# Round Island Field Report

May 6 - August 16, 2000

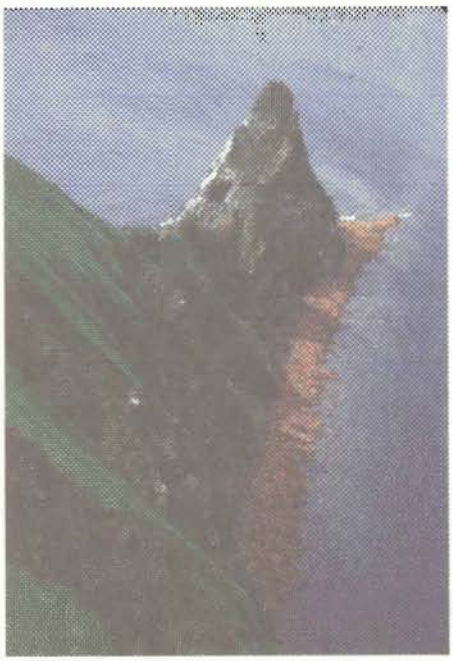

Photo by Steve Rice

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Summary

We counted walrus (*Odobenus rosmarus*) at Round Island haulouts daily from May 06 through August 16, 2000. Counts for all East side beaches combined ranged from a low of 17 on June 7 to a high of 7,573 on August 8. Counts on West side beaches ranged from 0 on several days to a high of 1,612 on July 30. The island-wide high count for the summer was 8,716 on August 8. We monitored seabird plots for productivity and population size. Common murre (*Uria aalge*,) black-legged kittiwakes (*Rissa tridactyla*) and pelagic cormorants (*Phalacrocorax pelagicus*) fledged chicks of 24%, 26% and 40% respectively of the eggs laid. The number of common murre and black-legged kittiwakes increased slightly on each plot, while the number of pelagic cormorants decreased. We counted Steller sea lions (*Eumetopias jubatas*) at the East cape haulout at least once every six days. Counts of Steller sea lions ranged from a low of 14 on July 19, to a high of 378 on May 14. An average of 85 Steller sea lions used the East Cape haulout throughout the summer. We continued and expanded a study of raven (*Corvus corax*) predation upon seabirds. We also administered a visitor program, monitored haulout disturbance, and performed routine maintenance and improvement of the trails and facilities on the island.

## Introduction

The summer of 2000 marked the eighth consecutive year of a cooperative program between the Alaska Department of Fish and Game (ADF&G) and the U. S. Fish and Wildlife Service (USFWS). The two agencies provide staff and funding to monitor walrus (*Odobenus rosmarus*) and seabird populations on Round Island, administer a visitor program, monitor haulout disturbance, and maintain and improve trails and facilities on the island. Round Island is located in the Walrus Islands State Game Sanctuary and has traditionally supported the largest number of walrus of the four terrestrial walrus haulouts in Bristol Bay, Alaska. The other terrestrial walrus haulouts 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 and 1999, Cape Seniavin was monitored by MMM staff. This report provides a basic synopsis of walrus, Steller sea lion (*Eumetopias jubatas*) and seabird research conducted on Round Island during this summer field season. For information on the visitor program, walrus disturbance, raven (*Corvus corax*) research, trail and cabin maintenance, see the ADF&G report (Rice 2000).

## Methods

*Weather*

We collected the following weather information daily near the cabin at 14:00 hours: wind speed and direction, maximum and minimum temperature for the preceding 24 hours, amount of precipitation over the preceding 24 hours, current weather conditions, and cloud cover. In addition, the barometer was recorded daily at 08:00 and at 20:00 hours.

*Walrus Monitoring*

Walrus haulout on nine beaches on the East side of Round Island and one beach on the West side of Round Island (Figure 2). West main beach is reached by traverse trail which passes through several avalanche chutes along the way. Heavy snow fall in the avalanche chutes caused the trail to be impassable until mid-June. It also prohibited us from setting up the boat and boat anchor system until much of the snow and ice had melted off the anchors in mid- June. Therefore, west main beach was not counted until mid-June. From June 15 through August 16, west main beach was counted at least once every three days. All accessible East side beaches were counted daily from May 6 through August 16, immediately after weather information was recorded at 14:00 hours. In addition to the 14:00 count, all East side beaches were counted at 09:00 hours and again at 19:00 hours every third day. Occasionally, conflicts with the scheduled arrival of the visitor boat made it impossible for either observer to do the scheduled interval counts. When raven work or the arrival of day visitors created a scheduling conflict, only one observer did the interval count. These data will be used to assess diurnal and tidal variation in haulout use. During all counts, each observer counted independently using 10 x 42 or 7 x 32 binoculars. Each beach was counted three times by each observer using a separate tally meter for each 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 time permitted, additional counts were done. The multiple counts will be 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 haulouts. For purposes of this report, all counts by all observers were averaged. Only the counts conducted at 14:00 hours were used to determine seasonal highs or daily averages.

Every effort was made to have both observers count together during the daily 14:00 counts. This was not always possible due to the needs of visitors on the island, to the timing of boat arrivals and departures, or conflicts with scheduled raven work. If the delay was less than half an hour, we started the count later, so that both observers could count together. If the delay was longer, then only one observer counted walrus. The nine beaches along the East side 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).

A complete copy of the count protocols is included as appendix A. The following information was recorded by each observer during each count: start time, end time, type of count, Beaufort sea state, beach condition, beach availability and beach used, visibility, land and water counts, and count quality. Walrus counts were divided into categories and each count was recorded as one of the following: a scheduled count of East side beaches which occurred at 14:00, a boat count of any beach, an interval count of East side beaches which occurred in the morning or evening, a land based count of West main beach, or any count done opportunistically 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 three feet, or wave height greater than three feet. Beach availability and beach used were both 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%. Visibility was a subjective measure of whether any walrus were hidden by obstacles, such as rocks or fog, and was recorded as clear, partially obscured or obscured. Land counts included all walrus on the beach and those in the surf zone. Water counts were only done once for each beach and included all walrus in the water within ten meters of shore. Count quality was a subjective measure of how accurate the observer felt the count was and was recorded as excellent, good, fair or poor.

Recorded sources of anthropogenic disturbance included boat traffic along the access corridor, authorized and unauthorized overflights by small aircraft, and staff and visitor arrivals and departures. We made every effort to minimize walrus disturbance by observers and visitors. When disturbances did occur, the following information was recorded: date, time, location, number of walrus on the beach where the disturbance occurred, number of walrus affected by the disturbance, behavior of the animals disturbed, the amount of time that passed before the walrus returned to their prior state, and the source of disturbance (if identified). Disturbance of walrus on the haulout was defined as any event that caused walrus to raise their heads, change their physical location or orientation on the beach, or to leave the beach (Hessing and Sheffield 1989, Kruse 1993).

*Seabird population and productivity*

We collected seabird population and productivity data for murre (*Uria aalge*), kittiwakes (*Rissa tridactyla*) and pelagic cormorants (*Phalacrocorax pelagicus*) following protocols used by the TNWR. Five population plots containing murre, kittiwakes and cormorants were delineated in 1997 (Rice 1997). In addition to the five plots used in 1997 and 1998 (Rice 1997, Stroka 1998,) a plot containing a pelagic cormorant colony was added in 1999. An additional cormorant colony plot was added in 2000. Photos were used to identify the plots and painted stakes were pounded into the ground to mark the observation points. Methods were consistent among years. Observers counted the number of murre, kittiwakes, kittiwake nests, cormorants and cormorant nests twice in each plot on 10 days between June 2 and June 25, 2000. Tufted puffins (*Fratercula cirrhata*) and horned puffins (*Fratercula corniculata*) were also counted when present. In order to determine some measure of reproductive success, 25 kittiwake nests on each of two plots, 25 pairs of murre on each of two plots, 21 cormorant nests on one plot and 21 cormorant nests on another plot were monitored until we left the island on August 17. Productivity plots were checked for status, but few notes were taken until June 3, when we saw the first kittiwake egg of the season. Kittiwake nests, and murre pairs were checked every one or two days from June 3 until August 16. During the height of the chick hatching and raven predation period from June 4 through17, kittiwake nests and murre pairs were checked daily. Cormorant nests were checked every two to three days from June 1 through August 16. 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*) haulout located at East Cape was monitored every six days using the same methods as the walrus counts. Beach-found ivory was collected from the beaches whenever possible without disturbing walrus. All ivory will be sold by the Eskimo Walrus Commission (EWC) and the proceeds donated to the Ivory Fund which will help finance future walrus research. Steve Rice continued his research on raven behavior and predation on cliff-nesting seabirds.

**Results and discussion**

Technicians Mary Cody (USFWS) and Steve Rice (ADF&G) arrived on Round Island on May 5. From July 5 until July 18 Andy Hoffmann (ADF&G) and Liz Hoffmann (ADF&G volunteer) replaced Steve Rice. An intern from Bristol Bay Native Association (BBNA), Paul Markoff assisted with walrus counts, sea lion counts, seabird work and other field camp duties from July 18 through July 30. We left the island for Dillingham on August 17, 2000. Our projected arrival date of May 1 was delayed several days due to logistical problems, and our departure date of August 15 was delayed due to weather.

We counted all East side walrus haulout beaches at 14:00 hours on 103 consecutive days from May 6 through August 16. All counts by all observers were averaged to determine the number of walrus using the haulout on a daily basis. Walrus counts for all East side beaches combined ranged from a high of 7,573 walrus on August 8 to a low of 17 walrus on June 7, with an overall

mean of 1,355 (Table 1). Counts of the West side beach (West main beach) ranged from a low of 0 on 4 days to a high of 1,612 on July 30. The mean count on the West side from June 15 to August 16 was 508 (Table 2). The daily mean of East and West side beaches combined, based only upon days when all beaches were counted, was 2,242 walrus. Haulout use appeared to be highest during low tides with fair weather and calm seas and lowest during high tides in periods of storms with onshore winds and high surf. Excellent weather conditions throughout most of the season may have contributed to higher numbers this year than in the past several years. Walrus numbers remained high when we ended the season on August 16 (1,420 walrus).

Walrus numbers varied greatly throughout the season, but were highest from mid-July to mid-August. For purposes of this report, the mean of all counts conducted at 14:00 were used to determine a daily walrus count (Figure 3). All haulout beaches were counted at a variety of times and tides to facilitate an evaluation of the effects of tidal variation and diurnal patterns of walrus use of the haulout. In the future, these data will be pooled with data from the other haulouts and analyzed together. In all, interval counts took place on 28 days between May 12 and August 10 (Table 3). On average, counts were slightly higher during evening counts (mean of 1,578) than at mid-day (mean of 1,355) or in the morning (mean of 1,390). Observer variation data from all haulouts will also be pooled and analyzed together. On Round Island, observer variation appeared to be smallest between experienced counters. The least amount of variation between observers occurred when walrus numbers were small. Observer variation was greatest with "new" observers without previous experience counting other species(Figure 4). It should be noted that most beaches (S, FP, FB, CG, and BC) are counted from two separate vantage points when walrus numbers are high, since there is no single vantage point that offers an unobstructed view of the entire beach. Count times include the hiking time between vantage points and do not accurately reflect the amount of time spent counting walrus.

This year, we used an Olympus digital camera to photograph beaches and seabird plots. The camera was used in the field to photograph large walrus groups on the closer beaches. Usually, when there is a large amount of variation in counts, it is because visibility is impaired by rain and fog or because the walrus herds are so tightly packed that observers lose their place while counting and either double-count or under count the number of walrus. We planned to partially resolve this problem by photographing the beaches and printing the photos immediately, then using a pen to mark off the animals on the photo while we counted them. We were hoping that the immediate feedback in the field would improve our counting skills over the course of the summer. In some cases this was in fact useful. However, in some cases the resolution quality was not high enough for this to work. There was a third cause of variation which the photograph did not address. In tightly packed groups, the walrus are partially on top of one another and it is sometimes difficult to tell whether there are two walrus or three. Because of the flattening of the field in a photograph, this problem is compounded. In instances where the large amount of variation among observer's counts was due to differences in observer's interpretations of what they were seeing, observers tended to interpret the photos in the same manner that they interpreted the beach. Therefore, each observer's counts were similar to their beach count. A telescope count proved more useful in clarifying numbers of walrus on the beach than a camera. The camera was very useful for other field documentation. Photos of each beach at mean low

tide and at a very high tide were taken in order to have a reference for determining how much beach was available. The camera was also used to document seabird plots and to identify which seabird nests were in the productivity plots.

Due to the heavy snow conditions, we were unable to get the boat in the water until early June. We circumnavigated the island by boat on four occasions between June 15 and July 12 to check for ivory, walrus on West side beaches, and to look for raven nests. We did not see any walrus or sea lions using any beach areas, other than those accessible by foot. In general walrus and sea lions appear to remain segregated on the island and to avoid or ignore one another in the water. However, a few walrus were seen by visitors at the East cape sea lion haulout beach in late July and early August, when no sea lions were present on the beach. We saw a single sea lion hauled out at Second beach in early August, but no walrus were present on the beach. On one occasion, we saw a small group of four to six sea lions circling two to four walrus near Second beach. The walrus did not appear to change their behavior in any way and the sea lions swam on after perhaps 20 seconds. On two occasions, we saw small groups of four to six sea lions circling four to six walrus near the north boat cove area. The walrus appeared to be swimming southward about 50 meters off shore. The sea lions appeared to be swimming off shore about 200 meters in a northward direction. They approached the walrus and began circling around them within a few feet, but without swimming below or touching them (as they commonly do with grey whales in near shore waters at Round Island). The walrus appeared to respond to this behavior by forming a posse, and remaining in a tight group until the sea lions moved on.

From May 8 to August 12, an average of 85 Steller sea lions were counted on land at the East Cape haulout (Table 4). Monthly averages were 240 in May, 58 in June, 36 in July and 27 in the first half of August. We counted sea lions between 14:00 and 20:30 hours. Most counts were done late in the evening. Sea lions also hauled out below the cliffs near East Cape, where they were not visible from onshore observation points. We were unable to find a safe vantage point and do not know how many additional sea lions were under the cliff edge. On May 14, we observed a dead pup on the haulout. It appeared to be a normal fully formed newborn with umbilicus attached. Its pelage was a dark chocolate color. Several sea lions were near by and we twice saw a large male approach the dead pup and sniff at it before moving over and lying down. We were unable to approach it closely or to collect it without disturbing the haulout. It was still visible on June 1, but was gone after June 7, when we had a series of high tides. This is the first recorded sea lion birth on Round Island. No other young pups were seen. Sea lions first began hauling out at East Cape in the mid-80's after walrus stopped using the East cape beach, possibly due to a rock fall (Sue Hills, pers. comm.). We observed two tagged sea lions at the haulout on July 7. One had a red tag with two digits on its left front flipper. The other had a pink tag on its right rear flipper. We were not able to read the numbers or letters on the red tag from the overlook, and could not see whether there was writing on the pink tag. On July 31, we again saw a sea lion with a red flipper tag.

We began seabird population counts on June 2 and completed the tenth count on June 25 (Table 5). We counted all plots in the same day, and counted every other day, unless weather prevented counting. We counted between 10 and 20% more kittiwakes and murre on each plot than in 1999,

with the exception of murre on plot MB-3, which were down 75%. There were about 50% fewer cormorants on the plot at the first beach colony, and no cormorants in plots MB-2, MB-3 or MB-4 this year. We added an additional plot at nearby First prime beach in order to have a reasonable sample size of cormorant nests. We observed the first pelagic cormorant egg on May 11, the first kittiwake egg on May 24 and the first murre egg on June 1. The observation point that had been used to count plot MB-4 in previous years had washed away over the winter. This year we counted MB-4 from the observation point also used for MB-2 and MB-3. Although the perspective is slightly different, this seemed to offer the best visibility.

Murre, kittiwakes and cormorants fledged 24%, 26% and 40% of the eggs laid respectively (Table 6). Some chicks of each species remained on the plots on August 16. We assumed that they fledged successfully if the murre chicks were 15 days old or older, kittiwake chicks were 30 days old or older and cormorants were 48 days old or older, either when they disappeared or when we left the island on August 17. Chicks of all three species were commonly lost due to storms and predation. All cormorant chicks at the first beach plot were covered with ticks, especially on the head and neck, and may have died of avian tick disease. Murre chicks were remained on the cliffs for as long as 28-33 days before fledging. Kittiwake chicks were remaining on the cliffs for 43-45 days. The longer brood times may be an indication of low level food stress or some other factor which is delaying growth rates. Ravens (*Corvus corax*) and foxes (*Vulpes vulpes*) were common predators. Ravens preyed upon adult murre and kittiwakes, on murre and kittiwake chicks, and on the eggs of all three monitored seabird species. Foxes took adults, chicks and eggs of all three species, but were limited to the lower and more accessible cliff areas. 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 and scavenging dead chicks, but were not observed hunting or harassing cormorants. We also commonly saw peregrine falcons (*Falco peregrinus*,) rough-legged hawks (*Buteo lagopus*) and bald eagles (*Haliaeetus leucocephalus*) hunting at the seabird cliffs. However, only peregrines were observed on the plots.

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 2 and 100 meters from the cliff edge platform where visitors and staff commonly sit. It has been estimated that over 210,000 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. This year, we looked for murre and kittiwake plots that were less subject to human disturbance and closer to the center of the colony, but were unable to locate plot sites that would be accessible often enough to be included in productivity work. When we were able to travel around the island by boat, it appeared, based on casual observation, that most other areas had about the same density and proportion of adults to chicks. The phrenology also appeared to be the same as on the monitored plots.

Three or four fox dens were active on Round Island this season. The den at East Cape produced

three pups. One or two dens on the hillside behind the cabin produced three pups. There are two den sites about 100 meters apart, one had one pup present and the other had two pups present on several occasions. On other occasions, all three pups were seen together at one den site or directly behind the cabin. At least two adult foxes were seen bringing food to the pups. Common prey items included tundra voles (*Microtus oeconomus*), kittiwakes and parakeet auklets (*Cyclorrhynchus psittacula*). A den about 200 meters above the trail at the north boat cove area, produced three pups. Several campers observed an adult fox moving the kits from the north boat cove den into a den in boat cove in mid-July.

A pair of rough-legged hawks were regularly seen by campers and staff in the main beach area and along traverse trail, and may have been nesting in that area. Bald eagles and a pair of peregrines may also have been nesting on the island. We saw a great grey owl (*Strix nebulosa*) over the course of several days, early in the spring. We also saw a short-eared owl (*Asio flammeus*) and one or more harriers (*Circus cyaneus*) off and on throughout the summer.

Grey whales (*Eschrichtius robustus*) were frequently seen in near shore waters from May through mid-June, however fewer were seen in 2000 than in 1999. Grey whales were observed feeding near shore and interacting with sea lions. On two occasions, we saw grey whales stop and roll over onto their backs or sides while four to six sea lions swam over, under and around them, sometimes touching the whale as they passed. These interactions lasted from 10 to 15 minutes. We saw one pod of eight orcas (*Orcinus orca*) traveling from north to south in mid-June. Although several passed within 100 meters of lone walrus which were traveling in the opposite direction, neither species appeared to alter their behavior in any way.

**Recommendations**

1. Collect cloud ceiling data along with the other weather data; this is standard in many field camps and both ADF&G and TNWR routinely collect it. Cloud ceiling is thought to affect seabird colony attendance (Lisa Haggblom, pers. comm). Consider recording wind speed and direction at several beaches, since it varies considerably throughout a single count and onshore winds appear to affect whether walrus are using a particular beach. To maintain consistency, we recommend continuing to record wind speed and direction at the cabin. The cabin is a sheltered area, and the wind speed and direction at the cabin do not accurately reflect the northwest and southeast beaches. In order to collect a more accurate representation, we recommend also recording wind speed and direction at SP and MB.

2. If variation between counts at a single beach is higher than a 10-20% difference, I think it would be worth spending some time trying to determine the cause of the variation using a telescope or digital camera in order to get a more accurate count.

3. Use the telescope to count MB at set intervals (every 3 days for ex.) or count MB once a day using the telescope, instead of doing three binocular counts. With more than one observer, one could use the telescope to do one count while the other observer did three counts using binoculars. We think that given the distance from the observation point to main beach, a telescope count, though time consuming is far more accurate.

4. Consider not using tally meters and doing only one count, when there are less than five or ten walrus on a beach.

5. During interval days, doing three counts per beach at each of the nine beaches on Round Island is exhausting, especially when walrus numbers are high. By the 19:00 count, accuracy is greatly reduced and observer variation increases. At Cape Pierce, observers have dealt with this problem by having different observers do different counts, for example, one observer does the 09:00 and the 14:00 count while the other observer does the 14:00 and 19:00 count. At Cape Seniavin, this apparently isn't a problem because there is only one beach and fewer walrus. We'd recommend changing the protocol to two counts per day, and staggering the second count throughout the day, or adopting some other change which would alleviate the problem.

6. Currently, count quality reflects the observer's gut feeling before looking at the tally meters. It might also be useful to record how accurate the observer thinks the count is after looking at the number on the tally meter.

7. Start/end times do not accurately reflect time spent actively counting walrus. When there are few walrus on a beach, an observer may complete three counts in one to two minutes, but has to record three separate times in the database. On some beaches, observers count from more than one spot (travel time). In order to analyze observer effort based on the amount of time spent counting, observers need to record start/end times differently. If time is used only as a marker in the data base, perhaps it would better to record a start time only.

8. Rather than doing a water count once at each beach, I would suggest doing a water count with each land count or not at all. Although water counts are not very accurate because animals in the water are not very visible, when done in conjunction with each land count, the water counts document whether a lot of walrus are entering or leaving the beach between counts. This clarifies whether observer variation is due to walrus movements or mistakes on the part of the observer. I would also recommend counting a little further out, since a lot of walrus seem to remain just off shore and go back and forth between the surf and 20-30 meters out, before finally hauling out or swimming away.

9. Try to take advantage of the many experienced marine mammal experts at ADF&G and MMM and have Steve's mid-summer replacement be a marine mammal person. Mid-summer seems to be when the visitor program is busiest, walrus numbers are high, and the seabird productivity monitoring takes the most time. It would be good to have a replacement who is already familiar with haulout count protocols and issues of disturbance in order to minimize training time.

10. Try to get some volunteers to come out and do a major one time trail-fixing party. Some areas of the trail are very rutted from years of use in muddy conditions and water run off. During wetter periods, the trails are several inches deep in mud and standing water. Building board walk in many areas seems like the best way to preserve the trails and also makes it obvious to visitors where the trails are (sometimes difficult to discern when the grass is high). I'm sure we could get a volunteer group (boy scouts or an earth watch type group) who'd be delighted to come out and help us build the trails. In that way, it might be done all at once, rather than doing it piecemeal over several years.

8. Install a water gauge to measure tide height, possibly in boat cove. This would provide a more concrete measure of tide height than our estimates. Tidal flow seems to vary considerably in Bristol Bay due to river flow, wind speed, wind direction and duration and the tide charts don't seem to be very accurate.

9. I'd also recommend that some annual progress occur on the statistical analysis of the multiple count/ multiple observer data. A benefit of this would be to better gauge whether the protocols should be amended

**Acknowledgments**

Like any remote field project with a long season, the Round Island project relies heavily on people back in the office to keep things running smoothly. In the Anchorage office, Ellen Baier, Doug Burn, Martha Corey, Rosa Meehan, Joel Garlich-Miller, and Wells Stephensen (USFWS) and John Westland (ADF&G) all helped with logistics, answered questions and managed the Anchorage end of things. Jim Woolington and Eunice Dyasuk (ADF&G) provided daily field support, were our link with civilization and managed the Sanctuary from Dillingham in spite of a daunting list of other duties. Don and Kathy Winkleman (Don's Round Island Charters) and Terry Johnson (Johnson Maritime/Walrus Island Expeditions) brought us groceries, mail and visitors, and provided the occasional salmon barbecue. Andy and Liz Hoffmann (ADF&G) happily replaced Steve for a ten day stint mid-summer, that turned into a thirteen day stint due to bad weather. The Hoffmann's helped with the walrus and seabird research, the visitor program, and various camp chores, including painting the cabin. Rob MacDonald and Geoff Beyersdorff (TNWR) provided walrus and seabird information and moral support while we were in the field. Paul Markoff (BBNA intern) helped with seabird and walrus research and camp chores. Chris Bailey, Larry Dickerson, Joel Garlich-Miller and Jonathan Snyder (USFWS) helped create graphs and edit this report. Steve Rice was, again, a terrific field partner and a mean euchre player (but needs to work on his scrabble skills.).

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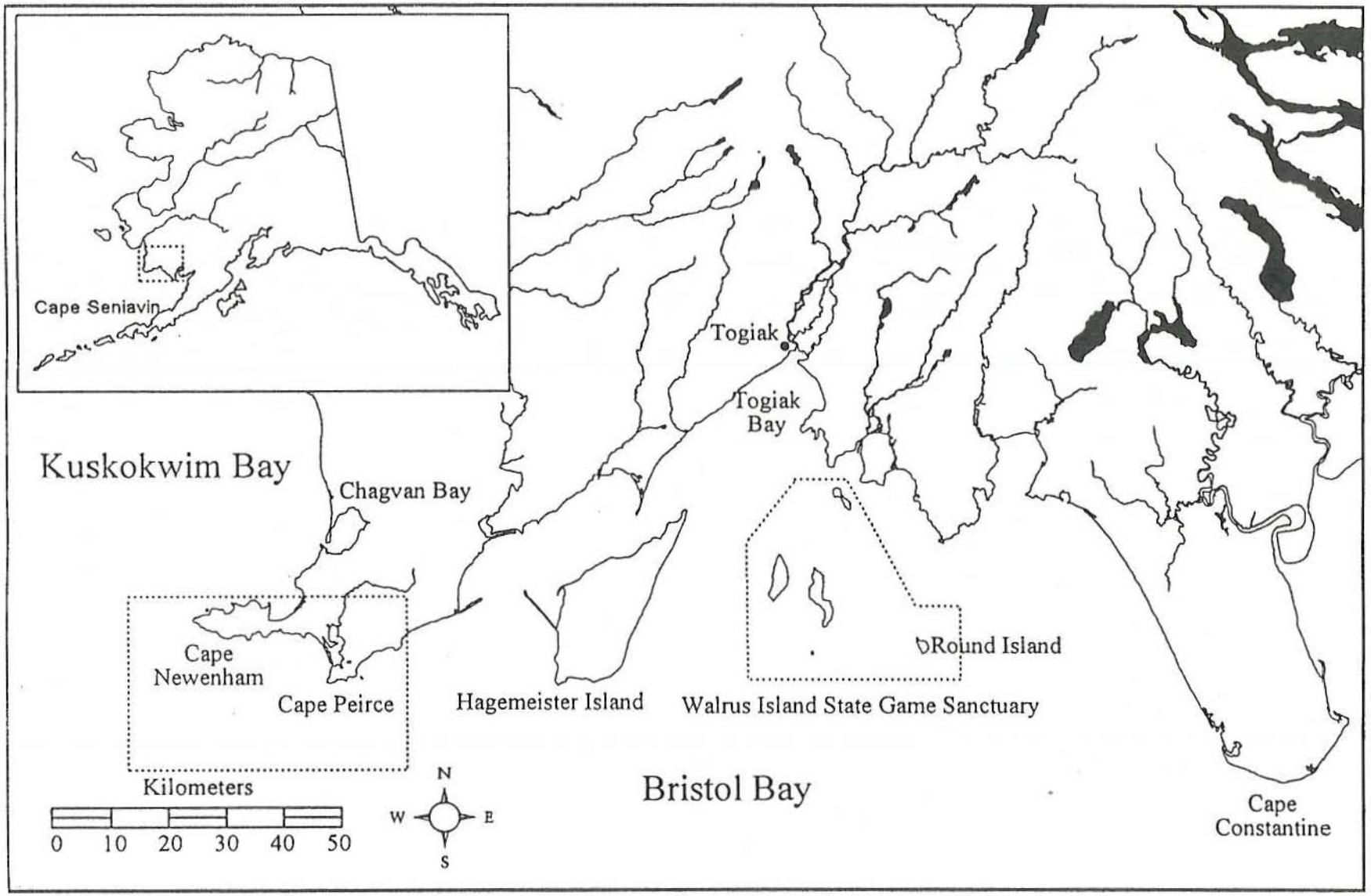



Figure 1. Marine Mammal Study Areas, Cape Peirce, Cape Newenham, Cape Seniavin and Round Island, Alaska.

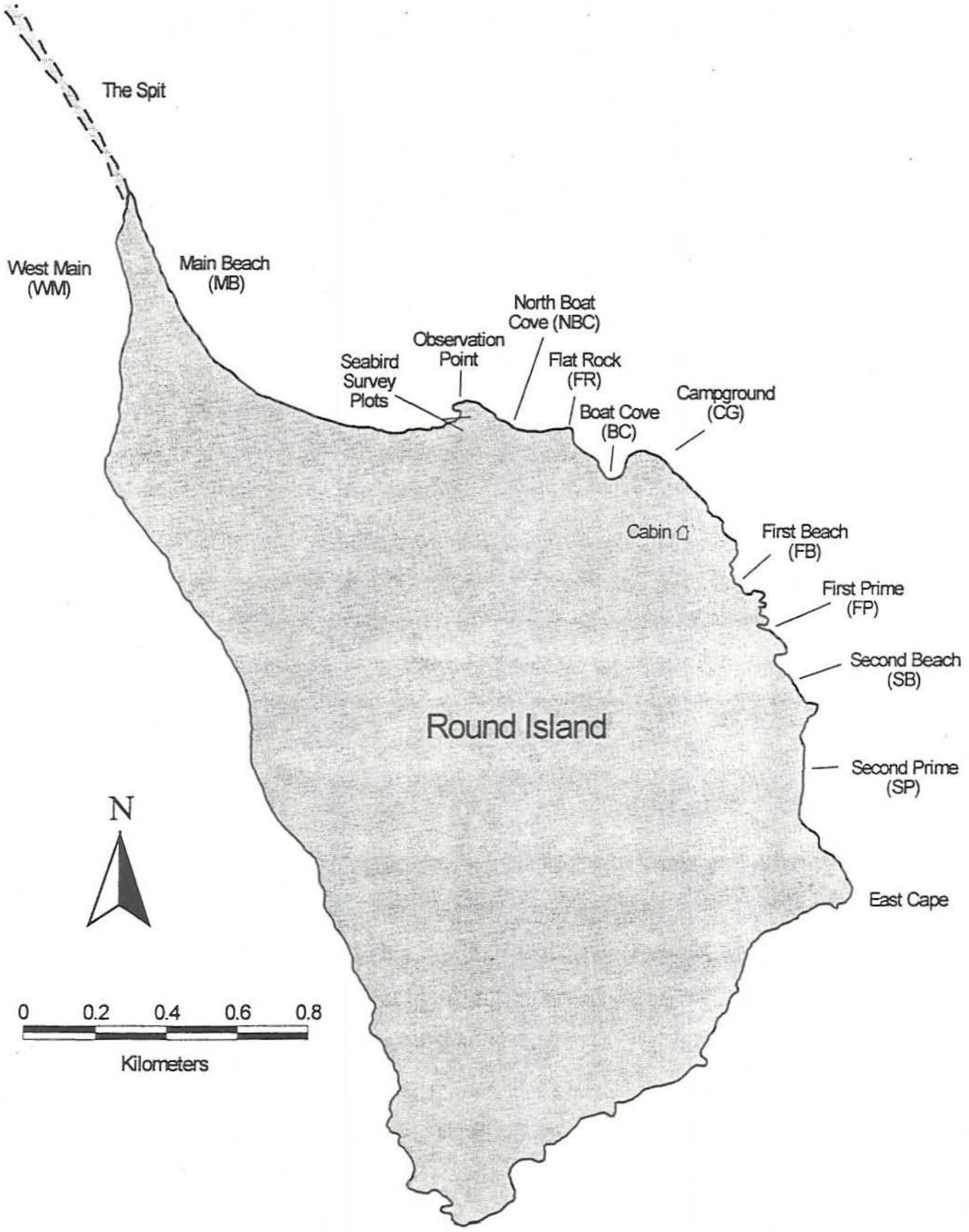



Figure 2. Area map of Round Island including landmarks and walrus haulout beaches.

Figure 3. Round Island, Bristol Bay, Alaska, 2000, daily counts of East and West side beaches.

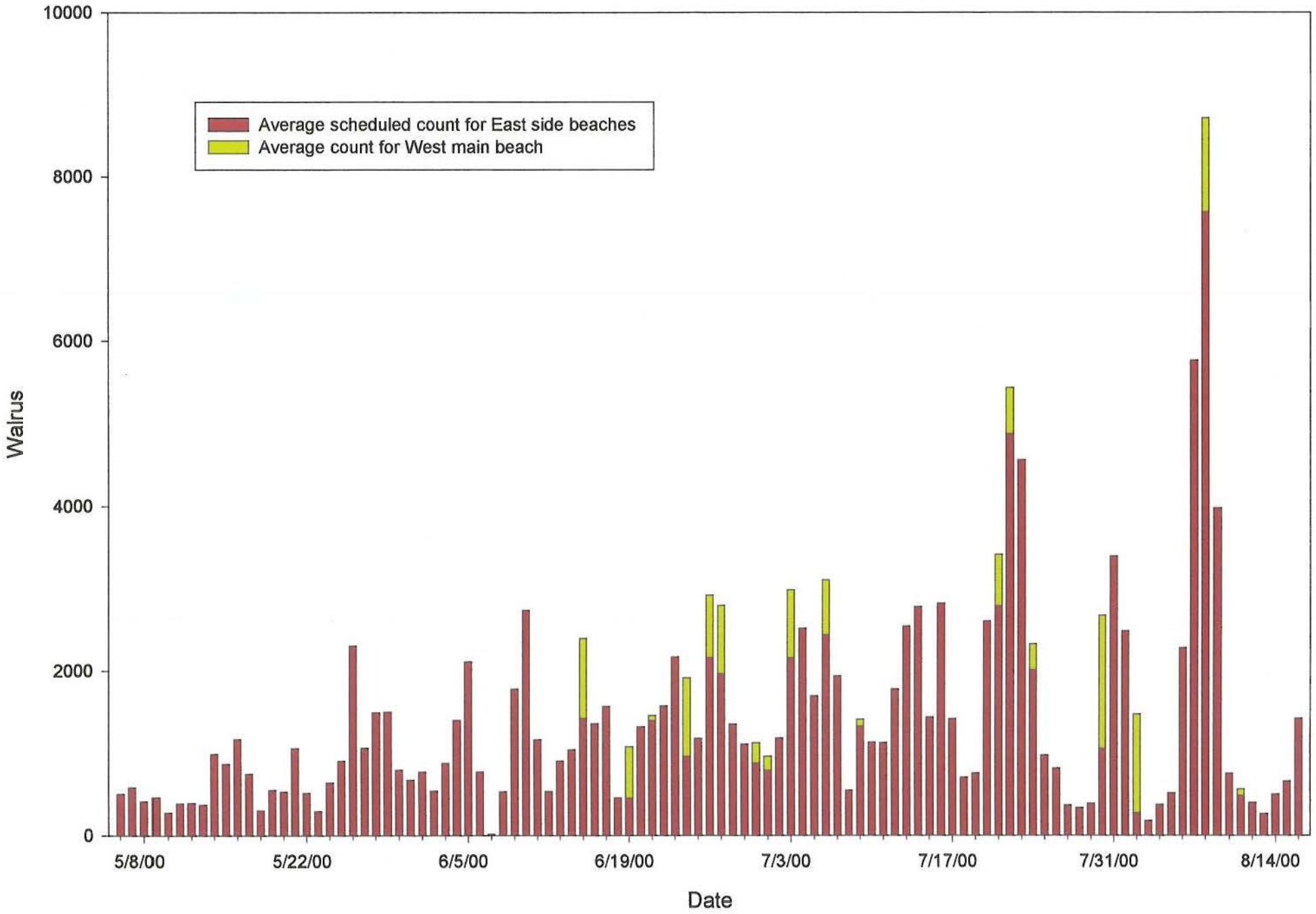


Figure 4. Round Island, Bristol Bay, Alaska, 2000, daily scheduled walrus counts of all east side beaches combined, by observer.

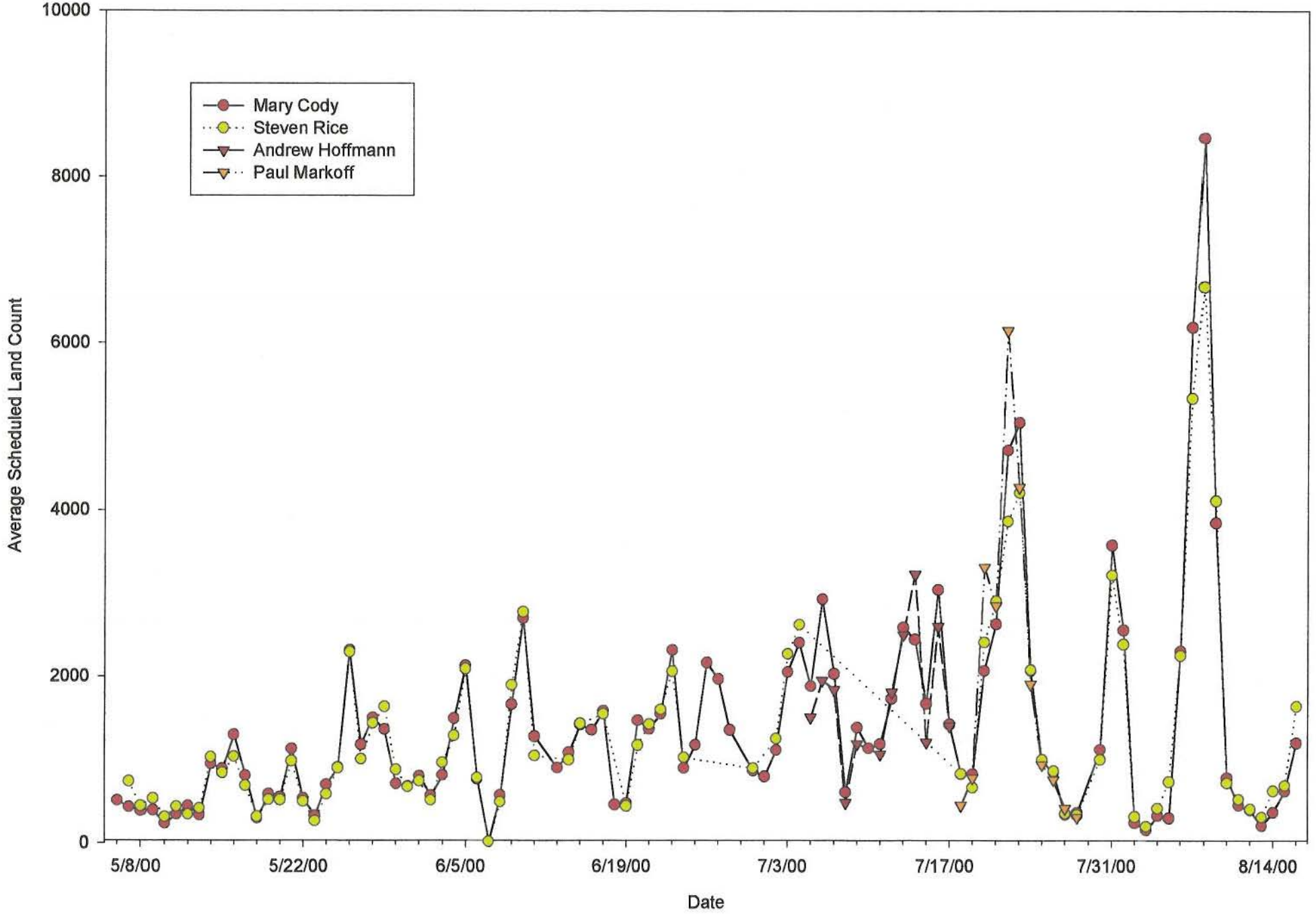


Table 1. Summary of scheduled daily walrus (*Odobenus rosmarus*) counts at Round Island, Alaska, 2000. The mean of all observers' counts at 14:00 hours have been combined for all East side beaches.

| **Month** | **Range** | **Mean** |
|---|---|---|
| May | 0-748 | 279 |
| June | 92-2540 | 1,333 |
| July | 276-4,186 | 1,807 |
| August | 0-2,972 | 1,438 |

Table 2. Summary of correlation walrus (*Odobenus rosmarus*) counts of West main beach. The mean of all observers' counts have been combined, Round Island, Alaska, 2000.

| **Month** | **Range** | **Mean** |
|---|---|---|
| June | 59-760 | 633 |
| July | 0-1,612 | 403 |
| August | 0-1,196 | 483 |

Table 3. Interval walrus (*Odobenus rosmarus*) counts for Round Island, Alaska, 2000. All observers counts were averaged and all East side beaches were combined.

| Date | 09:00 | 14:00 | 19:00 |
|---|---|---|---|
| 5/12/00 | 338 | 394 | 422 |
| 5/15/00 | 1,408 | 868 | 1,317 |
| 5/18/00 | 254 | 307 | 249 |
| 5/21/00 | 917 | 1,057 | 1,284 |
| 5/24/00 | 518 | 644 | 624 |
| 5/27/00 | 1,307 | 1,063 | 1,509 |
| 5/30/00 | 797 | 794 | 839 |
| 6/2/00 | 665 | 541 | 978 |
| 6/5/00 | 2,080 | 2,110 | 2,465 |
| 6/8/00 | 367 | 534 | 729 |
| 6/11/00 | 1,066 | 1,163 | 1,325 |
| 6/14/00 | 1,459 | 1,043 | 1,842 |
| 6/17/00 | 1,619 | 1,569 | 1,876 |
| 6/23/00 | 1,786 | 2,170 | 1,903 |
| 6/26/00 | 1,729 | 2,164 | 2,313 |
| 6/29/00 | 1,099 | 1,111 | 1,250 |
| 7/2/00 | 1,002 | 1,183 | 1,403 |
| 7/8/00 | 448 | 547 | 617 |
| 7/11/00 | 847 | 1,126 | 1,102 |
| 7/14/00 | 2,795 | 2,780 | 3,106 |
| 7/17/00 | 1,208 | 1,415 | 1,344 |
| 7/23/00 | 3,713 | 4,563 | 3,972 |
| 7/26/00 | 793 | 818 | 616 |
| 7/29/00 | 446 | 387 | 609 |
| 8/1/00 | 3,011 | 2,489 | 2,428 |
| 8/4/00 | 362 | 372 | 431 |
| 8/7/00 | 6,019 | 5,767 | 6,707 |
| 8/10/00 | 855 | 751 | 940 |

Table 4. Summer 2000 Steller sea lion (*Eumetopias jubatas*) counts from the East cape haulout on Round Island, Walrus Islands State Game Sanctuary, located in Bristol Bay, Alaska.

| Date | Start Time | Land Count | Water Count | Total |
|---|---|---|---|---|
| 5/8/00 | 13:51 | 213 | 63 | 276 |
| 5/14/00 | 20:07 | 378 | 7 | 385 |
| 5/20/00 | 17:53 | 200 | 45 | 245 |
| 5/26/00 | 18:06 | 169 | 7 | 176 |
| 6/1/00 | 18:38 | 140 | 8 | 148 |
| 6/7/00 | 14:00 | 39 | 6 | 45 |
| 6/13/00 | 19:26 | 19 | 4 | 23 |
| 6/19/00 | 20:00 | 24 | 4 | 28 |
| 6/26/00 | 20:00 | 76 | 4 | 80 |
| 6/28/00 | 17:04 | 49 | 4 | 53 |
| 7/1/00 | 19:46 | 75 | 0 | 75 |
| 7/7/00 | 19:30 | 26 | 5 | 31 |
| 7/12/00 | 13:30 | 25 | 0 | 25 |
| 7/13/00 | 13:44 | 23 | 1 | 24 |
| 7/19/00 | 14:15 | 14 | 2 | 16 |
| 7/25/00 | 17:12 | 31 | 8 | 39 |
| 7/31/00 | 20:29 | 60 | 0 | 60 |
| 8/6/00 | 14:09 | 17 | 1 | 18 |
| 8/12/00 | 14:05 | 37 | 2 | 39 |
| mean: | | 85 | 9 | 94 |

Table 5. Seabird population summary for Round Island, Alaska, 2000. Mean of counts conducted at peak laying for each species, common murre (*Uria aalge*), black-legged kittiwakes (*Rissa tridactyla*) and their nests, and pelagic cormorants (*Phalacrocorax pelagicus*) and their nests.

| Plot ID | MB-1 | MB-2 | MB-3 | MB-4 | MB-5 | FB | FP |
|---|---|---|---|---|---|---|---|
| common murre | 121 | 238 | 21 | 623 | 142 | 0 | 1 |
| black-legged kittiwake | 55 | 138 | 90 | 136 | 24 | 0 | 2 |
| black-legged kittiwake nests | 52 | 118 | 78 | 114 | 22 | 0 | 2 |
| pelagic cormorant | 0 | 0 | 0 | 0 | 0 | 22 | 35 |
| pelagic cormorant nests | 0 | 0 | 0 | 0 | 0 | 25 | 22 |

Table 6. Seabird productivity summary for Round Island, Alaska, 2000. For common murre (*Uria aalge*,) 50 pairs of adults were monitored on two plots. For black-legged kittiwakes (*Rissa tridactyla*,) 50 nests were monitored on two plots. For pelagic cormorants (*Phalacrocorax pelagicus*,) 42 nests were monitored on two plots.

| | common murre | black-legged kittiwake | pelagic cormorant |
|---|---|---|---|
| no. of nests/pairs | 50 | 50 | 42 |
| no. of eggs laid | 46 | 80 | 102 |
| no. of chicks hatched | 22 | 43 | 68 |
| no. of chicks fledged | 11 | 21 | 25 |
| | | | |
| | | | |
| laying success | 78% | 92% | 67% |
| hatching success | 48% | 54% | 73% |
| reproductive success | 24% | 26% | 40% |
| productivity | 22% | 42% | 60% |
| nesting success | N/A | 42% | 26% |
| brood reduction | N/A | 100% | 90% |

Laying success: pairs/nest structures where 1+ egg is layed per total pairs/nest structures.
Hatching success: eggs that hatch per total eggs layed.
Reproductive success: chicks that fledge per total eggs layed.
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**

**Data collection protocols for Bristol Bay walrus haulout counts.**

**DAYLOG Information - recorded on the upper half of the field data sheet (one data sheet for each day).**

Log ID: Concatenation of location code and the date in *yymmdd* format. For example, a data sheet from Round Island on May 10, 1997 would be entered as RI970510.

Location: General location of haulout counts.
**CP** = Cape Peirce
**CN** = Cape Newenham
**CS** = Cape Seniavin
**RI** = Round Island
**OT** = Other

Date: Date in *mm/dd/yy* format

Time: Time in *hh:mm* (24 hr) format. Record at the start of environmental data collection at designated weather observation site.

Cloud Cover: A qualitative description of the visible sky. Recorded at the designated weather observation site.
**C** = Clear 0/8 (amount of sky obscured - no clouds or haze)
**F** = Few 1/8-2/8
**S** = Scattered 3/8-4/8
**B** = Broken 5/8-7/8
**O** = 0vercast 8/8

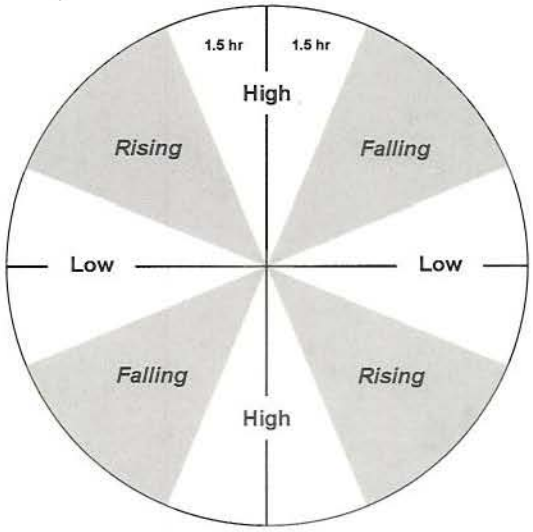
Wind Speed: The wind speed reported at the designated weather observation site (km/hr). Record the estimated average reading after watching changes in the anemometer for 60-90 seconds.

Wind Direction: Compass direction of prevailing wind measured at camp's weather station. Measured at the weather observation site.
**N** = North
**S** = South
**E** = East
**W** = West
**NE** = Northeast
**SE** = Southeast
**NW** = Northwest
**SW** = Southwest
**V** = Variable
**NO** = No wind detectable

Precipitation Any precipitation, such as rain, sleet, snow, or fog. Recorded at weather observation site. Usually, conditions are very dynamic, so record weather encountered while you were collecting the above weather information.

**N** = No precipitation occurred during your weather evaluation

**R** = Rain
F = Fog
**S** = Snow
**RF** = Rain and fog
**SL** = Sleet




Barometer AM Barometer reading at about 08:00 (mmHg). Figure 1.

Barometer PM Barometer reading at about 20:00 (mmHg).

Tide Tidal stage. Record just before leaving camp to begin counts. Each location has different methods for determining tidal stage. If your location relies on a published tide table, look up the day's record and if necessary, extrapolate tide stage according to corrections provided in the tide book for time zone and area. Tide stages are defined by breakpoints 1.5 hours before and after high and low tides. A more detailed example of determination of tidal stage is presented in Figure 1.

**H** = High
**L** = Low
**R** = Rising
**F** = Falling.

Max Temp Maximum temperature (degrees Fahrenheit) over the last 24 hrs as read from a minimum-maximum thermometer. Record when you take the pm barometer reading.

Min Temp Minimum temperature (degrees Fahrenheit) over the last 24 hrs as read from a minimum-maximum thermometer. Record when you take the pm barometer reading. *Remember to reset the thermometer after you record the temperature data.*

Comments Record comments at any time. This is a narrative pertaining to walrus observations, problems with methodology, or needed changes. If comments are extensive, continue on the back of the field data sheet.

**COUNT Information - recorded in the table on the lower half of the field data sheet (one beach count per line). In general, environmental information for the count should be recorded before counting.**

Beach — Code for the beach being counted (Table 1). Additional beach codes can be added to the database.

Start Time — Time the count begins in *hh:mm* (24 hr) format.

End Time — Time the count ends in *hh:mm* (24 hr) format.

Method — The method used for counting the beach. Record appropriate code before counting.

- **S =** Scheduled ground count. A count scheduled on the basis of time of day. (The daily count described in the count methodology)
- **I =** Interval count. Regularly scheduled, repeated counts of beaches used to assess diurnal variability of walrus on beaches.
- **C =** Correlation count. Scheduled counts of West Main beach (Round Island) to determine relationship between use of Main beach and West Main.
- **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 count).
- **T =** Tide ground count. A count scheduled to correspond with particular tide stage.
- **A =** Aerial count.
- **GP =** Ground photograph. While the actual number of walrus will not be recorded in the field, record the available information on the data sheet to indicate that photographs were taken. *Enter the Roll and frame #'s into the comments section of the DAYLOG part of the data sheet.*
- **AP =** Aerial photograph. Similar to ground photographs, record available information on the data sheet to indicate that aerial photographs were taken. *Enter the Roll and frame #'s into the comments section of the DAYLOG part of the data sheet.*
- **B =** Boat count.

Observer — Initials of person making the count.

Beaufort — Beaufort sea state (Table 2) of offshore waters, away from Sea State land effects. Identify an area which is not in a wind shadow or otherwise immediately influenced by land. This is important because islands and shore

topography can have major effects on perceived water conditions. Record before counting.

Beach Condition An evaluation of the size of waves breaking on the beach. Record before counting.

**0** = Very calm. No wave splash at all.
**1** = Small waves, ranging to 1 ft (0.3 m).
**2** = Moderate waves, ranging from 1-3 ft (0.3- 1.0 m).
**3** = Rough waves > 3 ft (>1m).

Beach Availability — An assessment of amount of beach available to walrus for hauling out. Record before counting. Beach availability combines aspects of both tide and weather conditions. 100% available is the amount of beach visible during mean low tide during a calm day. Observers will have to make observations of each beach counted to determine what 100% is. Identify landmarks you can reliably 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%, and record to the nearest quartile. 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 half of the mean low beach is exposed, record as 50%.

Beach Used — An estimate of the amount of the available haulout area being used by walrus. For example, if it is high tide and only 25% of the beach is available for hauling out, and 50% of that area is being used by walrus, record 50%.

Visibility — A qualitative assessment of the visibility of the haulout you are counting. Record before counting.

**C** = Clear. No obstructions (physical: i.e. rocks, sand dunes, etc; 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 on a particular beach. Animals must be on exposed beach or standing in surf zone.

Water — All walrus in the water and within 10m of the shoreline. Count once.

Count Quality — Subjective rating of count quality. If counts are scored fair or poor, explain the situation leading to this assessment in the comments section.

- **E** = Excellent
- **G** = Good
- **F** = Fair
- **P** = Poor

Table 1. Beach codes for Bristol Bay Walrus Haulout database.

| Location | Beach Code | Description |
|---|---|---|
| Cape Newenham | AFC | Air Force Cove |
| | BRC | Bird Rock Cove |
| | CNP | Cape Newenham Point |
| | WC | Wally Cove |
| Cape Peirce | CB | Channel Bar |
| | FB | Far Bar |
| | IB | In Between Bar |
| | MB | Maggy Beach |
| | MBB | Mid-Bay Bar |
| | NFB | North Firebaugh |
| | NS | North Spit |
| | OC | Odobenus Cove |
| | PB | Parlier Beach |
| | SFB | South Firebaugh |
| | RP | Rugged Point |
| | PECO | Pelagic Cormorant Rocks |
| Cape Seniavin | CS | Cape Seniavin |
| Round Island | BC | Boat Cove |
| | CG | Campground |
| | EC | East Cape |
| | FB | First Beach |
| | FP | First Prime |
| | FR | Flat Rock |
| | MB | Main Beach |
| | NBC | North Boat Cove |
| | OBP | OB Point |
| | S | Second |
| | SP | Second Prime |
| | TM | Third Main |
| | WM | West Main Beach |
| | WMS | West Main South |
| Other | OT | Other |
| | BR | Black Rock |
| | BRC | Bird Rock Cove |
| | CLM | Calm Point |
| | CAS | Castle Rock |
| | CB | Chagvan bay |
| | CRK | Crooked Island |
| | EST | Estus Point |
| | NH | North Hagemeister |
| | WHS | West Hagemeister South |
| | WHN | West Hagemeister North |
| | T-E | Halfway Between Tongue Pt.and |

| | |
|---|---|
| | Estus Pt. |
| EHIN | East High Island North |
| EHIS | East High Island South |
| WHI | West High Island |
| MTV | Metervik Rock |
| ENG | East Negukthik Bay |
| NUN | Nunavachak Bay |
| RP | Rocky Point |
| OOS | Oosik Bay |
| ORA | Oracle Mtn. |
| OWB | Owen's Bay |
| PP | Pyrite Point |
| RUG | Rugged Point |
| SUM | Summit Island |
| TT | The Twins |

Add new beaches as needed. Describe them clearly in the daylog for reference.

Table 2. Beaufort scale description.

| *Beaufort Number* | *Wind Speed* | | | *Effects Observed at Sea* |
|---|---|---|---|---|
| | *Knots* | *mph* | *km/hr* | |
| 0 | <1 | <1 | <1 | Sea like a mirror, no waves. |
| 1 | 1-3 | 1-3 | 1-5 | Ripples with appearance of scales; no foam crests. |
| 2 | 4-6 | 4-7 | 6-11 | Small wavelets; crests of glassy appearance, not breaking. Breeze can be felt on face, and causes grasses to rustle. |
| 3 | 7-10 | 8-12 | 12-19 | Large wavelets; crests begin to break, scattered whitecaps. A light flag would be extended by the wind. |
| 4 | 11-16 | 13-18 | 20-28 | Small wave 0.5-1.25m high, becoming longer; numerous whitecaps. Loose clothing will flap in the wind. |
| 5 | 17-21 | 19-24 | 29-38 | Moderate waves of 1.25-2.5m taking longer to form; many whitecaps; some spray. Wind will cause eyes to tear; difficult to hold binoculars steady. |
| 6 | 22-27 | 25-31 | 39-49 | Larger waves 2.5-4m forming; whitecaps everywhere; more spray. Cannot look directly into the wind without squinting; may have to lean into the wind when walking. |
| 7 | 28-33 | 32-38 | 50-61 | Sea heaps up, waves 4-6m; white foam from breaking waves begins to be blown in streaks. Extremely poor conditions for walrus counts. Little chance of holding binoculars steady enough for a reliable count |