

MATERNAL FORAGING TRIP DURATIONS OF NORTHERN FUR SEALS

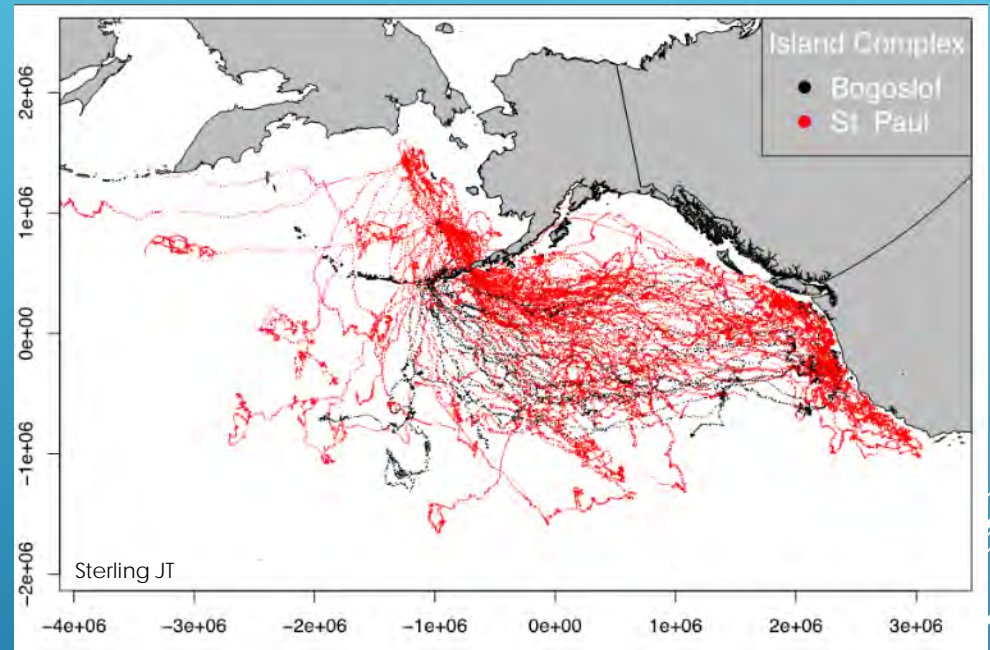
An Index to Prey Availability in the
Eastern Bering Sea Ecosystem

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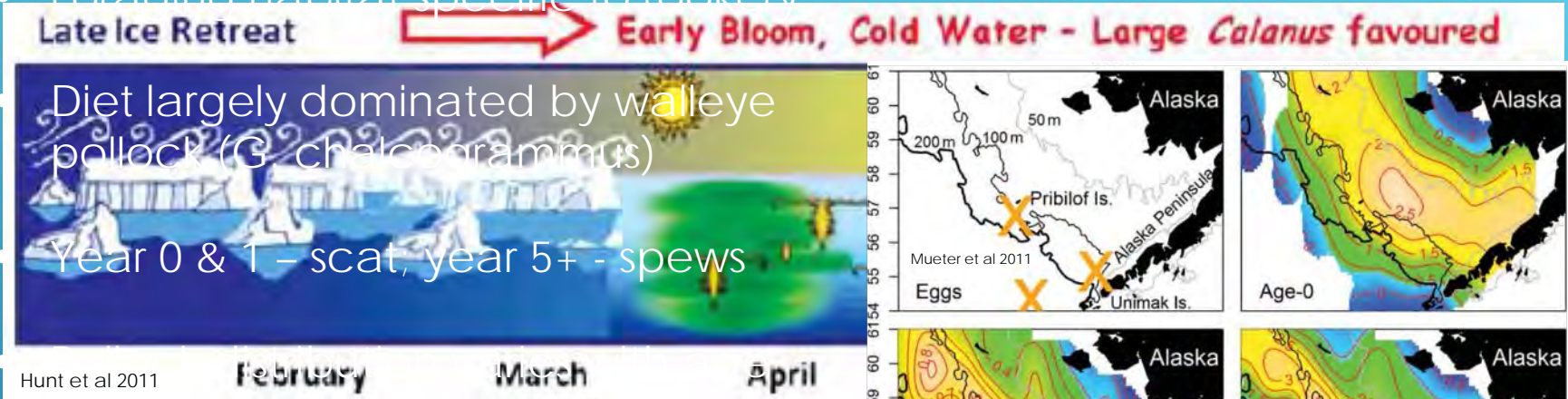
BASIC NFS BIOLOGY

- Migratory
 - Winter/spring in Pacific Ocean
 - Summer/fall breeding and pupping
- 4 mo. lactation period (July – Nov)
- Alternate foraging trips (1-15 d at sea) with nursing (1-2 d on shore)
- Highly philopatric to neonatal sight (rookery) and foraging habitat

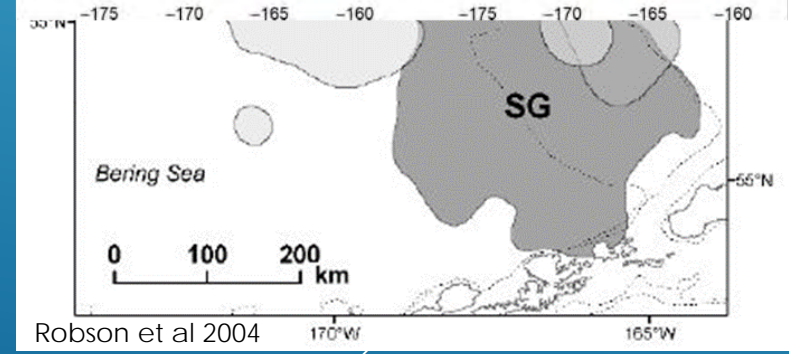
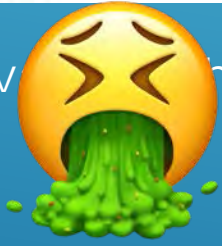


POLLOCK

- Foraging habitat specific to rookery

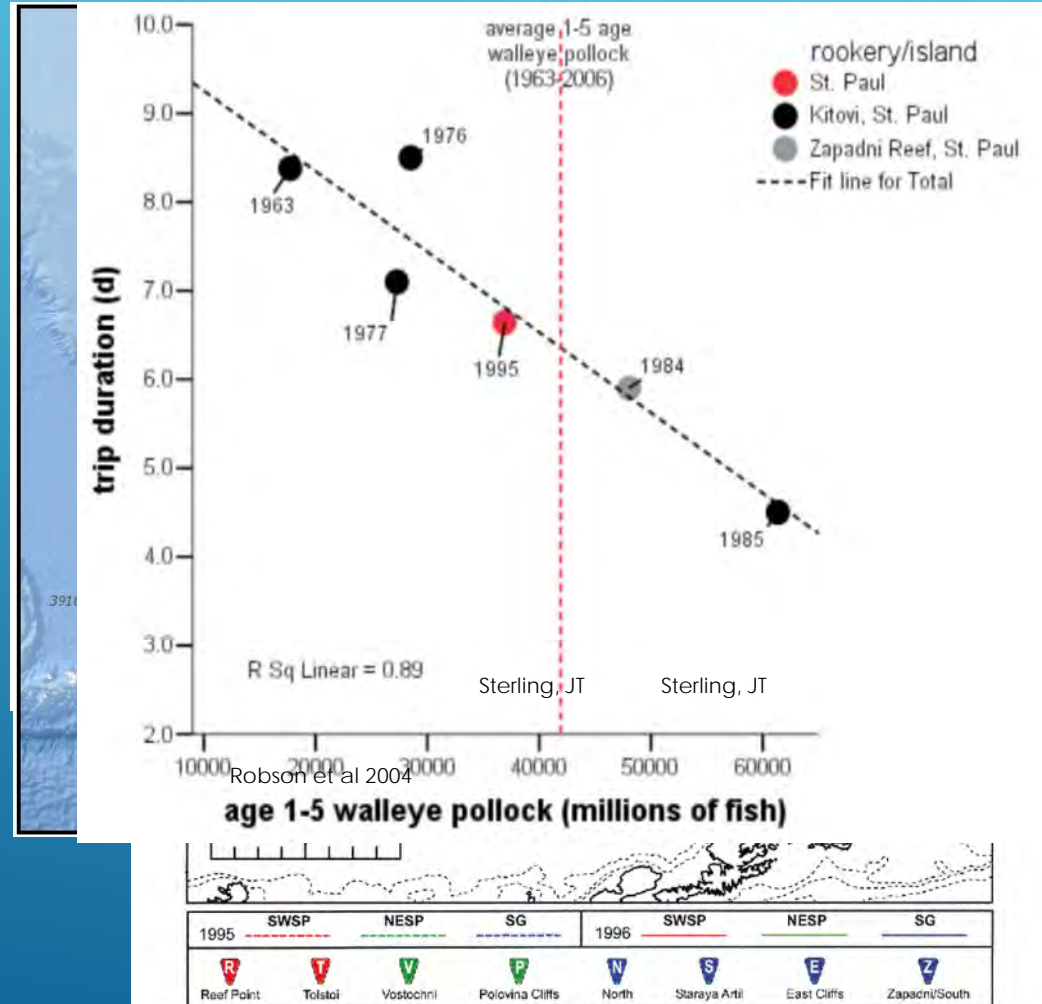


- Pollock abundance v climate
- 2nd largest fishery
 - Sustainably managed



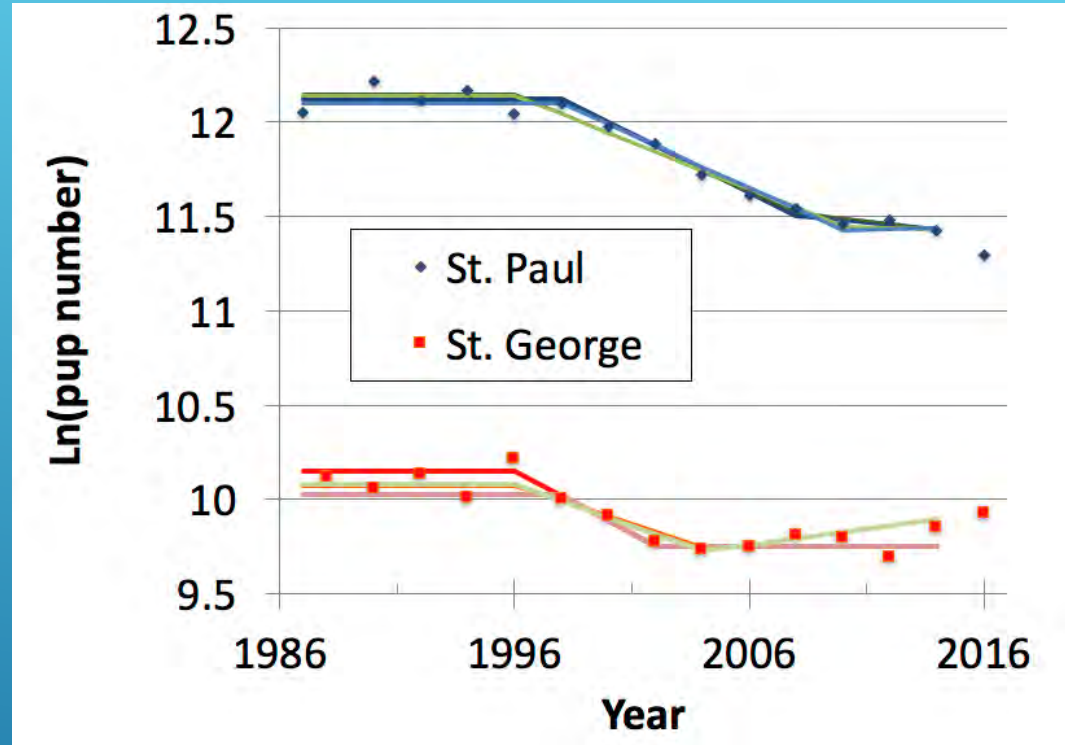
FORAGING ECOLOGY

- Adult females spatially segregated by island, rookery, & foraging habitat
- Pollock availability directly related to Maternal Foraging Trip Durations (MFTD)
- MFTD related to pup growth
- Pup weights positively related to pup survival



MOTIVATION FOR RESEARCH

- Periods of temporal and regional decline
 - 2.5% decline in the overall eastern stock NFS population in 2016.
- Reduced pup production
 - 12% decline in SNP pup production 2014-2016
- “Maintaining prey availability may provide better foraging opportunities for the fur seal stock to minimize further declines.”



HYPOTHESES

1. MFTD is spatially and temporally correlated with mean pup mass at the rookery level

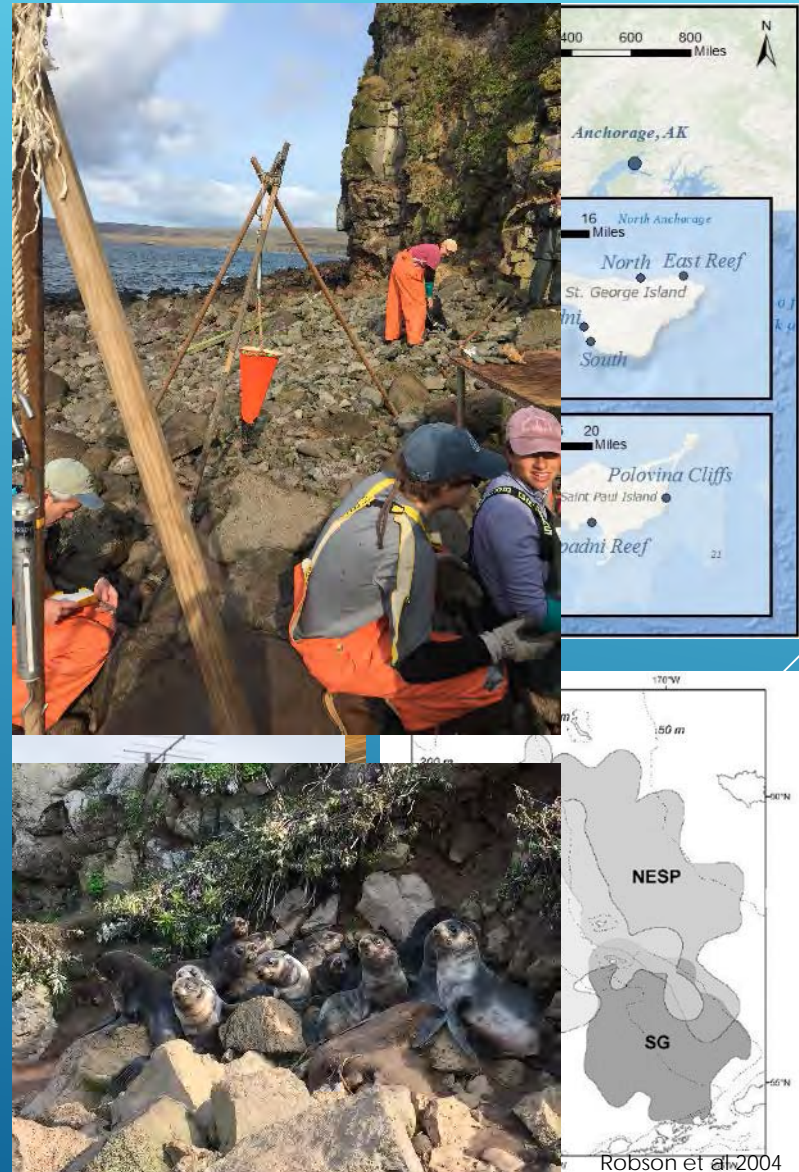


2. MFTD varies within and between seasons in response to environmental changes

3. MFTD is correlated with indicators of pollock availability specific to the foraging habitat of the source rookeries

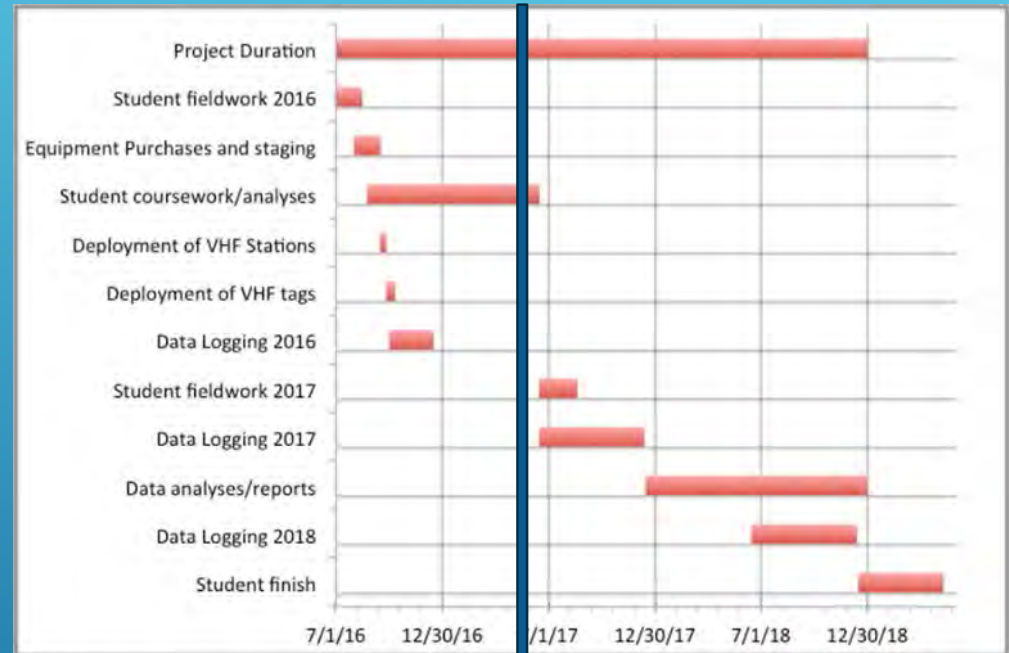
METHODS: A REVIEW

- Radio telemetry: detect presence/absence
 - Pulse-coded VHF flipper tags
 - Duty-cycled: long life
 - 212 total deployed since onset
- Data-logging receivers at 6 study rookeries
 - 3 PCCRC, 3 NMFS; overlapping goals expand sample size
 - Represent 3 foraging habitats
 - Solar powered; low maintenance
- Concurrent NMFS-AFSC operations include pup weighing at 3 rookeries

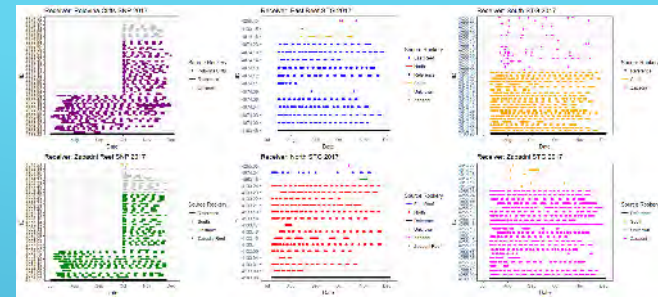


2017 PROGRESS

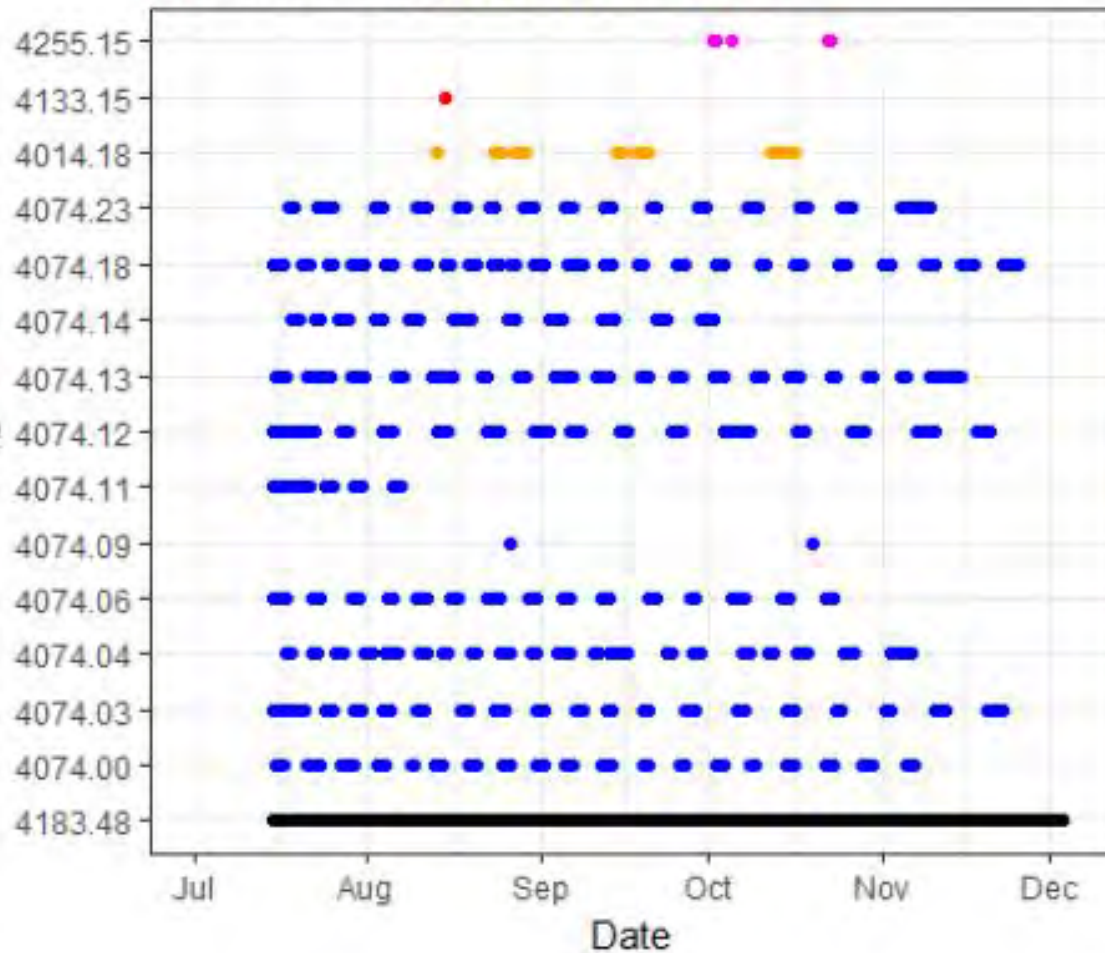
- Deployed receivers in May (SNP) & July (STG)
 - Weather delays STG
 - Replaced broken antennae
- 70 new tags (20 PCCRC; 50 NMFS AK Region)
- Pups weighed at 3 sites in Oct
- Receivers retrieved by tribal partners in Dec
- Preliminary analysis of 2017 data set



2017 DATA



Receiver: East Reef STG 2017

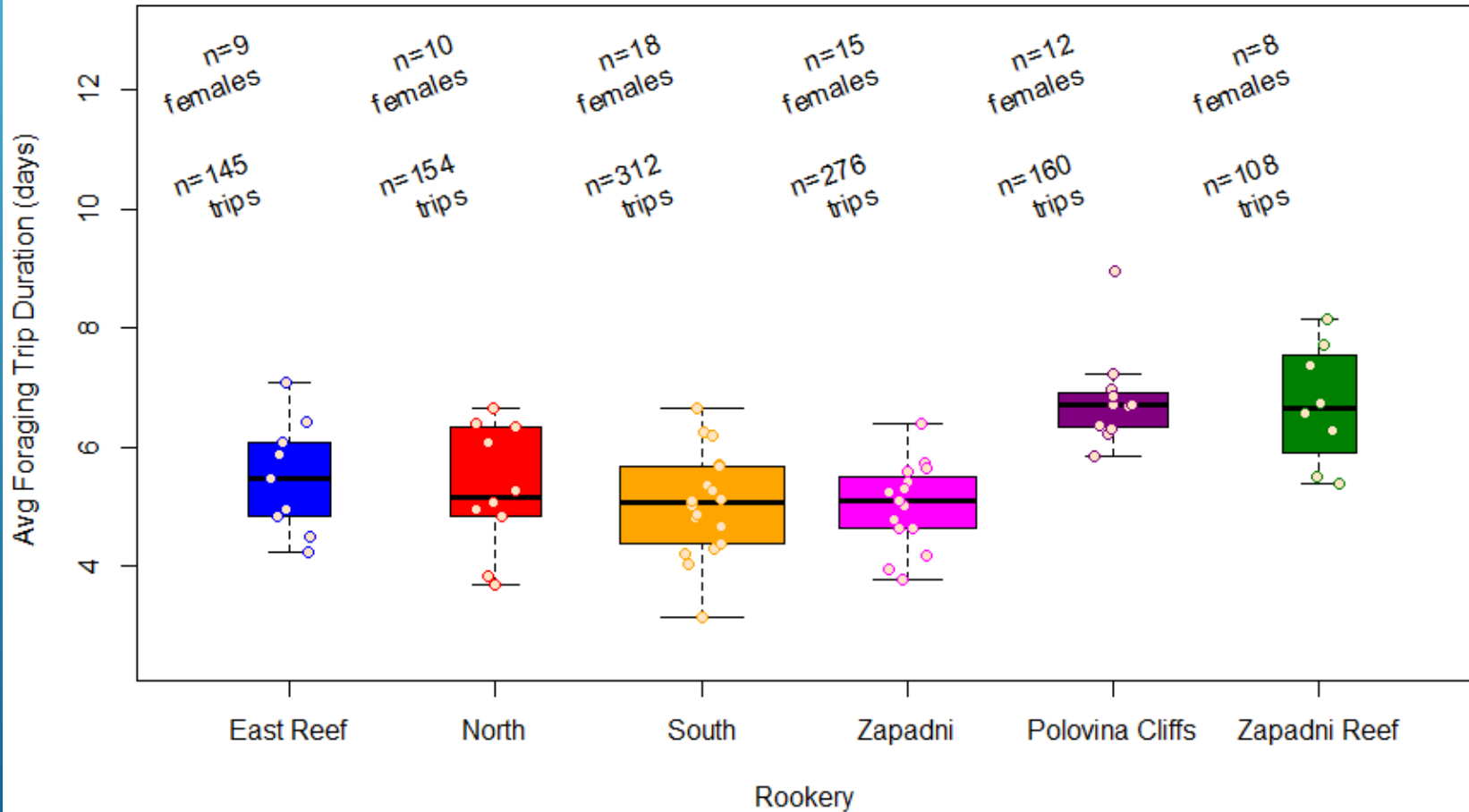


Source Rookery

- East Reef
- North
- Reference
- South
- Unknown
- Zapadni

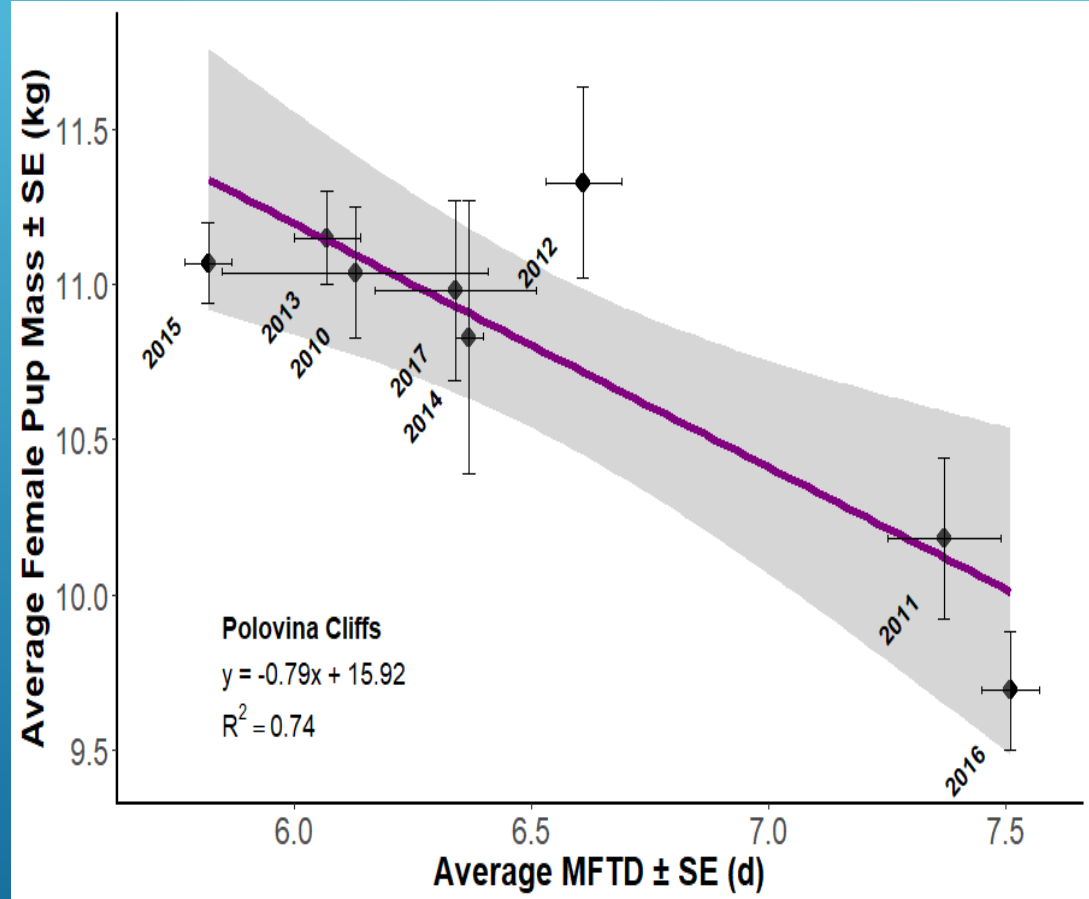
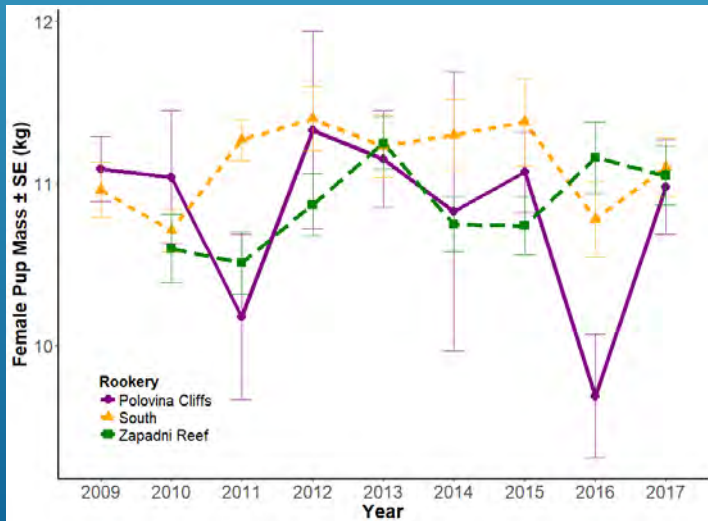
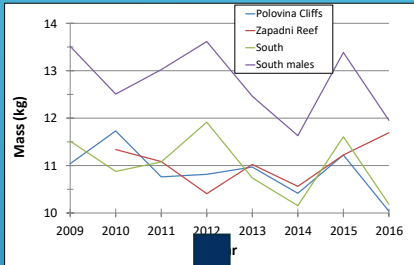
2017 DATA: SUMMARY

2017 Trip Duration by Rookery



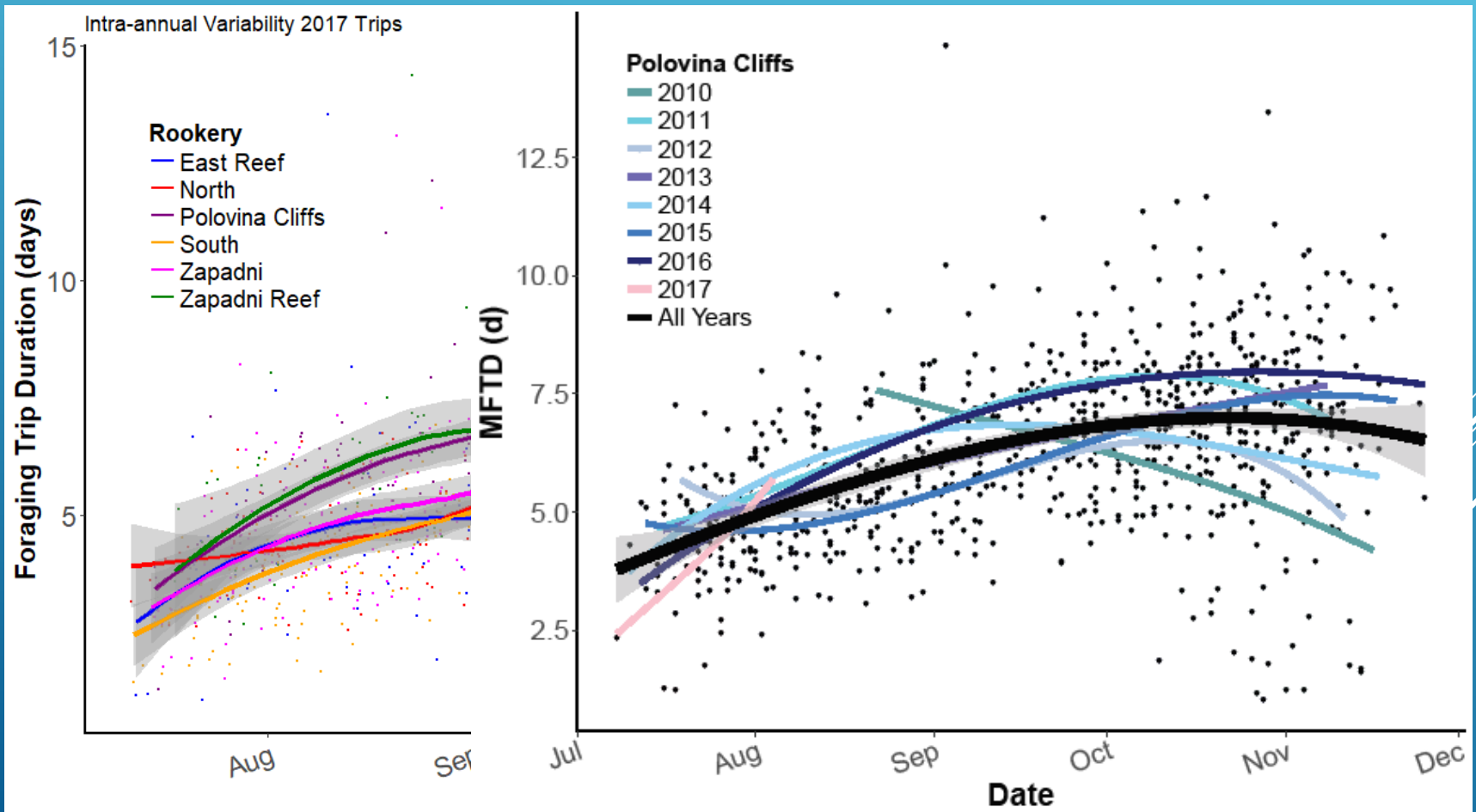
2017 DATA: H1

MFTD is spatially and temporally correlated with mean pup mass at the rookery level



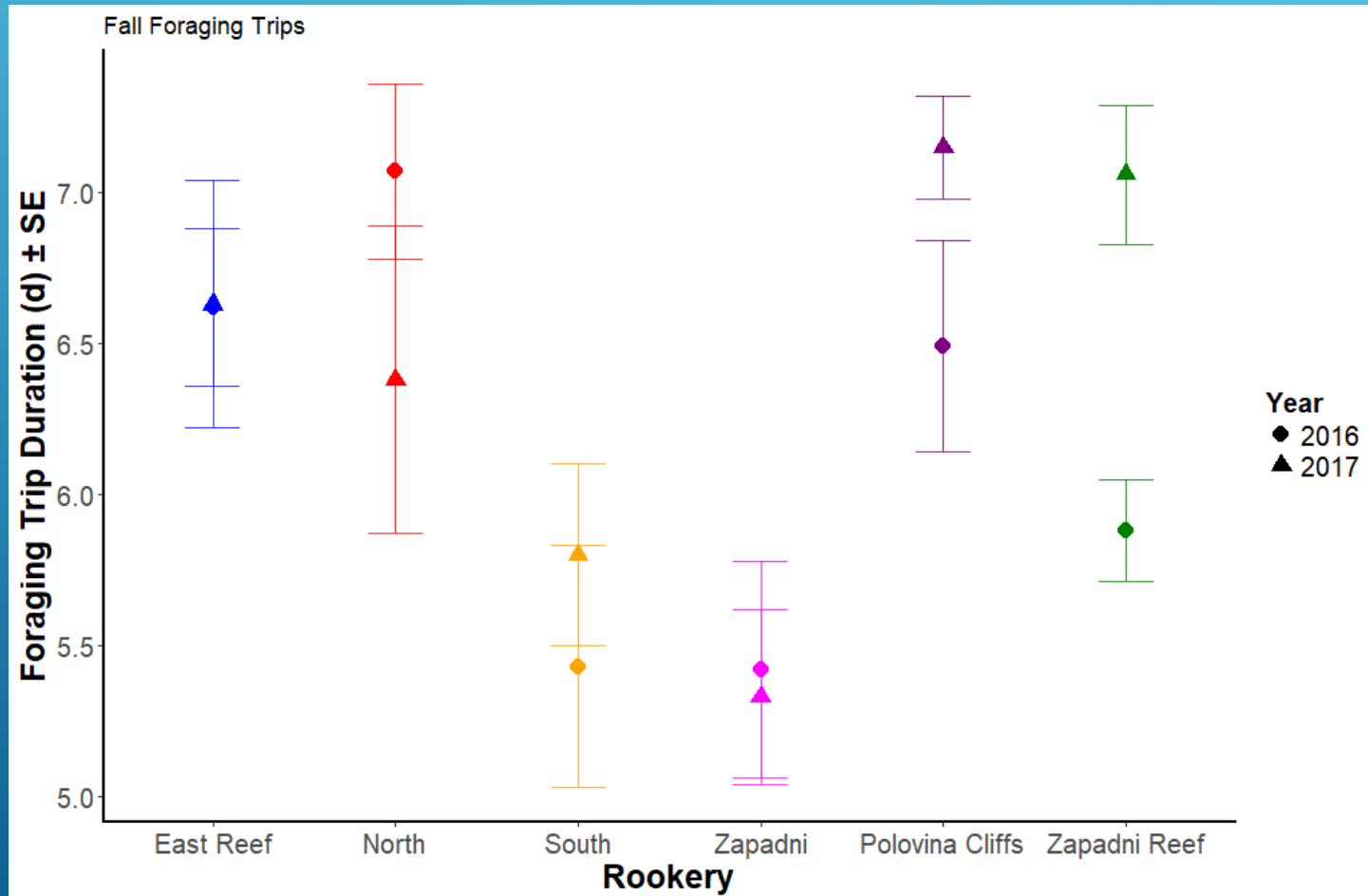
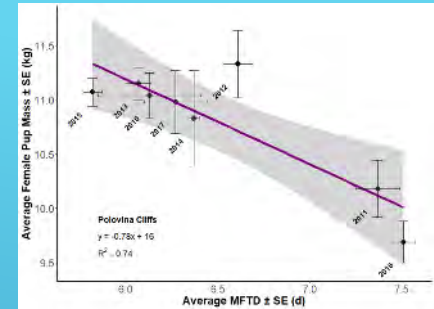
2017 DATA: H2

MFTD varies within and between seasons [in response to environmental change]*



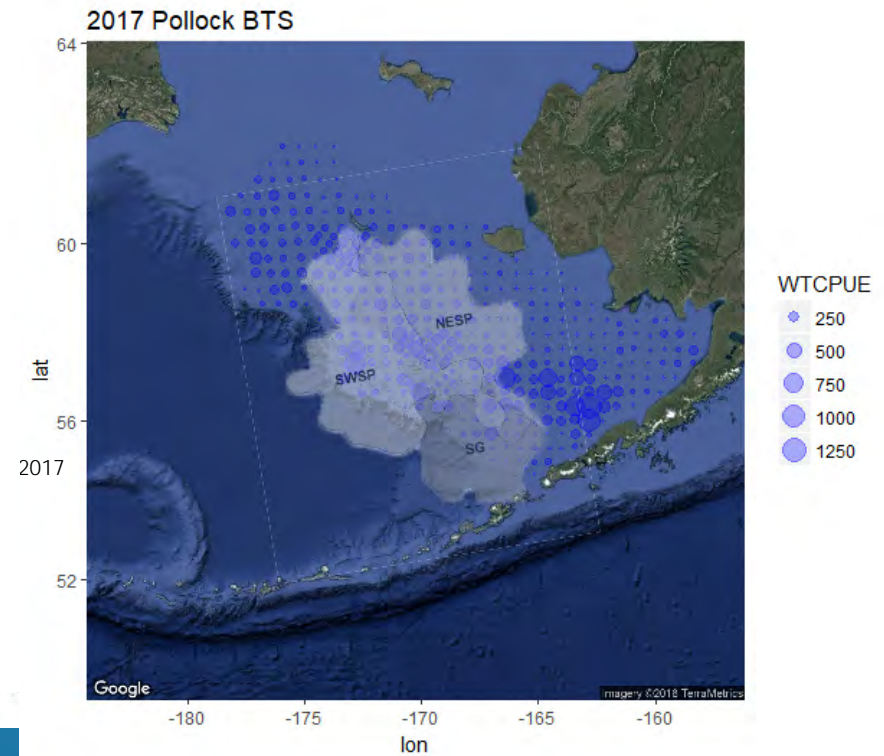
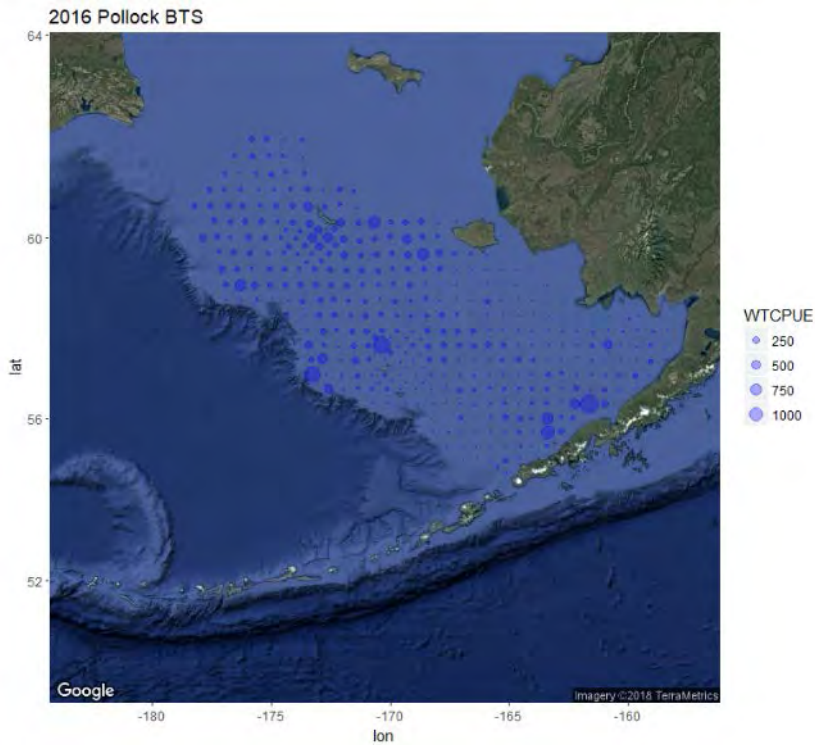
2017 DATA: H2

MFTD varies within and between seasons [in response to environmental change]*




2017 DATA: H3

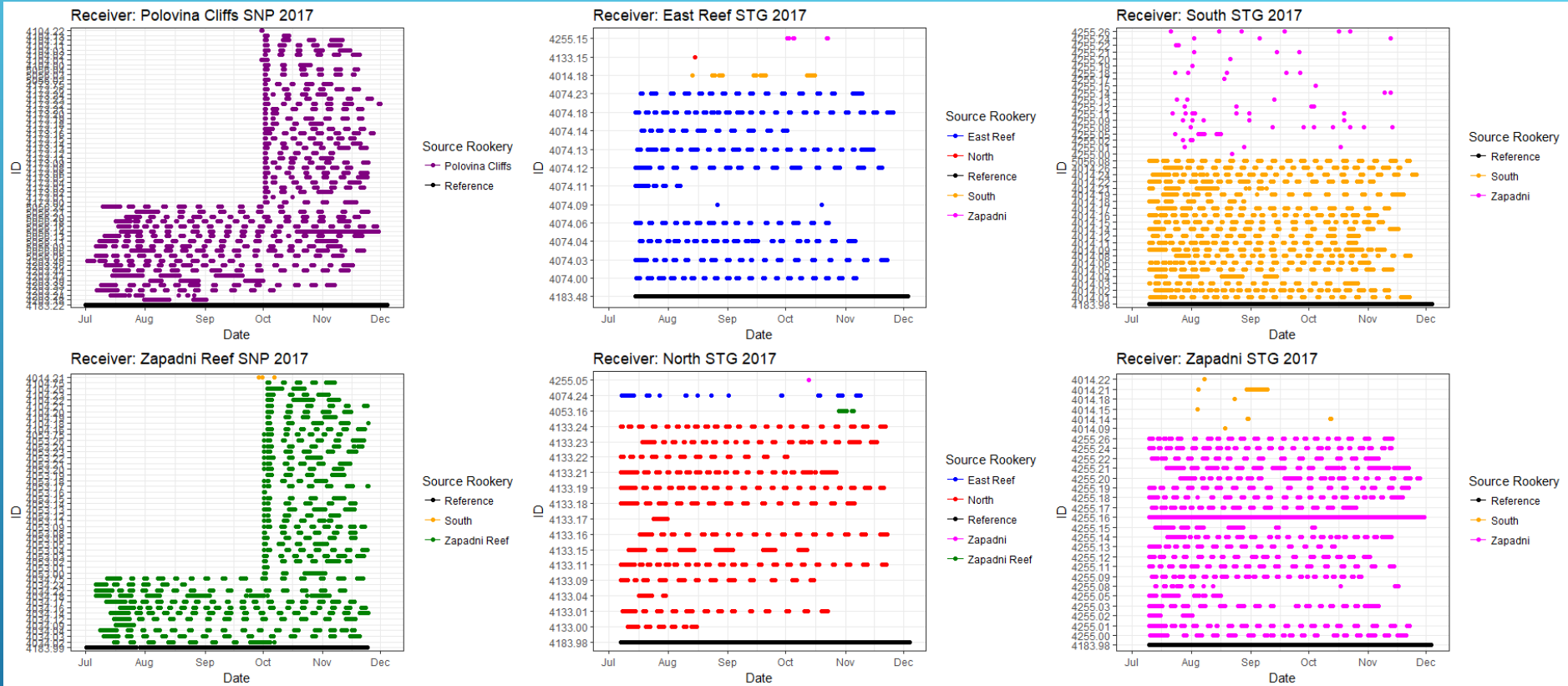
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PUTTING IT TOGETHER: H1 - H3


- Generalized Additive Mixed Modeling
 - Combine the MFTD Telemetry data with the pollock abundance and oceanographic parameters found in the EBS BTS to determine most influential factors in rookery-specific foraging trip durations
 - Appropriately model seasonal trends and effects of individual animals
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ADDITIONAL ANALYSES



- Emigration (2017)
- Potential bias to survival estimates

LOOKING FORWARD

- Field season 2018
 - Receiver deployment in May
 - Pup weights & supplemental tagging in Sept
 - Receiver retrieval Dec
 - Anticipate two publications
 - Expected graduation May 2019
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THANK YOU!



Graduate^{*}
Research
Fellowship
Program



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ANCHORAGE.



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