Oceanographic Influences on Northern Fur Seal Migratory Movements

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Northern fur seal (Callorhinus ursinus)

- ~1.2 million
  - Summer breeding colonies
- Pribilof Islands
  - 63% of total
  - Declining
- Winter Migration
  - 8 months at sea
  - Distribution reported from pelagic collections
Objectives

• Describe migration
  – Early, middle, late

• Relationships to oceanographic features

• Summarize pelagic harvest data from winter foraging areas
  – Fur seal age, gender, diet
Satellite telemetry

• 13 adult females from St. Paul Island
  – Physical locations
  – General timing and routes of migration
  – Identify winter foraging areas
  – Small scale movements

• Dive data for 3 females
  – Dive rate, depth
Remote sensed data

• Sea surface:
  – Temperature (SST)
  – Chlorophyll a (Chl a)
  – Height anomalies (SSH)

• Integrated with fur seal location data
Dive data

- Mean dive depth (m)
  - Seal 69
  - Seal 68
  - Seal 67

- Mean dive rate (dives/hour)
  - Seal 69
  - Seal 68
  - Seal 67

Region
- Bering Sea
- N. Pacific Transit
- Destination Area
Dive data

- Foraging effort high during transit across North Pacific
SST encountered by fur seals

Sea Surface Temperature (°C)

- Washington/Oregon
- Transition Region
- California

November December January February March April May June
Chl a encountered by fur seals

Chlorophyll a concentration (mg/m$^3$)

- Washington/Oregon
- Transition Region
- California

January, February, March, April, May, June
Bearing deviation (degrees)

Percent:

- 0-45
- 45-90
- 90-135
- 135-180

Geostrophic velocity (cm/s)
Tracking and remote sensed data

• 1-3.5 months in open ocean during transit
  – Between early December and late March

• 3 winter foraging areas identified
  – Transition region!
  – ~3–6 months in these areas (January-June)

• Remote sensed data
  – SST, Chl a differed among destination areas
  – SSH identified features affecting fur seal movements
  – Tools for understanding at-sea distribution
Pelagic collections:
1958-1974, 1990*

- Gender
- Age
- Diet
(stomachs)
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