ROUND ISLAND FIELD REPORT

MAY - AUGUST 1998

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Introduction

Between May 7 and August 8, 1998, Wildlife Technicians Steve Stroka, U.S. Fish & Wildlife Service(USF&WS), and Rick Raymond, Alaska Department of Fish & Game(ADF&G), conducted the 6th consecutive year of a cooperative walrus monitoring and visitor program on Round Island in Bristol Bay, Alaska (Figure 1).

Effort in 1998 included: the continued support of the ADF&G Round Island visitor program, consisting of visitor support and facility maintenance; daily monitoring of walrus numbers on haulout beaches; conducting population and productivity studies of cliff nesting seabirds; and providing support for a U.S. Geological Survey/Biological Resources Division (USGS/BRD) walrus tagging project. The following report summarizes work conducted during the 1998 summer field season.

Methods

Walrus Counts

We conducted scheduled, interval, and correlation counts of walrus hauled out and in the near shore waters of the island (see Appendix 1 for Count Protocols). Each observer made three counts of each beach and recorded counts in field books. Each count was independent and observers did not calibrate counts with each other.

We conducted scheduled counts every day at 1400 hours, starting with Main Beach(MB) progressing to North Boat Cove(NBC), Flat Rock(FR), Boat Cove(BC), Campground(CG), First Beach(FB), First Prime(FP), Second Beach(SB). and Second Prime(SP)(Figure 2). Interval counts were conducted every third day, at 0900, 1400, and 1900 hours, for all beaches noted in scheduled counts. Correlation counts, which included all beaches noted for scheduled counts and also West Main Beach(WM), were to be conducted every 3 days. Poor Weather and trail conditions prevented us from conducting these counts on many scheduled days. We did not start correlation counts until June 16 due to snow and ice covering the trail.

Haulout counting method varied with walrus group size and location of haulout. Due to the long focal distance, walrus at Main Beach were always counted using (10 X 42) or (7 X 35) binoculars. We counted a number of animals in a manageable, representative subsection of the group. We then extrapolated that number over the remaining haulout area. All other beaches were counted by counting individual animals with the unaided eye or using binoculars.

Each day environmental information was recorded. This included - cloud cover, precipitation, and wind speed. Minimum/maximum temperature was monitored each day and barometer readings were taken at 0800 and 2000 hours. Along with each separate beach count, we recorded:

Start/stop time for each count

Observer name

Beaufort sea state

Beach condition

Beach available/used

Qualitative assessment of visibility

Qualitative assessment of count quality

(Appendix 1)

Field notes of walrus counts were transcribed to data sheets at the end of each day. The data sheets were quality checked in the field by the opposite observer each day. All count data were then entered into the Bristol Bay Haulout Database (Paradox). The database was quality checked upon return to the office, by comparing original field data sheets to data entered into the computer.

Walrus Disturbance

We recorded opportunistic observations of walrus responses to human activities on only a few occasions. In each observation, we recorded the stimulus source, approximate distance from walrus, number of walrus, and their response.

Seabird Census

We conducted population and productivity surveys of Common Murres (COMU), Black Legged Kittiwakes (BLKI), and Pelagic Cormorants (PECO) following protocols outlined by Andy Aderman -Togiak NWR (Appendix 2).

Productivity plots were located at or near Observation Point (Figure 1). All plots used were based on photos of 1997 plots (Appendix 3). BLKI were monitored on MB-1 and MB-3 plots. COMU were monitored at MB-1 and MB-4. PECO were monitored at MB-2 and MB-3. Plot boundaries used were consistent with 1997 plot boundaries with the exception of MB-3 (BLKI). Due to a lower number of BLKI nests in given plot, we extended the plot boundary as noted (Appendix 3) to obtain 25 nests. Due to delayed receipt of study plot materials and bad weather,

monitoring of plots was delayed and did not follow the two to three day schedule in the protocols. The surveys became opportunistic in order to obtain a reasonable number (≥25% of normal occupancy) of birds on the plots to survey.

Population plots for COMU, BLKI, and PECO were started shortly after the first COMU eggs were seen. Plots used (MB-1, MB-2, MB-3, MB-4) followed the plots outlined in 1997 photos (Appendix 4).

Results

We traveled to the island with minimal gear on May 6, 1998 via helicopter. The remainder of our gear came out on May 10. We started walrus counts on May 7. The walrus counts ended August 8, 1998 and we left the island August 9 via the vessel *Puffin*.

Walrus Counts

We surveyed walrus on 94 continuous days throughout the season. We conducted 94 scheduled counts, 31 interval counts (Table 1) and 11 correlation counts (Table 2). Walrus numbers ranged from a high of 1725 on June 2 to a low of 13 on June 8 . Monthly peaks for May, June, July, and August were 1505, 1725, 1378, and 576 respectively . Average daily counts of walrus varied considerably (Figure 2). The overall average daily count was 580 (SD = 414). Monthly averages for May, June, July, and August were 568 (n = 25, SD = 417), 699 (n = 30, SD = 505), 541 (n = 31, SD = 321), and 321 (n = 8, SD = 196) respectively.

Walrus Disturbance

Observations of walrus disturbances were collected opportunistically. There were 8 noted instances of disturbance (Table 3). Disturbances were caused by marine vessels and aircraft (Appendix 5). During much of the season, walrus were not present at Flat Rock or Boat Cove,

which lessened the opportunity for disturbance by visitor transfers. In addition, we limited our boat activities around the island to 2 ivory salvaging trips and 4 trips transporting USGS/BRD personnel for walrus tagging. No walrus disturbance by terrestrial human activities were noted or reported by campers.

Walrus Tagging

A research team from USGS/BRD came on the island on June 6. The team consisted of Chad Jay, Sean Farley, and Mike Rehberg. They were on the island for 7 days in order to capture and put satellite and VHF transmitters on walrus. There were 4 capture days, with 9 walrus immobilized. Seven walrus were equipped with both types of transmitters and there were 2 capture related mortalities. Six of the 7 walrus were branded (a numerical I.D.) on the rear end of animal. We assisted the team by providing transport to/from Main Beach aboard the 14' inflatable skiff, administering the walrus internal temperature monitor, applying ophthalmic ointment to sedated walrus, tattooing their lower lip, assisting with attachment of transmitters, and hauling equipment. After the team left the island on June 13, I monitored Main Beach with a VHF receiver each day and noted any transmitter equipped animals. On June 18, we received a call from ADF&G notifying us that one of the captured walrus was found deceased at Anchor Point (Togiak Bay).

Seabird Census

Productivity surveys were started June 11. Counts were delayed and interrupted by very bad weather during much of June. High winds, fog, rain, and poor visibility conditions prevailed many days during early to mid June. On several occasions, a survey was attempted, but canceled due to extremely low numbers of birds on plots and/or difficult survey conditions. Productivity surveys were accomplished on 7 occasions from June 11 to July 7. (Appendix 4)

The first COMU egg was seen being carried by a Raven on June 10, with the first noted during a survey on June 13. No BLKI eggs were ever seen on the surveyed plots.

Throughout the survey period, very few birds, on any plot, appeared to be successful in maintaining a nest. Most BLKI nests were falling apart or in dis-repair by middle to late June.

Many of the COMU eggs disappeared throughout the survey period, as well as a high percentage of egg abandonment. The final productivity check scheduled for early August was not done as described. Instead, each plot was checked randomly on several occasions from late July through early August, and no COMU or BLKI chicks were ever seen. There were 2 PECO nests which had 2 chicks each, seen on MB-3, but all disappeared by July 7.

While conducting walrus counts on the west side of the island, I noted one section of northwest facing cliff that had 3 out of 6 visible BLKI nests that produced 3 eggs, leading to 3 chicks. But by July 27, all 3 chicks had disappeared (one was seen partially eaten).

Five population surveys were conducted between June 19 and July 7 (Appendix 5). Due to time constraints of other work, population counts were accomplished on the same day as productivity plots. Plots surveyed were commonly exposed to very high winds throughout the nesting period. During the periods of high wind, many birds abandoned cliff sites and appeared to be waiting out the storm on the water.

Recommendations

General

1. The provided communication equipment was not reliable. VHF and Side Band radios and the radio telephone all worked intermittently (dependent upon weather, atmospheric conditions, and malfunctions). If a situation arises that needs immediate attention, it is possible that inadequate communication could worsen the situation. If a health emergency arises, reliable communication is a necessity. Having a satellite phone for an emergency backup would solve this problem. A satellite phone was brought to the island this year, and used successfully right from the cabin deck.

2. Harvesting of walrus ivory was hindered by poor quality knives and knife sharpeners. At

the least, a reliable and easy knife sharpener should be allocated for the island. I would recommend the Lansky Knife Sharpening System. It is fool proof and would greatly reduce the time needed to salvage walrus ivory.

Walrus counts

1. If there are large numbers of walrus on the "spit" portion of Main Beach, it is likely that we are considerably under estimating walrus numbers. If trail conditions permit, it is possible to get a good correlation photo from Traverse Trail (only need to travel half of trail to get good photo).

2. Tide descriptions, as described in protocols, do not give an accurate description of actual water levels on haulouts. I think it would be more appropriate to install a water level gauge, somewhere easily seen. This would give a much closer description to water levels encountered on the beach.

3. Wind speed and direction was only recorded at one location for each count (the cabin was used because it was the "middle" of the counted beaches). On some occasions, usually when there is wind over 15 km/h, winds varied considerably at each beach, depending upon wind direction. Recording winds at each beach overlook would give a better indication of what effects wind has at each beach.

Seabird Census

1. Without much experience working with COMU, it was very difficult to distinguish Incubating posture from Brooding posture. The sketches provided were not very helpful.

Effort should be made to obtain good photographs distinguishing between the 2 behaviors.

Visitor Program

1. It became evident throughout the season, that campers were either not getting the proper information, or it is not stressed well enough in the information packet. Perhaps the visitor information packet should be reevaluated to include these items:

   A. Waterproofing their important gear and baggage (especially cameras). Recommend dry bags or at least plastic bags inside packs.

   B. The difficulty of climbing Boat Cove's cliff, especially when carrying heavy baggage (i.e. Do not pack your gear in 80lb. cumbersome boxes).

   C. Stress that tents are set up on plywood platforms, which entails use of extra rope/cord to ensure good tie downs in order to withstand winds.

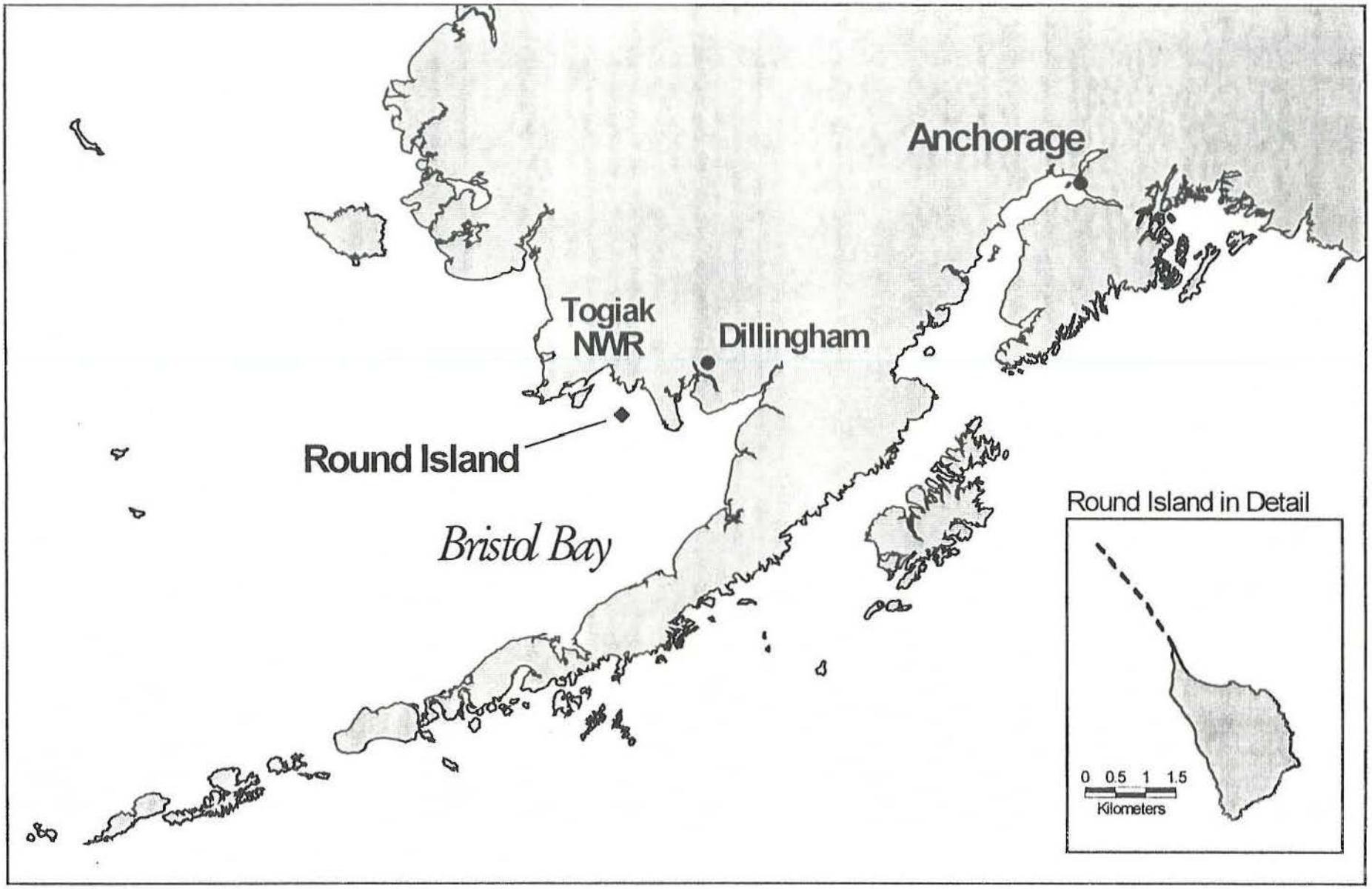


Figure 1. Bristol Bay area map.

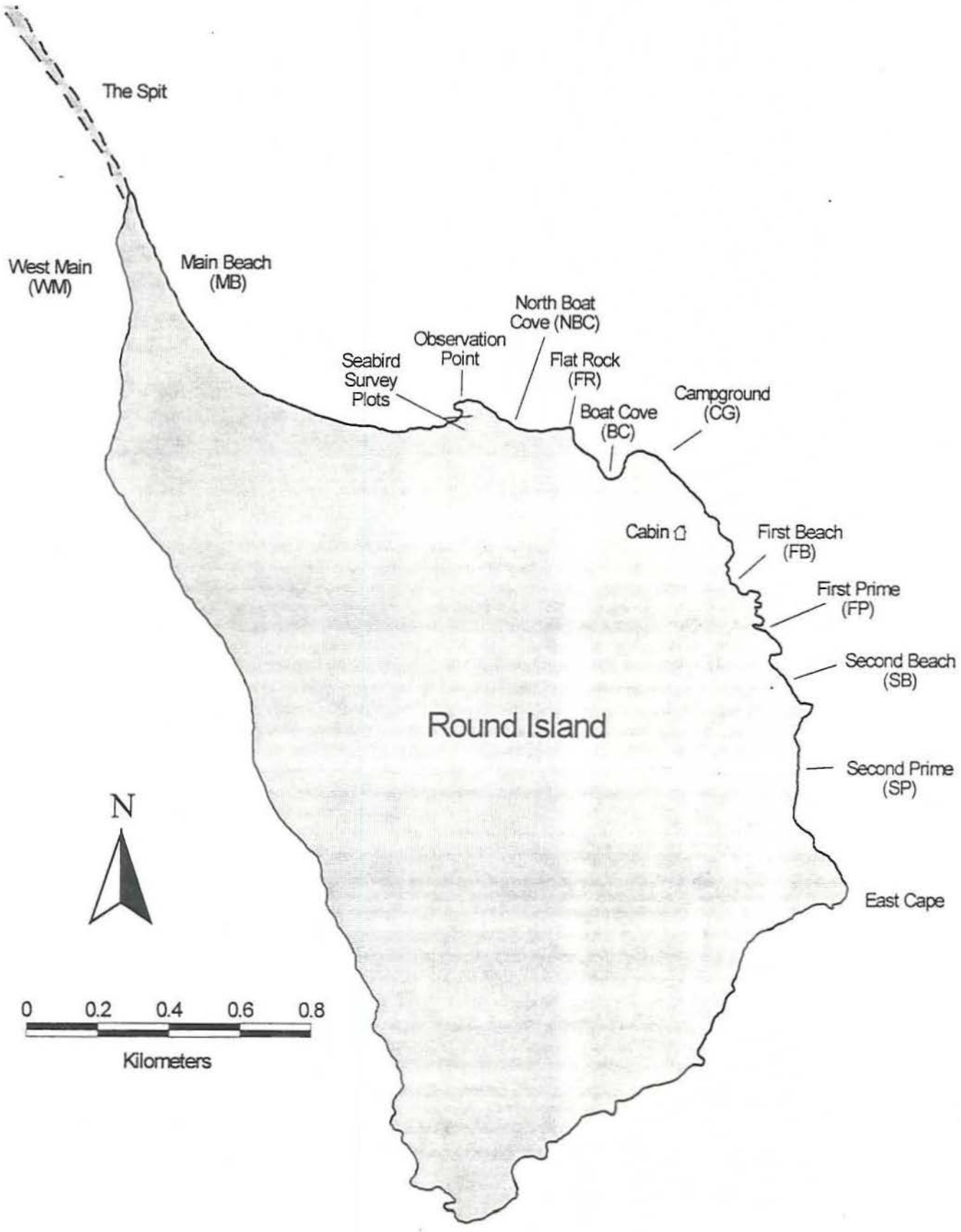


Figure 2. Area map of Round Island including landmarks and walrus haulout beaches.

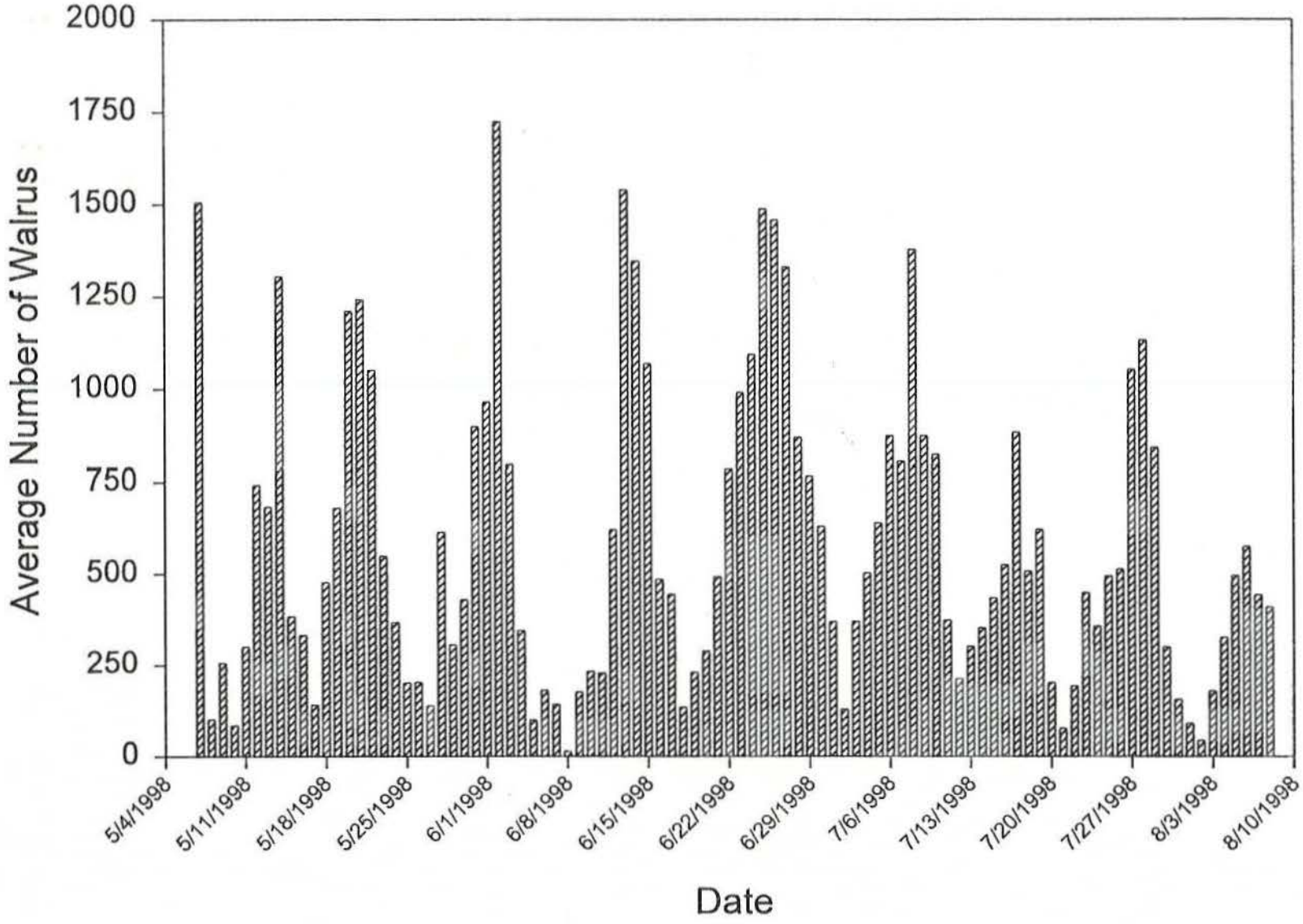


Figure 3. Daily average number of walrus at Round Island, Alaska.

Table 1. Summary of Round Island Interval Counts.

Round Island Interval Counts			
Date	Morning	Afternoon	Evening
5/09/98	249	255	219
5/12/98	417	743	672
5/15/98	210	384	482
5/18/98	282	477	631
5/21/98	1630	1242	1090
5/24/98	327	368	296
5/27/98	85	139	189
5/30/98	365	431	621
6/02/98	1355	1725	1985
6/05/98	58	99	129
6/08/98	12	13	17
6/11/98	101	228	209
6/14/98	1000	1347	1738
6/17/98	350	445	364
6/20/98	281	289	316
6/23/98	789	992	1007
6/26/98	1108	1458	1592
6/29/98	649	768	745

Table 1. Summary of Round Island Interval Counts, (Continued).

Round Island Interval Counts			
7/02/98	171	129	149
7/05/98	607	640	681
7/08/98	1285	1378	1544
7/11/98	331	375	394
7/14/98	283	353	436
7/17/98	671	884	902
7/20/98	362	202	174
7/23/98	445	449	487
7/26/98	447	514	564
7/29/98	859	843	798
8/01/98	85	90	99
8/03/98	236	327	388
8/07/98	389	444	432

Date: Date of interval count.

Morning: Number of walrus hauled out during 0900 count.

Afternoon: Number of walrus hauled out during 1400 count.

Evening: Number of walrus hauled out during 1900 count.

Note: Walrus numbers are an average of 6 replicate counts.

Table 2. Summary of Correlation counts between Main Beach (MB) and West Main Beach (WM).

Correlation Counts						
Date	Count Start Time	West Main Beach		Count Start Time	Main Beach	
		Land	Water		Land	Water
6/16/98	1430	1	1	1615	485	14
6/24/98	1229	216	4	1409	740	51
6/28/98	1435	0	0	1615	871	3
7/7/98	1435	26	2	1612	796	16
7/10/98	1620	0	0	1400	451	7
7/13/98	1619	0	0	1350	126	3
7/16/98	1750	136	0	1400	288	7
7/19/98	1305	192	14	1400	389	3
7/22/98	1357	63	4	1343	193	5
7/28/98	1625	0	0	1353	553	3
7/31/98	1245	0	0	1400	89	7

Count Start Time: Time when the specified beach count began.
Land counts: Number of walrus counted on land (protocols in Appendix 1).
Water counts: Number of walrus counted in the water within 10m of shore (Protocols in Appendix 1).

Table 3. Summary of Round Island Walrus Disturbances

Date	Time	Stimulus Type	Distance From Walrus	Number of Walrus Present	Walrus Reaction		
					# Head Raises	# Orienting	# Displaced
5/06/98	1900	Helicopter	250 ft	~ 30	~15	0	All
5/11/98	0945	Fishing Vessels	150 m	13	7	3	All
6/12/98	1830	Inflatable Boat	150 m	15	6	3	All
6/17/98	0930	Marine Vessel	200 m	7	2	0	3
6/27/98	1030	Marine Vessel	100 m	30	4	0	4
7/10/98	0915	Marine Vessel	150 m	9	4	0	1
7/10/98	1400	Aircraft	2000 ft	~200	0	0	0
7/17/98	1030	Aircraft	3000 ft	350	10	0	2

Time: Time at the onset of the walrus disturbance.
Stimulus type: The source of the disturbance.
Distance from walrus: Estimated distance (in meters) from the walrus affected and the disturbance source.
Number of walrus present: Number of walrus that were seen near the disturbance source.
Head raises: Number of walrus that exhibited a head raise (standing up) in response to the disturbance.
Orienting: Number of walrus that changed their position on the haulout in response to the disturbance.
Displaced: Number of walrus that abandoned the haulout in response to the disturbance.

Appendix 1

Bristol Bay

Walrus Haulout Monitoring Program

Summer, 1998

Background: Joint USA-Russia range-wide population surveys of the Pacific walrus are currently cost-prohibitive and do not provide data useful for detecting trends in a statistically reliable manner. Alternative methods to monitor population status and trend are needed. Meetings were held in 1996 between the Fish and Wildlife Service, National Biological Service (now U.S. Geological Survey's BRD), Alaska Department of Fish and Game, University of Alaska, and the Eskimo Walrus Commission to discuss options for assessing the Pacific walrus population. It was suggested that a Bristol-Bay wide walrus monitoring program might provide needed data on haulout dynamics and trends of walrus residence in Bristol Bay which might be used in development of future survey methodology and which could possibly be used as an index of population-wide trends.

From May through October, walrus congregate in Bristol Bay to feed and haulout in large numbers at traditional hauling-out grounds at Round Island, Cape Peirce, Cape Newenham, and Cape Seniavin. It was suggested that monitoring these 4 largest terrestrial haulouts could provide cost-effective information on trends in the number of male walrus summering in Bristol Bay region and other useful information. In addition to initiating the evaluation of historic count data from Round Island and Cape Peirce, it was decided that a bay-wide monitoring program be developed and tested as soon as possible.

Purpose: To develop and test the feasibility of conducting a walrus monitoring project in Bristol

Bay which would be useful for managing on a regional basis and which might form the basis of a population trend index.

Objectives: 1) Test the feasibility of establishing a long-term program for systematically monitoring trends in walrus numbers summering in Bristol Bay.

2) Identify and monitor anthropogenic and environmental conditions which change walrus usage patterns of Bristol Bay haulouts.

3) Identify temporal and tidal effects on haulout behavior

4) Identify any correlation of occupancy patterns between the four haulouts.

5) Determine the utility of these data as a tool for monitoring walrus regionally and as potential trend index for the Pacific walrus population.

6) Assess the management benefits of such a monitoring program.

Count data will be used to identify patterns in haulout use, including diurnal periodicity, minimum and maximum Bristol Bay counts, correlations of counts between haulouts, and correlations between counts, levels of anthropogenic activities, and environmental conditions. Information on haulout patterns will be used in the development of future range-wide population surveys. An evaluation of the benefits of continuing a bay-wide monitoring program and subsequent recommendations for systematic, bay-wide data collection protocols will be made.

Walrus Counting Protocols
Bristol Bay Walrus Haulout Monitoring Program
Summer, 1998

Follow these protocols every day. If a situation arises and you cannot follow standard protocols, document (in detail) how and why you changed protocols in the comments section of the count data form.

We are asking for an increase in observer effort this year so we can collect information to answer some basic questions of haulout use and herd movement patterns. This information will help to refine the methodology for the Bristol Bay haulout index and monitoring program and will provide important information on widespread movement patterns (useful in understanding the dynamics of the Bristol Bay complex and will help in the design of the next range-wide population survey) .

1. Counting Methodology. Individually count walrus hauled out on each beach or estimate their numbers using binoculars, tally meter, pencil, and notebook. Count the number of walrus in the water (within 10m of shore) at each beach and record the number separately from the beach count.

Tally meters are notorious for short functional (accurate) lives, and quickly become great sources of variability and inaccuracy in counting. Every day or 2, check your tally meter by counting to 100-200 and checking what the tally reads, repeat this once or twice to determine if the tally is working properly. Replace the tally meter as soon as the it begins malfunctioning.

Counting technique will vary with group size counted. The following guidelines are suggested. In general, count individuals in groups of up to 200 animals. The maximum number of walrus that can be counted individually will vary with observer experience, beach location, survey conditions, etc. For example: on haulouts with distinctive landmarks such as boulders, larger numbers of walrus can be individually counted. To count these groups, divide the beach into sections, using landmarks as reference points. Count walrus in each section, and add these sections for a total count. Otherwise, in groups >200 individuals, estimate walrus numbers.

To estimate numbers in larger groups, count the number of animals in a manageable, representative subsection of the group. Extrapolate that number over the remaining herd area.

All observers involved in walrus counting will count together each day.
Each observer will make 3 independent counts of each beach (groups $\geq$ 10 animals) and record these counts in their field book. If time permits, make 4 independent counts/beach. Each count is independent; the replicates will be used to identify sources and levels of variability in the count data. Do not discuss your counts with your partner until after counts are complete. Do not discard counts or change your counts after discussing them with other observers. If you are mid-way into a count and lose track or feel that the count is poor, start over.

Photograph one beach each survey day. Select a beach to start with and then photograph each beach (one each day) in sequence. Don't photograph herds comprising less than 10 animals. Record the roll identification and frame numbers in your field book and transfer this information to the comments section of the count data form. After the slides are processed, write the log-ID, beach, and start time on the slide frame with indelible marker. We will count a sample of these slides to identify individual bias and assess count accuracy of herds.

2. Daily Counts.

I. Round Island, Cape Peirce, Cape Seniavin: Start by recording the AM barometer reading at 0800. Begin counts at 14:00. Establish a routine where you count the beaches in the same

order each day. Describe any changes to your normal routine in the comments section of the count data form.

II. Cape Newenham: Collect the AM barometer reading at 0800. Time your hikes to arrive at the haulout as close to 14:00 as possible.

3. Interval Counts (Round Island, Cape Peirce, Cape Seniavin). Every third day, observers will conduct repeated counts of each beach at prescribed intervals. Like the daily counts, these counts will be conducted independently, by both observers. Interval counts will occur simultaneously at monitored haulouts. (Because of the distance and time involved in covering Cape Newenham beaches, this haulout is exempt from interval counts). Once you begin a sequence of beaches counted, follow this same sequence for the duration of the field season. Collect the same environmental data as you do during routine daily counts.

Interval counts will begin at 0900, 1400, and 1900. Dates of interval counts are:

MAY: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
JUNE: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
JULY: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
AUG: 1, 4, 7, 10, 13, 16, 19, 22

Disregard any dates you are not in the field. Continue the pattern if you are in the field longer than the listed schedule. If there is a conflict between a scheduled interval count and another unavoidable activity (Round Island boat visit, etc), continue normal protocols (multiple observers, independent counts) to count as many of the intervals as possible. During periods of interruption, attempt to have one observer keep to the schedule to prevent interruptions of the intervals. Note any changes to standard protocols in the comments section of the count data form.

4. **Main Beach Correlation (Round Island only).** In order to determine the relationship

between numbers of walrus hauled out on West Main beach and Main beach, observers on Round Island will include counting walrus at West Main as part of their daily counts once every 3 days. In order to count West Main beach, observers must walk Traverse Trail to the west end of the island. If trail or weather conditions prevent safe travel over this trail, delay beginning the counts until conditions are safe. If scheduling conflicts prevent observers from counting West Main, reschedule the correlation count for the day before the originally scheduled count (ie. if a correlation count is scheduled for July 4 and Winkleman is bringing visitors to the island during the counting period, reschedule the correlation count for July 3). This will take a little advance planning. If schedules or protocols are modified in any way, record how and why in the comments section of the count data form.

Dates of correlation counts are:
MAY: 5, 8, 11, 14, 17, 20, 23, 25, 28
JUNE: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28
JULY: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31
AUG: 3, 6, 9, 12, 15

Appendix 2

Seabird Productivity and Population Survey Protocols for Round Island

-Outlined by Andy Aderman, Wildlife Biologist, Togiak NWR

June 1, 1998

Productivity Plots

For Black Legged Kittiwakes(BLKI) - monitor about 25 nests at MB-1 and MB-3. Pick 25 nests within the boundaries noted on plot photograph that you want to monitor. Keep track of each nest by assigning a number to each. Make sketches and notes, or number them on photo. A nest is considered as any new material being deposited. Use codes on bottom of productivity form (same codes as for Pelagic Cormorants [PECO]).

For Common Murres (COMU) - monitor productivity at MB-1 and MB-4. Again, try to get 25 incubating birds per plot. No photos are available that show incubating posture (IP) or brooding posture (BP), but can read description on code form. Assign a number to each IP bird and make notes, sketches, etc., so you can follow them through out the season.

Monitor productivity plots every second or third day, starting in late May and continuing until the end of June. All productivity plots do not have to be done on the same day (like population counts).

Population Plots

After the first Black Legged Kittiwake (BLKI) or Common Murre (COMU) eggs are observed, begin population counts. Count all birds within plot boundaries (noted on plot photos) for all three species. In addition, count all nests for PECO and BLKI, COMU have no nests. Conduct 2 counts for each plot (MB-1, MB-2, MB-3, MB-4, MB-5, FB-1). Visit all population plots on the same day. Try to get 10 counts (10 different days) and finish the last count by the end of June.

On the same plots, count the number of chicks present starting around August 1. Chicks will usually start to fledge by 5-6 August. This "chick check" can be as late as 12 August and can be reasonably accurate. You only have to count chicks on one day, but you must be keeping track of their ages to determine a good day to count, so you don't lose them to mortality or fledging.

Feel free to monitor additional plots if you want, just keep notes on where you are monitoring the birds, observation points, photos, etc.

*Plot boundaries and descriptions of observation locations are provided in Appendixes 3 & 4.

Appendix 3

* Notes on Back

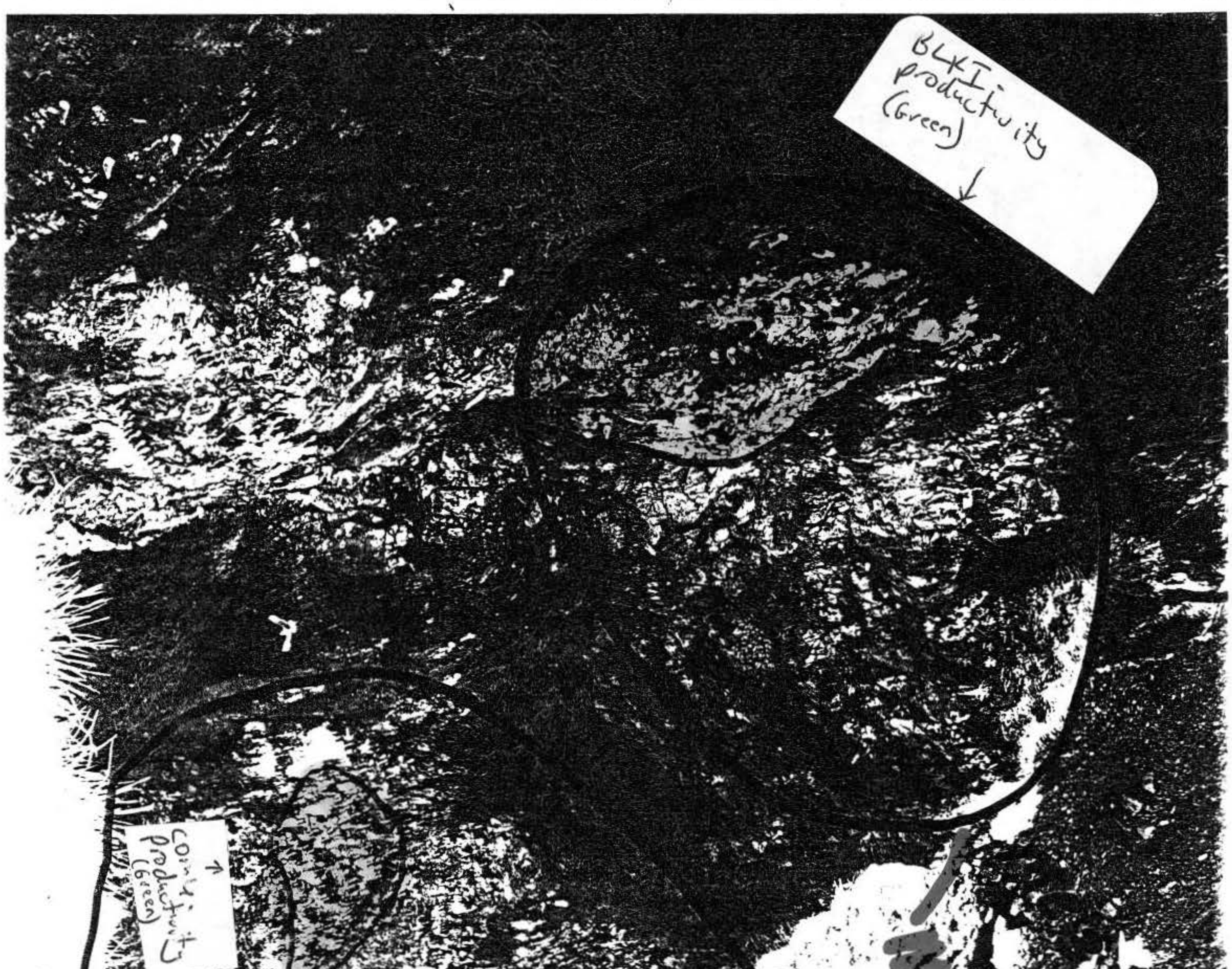
View from point 10 m East of MB observation pt.

MB-1 Back side of MB observation point

monitor productivity for BLKI, PECO, COMM (inside screen)

population - BLKI, COMM, PECO

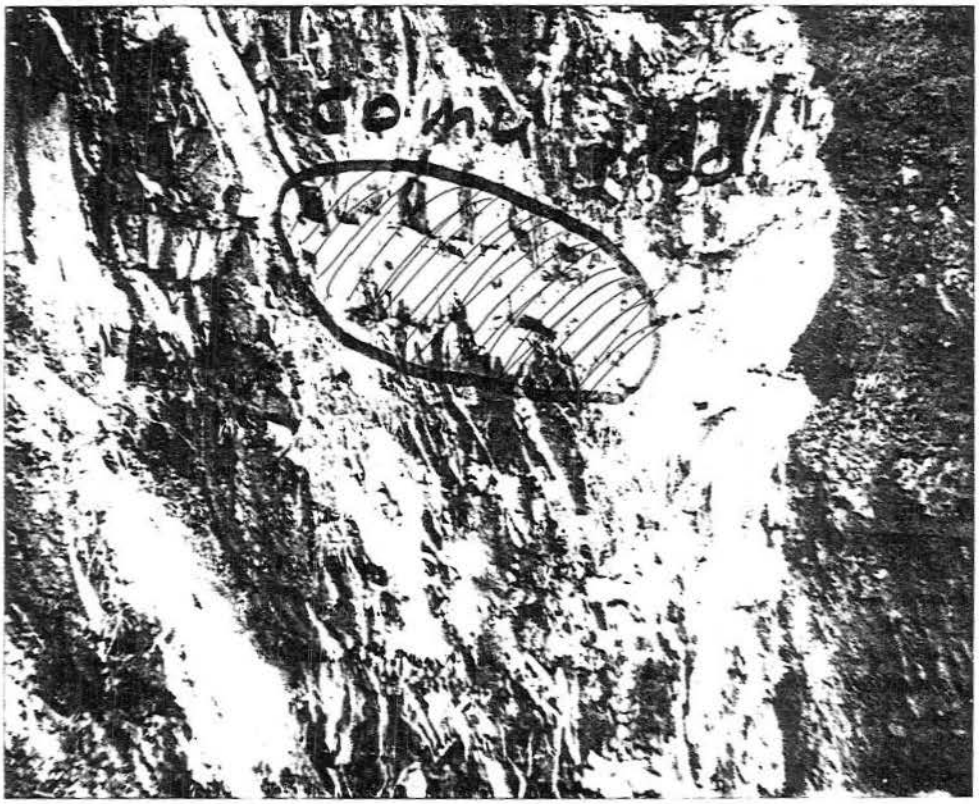
(edge of photograph is plot boundary)


B4XI productivity (Green)
MB3
MB-4

Orientation Shot BLKI MB-3 (upper Section) and BLKI MB-4 (lower Section). Photo taken from Observation pt. for BLKI MB-3. BLKI MB-4 viewed from Observation pt ≃ 30m downhill (marked by wooden stake)

MB-4 monitor population (BLKI, COMU, PECO)
productivity (COMU - inside green)

MB-3 see back of other photo



MB 1 1998

Comu Productivity Plot

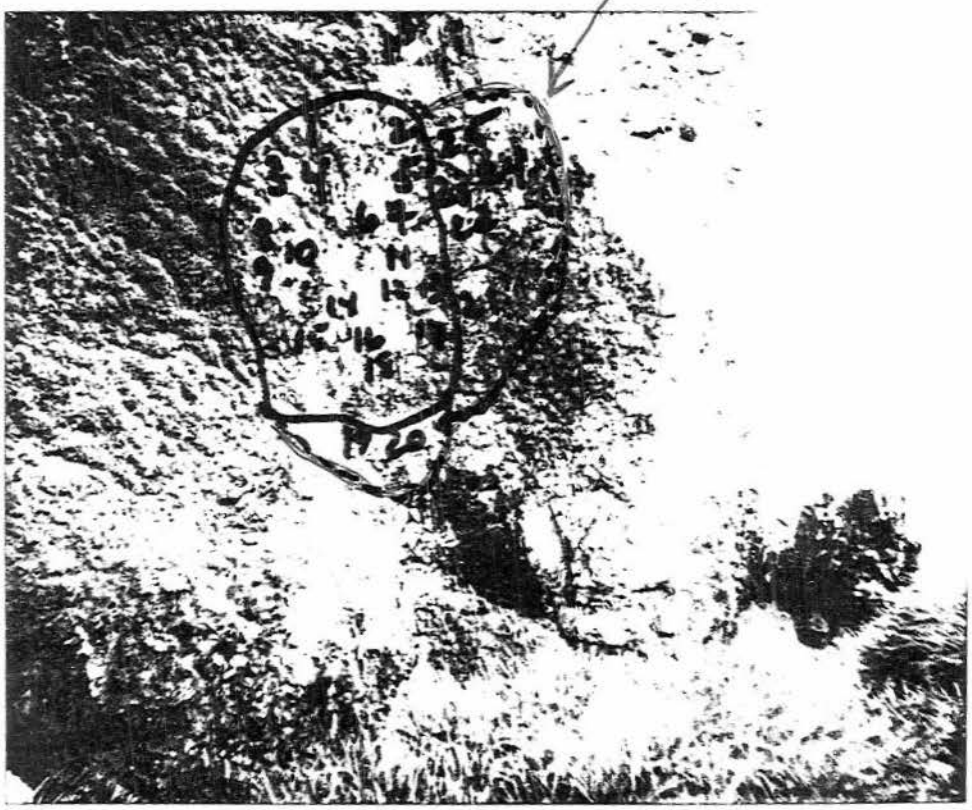
MBI

BLK I
productivity
plot

1998

nest locations

26 (con't)



MB3

1998

LKI Productivity plot + nest sites

26 (con't)

mB4

1998

Comy productivity plot

26 (con't)

Round Band

Year–1998	Colony–~~Cape Pierce~~	Productivity plot– MB-1	Species– BLKI

Observer										
Even julian date or midpoint										
Date	6/11/98	6/13/98	6/19/98	6-23-98	6/27/98	7/3/98	7/7/98			
Julian date				E						
Time start	1345	1730	1900	1831	1850	1444	1930			
1	B	B	BE	N	N	U	B			
2	N	B	B	N	N	B	U			
3	N	B	B	N	N	U	B			
4	B	U	BU	B	B	B	B			
5	B	B	B	N	N	N	B			
6	B	B	B	N	B	U	N			
7	B	B	U	B	B	N	B			
8	B	B	U	N	N	B	B			
9	N	N	U	N	N	B	B			
10	B	B	B	N	N	N	B			
11	B	N	B	U	N	B	B			
12	B	N	BU	N	N	B	B			
13	B	U	B	N	N	B	N			
14	N	B	B	B	U	U	B			
15	B	B	B	N	B	B	U			
16	B	B	B	BU	B	B	B			
17	B	B	B	U	N	B	B			
18	B	U	B	N	B	B	B			
19	B	B	U	U	U	B	N			
20	B	B	B	N	B	U	N			
21	B	B	B	N	N	B	B			
22	B	B	B	N	N	B	B			
23	B	B	U	N	N	U	B			
24	B	B	B	N	B	B	B			
25	B	B	U	N	N	B	B			
ceiling (ft)	1000	1500	1500	2000	3000	2000	unlimit.			
visibility (miles)	12	15	2	15	unlimited	15	unlimit			
wind speed (mph)	8	5	5	35	3	5	5			
wind direction	S	N	S	N	E	N	SE			
rain (yes/no)	NO	NO	YES	NO	NO	NO	N			
fog (yes/no)	NO	NO	NO	NO	NO	NO	N			
observations							Never saw an egg (or chick for that matter)			

Codes: N=an empty nest site; B=an adult bird;BE=bird w/egg(E2,E3,etc);BC=bird w/chick(C1,C2, etc.);
IP=incubating posture(murres);E=egg present, no adult; BP=brooding posture(murres);
C= chick present, no adult; NN=no nest; F= fledged; U= adult present, unknown egg or chick.

Round Island

Year–1998 Colony–~~Cape Peirce~~ Productivity plot– MB-1 Species– COMU

Observer										
Even julian date or midpoint										
Date										
Julian date	6/11/98	6/13/98	6/19/98	6-23-98	6/29/98	7/3/98	7/7/98			
Time start	1400	1735	1909	1835	1856	1955	1940			
1	B	BE	B	B	IP	IP	BE			
2	B	BP	B	B	IP	IP	IP			
3	B	B	IP	IP	IP	B	B			
4	B	B	IP	IP	IP	BE	IP			
5	IP	B	IP	IP	IP	IP	B			
6	B	B	BE	B	IP	B	B			
7	B	B	B	B	B	IP	BP?			
8	B	B	U	IP	IB	IP	B			
9	B	BE	B	IP	IB	B	B			
10	B	B	B	BE	IP	B	B			
11	B	B	B	IP	B	IP	B			
12	B	B	B	IP	BE	IP	B			
13	IP		IP	BE	BE	B	BE			
14	B		B	BE	IP	IP	B			
15	B		U	IP	IP	IP	IP			
16	B		U	IP	IP	B	B			
17	B		B	IP		B	BE			
18	B		B	B		B	IP			
19	B		IP	IP		B	IP			
20	B		BU	IP		B	B			
21	B		B	B		IP	B			
22			B	IP		IP	B			
23			B			IP	B			
24			IP			B	B			
25			U			BE	BE			
ceiling (ft)	1600	1500	1500	2000	3000	2000	unlimit			
visibility (miles)	12	15	10	15	unlimited	15	unlimit			
wind speed (mph)	5	5	5	35	3	5	5			
wind direction	S	N	S	N	E	N	SE			
rain (yes/no)	N	N	Y	NO	NO	N	N			
fog (yes/no)	N	N	N	NO	NO	N	N			
observations										

Codes: N=an empty nest site; B=an adult bird;BE=bird w/egg(E2,E3,etc);BC=bird w/chick(C1,C2, etc.);
IP=incubating posture(murres);E=egg present, no adult; BP=brooding posture(murres);
C= chick present, no adult; NN=no nest; F= fledged; U= adult present, unknown egg or chick.

Year: 1998 Colony: Round Island Population Plot: MB-1

Replicate	Obs.	Date	Time	Count	BLKI adults	BLKI nests	COMU adults	PECO adults	PECO nests
1	STEVE STROKA	6/19/98	start: 1912	1	69	38	65	0	0
			stop: ~~1919~~ 1919	2	64	41	61	0	0
				mean	ERR	ERR	ERR	ERR	ERR
2	Steve Stroka	6/23/98	start: 1825	1	~~68~~ 19	31	48	0	0
			stop: 1830	2	19	30	49	0	0
				mean	ERR	ERR	ERR	ERR	ERR
3	Steve Stroka	6/27/98	start: 1843	1	13	39	50	0	0
			stop: 1849	2	13	38	54	0	0
				mean	ERR	ERR	ERR	ERR	ERR
4	Steve Stroke	7/3/98	start: 1437	1	52	38	50	0	0
			stop: 1444	2	48	37	51	0	0
				mean	ERR	ERR	ERR	ERR	ERR
5	Steve Stroke	7/7/98	start: 1920	1	67	36	69	0	0
			stop: 1928	2	71	37	65	0	0
				mean	ERR	ERR	ERR	ERR	ERR
6			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
7			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
8			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
9			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
10			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
				mean	ERR	ERR	ERR	ERR	ERR

Round Island

Year--1998 Colony--~~Cape Pierce~~ Productivity plot-- MB-3 Species-- BLKI

Observer											
Even julian date or midpoint											
Date	6/11/98	6/13/98	6/19/98	6-23-98	6-27-98	7-3-98	7-7-98				
Julian date											
Time start	1705	1745	1933	1845	1917	2010	2005				
1	B	B	B	U	N	N	N				
2	B	B	B	U	N	B	B				
3	B	U	B	U	N	U	B				
4	N	B	B	N	N	U	U				
5	B	N	B	U	N	U	U				
6	B	B	B	U	N	B	B				
7	B	B	U	N	N	U	B				
8	B	N	U	N	N	U	U				
9	B	B	U	N	N	U	B				
10	B	B	B	B	N	B	B				
11	B	U	U	N	N	B	B				
12	B	U	U	N	B	U	B				
13	B	B	U	N	N	B	B				
14	B	N	U	N	N	U	N				
15	B	B	B	N	N	B	B				
16	N	B	B	U	N	B	U				
17	N	U	U	N	B	B	B				
18	N	N	U	B	N	B	B				
19	B	B	B	N	B	U	B				
20	B	B	U	U	N	U	U				
21	B	U	B	N	N	U	B				
22	B	U	B	U	N	B	B				
23	B	B	U	B	N	U	B				
24	B	B	U	B	N	N	B				
25	B	B	U	U	N	B	U				
ceiling (ft)	1000	1500	1500	2000	3000	2000	unlimit.				
visibility (miles)	12	15	5	15	unlimited	15	unlimit.				
wind speed (mph)	8	5	5-8	35	3	5	5				
wind direction	S	N	S	N	E	N	SE				
rain (yes/no)	N	N	Y	NO	NO	N	N				
fog (yes/no)	N	N	N	NO	NO	N	N				
observations	did most nest counts for U but was some.						never saw any eggs or chicks - most nests falling apart now.				

Codes: N=an empty nest site; B=an adult bird;BE=bird w/egg(E2,E3,etc);BC=bird w/chick(C1,C2, etc.);
IP=incubating posture(murres);E=egg present, no adult; BP=brooding posture(murres);
C= chick present, no adult; NN=no nest; F= fledged; U= adult present, unknown egg or chick.

Round Island

Year–1998 *Colony–~~Cape Peirce~~* *Productivity plot–MB-3* *Species–PECO*

Observer										
Even julian date or midpoint										
Date	6/23/98	6-22-98	7-3-98	7-7-98						
Julian date										
Time start	1855	1420	2015	2010						
1	U	C2	C1	B						
2	C2	C2	U	N						
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
ceiling (ft)	2000	3000	unlimit							
visibility (miles)	15	unlimited	unlimit							
wind speed (mph)	35	3	4							
wind direction	N	E	SE							
rain (yes/no)	NO	NO	N							
fog (yes/no)	NO	NO	N							
observations										

Codes: N=an empty nest site; B=an adult bird;BE=bird w/egg(E2,E3,etc);BC=bird w/chick(C1,C2, etc.);
IP=incubating posture(murres);E=egg present, no adult; BP=brooding posture(murres);
C= chick present, no adult; NN=no nest; F= fledged; U= adult present, unknown egg or chick.

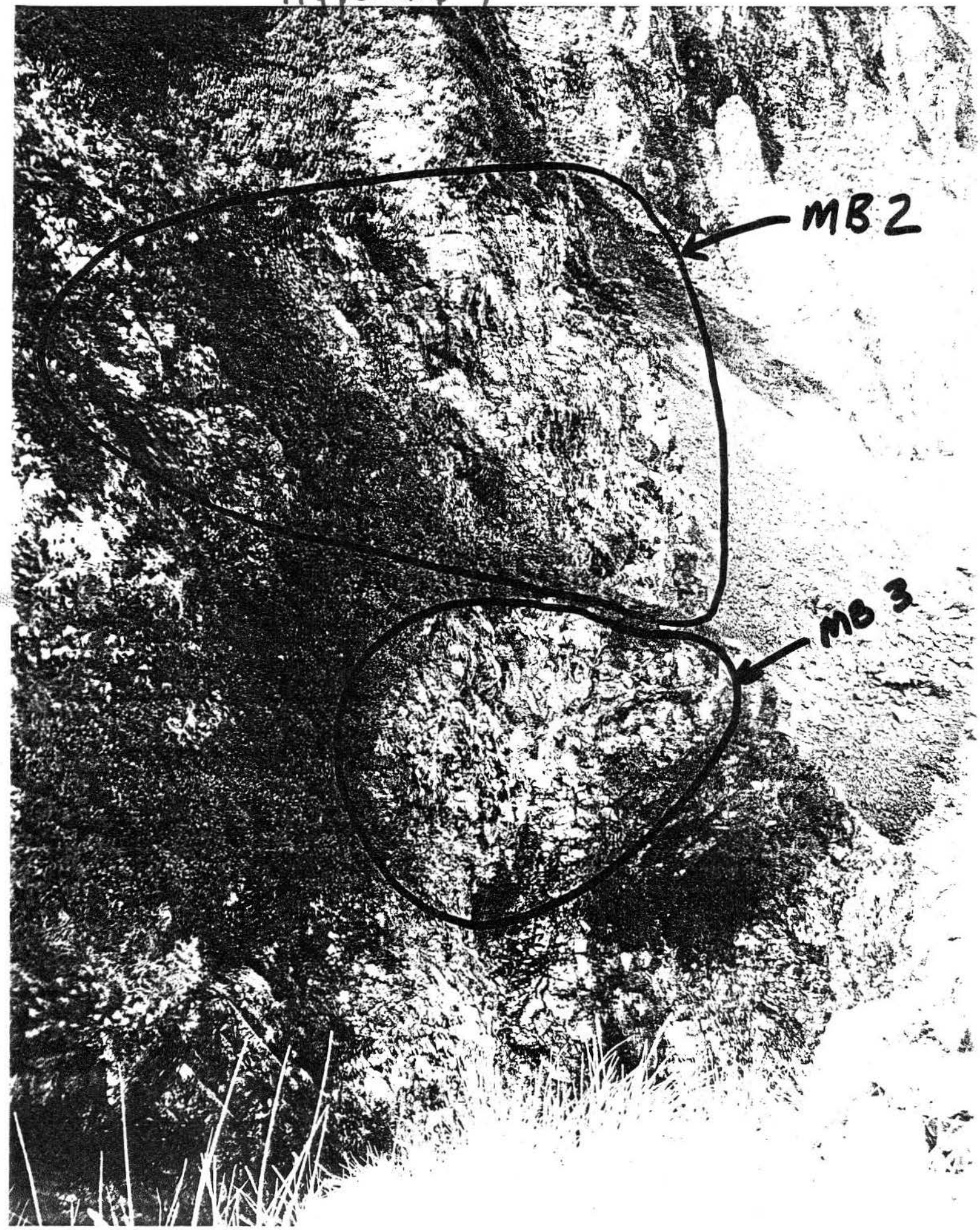
Round Island

Year--1998 Colony--~~Cape Peirce~~ Productivity plot-- mB-4 Species-- COMU

Observer										
Even julian date or midpoint										
Date	6/11/98	6/13/98	6/19/98	6/23/98	6-27-98	7-3-98	7-7-98			
Julian date										
Time start	1422	1755	1950	1913	1936	2045	2040			
1	B	B	IP	IP	IP	B	B			
2	B	U	IP	IP	IP	B	B			
3	B	IP	IP	B	IP	IP	B			
4	B	IP	IP	B	B	IP	BE			
5	B	B	BE	E	IP	IP	IP			
6	IP	B	B	IP	IP	IP	BE			
7	B	U	B	B	IP	B	B			
8	B	B	IP	U	U	IP	B			
9	B	B	BE	U	IP	IP	IP			
10	U	IP	B	IP	B	IP	IP			
11	U	B	IP	IP	U	B	U			
12	B	U	BC	B	IP	B	U			
13	B	U	IP	B	U	B	IP			
14	U	U	B	B	U	B	IP			
15	U	IP	B	B	B	B	IP			
16	U	B	U	IP	B	B	B			
17	U	U	B	IP	B	B	B			
18	B	U	B	IP	IP	B	B			
19	U	U	IP	IP	B	IP	B			
20	B	B	IP	BE	U	IP	B			
21	IP	U	U	IP	IP	IP	B			
22	B	U	B	IP	IP	U	BE			
23	U	U	U	B	B	IP	B			
24	U	U	IP	B	U	B	U			
25	U	IP	IP	IP	U	IP	B			
ceiling (ft)	1000	1500	1500	2000	3000	2000	unlimit			
visibility (miles)	12	15	10	15	unlimited	15	unlimit			
wind speed (mph)	8	5	5	35	3	5	5			
wind direction	S	N	S	N	E	N	SE			
rain (yes/no)	N	N	Y	NO	N	N	N			
fog (yes/no)	N	N	N	NO	N	N	N			
observations										

Codes: N=an empty nest site; B=an adult bird;BE=bird w/egg(E2,E3,etc);BC=bird w/chick(C1,C2, etc.);
IP=incubating posture(murres);E=egg present, no adult; BP=brooding posture(murres);
C= chick present, no adult; NN=no nest; F= fledged; U= adult present, unknown egg or chick.

Appendix 4

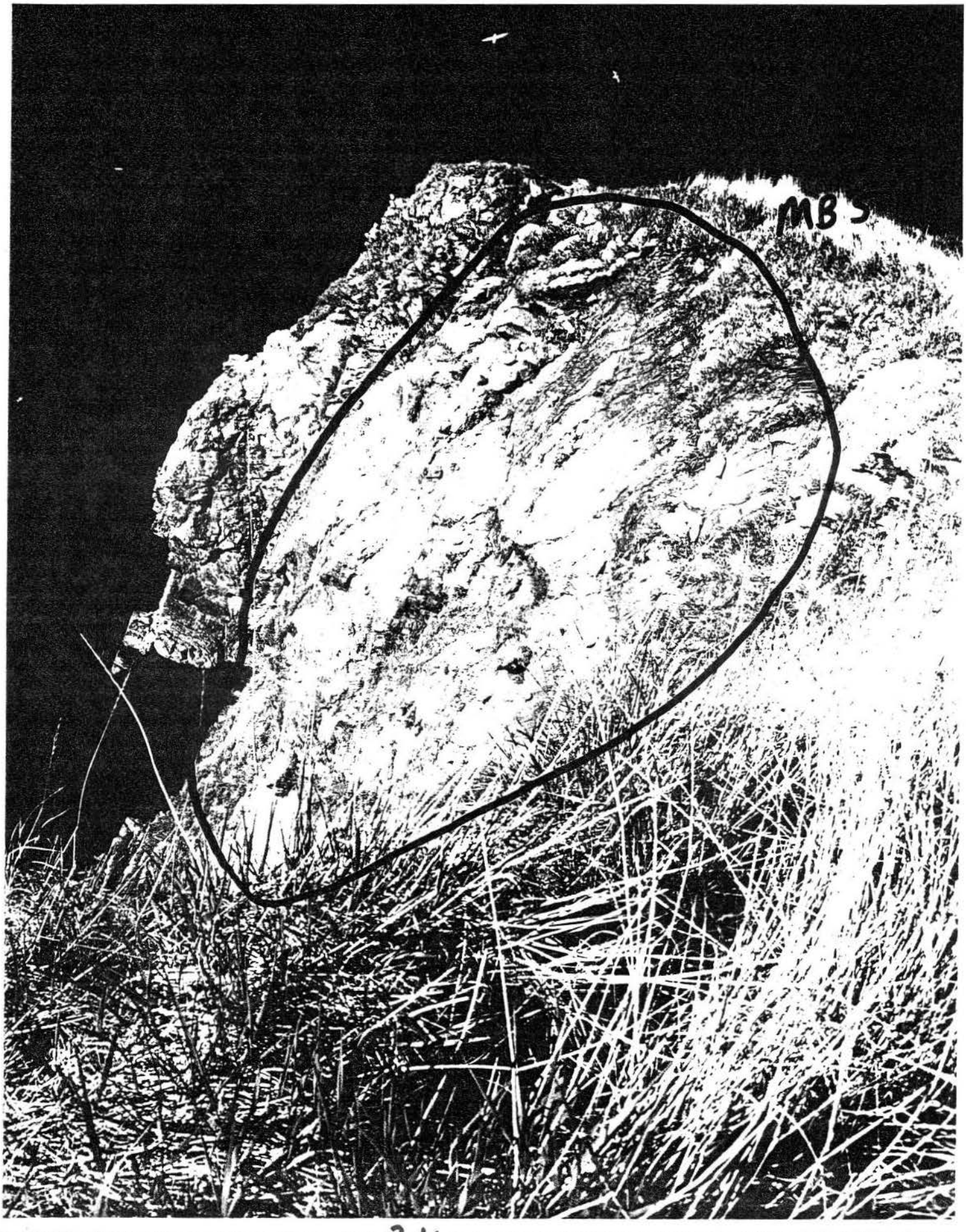


1998 MB-2 & MB-3 are monitored from MB observation point

MB-2 Population only (BLKI, COMU, PECO)

MB-3 Productivity) - BLKI, PECO if there ← area inside green (see other photo)
Population - BLKI, PECO if there ↓ area inside black

MB-5

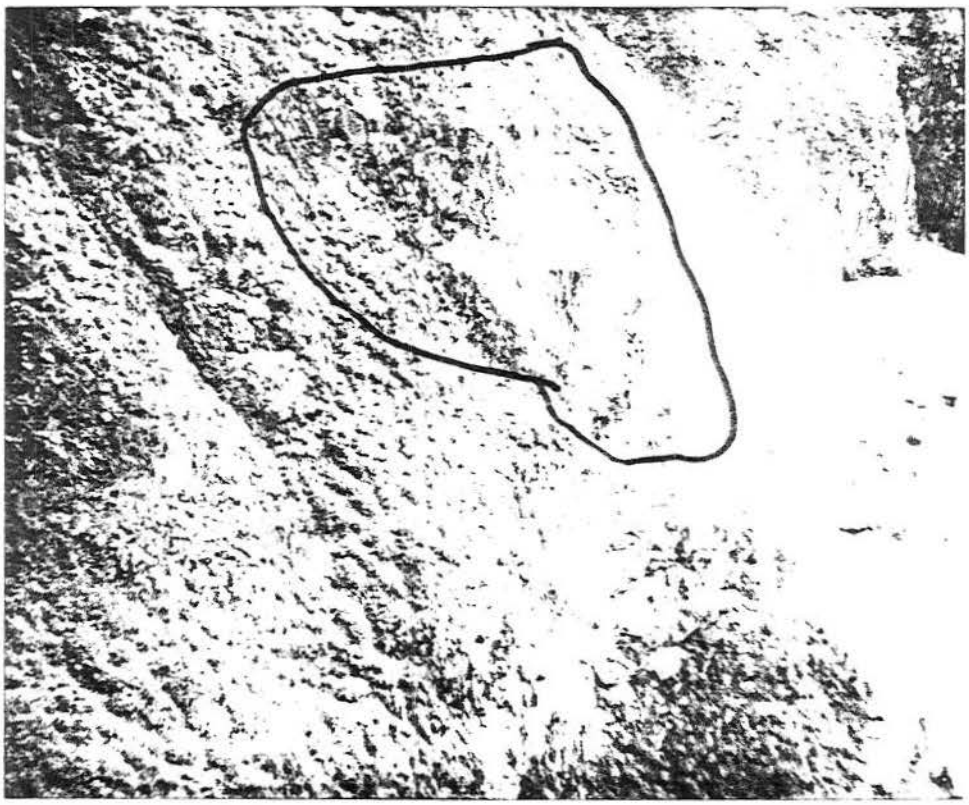


Frame 22

PECO and BLKI MB-5. View from rocky ledge ~ 5 m below Observation pt. Some nests difficult to view with out leaning dangerously over cliff. Consider placing anchor here and roping up during counts.

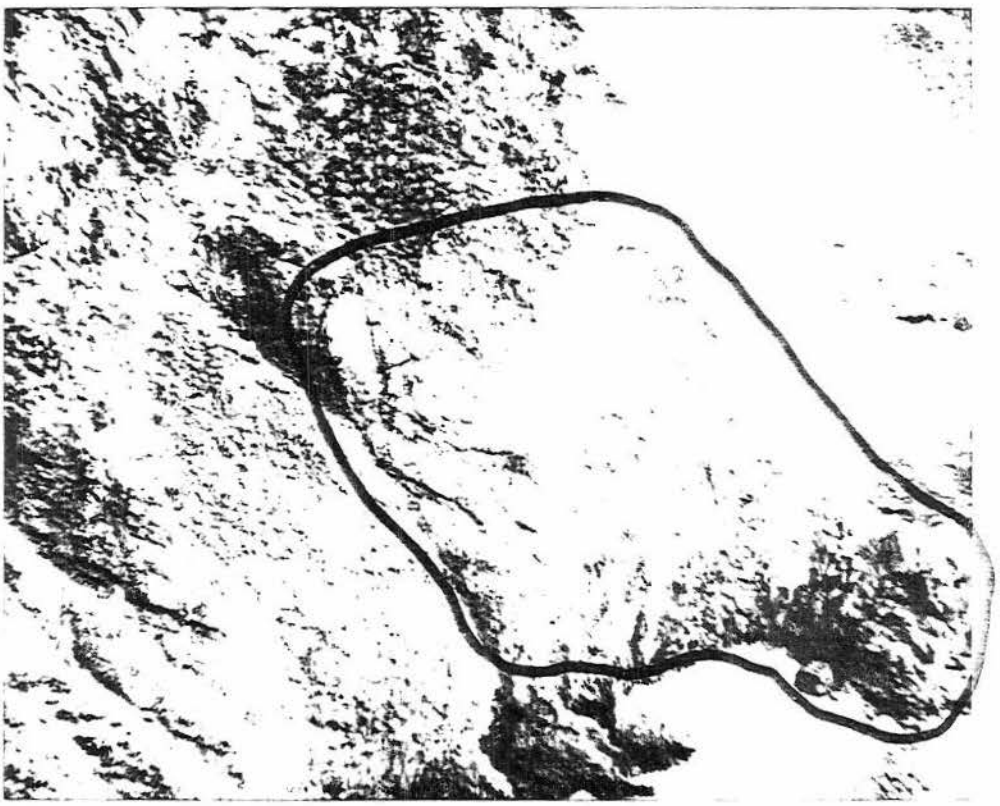
MB-5 population - BLKI, PECO

Population Plot



MB2
1998

Population Plot

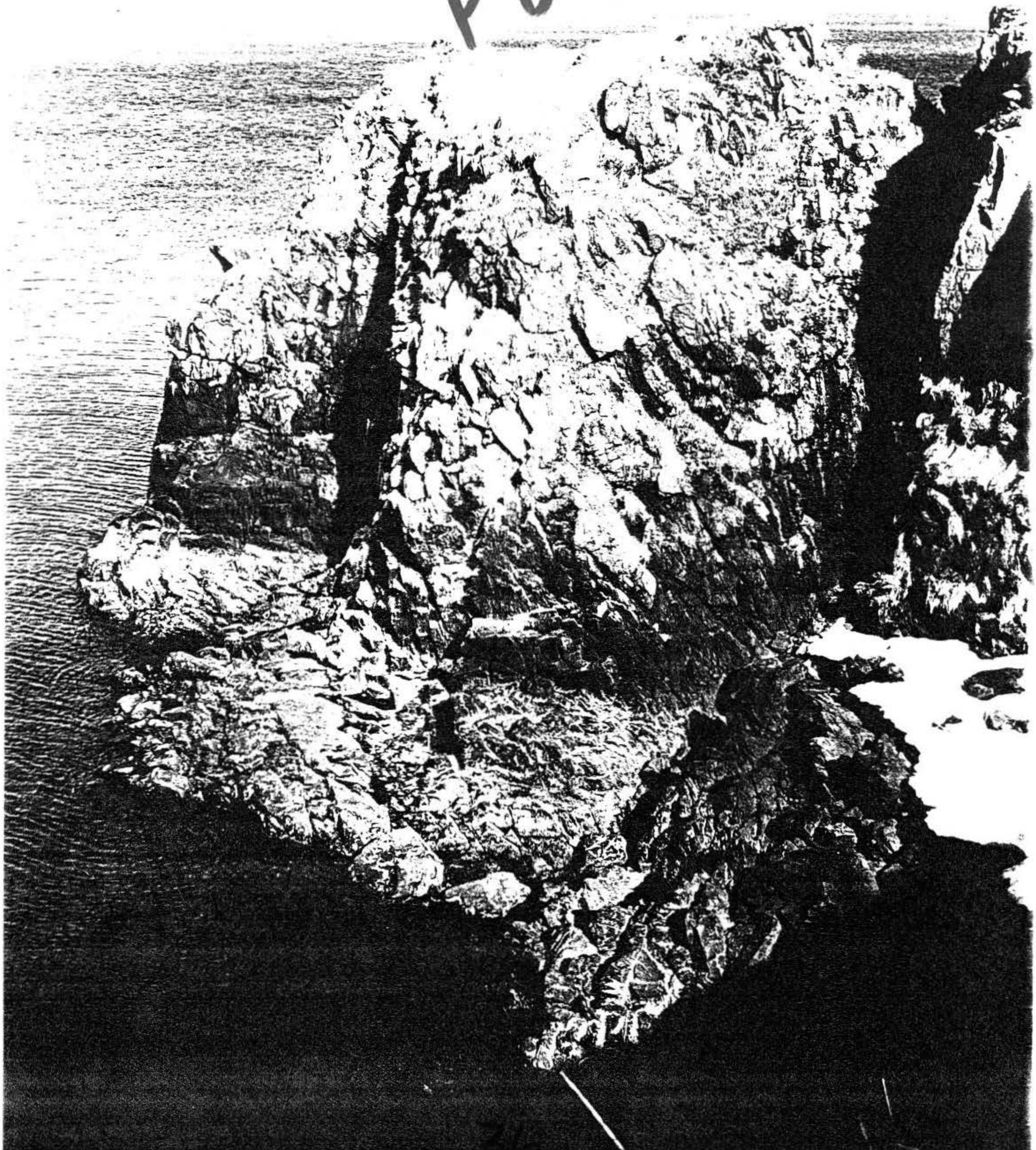


mB4 1998

population plot

35 (cont)

FB-1



Frame 15

FB-1 PECO productivity / population plot

Fig: draw boundaries for population plot

Year: 1998 Colony: Round Island Population Plot: MB-1

Replicate	Obs.	Date	Time	Count	BLKI adults	BLKI nests	COMU adults	PECO adults	PECO nests
1	STEVE STROKA	6/19/98	start: 1912	1	69	38	65	0	0
			stop: ~~1919~~ 1919	2	64	41	61	0	0
				mean	ERR	ERR	ERR	ERR	ERR
2	Steve Stroka	6/23/98	start: 1825	1	~~18~~ 19	31	48	0	0
			stop: 1830	2	19	30	49	0	0
				mean	ERR	ERR	ERR	ERR	ERR
3	Steve Stroka	6/27/98	start: 1843	1	13	39	50	0	0
			stop: 1849	2	13	38	54	0	0
				mean	ERR	ERR	ERR	ERR	ERR
4	Steve Stroka	7/5/98	start: 1437	1	52	38	50	0	0
			stop: 1444	2	48	37	51	0	0
				mean	ERR	ERR	ERR	ERR	ERR
5	Steve Stroka	7/17/98	start: 1920	1	67	36	69	0	0
			stop: 1925	2	71	37	65	0	0
				mean	ERR	ERR	ERR	ERR	ERR
6			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
7			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
8			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
9			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
10			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
				mean	ERR	ERR	ERR	ERR	ERR

Year: 1998 Colony: Round Island Population Plot: MB-2

Replicate	Obs.	Date	Time	Count	BLKI adults	BLKI nests	COMU adults	PECO adults	PECO nests
1	STEVE STROKA	6/19/98	start: 1921	1	101	56	106	~~0~~	~~0~~
			stop: 1932	2	113	50	91	~~0~~	0
				mean	ERR	ERR	ERR	ERR	ERR
2	STEVE STROKA	6-23-98	start: 1838	1	38	46	33	1	1
			stop: 1844	2	38	48	34	1	1
				mean	ERR	ERR	ERR	ERR	ERR
3	Steve Stroka	6-27-98	start: 1900	1	14	48	18	0	1
			stop: 1910	2	14	54	17	0	1
				mean	ERR	ERR	ERR	ERR	ERR
4	Steve Stroka	7-3-98	start: 1958	1	114	64	31	0	1
			stop: 2004	2	119	67	33	0	1
				mean	ERR	ERR	ERR	ERR	ERR
5	Steve Stroka	7/7/98	start: 1945	1	127	58	54	0	1
			stop: 1954	2	126	62	52	0	1
				mean	ERR	ERR	ERR	ERR	ERR
6			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
7			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
8			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
9			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
10			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
				mean	ERR	ERR	ERR	ERR	ERR

Year: 1998 Colony: Round Island Population Plot: MB-3

Replicate	Obs.	Date	Time	Count	BLKI adults	BLKI nests	COMU adults	PECO adults	PECO nests
1	STEVE STROKA	6/19/98	start: 1910	1	84	42	1	3	4
			stop:	2	83	43	1	3	4
				mean	ERR	ERR	ERR	ERR	ERR
2	Steve Stroka	6/23/98	start: 1849	1	39	43	2	6	2
			stop: 1855	2	39	39	2	6	2
				mean	ERR	ERR	ERR	ERR	ERR
3	Steve Stroka	6/27/98	start: 1911	1	6	36	5	3	2
			stop: 1916	2	6	30	5	3	2
				mean	ERR	ERR	ERR	ERR	ERR
4	Steve Stroka	7-3-98	start: 2006	1	82	39	5	3	2
			stop: 2012	2	80	36	5	3	2
				mean	ERR	ERR	ERR	ERR	ERR
5	Steve Stroka	7/4/98	start: 1955	1	103	36	2	2	2
			stop: 2003	2	101	39	2	2	2
				mean	ERR	ERR	ERR	ERR	ERR
6			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
7			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
8			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
9			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
10			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
				mean	ERR	ERR	ERR	ERR	ERR

Year: 1998 Colony: Round Island Population Plot: MB-4

Replicate	Obs.	Date	Time	Count	BLKI adults	BLKI nests	COMU adults	PECO adults	PECO nests
1	STEVE STROKA	6/19/98	start: 1954	1	128	90	180	3	2
			stop: 2006	2	126	87	~~210~~ 213	3	2
				mean	ERR	ERR	ERR	ERR	ERR
2	Steve Stroka	6/23/98	start: 1900	1	~~116~~ 49	66	~~194~~	2	1
			stop: 1911	2	52	59	175	2	1
				mean	ERR	ERR	ERR	ERR	ERR
3	Steve Stroka	6/27/98	start: 1930	1	36	72	198	4	1
			stop: 1941	2	38	74	197	4	1
				mean	ERR	ERR	ERR	ERR	ERR
4	Steve Stroka	7-3-98	start: 2022	1	121	84	279	1	1
			stop: 2040	2	116	87	287	1	1
				mean	ERR	ERR	ERR	ERR	ERR
5	Steve Stroka	7-7-98	start: 2016	1	150	73	384	0	?
			stop: 2036	2	118	75	395	0	can't find it
				mean	ERR	ERR	ERR	ERR	ERR
6			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
7			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
8			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
9			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
10			start:	1					
			stop:	2					
				mean	ERR	ERR	ERR	ERR	ERR
				mean	ERR	ERR	ERR	ERR	ERR

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Appendix 5

Walrus Disturbance Narratives

May 6 - Island personnel were being flown in at approximately 1900 hours. The helicopter flew in the access corridor when there were about 30 walrus hauled out in Boat Cove. The helicopter flew in to the island at approximately 250 feet. All walrus were displaced and vacated the beach.

May 11 - The *Bel Canto* (Terry Johnson bringing day visitors) approached the island using the access corridor and moored about 200 m from walrus. Then two fishing vessels (also carrying day visitors) closely followed, and moored about 150 m from the walrus. There were 13 walrus on Flat Rock (FR). Seven of them did a head raise at the approach of fishing vessels, then all displaced from haulout.

June 12 - Island personnel were traveling back from Main Beach in the inflatable during rough seas. There were 15 walrus on FR as the inflatable came by within 150 m. Six animals did a head raise, followed by 3 orienting themselves. Finally, all walrus left FR. By the time the inflatable made it to shore, 6 walrus were climbing back up FR.

June 17 - The *Bel Canto* approached using the access corridor at 0930. There were 7 walrus on FR. The *Bel Canto* approached to 200 m and anchored. Two walrus did head raises, then 3 displaced from FR.

June 27 - The *Puffin* (Don Winkelman doing a camper transfer) approached using the access corridor. There were 30 walrus hauled out on FR and Boat Cove (BC). The *Puffin* anchored approximately 100 m from the walrus. Four walrus did head raises and 2 displaced. Upon launching the inflatable to the *Puffin*, 2 more walrus displaced.

July 10 - The *Bel Canto* approached the island at 0930 using access corridor. It approached to 200 m and anchored. Two walrus did head raises. A Zodiac was launched from the vessel which resulted in 2 more walrus doing head raises and one displacement.

July 10 - The aircraft *7UP* flew over the island to take aerial photographs of walrus hauled out on Main Beach (MB). There were approximately 200 walrus visible on MB when 7UP flew over at 2000 feet. There were no walrus reactions noted.

July 17 - The aircraft *7UP* flew over the island at 3000 feet for another aerial photograph of MB. There were 350 walrus hauled out. Approximately 10-20 walrus did head raises during flyover. A camper reported that 2 of 3 walrus hauled out at Camp Ground displaced during flyover.