Alaska Department of Fish and Game

Division of Wildlife Conservation

Waterfowl Program

Annual Progress Report

1 July 1989-30 August 1990

by

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October 1990

CONTENTS

WATERFOWL PROGRAM PROGRESS REPORT, 1990

Introduction

Changes in federal aid reporting requirements have eliminate production of comprehensive annual reports for programs using federal funds. Consequently, there is no longer a process by which annual project accomplishments are documented. This program progress report is produced to satisfies those reporting needs.

WATERFOWL HARVEST AND HUNTER ACTIVITIES

Introduction

Except for the period 1977 to 1981 and 1986, the state of Alaska has surveyed waterfowl hunters to estimate annual harvest and hunter activity since 1972. This survey was redesigned in 1987 to increase efficiency and accuracy (Campbell et al. 1989). Results from both state and U.S. Fish and Wildlife Service (FWS) surveys were used to determine hunter activity and harvest for the 1989-90 waterfowl season. Because of the scheduling of this report, final FWS survey data for the reporting period were not available; however, because their third-quarter harvest data typically do not vary significantly from their final data, they will be used in this report. In addition, the distribution of the harvest of ducks by species and geographical was not estimated by the FWS. Consequently, no estimate of the regional species composition of the 1989-90 duck harvest is presented in this report.

Methods

The distribution of hunter questionnaires has been incorporated into the sales of the state duck stamp. Self-addressed, preposted questionnaires (Fig. 1) were issued by license vendors to the purchasers of the first 2 stamps out of each booklet of 5 stamps (40% sample). Harvest and hunter activity data were compiled from survey cards returned by 1 June 1990. Reminder questionnaires were not sent to nonrespondents.

Harvest location information from the questionnaires were coded by a hierarchical system based on specificity of responses. Locations were coded to the lowest level or most specific location when possible. When a specific location was not reported, a general area (e.g., based on the respondent's resident ZIP code) was assigned. These were then coded according to a geographical region (Fig. 2); e.g., if a reported harvest of ducks from the Fairbanks area could not be assigned to a specific harvest location, it would be coded to the central region (005). For reporting purposes, the harvest data were combined when

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

1989-90

WATERFOWL HUNTER SURVEY

STAMP NO. 053066

DEAR HUNTER:

Your cooperation is needed to better manage Alaska's waterfowl. By accurately answering the questions below concerning your hunting activities in 1989, you can help insure proper management and good hunting for the future. If you can't remember exact numbers, give your best estimates. Complete the form printed below and drop this card in the mail. No postage stamp is necessary: Thank you for your cooperation.

PART I (ALL RECIPIENTS COMPLETE)

A. DID YOU BUY A FEDERAL DUCK STAMP IN 1989? YES ☐ NO☐

B. HOW MANY ALASKA STATE DUCK STAMPS DID YOU BUY? ☐

C. DID YOU HUNT FOR WATERFOWL DURING THE 1989-1990 SEASON? YES☐ NO ☐

PART II (COMPLETE ONLY IF YOU HUNTED)

D. PLEASE LIST ALL THE PLACES WHERE YOU HUNTED WATERFOWL, NUMBER OF DAYS HUNTED AT EACH LOCATION AND NUMBER OF BIRDS SHOT AND RETRIEVED.

— PLACES HUNTED — (FOR EXAMPLE, MINTO FLATS, STIKINE FLATS, SUSITNA FLATS, ETC.)	NUMBER BIRDS SHOT AND RETRIEVED										
	9. DAYS HUNTED	10. DUCKS	11. SEA DUCKS & MERGANSERS	12. CANADA GEESE	13. SNOW GEESE	14. WHITE-FRONTED GEESE	15. BRANT	16. EMPEROR GEESE	17. UNKNOWN GEESE	18. CRANE	19. SNIPE
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											

Figure 1. Questionnaire issued to waterfowl hunters purchasing state duck stamps for the 1989-90 Alaska waterfowl season.

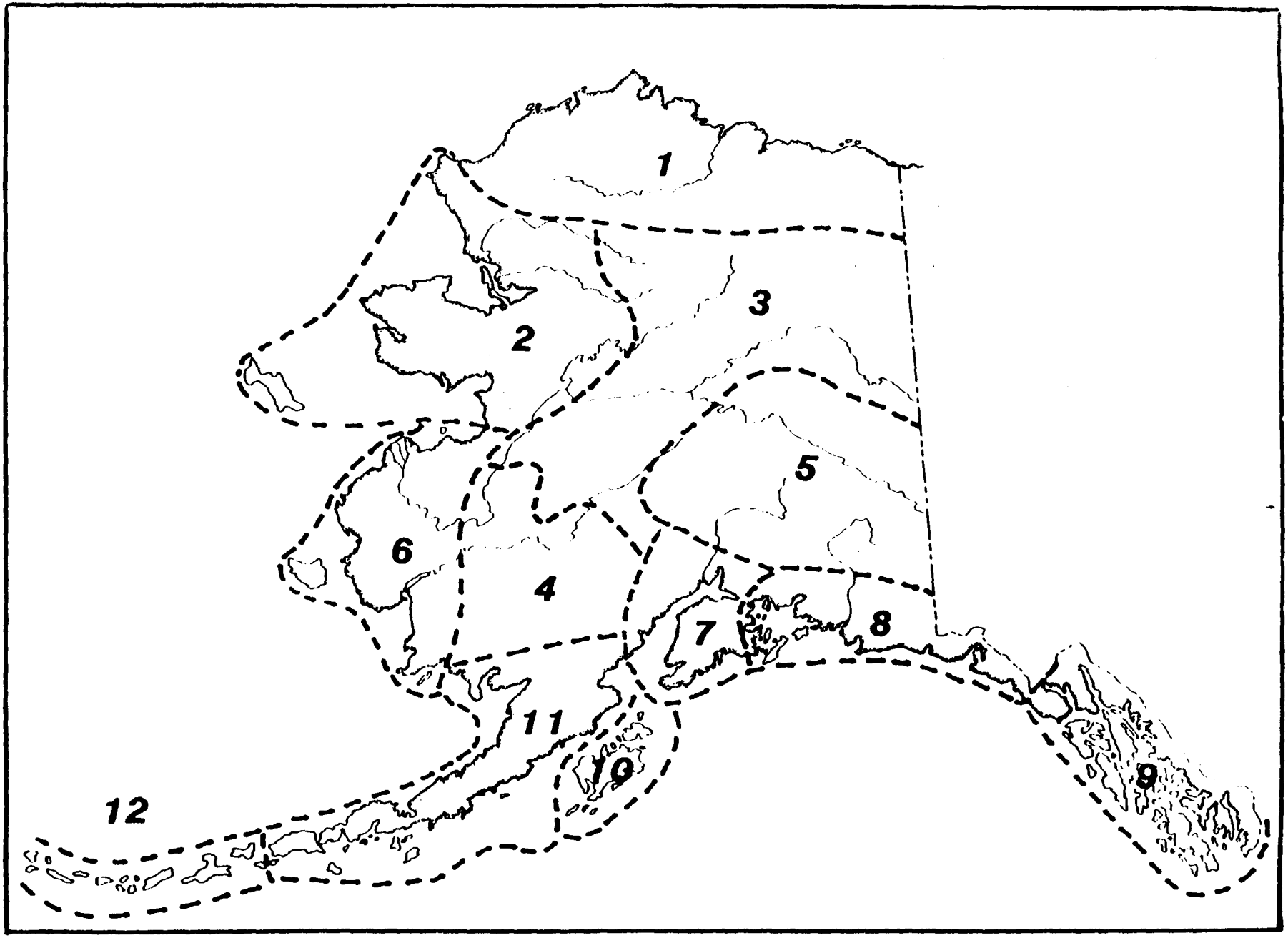

Figure 2. State waterfowl and crane harvest survey regions.

harvests for several locations were low and scattered throughout a local geographical area; for example, reported harvests from Kenai Lake, Summit Lake, and Anchor River were reported as the Greater Kenai Peninsula area (119). Harvest location codes are presented in Table 1. To facilitate comparison of ADF&G and FWS data, harvest locations were also categorized according to location codes used in the FWS parts collection survey.

Reporting bias was corrected during data analysis (Voelzer et al. 1982). Briefly, this was done by correcting for memory and prestige response biases by multiplying the reported duck and goose bags by 0.7895 and 0.8516, respectively. Adjustments for junior hunter activity were made by multiplying the estimated ducks and geese bagged by 1.0451 and 1.0871, respectively. Reported crane and snipe harvest data were not corrected for memory bias or junior harvest.

Because of nonreporting by hunters without duck stamps and these hunting outside legal seasons, the assessment of waterfowl hunting and harvest is complicated. Analysis did not include data from 40 respondents who reported hunting without a federal duck stamp or did not respond to the relevant questions. Estimates of hunters, harvest, etc. in this report are based solely on duck stamp sales and, therefore, reflect only the reported fall harvest.

Results

Number of Hunters:

Based on licensing reports, 4,434 questionnaires were distributed to state duck stamp buyers; of these, 1,100 were returned (i.e., response rate of 24.8%); 1,080 (98.2%) of the returned questionnaires contained sufficient information to be used in the survey. Of the 1,080 hunters who reported purchasing a state duck stamp, 733 (69.7%) reported hunting in 1989 (Table 2), compared with a FWS estimate of 76.1%. Based on the sales of 12,754 federal duck stamps, down 15% from 1988 and 30.5% below the 20-year average (Fig. 3), and a state estimate of 14.6% sales to stamp collectors, there were 10,892 potential waterfowl hunters in Alaska during the 1989-90 season (Table 2). This compares with a FWS estimate of 11,667 potential hunters and a correction factor of 8.3% for philatelic sales (Martin et al. 1990). The 1989 state estimate of potential hunters is below the 13-year state survey average of 11,119 while the FWS estimate is 15% below that for 1988 and similar to the 20-year average (Fig. 3). After adjustment for inactive and nonhunters, an estimated 7,392 adults hunted waterfowl in 1989 (Table 2), compared with a federal estimate of 8,879 adult hunters.

Table 1. Summary of codes used to assign harvest locations in Alaska.

ADF&G Code	FWS Code	ADF&G geographical region (R)and harvest location names	Original FWS "county" name	FWS harvest zone
000	0000	Unknown	Unknown	Unknown
001	0101	North Slope (R)	Arctic Slope	Northwest
002	0301	Seward Peninsula (R)	Seward Peninsula	NW
020	----	Shishmaref	Seward Peninsula	NW
021	----	Norton Sound	Seward Peninsula	NW
022	----	Nome area	Seward Peninsula	NW
023	----	Safety Lagoon	Seward Peninsula	NW
024	----	Serpentine River	Seward Peninsula	NW
025	----	Golovin	Seward Penisnula	NW
003	0502	Upper Yukon Valley	Upper Yukon-Kuskokwim	Central
004	0502	Lower yukon Valley	Upper Yukon-Kuskokwim	C
005	0702	Central (R)	Fairbanks-Minto	C
070	0752	Delta area	Fairbanks-Minto	C
071	----	Denali Highway	Fairbanks-Minto	C
079	0722	Eielson AFB	Fairbanks-Minto	C
080	----	Fort Wainwright	Fairbanks-Minto	C
081	0742	Healy Lake area	Fairbanks-Minto	C
082	0712	Minto Flats	Fairbanks-Minto	C
083	----	Salcha River	Fairbanks-Minto	C
084	0732	Salchaket Slough	Fairbanks-Minto	C
085	----	Tanana Flats	Fairbanks-Minto	C
086	----	Tetlin Flats	Fairbanks-Minto	C
087	0762	Tok-Northway	Fairbanks-Minto	C
088	----	Fort Greely	Fairbanks-Minto	C
089	----	Chena River	Fairbanks-Minto	C
090	----	Creamer's Field	Fairbanks-Minto	C
006	0901	Yukon Delta (R)	Yukon-Kuskokwim Delta	NW
007	1103	Cook Inlet (R)	Anchorage-Kenai	Southcentral
115	1153	Chickaloon Flats	Anchorage-Kenai	SC
116	----	Eagle River	Anchorage-Kenai	SC
117	1133	Goose Bay	Anchorage-Kenai	SC
118	1193	Kachemak Bay	Anchorage-Kenai	SC
119	----	Greater Kenai Pen. Area	Anchorage-Kenai	SC
120	----	Jim-Swan Lakes area	Anchorage-Kenai	SC
121	1123	Palmer Hay Flats	Anchorage-Kenai	SC
122	1163	Portage	Anchorage-Kenai	SC
123	1143	Potter's Marsh	Anchorage-Kenai	SC
124	1183	Redoubt Bay	Anchorage-Kenai	SC
125	1113	Susitna Flats	Anchorage-Kenai	SC
126	1173	Trading Bay	Anchorage-Kenai	SC
127	----	Kenai River Flats	Anchorage-Kenai	SC
128	----	Kasilof River	Anchorage-Kenai	SC
129	----	Knik River	Anchorage-Kenai	SC
130	----	Skilak Lake	Anchorage-Kenai	SC
131	----	Tuxedni Bay	Anchorage-Kenai	SC
132	----	China Poot Bay	Anchorage-Kenai	SC

Table 1. (Cont).

ADF&G Code	FWS Code	ADF&G geographical region (R)and harvest location names	Original FWS "county" name	FWS harvest zone
133	----	Swanson River	Anchorage-Kenai	SC
134	----	Seward	Anchorage-Kenai	SC
008	1303	Gulf Coast (R)	Cordova-Copper River	SC
150	1313	Copper River Delta	Cordova-Copper River	SC
151	1333	Prince William Sound	Cordova-Copper River	SC
152	1323	Yakutat area	Cordova-Copper River	SC
153	----	Montague, Hawkins, Hinchenbrook Islands	Cordova-Copper River	SC
154	----	Valdez area	Cordova-Copper River	SC
009	1503	Southeast Coast (R)	Juneau-Sitka	Southeast
170	1523	Blind Slough	Juneau-Sitka	SE
171	1513	Chilkat River	Juneau-Sitka	SE
172	1543	Duncan Canal	Juneau-Sitka	SE
173	1573	Farragut Bay	Juneau-Sitka	SE
174	----	Icy Strait	Juneau-Sitka	SE
175	----	Ketchikan area	Juneau-Sitka	SE
176	1563	Mendenhall Flats	Juneau-Sitka	SE
177	----	Petersburg area	Juneau-Sitka	SE
178	----	Prince of Wales Is.	Juneau-Sitka	SE
179	1533	Rocky Pass	Juneau-Sitka	SE
180	----	Seymour Canal	Juneau-Sitka	SE
181	----	Sitka area	Juneau-Sitka	SE
182	1553	St. James Bay	Juneau-Sitka	SE
183	1583	Stikine River Delta	Juneau-Sitka	SE
194	----	Thorne Bay	Juneau-Sitka	SE
195	----	Lynn Canal	Juneau-Sitka	SE
196	----	Pybus Bay	Juneau-Sitka	SE
197	----	Tenakee Inlet	Juneau-Sitka	SE
198	----	Admirality Cove	Juneau-Sitka	SE
199	----	Eagle River	Juneau-Sitka	SE
242	----	Angoon	Juneau-Sitka	SE
243	----	Kake	Juneau-Sitka	SE
010	1704	Kodiak (R)	Kodiak Island	Southwest
200	1714	Kalsin Bay	Kodiak Island	SW
201	----	Middle Bay	Kodiak Island	SW
202	----	Old Harbor	Kodiak Island	SW
203	----	Ouzinkie	Kodiak Island	SW
204	----	Raspberry Straits	Kodiak Island	SW
205	----	Women's Bay	Kodiak Island	SW
206	----	Port Lion's	Kodiak island	SW
207	----	Pasagshak	Kodiak Island	SW
208	----	Afognak	Kodiak Island	SW
011	1904	Alaska Peninsula (R)	Cold Bay-Ak Peninsula	SW
220	----	Cinder River	Cold Bay-Ak Peninsula	SW
221	1914	Cold Bay	Cold Bay-Ak Peninsula	SW
222	----	Naknek River	Cold Bay-Ak Peninsula	SW

Table 1. (Cont).

ADF&G Code	FWS Code	ADF&G geographical region (R)and harvest location names	Original FWS "county" name	FWS harvest zone
223	----	Pilot Point	Cold Bay-Ak Peneinsula	SW
224	----	Port Moller	Cold Bay-Ak Peneisula	SW
225	----	Port Heiden	Cold Bay-Ak Peninsula	SW
226	----	Egegik River	Cold Bay-Ak Peninsula	SW
227	----	Dillingham/Nushegak River and Bay	Cold Bay-Ak Peninsula	SW
228	----	Ugashik	Cold Bay-Ak Peninsula	SW
012	2104	Aleutian Chain (R)	Aleutian-Pribilofs	
240	----	Unimak	Aleutian-Pribilofs	
241	----	Adak	Aleutian-Pribilofs	

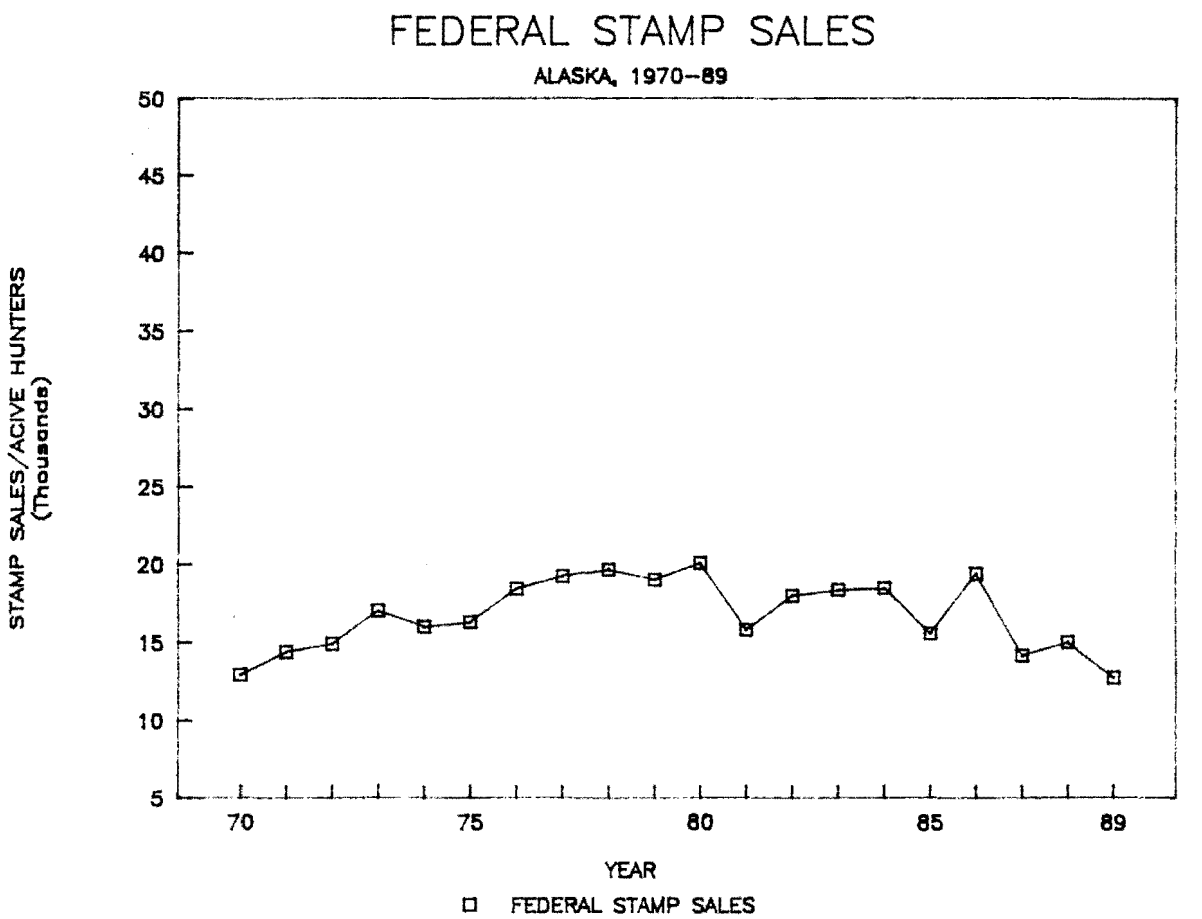

Figure 3. Tewnty year tred in duck stamp sales and potential hunters in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

Table 2. Summary of Alaska waterfowl hunter activity and harvest from the state survey, 1989-90.

Number of survey cards issued: 4,434

Number of survey cards returned: 1,100 (24.8%)

Number of survey cards usable for data analysis: 1,080 (98.2%)

Projected number of fall sport hunters:

Total federal duck stamps sold[a]: 12,754

Federal duck stamps sold to potential hunters in Alaska: 10,892

Number of active hunters: 7,392 (67.9%)

Calculated statewide fall sport harvest:

Ducks: Dabblers/divers: 46,681; Sea ducks: 5,606;
Total: 52,287

Geese: Canada: 4,014; white-fronted: 1,117; brant: 417;
snow: 95; unknown species: 237
Total: 5,879

Cranes: 625

Snipe: 1,170

Calculated hunter days: 33,069

[a] Martin et al. 1990

Hunting Activity:

Hunters reported hunting an average of 5.3 days during the 1989-90 season, representing a total of 33,069 waterfowl hunter days (Table 2), considerably lower than the federal estimate of 54,390 days. The state estimate was down about 42% from the 13-year average and the FWS estimate was down 25% from the 20-year average (Fig. 4). The distribution of hunter days and resulting harvest are summarized by specific location in Table 3.

Duck Harvest. According to state and FWS surveys, the average harvests per active hunter were 6.3 and 5.6 ducks, respectively (Martin et al. 1990), compared with a FWS 20-year average of 5.3 ducks/active hunter and a 13-year state survey average of 8.3 ducks/active hunter (Fig. 5). Average daily hunting success from state data was 1.6 ducks/hunter in 1989.

The projected statewide harvest was 52,287 ducks, of which 46,681 (89.3%) were dabbling and diving ducks and 5,606 (10.7%) were sea ducks and mergansers (Table 4), compared with the FWS estimate (Martin et al. 1990) of 68,728, of which 66,803 (97.2%) were dabbling and diving ducks and 1,924 (2.8%) were sea ducks and mergansers. The 1989 state duck harvest estimate was down 41% from the FWS 20-year average and down 42% from the 13-year state average (Fig. 6).

As calculated from the state survey, about 38% of the statewide duck harvest occurred in Cook Inlet, followed by about 26% in the central region and 13% in Southeast Alaska (Table 4). Nearly 24% of the statewide harvest and 20% of the hunter days occurred at 3 locations in Cook Inlet: Susitna Flats, Palmer Hay Flats, and Portage. The only other area in the state with similar harvest and hunter effort was Minto Flats (Table 3). Nearly 41% of the statewide sea duck and merganser harvest occurred on Kodiak Island. An additional 17% of the harvest occurred in Kachemak Bay

Goose Harvest. Hunters reported taking an average 0.8 geese/active hunter in 1989; this was above the 20-year FWS average of 0.7 geese/hunter but somewhat below the 12-year state survey average of 1.2 geese/hunter (Fig. 7). The FWS estimate of 0.6/hunter (Martin et al. 1990) was also considerably below both the state and FWS averages.

The calculated 1989 goose harvest was 5,879 (Table 2), down 33% from 1988 and well below the 13-year average. The FWS estimated harvest of 6,858 was up slightly from the 1988 estimate of 6,532 but well below the 20-year average (Fig. 8).

Based on the state survey, which had a sample size 4 times larger than the FWS parts collection survey, the Canada goose (Branta canadensis) was by far the most common goose harvested by sport hunters in 1989 (Table 2). This species made up over 68% of the

Table 3. Calculated hunting activity and duck harvest for specific locations in Alaska where more that 0.1% of the harvest occurred in 1989-90.

Location	Ducks		Hunter days	
	Calculated harvest	% of state total	Calculated days	% of state total
Susitna Flats	7,053	13.5	2,864	8.7
Minto Flats	6,338	12.1	2,138	6.5
Palmer hay Flats	3,602	6.9	2,370	7.2
Portage	1,624	3.1	1,261	3.8
Delta	1,465	2.8	2,057	6.2
Tok-Nothway	1,431	2.7	535	1.6
Redoubt Bay	1,414	2.7	504	1.5
Tanana Flats	1,347	2.6	1,170	3.5
Copper River Delta	1,321	2.5	1,513	4.6
Kachemak Bay	1,296	2.5	313	0.9
Mendenhall	1,010	1.9	867	2.6
Potter's Marsh	1,002	1.9	1,210	3.7
Trading Bay	985	1.9	333	1.0
Duncan Canal	976	1.9	535	1.6
Kenai River/Flats	985	1.9	524	1.6
Pilot Point	833	1.6	363	1.1
Healy Lake	791	1.5	585	1.8
Icy Striat	766	1.5	434	1.3
Stikine River Flats	606	1.2	403	1.2
Cold Bay	598	1.1	716	2.2
Old Harbor	513	1.0	81	0.2
Naknek River	513	1.0	232	0.7
China Poot Bay	505	1.0	101	0.3
Kalsin Bay	480	0.9	575	1.7
Woman Bay	463	0.9	484	1.5
Ugashik	463	0.9	141	0.4
Eielson AFB	438	0.8	595	1.8
Denali Highway	362	0.7	202	0.6
Middle Bay	345	0.7	514	1.6
Ketchikan Area	337	0.6	192	0.6
Petersberg Area	337	0.6	514	1.6
Seward	303	0.6	91	0.3
Chickaloon	295	0.6	161	0.5
Goose Bay	286	0.5	101	0.3
Prince William Sound	286	0.5	282	0.9
Prince of Whales	269	0.5	182	0.5
Kake	261	0.5	121	0.4
Angoon	253	0.5	161	0.5
Creamer's Field	227	0.4	222	0.7
Jim Creek/ Swan Lakes	210	0.4	222	0.7
Swanson River	202	0.4	141	0.4
Greater Kenai Peninsula	194	0.4	171	0.5

Table 3. (Cont).

Location	Ducks: Calculated harvest	Ducks: % of state total	Hunter days: Calculated days	Hunter days: % of state total
Yakutat	177	0.3	151	0.5
Raspberry Striats	168	0.3	30	0.1
Kink River	152	0.3	262	0.8
Sitka Area	143	0.3	202	0.6
Seymore Canal	135	0.3	40	0.1
Skilak Lake	118	0.2	40	0.1
Nome	101	0.2	91	0.3
Golovin	101	0.2	61	0.2
Pagadshak	101	0.2	212	0.6
Adak	101	0.2	212	0.6
Salcha River	93	0.2	91	0.3
Eagle River (S.E. AK)	93	0.2	101	0.3
Montegue, Hitchenbrook, & Hawkins Islands	84	0.2	61	0.2
St. James Bay	84	0.2	81	0.2
Lynn Canal	84	0.2	20	0.1
Subtotals	44,721	85.5	27,838	84.2
Statewide Totals	52,287	100	33,069	100

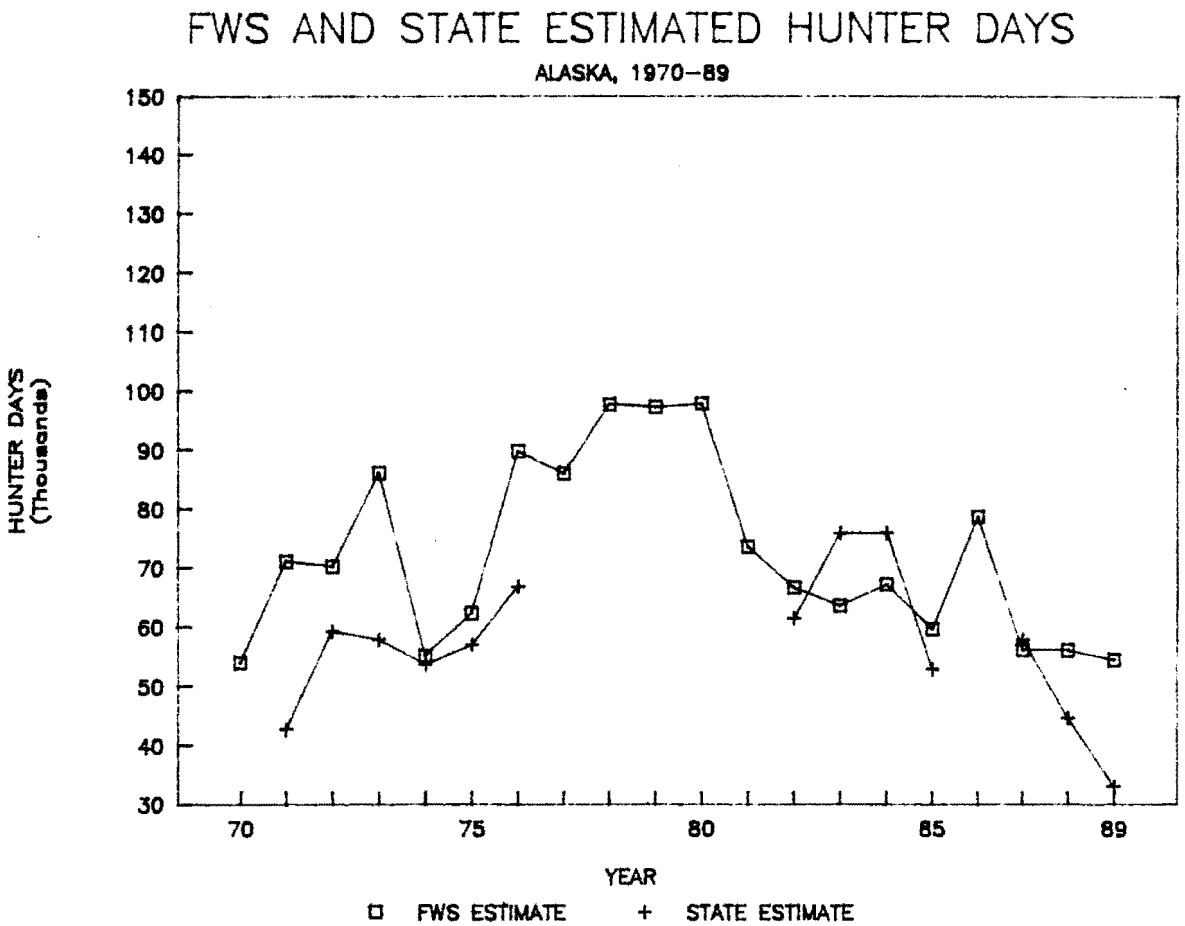

Figure 4. Twenty year trend in hunter days for Alaska as estimated by the State and U.S. Fish and Wildlife Service.

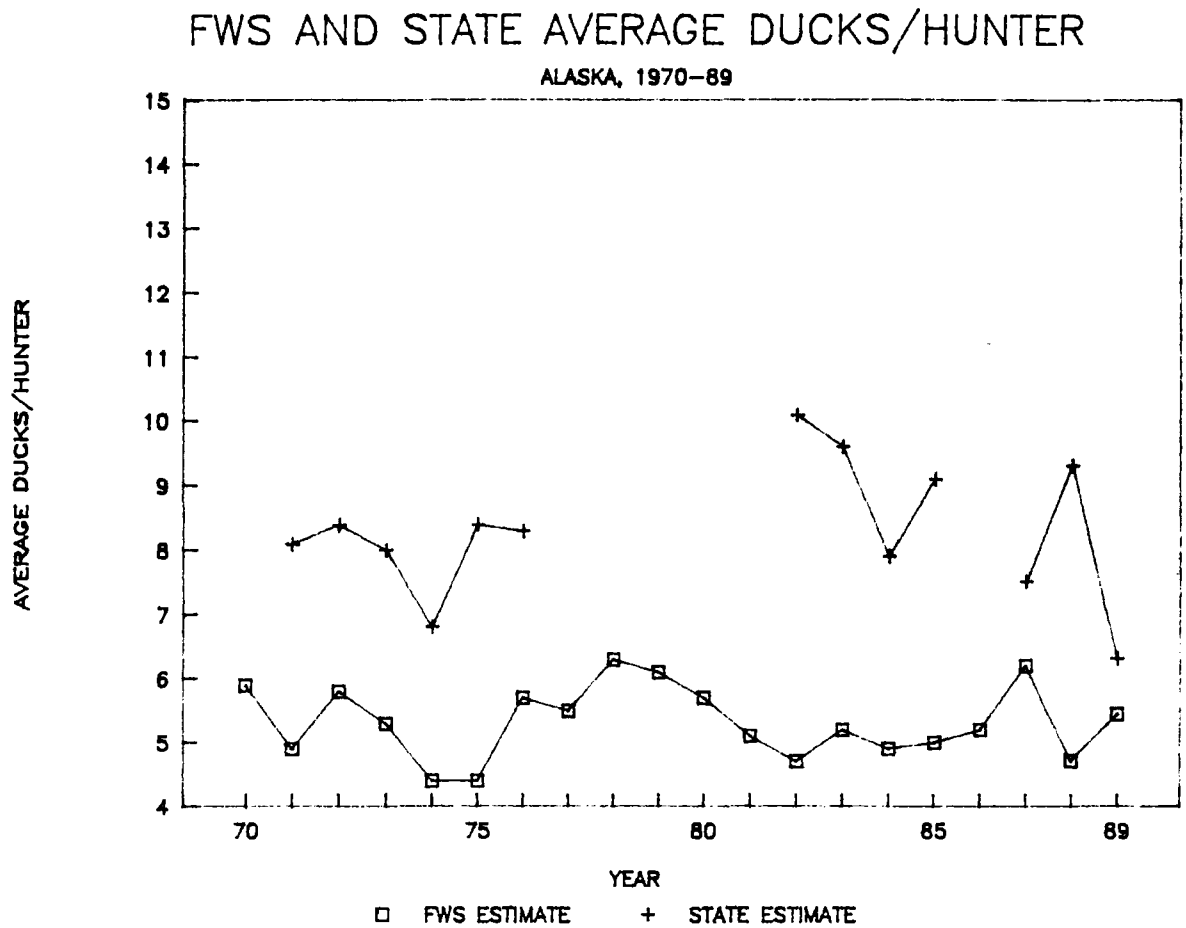

Figure 5. Twenty year trend in average ducks per hunter in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

Table 4. Proportion (%) of duck, goose, crane, and snipe sport harvests and hunter activity in the fall by geographic region from the state survey for 1989-90.

Harvest Region	Hunter Days	Dabblers/ Divers	Sea Ducks	Geese	Cranes	Snipe
North Slope [a]	0.0	0.0	0.0	0.0	0.0	0.0
Seward Peninsula	1.2	0.7	0.2	3.0	8.1	0.0
Upper Yukon Valley	2.3	1.3	0.0	0.0	0.0	0.0
Lower Yukon Valley	0.4	0.5	0.3	0.3	0.0	0.0
Central	25.8	28.4	3.8	35.7	79.0	20.7
Yukon Delta	1.0	1.4	1.4	1.4	0.0	0.0
Cook Inlet	32.7	39.9	26.0	18.2	6.5	30.2
Gulf Coast	6.6	4.8	2.0	5.5	0.0	1.7
Southeast	14.8	12.6	18.2	20.0	4.8	42.2
Kodiak	9.1	4.6	41.0	0.0	0.0	0.0
Alaska Peninsula	5.0	5.4	2.9	14.2	1.6	5.2
Aleutian Chain	0.5	0.0	1.8	0.0	0.0	0.0
Unknown	0.6	0.5	0.1	2.7	0.0	0.0
Statewide Days/Harvest	33,069	46,681	5,606	5,879	625	1,170

[a] No questionairres returned from the North Slope region.

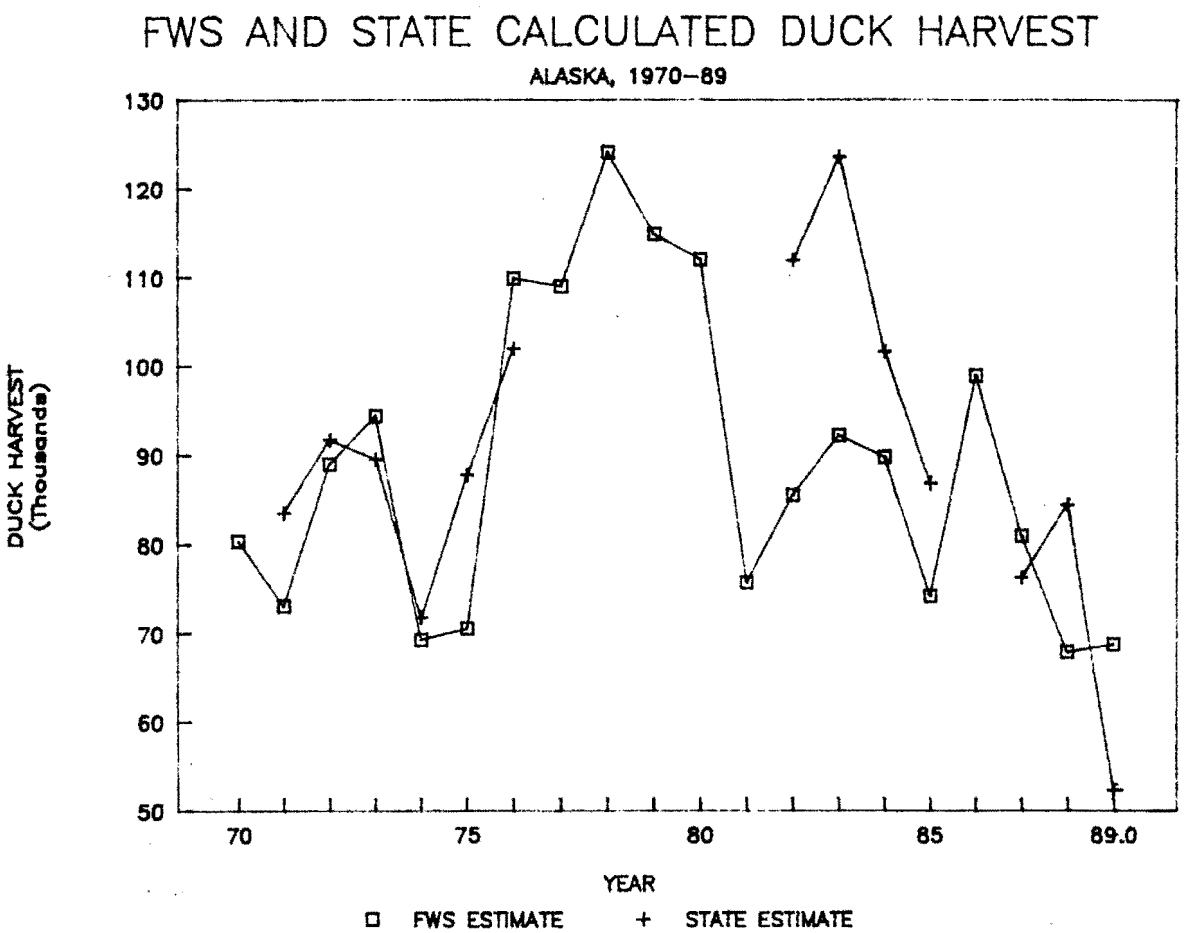

Figure 6. Twenty year trend in the duck harvest in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

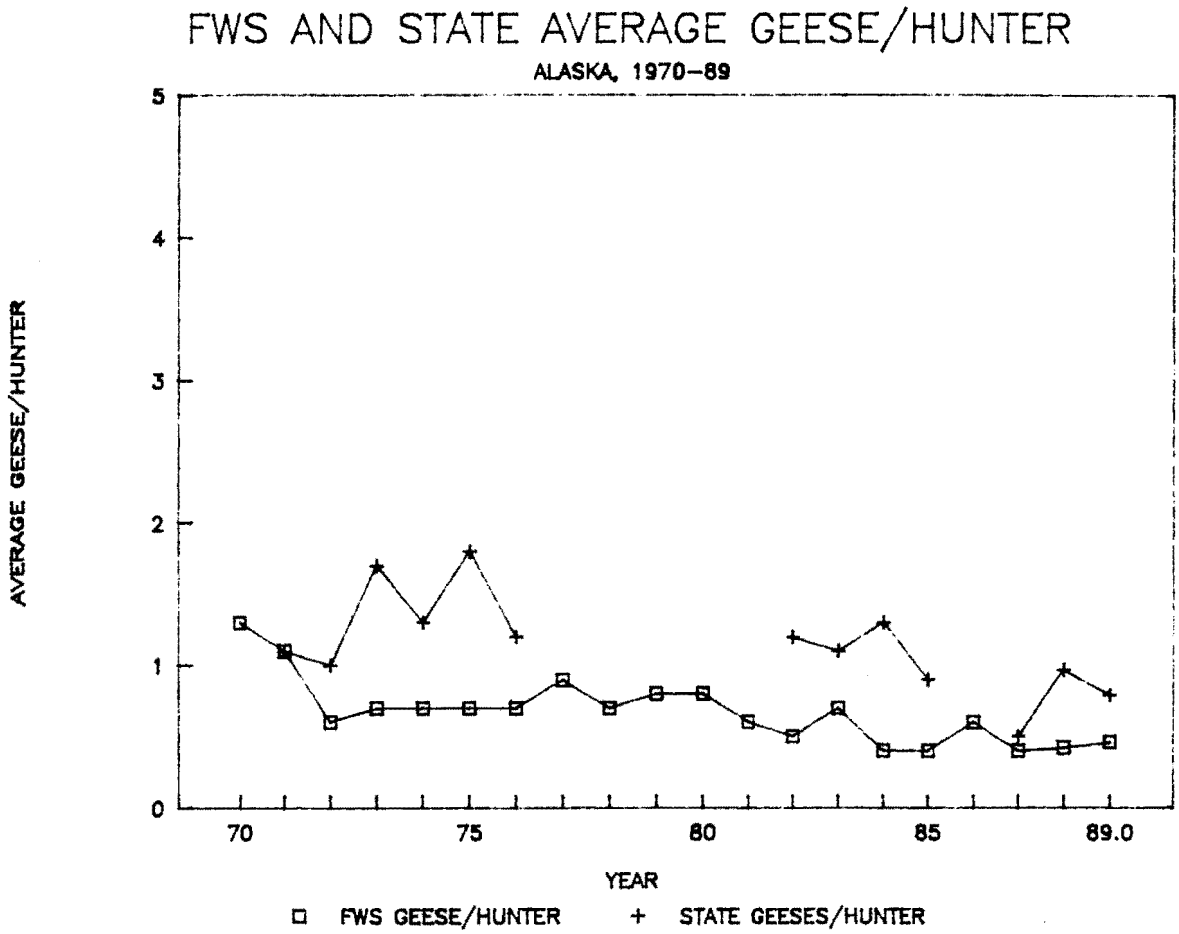

Figure 7. Twenty year trend in average geese harvested per hunter in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

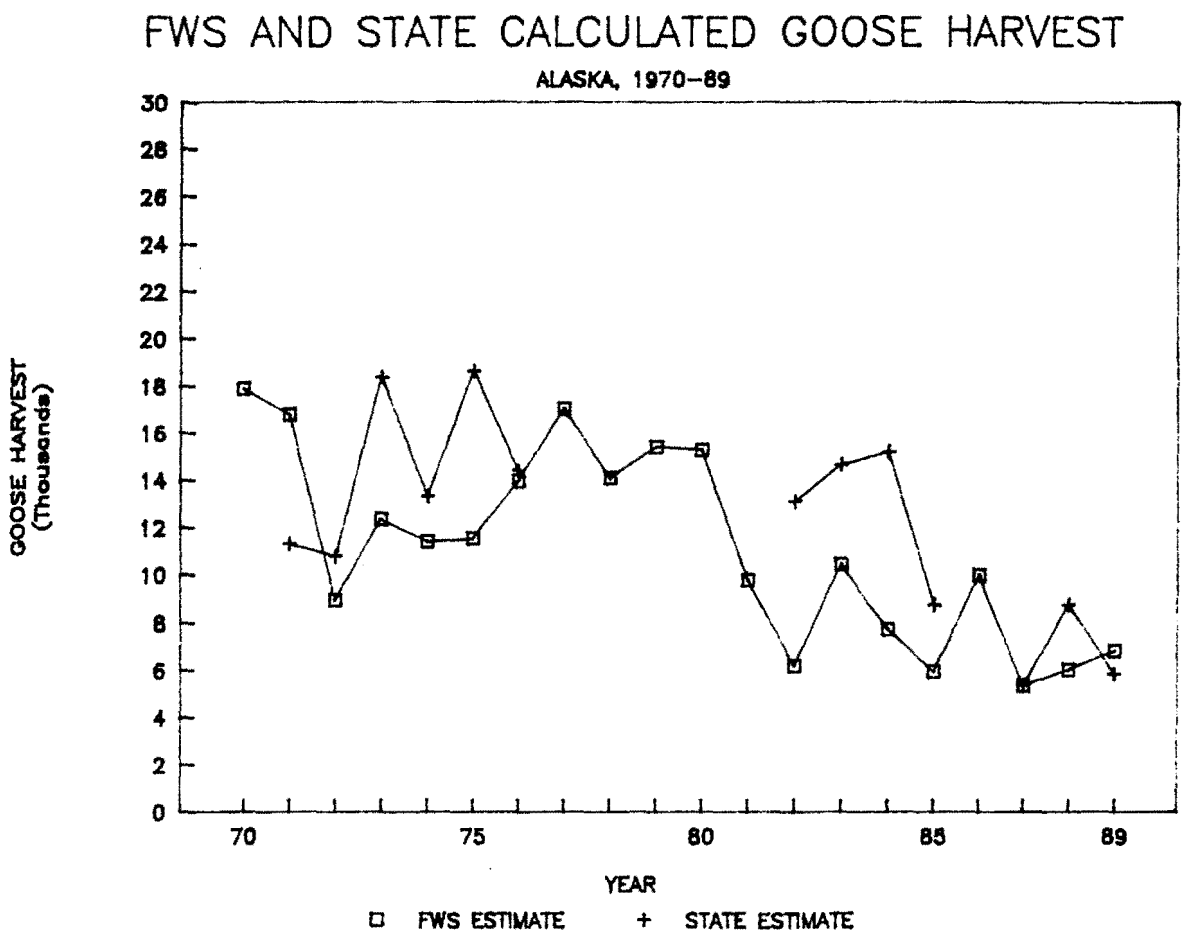

Figure 8. Twenty year trend in the goose harvest in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

harvest, followed by the white-fronted goose (Anser albifrons) (19%), Pacific brant (Branta bernicula) (7%), and snow goose (Chen caerulescens) (2%). A portion of the harvest (4%) was composed of unknown geese. This compares with a 1988 harvest composition of 80% Canadas, 10% white-fronts, 7% Pacific brant, 1% snow geese, 1% emperors, and 1% unknown (Campbell et al. 1990). The FWS estimated that the 1989 goose sport harvest was composed of 68% Canada geese, 25 % white-fronted geese, 5% brant, and 2% snow geese (Martin et al. 1990).

A regional breakdown of the 1989 goose harvest indicates that over a one-third of the harvest occurred in the central region, primarily the Delta area (20%). An additional 20% of the harvest occurred in the Southeast Alaska, followed by 18% in Cook Inlet, and 14% on the Alaska Peninsula (Table 5). Major regions for the Canada goose harvest were Central (29%), Southeast (27%), Cook Inlet (20%), and the Alaska Peninsula (15%). Most of the white-fronted goose harvest (75%) occurred in the central region (midcontinent population), followed by Cook Inlet (20%) (Pacific white-fronts). Most of the Pacific brant harvest took place on the Alaska Peninsula (54%) with the Central region (18.2%) and Yukon Delta (16%) also reporting harvest. Snow geese were harvested primarily in Cook Inlet and Southeast Alaska. Table 6 summarizes the 1988 goose harvest by specific location.

Crane Harvest. A calculated 625 sandhill cranes (Grus canadensis) were harvested in 1989 (Table 2), down 57% from 1988 and 48% from the 1971-88 state survey average (Table 7). No estimate of the Alaska harvest was made by the FWS. Approximately 88% of the harvest were from midcontinent populations and 12% were from the Pacific Flyway population of lesser sandhill cranes (Table 4).

Snipe Harvest. The calculated snipe (Capella gallinago) harvest for 1989 was 1,170 (Table 2), down 35% from 1988 and 66% below the 13-year average (Table 7).

Table 5. Distribution (%) of the fall goose harvest by species and harvest region, 1989-90.

Region	Canada	White-fronts	Pacific brant	Snow	Unknown	Total
North Slope [a]	0.0	0.0	0.0	0.0	0.0	0.0
Seward Peninsula	1.4	0.0	6.8	0.0	52.0	3.1
Upper Yukon Valley	0.0	0.0	0.0	0.0	0.0	0.0
Lower Yukon Valley	0.5	0.0	0.0	0.0	0.0	0.3
Central	28.5	74.6	18.2	0.0	20.0	35.7
Yukon Delta	0.0	0.8	15.9	0.0	4.0	1.4
Cook Inlet	19.8	20.3	0.0	50.0	0.0	18.2
Gulf Coast	8.0	0.0	0.0	0.0	0.0	5.5
Southeast	26.7	0.0	0.0	50.0	0.0	20.0
Kodiak	0.0	1.7	11.4	0.0	0.0	1.1
Alaska Peninsula	15.1	0.0	54.5	0.0	0.0	14.2
Aleutian Chain	0.0	0.0	0.0	0.0	0.0	0.0
Unknown	0.0	2.5	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

[a] No hunter questionaires returned from the North Slope region.

Table 6. Calculated goose harvest and proportion of the state total for specific locations in Alaska where more than 0.1% of the harvest occurred in 1989-90.

Location	Calculated harvest	%of state total
Delta	1,174	20.0
Cold Bay	833	14.2
Susitna Flats	483	8.2
Minto Flats	341	5.8
Tanana Flats	331	5.6
Duncan Canal	265	4.5
Portage	208	3.5
Shishmaref	170	2.9
Copper River Delta	170	2.9
Healy Lake	142	2.4
Angoon	142	2.4
Kake	123	2.1
Petersberg Area	114	1.9
Montague, Hitchenbrook, & Hawkins Islands	85	1.4
Potter's Marsh	76	1.3
Icy Strait	76	1.3
Prince of Whales	76	1.3
Chickaloon Flats	66	1.1
Ketchemak Bay	66	1.1
Prince William Sound	57	1.0
Redoubt Bay	47	0.8
Knik River	47	0.8
Farragut Bay	47	0.8
Mendenhall	47	0.8
Eielson AFB	38	0.6
Palmer Hay Flats	28	0.5
Tuxedni Bay	28	0.5
Stikine River Flats	28	0.5
Pybus Bay	28	0.5
Creamer's Field	19	0.3
Ketchikan Area	19	0.3
Rocky Pass	19	0.3
Sitka Area	19	0.3
Salcha River	19	0.3
Golovin	9	0.2
Tok-Northway	9	0.2
Greater Kenai Peninsula	9	0.2
Trading Bay	9	0.2
Yakutat	9	0.2
Subtotals	5,481	93.2
Statewide Totals	5,879	100.0

Table 7. FWS and state estimated crane and snipe harvest in Alaska, 1971-89

Year	Crane		Snipe	
	FWS	State	FWS	State
1971	--	502	--	3,087
1972	--	765	--	3,498
1973	--	602	--	1,661
1974	--	640	--	2,205
1975	288	1,642	--	4,318
1976	1,082	873	--	7,003
1977	619	--	--	--
1978	312	--	--	--
1979	675	--	--	--
1980	1,049	--	--	--
1981	553	--	--	--
1982	948	1,746	--	4,833
1983	903	1,805	--	3,476
1984	1,552	2,376	--	3,564
1985	642	1,270	--	1,597
1986	731	--	--	--
1987	1,206	1,014	--	2,654
1988	--	1,443	--	1,807
1989	--	625	--	1,170
	812	1,052	--	2991
SD	±358.5	±613.5		±1,786.6

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DUSKY CANADA GOOSE STUDIES

Introduction

Dusky Canada geese (Brant canadensis occidentalis) are known to nest only on the Copper River Delta and Middleton Island in Alaska and winter primarily in southwestern Washington and the Willamette Valley of Oregon. Until the late 1970's population size, which has ranged from a midwinter index of 7,500-8,000 in 1953 to 28,000 in 1960, was limited by hunting on the wintering grounds. Hunting was responsible for nearly all (95%) of the 45% annual population mortality (Chapman et al. 1969). Band recoveries indicated that about 70% of this harvest occurred in Oregon; the remaining 30% was about equally split between Washington, British Columbia, and Alaska. Production was typically good, and during the mid-1970's the population increased, despite a heavy annual harvest. Around 1979 production dropped off considerably and the population began to decline. Poor response of the population to harvest restrictions between 1983 and the present indicate that conditions influencing production are now limiting the population.

The Dusky Canada Goose Subcommittee of the Pacific Flyway Study Committee was formed in the early 1970's to set objectives and coordinate management of the dusky goose. In 1985 this subcommittee developed a council-endorsed management plan that established a population objective of 20,000 (i.e., based on a midwinter population index) and recommended guidelines for achieving and maintaining that objective. The recommended management procedures in the plan that involve ADF&G are as follows: (1) monitor and describe changes in nest site selection and nest success as related to changes in vegetation; (2) monitor annual nest density and success; (3) conduct annual production surveys and develop fall flight forecasts; (4) mark and band geese annually to monitor population age structure, survival rates, harvest distribution, and support studies on the wintering grounds; and (5) describe and evaluate interactions between habitat change, predator ecology, and production.

Study Area

The Copper River Delta is an approximately 650-km^2 deltaic plain at the mouth of the Copper River on the Gulf of Alaska (Fig. 1). It is bounded on west, north, and east by the Chugach Mountain Range and to the south by the Gulf of Alaska. The area has a typical maritime climate; cool summers, mild winters, and abundant precipitation. Annual precipitation averages 205 centimeters, including 319 centimeters of snowfall; annual temperatures average 3.4 C, ranging from averages of -5 C in January to 12 C in July.

The major dusky goose nesting area is the approximately 450-km^2 west Copper River Delta. This area is interlaced with tidal

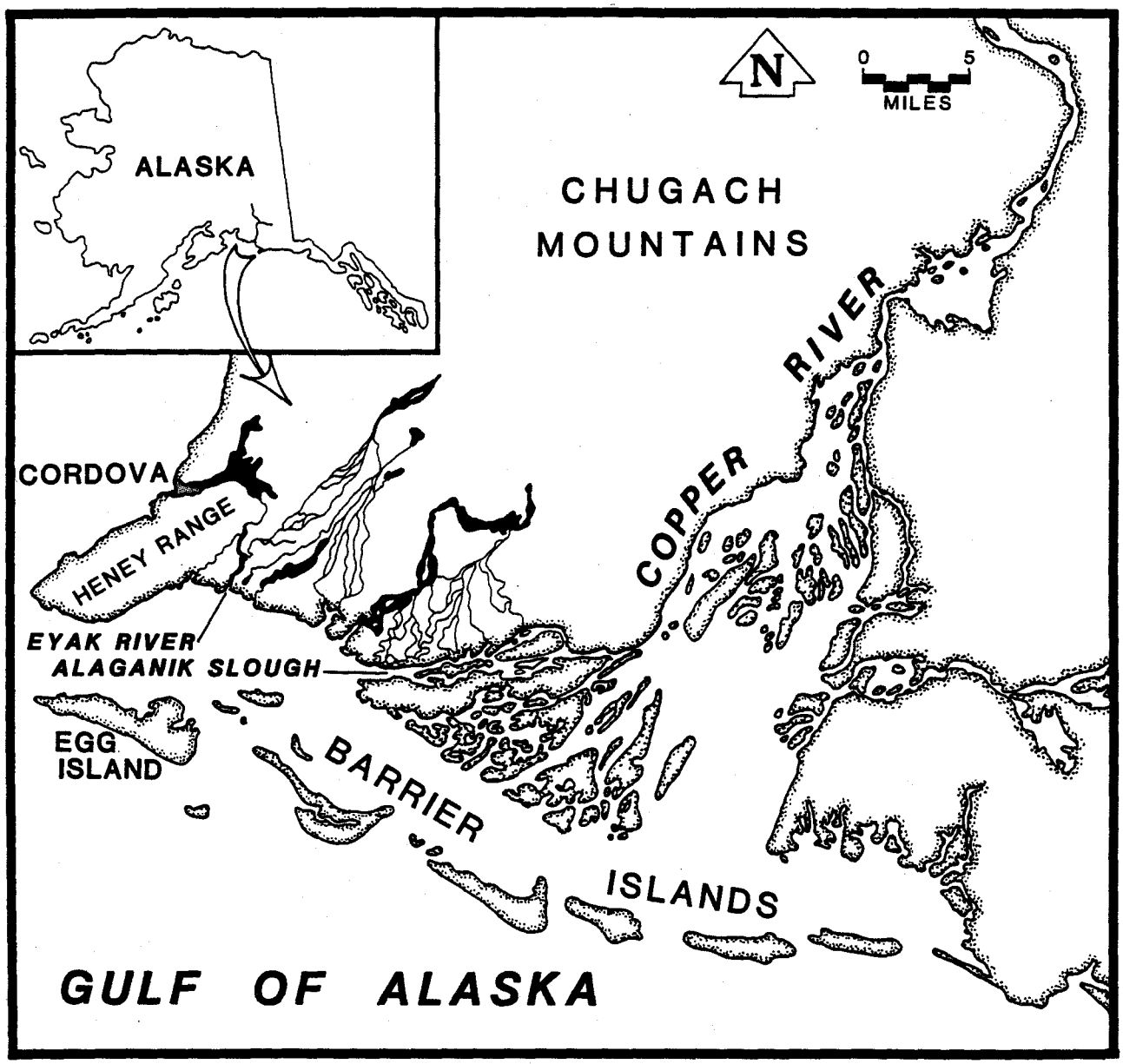

Figure 1. Copper River Delta, Alaska.

sloughs; glacial streams; and numerous small, shallow, freshwater ponds between drainages. Plant communities are evolving as a result of uplifting of the area by as much as 2 meters during the 1964 Good Friday earthquake (Potyondy et al. 1975). Currently coastal communities are dominated by freshwater sedge (Carex spp.) meadows interspersed with dense tall shrub (Alnus crispa and Salix spp.) stringers along drainages. Stands of tall shrub and shrub-bog (Myrica gale, Carex spp., and Menyanthes trifoliata) increase in frequency inland from the coast. An Alder, Sitka spruce (Picea sitchensis), and western hemlock (Tsuga heterophylla) community becomes dominant 7-11 km from the coast.

Projects

Monitor and Describe Changes in Nest Site Availability and Selection:

This project was completed in 1988. A final report has been accepted by the Canadian Field Naturalist and will be published in the Oct.-Dec. edition (Vol. 104, No. 4).

Describe and Evaluate Interactions Between Habitat Change, Predator Ecology, and Production:

A manuscript for a paper summarizing the results of an investigation of the activities of brown bears (Ursus arctos) on the Copper River Delta and their impacts on nesting geese is currently under revision. A manuscript summarizing the effects of an experimental reduction of bear numbers on dusky goose production is in final preparation and will be submitted to The Wildlife Society Bulletin.

Monitor Nest Densities and Fate:

Methods. The number and size of study plots used to sample nest densities and fates have varied since they were originally established in 1974 (Campbell and Rothe 1989). Seven plots totaling 2.49 km^2 were sampled twice in 1989 (Fig. 2). Each was extensively sampled immediately after the peak of incubation and again after the peak of hatch. During the first sampling, clutch size and stage of development (i.e., based on egg flotation) were recorded for active nests (Westerkov 1950). To facilitate relocation, all nests were also marked with wands and their location plotted on large-scale (1:330-1:700) maps. Wands were placed at least 50 feet from the nests to minimize the possibility of attracting predators.

During the second visit, the fates of both previously located and newly discovered nests were determined. Nests in which one or more eggs had hatched were considered successful. Attended nests were considered to be incubating, and nest that were unattended and where egg development had ceased were classified as abandoned. Nest destruction was classified as avian, unknown

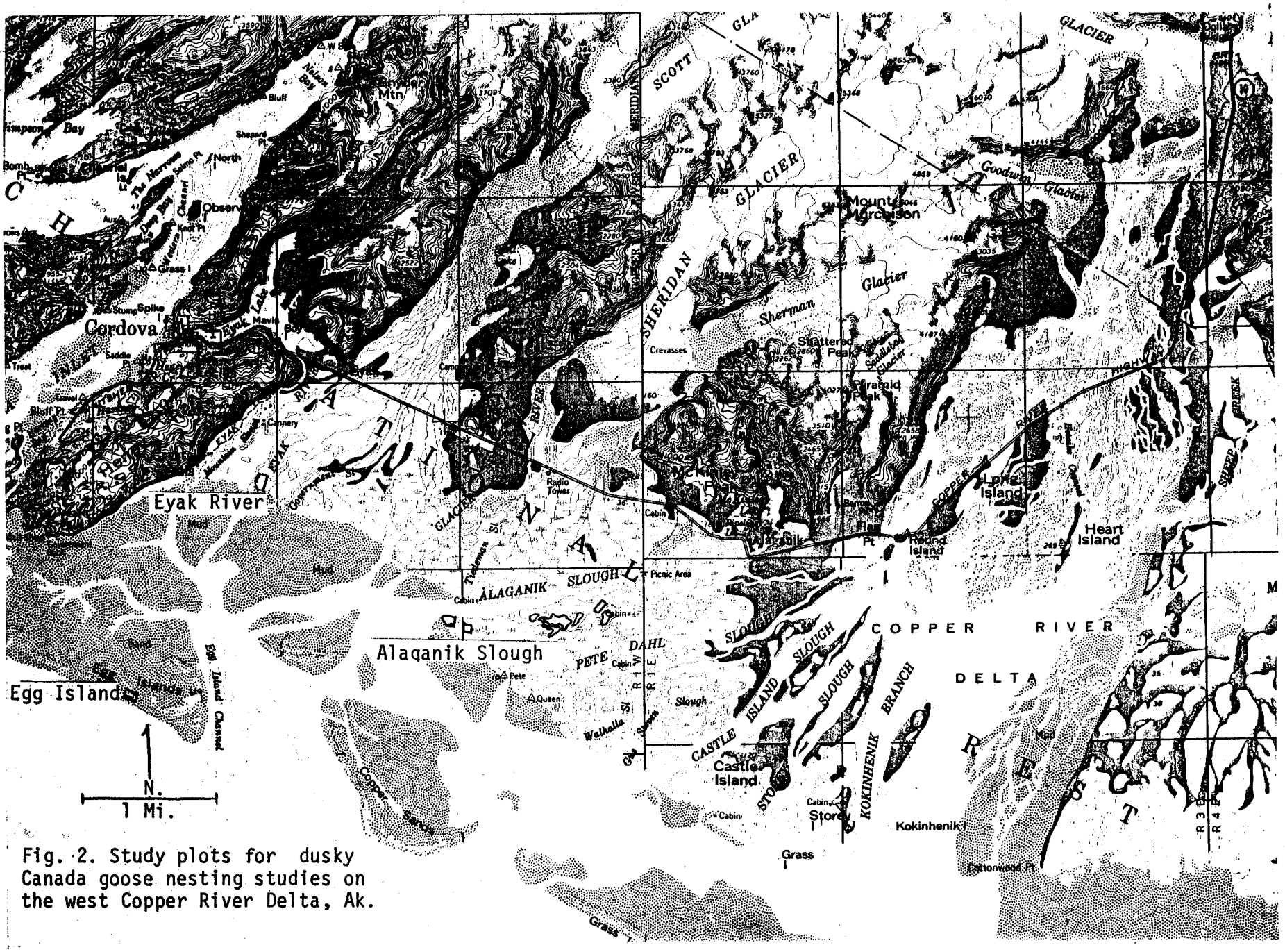

Fig. 2. Study plots for dusky Canada goose nesting studies on the west Copper River Delta, Ak.

mammal, canid, or bear, when sufficient evidence allowed, using published characteristics of predation (Darrow 1938, Sooter 1946, Rearden 1951) and techniques applicable to the local area that were developed during the project.

Assistance with this project was provided by the Washington Department of Wildlife, U.S. Fish and Wildlife Service (Region 1), U.S. Forest Service, and nongovernmental volunteers.

Results. Dusky geese were first reported on the Copper River Delta on March 26 by U.S. Forest Service personnel. Conditions on the nesting grounds were poor when they arrived with a heavier-than-normal spring snow pack. This changed rapidly in early May when 60-70 F^{o} temperatures persisted for several weeks. Consequently, conditions during nest initiation and laying were favorable.

The "early spring" was reflected in earlier than normal nest initiation and the distribution of nests. Peak of nest initiation was 8-17 May (Fig. 3) and nearly 57% of the nests were built in shrub communities (31.8% - tall alder/willow; 25.0% - low shrub), habitats preferred when conditions allow (Campbell 1990). An additional 30% of the nests were in meadow habitat, 11% in grass/forb habitat on Egg Island, and only 2% in open levee habitat.

The calculated density of nests was 92/mi^2, down about 4% and 12% from 1989 and the 1980-89 average, respectively (Table 1). This density must be used with caution, however, as it reflects a record number of nests found on Egg Island, an area where nest destruction and probability of renesting was high. Calculated nest density for the mainland plots was 76/mi^2, down 12% from 1989 and 23% from the 10 year average. Average clutch size was 5.3 $\pm$ 1.5 eggs.

While nest success on Egg Island was relatively poor (15.4%), over all nest success was 44.3% (Table 2), the highest success since 1984. Success on the mainland plots was 56.5%, the highest since 1978. Avian predators, including ravens, crows, magpies, gulls, and jaegers, were responsible for nearly all of the identifiable nest losses (85.2%) while bears, the primary source of nest losses during the past decade, were responsible for only 7% of the nest destruction (Table 2).

Except for Egg Island, predation of adult geese was apparently not a major problem during the spring of 1990. A calculated 8.3 goose carcasses or kill sites were observed per sq. mi. (Table 3). This was down nearly 50% from 1989. On the other hand, a serious predation problem occurred on Egg Island where over 33

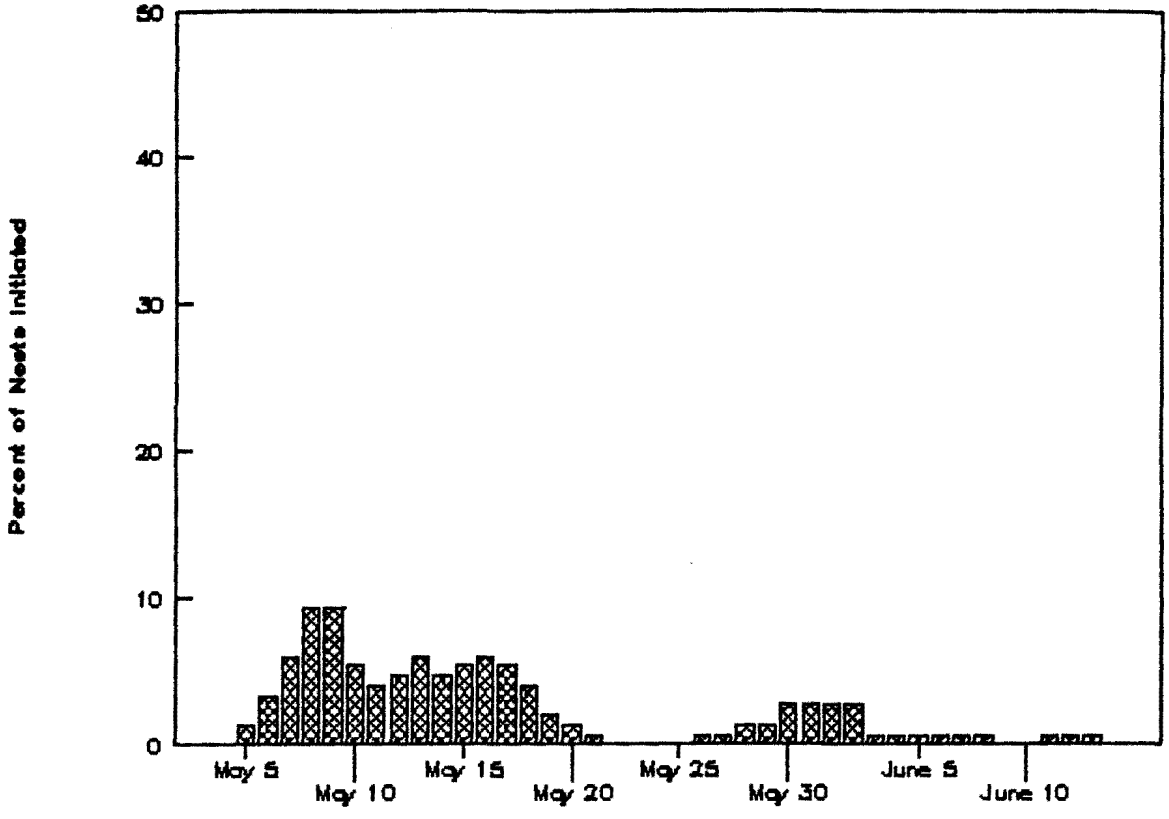

Fig. 3. Nest initiation dates on the Copper River Delta in 1990.

Table 1. Dusky Canada goose nest densities, nest success, and average clutch size on the west Copper River Delta, 1959-90.

Year	Nest density nests/mi^2	Nest Success N	Nest Success %	Clutch Size N	Clutch Size Average
1959	105	222	89.2	194	5.6
1964	---	102	82.2	114	4.3
1965	---	221	62.9	140	5.8
1966	---	100	97.0	100	4.8
1967	111	---	----	---	---
1968	---	38	86.8	75	5.1
1969	---	---	----	---	---
1970	---	164	88.2	146	5.4
1971	---	100	76.0	113	3.6
1972	---	116	81.0	92	4.4
1973	---	---	----	48	4.9
1974	---	81	82.7	---	---
1975	179	215	31.6	215	4.8
1976	156	168	----	168	4.8
1977	175	229	79.0	181	5.4
1978	183	390	56.2	---	---
1979	133	409	18.8	338	5.7
1980	108	---	----	152	5.4
1981	---	---	----	28	4.9
1982	102	158	49.2	135	4.8
1983	91	162	51.9	87	5.5
1984	95	161	75.8	123	5.6
1985	97	168	8.9	64	4.4
1986	119	201	11.4	78	4.9
1987	116	196	23.7	121	5.2
1988	116	111	17.3	121	5.2
1989	98	94	4.3	25	5.3
1990	92	88	44.3	50	5.3

Table 2. Fate of dusky Canada goose nests on the west Copper River Delta study area, 1958, 1974-75, 1982-90.

Year	No. nests	% Successful	% Abandoned	% Fate unknown	Type destruction: % Destroyed	% Mammal	% Avian	% Flooded	% Unknown
1959[a]	1,162[b]	79.6	1.8	2.0	6.0	0	11.4	88.6	0
1974[c]	81	82.7	2.5	ND[d]	14.8	ND[d]	--[e]	0	ND[d]
1975[c]	215	31.6	3.7	ND[d]	64.6	ND[d]	--[e]	0	ND[d]
1982	158	49.2	1.8	ND[d]	49.0	45.0	33.8	0	21.8
1983	162	51.9	3.7	8.0	35.2	64.8	5.6	0	29.6
1984	161	745.8	3.1	6.2	14.9	62.4	37.6	0	4.0
1985	258	7.0	1.9	10.9	81.0	78.8	18.4	0	2.8
1986	201	11.4	9.0	12.5	67.2	83.7	5.2	0	11.1
1987	213	23.9	14.1	1.0	61.0	45.6	47.3	7.0	0.2
1988	110	17.3	3.6	17.3	61.8	53.3	40.0	6.7	0.1
1989	94	4.3	3.2	14.8	76.6	54.1	45.8	0.0	0.1
1990	88	44.3	5.7	15.9	34.1	15.0	85.0	0.0	0.0

a Trainer 1959
b Eggs rather than nests
c Bromley 1976
d Not reported
e Percentages not given, but majority of losses attributed to avian predators.

Table 3. Alternative prey abundance and dusky goose carcass indices for the west Copper River Delta study plots, 1983-90.

Year	Trap hours	Small mammals captured	Abundance index[a]	Goose carcasses and kill sites	Carcasses/ mi2
1983	2,304	31	13.46	3	1.7
1984	1,849	25	13.52	4	2.3
1985	3,000	4	1.33	17	9.8
1986	3,125	2	0.64	34	20.1
1987	1,621	26	16.04	15	8.9
1988	3,015	1	0.33	26	27.1
1989	3,600	1	0.28	16	16.7
1990	1,152	1	0.87	8	8.3

[a] Number of small mammals captured divided by trap-hours multiplied by 1000.

carcasses or kill sites were observed per sq. mi. Birds of prey were responsible for most of the losses.

Production Survey:

Methods. A production survey was conducted on 23 July 1990, using techniques that facilitate development of weighted regression corrections for visual estimates (Campbell et al. 1988). Because of limited biometrics staff and continued priority for studies associated with the impacts of the Exxon Valdez oil spill, statistical analyses and correction factors have not yet been completed. The production estimate for 1990 is based on visual estimates only.

Results. Conditions were acceptable for flying, with overcast skies, a variable 500-1,000 foot ceiling, 30 mile visibility, moderate winds form the southwest, and 60 F^{o}. An estimated 5530 geese were observed during 3 hours of flying. Of these, 4,232 were adults and 1298 young for an uncorrected production estimate of 23.5% young, the best production since 1980.

Goose Banding and Collaring:

This project has two objectives: (1) maintain a sample of marked geese in the population to facilitate studies of population size, collar loss, age structure, and survival rates being conducted by biologists from Oregon State University and (2) harvest distribution. In 1990 assistance was provided by the Washington Department of Game, Oregon Department of Fish and Wildlife, Region 1 of the U.S. Fish and Wildlife Service, and Oregon State University.

Methods. Molting, flightless geese with young were captured by driving them into portable traps with a helicopter. Unmarked geese were banded with FWS leg bands, and approximately 500 birds were fitted with red plastic collars with white characters and white tarsus bands with black characters. Previously marked geese were released after their identity was determined and recorded. A ratio of birds retaining collars to those losing them was obtained by comparing leg band numbers and collar status of these geese with original banding records.

Results. A total of 984 geese were captured at 6 locations on the delta between 24 and 26 July (Fig. 4). Two hundred and eighty-five had been previously marked, and the remaining 699, including 78 goslings, were unmarked. Two hundred and twelve birds were marked with only FWS leg bands. An additional 487 geese were marked with FWS leg bands, plastic collars, and plastic tarsus bands (Table 4).

Two hundred and eighty-five geese marked between 1984 and 1989 were recaptured in 1990, bringing the 5-year total for recaptures of previously marked geese to 1,117. While sample size is inadequate for birds marked as goslings, preliminary analysis of

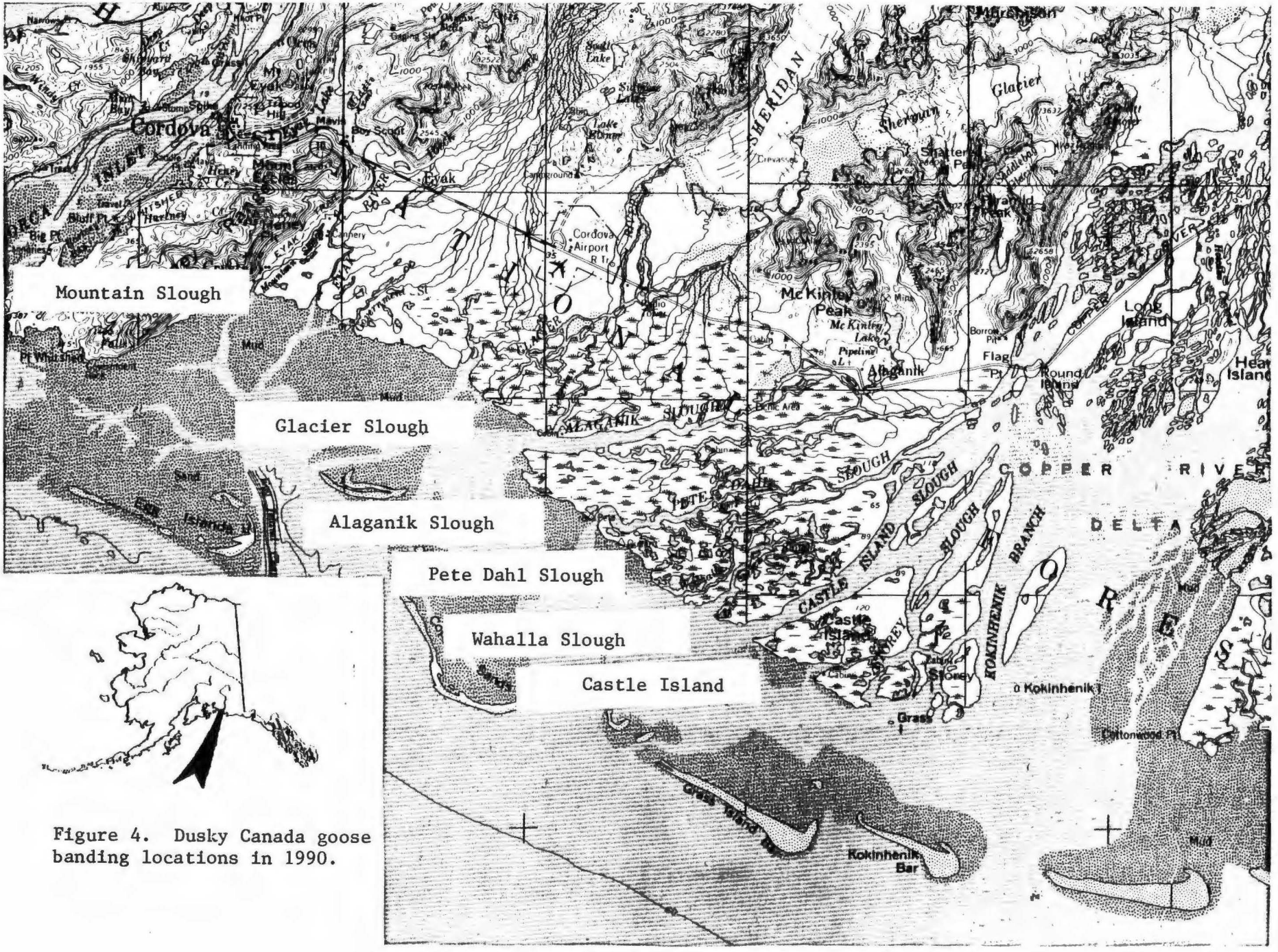

Figure 4. Dusky Canada goose banding locations in 1990.

Table 4. Summary of dusky Canada geese captured and marked on the Copper River Delta, Alaska in 1990.

Capture location	Total geese captured	Number of recaptures	Banded only[a]					Banded and collared	
			AHYM	AHYF	LM	LF	LU	AHYM	AHYF
Mountain Slough	159	53	0	0	9	17	48	17	15
Glacier Slough	148	44	0	0	2	2	0	56	44
Pete Dahl Slough	187	53	0	0	0	0	0	82	52
Castle Island	213	78	41	33	0	0	0	32	29
Walhalla Slough	162	21	38	22	0	0	0	45	36
Alaganik Slough	115	36	0	0	0	0	0	41	38
Total	984	285	79	55	11	19	48	273	214

[a] AHYM = Adult male; AHYF = Adult female; LM = Local Male or male gosling; LF Loc female or male gosling.

data for birds marked as adults indicates that annual retention rates (Table 5) vary significantly and reduce the utility of average retention rates. A logit model of collar retention in adult geese indicates that retention rates vary according to sex of the bird, year collared, year of data collection or year of study, and a combination of the year of study and sex of bird. A detailed analysis of collar retention rates has being completed and a manuscript for publication in either the Journal of Field Ornithology is in final preparation.

Goose Transplant:

Campbell and Griese (1987) identified establishment of additional breeding populations as a partial solution to the problem of poor production on the Copper River Delta. Middleton Island, which lies approximately 80 miles south-south west of Cordova in the Gulf of Alaska (Fig. 5), was chosen for this purpose in 1987. An abundance of favorable habitat, presence of a small pioneering flock of duskys, absence of mammalian predators, and apparent low density of avian predators all contributed to its selection. Originally, three transplants of goslings with adult guide birds were planned between 1987-89. However, due to the high reproductive success of naturally pioneering birds and apparent poor survival of transplanted goslings, only two transplants took place. With the cooperation of the Chugach Alaska Corporation, which has permitted access to private lands on the island, the size and reproductive effort of the new population has been monitored since 1988.

Methods. Middleton Island was extensively searched by a crew of 4 biologists on 11-12 July, 1990. Geese were counted, classified as adults or young of the year, and habitats used for brooding and molting noted.

Results. Weather conditions during the survey were ideal with scattered low overcast, temperatures in the 60's F^{o}, and a light southwest breeze. An estimated 334 geese were observed, all on the south end of the island (Fig. 6). Most of these birds were in large (>50) flocks that flushed into tidal pools from dense stands of tall forbs (Urtica layalli and Heracleum maximum) or sedges (Carex sp.) at the base of the terrace. A few family groups were encountered in tall (4-5 ft.), dense stands of skunk cabbage (Lysichiton americanum) and Heracleum along the top of the terrace. The secrecy of these birds, which remained motionless and could be captured by hand, suggests that many of the geese using this habitat type were missed during the survey.

Of the 334 geese observed, 241 were goslings for a production estimate of 72.2%. There were little evidence that the transplanted birds had contributed significantly to this production. One collared goose, too distant for the code to be read, was observed in a brooding flock of 35 adults and 115 young. While difficult to confirm, the behavior of this bird suggested that it was with a mate and young. A marked female (M

Table 5. Annual collar retention (%) for adult dusky geese collared on the Copper River Delta between 1984-89.

Year collared	Sex	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
1984	M	53.8	16.7	12.5	0.0	0.0	0.0
	F	25.0	90.9	83.3	88.8	85.7	75.0
1985	M	96.2	93.3	57.4	40.0	7.3	
	F	96.8	95.2	95.5	90.0	90.0	
1986	M	81.8	75.0	40.0	0.0		
	F	100.0	92.8	90.9	66.7		
1987	M	94.7	83.3	14.3			
	F	93.3	93.3	90.9			
1988	M	95.7	94.1				
	F	96.6	92.3				
1989	M	96.7					
	F	100.0					

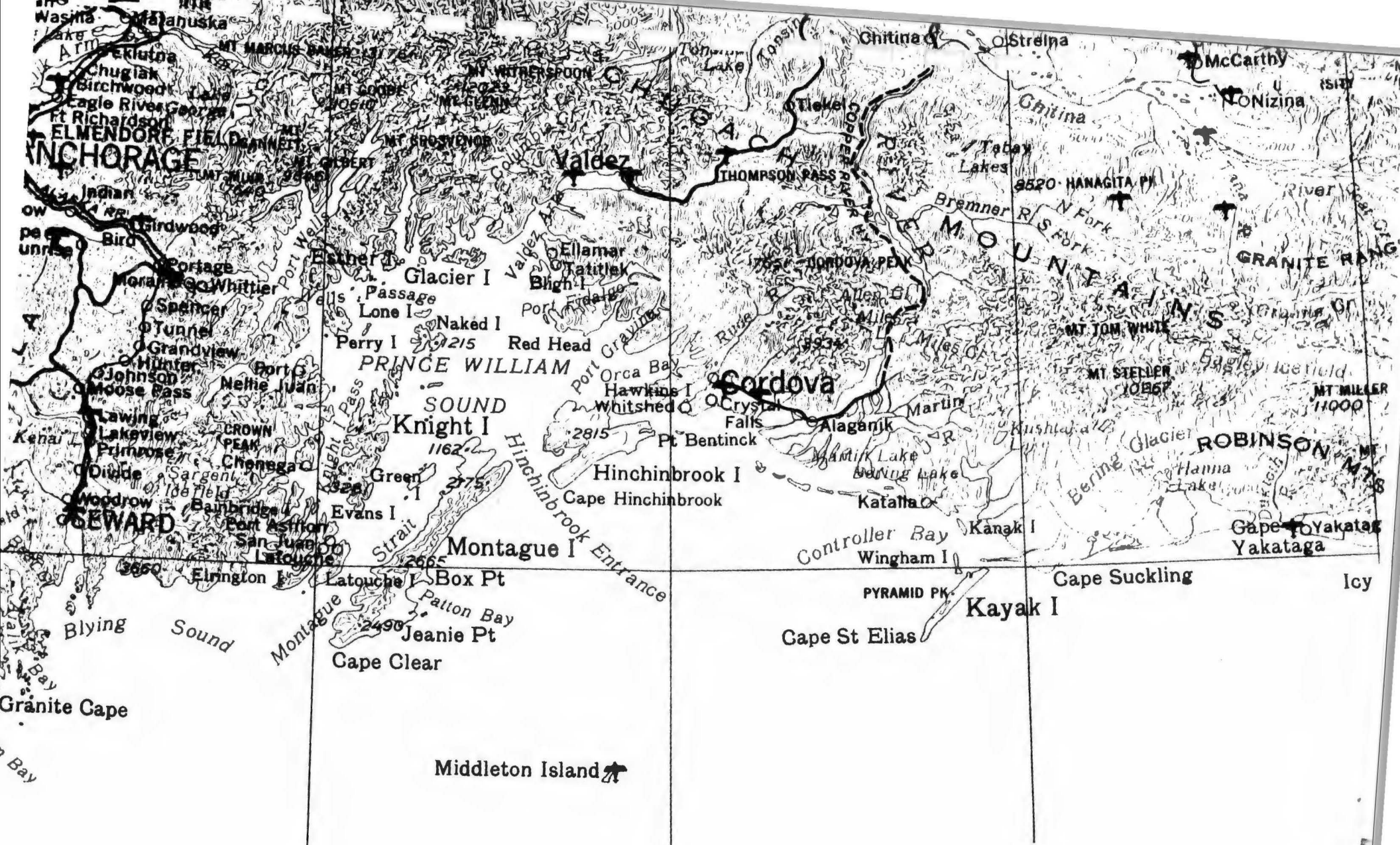

Figure 5. Location of Middleton Island.

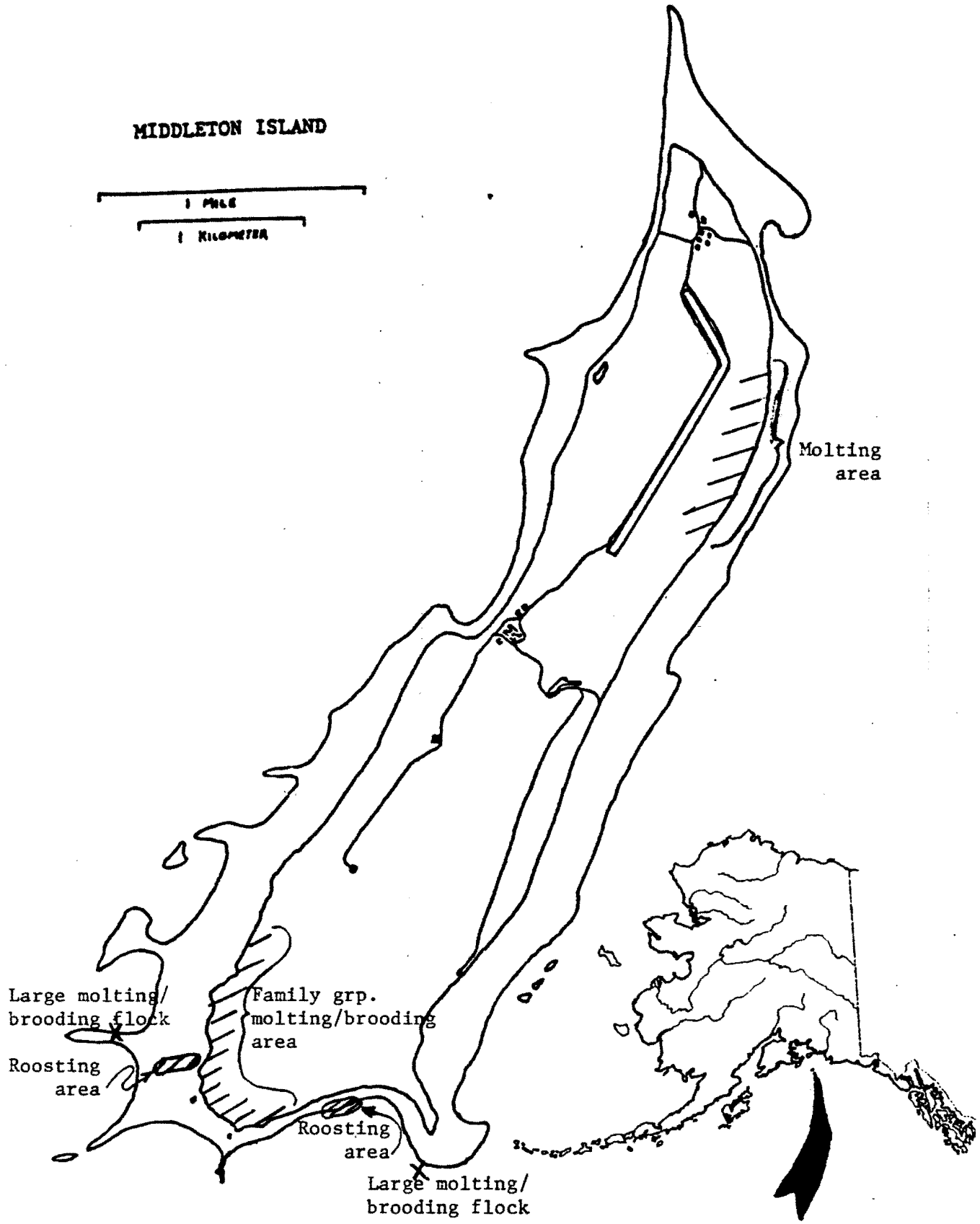

Figure 6. Location of brooding and molting Canada geese on 11-12 July, 1990.

12) was observed with a brood on the south end of the island in June (Schmutz pers comm.).

The potential for avian predation to become a limiting factor on goose production on Middleton continues to grow. The glaucous-winged gull colony continues to expand at an exponential rate and is currently estimated to number 15,000 breeding birds (Fadely per. comm.). In addition, the pair of bald eagles, which are known to prey upon goslings (Campbell and Rothe 1990), were defending their nest and presumably had young.

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