Developing New Techniques to Assess the Impact of Prey Availability and Predation on Steller Sea Lion Populations

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SFOS

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Introduction

- One of the leading hypotheses for the decline of the Steller sea lion (SSL) is nutritional stress.
  - Is it food?
- How do changes in prey availability and variation affect the health and reproductive success of SSLs?
  - Are SSLs expending more energy acquiring the prey than they are obtaining from the prey?
- How is predation from marine-mammal eating killer whales affecting SSL populations?

Specific Objectives:

1. Develop new instrumentation and techniques for remotely monitoring the foraging of wild Steller sea lions.

2. Assess how changes in prey type, quantity, quality or availability, affect the behavior, condition, and survival of individual sea lions.

3. Investigate the role of killer whale predation in the decline of the Steller sea lion population and gather information on the population sizes, home ranges and foraging behavior of marine-mammal eating killer whales.

Tasks:

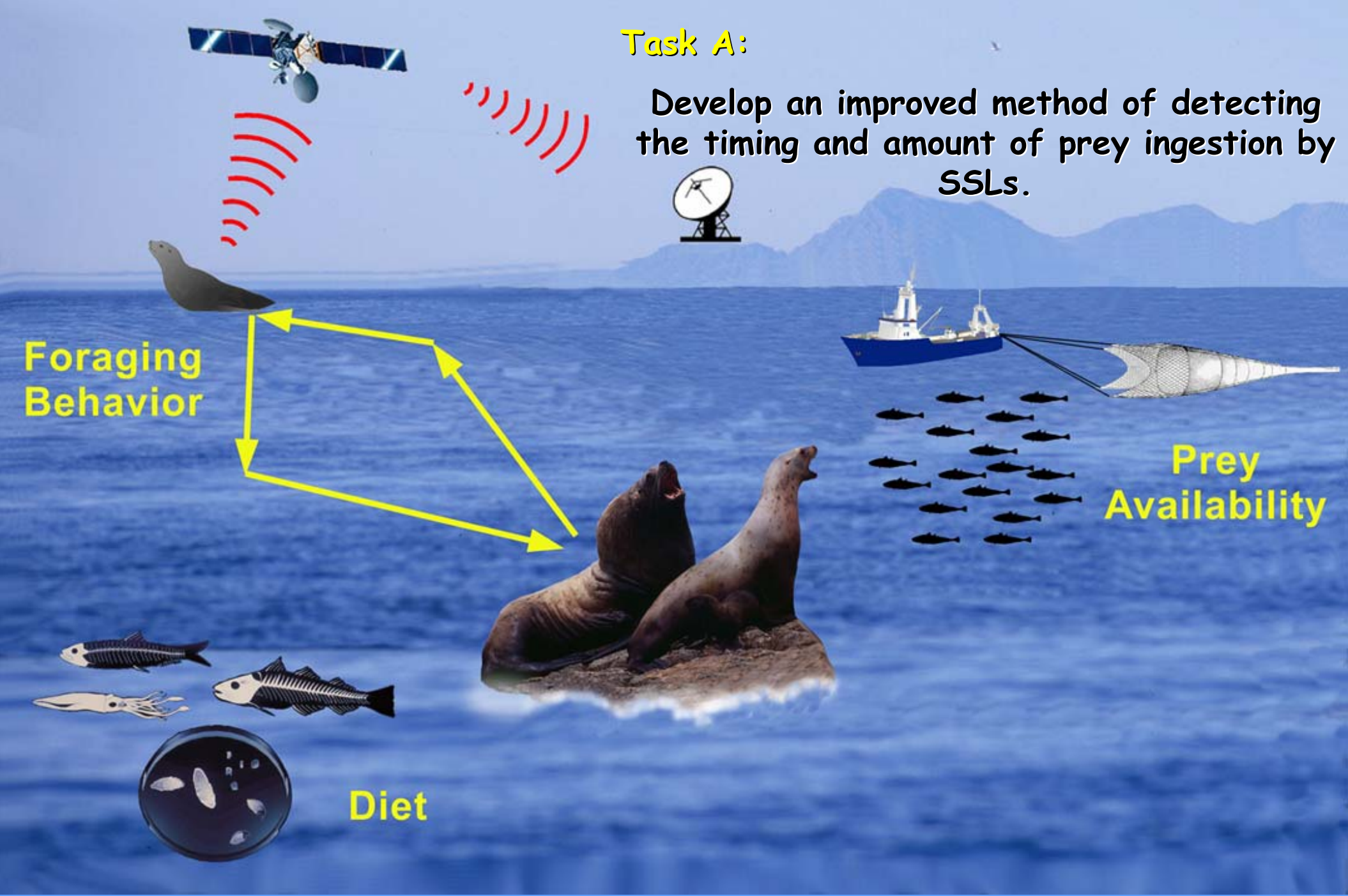
a) Develop an improved method of detecting the timing, species and amount of prey ingestion by SSLs.

b) Study transition to completely independent foraging by juveniles near 1-yr. of age; compare with older juveniles (>1 yr old).

c) Study lactating adult females and their pups during summer

d) Develop a better, long-term instrument attachment method for Steller sea lions.

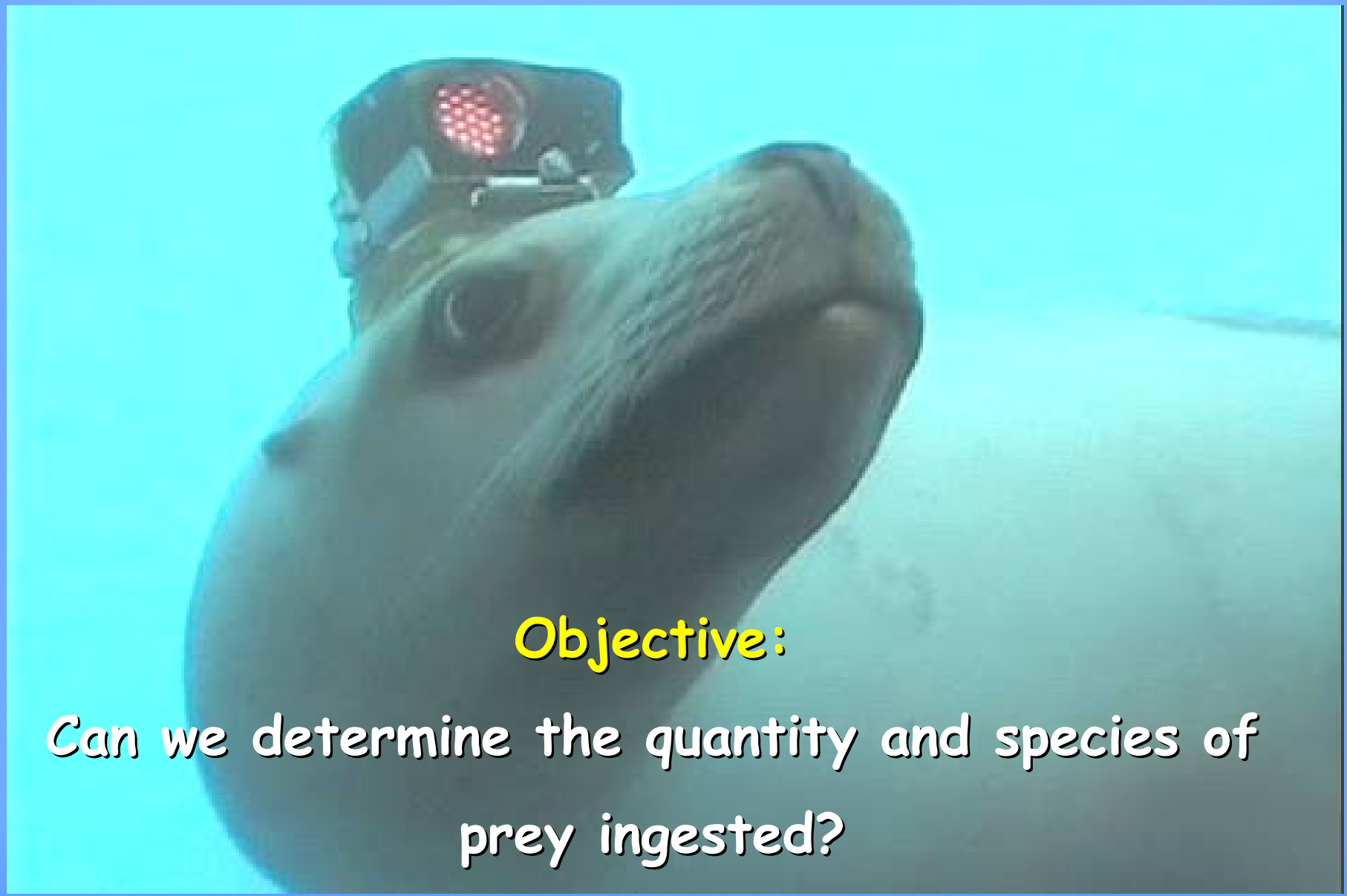
e) Develop remote monitoring tracking devices and attachment methods for marine-mammal eating killer whales.


Task A:
Develop an improved method of detecting the timing and amount of prey ingestion by SSLs.
Foraging Behavior
Prey Availability
Diet

Instruments and Methods for Remotely Monitoring Prey Ingestion

- Animal-borne video cameras
- Acceleration data loggers
- Animal capture and instrument deployment

Animal-Borne Video Camera



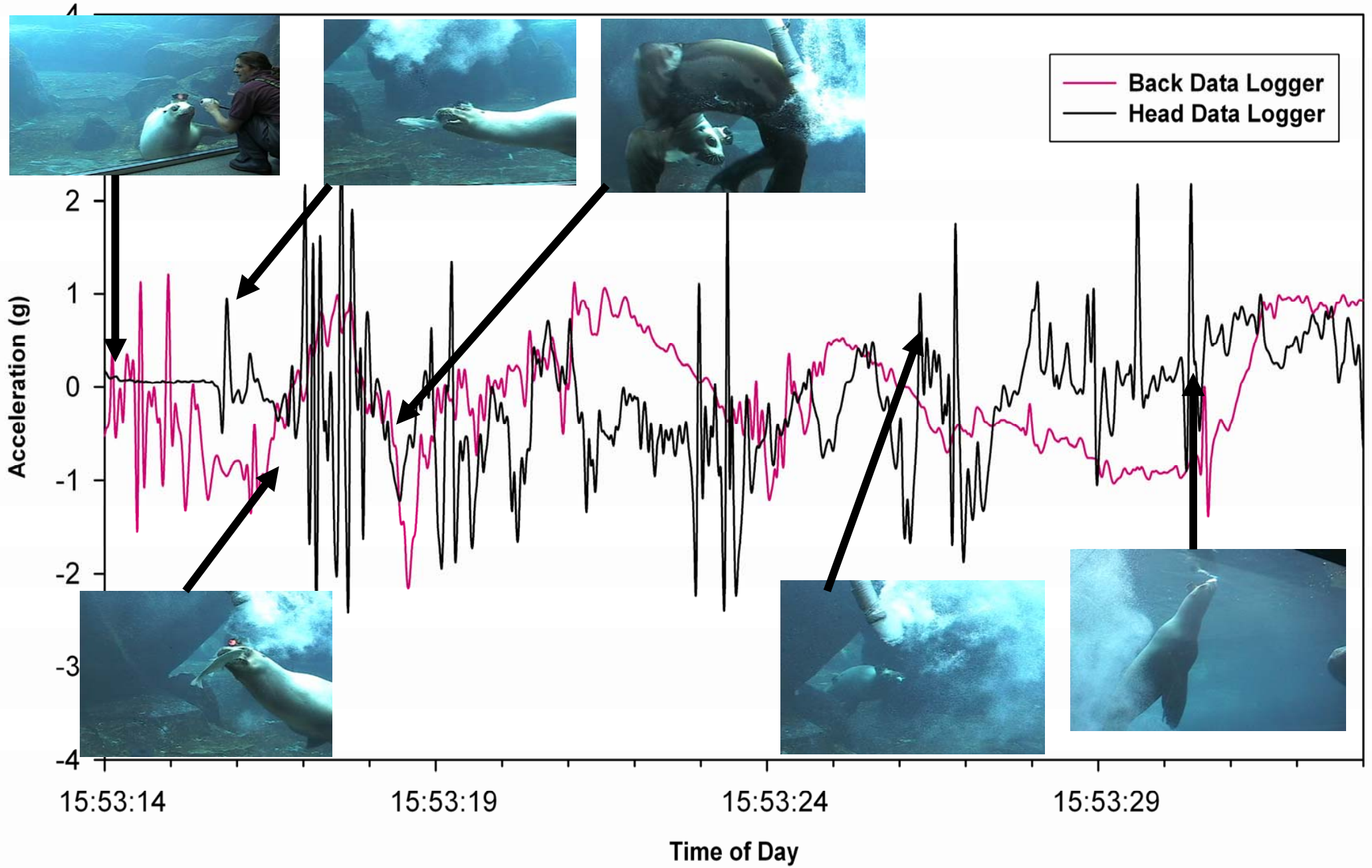
Objective:

Can we determine the quantity and species of prey ingested?

Acceleration Data Loggers

Objective:

Can we quantify prey consumption using acceleration data?


Back Data Logger
Head Data Logger
Acceleration (g)
4
2
1
0
-1
-2
-3
-4
15:53:14
15:53:19
15:53:24
15:53:29
Time of Day

Task B:

Study transition to completely independent foraging by juveniles near 1-yr. of age; compare with older juveniles (>1 yr old).

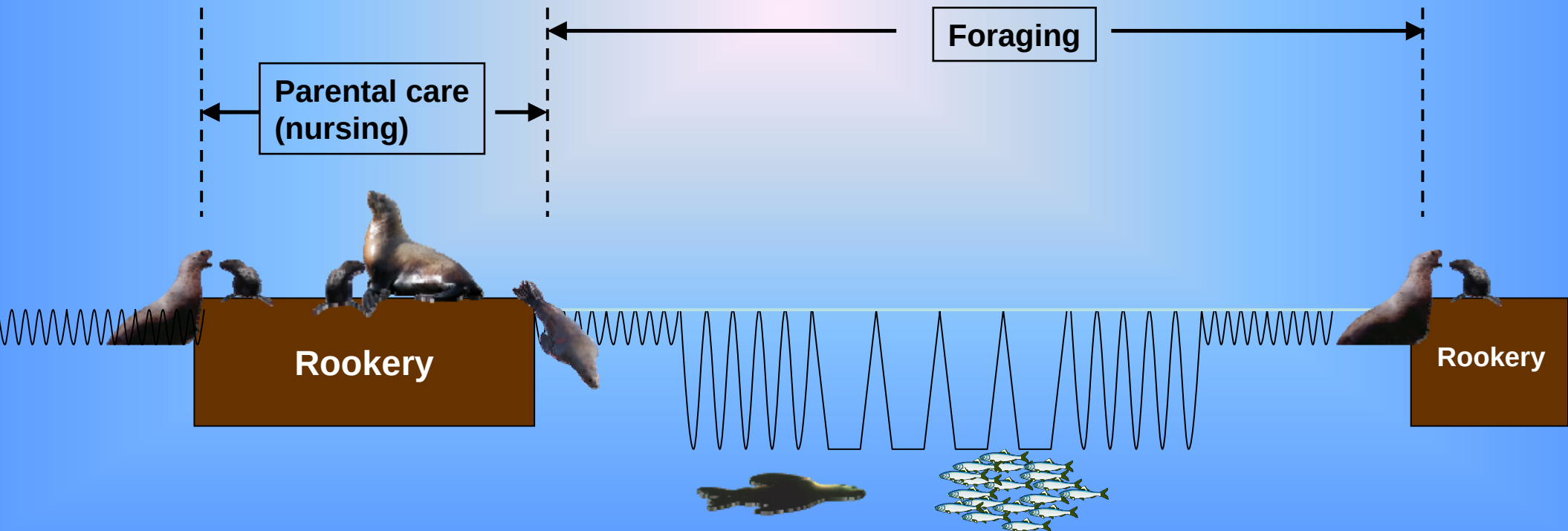
Short-term captive research on Steller sea lion mother/pup pairs in Russia

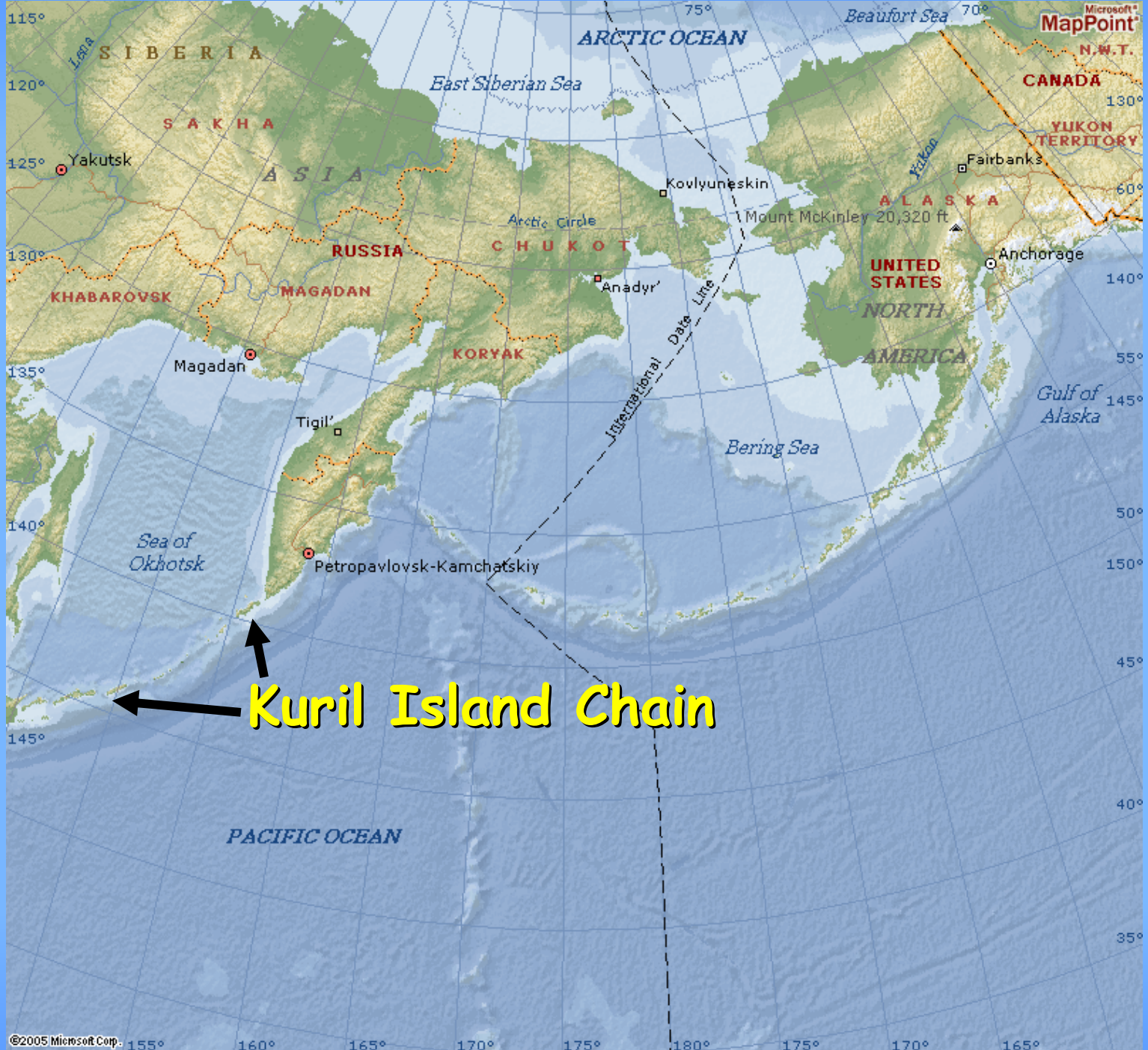
Task C:

Study lactating adult females and their pups during summer

Task D:

Develop a better, long-term instrument attachment method for SSLs




Kuril Island Chain
ARCTIC OCEAN
East Siberian Sea
Beaufort Sea
SIBERIA
SAKHA
ASIA
Lena
Yakutsk
RUSSIA
KHABAROVSK
MAGADAN
CHUKOT
KORYAK
Arctic Circle
Magadan
Tigil'
Anadyr'
Kovlyuneskin
Petropavlovsk-Kamchatskiy
International Date Line
Bering Sea
Sea of Okhotsk
PACIFIC OCEAN
CANADA
N.W.T.
YUKON TERRITORY
Yukon
Fairbanks
ALASKA
Mount McKinley 20,320 ft
Anchorage
UNITED STATES
NORTH AMERICA
Gulf of Alaska
MapPoint
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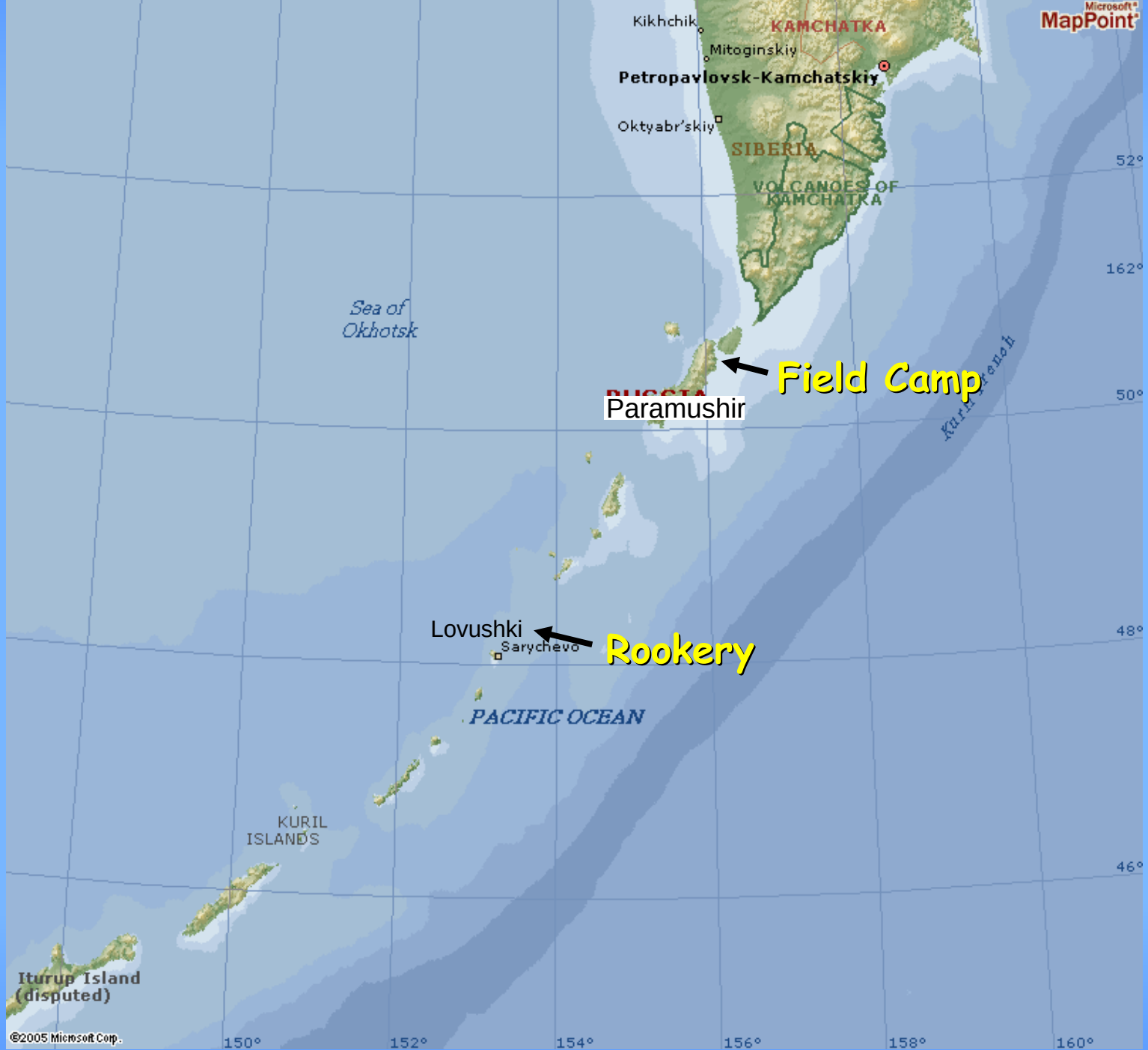
Kikhchik
KAMCHATKA
Mitoginskiy
Petropavlovsk-Kamchatskiy
Oktyabr'skiy
SIBERIA
VOLCANOES OF KAMCHATKA
Sea of Okhotsk
Paramushir
Field Camp
Lovushki
Sarychevo
Rookery
PACIFIC OCEAN
KURIL ISLANDS
Iturup Island (disputed)
52°
162°
50°
48°
46°
150°
152°
154°
156°
158°
160°
MapPoint
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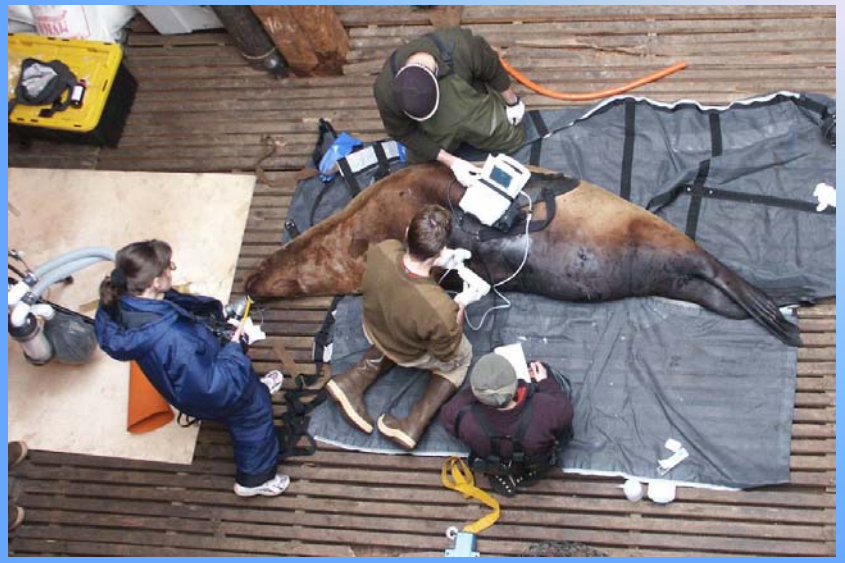
Mobil

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L18H
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TRIAC CENTRIFUGE
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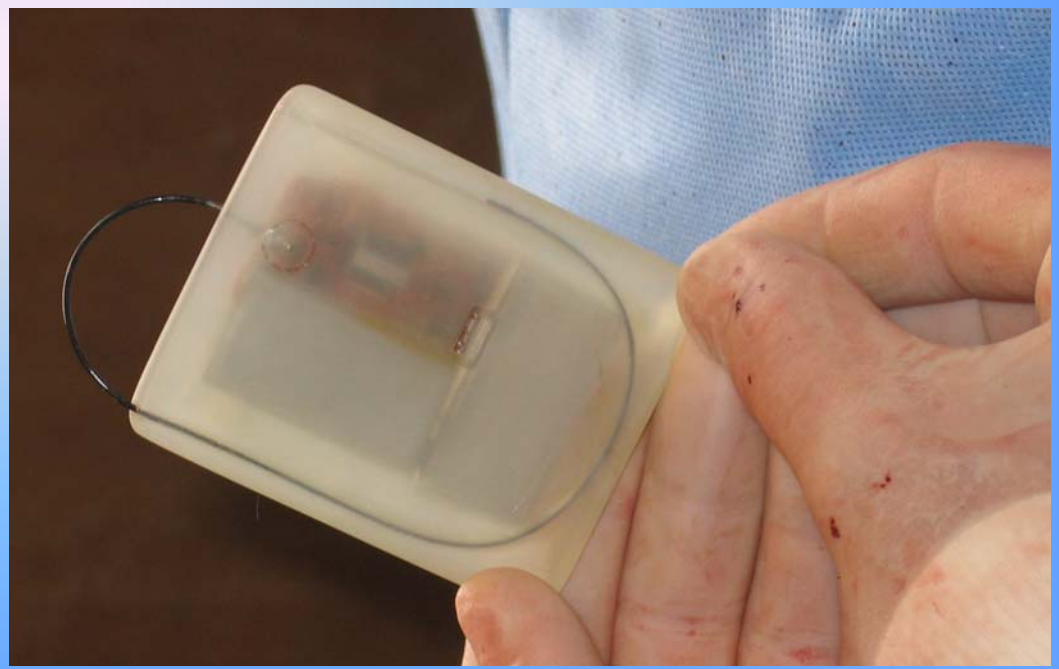
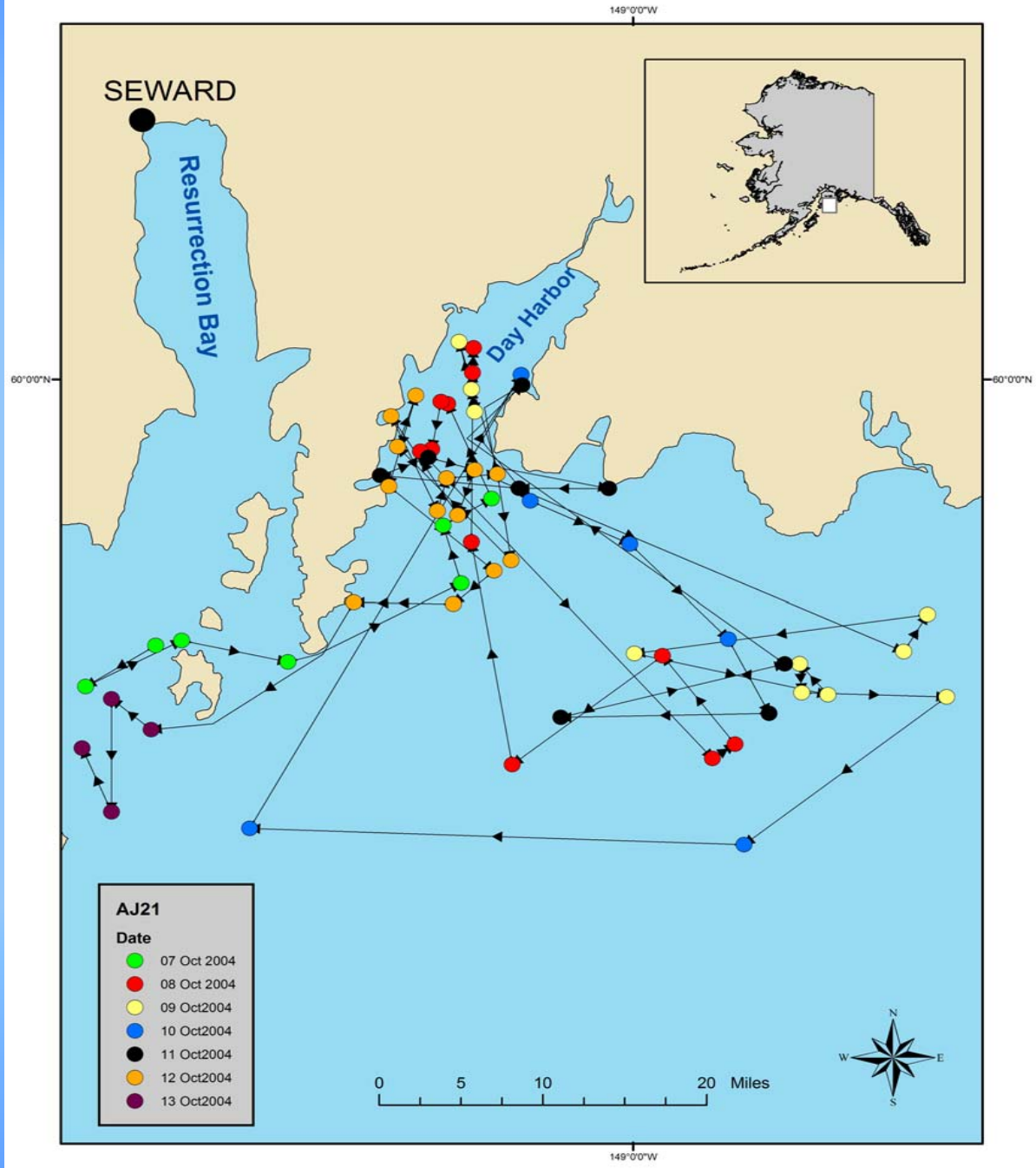
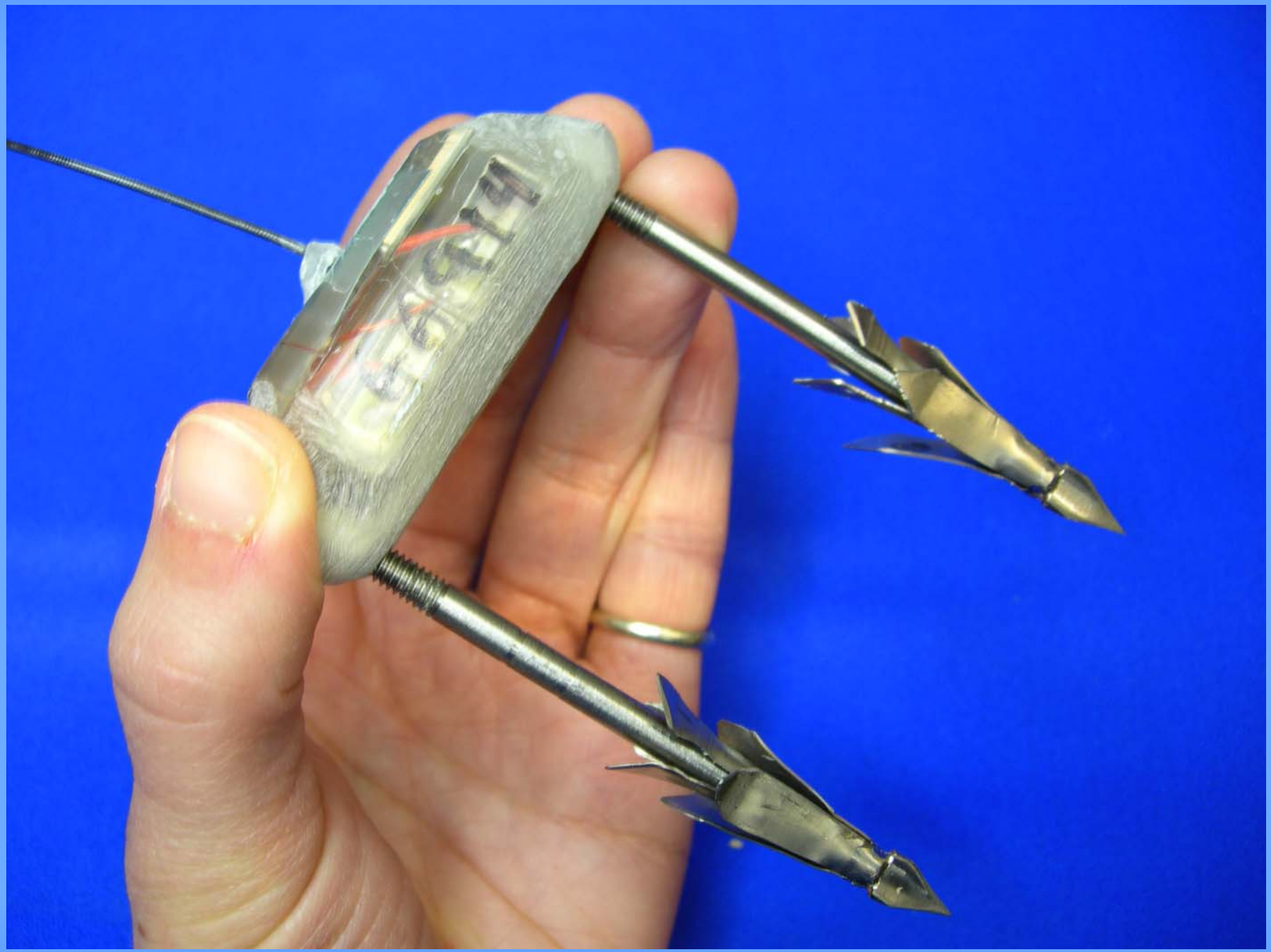


Task C:

Develop remote monitoring tracking devices and attachment methods for marine-mammal eating killer whales


149°0'0"W
SEWARD
Resurrection Bay
Day Harbor
60°0'0"N
60°0'0"N
AJ21
Date
07 Oct 2004
08 Oct 2004
09 Oct2004
10 Oct2004
11 Oct2004
12 Oct2004
13 Oct2004
0
5
10
20 Miles
N
W
E
S
149°0'0"W



Summary

Significant progress made on:

- Establishing infrastructure (personnel, lab facilities, gear)
- Developing new methods to detect prey ingestion
- Implantation method for multi-year satellite tracking
- Tracking predators

Future:

- New developments for measuring energy intake and output
- Applying methods in the wild

Collaborators

Implantable satellite transmitter:
- Dr. Roger Hill, Wildlife Computers
- Robert Davis, Davis RF Engineering

New Sensors:
- Koullis Pitsillides, UC Davis
- Dr. Dale Baker, UC San Diego
- Dr. Yasuhiko Naito, Japan's NIPR

Surgical Implantation of Instruments:
- Dr. Wendell Nelson & Dr. Bruce Heath, CSU

Killer Whale Work:
- Lance Barrett-Lennard, Mike Brittain, Dave Ellifrit, Dave Holley, Lori Mazzuca, Sarah Norberg, Greg Spencer, Jamie Thomton

ASLC Steller sea lion and sea otter programs

Field work:
•Dave Holley, Sarah Norberg, Greg Spencer, Vic Aderholt, Don Calkins, Shannon Atkinson, John Maniscalco, Pam Parker and other ASLC staff; Dr. Vladimir Burkanov, NPWC; Dr. Ward Testa, NMFS, Vladimir Vertyankin, Yura Vertyankin, Dima Pasenyuk, Sasha Kim, Sergey Purtov, Alexey Purtov,Alexey Altukhov, Eli Gurarie,Roman Belobrov, Peter Permyakov, Nikolay Kutrukhin, Sergey Sergeev, Dmitriy Tormosov; Dr. Randy Davis, Dr. Yoko Mitani, Texas A&M; Dr. Dan Costa, Mike Weise, Carey Kuhn, Samantha Simmons, Patrick Robinson, Pat Morris, UC Santa Cruz.

Lab work:
- Sarah Norberg, Dave Holley
- Kelsey Alexander, Rachael Murton, Dima Pasenyuk
- ASLC research, aquarium and mammal husbandry staff

Questions?

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