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South Atlantic Cephalopod Fisheries and Conservation

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Introduction

- Global squid fisheries have been steadily increasing for decades, yet little is known about how the fishery is impacting important squidconsuming predators.
- The South Atlantic is home to two major squid fisheries: Illex argentinus and Loligo gahi. These species also play an important ecological role in the diets of local predators.
- Managing coastal marine ecosystems requires consideration of the local food web.
- The goal of this research is to establish whether squid fisheries are sufficiently managed to prevent a negative impact on the life cycle of important local predators.

Methods

- Through the use of available data on *Illex* argentinus catch in the South Atlantic and Northern Elephant Seal Bioenergetics, the fishery was analyzed and a model was created to evaluate the standard metabolic rate of highly migratory marine mammals during critical life stages.
- using the standard physiological model:

 $\frac{dW}{dt} = SMR * (1 + Reproduction + Forage + Molt)$

• The current status of the South Atlantic squid fishery management and conservation of other important relevant predators were considered using discussion from available literature.





Fig. 1 (left) Locations of the Argentine southern elephant seal colony at Peninsula Valdez, the South Atlantic Souid Fisheries and female elephant seal foraging areas from satellite tracking by Campagna et al. (2020).





Conclusions

- The Northern Elephant Seal, like many highly migratory marine mammals and birds, go through critical life stages where foraging opportunities are limited and the use of stored energy is crucial. These two important life stages are the pup-rearing and molting stage in females and the juvenile stage.
- If these species do not get enough food as they forage for these critical life stages, the juveniles may not survive and the females will abort their young.
- Bingham (2020) found that penguins in the Falkland Islands are already being forced to shift their diet from squid to less nutritious but more abundant foods, leading to low breeding success and high chick mortality.
- The current regulations and monitoring of the South Atlantic squid fishery is not sufficient enough to properly analyze and manage local conservation efforts

References

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female southern elephant seal over a successful pupping cycle, where 1) Lactation period, 2) Post-weaning foraging period, 3) Molting period, 4) Prolonged at sea foraging. Calculations are based on the bioenergetics model parameterized using the measurements of Costa et al (1986) and Boyd et al (1993). Solution is analytic for each of the discrete life stages. Actual Weight trajectory of a successful season is shown by the bold curve. Models for each life stage are shown by light colored lines. Starvation onsets below the thin red line.