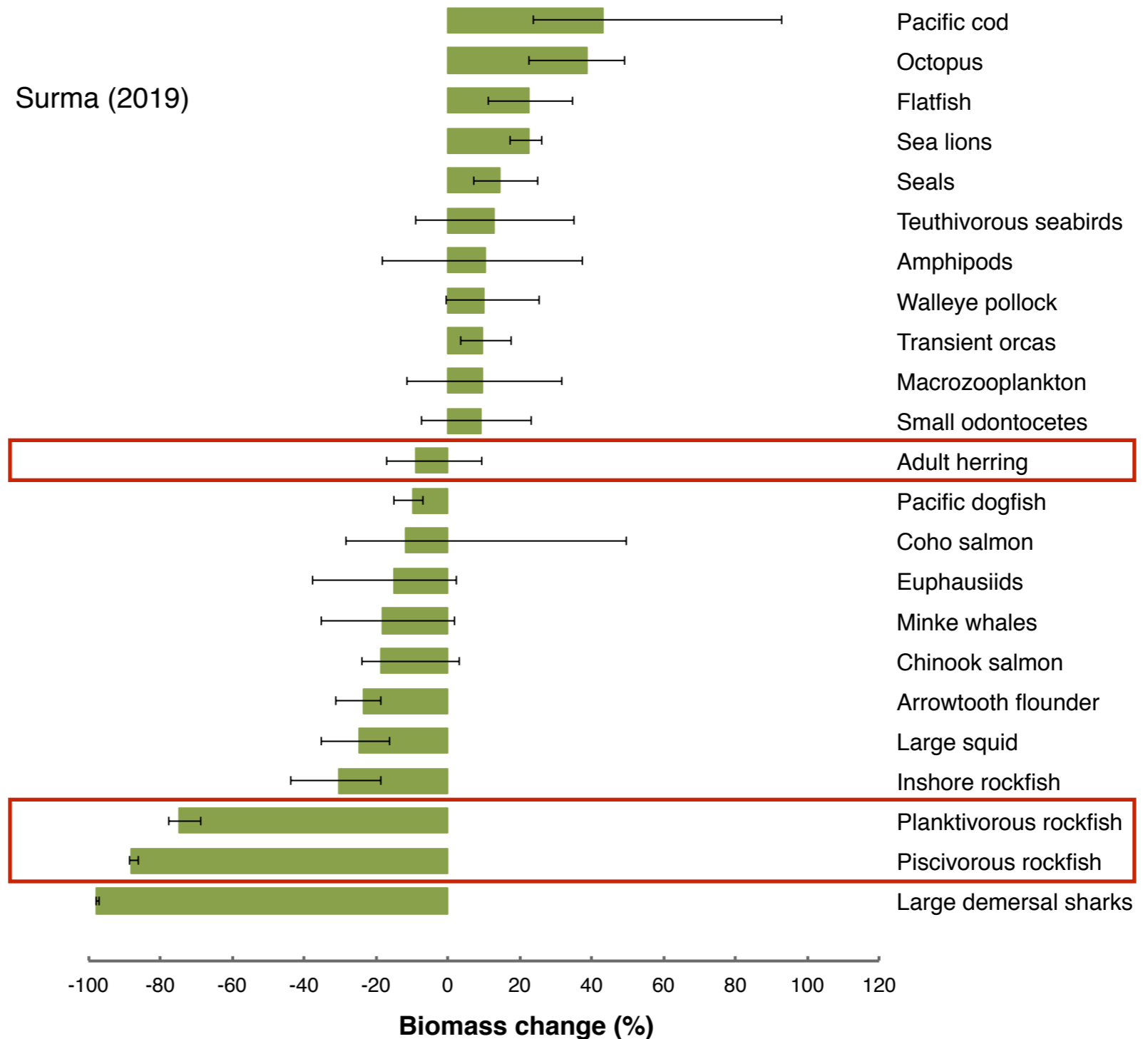
- population projections: surplus production models
- output trends used to drive ecosystem simulations
- ecosystem model estimated impacts on food web
- 15 simultaneous primary productivity scenarios



Whale recovery

Top-down effects

Competition with fisheries



Conclusions

- mammals notable consumers in all periods
- most important for forage fish & groundfish
- pinnipeds more important now than before
- whales slowly recovering past importance

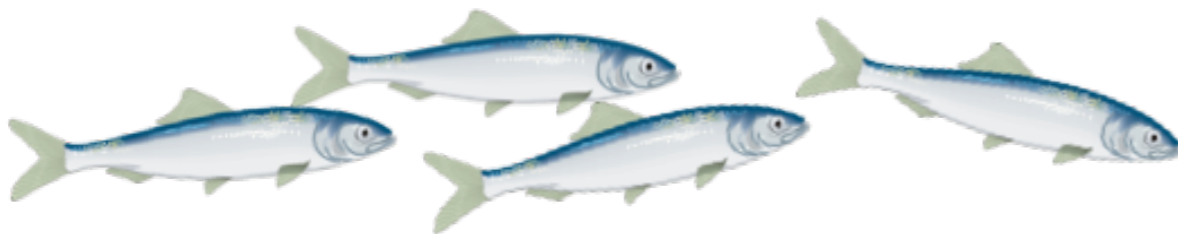


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Thank you!