Bearded seal productivity in Alaska using harvest-based monitoring; 1960s, 1970s, 2000s, and 2010s

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Introduction

Declines in Arctic sea ice extent, thickness, and duration are projected to negatively impact bearded seals (*Erignathus barbatus*) by reducing their time to rest, pup, nurse, and molt on sea ice. Existing population estimates for bearded seals in Alaska cannot be used to detect trends; however, the Alaska Department of Fish and Game works with Alaska Native hunters to collect data from the subsistence harvest that are used to determine several population health indices.

Methods

- Bearded seals were sampled from subsistence harvests in 15 villages along the Beaufort, Bering, and Chukchi sea coasts during 1963–1979 and 2002–2016.
- Female reproductive tracts and canine teeth were collected.
- Age of seals was determined by counting annuli in the dentine or cementum layers of sectioned teeth.
- Reproductive tracts were examined for sexual maturity and reproductive condition.
- Data are grouped by decade 1960s (1963–1969), 1970s (1970–1979), 2000s (2000–2009), and 2010s (2010–2016).

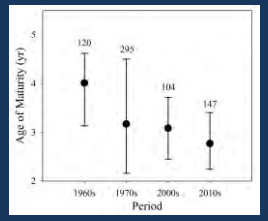
Villages in the Beaufort, Bering, and Chukchi seas where harvested bearded seals were sampled.

Subsistence harvested bearded seal. Point Hope, AK. Photo by: Lori Quakenbush

Age of Maturity

Age of maturity was estimated as the age at which 50% of females had ovulated at least once (DeMaster, 1978). Data was analyzed using a probit regression.

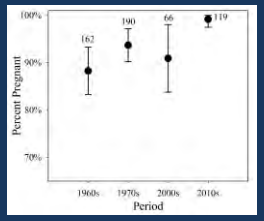
- Seals are maturing at a significantly younger age during the 2010s than during the 1960s ($p<0.05$).



Average age of maturity by decade.

Pregnancy Rate

Pregnancy rate was defined as the proportion of mature females that were pregnant in the year of harvest. Average pregnancy rate was estimated and evaluated for differences among time periods using a logistic regression model.

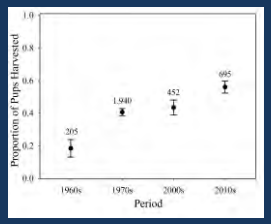


Average pregnancy rate by decade.

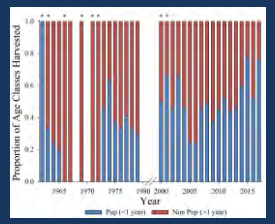
- Pregnancy rate in the 2010s is significantly higher than all other decades ($p<0.05$).

Proportion of Pups Harvested

The proportion of pups (<1 year of age) in the sampled harvest is representative of their presence in the population. If pups were not surviving past weaning, their presence in the harvest would decrease.



Proportion of pups harvested by decade. Sample size is listed above the error bars.



*Annual proportions of age classes harvested. *Sample size in these years were <10 seals.*

- The proportion of pups in the sampled harvest was significantly lower in the 1960s than all other decades and significantly higher in the 2010s than all other decades ($p<0.05$).

Conclusions

- **Bearded seal productivity and pup survival have improved in recent years.**
  - Seals are maturing at a younger age.
  - Pregnancy rate is higher.
  - Proportion of pups in the sampled harvest is higher.
- **These results are inconsistent with predicted negative effects of climate change on bearded seals.**
- **Continued monitoring is important as environmental conditions change.**

Acknowledgments

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