Fall Migration and Nearshore Habitat Requirements of Ross' Gulls (*Rhodostethia roses*)

PART C

Migration of Ross' Gulls at Point Barrow, Alaska

September - October 1987

by

Gerald A. Sanger

and

J. Christopher Haney

U.S. Fish and Wildlife Service

Alaska Fish and Wildlife Research Center

1011 East Tudor Road

Anchorage, Alaska 99503

(907) 786-3512

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Minerals Management Service

Environmental Studies Unit

949 East 36th Avenue

Anchorage, Alaska 99503

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ABSTRACT'

Ross' Gulls were seen on 19 of 35 observation days between September 19 and October 15, 1987, at Point Barrow, Alaska. An eastward migration peaked on October 1 and 2, when daily totals of 2,754 and 990 Ross' Gulls were projected. A westward migration peaked on October 11, when nearly 2,500 birds were projected to be migrating past Point Barrow. About 1,000 more Ross ' Gulls were estimated to have migrated east then returned to the west. The projected total number of Ross' Gulls migrating past Point Barrow during the study was 4,000-5,000 birds. Winds generally blew from the east throughout the study. These studies help expand a meager data base on nearshore movements of Ross' Gulls at Point Barrow. Ross ' Gulls are highly concentrated along the Alaskan arctic coast in the fall, where they are vulnerable to petroleum spills or other adverse environmental impacts.

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1. INTRODUCTION

This report helps fulfill the objectives of Project 2 of a contract between the U.S. Fish and Wildlife Service, Alaska Fish and Wildlife Research Center, and the Minerals Management Service on "Monitoring seabird populations in areas of oil and gas development on the Alaskan continental shelf." Although the results reported here are summarized in Part A (of which the present report comprises the third and final part, Part C), this report gives details of the results of field studies of the migration of Ross' gull (Rhodostethia rosea) at Point Barrow, Alaska, in September and October 1987.

The field studies at Point Barrow served the important function of adding a fourth year of data to three years of land-based studies of nearshore movements of Ross' gulls. They helped add the important dimension of understanding annual variations in the nearshore movements of Ross' gull at Point Barrow.

2. METHODS

2.1 Field studies

2.1.1. Land-based observations

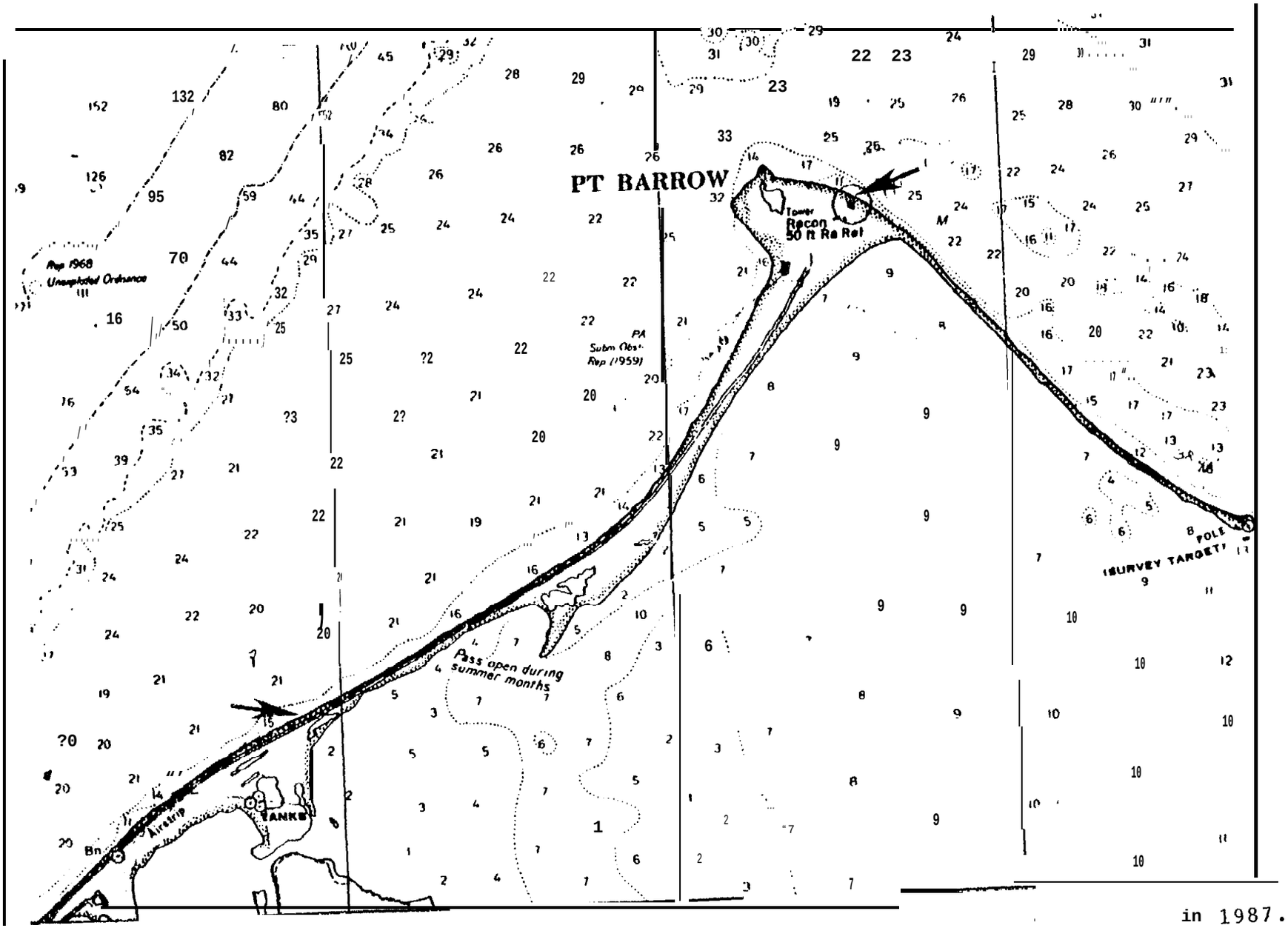
From September 19 through October 15, approximately 1 to 6 hours of observations were conducted daily by one of two observers (Haney and William Maynard) between approximately 0830 and 1700 hrs at either the base of Barrow Spit or at Point Barrow itself (Fig. 1). Observations on most days were continuous, but they were broken into 10 min segments to allow a fine scale analysis of the data. A lunch break of about 2 hr was taken in the middle of the day by the observers. Data recorded included number of birds, age if known, flight direction if the birds were flying, and any other behavior seen.

2.1.2 Aerial observations

Aerial observations were conducted on two days (September 28 and October 11) on a not-to-interfere basis during bowhead whale surveys. The bird observer recorded any Ross' gulls seen as the survey plane, an Office of Aircraft Surveys' Grumman Goose, flew at 120 kt, at an altitude of 1,000' to 1,500'.

2.2 Data analysis

A data base (Appendix 1) summarizing the field observations by number of birds, age (adult, juvenile, unknown), flight



in 1987.

Figure 1. Locations (arrows) where migrant watches were conducted at Point Barrow

direction, and behavior was created with a Microsoft Excel program on an Apple Macintosh Plus microcomputer. The data was reduced further into tables and graphics, using the spreadsheet analysis and charting capabilities of the same program.

The net directional movement of Ross' gulls was estimated for each day by calculating the daily average number of birds per hour for gulls flying eastward and westward. These figures were then multiplied times 10, the approximate number of hours of daylight during the observation period, to estimate birds per day flying in each direction. Net daily directional movement was obtained by subtracting the smaller of the two figures from the larger.

The National Weather Service collects standard climatological data at Barrow (Local Climatological Data, Monthly Summary, September and October 1987, NOAA, National Climatic Data Center, Asheville, NC). These are used here to determine possible climatic influences on the migration of Ross' gulls at Point Barrow.

3. RESULTS

3.1 Nearshore Ross' Gull Occurrence and movements

Ross' gulls were seen on 19 of 35 observation days (Table 1). A single gull was seen on the first day of observing, September 19, but it was not until September 30 that they began appearing in numbers (Fig. 2). Numbers of Ross' gulls per day (bpd) jumped dramatically from 97 bpd on September 30 to 2,754 bpd on October 1. The latter figure was based on sightings of 1,653 birds (48% of all Ross' gulls counted during the study) in 6 hrs of observing (T-able 1), the largest daily movement in either direction during the study. The heavy movement continued into October 2, when 990 bpd were estimated flying eastward.

From October 3 through October 9, birds were seen flying in both directions (Fig. 3) and there was no clear trend in directional movement. However, an obvious migration to the west began and peaked on October 11 (Fig. 3); 620 birds that were counted flying to the west in 2.5 hours of observing extrapolated to a projected westward movement of 2,468 bpd. Although the net movement continued westward at about 100 to 300 bpd for three days after this, some birds also continued flying eastward through the last day of observations, October 15 (Figure 3).

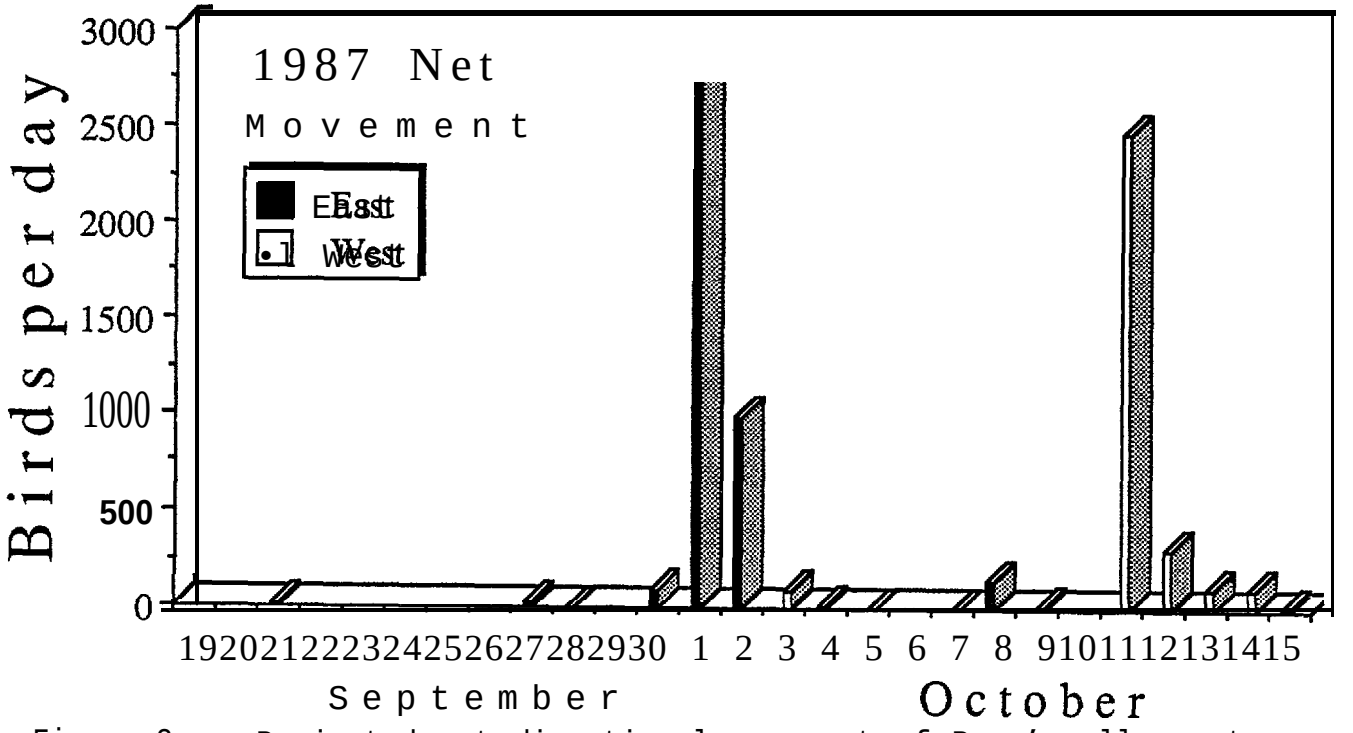


Figure 2. - Projected net directional movement of Ross' gulls past Pt. Barrow in 1987.

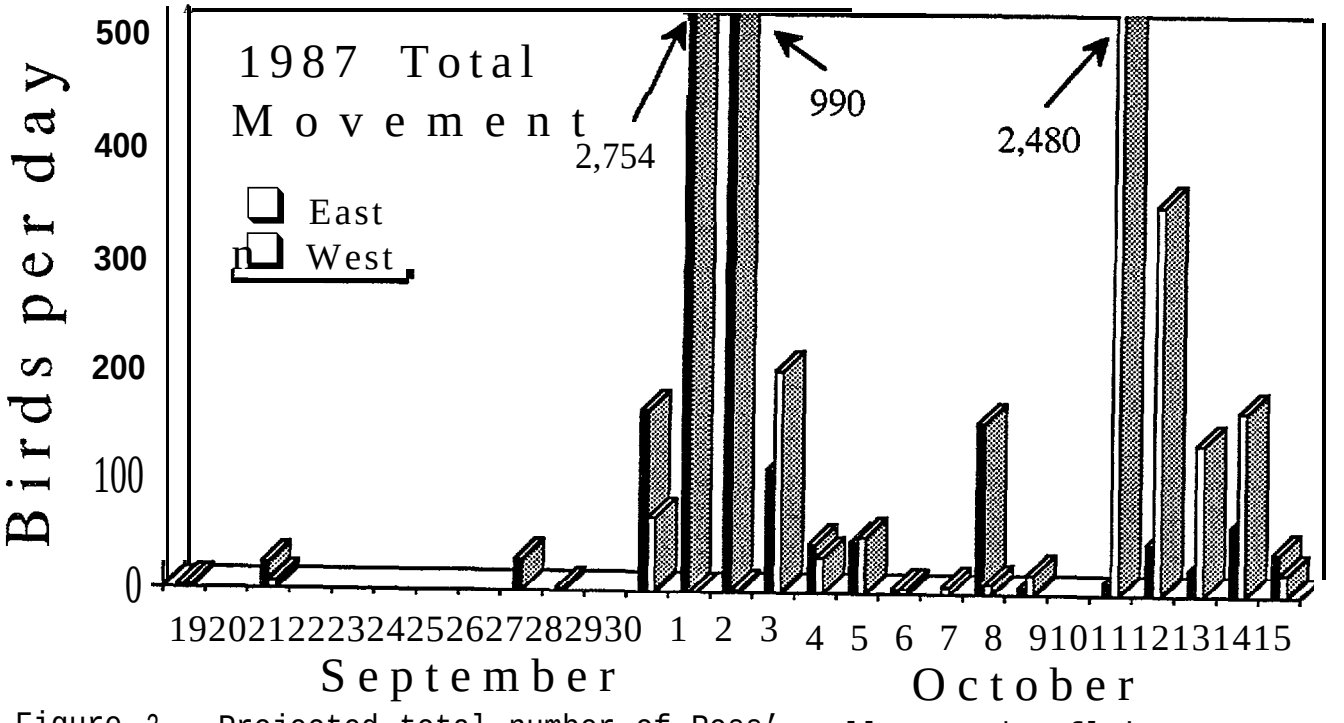


Figure 3. Projected total number of Ross' gulls per day flying past Pt. Barrow, 1987.

Table 1. - Observed and estimated total movements of Ross's Gulls at

Date & hours observed	Age	Direction of movement: East, Number per: Total	Hour	day	West, Number per: Total	Hour	day	Net numbers: East	West
Sep 19 5.9	Adult	1	0.2	2	1	0.2	2		
	Juv								
	Unk								
	Total	1	0.2	2	1	0.2	2		
Sep 20 2.2	Adult								
	Juv								
	Unk								
	Total								
Sep 21 6.3	Adult	14	2.2	22	3	0.5	5	17	
	Juv	1	0.2	2	2	0.3	3		1
	Unk								
	Total	15	2.4	24	5	0.8	8	16	
Sep 22 4.7	Adult								
	Juv								
	Unk								
	Total								
Sep 23 4.4	Adult								
	Juv								
	Unk								
	Total								
Sep 24 3.0	Adult								
	Juv								
	Unk								
	Total								
Sep 25 5.3	Adult								
	Juv								
	Unk								
	Total								
Sep 26 2.3	Adult								
	Juv								
	Unk								
	Total								

Table 1. - Observed and estimated total movements of Ross's Gulls at
• (Page 2 of 4)

Date & hours observed	Age	Direction of movement: East, Number per: Total	Hour	day	West, Number per: Total	Hour	day	Net numbers: East	West
Sep 27 3.7	Adult	10	2.7	27				27	
	Juv								
	Unk								
	Total	10	2.7	27				27	
Sep 28 4.2	Adult	1	0.2	2				2	
	Juv								
	Unk								
	Total	1	0.2	2				2	
Sep 29 1.2	Adult								
	Juv								
	Unk								
	Total								
Sep 30 3.8	Adult	62	16.3	163	3	0.8	8	155	
	Juv				22	5.8	58		58
	' Unk								
	Total	62	16.3	163	25	6.6	66	97	
Ott 1 6.0	Adult	938	156.3	1,563	1	0.2	1	1,562	
	Juv	119	19.8	198				198	
	Unk	596	99.3	993				993	
	Total	**1,653**	####	2,755	**1**	0.2	**1**	2,754	
Ott 2 5.0	Adult	263	52.6	526	1	0.2	2	524	
	Juv	88	17.6	176				176	
	Unk	145	29.0	290				290	
	Total	496	99.2	992	1	0.2	2	990	
Ott 3 4.7	Adult	41	8.7	87	72	15.3	153		81
	Juv	10	2.1	21	16	3.4	34		13
	Unk	1	0.2	2	6	1.3	13		11
	Total	52	11.1	111	94	20.0	200		89
Ott 4 2.8	Adult	5	1.8	18	2	0.7	7	11	
	Juv	7	2.5	25	7	2.5	25		
	Unk								
	Total	12	4.3	43	9	3.2	32	11	

Table 1. - Observed and estimated total movements of Ross's Gulls at
(Page 3 of 4)

Date & hours observed	Age	Direction of movement: East Total	East Number per: Hour	East Number per: day	West Total	West Number per: Hour	West Number per: day	Net numbers East	Net numbers West
Ott 5 4.5	Adult	16	3.6	36	17	3.8	38		2
	Juv	5	1.1	11	6	1.3	13		2
	Unk								
	Total	21	4.7	47	23	5.1	51		4
Ott 6 2.7	Adult	1	0.4	4	1	0.4	4		
	Juv								
	Unk								
	Total	1	0.4	4	1	0.4	4		
Ott 7 3.3	Adult								
	Juv				2	0.6	6		6
	Unk								
	Total				2	0.6	6		6
Ott 8 4.0	Adult	30	7.5	75	3	0.8	8	67	
	Juv	19	4.8	48	1	0.3	3	45	
	Unk	13	3.3	.33				33	
	Total	62	15.5	155	4	1.0	10	145	
Ott 9 3.2	Adult				2	0.6	6		6
	Juv	2	0.6	6	4	1.3	13		7
	Unk								
	Total	2	0.6	6	6	1.9	19		13
Ott 11 2.5	Adult	3	1.2	12	404	161.6	1,616		1, 604
	Juv		0.0	0	209	83.6	836		836
	Unk		0.0	0	7	2.8	28		28
	Total	3	1.2	12	**620**	**####**	**2,480**		2,468
Ott 12 3.7	Adult	10	2.7	27	54	14.6	146		119
	Juv	7	1.9	19	36	9.7	97		78
	Unk				40	10.8	108		108
	Total	17	4.6	**46**	130	35.1	351		305
Ott 13 2.2	Adult	3	1.4	14	15	6.8	68		54
	Juv	2	0.9	9	15	6.8	68		59
	Unk								
	Total	5	2.3	23	30	13.6	136		113

Table 1. - Observed and estimated total movements of Ross's Gulls at
(Page 4 of 4)

Date & hours observed	Age	Direction of movement: East, Number per: Total	Hour	day	West, Number per: Total	Hour	day	Net numbers: East	West
Ott 14 3.7	Adult	20	5.4	54	40	10.8	108		54
	Juv	2	0.5	5	21	5.7	57		52
	Unk	1	0.3	3				3	
	Total	23	**6.2**	62	61	16.5	165		103
15-Oct 0.5	Adult								
	Juv	2	4.0	40	1	2.0	20	20	
	Unk								
	Total	2	**4.Q**	40	**1**	**2.0**	20	20	
	TOTALS			4,514			3,553	3,596	3,101

Data on both total directional and net directional movements (Table 1, p.4) indicate that about 1,000 more Ross' gulls were seen flying eastward than westward, and the overall net directional movement (Table 1, p.4) showed about 500 birds moving eastward. Thus, it seems likely that the return migration to the west continued to some degree after October 15.

The projected numbers of Ross' gulls involved in the 1987 migration past Point Barrow, about 4,000-5,000 birds, was considerably lower than in recent years, which has been as high as 16,500 (G. Divoky, pers. comm.) . The ice pack was relatively far offshore, and many Ross' gulls likely migrated along the ice edge, beyond the sight of observers during this study (G. Divoky, pers. comm.) .

3.2 Climatic conditions and Ross' Gull movements

Climatological data for Barrow (Table 2) indicate fairly typical conditions during the study. Temperatures ranged from the low 300's F at the start of September to 10-20 'F at the end of October (Fig. 4).

Figure 5 shows daily wind speed and direction vectors for September and October 1987 and corresponding net directional movement of Ross' gulls. The heavy eastward movement of gulls

Table 2. Climatological data, Pt. Barrow, Alaska, September - October, 1987. National Weather Service data

Date, 1987	Temperature, 'F			Resultant Wind	
	Max	Min	Ave	Dir.	Speed
Sep 1	35	31	33	7	10.5
Sep 2	32	28	30	7	12.8
Sep 3	31	27	29	5	16.7
Sep 4	37	27	32	27	5.7
Sep 5	38	31	35	25	9.8
Sep 6	4.5	29	37	12	10.2
Sep 7	46	33	40	17	1.0
Sep 8	36	23	30	30	10.7
Sep 9	27	23	25	30	4.7
Sep 10	38	25	32	17	17,5
Sep 11	35	24	30	36	2.7
Sep 12	34	23	29	27	16.4
Sep 13	35	27	31	24	17.0
Sep 14	34	22	28	28	15.5
Sep 15	26	15	21	19	12,4
Sep 16	32	14	23	18	8.0
Sep 17	17	29	19	14	17.1
Sep 18	30	19	25	36	2.9
Sep 19	30	13	22	7	10.4
Sep 20	35	25	30	7	5.0
Sep 21	31	24	28	33	9.9
Sep 22	27	23	25	5	14.2
Sep 23	32	26	29	8	29.4
Sep 2"4	33	31	32	9	25.4
Sep 25	32	24	28	6	15.8
Sep 26	27	23	25	5	19.3
Sep 27	26	21	24	6	13.9
Sep 28	28	19	24	7	11.9
Sep 29	31	26	29	8	9.3
Sep 30	28	22	25	6	14.1

Table 2. Climatological data, Pt. Barrow, Alaska, September - October, 1987. National Weather Service data

Date, 1987	Temperature, 'F			Resultant Wind	
	Max	Min	Ave	Dir.	Speed
Ott 1	24	20	22	6	19
Ott 2	23	19	21	7	20.7
Ott 3	28	19	24	7	22.9
Ott 4	32	28	30	9	15.4
Ott 5	32	16	24	16	4.5
Ott 6	22	13	18	19	6.7
Ott 7	30	13	22	11	4.9
Ott 8	28	23	26	14	5.9
Ott 9	30	21	26	22	5.2
Ott 10	29	19	24	7	6.8
Ott 11	30	27	29	8	16.6
Ott 12	30	27	29	10	16.1
Ott 13	29	24	27	11	20.4
Ott 14	30	20	25	10	19.9
Ott 15	33	16	25	13	6.4
Ott 16	32	11	22	19	9.5
Ott 17	27	5	16	12	10.3
Ott 18	29	21	25	11	13.4
Ott 19	28	23	26	8	10.4
Ott 20	30	20	25	2	9.1
Ott 21	30	25	28	4	8.9
Ott 22	29	26	28	4	12.7
Ott 23	30	25	28	8	10.5
Ott 24	30	23	27	9	14.7
Ott 25	29	18	24	24	8.4
Ott 26	25	17	21	30	16.5
Ott 27	20	15	18	32	9.4
Ott 28	16	14	15	20	3.6
Ott 29	22	4	13	18	3.9
Ott 30	21	8	15	8	6.9
Ott 31	19	10	15	5	12.0

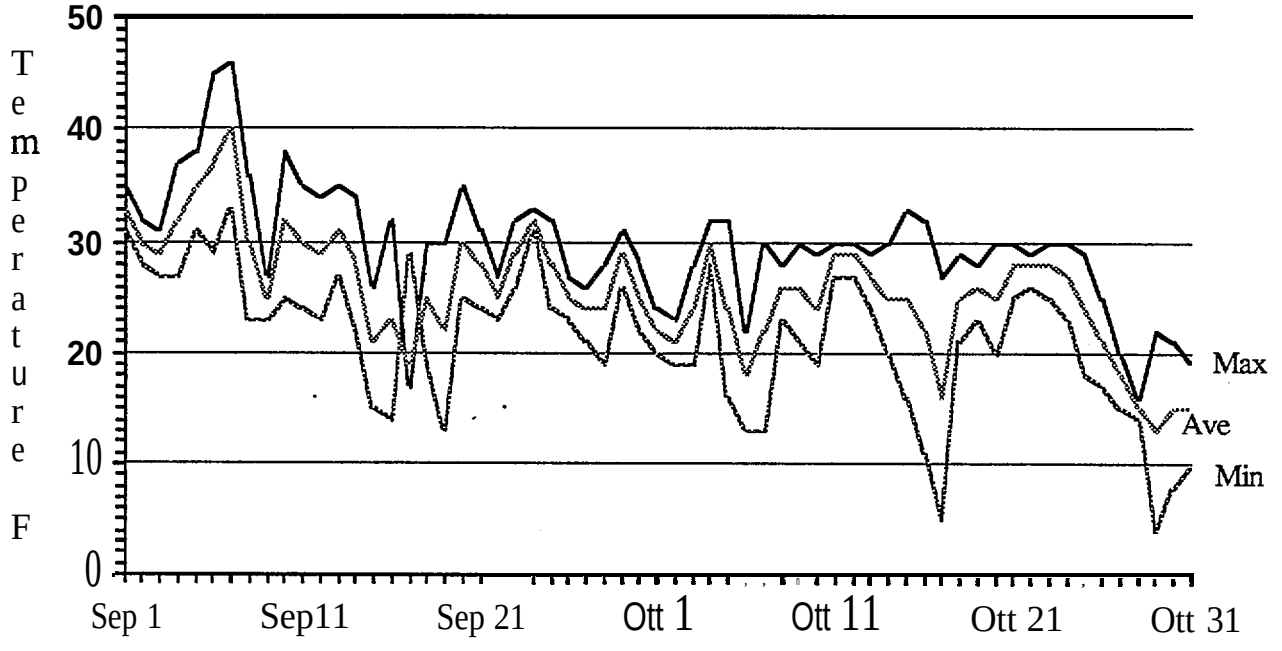


Figure 4. Air temperatures at Pt. Barrow, Alaska, 1987. Data from National Weather Service, "Local Climatological Data, Monthly Summary, September and October 1987.

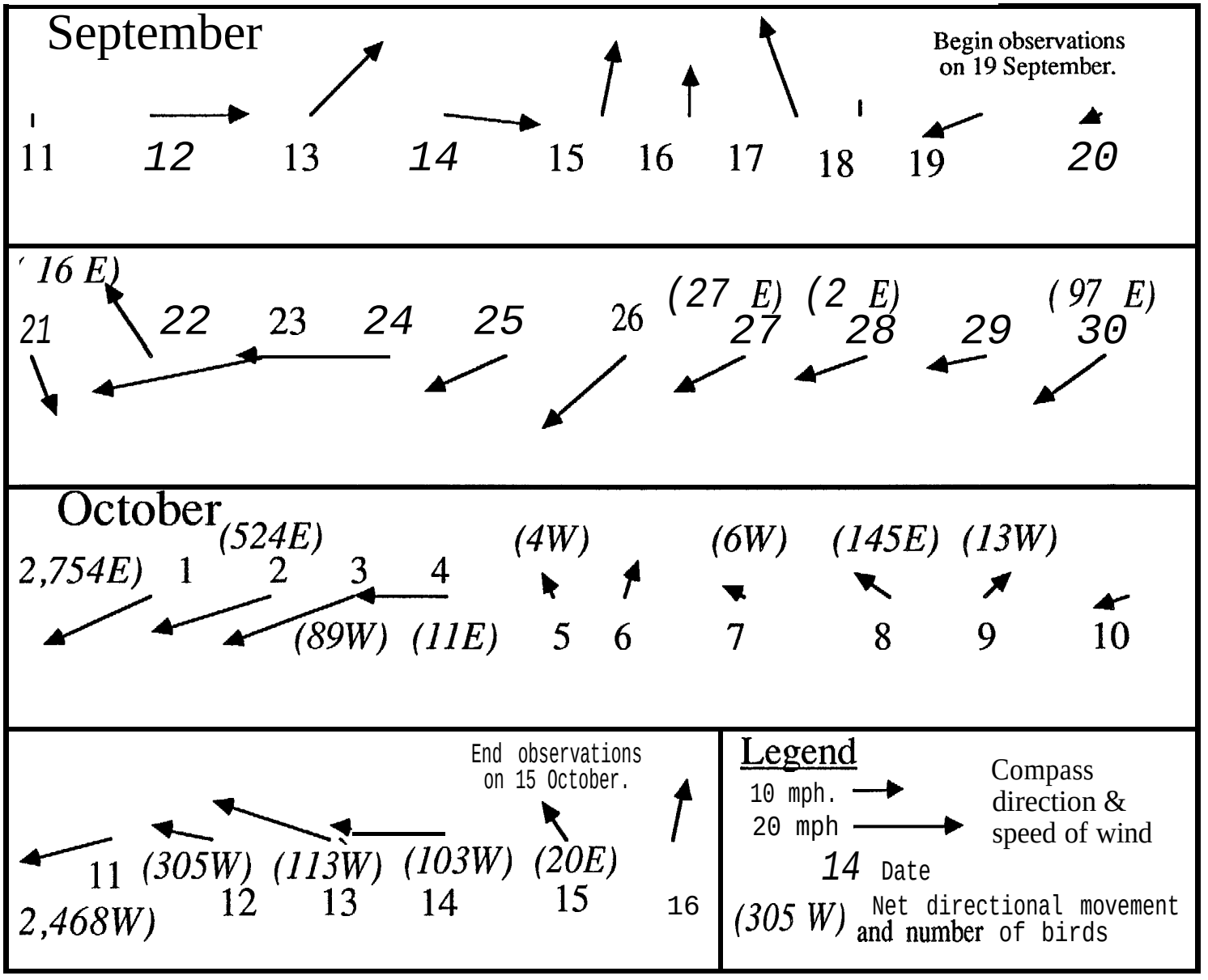


Figure 5. Net directional movement of Ross' gulls and corresponding daily wind speed and direction vectors at Pt. Barrow, Alaska, September - October 1987. Wind data from National Weather Service

noted on October 1 followed about a week of E and NE winds of 15-30 m.p.h., indicating that the birds were flying into the wind. However, the peak return migration to the west on October 11-14 was also accompanied by easterly winds (Figure 5), so correlations between flight dirction and wind direction are problematical.

3.3 Aerial surveys

Ross ' gulls were seen during aerial surveys, as follows:

Date	Number of Birds	Position
September 28	1	70°53'N, 159°56'W
September 28	2	70°58'N, 159°44'W
October 11	1	71°45'N, 161°51'W
October 11	1	71°36'N, 161°52'W

4. DISCUSSION

The 1987 studies showed that about 4,500 Ross' gulls flew east past Point Barrow, mostly on October 1 and 2, and about 3,600 gulls flew west 10 days later. The great majority of movement in both directions took place on one day each. The birds generally followed the shoreline a short distance offshore. After the first day of Ross' Gull sightings, birds

were seen flying in both directions, and some birds were still moving eastward on the last day of observations. Thus, it is likely that the westward migration continued for some period past these field studies.

There was no clear relationship between wind direction and flight direction. Winds generally blew from the east to the west before or during the gulls' movements in both directions.

This study adds further documentation to previous studies (Divoky, Part B of this report) that Ross' gulls are highly concentrated along the Alaskan arctic coast within a very 'narrow time window in the fall just before freeze-up. It is likely that a large proportion of the world population of Ross' gulls are present in the area at that time. For these reasons, it appears that while the Ross' gull population is in this area, it would be highly vulnerable to petroleum spills or other adverse environmental impacts.

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott "1987.

Rec.					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
1	Sep 19	825	835	Base of Spit									
2	Sep 19	835	845	Base of Spit									
3	Sep 19	845	855	Base of Spit									
4	Sep 19	855	905	Base of Spit									
5	Sep 19	905	915	Base of Spit									
6	Sep 19	915	925	Base of Spit									
7	Sep 19	925	935	Base of Spit									
8	Sep 19	935	945	Base of Spit									
9	Sep 19	945	955	Base of Spit									
10	Sep 19	955	1005	Base of Spit									
11	Sep 19	1005	1015	Base of Spit									
12	Sep 19	1015	1535	Base of Spit									
13	Sep 19	1535	1545	Pt Barrow									
14	Sep 19	1545	1555	Pt Barrow									
15	Sep 19	1555	1605	Pt Barrow									
16	Sep 19	1605	1615	Pt Barrow									
17	Sep 19	1615	1625	Pt Barrow									
18	Sep 19	1625	1635	Pt Barrow	1	fly	1						
19	Sep 19	1635	1645	Pt Barrow									
20	Sep 19	1645	1655	Pt Barrow									
21	Sep 19	1655	1705	Pt Barrow	1	fly	5						
22	Sep 19	1705	1715	Pt Barrow									
23	Sep 19	845	915	Pt Barrow									
24	Sep 19	915	945	Pt Barrow									
25	Sep 19	945	1015	Pt Barrow									
26	Sep 19	1015	1045	Pt Barrow									
27	Sep 19	1050	1120	Pt Barrow									
28	Sep 19	1515	1525	Base of Spit									
29	Sep 19	1525	1536	Base of Spit									
30	Sep 19	1536	1546	Base of Spit									
31	Sep 19	1546	1556	Base of Spit									
32	Sep 19	1556	1606	Base of Spit									
33	Sep 19	1606	1617	Base of Spit									
34	Sep 19	1617	1627	Base of Spit									

Appendix 1. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
35	Sep 19	1627	1637	Base of Spit									
36	Sep 19	1637	1648	Base of Spit									
37	Sep 19	1648	1658	Base of Spit									
38	Sep 19	1658	1708	Base of Spit									
39	Sep 19	1708	1718	Base of Spit									
40	Sep 19	1718	1728	Base of Spit									
41	Sep 20	930	940	Base of Spit									
42	Sep 20	1120	1130	Base of Spit									
43	Sep 20	1130	1140	Base of Spit									
44	Sep 21	830	840	Base of Spit									
45	Sep 21	840	850	Base of Spit									
46	Sep 21	850	900	Base of Spit									
47	Sep 21	900	910	Base of Spit									
48	Sep 21	910	920	Base of Spit									
49	Sep 21	920	930	Base of Spit									
50	Sep 21	930	940	Base of Spit									
51	Sep 21	940	950	Base of Spit									
52	Sep 21	950	1000	Base of Spit									
53	Sep 21	1000	1010	Base of Spit									
54	Sep 21	1010	1020	Base of Spit									
55	Sep 21	1020	1030	Base of Spit									
56	Sep 21	1030	1040	Base of Spit	1	fly	7	1	fly	7			
57	Sep 21	1040	1050	Base of Spit									
58	Sep 21	1050	1100	Base of Spit									
59	Sep 21	1100	1110	Base of Spit									
60	Sep 21	1305	1315	Base of Spit									
61	Sep 21	1315	1325	Base of Spit									
62	Sep 21	1325	1335	Base of Spit									
63	Sep 21	1335	1345	Base of Spit	10	fly	12						
64	Sep 21	1345	1355	Base of Spit									
65	Sep 21	1355	1405	Base of Spit									
66	Sep 21	1405	1415	Base of Spit									
67	Sep 21	1415	1425	Base of Spit									
68	Sep 21	1425	1435	Base of Spit									

Appendix I . Ross ' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec .					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
69	Sep 21	1435	1446	Base of Spit	1	fly	6	1	fly	6			
70	Sep 21	1446	1456	Base of Spit	1	fly	6						
71	Sep 21	1456	1506	Base of Spit									
72	Sep 21	1523	1533	Base of Spit	4	feed	12						
73	Sep 21	1620	1630	Base of Spit									
74	Sep 21	1630	1640	Base of Spit									
75	Sep 21	1640	1650	Base of Spit									
76	Sep 21	1650	1660	Base of Spit									
77	Sep 21	1660	1670	Base of Spit									
78	Sep 21	1670	1680	Base of Spit									
79	Sep 21	1680	1690	Base of Spit									
80	Sep 21	1690	1700	Base of Spit									
81	Sep 21	1700	1710	Base of Spit				1	fly	12			
82	Sep 21	1710	1720	Base of Spit									
83	Sep 21	1720	1730	Base of Spit									
84	Sep 21	1730	1740	Base of Spit									
85	Sep 21	1740	17%	Base of Spit									
86	Sep 22	820	845	see notes									
87	Sep 22	850	900	Base of Spit									
88	Sep 22	900	910	Base of Spit									
89	Sep 22	910	920	Base of Spit									
90	Sep 22	920	930	Base of Spit									
91	Sep 22	930	940	Base of Spit									
92	Sep 22	940	950	Base of Spit									
93	Sep 22	950	1000	Base of Spit									
94	Sep 22	1000	1010	Base of Spit									
95	Sep 22	1010	1020	Base of Spit									
96	Sep 22	1020	1030	Base of Spit									
97	Sep 22	1030	1040	Base of Spit									
98	Sep 22	1040	1050	Base of Spit									
99	Sep 22	1050	1100	Base of Spit									
100	Sep 22	1100	1110	Base of Spit									
101	Sep 22	1110	1120	Base of Spit									
102	Sep 22	1450	1500	Base of Spit									

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec.					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
103	Sep 22	1500	1510	Base of Spit									
104	Sep 22	1510	152o	Base of Spit									
105	Sep 22	1520	1530	Base of Spit									
106	Sep 22	1530	1540	Base of Spit									
107	Sep 22	1540	1550	Base of Spit									
108	Sep 22	1550	1600	Base of Spit									
109	Sep 22	1600	1610	Base of Spit									
110	Sep 22	1610	1620	Base of Spit									
111	Sep 22	1620	1630	Base of Spit									
112	Sep 22	1630	1640	Base of Spit									
113	Sep 22	1640	1650	Base of Spit									
114	Sep 22	1650	1700	Base of Spit									
115	Sep 23	835	845	Base of Spit									
116	Sep 23	845	855	Base of Spit									
117	Sep 23	855	905	Base of Spit									
118	Sep 23	905	915	Base of Spit									
119	Sep 23	915	925	Base of Spit									
120	Sep 23	925	930	Base of Spit									
121	Sep 23	930	940	Base of Spit									
122	Sep 23	940	950	Base of Spit									
123	Sep 23	950	1000	Base of Spit									
124	Sep 23	1000	1010	Base of Spit	1	fly	12	1	fly	12			
125	Sep 23	1010	1020	Base of Spit									
126	Sep 23	1020	1030	Base of Spit									
127	Sep 23	1030	1040	Base of Spit									
128	Sep 23	1040	1050	Base of Spit	1	feed	12						
129	Sep 23	1050	1100	Base of Spit									
130	Sep 23	1055	1056	Bight area	1	fly	?	2	fly	?			
131	Sep 23	1430	1440	Base of Spit									
132	Sep 23	1440	1450	Base of Spit									
133	Sep 23	1450	1500	Base of Spit									
134	Sep 23	1500	1510	Base of Spit									
135	Sep 23	1510	1520	Base of Spit									
136	Sep 23	1520	1530	Base of Spit									

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
137	Sep 23	1530	1540	Base of Spit									
138	Sep 23	1540	1550	Base of Spit									
139	Sep 23	1550	1600	Base of Spit									
140	Sep 23	1600	1610	Base of Spit	1	fly	9	1	fly	9			
141	Sep 23	1610	1620	Base of Spit									
142	Sep 23	1620	1630	Base of Spit									
143	Sep 24	830	840	Base of Spit.									
144	Sep 24	840	850	Base of Spit									
145	Sep 24	850	900	Base of Spit									
146	Sep 24	900	910	Base of Spit									
147	Sep 24	910	920	Base of Spit.									
148	Sep 24	920	930	Base of Spit									
149	Sep 24	930	940	Base of Spit									
150	Sep 24	940	950	Base of Spit.									
151	Sep 24	950	1000	Base of Spit									
152	Sep 24	1000	1010	Base of Spit									
153	Sep 24	1010	1020	Base of Spit.									
154	Sep 24	1020	1030	Base of Spit									
155	Sep 24	1030	1040	Base of Spit									
156	Sep 24	1040	1050	Base of Spit									
157	Sep 24	1050	1100	Base of Spit									
158	Sep 24	1100	1110	Base of Spit									
159	Sep 24	1110	1120	Base of Spit									
160	Sep 24	1120	1130	Base of Spit									
161	Sep 25	900	1100	Pt Barrow	4	resting		1	feed				
162	Sep 25	845	855	Base of Spit									
163	Sep 25	855	905	Base of Spit									
164	Sep 25	905	915	Base of Spit.									
165	Sep 25	915	925	Base of Spit									
166	Sep 25	925	935	Base of Spit									
167	Sep 25	935	945	Base of Spit									
168	Sep 25	945	955	Base of Spit									
169	Sep 25	955	1005	Base of Spit									
170	Sep 25	1005	1015	Base of Spit									

Appendix I. R ss' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

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Rec.					Adults			Juven i les			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
171	Sep 25	1015	1025	Base of Spit									
172	Sep 25	1025	1035	Base of Spit									
173	Sep 25	1035	1045	Base of Spit									
174	Sep 25	1045	1055	Base of Spit									
175	Sep 25	1055	1105	Base of Spit									
176	Sep 25	1105	1115	Base of Spit									
177	Sep 25	1115	1125	Base of Spit									
178	Sep 25	1320	1330	Base of Spit									
179	Sep 25	1330	1340	Base of Spit									
180	Sep 25	1340	1350	Base of Spit									
181	Sep 25	1350	1400	Base of Spit									
182	Sep 25	1400	1410	Base of Spit									
183	Sep 25	1410	1420	Base of Spit									
184	Sep 25	1420	1430	Base of Spit									
185	Sep 25	1430	1440	Base of Spit									
186	Sep 25	1440	1450	Base of Spit									
187	Sep 25	1450	1500	Base of Spit									
188	Sep 25	1500	1510	Base of Spit									
'189	Sep 25	1510	1520	Base of Spit									
190	Sep 25	1520	1530	Base of Spit									
191	Sep 25	1530	1540	Base of Spit									
192	Sep 25	1540	1550	Base of Spit									
193	Sep 25	1550	1600	Base of Spit									
194	Sep 26	840	850	Base of Spit									
195	Sep 26	850	900	Base of Spit									
196	Sep 26	900	910	Base of Spit									
197	Sep 26	910	920	Base of Spit									
198	Sep 26	920	930	Base of Spit									
199	Sep 26	93C	940	Base of Spit									
200	Sep 26	94C	950	Base of Spit									
201	Sep 26	95C	1000	Base of Spit									
202	Sep 26	100C	1010	Base of Spit									
203	Sep 26	101C	1020	Base of Spit									
204	Sep 26	1020	1030	Base of Spit									

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec.					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
205	Sep 26	1030	1040	Base of Spit									
206	Sep 26	1040	1050	Base of Spit									
207	Sep 26	1050	1100	Base of Spit									
208	Sep 26	1500	1615	Pt Barrow	9	feed		2	feed				
209	Sep 27	1035	1045	Pt Barrow									
210	Sep 27	1045	1055	Pt Barrow									
211	Sep 27	1055	1105	Pt Barrow									
212	Sep 27	1105	1115	Pt Barrow									
213	Sep 27	1115	1125	Pt Barrow									
214	Sep 27	1125	1135	Pt Barrow									
215	Sep 27	1135	1145	Pt Barrow	6	fly	2						
216	Sep 27	1145	1155	Pt Barrow	2	fly	4						
217	Sep 27	1155	1205	Pt Barrow									
218	Sep 27	1205	1215	Pt Barrow									
219	Sep 27	1215	1225	Pt Barrow									
220	Sep 27	1225	1235	Pt Barrow									
221	Sep 27	1235	1245	Pt Barrow									
222	Sep 27	1245	1255	Pt Barrow									
223	Sep 27	1255	1305	Pt Barrow	4	fly	3						
224	Sep 27	1305	1315	Pt Barrow									
225	Sep 27	1315	1325	Pt Barrow									
226	Sep 27	1325	1335	Pt Barrow									
227	Sep 27	1335	1345	Pt Barrow									
228	Sep 27	1345	1355	Pt Barrow									
229	Sep 27	1355	1405	Pt Barrow									
230	Sep 27	1405	1415	Pt Barrow	12	feed		2	feed				
231	Sep 27	1430	1445	near NARL	3	feed	12	1	feed	12			
232	Sep 28	830	831	mid-Spit	3	fly	3						
233	Sep 28	840	850	Pt Barrow									
234	Sep 28	850	900	Pt Barrow									
235	Sep 28	900	910	Pt Barrow									
236	Sep 28	910	920	Pt Barrow									
237	Sep 28	920	930	Pt Barrow									
238	Sep 28	930	940	Pt Barrow									

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec #	Date	Start	stop	Location	Adults #	Adults Bhv	Adults Dir	Juveniles #	Juveniles Bhv	Juveniles Dir	Unidentified #	Unidentified Bhv	Unidentified Dir
239	Sep 28	940	950	Pt Barrow									
240	Sep 28	950	1000	Pt Barrow	1	fly	3						
241	Sep 28	1000	1010	Pt Barrow									
242	Sep 28	1010	1020	Pt Barrow									
243	Sep 28	1020	1030	Pt Barrow									
244	Sep 28	1030	1040	Pt Barrow									
245	Sep 28	1040	1050	Pt Barrow									
246	Sep 28	1050	1100	Pt Barrow									
247	Sep 28	1100	1110	Pt Barrow									
248	Sep 28	1110	1120	Pt Barrow									
249	Sep 28	1130	1131	1 mi S Pt	2	fly	12	1	fly	12			
250	Sep 28	1135	1136	mid-spit	1	feed							
251	Sep 28	1525	1535	Pt Barrow									
252	Sep 28	1535	1545	Pt Barrow									
253	Sep 28	1545	1555	Pt Barrow									
254	Sep 28	1555	1605	Pt Barrow									
255	Sep 28	1605	1615	Pt Barrow									
256	Sep 28	1615	1625	Pt Barrow									
257	Sep 28	1625	1635	Pt Barrow									
258	Sep 28	1635	1645	Pt Barrow									
259	Sep 28	1645	1655	Pt Barrow									
260	Sep 29	915	925	Pt Barrow									
261	Sep 29	925	935	Pt Barrow									
262	Sep 29	935	945	Pt Barrow									
263	Sep 29	945	955	Pt Barrow									
264	Sep 29	955	1005	Pt Barrow									
265	Sep 29	1005	1015	Pt Barrow									
266	Sep 29	1015	1025	Pt Barrow									
267	Sep 29	1025	1035	Pt Barrow									
268	Sep 29	1035	1045	Pt Barrow									
269	Sep 29	1045	1055	Pt Barrow									
270	Sep 29	1055	1105	Pt Barrow									
271	Sep 30	840	841	Pt Barrow	2	fly	12						
272	Sep 30	850	900	Pt Barrow									

Appendix I. . Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	Stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
273	Sep 30	900	910	Pt Barrow									
274	Sep 30	910	920	Pt Barrow									
275	Sep 30	920	930	Pt Barrow									
276	Sep 30	930	940	Pt Barrow									
277	Sep "30	940	950	Pt Barrow									
278	Sep 30	950	1000	Pt Barrow									
279	Sep 30	1000	1010	Pt Barrow									
280	Sep 30	1010	1020	Pt Barrow									
281	Sep 30	1020	1030	Pt Barrow									
282	Sep 30	1030	1040	Pt Barrow									
283	Sep 30	1040	1050	Pt Barrow	2	fly	3	1	fly	3			
284	Sep 30	1050	1100	Pt Barrow									
285	Sep 30	1100	1110	Pt Barrow	6	fly	2						
286	Sep 30	1115	1145	along spit	64			10					
287	Sep 30	1400	1500	Pt Brw bight	720	feed	12	180	feed	12			
288	Sep 30	1545	1555	Pt Barrow	8	fly	3	1	fly	3			
289	Sep 30	1545	1555	Pt Barrow	1	fly	2						
290	Sep 30	1555	1605	Pt Barrow	21	fly	3	8	fly	3			
291	Sep 30	1605	1615	Pt Barrow				1	fly	9			
292	Sep 30	1615	1625	Pt Barrow	3	fly	3	2	fly	3			
293	Sep 30	1625	1635	Pt Barrow									
294	Sep 30	1635	1645	Pt Barrow	7	fly	3	3	fly	3			
295	Sep 30	1645	1655	Pt Barrow	12	fly	3	6	fly	3			
296	Sep 30	1655	1705	Pt Barrow	1	fly	3						
297	Sep 30	1705	1715	Pt Barrow	1	fly	6						
298	Sep 30	1705	1715	Pt Barrow	1	fly	3						
299	Sep 30	1705	1715	Pt Barrow	2	fly	9						
300	Ott 1	845	855	Base of Spit	47	fly	12	9	fly	12			
301	Ott 1	845	855	Base of Spit	16	fly	1						
302	Oct 1	855	905	Base of Spit	50	fly	12	4	fly	12			
303	Oct 1	855	905	Base of Spit				3	fly	3			
304	Oct 1	905	915	Base of Spit	65	fly	12	4	fly	12			
305	Oct 1	915	925	Base of Spit	18	fly	1	3	fly	3			
306	Oct 1	915	925	Base of Spit	14	fly	12	1	fly	12			

App ndix I . Ross ' gull migration da a, Pt . Barrow, Alaska, Sep>t-Ott 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
307	Ott 1	925	935	Base of Spit	23	fly	12	2	fly	12			
308	Ott 1	935	945	Base of Spit	29	fly	12	2	fly	12			
309	Ott 1	935	945	Base of Spit	16	fly	11	1	fly	11			
310	Ott 1	945	955	Base of Spit	21	fly	11	4	fly	11			
311	Ott 1	945	955	Base of Spit	115	fly	12	17	fly	12			
312	Ott 1	945	955	Base of Spit	1	fly	6						
313	Ott 1	955	1005	Base of Spit	127	fly	12	19	fly	12			
314	Ott 1	955	1005	Base of Spit	4	fly	11						
315	Ott 1	1005	1015	Base of Spit	19	fly	11	4	fly	11			
316	Ott 1	1005	1015	Base of Spit	71	fly	12	5	fly	12			
317	Ott 1	1015	1025	Base of Spit	99	fly	12	17	fly	12			
318	Ott 1	1015	1025	Base of Spit	2	fly	11						
319	Ott 1	1025	1035	Base of Spit	26	fly	12	3	fly	12			
320	Ott 1	1025	1035	Base of Spit	3	fly	1						
321	Ott 1	1035	1045	Base of Spit	8	fly	12	3	fly	12			
322	Ott 1	1045	1055	Base of Spit	4	fly	12						
323	Ott 1	1055	1105	Base of Spit	22	fly	12	1	fly	12			
324	Ott 1	1105	1115	Base of Spit	31	fly	12	6	fly	12			
325	Ott 1	1345	1355	Base of Spit									
326	Ott 1	1355	1405	Base of Spit	8	fly	12						
327	Ott 1	1405	1415	Base of Spit									
328	Ott 1	1415	1425	Base of Spit	2	fly	12						
329	Ott 1	1425	1435	Base of Spit	3	fly	12						
330	Ott 1	1435	1445	Base of Spit	2	fly	12						
331	Ott 1	1445	1455	Base of Spit									
332	Ott 1	1455	1505	Base of Spit	3	fly	12						
333	Ott 1	1505	1515	Base of Spit	5	fly	12						
334	Ott 1	1515	1525	Base of Spit	8	fly	12						
335	Ott 1	1525	1535	Base of Spit	4	fly	12				115	fly	1
336	Ott 1	1525	1535	Base of Spit	1	fly	11						
337	Ott 1	1535	1545	Base of Spit	1	fly	12				48	fly	12
338	Ott 1	1535	1545	Base of Spit							34	fly	1
339	Ott 1	1545	1555	Base of Spit	7	fly	12	1	fly	12	26	fly	2
340	Ott 1	1555	1605	Base of Spit							118	fly	1

Appendix I. Ross ' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec .					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
341	Ott 1	1605	1615	Base of Spit	1	fly	12				83	fly	1
342	Ott 1	1605	1606	Pt Brw bight							346		
343	Ott 1	1615	1625	Base of Spit	, 4	fly	12	1	fly	12	33	fly	12
344	Ott 1	1615	1625	Base of Spit							18	fly	11
345	Ott 1	1625	1635	Base of Spit	4	fly	12	3	fly	12			
346	Ott 1	1625	1635	Base of Spit	3	fly	4						
347	Ott 1	1635	1645	Base of Spit	16	fly	12				33	fly	1
348	Ott 1	1645	1655	Base of Spit	8	fly	1	1	fly	1			
349	Ott 1	1645	1655	Base of Spit	14	fly.	12				4	fly	12
350	Ott 1	1655	1705	Base of Spit							28	fly	12
351	Ott 1	1705	1715	Base of Spit	17	fly	12	5	fly	12	56	fly	12
352	Ott 2	825	835	Base of Spit	13	fly	12	2	fly	12			
353	Ott 2	835	845	Base of Spit	7	fly	12	3	fly	12			
3,54	Ott 2	845	855	Base of Spit	15	fly	12	6	fly	12	15	fly	1
355	Ott 2	855	905	Base of Spit	7	fly	12	1	fly	12	8	fly	12
356	Ott 2	905	915	Base of Spit	2	fly	12	1	fly	12	20	fly	12
357	Ott 2	915	925	Base of Spit	12	fly	12	2	fly	12	16	fly	12
358	Ott 2	915	925	Base of Spit	8	fly	11						
359	Ott 2	925	935	Base of Spit	32	fly	12	9	fly	12	30	fly	12
360	Ott 2	935	945	Base of Spit	6	fly	12	23	fly	12	37	fly	12
361	Ott 2	945	955	Base of Spit	29	fly	12	1	fly	12	5	fly	12
362	Ott 2	955	1005	Base of Spit	23	fly	12	6	fly	12			
363	Ott 2	1005	1015	Base of Spit	25	fly	12	10	fly	12			
364	Ott 2	1005	1015	Base of Spit				2	fly	11			
365	Ott 2	1015	1025	Base of Spit	25	fly	12	2	fly	12			
366	Ott 2	1025	1035	Base of Spit	13	fly	12	3	fly	12			
367	Ott 2	1035	1045	Base of Spit	8	fly	12	1	fly	12			
368	Ott 2	1045	1055	Base of Spit	10	fly	12	6	fly	12			
369	Ott 2	1055	1105	Base of Spit	10	fly	12	3	fly	12			
370	Ott 2	1105	1115	Base of Spit	4	fly	12	1	fly	12	10	fly	11
371	Ott 2	1115	1125	Base of Spit	1	fly	12						
372	Ott 2	1435	1445	Base of Spit	1	fly	12	1	fly	12			
373	Ott 2	1445	1455	Base of Spit	3	fly	12				2	fly	12
374	Ott 2	1505	1515	Base of Spit				2	fly	12			

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	Stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
375	Oct 2	1515	1525	Base of Spit	2	fly	6	2	fly	12			
376	Oct 2	1515	1525	Base of Spit	2	fly	12	3	fly	11			
377	Oct 2	1525	1535	Base of Spit									
378	Oct 2	1535	1545	Base of Spit	3	fly	12				2		1
379	Oct 2	1545	1555	Base of Spit	2	fly	12						
380	Ott 2	1555	1605	Base of Spit	1	fly	12						
381	Ott 2	1605	1615	Base of Spit									
382	Ott 2	1615	1625	Base of Spit									
383	Ott 2	1625	1635	Base of Spit	1	fly	12						
384	Ott 2	1600	1630	Pt Brw Bight							347	feed	
385	Ott 2	1600	1630	Pt Brw Bight	48	rest		9	rest				
386	Ott 3	900	930	Base of spit							110		
387	Ott 3	900	910	Base of spit									
388	Ott 3	910	920	Base of spit	3	fly	12	4	fly	12			
389	Oct 3	910	920	Base of spit				1	fly	6			
390	Oct 3	920	930	Base of spit	1	fly	12						
391	Oct 3	930	940	Base of spit									
392	Oct 3	940	950	Base of spit	1	fly	12						
393	Oct 3	940	950	Base of spit	3	fly	6						
394	Ott 3	950	1000	Base of spit	3	fly	8						
395	Ott 3	1000	1010	Base of spit							6	fly	9
396	Ott 3	1010	1020	Base of spit									
397	Ott 3	1020	1030	Base of spit	3	fly	8						
398	Ott 3	1030	1040	Base of spit									
399	Ott 3	1040	1050	Base of spit	5	fly	12				1	fly	12
400	Ott 3	1050	1100	Base of spit									
401	Ott 3	1100	1110	Base of spit	10	fly	12						
402	Ott 3	1100	1110	Base of spit	5	fly	6						
403	Ott 3	1110	1120	Base of spit	2	fly	12						
404	Ott 3	1110	1120	Base of spit	1	fly	6						
405	Oct 3	1120	1130	Base of spit	4	fly	12	1	fly	12			
406	Oct 3	1120	1130	Base of spit	3	fly	6						
407	Ott 3	1130	1140	Base of spit	1	fly	6						
408	Ott 3	1505	1515	Base of spit	6	fly	6	3	fly	6			

Appendix I. R ss' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec.					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
409	Oct 3	1505	1515	Base of spit	2	fly	12						
410	Oct 3	1515	1525	Base of spit	23	fly	6	5	fly	6			
411	Oct 3	1525	1535	Base of spit	1	fly	6	1	fly	6			
412	Ott 3	1535	1545	Base of spit	10	fly	6	2	fly	6			
413	Ott 3	1545	1555	Base of spit	4	fly	6	1	fly	6			
414	Ott 3	1545	1555	Base of spit	2	fly	9	1	fly	9			
415	Ott 3	1545	1555	Base of spit				3	fly	12			
416	Ott 3	1545	1546	Pt Barrow							218		
417	Ott 3	1555	1605	Base of spit	3	fly	12						
418	Ott 3	1605	1615	Base of spit	4	fly	12	1	fly	12			
419	Ott 3	1605	1615	Base of spit	2	fly	6						
420	Ott 3	1615	1625	Base of spit	1	fly	6	1	fly	6			
421	Ott 3	1615	1625	Base of spit	2	fly	12						
422	Ott 3	1625	1635	Base of spit	3	fly	12						
423	Ott 3	1625	1635	Base of spit	1	fly	6						
424	Ott 3	1635	1645	Base of spit	1	fly	12						
425	Oct 3	1645	1655	Base of spit									
426	Oct 3	1655	1705	Base of spit	2	fly	6	1	fly	6			
427	Oct 3	1655	1705	Base of spit	1	fly	7	1	fly	15			
428	Oct 3	1715	1716	Pt Barrow							218	?	
429	Oct 4	1020	1030	Base of spit									
430	Ott 4	1030	1040	Base of spit									
431	Ott 4	1040	1050	Base of spit									
432	Ott 4	1050	1100	Base of spit									
433	Ott 4	1100	1110	Base of spit									
434	Ott 4	1110	1120	Base of spit	1	fly	12						
435	Ott 4	1120	1130	Base of spit				1	fly	12			
436	Ott 4	1130	1140	Base of spit	4	fly	12	5	fly	12			
437	Ott 4	1140	1150	Base of spit	1	fly	6	2	fly	6			
438	Ott 4	1150	1200	Base of spit	1	fly	6	3	fly	6			
439	Ott 4	1200	1210	Base of spit									
440	Ott 4	1210	1220	Base of spit									
441	Ott 4	1220	1230	Base of spit									
442	Ott 4	1230	1240	Base of spit				1	fly	6			

Appendix I. Ross ' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec .					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
443	Ott 4	1240	1241	Pt Barrow	21			34					
444	Ott 4	1240	1250	Base of spit				1	fly	6			
445	Ott 4	1250	1300	Base of spit				1	fly	12			
446	Ott 4	1300	1310	Base of spit									
447	Ott 5	855	905	Base of spit	2	fly	12	1	fly	12			
448	Ott 5	855	905	Base of spit	1	fly	8	1	fly	6			
449	Ott 5	905	915	Base of spit	6	fly	6	3	fly	6			
450	Ott 5	905	915	Base of spit	1	fly	12						
451	Ott 5	915	925	Base of sPit	1	fly	11						
452	Ott 5	925	935	Base of spit									
453	Ott 5	935	945	Base of spit	1	fly	6						
454	Ott 5	945	955	Base of spit	1	fly	6						
455	Ott 5	955	1005	Base of spit	1	fly	12						
456	Ott 5	1005	1015	Base of spit	2	fly	6						
457	Ott 5	1015	1025	Base of spit	2	fly	12	2	fly	12			
458	Ott 5	1025	1035	Base of spit									
459	Ott 5	1035	1045	Base of spit	1	fly	12						
460	Ott 5	1045	1055	Base of sPit	1	fly	6						
461	Ott 5	1055	1105	Base of spit									
462	Ott 5	1105	1115	Base of spit									
463	Ott 5	1115	1125	Base of spit									
464	Ott 5	1515	1525	Base of spit	2	fly	6	1	fly	6			
465	Ott 5	1525	1535	Base of spit									
466	Ott 5	1535	1545	Base of spit	1	fly	6						
467	Ott 5	1545	1555	Base of spit									
468	Ott 5	1555	1605	Base of spit									
469	Ott 5	1605	1615	Base of spit									
470	Ott 5	1615	1625	Base of spit									
471	Ott 5	1625	1635	Base of spit	6	fly	12	1	fly	12			
472	Ott 5	1635	1645	Base of spit	2	fly	12	1	fly	12			
473	Ott 5	1645	1655	Base of spit									
474	Ott 5	1655	1705	Base of spit	2	fly	6						
475	Ott 5	1705	1715	Base of spit				1	fly	6			
476	Ott 6	945	955	Base of spit	1	fly	12						

Appendix I. Ross ' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec .					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
477	Ott 6	955	1005	Base of spit									
478	Ott 6	1005	1015	Base of spit									
479	Ott 6	1015	1025	Base of spit									
480	Ott 6	1025	1035	Base of spit									
481	Ott 6	1035	1045	Base of spit									
482	Ott 6	1045	1055	Base of spit									
483	Ott 6	1055	1105	Base of spit									
484	Ott 6	1105	1115	Base of spit	1	fly	6						
485	Ott 6	1115	1125	Base of spit									
486	Ott 6	1200	1300	Br'vl-->NARL	291	feed		227	feed		518		
487	Ott 7	905	915	Base of spit									
488	Ott 7	915	925	Base of spit									
489	Ott 7	925	935	Base of spit									
490	Ott 7	935	945	Base of spit				2	fly	6			
491	Ott 7	945	955	Base of spit									
492	Ott 7	955	1005	Base of spit									
493	Ott 7	1005	1015	Base of spit									
494	Ott 7	1015	1025	Base of spit									
495	Ott 7	1025	1035	Base of spit									
496	Ott 7	1035	1045	Base of spit				1	fly	12			
497	Ott 7	1045	1055	Base of spit									
498	Ott 7	1055	1105	Base of spit									
499	Ott 7	1450	1500	Base of spit									
500	Ott 7	1500	1510	Base of spit									
501	Ott 7	1510	1520	Base of spit									
502	Ott 7	1520	1530	Base of spit									
503	Ott 7	1530	1540	Base of spit									
504	Ott 7	1530	1531	Pt Barrow	4								
505	Ott 7	1540	1550	Base of spit									
506	Ott 7	1550	1600	Base of spit									
507	Ott 7	1600	1610	Base of spit									
508	Ott 7	1610	1620	Base of spit									
509	Ott 7	1620	1630	Base of spit									
510	Ott 7	1630	1640	Base of spit									

Appendix I. Ross ' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec ,					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
511	Ott 7	1640	1650	Base of spit									
512	Ott 8	910	920	Base of spit									
513	Ott 8	920	930	Base of spit									
514	Ott 8	930	940	Base of spit				2	fly	12	1	fly	12
515	Ott 8	940	950	Base of sPit	9	fly	12	6	fly	12			
516	Ott 8	940	950	Base of spit	2	fly	6						
517	Ott 8	950	1000	Base of spit							10	fly	12
518	Ott 8	1000	1010	Base of spit	14	fly	12	1	fly	12			
519	Ott 8	1010	1020	Base of sPit	1	fly	6	1	fly	6			
520	Ott 8	1010	1020	Base of spit	2	fly	12	5	fly	12			
521	Ott 8	1020	1030	Base of spit	5	fly	12	5	fly	12	2	fly	12
522	Ott 8	1030	1040	Base of spit									
523	Ott 8	1040	1050	Base of spit									
524	Ott 8	1050	1100	Base of spit									
525	Ott 8	1100	1110	Base of spit									
526	Ott 8	1425	1435	Base of spit									
527	Ott 8	1435	1445	Base of sPit									
528	Ott 8	1445	1455	Base of spit									
529	Ott 8	1455	1505	Base of spit									
530	Ott 8	1505	1515	Base of spit									
531	Ott 8	1515	1525	Base of sPit									
532	Ott 8	1525	1535	Base of spit									
533	Ott 8	1535	1545	Base of spit									
534	Ott 8	1545	1555	Base of spit									
535	Ott 8	1555	1605	Base of spit									
536	Ott 8	1605	1615	Base of spit									
537	Ott 8	1615	1625	Base of spit									
538	Ott 9	1025	1035	Base of spit									
539	Ott 9	1035	1045	Base of spit									
540	Ott 9	1045	1055	Base of spit									
541	Ott 9	1055	1105	Base of spit									
542	Ott 9	1105	1115	Base of spit									
543	Ott 9	1115	1125	Base of spit									
544	Ott 9	1125	1135	Base of spit									

Appendix I . Ross' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
545	Ott 9	1435	1445	Base of spit									
546	Ott 9	1445	1455	Base of spit									
547	Ott 9	1455	1505	Base of spit									
548	Ott 9	1505	1515	Base of spit									
549	Ott 9	1515	1525	Base of spit				1	fly	6			
550	Ott 9	1525	1535	Base of spit									
551	Ott 9	1630	1640	Base of spit									
552	Ott 9	1640	1650	Base of spit									
553	Ott 9	1650	1700	Base of spit									
554	Ott 9	1700	1710	Base of spit	2	fly	6	3	fly	6			
555	Ott 9	1710	1720	Base of spit									
556	Ott 9	1720	1730	Base of spit				2	fly	12			
557	Ott 11	1400	1401	NARL-->camp							50	feed	
558	Ott 11	1455	1505	Base of spit									
559	Ott 11	1505	1515	Base of spit									
560	Ott 11	1515	1525	Base of spit	1	fly	6						
561	Ott 11	1515	1525	Base of spit	1	fly	12						
562	Ott 11	1525	1535	Base of spit	7	fly	6	7	fly	6			
563	Ott 11	1535	1545	Base of spit	23	fly	6	12	fly	6	7	fly	6
564	Ott 11	1545	1555	Base of spit	27	fly	6	11	fly	6			
565	Ott 11	1555	1605	Base of spit	5	fly	6	4	fly	6			
566	Ott 11	1605	1615	Base of spit	52	fly	6	21	fly	6			
567	Ott 11	1615	1625	Base of spit	60	fly	6	39	fly	6			
568	Ott 11	1615	1625	Base of spit	2	fly	12						
569	Ott 11	1625	1635	Base of spit	55	fly	6	26	fly	6			
570	Ott 11	1635	1645	Base of spit	40	fly	6	18	fly	6			
571	Ott 11	1645	1655	Base of spit	25	fly	6	23	fly	6			
572	Ott 11	1655	1705	Base of spit	59	fly	6	22	fly	6			
573	Oct 11	1705	1715	Base of spit	40	fly	6	19	fly	6			
574	Oct 11	1715	1725	Base of spit	10	fly	6	7	fly	6			
575	Oct 12	945	955	Base of spit	4	fly	12						
576	Oct 12	945	955	Base of spit	6	fly	6						
577	Oct 12	955	1005	Base of spit	6	fly	6	4	fly	6			
578	Oct 12	955	1005	Base of spit	2	fly	5	1	fly	5			

Appendix I. Ross' gull migration data, Pt. Barrow, Alaska, Sept-Oct 1987.

Rec					Adults			Juveniles			Unidentified		
#	Date	Start	Stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
579	Oct 12	1005	1015	Base of spit	2	fly	4	1	fly	6	3	fly	4
580	Oct 12	1015	1025	Base of spit	3	fly	6	11	fly	6			
581	Oct 12	1025	1035	Base of spit									
582	Oct 12	1035	1045	Base of spit									
583	Oct 12	1045	1055	Base of spit	13	fly	6	6	fly	6			
584	Oct 12	1055	1105	Base of spit									
585	Oct 12	1105	1115	Base of spit	4	fly	6	1	fly	6			
586	Oct 12	1115	1125	Base of spit									
587	Oct 12	1125	1135	Base of spit	3	fly	12	6	fly	12			
588	Oct 12	1500	1510	Base of spit	7	fly	5		fly				
589	Oct 12	1510	1520	Base of spit	4	fly	6	2	fly	6			
590	Oct 12	1520	1530	Base of spit	4	fly	5	6	fly	5	2	fly	5
591	Oct 12	1520	1530	Base of spit	2	fly	12	1	fly	12			
592	Oct 12	1530	1540	Base of spit									
593	Oct 12	1540	1550	Base of spit									
594	Oct 12	1550	1600	Base of spit							35	fly	6
595	Oct 12	1600	1610	Base of spit	2	fly	6	2	fly	6			
596	Oct 12	1610	1620	Base of spit									
597	Oct 12	1620	1630	Base of spit	1	fly	6	1	fly	6			
598	Oct 12	1630	1640	Base of spit	1	fly	12	1	fly	6			
599	Oct 12	1640	1650	Base of spit									
600	Oct 12	1620	1621	Pt Barrow							32	" feed	
601	Oct 13	915	925	Base of spit									
602	Oct 13	925	935	Base of spit									
603	Oct 13	935	945	Base of spit	1	fly	6	7	fly	6			
604	Oct 13	945	955	Base of spit	7	fly	6	4	fly	6			
605	Oct 13	955	1005	Base of spit									
606	Oct 13	1005	1015	Base of spit									
607	Oct 13	1015	1025	Base of spit									
608	Oct 13	1025	1035	Base of spit									
609	Oct 13	1035	1045	Base of spit									
610	Oct 13	1045	1055	Base of spit	2	fly	6	1	fly	6			
611	Oct 13	1055	1105	Base of spit	3	fly	6	2	fly	6			
612	Oct 13	1105	1115	Base of spit	2	fly	6	1	fly	6			

Appendix I. Ross ' gull migration data, Pt. Barrow, Alaska, Sept-Ott 1987.

Rec .					Adults			Juveniles			Unidentified		
#	Date	Start	stop	Location	#	Bhv	Dir	#	Bhv	Dir	#	Bhv	Dir
613	Ott 13	1105	1115	Base of spit	1	fly	12						
614	Ott 13	1115	1125	Base of spit	2	fly	12	2	fly	12			
615	Ott 14	955	1005	Base of spit	2	fly	6						
616	Ott 14	1005	1015	Base of spit									
617	Ott 14	1015	1025	Base of spit	2	fly	12						
618	Ott 14	1025	1035	Base of spit									
619	Ott 14	1035	1045	Base of spit	5	fly	6	2	fly	6			
620	Ott 14	1035	1045	Base of spit	1	fly	12						
621	Ott 14	1045	1055	Base of spit									
622	Ott 14	1055	1105	Base of spit									
623	Ott 14	1105	1115	Base of spit	2	fly	12	1	fly	6			
624	Ott 14	1115	1125	Base of spit				1	fly	12			
625	Ott 14	1125	1135	Base of spit				3	fly	6			
626	Ott 14	1125	1135	Base of spit				1	fly	12			
627	Ott 14	1450	1500	Base of spit									
628	Ott 14	1500	1510	Base of spit	1	"fly	6	1	fly	6			
629	Ott 14	1510	1520	Base of spit	5	fly	12	5	fly	12			
630	Ott 14	1520	1530	Base of spit	4	fly	6	1	fly	6	1	fly	12
631	Ott 14	1530	1540	Base of spit	7	fly	6	5	fly	6			
632	Ott 14	1530	1540	Base of spit	1	fly	12						
633	Ott 14	1540	1550	Base of spit	11	fly	6	5	fly	6			
634	Ott 14	1550	1600	Base of spit	1	fly	6						
635	Ott 14	1600	1610	Base of spit				1	fly	6			
636	Ott 14	1610	1620	Base of spit	1	fly	12						
637	Ott 14	1610	1620	Base of spit	2	fly	6						
638	Ott 14	1620	1630	Base of spit	2	fly	12						
639	Ott 14	1620	1630	Base of spit	1	fly	6						
640	Ott 14	1630	1640	Base of spit	6	fly	12	1	fly	12			
641	Ott 14	1630	1640	Base of spit	2	fly	6						
642	Ott 14	1640	1650	Base of spit	4	fly	6	2	fly	6			
643	Ott 15	955	1005	Base of spit				2	fly	12			
644	Ott 15	955	1005	Base of spit				1	fly	6			
645	Ott 15	1005	1015	Base of spit									
646	Ott 15	1015	1025	Base of spit									