Round Island Field report
May 3 - August 10, 2003

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Summary

Mary Cody and Diane Okonek arrived on Round Island on May 3, 2003 and departed on August 11, 2003. Staff counted walruses (*Odobenus rosmarus*) on all east side beaches daily from May 4, 2003 through August 10, 2003. In addition, we counted walruses on West Main Beach on most days from May 11, 2003 to August 9, 2003. Total island counts ranged from a low of 0 walruses on July 17 and 18 to a high of 3487 walruses on June 1, 2003. The average number of walruses on Round Island was 1075 in 2003, compared to1031 in 2002, 1459 in 2001 and 2242 in 2000, an overall four year declining trend.

We recorded 33 anthropogenic and 3 natural disturbances to walrus resting on the haulout, two of these disturbances resulted in death to at least one walrus. We retrieved ivory from four walrus, which was sold to Alaska Native carvers, and the proceeds donated to the Pacific Walrus Conservation Fund.

We monitored seabird plots for both population size and productivity. Common murre (*Uria aalge*,) black-legged kittiwakes (*Rissa tridactyla*) and pelagic cormorants (*Phalacrocorax pelagicus*) fledged chicks from 16%, 35% and 29% respectively of the eggs laid. There was a marked increase in the number of common murre on study plots in 2003, while black-legged kittiwake numbers decreased by about 10%. Pelagic cormorants nested on Main Beach study plots for the first time since 2001. Pelagic cormorants continued to be absent from First and Second Beach plots used in 2000 and 2001. The Second Beach colony established in 2002 was again active in 2003, and a new area at First Beach was colonized in 2003. An additional new plot at West Main Beach was established in 2003.

We counted Steller sea lions (*Eumetopias jubatas*) at the East Cape haul out every five days. Counts of Steller sea lions ranged from a low of 13 on July 18 to a high of 458 on May 14, 2003. An average of 91 Steller sea lions used the East Cape haul out throughout the summer, compared to an average of 120 in 2002, 98 in 2001 and 85 in 2000.

In June, sanctuary staff worked with U. S. Geological Survey biologists on a pilot study examining the feasibility of using a crossbow and dart system to attach satellite transmitters to walrus. The crossbow system was also used to retrieve 18 skin samples from walrus resting on the haul out for later DNA analysis.

In July, two interns spent a month working with staff as part of a joint U. S. Fish and Wildlife Service/Bristol Bay Native Association program designed for Bristol Bay area Native college students majoring in natural resource management or related fields.

We continued developing a project using ground-based photos to improve walrus count accuracy, and to assess alternate vantage points for more accurate counts of haul out beaches. Other duties included administering a visitor program, monitoring haul out disturbance, and routine maintenance and improvement of trails and facilities on the island.

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Introduction

The summer of 2003 marked the eleventh consecutive year of a cooperative program between the Alaska Department of Fish and Game (ADF&G) and the Marine Mammals Management Division (MMM) of the U. S. Fish and Wildlife Service (USFWS). The two agencies provide staff and funding to monitor Pacific walrus (*Odobenus rosmarus,*) Steller sea lion (*Eumetopias jubatas,*) common murre (*Uria aalge,*) black-legged kittiwakes (*Rissa tridactyla*) and pelagic cormorants (*Phalacrocorax pelagicus*) populations on Round Island. Staff also administer an internship program with the Bristol Bay Native Association (BBNA), a visitor program, monitor haulout disturbance, and maintain and improve trails and facilities on the island. The cooperative agreement between the two agencies was renewed for another five years in the spring of 2003.

Round Island is located within the Walrus Islands State Game Sanctuary and has often supported the largest number of walruses of the four terrestrial walrus haul outs in Bristol Bay, Alaska. The other terrestrial walrus haul outs located in Bristol Bay are Cape Pierce and Cape Newenham, both within the Togiak National Wildlife Refuge (TNWR), and Cape Seniavin located on the Alaska Peninsula northeast of Port Moller (Figure 1). Cape Pierce and Cape Newenham are both monitored by TNWR staff. In 1998, 1999 and 2001, Cape Seniavin was monitored by MMM staff. In 2003, Cape Seniavin was monitored by BBNA and MMM staff. This report provides a synopsis of walrus numbers throughout the summer, walrus disturbance events, Steller sea lion counts, seabird research and the internship program conducted on Round Island during this summer field season. For more information on the visitor program, trail and cabin maintenance, see the ADF&G report (Okonek 2003).

Methods

Weather

We collected the following weather information daily near the cabin at the start of the walrus count: wind speed and direction, cloud cover and type of precipitation. The maximum and minimum temperatures for the preceding 24 hours were recorded as near to 1400 hours as possible. Barometric pressure was recorded daily at 0800 and at 2000 hours.

Walrus Monitoring

Walrus haulout counts followed protocols used since 1998 on Round Island to allow direct inter-year comparisons (Stroka 1998). Walrus haul out on nine beaches on the east side of Round Island and on two beaches on the west side of Round Island (Figure 2). All accessible east side beaches were counted daily from May 4 through August 11, at 0900, 1400 or 1700 hours. Snow fall remaining in gullies along the trail leading to West Main Beach made the access route impassable until May 11. From May 11 through August 9, West Main Beach was counted daily, except when gusting winds (above 50 knots) and heavy rain made the traverse trail leading to West Main Beach too dangerous to cross. Due to changes in staff, the skiff was not used to conduct walrus counts until July. Therefore, West Main Beach was not counted until the trail became passable. During all counts, each observer counted independently using 10 x 42 or 7 x

32 binoculars. At each beach, each observer counted walrus present on the beach three times, using a separate tally meter for each count. Observers either counted individual walrus or counted by groups of five, ten or twenty, depending upon herd size. Which count method was used was at the discretion of the observer. If ten or fewer walruses were present, we did not use tally meters. We have found that tally meters do not add precision when so few animals are being counted. Observers also counted walrus in the water within ten meters of shore in a separate count. Observers did not discuss or compare numbers during counts. After three counts, observers would compare numbers and try to locate where discrepancies may have occurred. If the observers felt that the amount of variation in their counts was excessive (20% or more) and had time, additional counts were done. These multiple counts by multiple observers have been analyzed by Mark Udevitz of the Biological Resource Division (BRD) of the U. S. Geological Survey (USGS) to determine the amount of variability within and among observers at all haul outs. Results of this study will be published in the journal Marine Mammal Science in 2004 (Udevitz et al in press). For this report, only counts by the most experienced observer were used. When counts by the most experienced observer were not available (three days) other observers' counts were used.

The nine beaches along the east side of Round Island were counted in the following order during each count: Second Prime (SP,) Second Beach (S,) First Prime (FP,) First Beach (FB,) Campground (CG,) Boat Cove (BC,) Flat Rock (FR,) North Boat Cove (NBC,) and Main Beach (MB). West Main Beach is approximately forty-five minutes by foot from the Main Beach overlook. We counted West Main Beach as quickly as possible after Main Beach when trail and weather conditions allowed. West Main Beach South (WMS) is only visible by skiff, and was only counted three times during this summer. No walrus were observed on West Main Beach South. It is a very small area, even at very low tides, and missing it does not significantly affect total numbers for Round Island.

The following information was recorded by all observers during each count: start and end times, count type, Beaufort sea state, beach condition, beach availability, beach used, visibility, land and water counts, and count quality. Walrus counts were divided into categories (type of count) and each count was recorded as one of the following: a scheduled count of east side beaches, a scheduled count of West Main Beach, a boat count of any beach, a photo count of any beach, or an opportunistic count (defined as any count that did not fit into the other categories). For beach condition, we used a scale based on the size of waves breaking on the beach: calm, wave height up to one foot, wave height between one and three feet, or wave height greater than three feet. Beach availability was recorded as a percentage in quartiles from 0 to 125% based on the amount of beach visible at mean low tide. Mean low tide was recorded as 100%. Beach used was recorded in 5 percent increments from 0 to 100%. Visibility was a subjective measure of whether any walrus were hidden by obstacles, such as rock walls, or poor viewing conditions, such as fog. Visibility was recorded as clear, partially obscured or obscured. Land counts included all walruses on the beach and those in the surf zone. Water counts included all walruses in the water within ten meters of shore. Count quality was a subjective measure of observer accuracy and was recorded as excellent, good, fair or poor. Count quality was recorded before looking at the actual count recorded on the clicker. For a complete copy of the count

protocols, see Appendix A.

Remote Sensing Coordination

In 2002 and 2003, we used a Canon EOS D30 digital camera system with multiple lenses and high resolution to test photo count strategies. We used photographic images to count walrus on each beach on Round Island. This project was begun in 2001 with an Olympus digital camera with a built-in 70mm zoom lens. We used the Canon EOS-D30 camera with a variety of lenses (17mm through 400mm) and both 1.4 and 2.0 extenders depending upon the beach and where on the beach walrus were located. We initially took photos from a variety of locations at each beach and using a variety of lenses. Once the locations offering the best visibility and resolution for photos had been established, photos were taken from the same locations at each beach on each day. We used the best lens combination for capturing the walruses with the highest resolution possible. This varied from day to day depending upon the location and number of walrus present on the beach. We entered the number of photos taken and at what focal length alongside each count in the data book. On days that coincided with a satellite photo, we photographed the entire length of each beach whether or not walruses were present. On other days, we simply photographed all walruses on the beach, but did not photograph beaches where no walruses were present. Photos were downloaded onto a laptop in the field and individual photos were made into a single composite photo using a standard Photo Stitch program. We attempted to create composite photos of the entire beach wherever possible, so that fewer individual photos needed to be counted later on. This also made data storage and labeling easier. However, depending on where on the beach the walruses had hauled out, it was sometimes necessary to use several individual photos or composite photos for each beach. We tried to use as few photos per beach as possible. We edited and improved visibility and lighting in the photos as necessary using Adobe Photoshop. We then imported the digital photos into an Arc View GIS program. Each observer who participated in the ground count counted the number of walruses in each photograph on three separate overlays by placing a brightly colored dot on each walrus as it was counted, this may help to reduce undercounting or double-counting. We then used the program to tally the number of dots (walrus) per photo/beach. While it takes a great deal more time to count from the photos, rather than on the ground, this method has significantly reduced observer variation, and creates a permanent record for comparison with future years.

In 2001, a single IKONOS satellite image of Round Island taken on June 16 was used to assess the possible usefulness of satellite images in counting walruses at remote sites. Land-based counts from Round Island were used to ground truth a computer count done by Doug Burn (MMM-USFWS) based on a computer assessment of area covered with walruses in this image. This method compared favorably with a ground count done at the same time that the satellite image was taken (a difference of one walrus between the two counting methods for all beaches combined). In 2002, this project was expanded and we attempted to collect five satellite images of Round Island using an ERDOS satellite. The satellite attempted to capture an image of Round Island whenever it passed overhead in the correct position, which was approximately every three to five days. However, useful images were only acquired on cloudless days, very rare in Bristol Bay. In 2003, we attempted to collect seven satellite images, weather permitting. Since we wished to continue to collect data on possible effects of time of day and time of tidal stage on

walrus haul out patterns, we continued to use a randomized schedule for count start times. Over each three day period, we conducted one count beginning at 0900, one beginning at 1400 and one beginning at 1700. We moved the start time for the evening count from 1900 to 1700 in order to be able to maintain the pattern of counting West Main Beach after the other nine east side beaches, without hiking along the cliff face after dark. We continued to try to get one ground count paired with a photo count at least every third day, weather permitting. The exceptions to the randomized schedule were satellite days. On all satellite days counts started at 1230 in order to be mid-way through the count, and preferably, in the process of counting Main Beach when the satellite passed overhead. In addition, all satellite days were photograph days as well. Count start times were also changed occasionally to accommodate other work that was occurring on the island, such as visitor arrival and departure schedules.

Disturbance Documentation

We recorded sources of anthropogenic disturbance. These included boat traffic, land-based visitor disturbance, staff and visitor arrivals and departures. We made every effort to minimize walrus disturbance by staff and visitors. When disturbances did occur, the following information was recorded: date, time, location, number of walruses on the beach where the disturbance occurred, number of walruses affected by the disturbance, behavior of the animals disturbed, the amount of time that passed before the walruses returned to their prior state, and the source of disturbance (if identified). Disturbance of walruses on the haul out was defined as any event that caused walruses to raise their heads, change their physical location or orientation on the beach, or to leave the beach (Salter 1979, Hessing and Sheffield 1989, Kruse 1997).

Seabird Population and Productivity

We collected seabird population and productivity data for common murre (*Uria aalge,*) black-legged kittiwakes (*Rissa tridactyla*) and pelagic cormorants (*Phalacrocorax pelagicus*) following protocols (Kettle, et al, 1997; Hatch and Hatch, 1981) used by the TNWR and by the Alaska Maritime National Wildlife Refuge (AMNWR.) Five population plots containing common murre, black-legged kittiwake and pelagic cormorants were delineated in 1997 (Rice 1997). In addition to the five plots used in 1997 and 1998 (Rice 1997, Stroka 1998,) a plot at First Beach containing a small pelagic cormorant colony was added in 1999. An additional pelagic cormorant colony plot at First Prime beach was added in 2000. As neither of these pelagic cormorant colonies were active in 2002, another small plot at Second Beach was added in 2002 (Cody 2000, Cody 2001, Cody 2002). In 2003, a new area at First Beach was colonized by pelagic cormorants, the Second Beach plot remained active and a new plot at West Main Beach was added. Photos were used to identify the plots and painted stakes installed to mark observation points.

Methods were consistent among years, with one exception: due to erosion, a new observation point was used for plot five on all but one of the counts of plot five. This appears to change the extent to which plot five is visible, and counts from this alternate vantage point were dropped in this analysis. Observers counted the number of common murre, black-legged kittiwakes, black-legged kittiwake nests, pelagic cormorants and pelagic cormorant nests twice in each of the five Main Beach plots on ten days between June 6 and June 28, 2003. Tufted puffins (*Fratercula*

cirrhata) and horned puffins (*Fratercula corniculata*) were recorded if present, but no attempts were made to follow their reproductive success or to estimate their numbers overall. In order to determine some measure of reproductive success, 25 black-legged kittiwake nests on plot two and 25 black-legged kittiwake nests on plot three, 25 pair of common murre on each of plots two and three, and 10 pelagic cormorant nests on one plot were monitored until we left the island on August 12. An additional 48 pelagic cormorant nests monitored on two plots are not included in this report. Productivity plots were checked for status upon our arrival and pelagic cormorant plots were already active. Cormorant data was collected from May 4 through August 12. The first population counts were started on June 6. Black-legged kittiwake nests and murre pairs were checked every two or three days from June 11 through August 10. We may have missed early eggs of kittiwakes and possibly of murres due to our late start. In previous years, kittiwake and murre pairs were chosen from plots one and two, however plot one is very close to the visitor observation point and is often disturbed by visitors. In 2003, we chose pairs on plots two and three instead, in order to minimize any effects that visitor disturbance might have on overall reproductive success within our study sample. A telescope or 10 x 42 binoculars were used to determine nest contents and presence and behavior of adult birds.

Other Projects

A small Steller sea lion (*Eumetopias jubatas*) haul out located at East Cape was monitored every five days using the same methodology as walrus counts. After July 1, when the skiff again became available, beach-found ivory was collected from the beaches whenever it was possible to do so without disturbing any walrus. All ivory was sold by the Eskimo Walrus Commission (EWC) in conjunction with the FWS and ADF&G during the Alaska Federation of Natives Convention in Anchorage, or at Beaver Round Up in Dillingham. The proceeds were deposited in the Ivory Fund which will help finance future walrus research. Fox dens were monitored informally and the presence and number of kits noted. Unusual sightings, first sightings of the season of bird and plant species and anything else of interest were recorded in a daily log book.

Results and discussion

Technicians Mary Cody (USFWS) and Diane Okonek (ADF&G) arrived on Round Island on May 3, 2003. Additional staff, Chad Jay and Dave Tessler from the Biological Resources Division of the U. S. Geological Survey (USGS) arrived on June 15 to gather DNA samples using a crossbow and dart system and to test a pilot system using the crossbow to attach satellite transmitters. The satellite transmitters will be used to establish the amount of time that walrus spend below the surface of the water when at sea. This information will be used to develop a correction factor for the percentage of walrus below the water at any given time, which will be used in the analysis of aerial surveys of walrus along the ice edge. Eight satellite transmitters were deployed, and 18 biopsies This work was successfully completed with a minimum of disturbance and they departed on June 21. Joe Meehan (ADF&G) replaced Diane Okonek on the island for four days in mid-July. BBNA interns Sawyer Alexei of Togiak and Apayo Moore of Dillingham spent the month of July on the island. Staff left Round Island on the morning of August 11, 2003 aboard the 'Inconnu.,' but spent several days weathered in at Nunavachak Bay before returning to Dillingham. For information on trail improvement, new visitor facilities and

the visitor program, see ADF&G report, Okonek, 2003.

Walrus Monitoring

We counted all east side walrus haulout beaches on 99 consecutive days from May 3 through August 10. In previous years, a mean of all counts by all observers was used to determine the number of walruses using the haulout on a daily basis. In 2003, only one observer counted walrus on most days. Counts by the primary observer were used when available, and additional observer's counts were used when the primary observer's counts were not available. Mary Cody served as the primary observer throughout the summer. Counts of east side beaches by Diane Okonek were used on May 19 and June 6, and counts of east side beaches by Joe Meehan were used on July 14. Counts of West Main Beach by Diane Okonek were used on May 19, June 6, 13, 17, July 22, August 7, and 9. Counts of West Main Beach by Joe Meehan were used on July 14. Walrus counts for all east side beaches combined ranged from a high of 2746 walruses on June 1 to a low of zero walrus on July 17 and 18, with a mean of 799 walrus. We counted West Main Beach on 71 days from May 11 through August 9. Counts of West Main Beach ranged from a low of zero on four days to a high of 1319 walruses on May 28, with a mean of 441 walruses. The daily mean of East and West side beaches combined was 1075 walruses. Mean counts may better reflect the number of walruses habitually using the haulout, but most historical data focused on high counts in an effort to capture the minimum total number in Bristol Bay in any given summer. In recent years, we've reported both (Table 1). For a complete list by date of all counts, see Appendix B.

Walrus numbers tend to build gradually and then to drop off sharply over cycles of about two weeks duration. Within this pattern, walrus numbers were highest in late May and late June in 2003, but were starting to drop off when we left in mid-August (Figure 3). This pattern was consistent between 2001 and 2002. In 2001, peak numbers built throughout the summer before dropping off in late July. In 2002, peak numbers were highest when we arrived in May and dropped throughout the rest of the summer.

In 2003, we emphasized collecting as many photo counts as possible of all beaches for comparison with ground counts and satellite photo counts. We photographed each beach with walrus present while conducting the daily ground count on approximately thirty days throughout the season. One observer participated in all thirty photo counts. Three additional observers counted walrus on the beach and later counted the photos on between ten and fifteen of those days. A preliminary look at the data showed photo based counts to have a much smaller variance than ground counts. In addition, photo counts appeared to be an excellent training tool for improving ground count skills. Unfortunately, in rainy or foggy weather the photo resolution was not high enough to use the photos as a primary counting method. For detailed photos of each beach from each vantage point, see Appendix C.

Disturbance Events

We recorded 54 walrus disturbance events in 2002 (Table 2.) A walrus disturbance event is defined as any action or event that is likely to cause a visible reaction in one or more walrus on a haulout beach. Potential disturbance events include boats arriving or departing, large rock falls, some staff research activities and some visitor activities. Walrus disturbance is defined as any change in one or more animal's behavior due to the event. These changes fall into three general categories. The categories, in increasing levels of severity, are head raises, reorienting their bodies, usually toward the source of disturbance or toward the water, and dispersal. Dispersal includes moving one body length or more toward the water as well as actually dispersing from the beach (Slater 1979, Kruse 1997). Of the 54 events recorded in 2003, 18 caused no disturbance, 36 caused a disturbance and in two cases the outcome was unknown. We recorded 18 occasions when disturbance could be attributed to a boat, and 18 occasions when boats caused no disturbance, one occasion when disturbance could be attributed to a plane and nine occasions when the disturbance could be attributed to staff activities or visitors on foot. In any disturbance that includes dispersals, walruses may be injured or killed. Walrus are particularly vulnerable during stampedes when they may sustain internal injuries. In 2003, we had several mortalities from natural events (rock falls) and one mortality from a stampede caused by a visitor's strobe light flash used during evening photography. The visitor was unaware that flash was not allowed on wildlife within the Round Island section of the Sanctuary, and was taking photos of a red fox at close range. A fox with a hemorrhaging left eye was observed in the Campground area the next day and off and on for the rest of the summer. The injury appears to have left the fox with limited vision in that eye as of May 2004. For photos of the stampede and subsequent injuries, see Appendix D. On one occasion no specific anthropogenic or natural cause of the disturbance could be determined that initiated the walrus response and dispersal. An additional two potential disturbance events were recorded where staff were unable to observe the walrus and so could not determine whether a disturbance had occurred or not. The following point system is used to determine the level of disturbance. Each head raise is given one point, each reorientation is given three points, and each dispersal is given five points. Disturbances of less than 100 points are low level disturbances, 101 to 1000 points are medium level disturbances, and disturbances over 1001 points are high level disturbances (Salter 1979, Kruse 1997). Any mortality due to anthropogenic causes is considered a "take" under the Marine Mammal Protection Act of 1972, and could be grounds for prosecution. See Appendix E for a complete list of all recorded potential disturbance events.

Seabird Population and Productivity

We began seabird population counts on June 6 and completed the tenth count on June 27 (Table 3). We counted each species on each plot twice on ten separate days. We counted plots every second or third day, unless weather or plot disturbance by ravens or other predators caused birds to leave the plots during counting. In 2001, the average numbers of each species on all plots decreased by 46% to 67% from 2000. In 2002, murre and kittiwake numbers remained about the same or increased slightly (~10%) on all plots from 2001. In 2003, murre numbers doubled or nearly doubled on all plots when compared to 2002, while black-legged kittiwake adults and nests decreased by roughly 10% on all plots. We observed the first black-legged kittiwake chick

on June 26 and estimate that the first egg occurred on about May 25th. We observed the first common murre egg on June 5, the first common murre chick on July 20, and the first fledgling was observed on the water on August 3. The first pelagic cormorant egg was observed on May 13, the first chick on June 12, and the first fledgling on July 27th. A count of chicks of each species on all five plots in the first week of August found an average of 11 common murre chicks per plot, 30 black-legged kittiwake chicks per plot and 1 pelagic cormorant chick per plot (Table 4).

All five plots are located at the edge of the main colony and may not reflect success or failure rates that occur in the center of the colony. The plots are located near the Main Beach overlook area and may be negatively affected by the daily human activity at the observation point. Plots at Main Beach are between two and 100 meters from the cliff edge platform where visitors and staff commonly sit. It has been estimated that over 220,000 seabirds nest annually on Round Island (Haggblom 1994). However, most are located along cliffs that are not observable from land. Due to frequent high seas and poor weather, it is not possible to regularly monitor any sites by boat. Few pelagic cormorants nest in the Main Beach area, but accessible colonies in the First Beach, Second Beach and West Main Beach areas were followed in 2003. No common murres or kittiwakes nest within the First Beach or Second Beach cormorant plots, and no population counts were done on these plots.

Common murre, black-legged kittiwakes and pelagic cormorants fledged 16%, 35% and 29% of the eggs laid respectively (Table 4). Some murre, kittiwake and cormorant chicks remained on the plots on August 10. Following APEX protocols (Kettle *et al*, 1997,) we assumed that murre chicks fledged successfully if the murre chicks were 15 days old or older when we left the island. Therefore, we assumed that the six murre chicks aged 16 to 21 days old fledged after we left the island. We also assumed that one murre chick that disappeared at the age of 16 days fledged. Predation rates are very high on Round Island, however we did observe several murre fledglings on the water before we left. We assumed that three murre chicks younger than 16 days old on August 12, and two murre eggs did not fledge. We assumed that seven kittiwake chicks aged 37 days or older when we left the island successfully fledged, in addition to17 that had fledged before we left and were returning to the nest off and on during the day to feed. There were no younger kittiwake chicks nor were there any kittiwake eggs. The ten accessible pelagic cormorant nests that we were able to follow successfully fledged ten out of 19 chicks.

Chicks of all three species were commonly lost due to storms. Murre and kittiwake chicks were commonly lost due to predation as well, particularly by ravens (*Corvus corax*). Cormorants colonized a new area at the First Beach colony, but did not return to previously nest areas. All of these nests apparently failed due to predation. The First Prime pelagic cormorant colony had no nests or attendance by adults in 2003. We were able to gather some data on nests at Second Beach, however we never felt that we could see into the nests well enough to gather accurate data on the number of eggs laid, or the number of chicks present. A third small plot of ten nests at West Main Beach was easily visible.

Ravens and foxes (*Vulpes vulpes*) were commonly seen predators again in 2003. Ravens preyed

upon adult murre and kittiwakes, on murre and kittiwake chicks, and on the eggs of all three monitored seabird species, in addition to voles. Foxes took adults, chicks and eggs of all three species, but were limited to the lower and more accessible cliff areas. Foxes were frequently seen taking parakeet auklets, pigeon guillemots, horned and tufted puffins, as well as voles. Ravens were frequently seen hunting and harassing murre and kittiwakes at all Main Beach plots. Ravens often flew by each cormorant plot and were observed taking unattended eggs, but were not observed hunting or harassing adult cormorants or chicks. We also observed peregrine falcons (*Falco peregrinus*,) rough-legged hawks (*Buteo lagopus*) and bald eagles (*Haliaeetus leucocephalus*) hunting at the seabird cliffs.

Steller sea lions

From May 4 to August 6, a range of 17 - 458 Steller sea lions with an average of 91 Steller sea lions were counted on land at the East Cape haulout (Table 6). Monthly averages were 246 in May, 45 in June, 38 in July and 33 in the first half of August. Sea lion numbers typically drop off in late May, possibly because sea lions are in the area in larger numbers when the herring are moving through the area. We usually counted sea lions from a single land-based observation point. Sea lions also hauled out below cliffs near East Cape where they were not visible from onshore observation points. On July 19, July 30 and August 2nd we were able to count the entire sea lion haulout from a skiff while circumnavigating the island. Both tagged and branded sea lions were regularly observed on the haulout in 2003, as they were in 2002. Observers at the East Cape haulout are usually land based and within100 meters of the sea lions, so brands are often easily visible, while tags are difficult to identify, particularly when the color has become faded. Both tags and brands were recorded whenever possible. Photos of branded and tagged animals were taken when possible, and photos were given to the Steller sea lion researchers of the marine mammal division of ADF&G. Several females nursing large (second year) pups were seen throughout the summer. No young of year pups were observed at the haulout.

Other Projects

Two college interns from the Bristol Bay Native Association, Sawyer Alexei from Togiak and Apayo (Loulare) Moore from Dillingham joined us on the island for the month of July. They participated in research and camp chores, and participated in data collection, data entry and field-checking. Sawyer began college at the University of Alaska-Fairbanks in the fall of 2003. Apayo began college at a small private college in the Seattle area. April Alexei, Round Island intern in 2002 is currently a sophomore at University of Alaska- Anchorage and interned on a walrus project at Cape Seniavin in the summer of 2003. Tim Dyasuk, also a Round Island intern in 2002, worked for the ADF&G as a fisheries technician in 2003 and is a sophomore at the University of Alaska-Fairbanks. For more information on the interns' experiences in 2003, see the interns' reports in Appendix F.

Only two fox dens were known to be active on Round Island this season. The pair at East Cape seemed to have moved to an alternate den site higher up on the hillside above East Cape. The den site on the hillside behind the cabin appeared to be active, however no kits were observed at either site. Adults were observed bringing both birds and eggs to the den sites. A pair of fox were frequently seen in the West Main Beach area, however no den site or kits were observed in

this area.

A pair of rough-legged hawks (*Buteo lagopus*) were occasionally seen by campers and staff in the Main Beach area and along traverse trail, but did not appear to be nesting this year. A pair of bald eagles and a pair of peregrines were nesting in an inaccessible area on the southwest part of the island. For the third season, we again saw at least one short-eared owl (*Asio flammeus*) off and on throughout the early part of the summer.

Recommendations

1. Drop some research monitoring projects that have been ongoing. In 2003, there was a much greater emphasis on facilities maintenance and trail building. This left far less time for research. Seabird studies, specifically productivity and population plots were started late and were not done as thoroughly or as accurately as in past years. Consider dropping all pelagic cormorant, and possibly common murre and black-legged kittiwake productivity plots.

2. Consider shifting to photo counts instead of ground counts for the Main Beach area. Photo counts tend to be slightly lower than ground counts of Main Beach, but greatly reduce variation in observers' counts, and between observers.

3. Increase the amount of cross-cultural and conflict resolution training that staff who have contact with the BBNA internship program receive. Ongoing conflicts with ADF&G staff greatly marred the experiences of interns in 2002. The ability to understand the cultural responses of Yupik students and to calmly resolve conflicts as they arise is critical to the continued success of the internship program.

4. Continue to explore other observation locations for Main Beach sections one through six along the traverse trail. On most days, the walrus on Main Beach are concentrated in this section, which is visible from a less oblique angle along the traverse trail. Counts from this trail are generally about 25% higher than counts from the Main Beach overlook, as many more walrus are visible from the higher overlook. Consider counting from the trail once it opens up for the summer rather than, or in addition to, the usual observation point.

Acknowledgments

The Round Island field camp relies heavily on people back in the office to keep things running smoothly. In the Anchorage offices, Ellen Baier, Rosa Meehan, Joel Miller, Wells Stephensen and Marc Webber (USFWS) and Joe Meehan (ADF&G) all helped with logistics and provided much needed support. In Dillingham, Jim Woolington (ADF&G) and Eunice Dyasuk (ADF&G) provided daily field support, were our link with civilization and managed the sanctuary in spite of a daunting list of other duties. Mark Reynolds (ADF&G) helped trouble shoot ongoing field camp problems from afar, and helped with maintenance of field gear before and after the field season. Pete Andrew (Ayungsi Tours) helped us get our gear and ourselves out to the island in May, and brought out groups of volunteers and researchers. Terry Johnson (Johnson

Maritime/Walrus Island Expeditions) brought us groceries, mail and visitors, and helped us load up all of our gear and take it back home at the end of the season. A big and heartfelt thank you to each of them.

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Figure 1. Location of walrus haulouts in Bristol Bay, Alaska. Round Island is located within the Walrus Islands State Game Sanctuary. Capes Newenham and Peirce are located within the Togiak National Wildlife Refuge. Cape Seniavin is on state land.

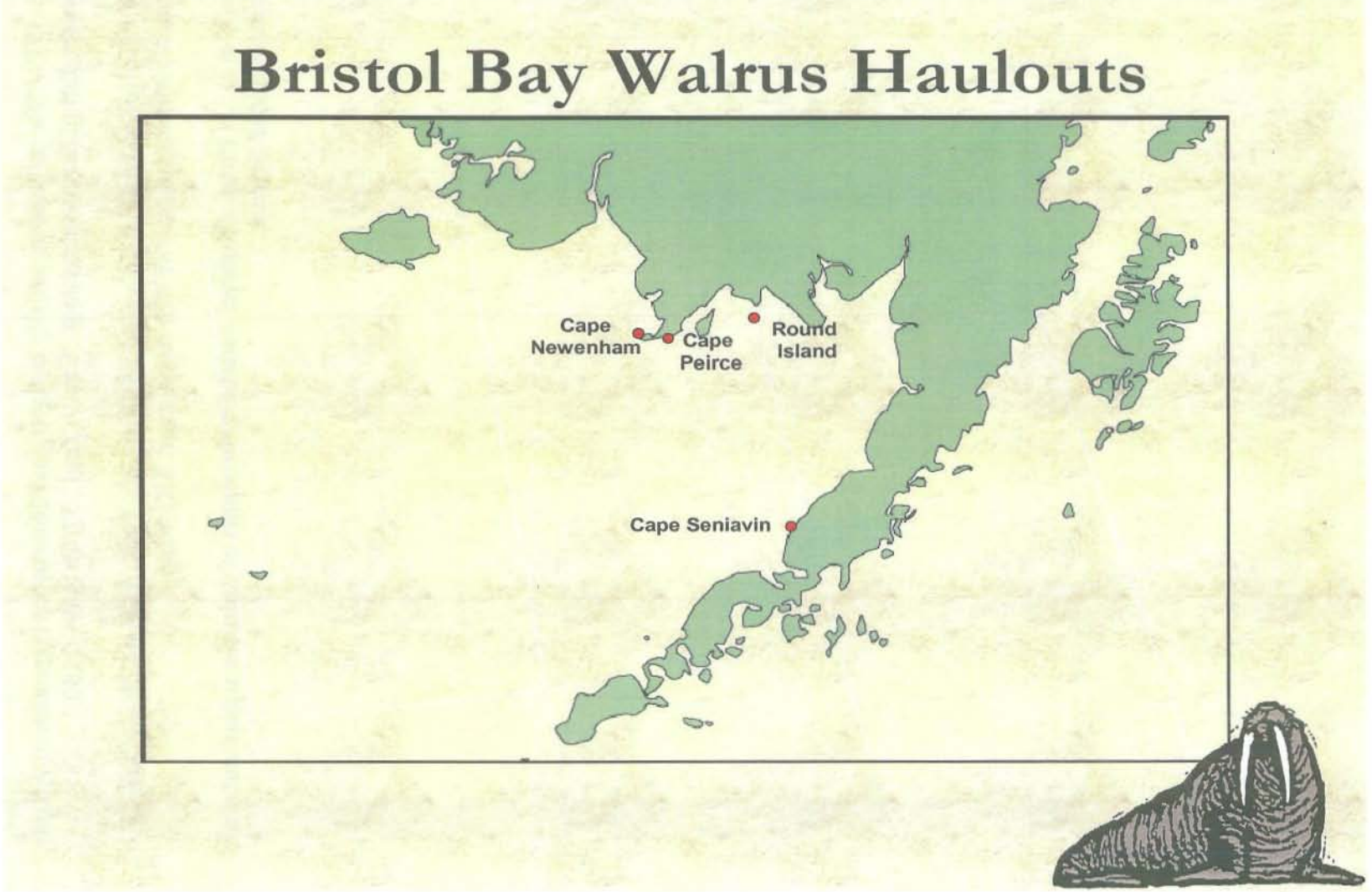


Figure 2. Map of Round Island labeled with walrus haulout beaches.

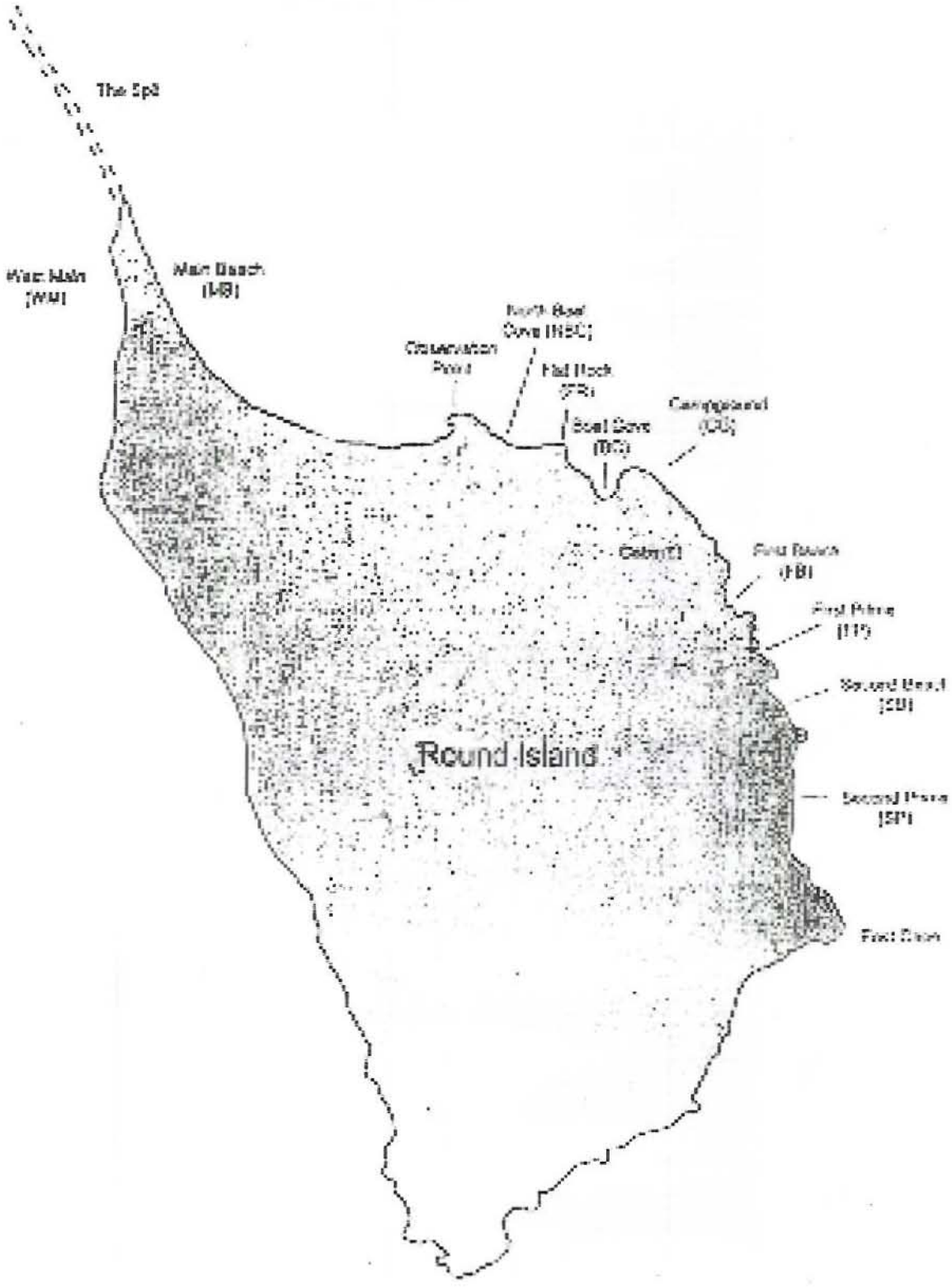


Figure 3. The number of walrus on Round Island during the summer monitoring period, from May 4 through August 10, 2003. The average number of walrus using the island's beaches from May through mid-August was 1,075. The high count for the summer was 3,487 on June 1, 2003. The low count of 0 occurred on July 17 and 18 during a heavy storm.

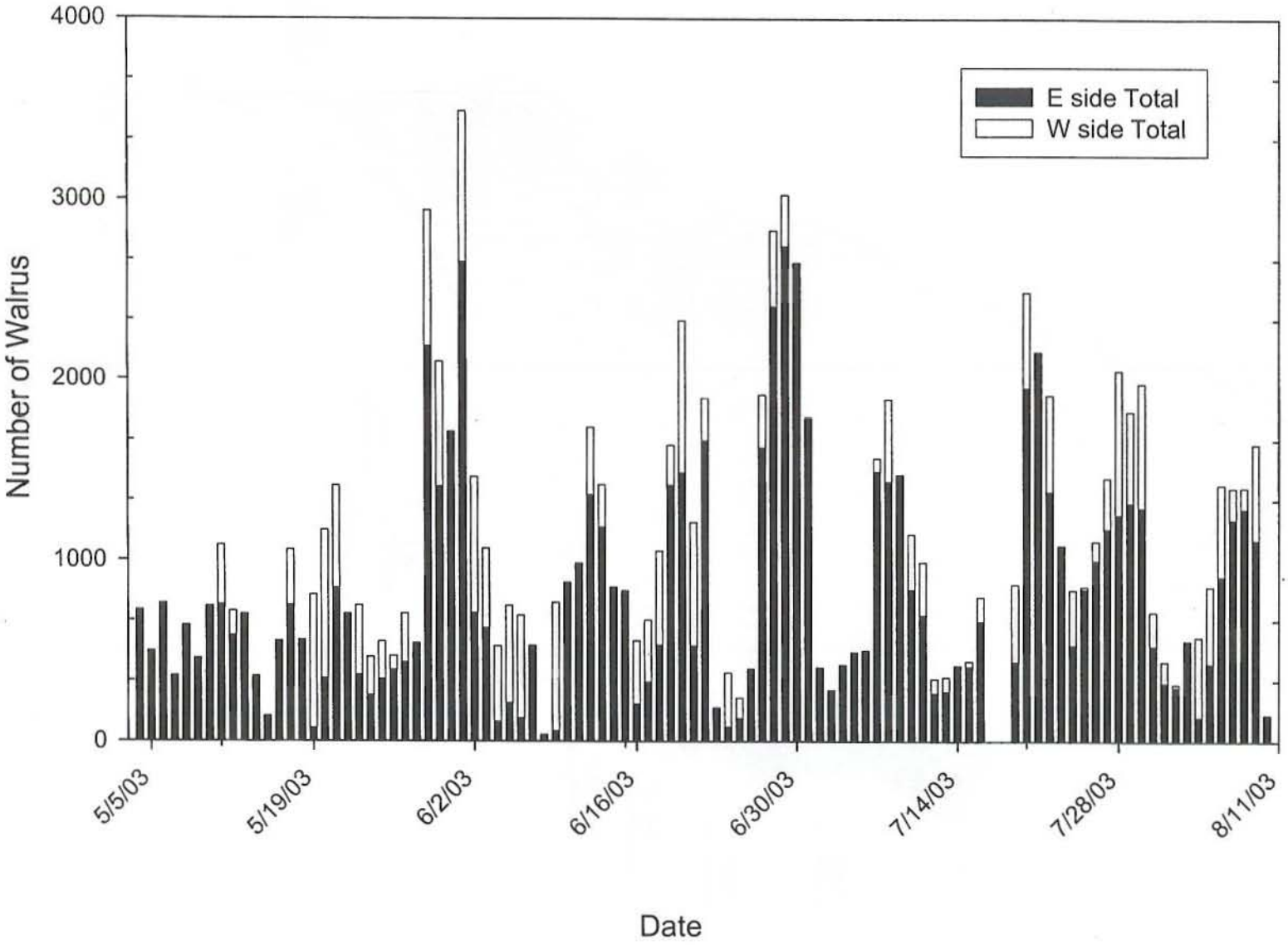


Table 1. Summary of 2003 daily walrus count information.

Month	Range	Mean
May 4 - 31	139 - 2983	938
June 1 - 30	37 - 3487	1332
July 1 - 31	0 - 2487	1036
August 1 - 10	315 - 1418	805

Note: Walrus were counted daily from May 4 through August 10, 2003 on the Round Island haulout, located in Bristol Bay, Alaska. The range for May 4 through August 10 was 0 to 3,487 walrus, with a mean of 1075 walrus.

Table 2. Summary of disturbance events on Round Island in 2003.

Cause	None	Low	Medium	High	Unknown	Totals
Pedestrians		2	1			3
Large Boat	18	14	1	1	1	35
Small Boat		2				2
Plane		1			1	2
Helicopter and Boat		1				1
Strobe Flash Photography				1*		1
Rock Fall and Natural Events			3*			3
Large Boat and Pedestrian Combination		2				2
Tagging and Collecting Biopsies		5				5
Totals:	18	27	5	2	2	54

Note: Events marked with a * include known mortalities.

Table 3. Seabird population summary for Round Island, Alaska, 2003.

Plot ID	MB-1	MB-2	MB-3	MB-4	MB-5
common murre	116	241	102	603	181
black-legged kittiwakes	30	90	84	102	21
black-legged kittiwake nests	25	76	77	91	23
pelagic cormorants	1	2	2	5	1
pelagic cormorant nests	1	1	1	3	1

Table 4. Chicks remaining on population plots at main beach on August 7, 2003.

Plot ID	MB-1	MB-2	MB-3	MB-4	MB-5
common murre	0	13	10	18	3
black-legged kittiwakes	7	37	31	45	0
pelagic cormorants	3	1	2	0	0

Table 5. Seabird productivity summary for Round Island, Alaska, 2003.

	Common murre	Black-legged kittiwakes	Pelagic cormorants
	N	N	N
Nests or pairs	50	50	10
Eggs laid	43	68	34
Chicks hatched	12	41	19
Chicks fledged	7	24	10
	%	%	%
Laying success	70	92	90
Hatching success	28	60	56
Reproductive success	16	35	29
Productivity	14	48	100
Nesting success	n/a	48	40
Brood reduction	n/a	100	67

Definitions:
Laying success: pairs/nest structures where 1+ egg is laid per total pairs/nets structures.
Hatching success: eggs that hatch per total eggs laid.
Reproductive success: chicks that fledge per total eggs laid.
Productivity: chicks fledged per pair/nest structure.
Nesting success: nests where 1+ chicks fledge per total nest structures.
Brood reduction: number of 2+ chick nests where brood reduction occurred per total nests with 2+ chicks.

Appendix A. walrus count protocols

Protocols: Bristol Bay Walrus Haulout Data Base.

DAYLOG.DB - Daily environmental information table. This information primarily is collected once per day.

Log ID:	Concatenation of location code and the date in yymmdd format: for instance: a count on Round Island on May 10, 1997 would be entered: RI970410.
Location	General location of haulout counts (**CP** = Cape Peirce, **CN** = Cape Newenham, **CS** = Cape Seniavin, **RI** = Round Island)
Date	Date (mm/dd/yy)
Time	Military (24 hr) recorded when you start to collect the environmental data at the first beach counted.
Cloud Cover	A qualitative description of the visible sky. Record at the first beach counted. **C** = clear (no clouds or haze). **B** = broken (individual clouds separated by open sky, stretches of clear sky within a cloud cover, or patchy fog or haze). **O** = 0vercast (no clear sky visible). If the entire sky is obscured, except for a fine line at the horizon, record as overcast.
Wind Speed	The estimated wind speed at the observer's position obtained with a hand-held anemometer. Record in nautical miles per hour (kts). Face into the wind, make sure nothing is obscuring or deflecting the wind at your

position. If you are standing at a bluff where the wind funnels up, take a step back and get out of the main drift. This will allow you to obtain a more accurate wind speed reading. Hold the anemometer directly in from of you at eye level, record the average reading after watching changes for 60-90 sec.

Wind Direction — Estimated compass direction of prevailing wind. Stand facing the direction of the wind. If you are in an area where the wind swirls around local topography, assess the direction of prevailing wind offshore, beyond the influence of land. Record the direction the wind is coming from, not the direction it is going. If necessary, use a compass to help identify headings. Line north up, then, holding the compass directly in front of you, turn until you face into the wind and read the direction indicated on the compass. Enter the direction in a 1 or 2 letter code:

N = north; **S** = south; **E** = east; **W** = west

NE = northeast; **SE** = southeast; **NW** = northwest; **SW** = southwest

V = variable- the wind keeps switching directions and seems irregular

NO = no wind detectable.

Precipitation — Any precipitation, such as rain, sleet, snow, or fog. Record at the first beach counted. Usually, conditions are very dynamic so record the worst weather encountered while you are collecting the above weather information.

Y = yes, there is some kind of precipitation.

N = no precipitation occurred during your weather evaluation.

Barometer AM — Barometer reading at about 08:00 in the morning (in mmHg).

Barometer PM — Barometer reading at about 20:00 (8:00) at night (in mmHg).

Appendix A. walrus count protocols

Tide — Record the tidal state just before you leave camp to begin counts. Each location has different methods for determining tidal stage. If your camp relies on a published tide table, look up the day's record and if necessary, extrapolate tide stage according to differences in time zone and area (this information is available as "correction factors" in every tide book). Each tide stage will be of equal duration. Use this graphic to determine tide stage from tide table data. Enter the following codes, to indicate tide stage during counts:

H = high; **L** = low; **R** = rising; **F** = falling.

Max Temp — Maximum temperature: read the minimum-maximum thermometer immediately before you leave camp to begin counts. Record the maximum temperature for the last 24 hrs.

Min Temp — Minimum Temperature: read the minimum-maximum thermometer immediately before you leave camp to begin counts. Record the minimum temperature recorded for the last 24 hrs. RESET the thermometer before you leave camp for counts.

Comments — Record any time. This is you narrative pertaining to walrus observations/ problems with methodology, or needed changes. Comments can be an important part of your field observations so be thorough and concise.

COUNTS.DB- Daily walrus count information which is recorded at each beach counted.

Beach — Name of the beach being counted. Enter the 4-letter identifier which has been entered into the data base look-up table. If additional beaches must be added to the lookup table, follow directions in "data base management"

section. Appendix one is a printed look-up table for beach codes.

Start Time — Enter the time you begin to count the walrus on the beach. Use 24-hr. (Military) time.

End Time — Enter the time you conclude counting the beach. Use 24-hr. (Military) time.

Method — The method used for counting the beach. Enter appropriate code before you start counting.

O = opportunistic ground count- an unscheduled count which occurred because you were just walking by or were doing something else (as opposed to counting this beach as part of a regularly scheduled counting round).

S = scheduled ground count- a scheduled count performed as part of your daily census activities.

A = aerial count (made from an aircraft).

GP = ground photograph- counts made (or which will be made) from photographs of this beach taken from the ground. Enter the Roll # and frame #'s into the comments section of the DAYLOG.DB part of the form. This information is crucial to keep accurate records of photographic counts, especially when count methods are compared later.

AP = aerial photograph-counts made (or which will be made) from photographs of this beach which were taken from an aircraft. Enter the Roll # and frame #'s into the comments section of the DAYLOG.DB part

of the form. This information is crucial to keep accurate records of photographic counts, especially when count methods are compared later.

B = boat count. Count of beach made from a vessel of some kind, either as part of a scheduled counting plan or an opportunistic approach.

Observer

If you make the count alone, enter your 3 initials (First, Middle, Last). If you count with a partner or group of people, enter **G** (Group). If the identity of the counter is unclear or unknown, leave this field blank.

Beaufort

Before you begin counting, record the Beaufort sea state (0-7) of waters offshore, away from land effects. This is important because islands and shore topography can have major effects on perceived localized water conditions. The Beaufort Scale is described in detail in Appendix 2. In general the codes are:

0 = sea like a mirror. Wind speed is under 1 kt. No waves.

1 = slightly rippled- water's surface looks like orange peel or scales. Wind speed ranges from 1-5 kts. Sea waves are smooth and less than 1 ft.

2 = small wavelets- the crests are still glassy. Wind speed ranges from 6-11 kts and you can begin to feel a breeze on your face or hear the grasses rustle. Sea waves are slight- 1-3 ft.

3 = large wavelets which begin to crest with foam. The first signs of whitecaps will be seen. Wind speeds range from 12 -19, and you could imagine a light flag extended in the wind. Sea waves are moderate: 3-5 ft.

4 = Small waves are consolidating into lines (rather than individual wavelets); numerous whitecaps. Wind speeds range from 20-28. Loose

clothing will flap. Sea waves can be 3-8 ft.

5 = Many waves, growing slowly to ridges, many whitecaps and some spray off of the wave crests. Wind speeds range from 29-38 kts. Your eyes will tear and the binos will be difficult to hold steady. Sea waves range from 3-8 ft.

6 = Large waves are forming, walrus probably can disappear in the troughs. Lots of whitecaps. Spray trails (streaks of foam) are beginning to form down the backs of the waves. You have to lean into the wind and probably have to drop to your knees to count, you can't look directly into the wind without squinting hard. Wind speeds are 39-49, sea waves range from 3-8 ft.

7 = You probably shouldn't be out counting walrus. Winds are up to 50-60 kts, sea waves are 8-12 ft. Waves are leaving obvious foam streaks in their path. The sea is frothing and white with spray. There is little chance of being able to hold your binoculars steady, so the counts are probably pretty inaccurate.

Beach Condition

An evaluation of the waves breaking on the beach you are counting.

0 = very calm- no wave splash at all.

1 = little waves- ranging to 1 ft (0.3 m).

2 = moderate waves- ranging from 1 ft - 3 ft (0.3 m to 1.0 m).

3 = rough waves > 3 ft (>1m).

Beach Availability

An assessment of amount of beach available to walrus for hauling out. Beach availability is recorded for each beach counted. It combines aspects of both tide and weather conditions. 100% available is the amount

of beach visible during mean low tide during a calm day. You are going to have to make observations of each beach counted to determine what 100% is. Identify landmarks you can reliable see to help you identify levels of beach availability. Using the amount of beach exposed during mean low tide on a calm day as 100% we will be looking at extremes in both directions. Break changes down by quartiles. For example: if it's a pretty low tide and an additional 25 % of beach is available, record the beach availability as 125%. If the tide is high and only 50% of the mean low beach is exposed, record it as 50%. If tide is high and waves are breaking on the cliff face, that might be 0% beach availability.

Visibility

This is a qualitative assessment of the visibility of the haulout you are counting.

C = clear- there are no obstructions (physical, weather, or sun glare) which impede your ability to clearly see all of the haulout.

P = partially obscured- fog blows in and out during the count, partially obscuring some of the haulout all of the time. The sun glare might be bad, but you can still squint hard and make a count.

O = obscured- bad weather or sun glare can make it impossible to count a beach. If you linger for a time and conditions don't change- you probably can't get a decent count, so enter this qualifier.

Land

The number of walrus counted on a particular beach. These animals must be on exposed beach or standing in tide wash.

Water

All animals in the water and within 50m of the shore line.

Appendix B. 2003 Daily walrus counts for Round Island

Place and Date	Mean Number of Walrus Counted
RI030504	724.0
RI030505	497.0
RI030506	760.0
RI030507	361.3
RI030508	639.3
RI030509	457.3
RI030510	744.7
RI030511	1083.3
RI030512	717.9
RI030513	701.7
RI030514	357.3
RI030515	138.7
RI030516	554.0
RI030517	1058.0
RI030519	809.3
RI030518	559.0
RI030520	1167.0
RI030521	1412.7
RI030522	703.7
RI030523	749.8
RI030524	465.3
RI030525	550.6
RI030526	470.3
RI030527	705.0
RI030528	1860.3
RI030529	2941.0

Appendix B. 2003 Daily walrus counts for Round Island

Place and Date	Mean Number of Walrus Counted
RI030530	2098.3
RI030531	2982.5
RI030601	3487.0
RI030602	1461.7
RI030603	1066.0
RI030604	525.3
RI030605	748.7
RI030606	694.3
RI030607	1651.7
RI030608	36.7
RI030609	766.3
RI030610	2142.0
RI030611	2134.3
RI030612	1737.0
RI030613	1186.0
RI030614	851.0
RI030615	833.0
RI030616	555.6
RI030617	330.0
RI030618	1051.7
RI030619	1638.7
RI030620	2328.3
RI030621	1209.5
RI030622	1894.1
RI030623	186.0
RI030624	379.8

Appendix B. 2003 Daily walrus counts for Round Island

Place and Date	Mean Number of Walrus Counted
RI030625	240.3
RI030626	400.7
RI030627	1914.0
RI030628	2830.3
RI030629	3026.7
RI030630	2651.0
RI030701	1789.3
RI030702	408.3
RI030703	283.5
RI030704	422.0
RI030705	492.7
RI030706	502.9
RI030707	1566.2
RI030708	1889.7
RI030709	1475.7
RI030710	1145.3
RI030711	990.3
RI030712	346.0
RI030713	355.7
RI030714	418.0
RI030715	443.0
RI030716	797.0
RI030717	0
RI030718	0
RI030719	867.0
RI030720	2487.3

Appendix B. 2003 Daily walrus counts for Round Island

Place and Date	Mean Number of Walrus Counted
RI030721	2154.2
RI030722	1381.8
RI030723	1081.3
RI030724	835.5
RI030725	854.2
RI030726	1104.7
RI030727	1455.3
RI030728	2049.5
RI030729	1820.7
RI030730	1976.7
RI030731	713.3
RI030801	441.0
RI030802	315.3
RI030803	555.3
RI030804	575.7
RI030805	853.7
RI030806	1418.4
RI030807	1226.3
RI030808	1402.0
RI030809	1113.3
RI030810	148.0
RI030907	392.0
RI030908	873.5
RI030909	763.9
RI030910	354.0
RI030911	119.3

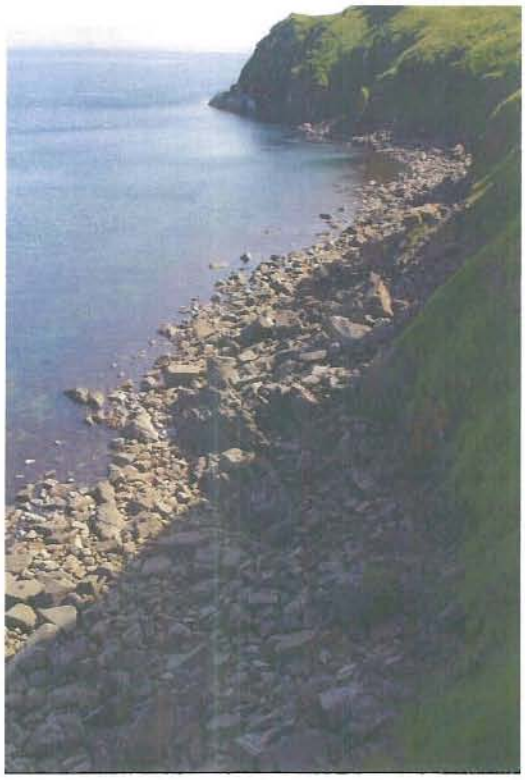
Appendix B. 2003 Daily walrus counts for Round Island

Place and Date	Mean Number of Walrus Counted
RI030912	344.7
RI030913	166.8
RI030914	122.0
RI030915	252.0
RI030916	65.1
RI030917	36.0
RI030918	113.7
RI030919	302.6
RI030920	172.0
RI030921	93.3
RI030922	134.5

Appendix C: Beach Photos for Arc View GIS Counts

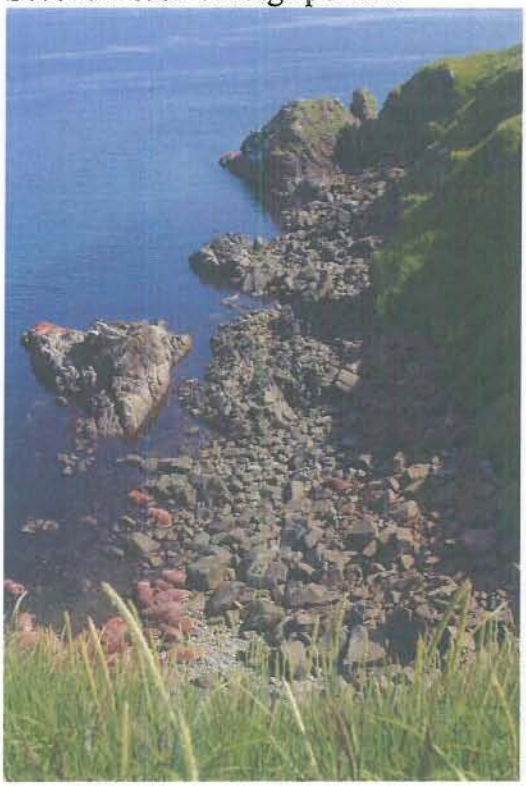
Second Prime vantage point A

Second Prime vantage point B

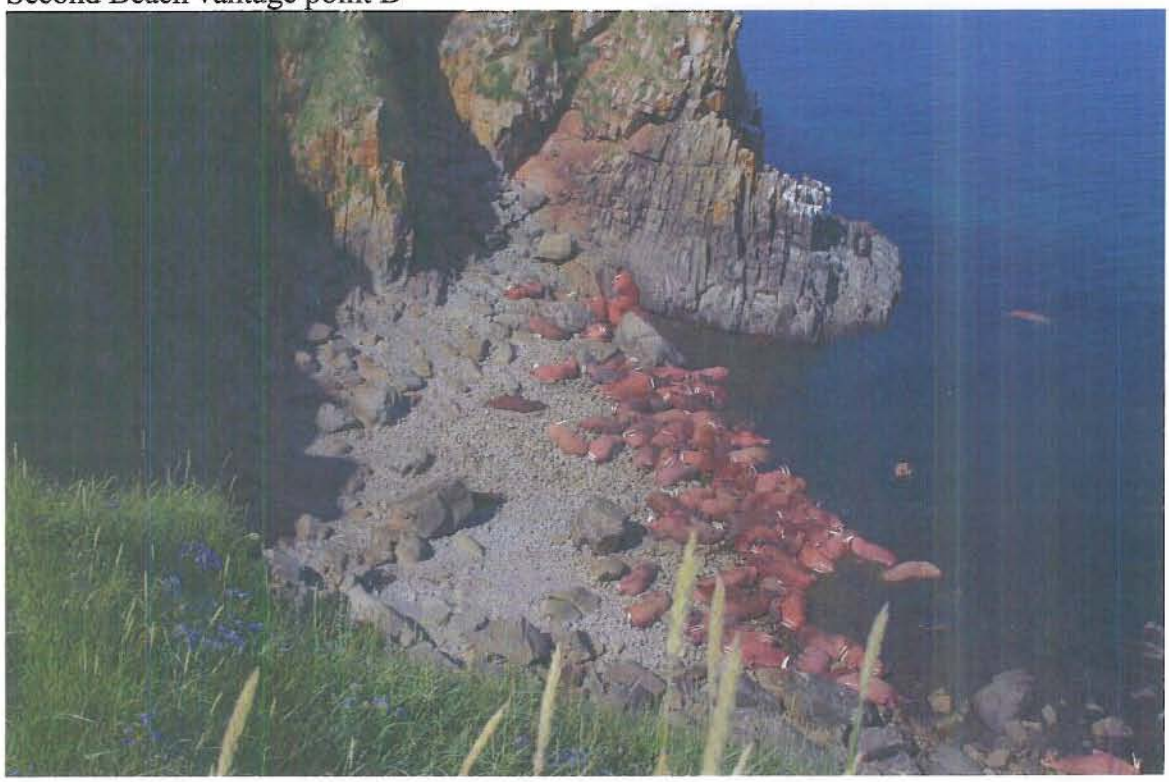


Appendix C: Beach Photos for Arc View GIS Counts

Second Beach vantage point A

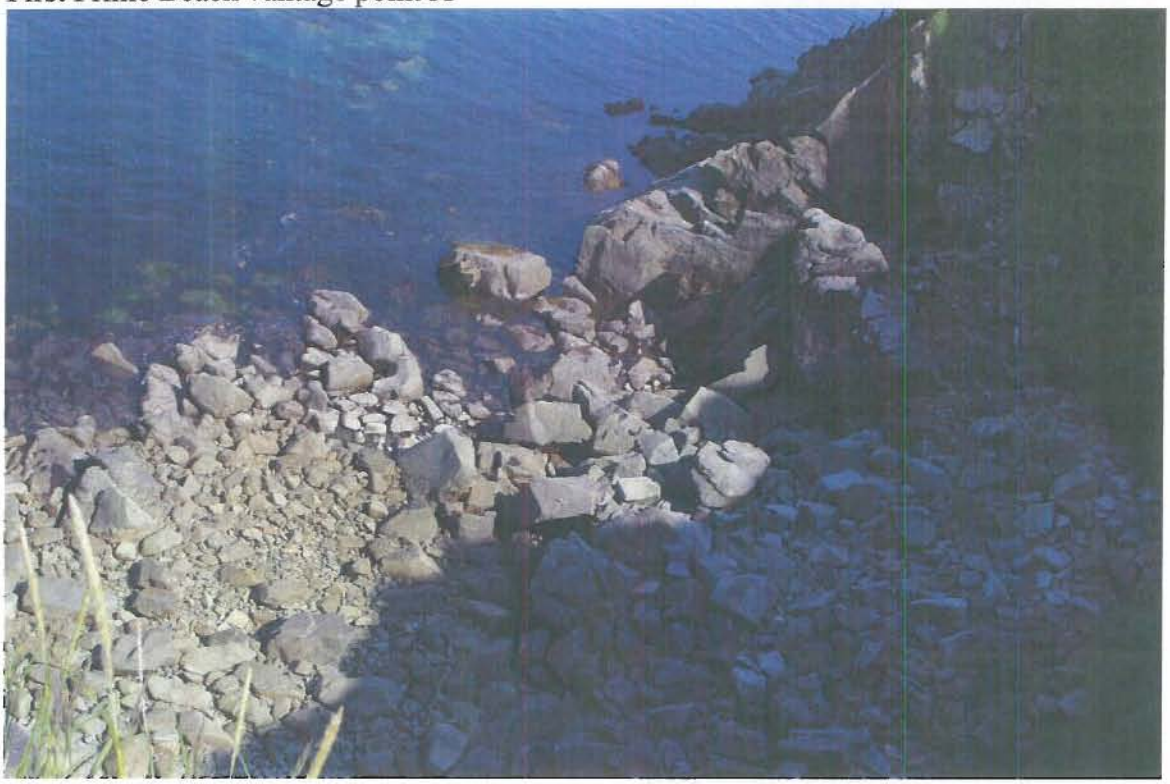


Second Beach vantage point B



Appendix C: Beach Photos for Arc View GIS Counts

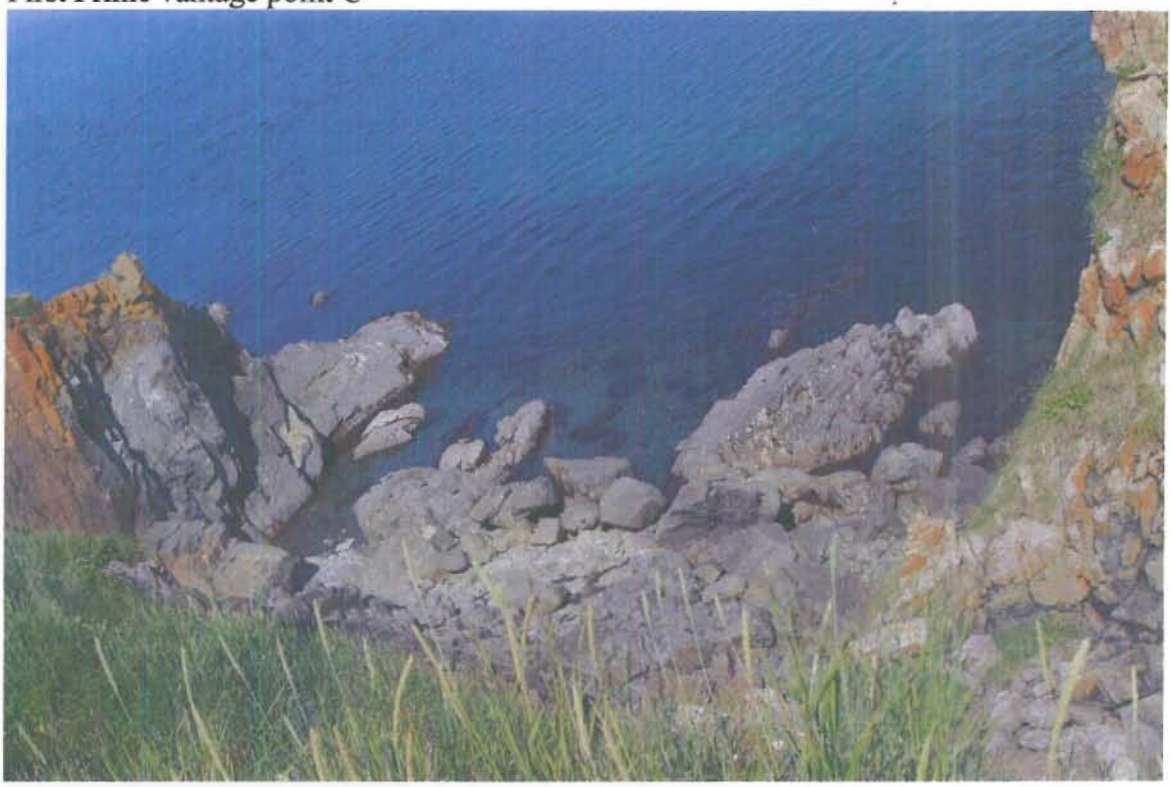
First Prime Beach vantage point A



First Prime Beach vantage point B

Appendix C: Beach Photos for Arc View GIS Counts

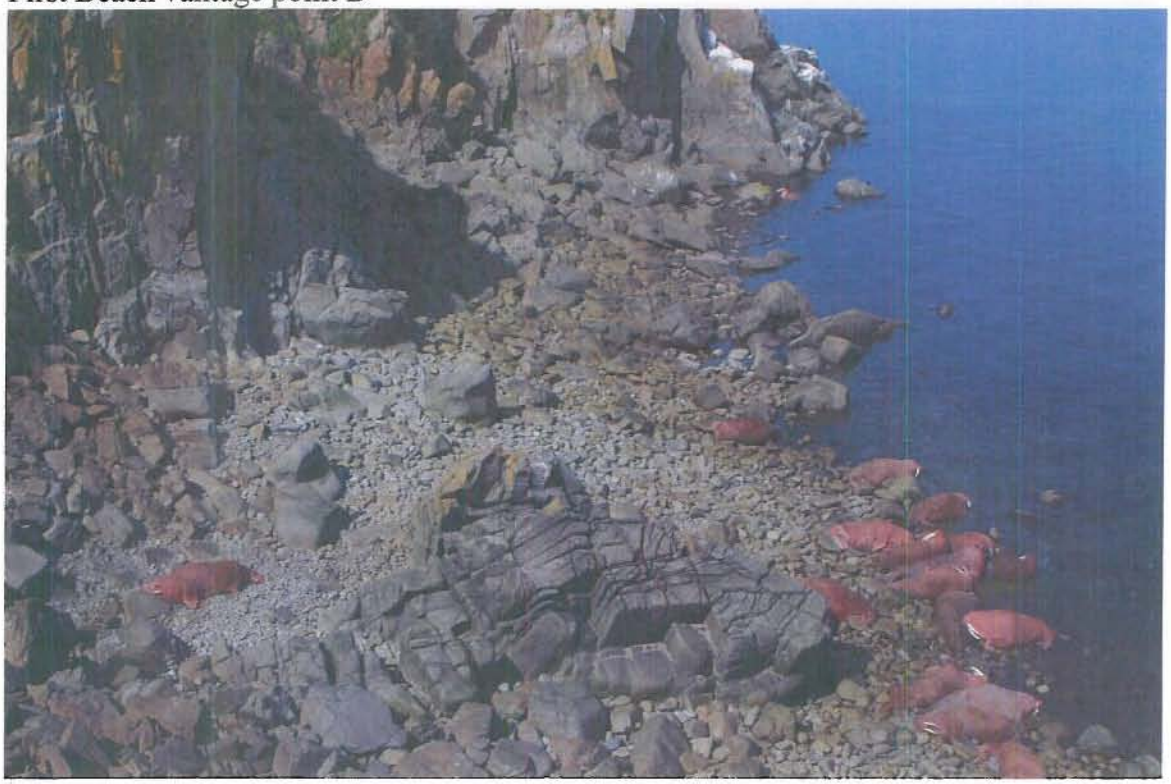
First Prime vantage point C



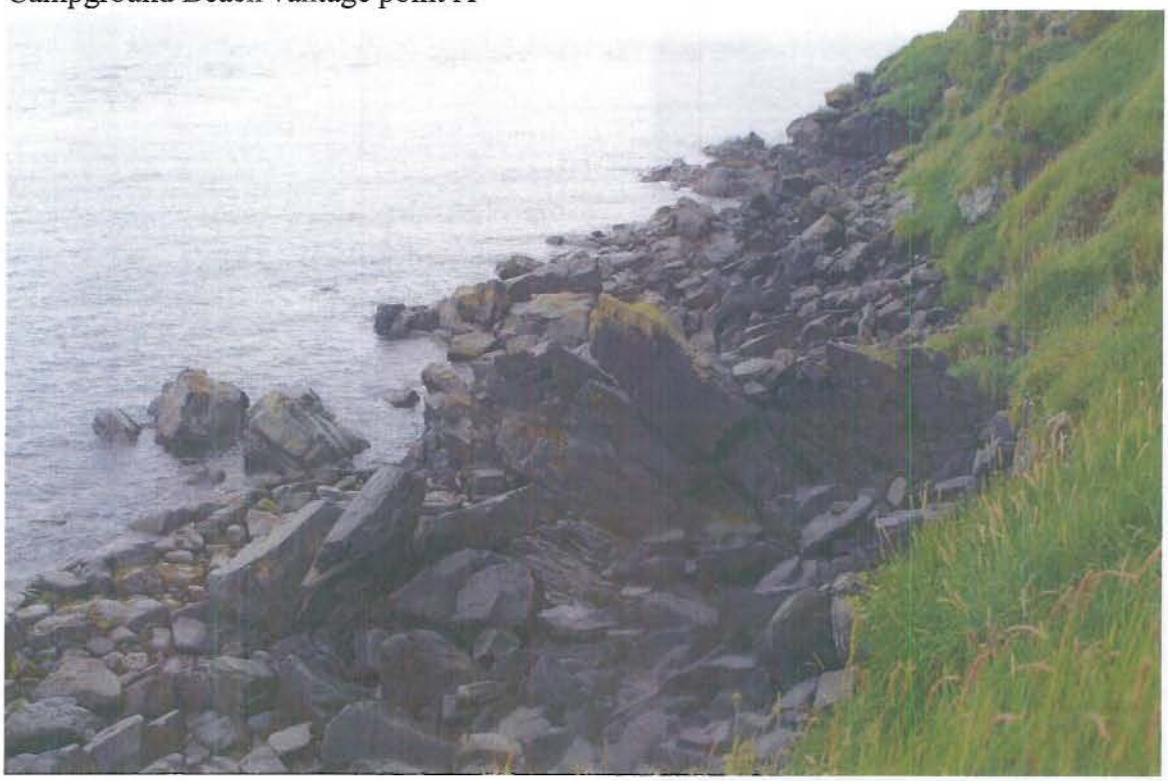
First Beach vantage point A

Appendix C: Beach Photos for Arc View GIS Counts

First Beach vantage point B

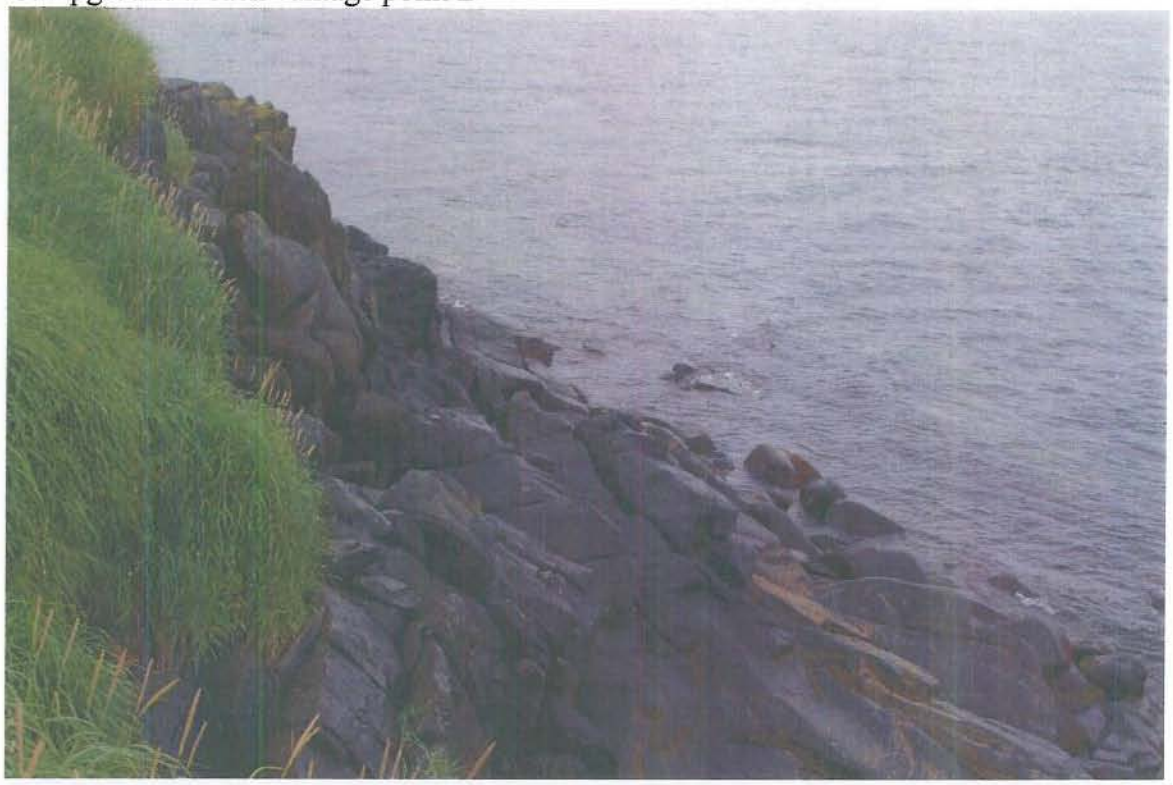


Campground Beach vantage point A



Appendix C: Beach Photos for Arc View GIS Counts

Campground Beach vantage point B



Campground Beach vantage point C

Appendix C: Beach Photos for Arc View GIS Counts

Campground Beach vantage point D

Boat Cove Beach vantage point A

Appendix C: Beach Photos for Arc View GIS Counts

Boat Cove Beach vantage point B

Flat Rock vantage point A

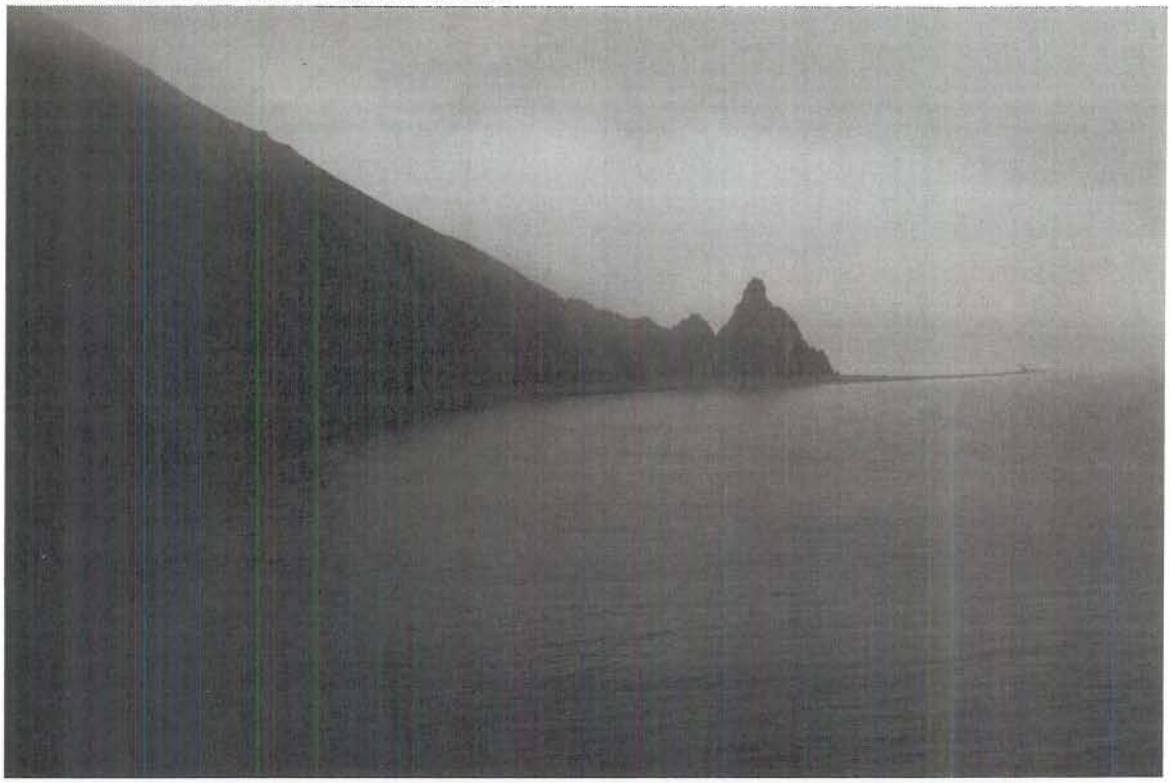
Appendix C: Beach Photos for Arc View GIS Counts

Flat Rock vantage point B

North Boat Cove Beach

Appendix C: Beach Photos for Arc View GIS Counts

Main Beach from Observation Point A



Main Beach from Observation Point B

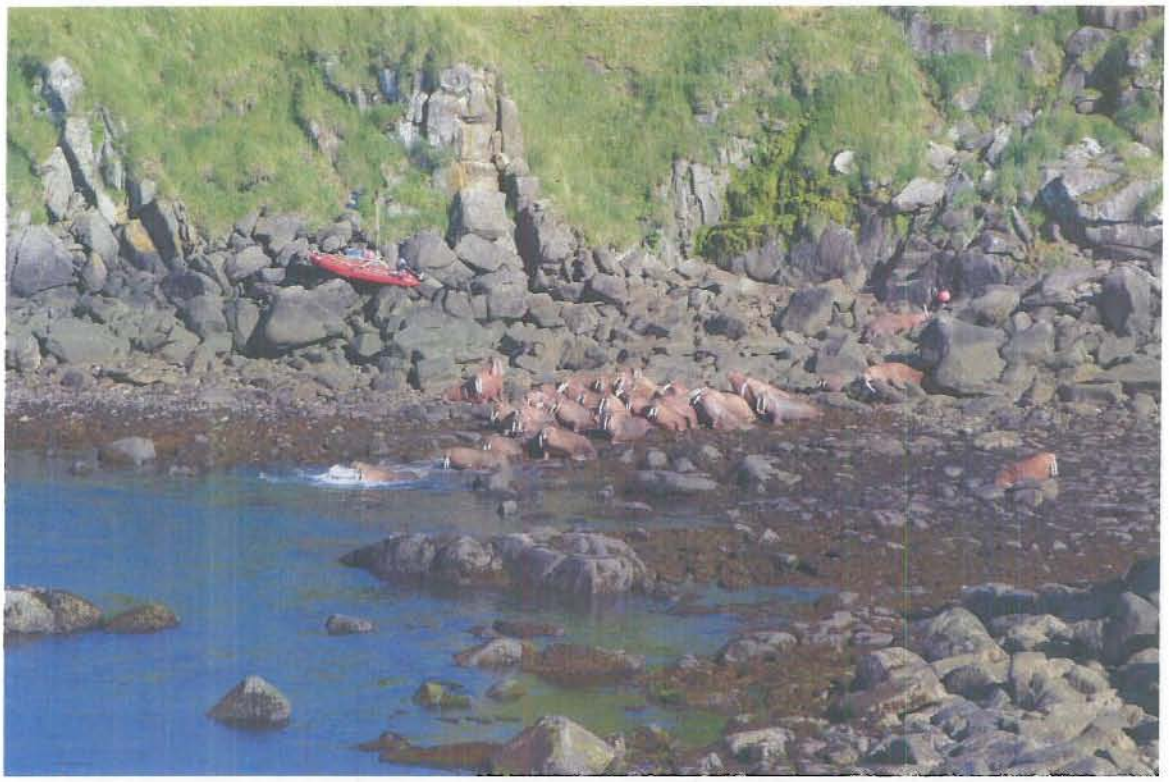
Appendix C: Beach Photos for Arc View GIS Counts

Main Beach from Traverse Trail (composite of six photos)

West Main Beach vantage point

Appendix D. Walrus stampede photographs from the Boat Cove disturbance on 6-27-03

Appendix D. Walrus stampede photographs from the Boat Cove disturbance on 6-27-03



Appendix D. Walrus stampede photographs from the Boat Cove disturbance on 6-27-03

Appendix D. Walrus stampede photographs from the Boat Cove disturbance on 6-27-03

Appendix E. Anecdotal Disturbance Information from 2003 for Round Island, located within the Walrus Islands State Game Sanctuary, Bristol Bay, Alaska. Behaviors defined as responses to disturbance by hauled out animals include head raises (HR), reorientation of the body, usually toward the water (OR), and dispersals (DS).

Date	Stimulus	Number of walrus	Response	Level of Disturbance	Brief Description
5/3	lg. boat and helicopter	607	7 DS from FR	low	Helicopter slings 11 loads of gear ashore, and boat brings in staff
5/20	lg. boat	unknown	none	none	boat drops off gear in BC
6/9	rock fall	60	~30 DS from MB	medium	rock slide at MB causes 2 mortalities, 1 broken baculum, and severe head injury resulting in death
6/10	lg. boat	28	10 HR, 1 OR, and 1 DS	low	boat anchors in BC to drop off visitors, walrus react to anchor going down
6/15	lg. boat	5	unknown	unknown	boat picks up/ drops off visitors in BC
6/15	research activities	30	20 HR	low	2 satellite tags attached to walrus with a crossbow and dart system
6/16	research activities	27	5 HR, 6 DS	low	2 satellite tags attached to walrus with a crossbow and dart system
6/17	research activities	26	6 HR, 2 DS	low	2 satellite tags attached to walrus with a crossbow and dart system
6/18	research activities	30	2 DS	low	2 satellite tags attached to walrus with a crossbow and dart system
6/19	research activities	465	5 DS	low	17 biopsies taken from walrus at FB and SB

Date	Stimulus	Number of walrus	Response	Level of Disturbance	Brief Description
6/21	lg. boat	49	3 HR, 2 OR, 7 DS	low	used staff skiff to move gear, researchers and visitors back and forth to boat near CG
6/22	plane	unknown	unknown	unknown	USCG plane in search pattern passes ~1/2 mile from FB area
6/25	lg. boat	unknown	none	none	visitors brought ashore
6/25	lg. boat	unknown	none	none	visitors brought ashore
6/27	lg. boat	85	none	none	visitors brought ashore
6/27	lg. boat and foot traffic ashore	125	125 HR, 122 OR, 122 DS	high	37 walrus initially reoriented themselves toward the water when boat increased motor speed approximately ½ mile out, then laid back down, when disturbed a second time by a visitor standing above them, all 122 left the area.
6/29	strobe flash photography	217	217 HR, 217 OR, 75 DS	high	visitor in CG area repeatedly using a very powerful strobe to take photos of a fox for approximately 20 minutes, causing damage to the fox's left eye and causing all walrus in BC to stampede toward the water. Some walrus ran over others and a dead walrus was found in the cove the next day.
6/30	lg. boat - staff activities	2	2 DS	low	visitors brought ashore

Date	Stimulus	Number of walrus	Response	Level of Disturbance	Brief Description
6/30	lg. boat	200	5 DS	low	anchor stuck, took about ½ hour to get it out, engine noise eventually caused 5 walrus to disperse from BC
7/1	lg. boat	unknown	none	none	visitors brought ashore
7/3	lg. boat	unknown	none	none	visitors brought ashore
7/4	lg. boat	unknown	none	none	visitors brought ashore
7/5	lg. boat	unknown	none	none	visitors brought ashore
7/9	foot traffic/ staff	360	20 HR, 20 OR, 5 DS	medium	walrus disturbed as staff approached overlook to count at SB
7/10	lg. boat	7	3 DS	low	visitors brought ashore
7/11	lg. boat	1	1 DS	low	visitors brought ashore
7/12	rock fall	49	49 HR, 49 OR, 30 DS	medium	rock slide onto beach at FB caused walrus to disperse
7/12	lg. boat	unknown	none	none	visitors brought ashore
7/15	plane	2	2 HR, 2 OR, 2 DS	low	plane overflew island above 5000 ft AGL, observers saw FR only
7/16	foot traffic	6	4 HR, 2 DS	low	Visitor standing above FR taking photos caused all walrus to turn toward him looking up and eventually 2 left

Date	Stimulus	Number of walrus	Response	Level of Disturbance	Brief Description
7/16	lg. boat	4	2 HR, 2 DS	low	walrus still agitated by visitor (see previous entry) reacted to boat anchoring outside of BC
7/19	small boat	800	8 HR, 4 OR,	low	staff conducting walrus count at WM by boat
7/19	lg. boat	unknown	none	none	visitors brought ashore
7/20	lg. boat	2	4 HR	low	2 walrus on FR each raised their heads twice while visitors were brought ashore
7/21	lg. boat	12	7 HR, 1 DS	low	boat anchored offshore, but did not bring in visitors
7/22	lg. boat	unknown	none	none	visitors brought ashore
7/24	lg. boat	10	9 DS	low	visitors brought ashore
7/25	lg. boat	15	8 HR, 1 OR, 1 DS	low	visitors brought ashore
7/26	lg. boat	17	6 HR, 3 DS	low	boat anchored about 1/4 mile out without coming ashore
7/27	lg. boat	14	4 HR, 4 DS	low	boat anchored offshore
7/28	lg. boat	38	10 DS	low	boat anchored off shore
7/29	lg. boat	32	6 HR, 2 DS	low	visitors brought ashore

Date	Stimulus	Number of walrus	Response	Level of Disturbance	Brief Description
7/29	lg. boat	17	17 HR, 17 OR, 17 DS	medium	walrus reacted to boat increasing speed when ½ mile offshore
7/30	small boat	22	17 HR, 5 DS	low	walrus reacted to skiff motor starting while leaving BC
7/31	lg. boat	unknown	none	none	visitors brought ashore
8/1	lg. boat	unknown	none	none	visitors brought ashore
8/4	lg. boat	unknown	none	none	visitors brought ashore
8/6	foot traffic	100	10 HR, 6 OR, 9 DS	low	staff sat at overlook and tattler flitted among walrus calling, not sure which caused the disturbance
8/6	lg. boat	20	5 HR, 5 OR, 1 DS	low	visitors brought ashore
8/7	unknown natural causes	180	20 HR, 40 OR, 120 DS	medium	unseen stimulus in cormorant nesting area at SB
8/7	lg. boat	unknown	none	none	visitors brought ashore
8/9	lg. boat	5	none	none	visitors anchored offshore
8/11	lg. boat	4	4 DS	low	staff and gear leave island, 5 skiff loads

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Round Island Intern Field Report
July 2-July 30, 2003
By Apayo (Loulare) Moore

Introduction

I was interested in applying for the Round Island Internship because I have been a Bristol Bay resident for my entire life and had never seen a live walrus, let alone know the slightest bit about them, until I got to Round Island.

Once when I was about 10, my family from Togiak took me around one of these islands in their skiff, I'm not sure which island, but we saw a dead walrus on the beach and that was the closest to a walrus I had ever been.

I applied for this internship was because I was looking for a physically challenging summer job and I enjoy learning about wildlife. Not to mention I am in search of a career, as many college students to be are. So here I am on Round Island, loving the physical challenge and enjoying the learning experience of the land and animals around my home region of Bristol Bay.

Before I arrived on Round Island, I was unsure of what to expect. I thought our trip to the island would be a short flight to Togiak and a long skiff ride to Round Island. I imagined flat trails, similar to what you'd walk on through the woods of a park. I knew we would be hiking a lot, but I had no clue to what sort of hiking it would be. I thought the cabin would be a little bigger, similar to a fish camp cabin with a couple of bunk beds in a back room.

I had no clue what to expect of the walrus. I was unsure of how they hauled out and I definitely didn't know there was even a term for walrus lying on the beach! I didn't know how we were going to count them, but I assumed it would be similar to the methods my friends described of counting salmon at sonar towers, which is oversized fish and game polarized sunglasses, to help with the glare on the water, and hand clickers.

My expectations for the weather were based upon the weather in Togiak and the few side comments made by various others of the wind and rain so I mentally prepared myself for a summer of rain. I just recently spent a few weeks in Dutch Harbor, Alaska and now I know that everything happens for a reason, my reason for going to Dutch Harbor was to experience sudden weather changes, so I wasn't too surprised when I found out the weather on the island could go from clear skies to fog within an hour.

I met Sawyer, the other intern, during our C.P.R. and First Aid training in Dillingham. He was definitely different from any of my friends but I knew working in a field camp meant working with other people I didn't necessarily know, which was something I was looking forward to. I wasn't sure what the biologists on the island were like, but I had a chance to speak with April Alexie, the previous Round Island Intern, and she spoke highly of Mary, so that was a relief to know I was going to have a friendly supervisor.

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I was basically clueless of what to expect and all I could do was hope that my decision of packing like I was going to Ekuk fish camp was going to work to my benefit. I have done a lot of traveling throughout high school so I habitually brought a warm sleeping bag, a ton of socks, and a lot of q-tips! I prepared myself the best I could, based upon my experience of traveling and camping, and overall I believed I did a decent job. All that was left to do was wait for Tikchik Adventures to call and say, "We're leaving!"

Helen Chythlook of B.B.N.A made travel arrangements through Tikchik Adventures and Walrus Island Expeditions. We arrived to Nunavachak Bay on July 2, 2003 with Tickchik Adventures on a Cessna Float plane. We were met by Walrus Island Expeditions, Terry Johnson, who was to transfer us from Nunavachak Bay to Round Island, via boat. Due to harsh weather conditions, we had to overnight on the Inconnu, Terry's Coastal Expedition Boat. We got to Round Island on the morning of July 3rd.

My first misconception was that it wasn't a flight to Togiak it was a short flight to Nunavachak Bay in a *floatplane*. Second misconception, we were going to the island in a really nice looking boat! Not the typical Togiak Lund I was expecting. Although with the wind and the huge waves hitting the beach, it was obvious that getting to the Inconnu in the small dingy was going to be a trick. Our first attempt to get off the beach a wave completely swallowed poor Terry and filled the zodiac with a few gallons of water. But his many years of experience in the high seas paid off, and we made it out with ease on the second attempt. There were no arguments about needing to stay the night on the Inconnu because it was definitely much classier than my dad's 30ft. Bow Picker.

Methods

Mary Cody, the Marine Mammal Biological Technician, along with Diane Okonek met us at Boat Cove when Terry dropped us off with the dingy. We packed our bags to the cabin and Mary briefed us on what to do in case of an emergency, and informed us of the proper way to use the VHF. We were also informed about the trail and beach rules. She gave us a work kit that included three clickers, binoculars, pencils and a data book. We were then given the basic tour of Round Island, starting with First Beach to East Cape and back toward Main Beach.

Throughout the whole hike, all I could think of was, "This is a lot of up hill. Can we take a break?" But of course I didn't ask for a break because here we are, young and supposedly fit, I didn't want to seem like a wuss on my first day. It's all about the first impressions. Keep walking Apayo!

There are a total of ten beaches that walrus haul out on, nine of which are hiking accessible. Our count starts with the furthest east side beach and then we work our way toward the dreaded West Main path. The beaches, in order of our count are as follows: Second Prime, Second Beach, First Prime, First Beach, Camp Ground, Boat Cove, Flat Rock, North Boat Cove, Main Beach, and West Main. The tenth beach, Southwest Main, is located on the other side of the island and is only accessible with a boat.

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Island Rules and Restrictions

There are 7 basic rules for Round Island. They are:

1) Permit fees are non refundable and non transferable. A 1-day permit is $10.
2) Round Island is a remote island located 80 air miles from the nearest medical facilities. The ADF&G and its employees are not liable for the health and safety of visitors.
3) Visitors, or their agents, need to contact ADF&G in Dillingham or on Round Island before 9 a.m. the morning of their arrival on Round Island to arrange for a pick-up. Permits are invalid if contact is not made.
4) If a Visitor is coming to the island with their own vessel, they can only approach the island within the designated access corridor. Vessels may remain moored within the access corridor during the time and date they scheduled with the ADF&G, but must have a crewmember on board at all times.
5) All beaches are closed to visitor access (except for loading and unloading in Boat Cove).
6) Prohibited Activities on Round Island and the waters within three miles of the island include: No discharge of firearms, no disturbance or harassment of wildlife, no removal of wildlife or wildlife parts, no swimming, diving or boating and domestic animals or pets are not allowed on Round Island.
7) Additional rules may be posted by the Alaska department of fish and game as necessary to maintain the integrity of the sanctuary and its wildlife.

Visitor Program

Two types of visitors come to the island. There are day visitors and camper visitors.

Day visitors arrange for their own transportation to and from Round Island and are permitted on the island from 9 a.m. to 10 p.m. They make arrangements through ADF&G (Alaska Department of Fish and Game) to receive their permit and are also responsible for paying a $10 per day fee.

Camper visitors also arrange for their own transportation to and from the island, but are allowed to camp on the island for 5 days. They too make arrangements through ADF&G and pay a $50 camping fee.

There are tent platforms, a cook tent and a latrine provided for visitors by fish and game in the Camp Ground area of the island. Propane and a propane-stove are also provided in the cook tent for visitor convenience.

The Trails

The trails on Round Island cover approximately 2.5 miles of the island from one end to the next. Trails are made through the tundra. Wet, swampy areas of the trail are covered with elevated 2x4s and geo-blocks. All restricted areas are marked off with yellow stakes. Only Fish and Game and Fish and Wildlife personnel are allowed beyond those points.

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Walrus Counting Method

A day of counting consists of recording the following at each beach: beach name, noted time for the beginning and end of each count, amount of the beach available, percentage of beach used, visibility, the Beaufort Sea Scale, 3 counts of the walrus on land, 3 counts for the walrus in the water, and the count quality.

Determining the amount of beach available was based upon picture charts that Mary Cody provided of previous years. The pictures were marked at certain landmarks to show the percentage of beach available during tides.

Percentage of beach used was based upon our own personal estimate of how much of the beach the walrus were occupying.

For visibility we simply noted a 'C' for Clear, 'P' for partially obscured and 'O' for Obscured.

- Partially obscured would be caused from a light island fog. Thus "partially obscuring" our count. It could also mean that there may have been more walrus on the beach, but a rock or cliff was in the way making it difficult to count accurately.
- Obscured would be a heavy low fog covering the beach, making the groups of walrus appear as pink blobs on the beach causing our count to become more of an estimate than an actual individual walrus count.

Beaufort Sea Scale (BSS) is the "effects observed at sea". In the back of each data book there is a scale rated 0-7 that describes the appearance of the sea. For example, if the sea is like a mirror, and there are no waves, it would be rated a 0. If there are large wavelets, crests begin to break and scattered white caps, we would rate the BSS as 3. There are sea descriptions through 7.

The count quality is our personal judgment of our counts; poor, fair, good, excellent.

Seabird Method

Sea bird counting: Kittiwake and Common Murre nests are numbered and accounted for. Nests are located at Observation Point on the east side of the island. The number of adults, eggs, and chicks is recorded for each numbered nest every other day until chicks fledge.

Results and Discussion

Official Counting for the B.B.N.A. Interns started on July 4, 2003. Counts were done every day on all east side beaches until July 30, 2003. West Main was done every day, except July 9th, 13th, 17th, 18th, 21st and 23rd due mostly to bad weather conditions.

There were no walrus on the island on July 17th and 18th. The peak number of walrus on the island for the month of July was on July20, 2003 averaging 2,454.

Counting was discouraging during our first few days of because we lacked "walrus eyes". Our counts were considerably lower then Mary's counts, but she said it was not uncommon for new comers to have lower numbers due to lack of experience.

Low and High Walrus Numbers
By observation, my opinion for high and low numbers of walrus on certain days was due to the weather. On the days the walrus all left the island, there were high winds, the beach conditions were bad; over 3 foot waves slamming against the beach rocks. Once the wind calmed down and the sun came out, the walrus numbers went back up.

Dead Walrus
For the month of July, we saw a total of 6 dead walrus. Reason for the deaths is unknown. Carcass sightings were; one in Boat Cove, one in North Boat Cove, two on Main Beach, one on West Main, and one on Southwest Main. We retrieved tusks off of three of the carcasses; One set from Main beach, Southwest Main and Boat Cove. We also recovered two other loose tusks while we were on Main Beach taking the tusks off of "Bob".

The first dead walrus I touched was Keith, named by Sawyer. He washed up in Boat Cove shortly before we arrived. After several attempts to remove the tusks whole, we resorted to sawing them off at the base of his gum line. Mary was very reluctant to give into sawing such beautiful tusks, but in fear of the carcass floating away before we had the chance to remove Keith's tusks, we were forced to remove them via saw. The stench was almost unbearable, but luckily our nostrils instinctively shut down.

Sea Bird Counting
Sea bird counting for the interns was done every other day from July 3, 2003 to July 30, 2003.

Kittiwake Gulls lay 1-3 eggs around mid June and incubate for approximately 23-32 days. Chicks are taken care of until they are about 43 days of age. Although a nest may start out with 2 eggs, it is unlikely that 2 chicks will fledge. This may be the cause of Raven's invading nests, foxes, or sudden a sudden scare of the bird colony will cause birds to rush off of the nests. Such a careless rush will result in eggs or chicks falling to their doom.

It is also not uncommon for the first chick in a nest of 2 to knock the other egg or chick out of the nest. This is known as siblicide. This is a natural survival instinct. The fewer chicks to feed, the more food there will be for the remaining chick.

Common Murres lay eggs in beginning to mid June. In most cases, a murre will lay only one egg, but if it is taken early in the breading season, they will lay a second. Common Murres incubate for 30-35 days. Chicks will fledge in 19-21 days.

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Reccomendations for 2004

1. *Some weak areas that could be worked on in future years are the "Intern Orientation".* On the first day interns arrive they should be given a visual checklist of what needs to be done each day and should be told what is expected out of them as interns. They should also be given more responsibility with checking the temp, barometer, and wind speed.

2. *An approach that could be taken for assigning certain days to certain people could be assigning people to do tasks on certain days.* Say on every 17:00 day, Bucko is responsible for getting the temp, barometer and wind. And on every 0900 day Jim is responsible for getting it.

They should also be assigned days to do certain chores such as garbage burning, dumping the compost and dishes so not just one person in the camp is taking on the full burden.

Example:

Date:	Garbage	Dishes	Compost	Weather
July 1	Apayo	Diane	Sawyer	Mary
July 2	Mary	Apayo	Diane	Sawyer

This way the biologists aren't frustrated with getting after the interns for not doing enough and the interns have a better prospective of what NEEDS to be done day by day.

3. *Interns should also be given the web address for Round Island*, so they know what animals they will be encountering and the terrain to expect on the island. They should also get more of a job description of the hours worked, what they will be counting and what they will be doing with the data they collect.

4. *Also, there should be a revised clothing and supply list for the interns.* I received a list of what to bring to the island, but it wasn't very accurate. A portable alarm clock is a MUST and for clothing, I recommend that interns be advised to bring at least three or four pairs of poly pro shirts and pants because they dry quickly. Also warm wool socks, they provide extra cushioning for feet and keep them warm on the long hikes. Bring a nice pair of hiking boots. Pack clothing that will dry quickly. But if you like jeans, or sweats, they are comfortable to wear on sunny days. Slippers or sandals are convenient for when you have time to lounge in the cabin, but that would be optional.

5. *A warm sleeping bag is definitely needed.* But avoid bringing a down sleeping bag because sleeping in a damp sleeping bag for a month would not be a fun experience.

6. *Bring reading material, stationary and stamps* (if you plan on sending out letters).

Last but not least, beware of grass allergies! There is grass all over the island. Even if you don't think you have allergies, it would be a good idea to bring some sort of allergy medication such as Benadril.

Overall I was satisfied with the program. I enjoyed working with Mary and Sawyer, I learned a lot, I exercised daily and I was well fed.

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2003 Walrus Islands Intern Report:

A Lesson in Human Psychology

By Sawyer Alexei

Introduction

This is the Walrus Islands (Round Island specifically) Intern Report, written on the dates of 07/26/03 - 07/29/03, using data collected during the dates of 7/04/03 - 7/30/03. The data pertaining to sea mammals (walrus specifically) was collected once per day, on a random schedule of 9:00 A.M., 12:00 P.M., 2:00 P.M., or 5:00 P.M. The ritual of gathering walrus (*Odobenus rosmarus*) will hereby be referred to as "the count". The data pertaining to seabirds (specifically Black-Legged Kittiwakes [*Rissa tridactyla*], Common Murres [*Uria aalge*], Pelagic Cormorants [*Phalacrocorax pelagicus*]) was collected once per day, during the time of the walrus count, three-four times a week. This report will describe what the interns did, from monitoring walrus haul-outs, to monitoring seabird productivity, to helping visitors on and off of the island.

Methods

Weather

Every day, the interns (*Innocenta victemus circumstansia*) would collect data on the weather patterns, for use in predicting future walrus behavioral patterns. The interns would measure wind speed and direction, cloud cover, precipitation (if any), the barometer readings (morning and evening), thermometer readings (highest and lowest temp. of the day, usually read after 2:00 P.M.) and the level of the ocean tide (high, falling, low, rising).

Walrus Monitoring

To get a more complete idea of when walrus haul-out of the water, each intern was directed to document the following before the actual count: the count method (S-scheduled count, B- counting from a boat, et cetera), the first three initials of the observer (JQP-John Quincy Public), Beaufort Sea Scale, Beach Conditions, Beach availability (how much beach is not covered by the tide, i.e. 50%), the name of the beach that the walrus were attending at the time, visibility at the time of the count, the quality of the count, the number of walrus on land and at sea, and finally, the time at the end of the count. Each page contained a space for writing down comments, i.e. "There were two dead walrus, one had been tagged."

Each count started once per day, either at 0900, 1400, 1700 or 1200 hours if an orbital satellite was in position to take a picture of the island that day, and lasted for two hours (not counting time for the hike to the West Main site). There were ten beaches that had to be monitored for walrus activity, and the first four were counted from one angle and then from a second, because they contained some large boulders and rock formations that obscured visibility. Each beach was counted three times to get a general idea of how many walrus were occupying said area; the interns counted three different times in case there were any walrus missed during the first or second count, they could be included, and in case of accidental counts (i.e. one walrus counted twice). Care was taken to keep

walrus from detecting the presence of observers, such as keeping low to the ground, not making loud noises, not making any sudden outbursts, no flailing of extremities, et cetera. The beaches that were counted were, in order of The Count: Second Prime, Second Beach, First Prime, First Beach, Camp Ground, Boat Cove, Flat Rock, North Boat Cove, Main Beach, and West Main Beach.

Sea Bird Population and Productivity

The Interns also observed various sea bird nests along the island, checking if any chicks or eggs were present and accounted for, any adult birds were present, and in what posture they sat. The birds that the interns observed were the black-legged kittiwake, a type of seagull, and the common murre, a bird not unlike the penguin in coloration and behavior.

The seabirds were observed once every other day, usually near the end of The Count. The nests that were observed were located near Main Beach, on two different plots. Twenty five nests of each seabird (25 for murres, 25 for kittiwakes, etc.) on each plot were observed, with eyes peeled for the number of eggs (or chicks later in the month), how many adults were at their nest sites, and what posture the adults were in. Seabird posture is quite important, as it tells whether the bird has an egg it is incubating, if it is keeping a chick warm, or just hanging out. However, not all birds nest in the same manner, for instance, kittiwakes build nests of grass quite like many birds, while the murres don't build nests. They keep their eggs and chicks balanced on their feet, like penguins do.

Other Projects

Visitors (*Nuisance gluteus maximus*) would come to the island to: a) view walrus in their natural habitat, b) view interns in their natural work environment, c) make lewd remarks about the way said interns dressed, or d) get away from it all. The interns confronted the situation head-on, by helping each visitor in and out of the boat, removing the visitor's gear from the boat with as little endangerment of said gear as possible, and ignore lewd remarks from visitors about the way said interns dressed. The boat was a rubber Zodiac, used to ferry visitors and interns from the vessel Inconnu, captained by Terry Johnson, head of Walrus Island Expeditions.

The interns did everything from photo counts (counts taken on satellite days by one of the biologists, in order to see if any walrus were missed), repaired trails, cooked, swept the cabin, and ignore the visitors.

All kidding aside, the interns were quite helpful with ferrying visitors and their belongings to and from the boat to the shore, particularly being careful with visitors of an elderly fashion. Otherwise, the interns kept out of the visitor's way, and the visitors followed the rules.

Results and Discussion

Interns Apayo Moore (*Homo sapiens*) and Sawyer Alexie (*Homo sapiens superior*) arrived on Round Island on July 03, 2003 and started working July 04 the same year. On July 03, they participated in a "practice run" with United States Fish and Wildlife

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Biologist Technician Mary Cody, one of two biologists on Round Island. Previous arrangements (I believe it was a game of Rock, Paper, Scissors) had Apayo sleeping in the Weather Port, a giant tent-like object, and Sawyer sleeping in the cabin, with one biologist in each housing unit. They would drink water, filtered, from a cistern, and use a Human Post Consumption Waste Capsule Containment Apparatus, known as an "outhouse" in layman terms. Meals were based on a "fend for ourselves" attitude except for dinners; dinners were eaten around a table. The interns were given quite a bit of freedom (after dinner, they could take the camera and use it while walking the trails unattended,); none of the interns abused the freedom.

The interns would start each day with either a walrus count, or, if The Count was scheduled for the latter part of the day, do computer work of some kind. If, after counting walrus to Main Beach, an intern wasn't up for the hike to West Main (if they strained their ankle while walking on of the trails, for example) then she or he would go back to the cabin and work on other things until they had put in their eight hours for the day (such as tool inventory, data entering). Joe Meehan came to replace one of the biologists for four days, starting on the 12th of July and left on the 16th. He participated on The Count, helped set up the door to one of the Weather Ports, and worked on some of the trail repairs.

The Count (and count related Topics)
As the days went by, the interns observed one of the more interesting of walrus behaviors. It seems that whenever the days were warmer and had relatively clear skies, the walrus would haul out onto Round Island en masse. On July 20, 2003, the beach haul-out record had been set for the summer. The average for all beaches counted amounted to about 2,770 walrus. The day conditions had been as follows: a maximum temperature of 86 degrees Fahrenheit, a minimum of 62, a barometer reading of 996, rising tide, the wind blew from the west at 13 knots, and the clouds were broken.

On days that were worse than others (rainy, windy, cold, wet, miserable) the walrus tended to avoid the beaches altogether. July 17 and 18 were the antithesis of July 20. July 17 was cloudy (overcast, all day they saw no sun), rainy, had a maximum and minimum temperature of 68 and 50, respectively, and had a northeastern wind at 19 knots. No walrus were traipsing along the edges of the island, and I wish I didn't have to either. The same went for July 18; the only difference was the absence of rain.

These readings are important, as they give scientists a clue on what factors are favored by walrus. For instance, walrus tend to be more populous on land when it is calm out on the ocean, and usually on warmer days. If it were a blustery day, and really rough waves pounded the beach (as on July 17, for example), walrus tend to stay in the water. If a biologist were doing walrus counts, and it stormed for three days, he or she may come to the conclusion that walrus don't use the monitored area.

Also worth mentioning was the fact that the older a walrus was, the more dead-set he was on getting to the "best spot." It didn't matter if there were seventy walrus between him

and the "best spot," he just had to get there, and would always crawl (slither?) over any and all walrus in the middle of the group to get there. The walrus would only sneak around the group if he was a small, young guy. It seems that walrus have some self-awareness, and don't try to climb over everyone unless they reach a certain body size.

The Data

As was stated before, the interns used three tally markers when counting walrus. This is to help ensure an accurate count. Also, there must be more than one observer to count the walrus to help determine the observer bias (why Emanuel counted 3 walrus and Mac counted 5, so to speak).

Recommendations

1. Bring more Top Ramen.

2. Most visitors are good about following the rules, however, there were some who just didn't get the message (one in particular would stand while the biologists weren't watching him [rule one: don't stand on cliff edges; it can spook the walrus if they see you]). While the biologists did their best, some visitors seem to respect the message if coming from a less threatening source. We recommend restricting the "problem children" from the island trails (where photographers and people can get better views of the wildlife) after two encounters with Round Island staff, and, if they fail to comply after four encounters, be removed as soon as possible from the island.