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ALEUTIAN CANADA GOOSE NESTING SURVEY
ON AGATTU I., ALASKA IN 1990

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ABSTRACT

A survey for nests of Aleutian Canada geese (Branta canadensis leucopareia) was conducted at Agattu Island in June 1990. The coastal fringe on the eastern and southeastern portions of the island contained at least 53-56 nests, and we estimated that over 200 non-breeding geese may have been present.

Most pairs began incubation during the last week of May and the peak of hatch occurred the last week of June. The average clutch contained 6 eggs, and at least 77 % of the eggs hatched. At least 1 egg hatched in nearly 95 % of the nests, so overall productivity in 1990 was excellent.

INTRODUCTION

A major goal of the Aleutian Canada Goose Recovery Plan is to reestablish self-sustaining populations of geese on breeding areas where they had been extirpated by introduced arctic fox (Alopex lagopus). A reintroduced population is considered "self-sustaining" when at least 50 breeding pairs occur (Martin et al. 1982). Agattu Island has been the primary site for reestablishment of endangered Aleutian Canada geese (Branta canadensis leucopareia). A total of 968 geese were released on Agattu from 1974-1982, and in 1984, nesting geese were observed (Deines and Willging 1984). Since then, periodic surveys have shown the reintroduced population to be increasing (Cantor and Sharpe 1985, Byrd et al. 1988, Byrd et al. 1989).

Reclassification of Aleutian Canada geese from endangered to threatened status is being considered based upon overall

population increases, and in 1990 the Fish and Wildlife Service needed to know how many pairs of geese were present at Agattu and on other sites where the goose nests. This report summarizes nest surveys at Agattu.

METHODS

We conducted surveys for nesting pairs in 1990 incidental to seabird studies in an effort to evaluate whether this reestablished population had reached "self-sustaining" levels. Surveys were conducted in potential nesting habitat between May 30 and June 18. The coastal Elymus/umbel fringe was searched from the west side of Karab Cove to Cape Sabak and along the eastern coast to the third drainage north of USGS VILE (Fig. 1). Sea slopes and the ecotone between the tall plant fringe and the shorter plant associations were searched in areas of heavy goose use. The search area was surveyed in 5-10 m strips, the width depending on density of vegetation. Inland areas of high potential were also searched, including Elymus/umbel areas in stream valleys (especially Goose Creek), fringes of interior lakes and ponds, and fairly random strips of upland tundra.

At each nest we recorded clutch size, float angle of eggs, flushing distance of parents, type of habitat, and physical characteristics of nest site (i.e., slope, aspect, and elevation). Nests were covered with down and grass after examination to insulate eggs and prevent predation by glaucous-winged gulls.

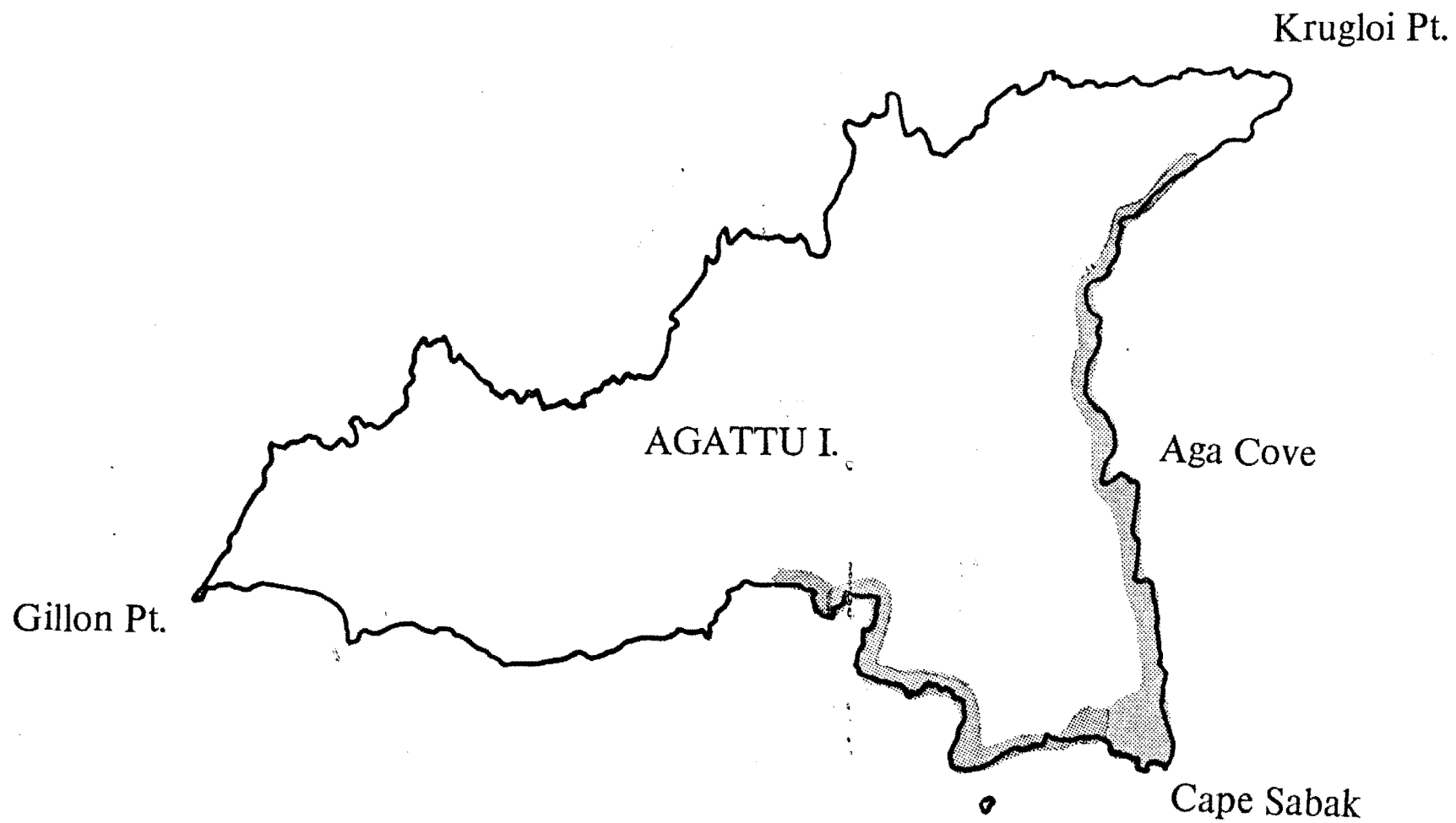


Figure 1. Map indicating area searched for Aleutian Canada goose nests on Agattu I., Alaska in 1990.

In late July and early August, nests were rechecked to estimate hatching success by counting egg membranes. A sample of remaining unhatched eggs was opened to determine the stage of development. Incidental goose sightings were recorded throughout the season, and a survey for broods was conducted through inland and coastal habitats in August.

RESULTS AND DISCUSSION

Total Nests

We found 53 nests in areas searched in 1990 and 3 additional nests had been found in 1989 in areas not searched in 1990 (Figs. 2 & 3; Appendix A). This represents a 95% increase since 1988 in the area between the Nile River and Anemone Falls.

Nest Characteristics

The majority (83%) of goose nests were located in Elymus/umbel (E/U) associations; a small proportion of these were in ecotones where E/U communities mixed with Carex spp. (sedge), Calamagrostis spp. (grass) or Empetrum nigrum (crowberry). The remainder (17%) were found in upland tundra; one was also found in a Carex/Calamagrostis meadow.

The mean slope at nest sites was 13.8 degrees ($n = 50$, $s = 12.1$) (Table B-1). The mean nest site elevation was 64.3 m ($n = 52$, $s = 24.4$). Of a sample of 25 nest cups examined between USGS NEWT and the west edge of Karab Cove, 17 were found to be composed solely of Elymus, with the remainder incorporating some

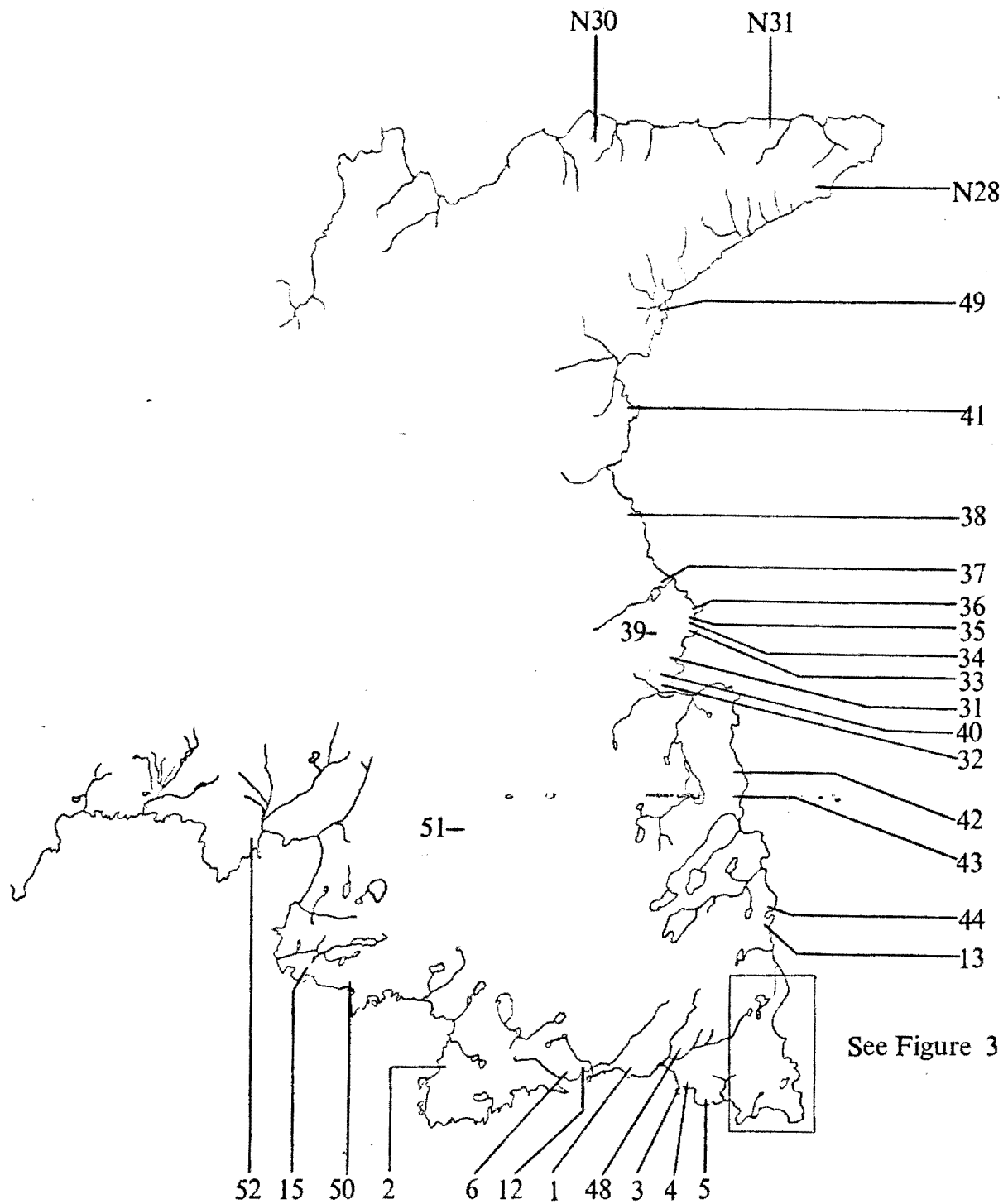


Figure 2. Locations of Aleutian Canada goose nests found during field surveys in 1989 and 1990 on Agattu I., Alaska (nests found in 1989 are prefixed with an N).

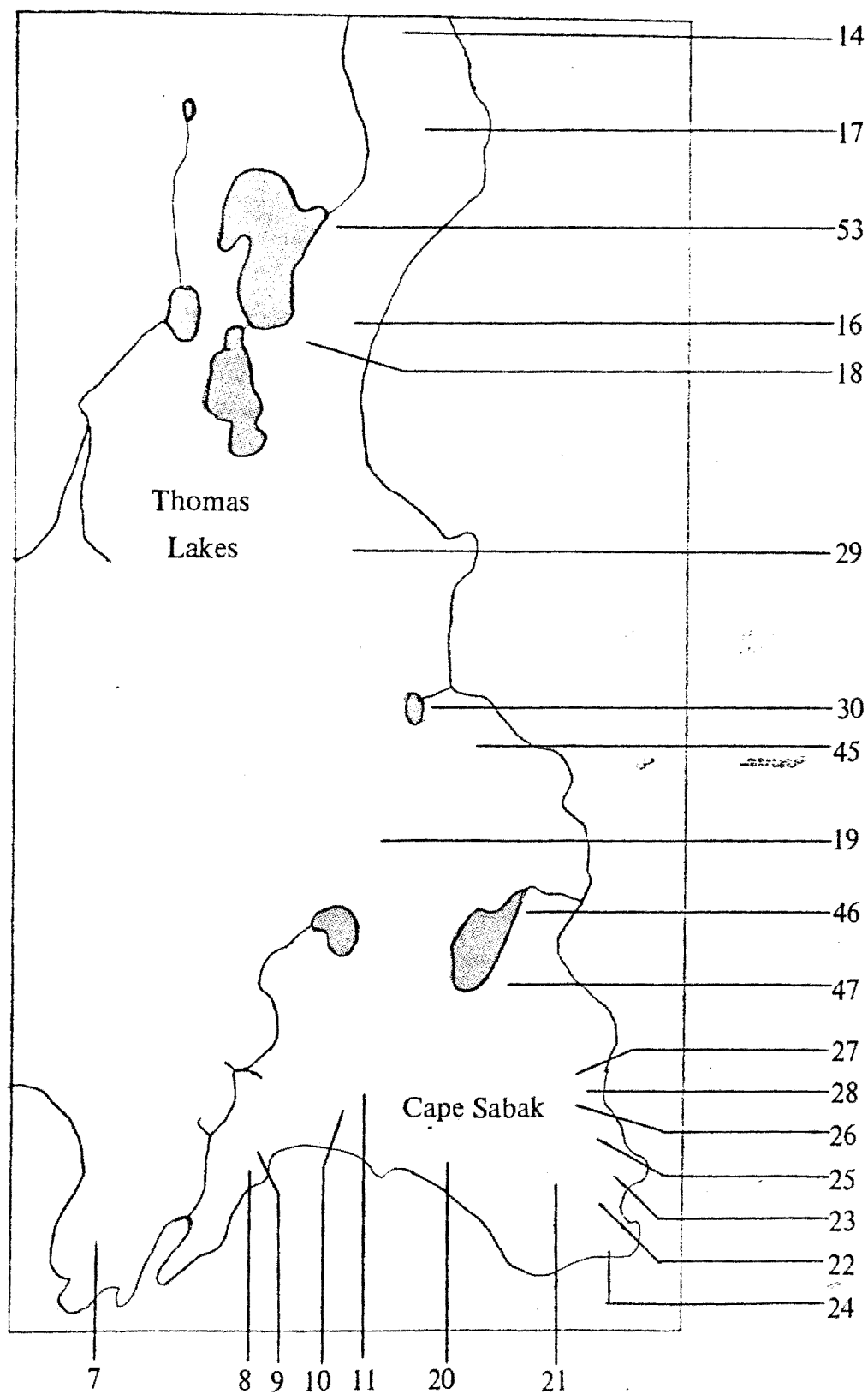


Figure 3. Locations of Aleutian Canada goose nests found in the vicinity of Cape Sabak during field surveys on Agattu I., Alaska in 1990.

combination of Elymus, Carex spp., Calamagrostis spp., Empetrum nigrum, old umbel stalks, lichens, and chrysanthemum roots.

Habitat Use

Goose habitat at Agattu can be divided into several categories. The coastal fringe and stream valleys are vegetated by Elymus and umbelliferous plants. An ecotone behind the coastal fringe is composed of Elymus/umbel/grass or Elymus/umbel/Carex. Interior plant communities include Carex marshes and meadows, grass meadows, and upland tundra of Empetrum nigrum and associates.

Protective cover, the proximity of food, and a view of the surrounding territory appear to be important factors that influence selection of nest sites. In 1990, the majority of geese nested in or near the coastal fringe, the highest densities being near Cape Sabak, an area dominated by E/U communities (Fig. 3). Along the southern coast, nests were confined primarily to the Elymus fringe, and were located high on seaward slopes, headlands, or plateaus. To the north, along the east coast, nests were also located primarily in the Elymus fringe near the edge of the plateau and sea slope. The other center of distribution was immediately north of Aga Cove, where geese were first released in 1974.

The coastal fringe is the first area to green up in the spring and it provides ample cover. Elymus is widely used by geese as nest material in the fringe, and its early phenology and fast growth rapidly disguise the nest site. In addition Elymus

tussocks and trenches provide protection from wind. The lush character of the coastal fringe is probably due to a rich supply of marine nutrients and moisture.

The ecotone between the coastal fringe and the upland plant communities was important early in brood rearing, because it provided food with the escape cover of the coastal fringe nearby. We watched young broods run from the ecotone into the fringe as we crested plateaus up to one kilometer away. The ecotone was also used as a nesting area.

A few geese also nested at interior sites, mostly near ponds or drainages, often among hummocks caused by solifluction. Carex was found nearby at most of these upland nest sites, and substituted well for Elymus as nest material. Numerous geese were observed in the upland areas well into the nesting season, suggesting that many non-breeders used this habitat.

Carex macrochaeta, an important spring food for geese, is common along the coast. We noted that C. macrochaeta had the earliest phenology among sedges at Agattu. It was cropped by geese throughout the search area and appeared to be the primary food in spring. Other species of Carex followed C. macrochaeta in phenology and were abundant throughout the coast and interior. We noted that these Carex spp. were the primary food for geese in July. Goose diets became more diversified late in the season, consisting of Carex seed, grass seed heads, and Empetrum nigrum berries.

We systematically searched the southeastern portion of Agattu but found no evidence of goose use in the interior beyond

the areas specified in Figure 4. Some family groups were sighted near their nests into mid-August, and evidence suggested that many families may remain near nest territories to rear broods. Family groups and at least some non-breeders remained in coastal areas where food was abundant. Throughout the fall, however, broods also were observed up to 1.6 km inland around the margins of lakes where no nests were detected earlier in the year. If greater concentrations of food were available around nearby lake fringes or Carex meadows and marshes, geese often moved inland. In late July and early August, many geese were raising broods, and all were in some stage of molting. This made the geese wary, and it became difficult to accurately assess their habitat use. But it was apparent that geese were using a variety of habitats, from coastal fringe to upland tundra.

Large natural bowls in the landscape were particularly favored by geese (i.e. Areas 11A & 16 in Fig 4). Water and alluvial materials accumulate in these bowls from the surrounding topography making them prime habitat for Carex. These areas, along with inland ponds and the coastal ecotone, were among the most important brood-rearing areas. Area 16 (see Fig. 4 and Appendix B) which includes Thomas Lakes, had the highest density of geese in any season. It was an important area for nesting, rearing broods, roosting, molting, and feeding non-breeders. Area 11A, a natural bowl which drains Thomas Lakes and inland areas, was another prime location for rearing broods and also supported non-breeders June through August. Further north along the coast, the upland hills immediately south and east of the Aga

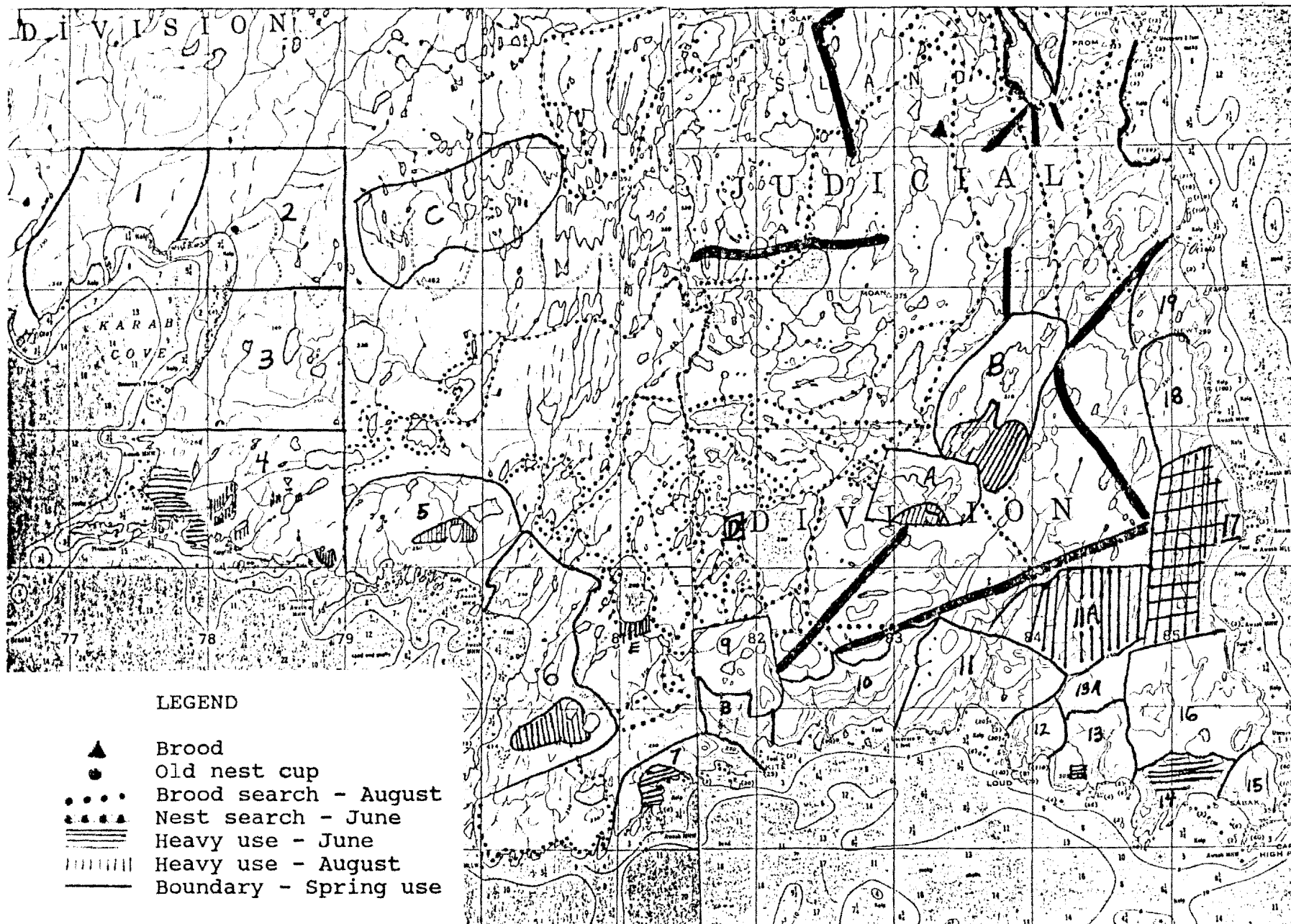


Figure 4. Map of areas used to describe distribution of and habitat use by Aleutian Canada geese on the southwestern coast of Agattu I., Alaska in 1990 (see Appendix B and Table B-1).

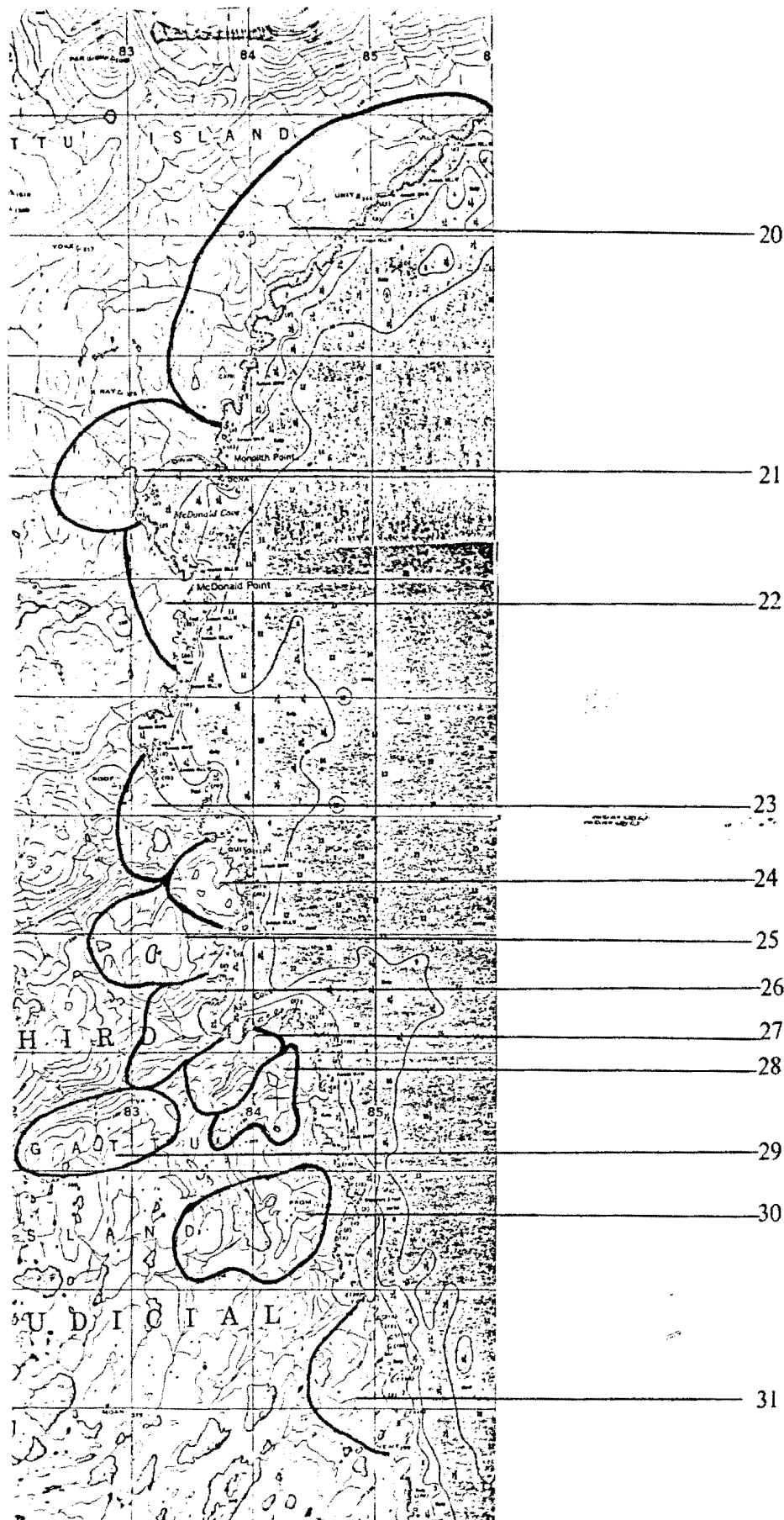


Figure 5. Map of areas used to describe distribution of and habitat use by Aleutian Canada geese on the northeast coast of Agattu I., in 1990 (see Appendix B and Table B-1).

Cove cabin were important roosting and feeding areas. Many geese were observed along these ridges throughout the summer (areas 27-29 in Fig. 5, Appendix B, and Table B-1).

Geese were recorded in frost ponds for the first time in 1990. Frost ponds are rimmed depressions produced by ice thrust, in poorly drained flat areas or on slopes of less than 10 degrees (Schafer 1971). One young goose (clutch of 4) was found nesting in a frost pond surrounded by upland tundra, and one freshly-hatched brood was found in a frost pond rimmed by Elymus tussocks in coastal fringe habitat. Both depressions were less than 25 feet in diameter, more than 6 feet in depth and were found in the vicinity of Cape Sabak.

Flocks of geese were regularly recorded throughout the field season. Based on these observations, we estimated that approximately 190 non-breeders used the southeastern coast of Agattu (USGS NEWT to Karab Cove) and 65 used the eastern coast from USGS NEWT to USGS VILE in June (Table B-1).

Breeding Biology

Goose nesting phenology was relatively early on Agattu in 1990, with the peak of hatch occurring approximately June 20-28, as calculated from float angles of eggs (Fig. 6). This implies that incubation began May 23-31. The mean clutch size was 6.04 eggs per nest ($n = 48$, $s = 0.96$), a slightly, but not significantly (AOV, $p = 0.32$), higher value than in prior years (Table 1).

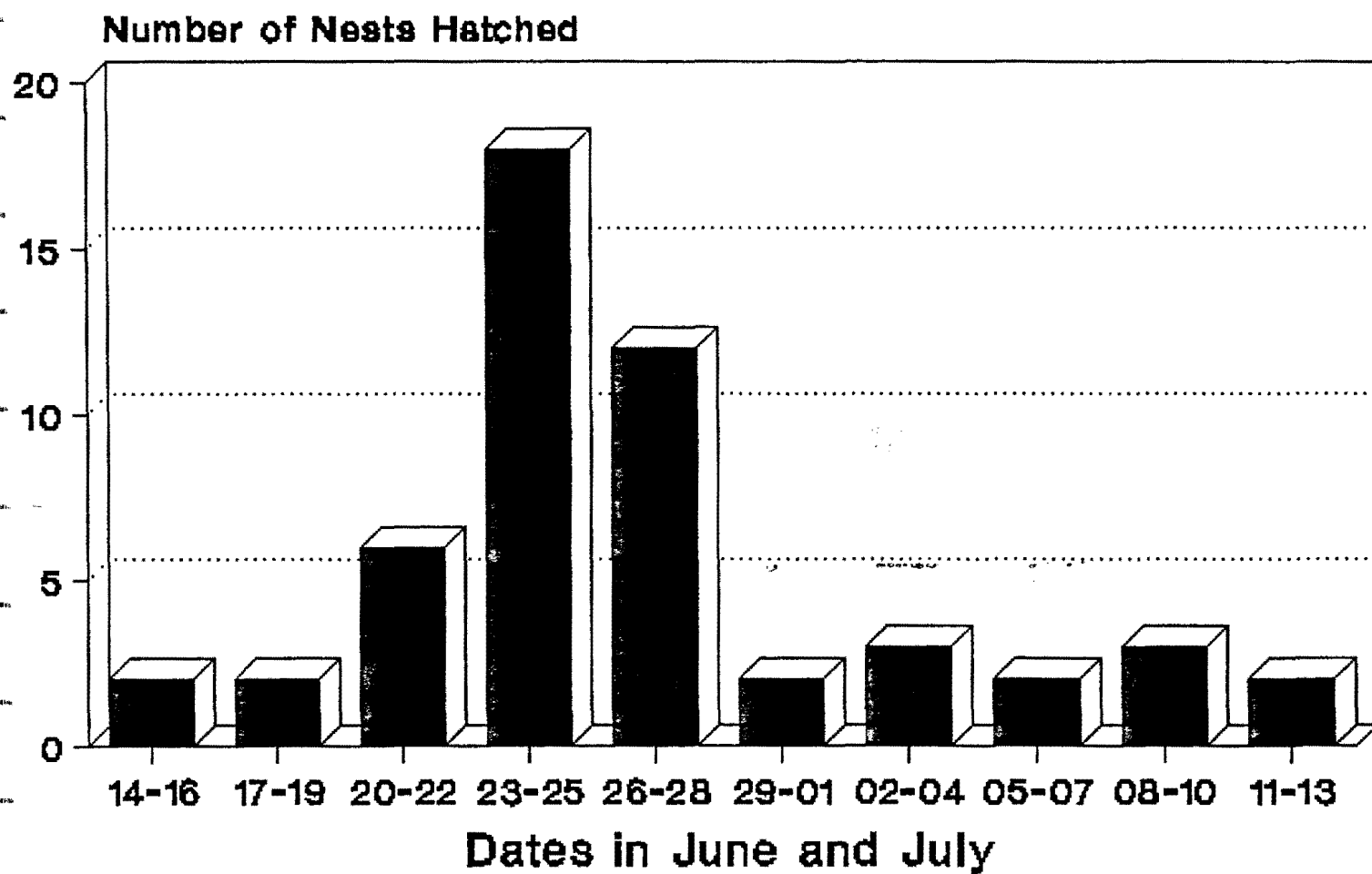


Figure 6. Hatch dates for Aleutian Canada geese on Agattu I., Alaska in 1990.

Table 1. Clutch size of Aleutian Canada geese on Agattu I., Alaska, 1984-1990.

Statistics	Year				
	a	b	c	d	e
	1984	1985	1988	1989	1990
x	4.00	5.73	5.68	5.75	6.04
s	1.00	0.79	1.22	0.96	0.96
range	3-5	4-7	2-8	5-7	4-8
n	3	11	25	4	48

a
Statistical abbreviations: x = sample mean, s = standard deviation, n = sample size.

b
From Deines and Willging (1984).

c
From Cantor and Sharpe (1985).

d
From Byrd et al. (1988).

e
From Byrd et al. (1989).

Of 277 eggs we observed, 77% hatched. Fourteen percent of the eggs failed to hatch and were still in the nest when rechecked. A majority of these eggs were in 3 nests (18 eggs) which apparently were abandoned. The remaining 9% of the eggs were unaccounted for, and some of these eggs may have hatched. Estimates of hatching success are conservative as some membranes, which would have indicated a hatch, may have blown away or been scavenged by gulls before nests were rechecked. Of 53 nests, at least 12 (23%) were constructed on top of, or in the immediate vicinity of, nest cups from previous years. Hatching success for these nests (75%) was nearly identical to the hatching success for all nests on the island (77%). Of the unhatched eggs remaining in the nests, a sample ($n = 9$) on the east coast from USGS NEWT to USGS VILE was opened to determine stage of development. Five of these eggs were addled and 4 were in various stages of embryonic development.

Nesting success, defined as the proportion of nests that hatched at least one chick, was 94.1% for 1990 ($n = 51$), up slightly, but not significantly ($p > 0.1$), from the value of 88.2% reported in 1988 ($n = 17$).

Mortality

The remains of a goose were found inland approximately one kilometer southwest of Aga Cove. The carcass was thoroughly scavenged and cause of death was not apparent. There was no leg band or neck collar on the carcass.

Resightings

A goose wearing a gray neck collar number J97 and a blue leg band of unknown number was sighted on June 16 and 18 at two locations approximately 7 kilometers apart in the company of three unmarked geese. Both sightings were within 100 m of the coast. A goose wearing a blue legband was sighted on May 31 in Area 2 at Karab Cove. It was feeding with its mate near the site of the previous year's nest, but we were unable to read the code on the blue band.

CONCLUSIONS AND RECOMMENDATIONS

The Aleutian Canada goose population on Agattu can now be considered a self-sustaining population with at least 56 breeding pairs currently present. The population appears to be healthy and increasing rapidly based on the high clutch size and reproductive success. Barring any unforeseen stochastic weather event or problems on migration and wintering areas, geese on Agattu should continue to increase in numbers.

The coastal Elymus fringe is still the primary habitat for nesting, feeding, and brood rearing. This habitat is probably not saturated, but geese are expanding into the E/U ecotone and upland tundra and will probably continue to do so in the future as densities increase.

We recommend that areas not searched for goose nests in 1989 and 1990 be surveyed in 1991 to complete one survey of the entire island. Future surveys (approximately every 3 years) should strive to cover the entire coastline in one field season to

obtain an accurate estimate of breeding pairs on the island. This would require 3 or 4 field crews to accomplish but it would result in more accurate estimates than those produced by combining data from consecutive years.

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Appendix A. Reproductive data and nest site characteristics for Aleutian Canada geese on Agattu I., Alaska in 1990.

Nest	Clutch	Hatch Success	a		b		Previous Nest Cup Territory	Aspect	Slope(°)	Elev.(m)
			Hatch Date	Nest Site Habitat	Nest Site	Nest Cup				
1	7	.86	6/19	E/U		No	SSE	5	37	
2	Unk	Unk	Unk	E/U/Cm		Unk	N	35	91	
3	6	1.00	6/18	E/U/C		Unk	WNW	15	37	
4	5	.80	6/28	E/U/C		Yes	WSW	10	61	
5	5	.60	6/24	E/U/C		No	SE	35	79	
6	6	≥0.17	6/20	E/U		No	S	30	21	
7	7	1.00	6/20	E/U		No	SSW	10	76	
8	4	1.00	7/4	E/U		Yes	E	40	61	
9	6	1.00	6/28	E/U		No	N	5	61	
10	6	0.83	7/4	E/U		No	N	<5	61	
11	6	≥0.83	6/26	E/U/Cm		No	N	10	61	
12	8	0.00	6/27	E/U/Cm		Yes	S	20	30-46	
13	5	1.00	7/2	E/U/C		No	E	5	79	
14	6	1.00	6/27	E/U		Yes	W	20	67	
15	7	≥0.86	6/27	Up/C		No	S	0	68	
16	5	≥0.80	6/24	E/U		No	ESE	35	76	
17	6	1.00	6/20	E/U		Yes	E	40	53-61	
18	6	≥0.83	6/24	E/U		No	E	5	76	
19	4	≥0.50	7/7	C/U		No	W	25	76-91	
20	7	1.00	7/5	E/U		No	SSE	0	76	
21	6	.67	6/24	E/U		No	W	5	100	
22	6	.33	6/22	E/U		No	WNW	10	104	
23	7	1.00	6/22	E/U		Yes	E	5	98	
24	4	0.00	7/12	E/U		No	E	35	9	
25	6	1.00	6/24	E/U		No	W	<5	91	
26	7	.71	6/24	E/U		No	W	20	91	
27	6	0.00	6/24	E/U		Yes	W	15	85	
28	7	1.00	6/24	E/U		No	NW	5	9	
29	6	≥0.50	6/24	C/Cm		No	W	5	91	
30	5	≥0.60	7/10	E/U		No	E	5	76	
31	6	1.00	6/25	E/U		No	S	20	50	
32	7	1.00	6/25	E/U		No	SE	25	20	
33	6	1.00	6/23	E/U		No	SE	20	70	
34	7	1.00	6/23	E/U		Yes	E	15	46	
35	6	Unk	6/27	E/U		No	NE	25	37	
36	8	1.00	6/25	E/U		Yes	N	5	30	
37	5	0.40	6/23	E/U		Yes	-	0	5	
38	5	0.20	6/23	E/U		No	N	25	37	
39	7	1.00	6/30	Em		No	-	0	50	
40	7	0.57	6/30	Em/Up		No	-	0	60	
41	6	1.00	6/27	E/U		No	E	25	30	
42	6	0.83	6/27	E/U/Em		No	NW	10	70	
43	7	1.00	6/27	E/U/Em		Yes	SE	20	70	
44	6	0.83	6/28	E/U		Yes	SE	10	91	
45	7	1.00	6/22	E/U		No	-	0	76	
46	Brood	Unk	6/15	E/U		Unk	Unk	Unk	76	
47	Brood	Unk	6/15	E/U		Unk	Unk	Unk	76	
48	6	≥0.83	7/10	Up		No	S	5	55	
49	4	0.50	7/11	E/U		No	N	25	9	
50	6	≥0.50	6/27	E/U		No	W	15	61	
51	Brood	Unk	6/25	Up		Unk	Unk	Unk	91	
52	6	1.00	7/9	Up/Cm		No	NE	10	43	
53	≥4	Unk		Up		Unk	N	5		

a based on egg float angles

b E/U= Elymus/Umbel, Cm= Carex meadows, C= Calamagrostis, Em= Empetrum, and Up= Upland Tundra.

Appendix B. Annotated list of areas used by geese at Agattu I., Alaska in 1990 (see Table B-1 for summary).

Area 1 Strong potential for feeding, roosting and nesting habitat at Carex marsh in creek bottom. The marsh was not searched.

Area 2 One pair feeding at previous year's nest cup along jeep road, within view of the beached landing craft at Karab Cove (6/90).

Area 3 Fresh goose droppings noted occasionally in Elymus fringe.

Area 4 Heavy spring use in areas noted -- Elymus fringe, sea-facing slopes, headlands. Heavy fall use in areas noted-- interior lakes, Carex meadows. Carex cropped extensively spring and fall. Heavy use in this area indicates that non-breeders stayed around this area at least in spring, and were not transient. Strong potential for use of triangular-shaped headland at eastern edge of this area; spring search in this area revealed little use.

Area 5 Light spring use in Elymus fringe and Carex meadows. Heavy fall use in area denoted. Carex cropped extensively. Goose droppings indicate Carex seed and mossberries are major components of diet.

Area 6 Several pairs flying around this area on 5/31 but apparently only one attached to a territory at that time. Subsequent checks confirmed this. Heavy fall use in area denoted. Carex cropped extensively. Nesting habitat thins out between Areas 6 and 7. This area is occupied by a large gull colony.

Area 7 Heavy spring use at old midden site. Although this area was searched intensively, we could not find a nest. Probably an important roost site as well as a feeding area.

Area 8 Carex macrochaeta lush and abundant on east wall of valley (sea-facing aspect).

Area 9 Carex meadows used spring and fall by non-breeders.

Area 10 The proximity of field camp to this area may have caused some geese to abandon potential territories and nest #12. Carex meadows and Carex in upland tundra used by non-breeders spring and fall.

Area 11 Territorial displays noted on plateaus east and west of Anemone Canyon involving 4 pairs of geese. Abundant food resources in spring.

Area 11A Important feeding area in spring and fall, particularly for brood rearing in fall. Carex meadow is

dissected by shallow streams and surrounded by low hills forming a shallow bowl. A likely site for expansion of nesting geese.

Area 12, 13, 13A Areas 12 and 13 were important feeding areas in the spring. The area denoted was used heavily by non-breeders for feeding. Windrowed Elymus gave the hillside in this area a trenched appearance that may have also made it an important roosting area. Area 13A was used in the fall for brood rearing along with 11A.

Area 14 The ecotone behind the Elymus fringe was used extensively for feeding in the spring.

Area 15 Heavily used by nesting geese in spring, this area showed little sign of use in late July. (Only one nest site offered evidence of brood rearing). Geese may have been rearing broods on steep sea slopes at the Cape, which was out of our view. Nevertheless we did not note any goose observations at Cape Sabak on July 25, the day that we rechecked nests there.

Area 16 Important feeding area for non-breeders in spring.

Area 17 Thomas Lakes was an important feeding area for nesting geese and non-breeders (spring and fall), for brood rearing, for molting and for roosting. North of Thomas Lakes a Carex marsh in a natural bowl was an important feeding area for non-breeders in spring and fall. Elymus windrows on a nearby inland-facing slope

(east side of the bowl) was an important roosting area in spring and has strong potential for more nesting geese in the future.

Area 18 & 19 Strong potential for expansion of nesting geese. Broad ecotone behind Elymus fringe was extensively used in spring for feeding. At nest recheck (8/3) we noticed that goose use around nest #13 had shifted inland from the ecotone toward interior lakes.

Area 20 Light use by one nesting pair and 2 non-breeders, all sighted in June. Goose with gray neck collar J97 sighted in company of 3 other geese.

Area 21 Use by 4 non-breeders in June. Two birds acting somewhat territorial but no nest was found.

Area 22 One nesting pair near McDonald Point.

Area 23 Three nesting pair between USGS ROOF and USGS QUIT. Six non-breeders feeding in June.

Area 24 Four nesting pair between North Head and USGS QUIT.

Area 25 Used frequently by one nesting pair and 2 non-breeders in June. In August, the 2 breeders and their 6 goslings were sighted. The area had signs of heavy use in August when 23 non-

breeders were observed. Geese were observed using lakes to the west of the coast.

Area 26 Goose Creek was the sight of 2 nesting pair and fairly continuous use by as many as 10 non-breeders. This heavily vegetated Elymus/umbel/grass community saw frequent use for both feeding and roosting.

Area 27 The upland ridges to the west and south of the Aga Cove cabin were heavily used feeding/roosting areas. Their proximity to the cabin may have contributed to an overestimation of importance. At least 2 family groups and up to 16 non-breeders used this area.

Area 28 Early summer use of Tasca pond, the small neighboring pond, and the surrounding meadows was frequently observed during passerine surveys. Up to 17 non-breeders used this area in June, but no geese were observed during our occasional visits in mid and late summer.

Area 29 A newly hatched brood of three goslings was observed in the company of 2 parents and 5 non-breeders in late June. Five non-breeders were sighted on separate occasions in June. An old nest from last year was found along the passerine transect approximately 500 m from the starting point.

Area 30 Two pair nested in this area, one of which was observed with goslings in the immediate vicinity of the nest (42) in August. Three non-breeders were regularly seen on the east shore of Lake Dawn Marie. There was heavy sign of use throughout the summer. A brood of 3 goslings was observed to the west of Dawn Marie up the drainage about 0.5 km. A pair of geese was observed 1.75 km inland from USGS PROM in August.

Area 31 One nesting pair was observed in this area in June.

Area A & B We found no sign of goose use in these areas in spring (6/8), but they were heavily used by family groups in fall. Three family groups, one of 7 individuals and the 2 groups heard in the fog on 9 August; also 16 adults and 9 goslings on 10 August.

Area C Somewhere in this area, Bob Angell, volunteer deckhand aboard the M/V Tiglax, saw a newly hatched brood (6/26).

Point D Old goose droppings were found at this site (8/12) indicating that the area was used in June or July.

Point E Sign of recent heavy use found here 10 August.

Table B-1. Observations of geese and estimates of population at Agattu Island, Alaska in 1990.

Area	Territorial ^a			Non Breeders ^a		
	June	July	August	June	July	August
1	Pair/nest	1 ad/6gos ^b		2		
2	Pair/old nest			2		
3				(LS)		
4	Pair/1 nest		(1 ad/6 gos) Fam. Gr.	24/12/7		1 + 2 flocks
5				2/26/9/4		5
6	Pair		(HS)	4 pairs + 1		(HS)
7				(HS)		
8	Pair/nest			4/6/2		
9				(LS)		
10	2 pair/1 nest			6/15		(LS)
11	6 pairs/2 nests 1 brood			9/4/3		5/7
				17/4/17/2/3		
11A				3		≥ 3 Fam. Gr. 8
12	2 pair/2 nests	1 brood		10/4/4		
13	1 pair/1 nest			16/4		
13A		13 ad/9 gos				
14	5 pair/5 nests			11/2/20		
15	9 pair/9 nests			3/5/2		
16	6 pair/6 nests			20/26/17		1 (HS)
17	5 pair/5 nests			12/40/1/1/1		1 (HS)
18	1 pair/1 nest			4/4/2		
19	1 pair/1 nest			2/2/4		
20	1 pair/1 nest			2		
21				4		
22	1 pair/1 nest					
23	3 pair/3 nests			6		
24	4 pair/4 nests	8				
25	1 pair/1 nest		Fam. Gr. 8 (2 ad./6 gos)	2 (HS)	2 (LS)	23 (HS)
26	2 pair/2 nests	2		10	3	7
27			Fam. Gr. 10 (4 ad./6 gos) Fam. Gr. 7 (2 ad./5 gos) Fam. Gr. 8 (2 ad./6 gos)	16	2	11
28				17		
29	Fam. Gr. 5 (2 ad./3 gos)			5		
30	2 pair/2 nest		Fam. Gr. 7 (2+ gos, rest unk)	3 (HS)	(HS)	(HS)
31	1 pair/1 nest					16 ad./9 gos. (HS)
A						2 Fam. Gr. (HS)
B						
C	1 brood					
D					(LS)	
E					(HS)	

^a Potential number of nonbreeding adults using an area. Numbers for areas 20-31 represent minimum number of nonbreeders using the area.

^b Abbreviations: ad= adult, gos= gosling, HS= Heavy sign of use, LS= Light sign of use, Fam. Gr.= Family Group

