Trip Report: SWAN Nearshore Monitoring Katmai NP 21 June – 1 July 2006

Personnel
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Vessel: R/V Waters
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Travel and Activity Summary

21 June depart Homer 0100 hrs, arrive Kukak Bay 1400, Conduct MBM and Bloy surveys in PM
22 June Set up and initiate sampling of ROI1 in AM, Conduct Bloy sampling in PM
23 June Complete sampling of ROI1 and set up ROE1 in AM and MBM surveys in PM
24 June Set up ROI2 in Kaflia Bay in AM, Bloy and MBM surveys in PM
25 June Set up and sample ROI3 Kinak Bay in AM MBM and Bloy in PM
26 June Set up and sample ROI4 Amalik Bay, MBM and Bloy surveys in PM
27 June Set up and sample ROI5 Takli Is. Sea otter forage in PM
28 June Sea otter forage Mink Is. Coastline, MBM Bloy surveys Hallo Bay,
29 June MBM transects Hallo Bay, Skull and BLOY data collection
30 June Bloy and MBM surveys to Shakun Is
1 July Sea otter skull collections and Coastline surveys, Depart for Homer 1800
2 July Arrive Homer 0200

Summary of Activities by Sampling Protocol

Black Oystercatcher breeding territory occupancy and chick diet

We sampled 5 black oystercatcher transects corresponding to each of the 5 rocky intertidal intensive sampling locations RO1I-RO5I. No nests were located on RO5I and a replacement transect was established around Takli Is. consistent with the relocation and establishment of the intensive intertidal site. An additional black oystercatcher transect was established around the perimeter of Ninagiak Is. in Hallo Bay. We mapped 17 black oystercatcher nests on the 6 transects, 15 that were classified as active and 2 as failed. The number of nests ranged from 1 to 5/transect. Eleven eggs and 13 chicks were located and two active nests were located but chicks were not detected. We recovered dietary prey remains from 10 of the 17 nest sites, or 10 of 12 nests where chicks were present. More than 500 prey items were identified to species and measured. Limpets (*Tectura* and *Lottia* spp) and mussels (*Mytilus*) dominated the dietary remains.

The sampling protocol was successfully implemented, transect lengths could be increased to increase the sample size. The range of stages of nesting, from eggs to large, nearly black chicks, suggests some initial nest failures may have occurred and we were detecting some second nest attempts. The sampling of each transect required about 2 hours for 3 persons (6 person hours) and could be accomplished with 2 persons. Care should be taken to minimize disturbance to eggs/chicks

Collection of sea otter foraging data

We collected foraging data on sea otters associated with 3 of the 5 rocky intertidal intensive sites (RO1I (Kukak Bay), and RO4I and RO5I (Amalik Bay). Sea otters were generally absent or rare in the vicinity of intensive sites RO2I (Kaflia Bay) and RO3I (Kinak Bay), precluding sampling. At Kukak Bay we observed 20 forage bouts that included 146 dives over 2 days. Diet was numerically dominated by bivalves, primarily clams. In Amalik Bay (Mink Is.) we observed 45 bouts that included 358 dives over 2 days. Diet was again dominated numerically by clams but included a diverse array of other invertebrates including, stars, urchins, crabs, chitons, snails and 7 bouts consisting of large octopus.

This sampling protocol was successfully implemented. Data collection will be constrained to sites where sea otters are present in relatively high densities and to where visual access to feeding animals is possible. Two observers spent about 21 hours (42 observer hours) acquiring feeding data from 65 forage bouts (1.5/hr) and about 500 dives (12/hr).

Collection of marine bird and mammal abundance data

We surveyed all marine birds and mammals along 24 of the 26, 5 km transects systematically selected. One transect (#41) in Hallo Bay was largely an unexposed reef and a replacement transect around the perimeter of Ninagiak island was established. All transects were located 100 m offshore from the shoreline and included sampling offshore islands. All data were entered directly into dLog2 software for biological sampling as described in the standard operating protocol. Each transect required about 40 minutes to sample, resulting in an average survey speed of about 10 knots.

This sampling protocol was successfully implemented. Data have been reviewed in their digital format. A skiff large enough to accommodate three standing persons and incorporating a navigation/steering console should be used exclusively as a survey platform, both for safe navigation and to provide suitable observation conditions. Because we only sample a 200-m strip contiguous with the shoreline, some species that occupy shallow nearshore habitats > 200m offshore may be underrepresented. Establishment of marine bird and mammal transects that sample > 200m offshore should be considered. Additionally, 5 km transects centered at each of the intensive intertidal sites should be established.

Coastline surveys of birds and mammals, animal carcasses, debris, and other resources

We implemented the protocol during two field trips to the Katmai coast (block 10) in 2006. The first occurred on 27 and 28 April by D. Monson, B. Thompson and J. Bodkin and was based out of King Salmon with access to beaches via a Cessna 185 aircraft piloted by A. Guilliland. On 27 and 28 April we surveyed 9.3 km of shoreline, encountering 1 sea otter carcass and 1 bald eagle carcass. On those 9.3 km of coast we established 4 small debris and beach wrack segments (each 100m in length) and 2 large debris locations (see notes on sampling below). During June 2006 we surveyed 2 additional segments representing about 12 km and encountered 2 sea otter carcasses and no birds. We established 4 small debris and beach wrack segments. On 30 June and 1 July we searched 2 small Islands at Ninagiak Is (< 1 km) and 2 at Shakun Is (approximately 4 km) for marine bird and mammal skulls. Locations of extensive sea otter use as haul outs were evident by abundant spraint. We identified 30 sea otter carcasses. Many of the skulls on Ninagiak had been broken, apparently as a result of bear scavenging. A total of 37 sea otter carcasses (including partial remains and a tooth for aging) were obtained.

While the coastline survey was successfully implemented, the minimal number of carcasses recovered from mainland coastlines may require revision to gain efficiency at least in terms of sea otter carcass recovery rates. Identification and searching of sea otter haul outs on islands may provide an efficient means to recover a large sample of skulls suitable for analyzing and modeling age at death. Surveying coastlines through access provided by fixed wing aircraft was difficult due to long commute distances from King Salmon and limited landing locations on the coast resulting from high wind conditions.

Sampling of intertidal invertebrates and algae on sheltered rocky shores

We implemented the protocol during the field trip to the Katmai coast (block 10) between June 22 and June 27, 2006. A total of five intensive sites were established and sampled. One additional extensive site was set up but not sampled. Intensive sites were established in Kukak Bay, Kaflia Bay, Kinak Bay, Amalik Bay, and Takli Island. The single extensive site was set up in Kukak Bay. The location of all sites was predetermined based on a GRTS sampling protocol. In three cases (Kaflia Bay site AP-B10-R02-I, Kinak Bay site AP-B10-RO3-I, and Takli Island site AP-B10-R05-I) sampling sites were moved from originally determined locations because habitats were inappropriate. In all cases, substrates in the lower intertidal at the originally selected sites were comprised primarily of small gravel/cobble or sand. Alternative site locations were chosen that were near the originally selected sites, were on a list of potential alternative sites (based on the GRTS protocol), and had the appropriate rocky substrate.

Permanent stainless steel tags with the site numbers inscribed were bolted into place at 0.5 and 1.5 m MLLW tidal elevations at each site. These marked the beginning of 100-m long transects. A Hobo temperature recording device was placed next to the 0.5 m

transect marker at each site. Two steel stakes were placed near high water at each site above the transect origins. We measured distances from each stake to each of the site tags in order to be able to relocate transect positions in the case site that tags are lost. Latitude and longitude were recorded for both transect origins and stake positions. Profiles of elevation were determined at each site by measuring distances from MLLW, +1 m, +2 m, and plus 3 m at positions corresponding to 0, 25, 50, 75, and 100 m along each transect. Digital photographs were taken at each end of the transect (facing the opposite end) and from offshore of each site. Large motile invertebrates (primarily sea stars) were counted along a 4-m wide band extending upslope from MLLW and stretching the 100-m length of the sampling site. The percent cover of algae and sessile invertebrates, and the abundance of smaller invertebrates (primarily littorine snails and limpets) were determined in 12 quadrats placed along each of the two transects. A digital photo was taken of each quadrat and substrate composition was estimated.
All transect and quadrat data were entered into an Access database. Analyses of these data have not been completed, but preliminary observations suggest that, as expected, there was considerable intersite variation. In general, dominant algae included *Fucus gardneri*, *Neorhodomela oregonia*, *Ulva* sp., and *Palmaria* sp. Dominant invertebrates included barnacles (primarily *Balanus/Semibalanus* spp.) *Littorina sitkana*, and small limpets.

A total of approximately 240 mussels and 120 limpets were collected at each site. All limpets and a subset of 120 mussels were measured to determine size distribution. Where possible, mussels and limpets were collected from at least 6 locations at each site directly above odd numbered quadrats. The first 20 mussels or limpets encountered (regardless of size) were collected for determination of size distribution. Mussels were collected from a tidal elevation of approximately 2 to 3 m MLLW and limpets (*Tectura persona*) from approximately 4 m MLLW, near the centers of vertical distribution for each species. Two samples of approximately 60 large (greater than 35 mm) mussels were collected from each site and frozen for later contaminant analysis. One sample is to be used for analysis of organics and the other for metals. At most sites, 10 mussels collected from 6 locations were composited. At one site (AP-B0-R03-I) there was and insufficient number of large mussels at the site to collect for contaminants and mussels were collected from a nearby site for this purpose.

The protocol was successfully implemented after moving some sites to alternative locations. We were generally able to set up and sample one site a day with six people. If sites are easily relocated (as we expect), then it should be possible for four persons to sample a site in a day.

Several modifications to the standard operating procedure would enhance the process. These include refinement of data sheets and refinement of procedures for collection of "unidentified" species. Also, *in situ* measurement of limpets (to avoid depletion of these populations over time) and the use of data logging computers should be explored. Measurements of slope for each individual quadrat should also be included. Slope of the quadrat (e.g. vertical vs. horizontal) appeared to have an influence on species

composition and relative abundance and may be a valuable covariate in the analysis of change over time. It is also suggested that selected extensive sites be established at Ninagiak and Shakun Islands where other sampling protocols were instituted. These sites appear to be important breeding and feeding grounds for a variety of birds and mammals and harbor rich intertidal communities.

Sampling of infaunal intertidal invertebrates on gravel, sand/gravel beaches

We conducted preliminary sampling of infaunal invertebrates at two sites in Kukak Bay and visually assessed several sites that were selected for future sampling using the GRTS sampling procedure. Sampling of infauna at GRTS sites in Kukak Bay revealed low densities of infauna and very few large clams. This was in spite of evidence of higher clam densities at nearby locations where bears were actively digging and eating clams. Also, many of the sites originally selected by the GRTS sampling protocol were very exposed and largely inaccessible by boat. Also, infaunal sampling sites were often far removed from sheltered rocky sites, making it difficult to sample both habitats efficiently in the same cruise. Because of these observations, we are recommending modification of the site selection process defined in the infaunal sampling protocol. Instead of using the GRTS procedure for selection of sites, we recommend placing infaunal sampling sites in soft-sediment habitat where clam litter is observed and that is in close proximity to sheltered rocky sites. In most cases, we were able to identify potential soft sediment sampling sites within several hundred meters of sheltered rocky sites. While not ideal in terms of making large-scale statistical inferences from these sites, it would make sampling more efficient (in terms of collection of a reasonable sample size of clams, ease of access, and proximity to sheltered rocky sites) and still maintain a reasonable spatial distribution of sites within the block.

Aerial surveys of the extent of eelgrass and kelp canopies

A sampling protocol has not yet been established for estimating the size of eelgrass and kelp canopies. However, potential survey sites were investigated to determine their potential suitability as candidate sites for future surveys. We visited several potential eelgrass and kelp beds identified in prior aerial video shoreline surveys (Harper and Morris). In general, bull kelp (*Nereocystis luetkana*) was widely distributed on exposed rocky headlands between Kukak Bay and Amalik Bay and the distribution was very similar to that described by Harper and Morris. In some cases *Nereocystis* was mixed with canopy forming *Alaria*. Eelgrass beds were less widely distributed, and visits to many sites identified as eelgrass habitat by Harper and Morris revealed little of no eelgrass present. However, we were able to identify eelgrass beds in relatively close proximity to most sheltered rocky sites.

We propose to do aerial photography of five eelgrass and five kelp beds that are located in close proximity to sheltered rocky sites. Based on maps of Harper and Morris and on our observations, we have selected these sites based on the presence of eelgrass or kelp and on the presence of defined geographic features that would facilitate georeferencing

aerial photos. It is hoped that preliminary aerial photo work will be completed in summer 2006.