Northern fur seal update

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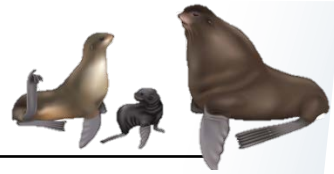
Northern fur seal update

1. Population status
2. Winter migration studies
3. Fur seal foraging studies using animal-born video
4. Lenfest Ocean Program, UW, NOAA project update

NOAA FISHERIES

Pup production Eastern Pacific Stock



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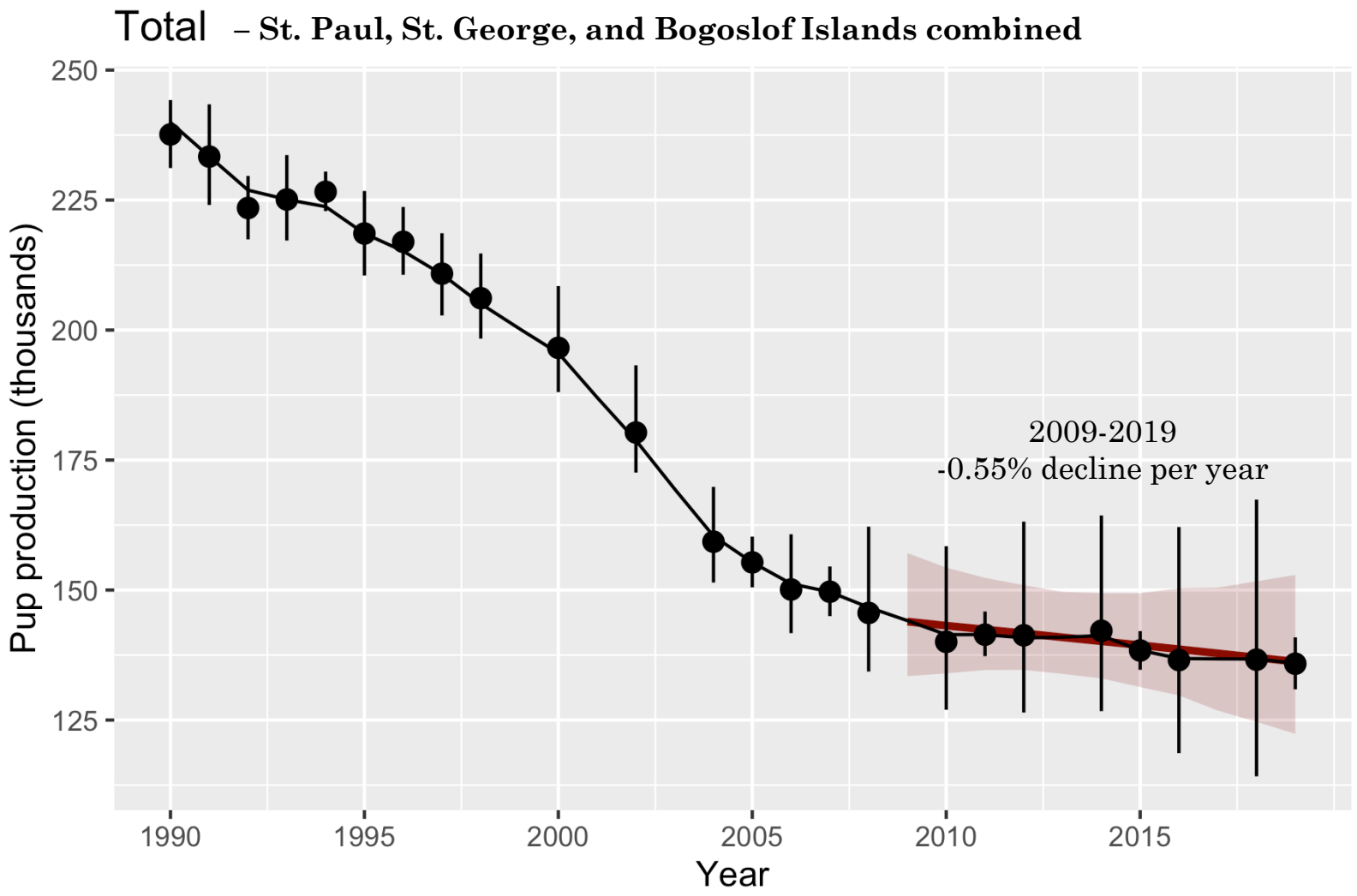
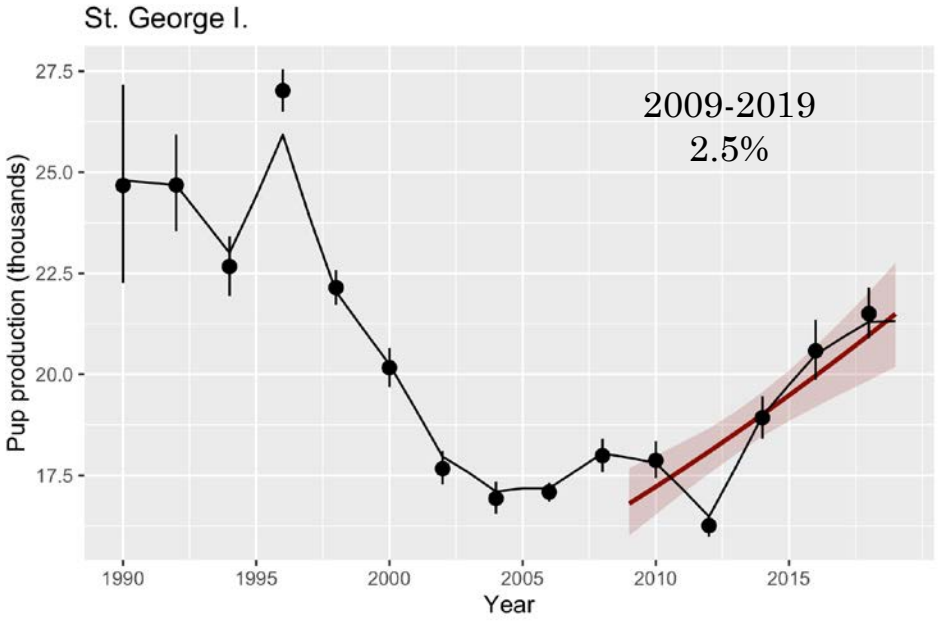
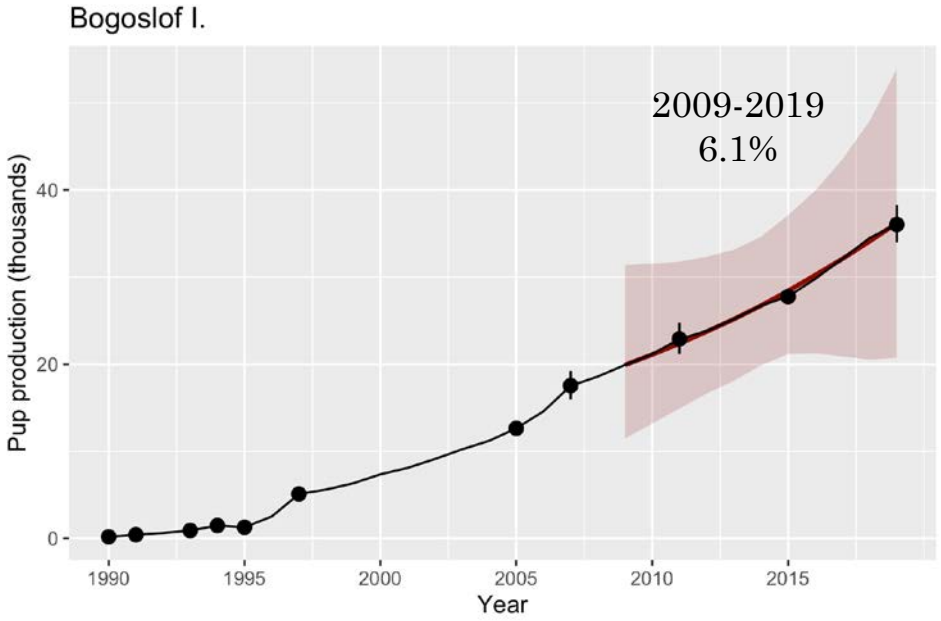


NOAA FISHERIES

St. George and Bogoslof Islands

Pup production





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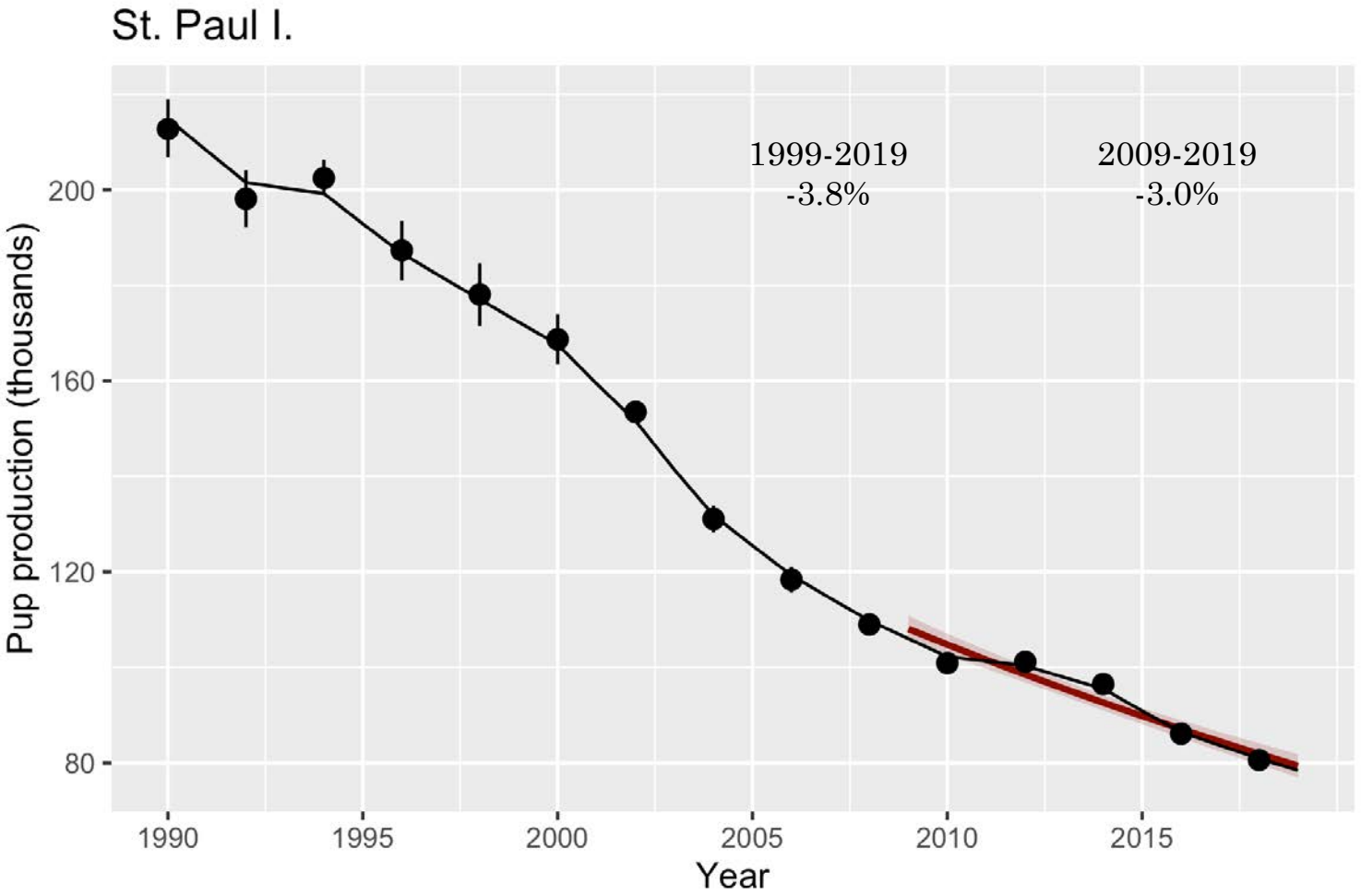
St. Paul Island

Pup production



Winter migration studies

- Zeppelin et al. 2019 – *Migratory strategies of juvenile northern fur seals (Callorhinus ursinus): bridging the gap between pups and adults*
- Johnson et al. 2020 – *A continuous-time semi-markov model for animal movement in a dynamic environment*
- Draft Pelland et al. – *Modeling and Hindcasting Weather-Mediated Migratory Departure of Northern Fur Seal Pups (**see Pellend AMSS presentation**)*
- Draft Pelland et al. – *Observations and simulations of interannual variability in the first migration of Bering Sea northern fur seal pups*

General migration synthesis

- Most mortality likely during the migratory phase
  - On-land mortality summer low
- No evidence of spatial segregation between the islands during the winter
- Migration speed, orientation, and directionality differed among female adults, juveniles, and pups
- Female pups are last to exit the Bering Sea compared to female counterparts
- Wind, snow, and temperature anomalies are predictors of pup departure.
- There is strong evidence for an influence of surface winds on pup movement
- Annual winter habitat use differences arise from wind
- Wind-forced simulations of northern fur seal pup dispersal can reproduce observed interannual variability
- Hindcasts to 1950 only show interannual variability in initial departure and dispersal patterns and lack any trends consistent with the decline

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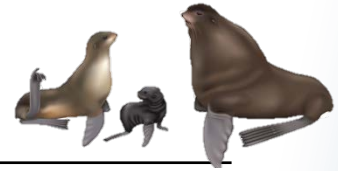
Quantification of northern fur seal prey capture behavior using animal-borne video



Carey Kuhn (Carey.Kuhn@noaa.gov)

Jeremy Sterling, Cal Mordy, Chris Meinig, Molly McCormley, Burlyn Birkemeier

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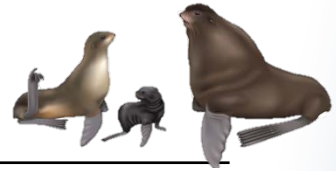
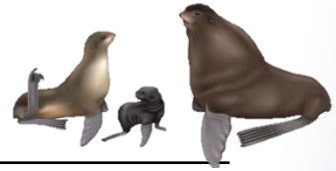
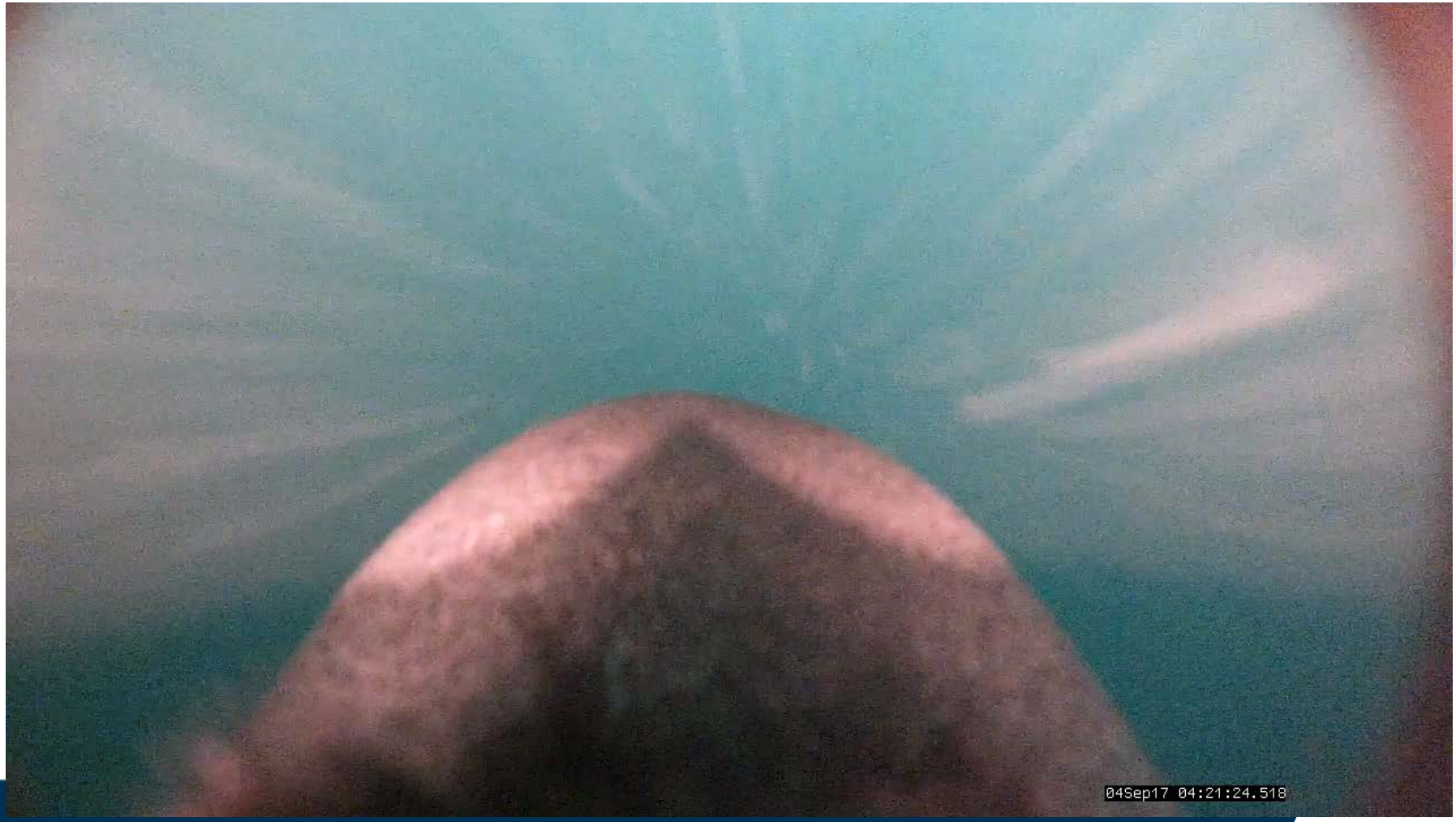


Quantification of northern fur seal prey capture behavior using animal-borne video





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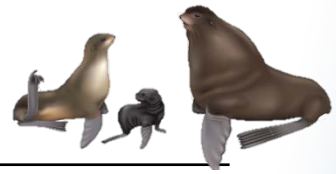
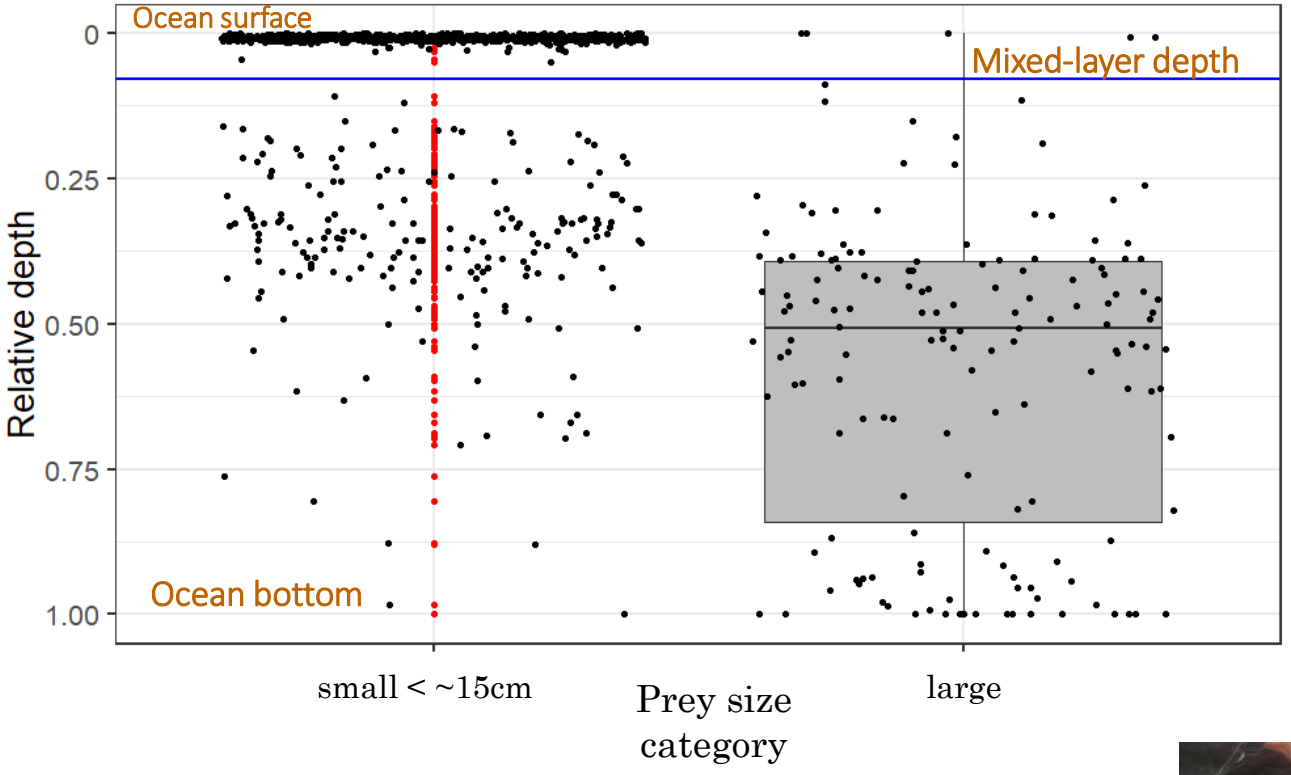
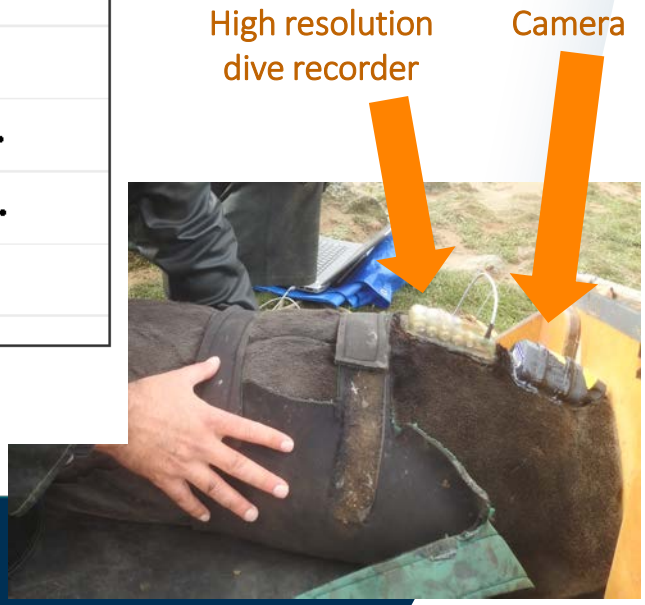


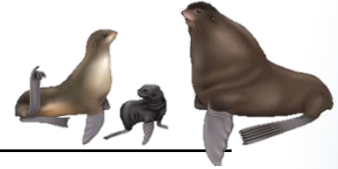
Prey capture depth vs. prey size – partial trips from 5 seals



- Reexamine ~ 12 million dives recorded 1992-2019

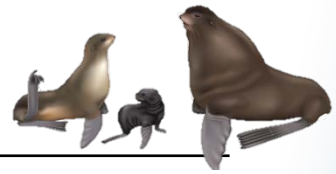


Lenfest study update



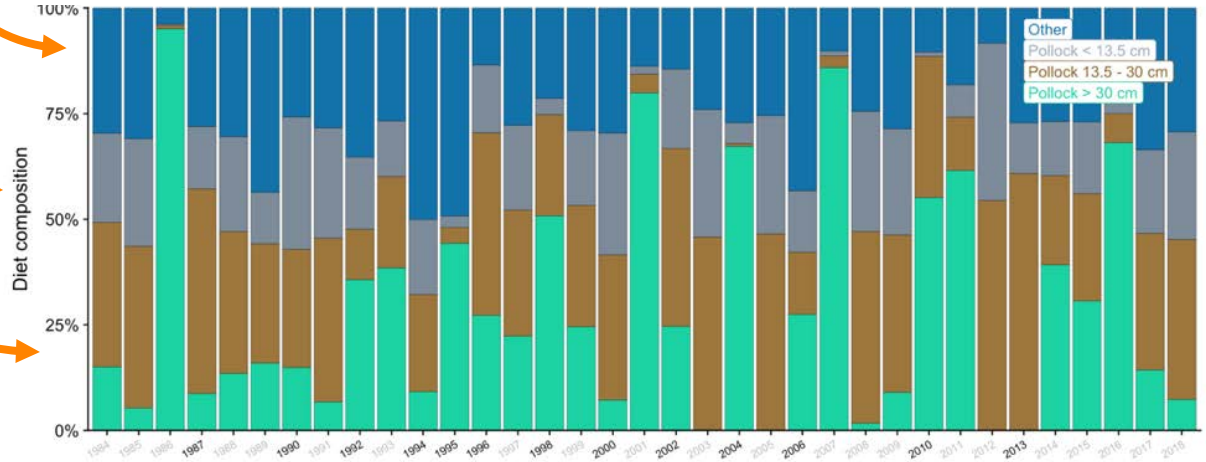
- Publications
  a) McHuron, E. A., Sterling, J. T., Costa, D. P., & Goebel, M. E. (2019). Factors affecting energy expenditure in a declining fur seal population. Conservation Physiology, 7(1), coz103
  b) McHuron, E. A., Luxa, K., Pelland, N. A., Holsman, K., Ream, R., Zeppelin, T., & Sterling, J. T. (2020). Practical application of a bioenergetic model to inform management of a declining fur seal population and their commercially important prey. Frontiers in Marine Science
  c) Draft – Seasonal and age-related variation in weight and prey consumption of northern fur seals (*Callorhinus ursinus*)
  d) Draft – The influence of changes in prey availability on optimal behavioral decisions for a central place forager during lactation
- Phase 3: Link fur seal bioenergetic model to FEAST and CEATTLE models
  - See McHuron AMSS presentation for CEATTLE/bioenergetic model coupling
- Phase 4: Evaluate potential future availability of pollock under different scenarios of climate change and fishing
- End date for the study was originally scheduled for 28 February 2021, but due to covid-19 related delays, the project has been extended to the end of 2021

Lenfest study update



See McHuron AMSS presentation

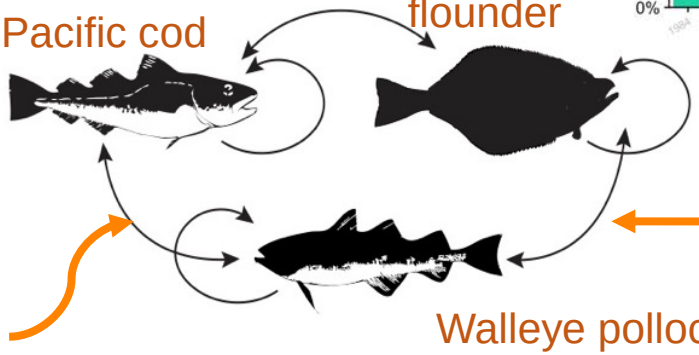
St. Paul East



W@Age~*f*(Temperature)
Pred/prey~*f*(Temperature)

Arrowtooth flounder

Pacific cod



Walleye pollock

Mortality ~f(Bioenergetics)

Thanks for your attention

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