

GEOS/MSL 695 – Field techniques in interdisciplinary sea-ice research

Module 8: Mammalian adaptations to seasonal sea ice

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Aims and introductory comments:

In this module, you will be introduced to the mammals adapted to seasonal sea ice. You will learn to:

- 1) recognize features of ice and snow cover important in the ecology of marine mammals,
- 2) locate, map, and describe subnivean breathing holes and lairs of ringed seals,
- 3) live-capture and handle ringed seals,
- 4) attach satellite-linked transmitters to seals, and
- 5) sample shed skin for DNA

Reading material:

- Course textbook: Chapter 8
- Burns et al. 1981 (*Ice as marine mammal habitat in the Bering Sea*)
- Kelly 2001 (*Climate change and ice breeding pinnipeds*)
- The bottom two papers can be downloaded at [ftp.gi.alaska.edu](ftp://ftp.gi.alaska.edu/pub/eicken/G695/Module8)
/pub/eicken/G695/Module8

Instrumentation and measurements:

Equipment needed on the ice:

Self-powered seal sensor
GPS
Graduated snow probe
Metric measuring tape
Anometer
Magnetic compass
Digital time or stop watch
Seal capture nets
Remotely operated burn-wires

Equipment needed in the lab:

Mapping software

Locating subnivean breathing holes and lairs

Finding breathing holes and lairs under the snow requires a sense other than vision. Predators rely on olfaction to detect these sites, and you will as well. Determine a suitable area of ice to search. Observe and describe the habitat features that might influence the distribution of seal holes. Determine the wind direction and speed and pick a course for

the search dog. Record the time from start of search until the dog alerts at a breathing hole or lair.

Observations and measurements at seal holes

Observe the site for evidence of seals, prey, and predators, and record that information in the data record. Record the latitude and longitude of the site. Use the graduated probe to measure the snow depth immediately adjacent to a breathing hole or at the deepest portion of a snow drift containing a lair. Use a compass to determine the direction of a snow drift containing a lair. Measure the diameter of the breathing hole. Estimate the percentage of the ice within a 200 m radius that is deformed sufficiently to produce drifts suitable for seal lairs.

Products: Assign an identification number to the breathing hole or lair, and produce a “seal structure” data sheet with your observations and measurements.

Capturing and tagging ringed seals

Locate a ringed seal’s basking hole. Use 12” steel spikes to fasten one side of a hoop net to the ice at the edge of the basking hole. Tie a line (50 – 60 lb. test monofilament fishing line) to the hoop at a point 180° from the point fastened to the ice. Compress the net’s flexible hoop so that the point where the line is attached contacts the opposite side and hold in place by anchoring the monofilament line to a spike driven into the ice or to a heavy battery. Wrap the compromised portion of the burn wire tightly around the monofilament line and connect the leads to the trigger box terminals. Supply 12-volts to the radio-controlled battery box, and use blocks of ice and/or snow to conceal the battery and trigger box from the seal’s view. Visually monitor the trapping site, and, when a seal is basking at the hole, trigger the net by sending a coded radio signal.

Pull the seal away from the net, and cover the hole to prevent escape. Determine - by observing the presence or absence of a penile opening - the seal’s gender, weigh the seal using a spring scale hung from a tripod, and estimate its minimal age by counting annuli on the claws of its front flippers.

Restrain the seal (holding one or both fore-flippers above the ice impedes locomotion), and extend the webbing of a hind-flipper by pulling on first and fifth digits. Puncture the webbing with a sharp punch in two locations, matching the distance between the attachment posts of the satellite-linked transmitter. Weave the transmitter’s posts through the webbing such that the posts occupy the holes in the webbing. Insert a brass screw to hold the tag’s posts together.

Products: Assign an identification number to the seal and record it with the seal’s weight, gender, and estimated minimal age. Record also the identification numbers for the satellite-linked transmitters and the date, time, and location of deployment.

Collecting skin samples

Locate breathing holes at which molting seals have been basking. Observe the evidence of the seal's presence around the hole and carefully record that information on the data form. Is there evidence that more than one seal used the site? If there is shed epidermis on the snow or ice surface, collect it using the procedures described in the attached protocol.

Product: Pay especial attention to the procedures designed to avoid cross contamination. Carefully record the collecting information on the data form and the sample envelope.

Data processing in the laboratory:

Read through you field notes and data forms and ensure they are complete. Make sure identification numbers for seal holes and genetics samples are consistently on each form and match the ID used in the GPS record.

Download your GPS to the *Map Source* program. Observed the distribution of holes – do they appear random?

Hang the envelopes containing skin samples in a warm, dry location until they envelopes are thoroughly dry. Store the dried envelope in the airtight containers with desiccant.

Log on to the ARGOS system web site and note any reports of the tagged seal's location.

Writing report

Your report should be comprised of the standard sections of an Introduction, Methods, Results, and Discussion. In the Introduction, describe the intent, location, and dates of the study. Your Methods section should concisely describe the equipment and procedures used for each portion of the field and laboratory work. Results should include observations of the distribution (including a map) of seal holes located and a measure of their density. You also should present observations of habitat features that characterize the locations of seal holes. For each seal captured and tagged, present the demographic data, weight, tag numbers, capture and release dates, and any subsequent locations reported by the ARGOS system. Construct a table to present a record of skin samples collected for genetic analysis. Use the Discussion section to summarize lessons learned, the relationship to previous studies, and suggested future directions.