Alaska Department of Fish and Game

Division of Wildlife Conservation

Waterfowl Program

Annual Progress Report

1 July 1990-30 August 1991

by

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CONTENTS

Introduction..... 1
Waterfowl Harvest and Hunter Activity..... 1
Introduction..... 1
Methods..... 1
Results..... 4
Number of Hunters..... 4
Hunting Activity.....10
Duck Harvest.....10
Goose Harvest.....10
Crane Harvest.....19
Snipe Harvest.....19
Literature Cited.....19
Dusky Canada Goose Studies.....24
Introduction.....24
Study Area.....24
Projects.....26
Nest Density and Fate.....26
Methods.....26
Results.....27
Gosling Production Survey.....32
Methods.....32
Results.....32
Banding and Collaring.....32
Methods.....32
Results.....32
Transplant.....36
Methods.....36
Results.....36
Literature Cited.....39

WATERFOWL PROGRAM PROGRESS REPORT, 1991

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 1990-91 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 1990-91 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 July 1991. 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

1990-91

WATERFOWL HUNTER SURVEY

STAMP NO. 052897

DEAR HUNTER:

Your cooperation is needed to better manage Alaska's waterfowl. By accurately answering the questions below concerning your hunting activities in 1990, 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 1990? YES ☐ NO ☐

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

C. DID YOU HUNT FOR WATERFOWL DURING THE 1990-1991 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.

NUMBER BIRDS SHOT AND RETRIEVED

— PLACES HUNTED — (FOR EXAMPLE, MINTO FLATS, STIKINE FLATS, SUSITNA FLATS, ETC.)	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
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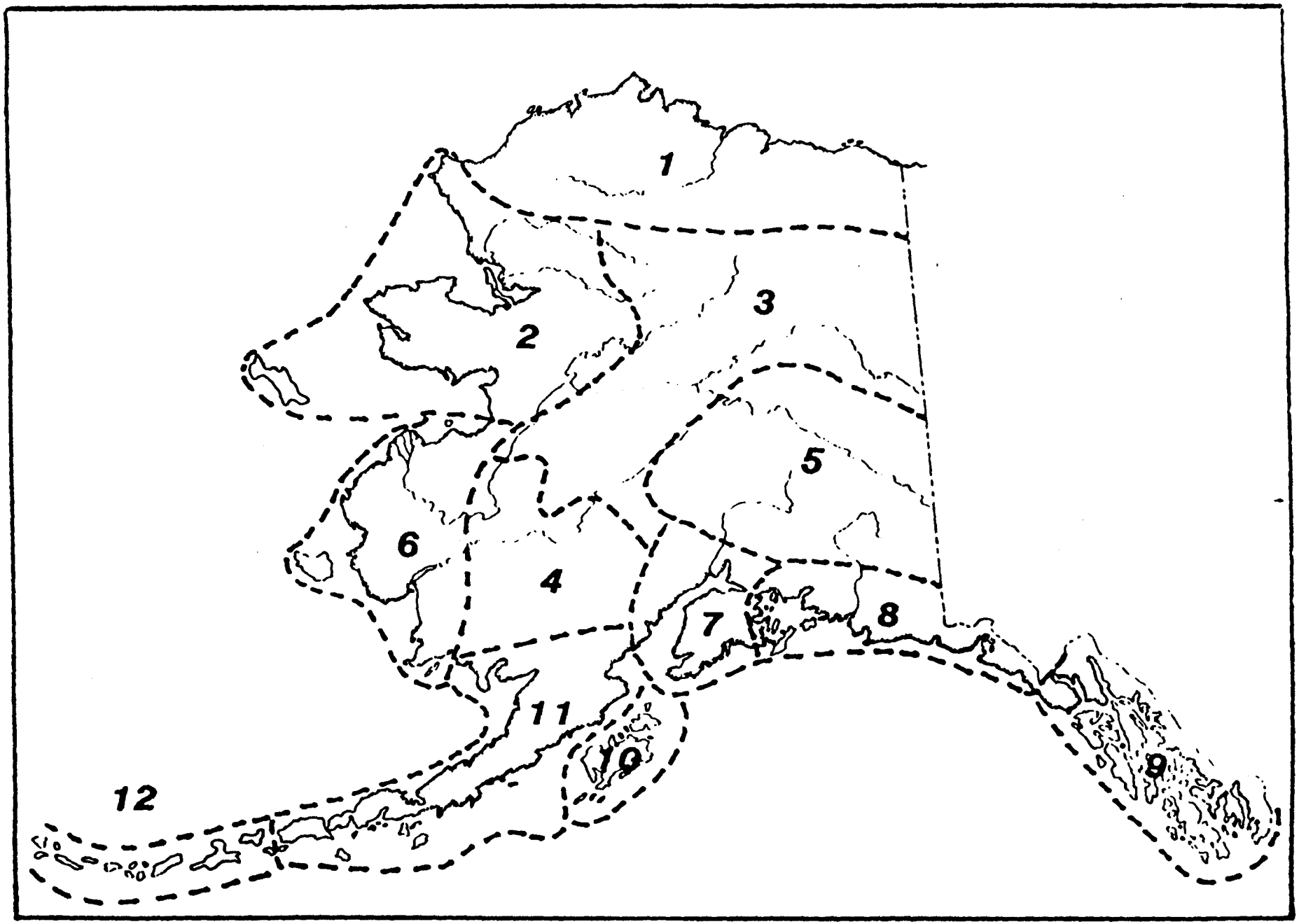

Figure 2. State waterfowl and crane harvest survey regions.

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, 5,052 questionnaires were distributed to state duck stamp buyers; of these, 1,054 were returned (i.e., response rate of 20.9%); 1,000 (94.9%) of the returned questionnaires contained sufficient information to be used in the survey. Of the 1,000 people who reported purchasing a state duck stamp, 748 (74.8%) reported hunting in 1990-91 (Table 2), compared with a FWS estimate of 76.7%. Based on the sales of 13,647 federal duck stamps, up 5% from 1989 but 19% below the 20-year average (Fig. 3), and a state estimate of 12.6% sales to stamp collectors, there were 11,927 potential waterfowl hunters in Alaska during the 1990 season (Table 2). This compares with a FWS estimate of 12,427 potential hunters and a correction factor of 8.9% for philatelic sales (Martin et al. 1991). The 1990 state estimate of potential hunters is 6.7% above the 14-year state survey average of 11,177 while the FWS estimate is 5% above the 20-year average (Fig. 3). After adjustment for inactive and nonhunters, an estimated 8,922 adults hunted waterfowl in 1990-91 (Table 2), compared with a federal estimate of 9,532 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
091	----	PaxsonLake	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

Table 1. (Cont).

ADF&G Code	FWS Code	ADF&G geographical region (R)and harvest location names	Original FWS "county" name	FWS harvest zone
131	----	Tuxedni Bay	Anchorage-Kenai	SC
132	----	China Poot Bay	Anchorage-Kenai	SC
133	----	Swanson River	Anchorage-Kenai	SC
134	----	Seward	Anchorage-Kenai	SC
135	----	Girdwood	Anchorage-Kenai	SC
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

Table 1. (Cont).

ADF&G Code	FWS Code	ADF&G geographical region (R)and harvest location names	Original FWS "county" name	FWS harvest zone
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
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	

Table 2. Summary of Alaska waterfowl hunter activity and harvest from the state survey, 1990-91.

Number of survey cards issued: 5,052

Number of survey cards returned: 1,054 (20.9%)

Number of survey cards usable for data analysis: 1,000 (94.9%)

Projected number of fall sport hunters:

Total federal duck stamps sold[a]: 13,647

Federal duck stamps sold to potential hunters in Alaska: 11,927

Number of active hunters: 8,922 (74.8%)

Calculated statewide fall sport harvest:

Ducks: Dabblers/divers: 74,003; Sea ducks: 5,814;
Total: 79,817

Geese: Canada: 6,527; white-fronted: 795; brant: 459;
snow: 22; emperor: 45; unknown species: 235
Total: 8,084

Cranes: 1,014

Snipe: 1,968

Calculated hunter days: 44,346

[a] Martin et al. 1991

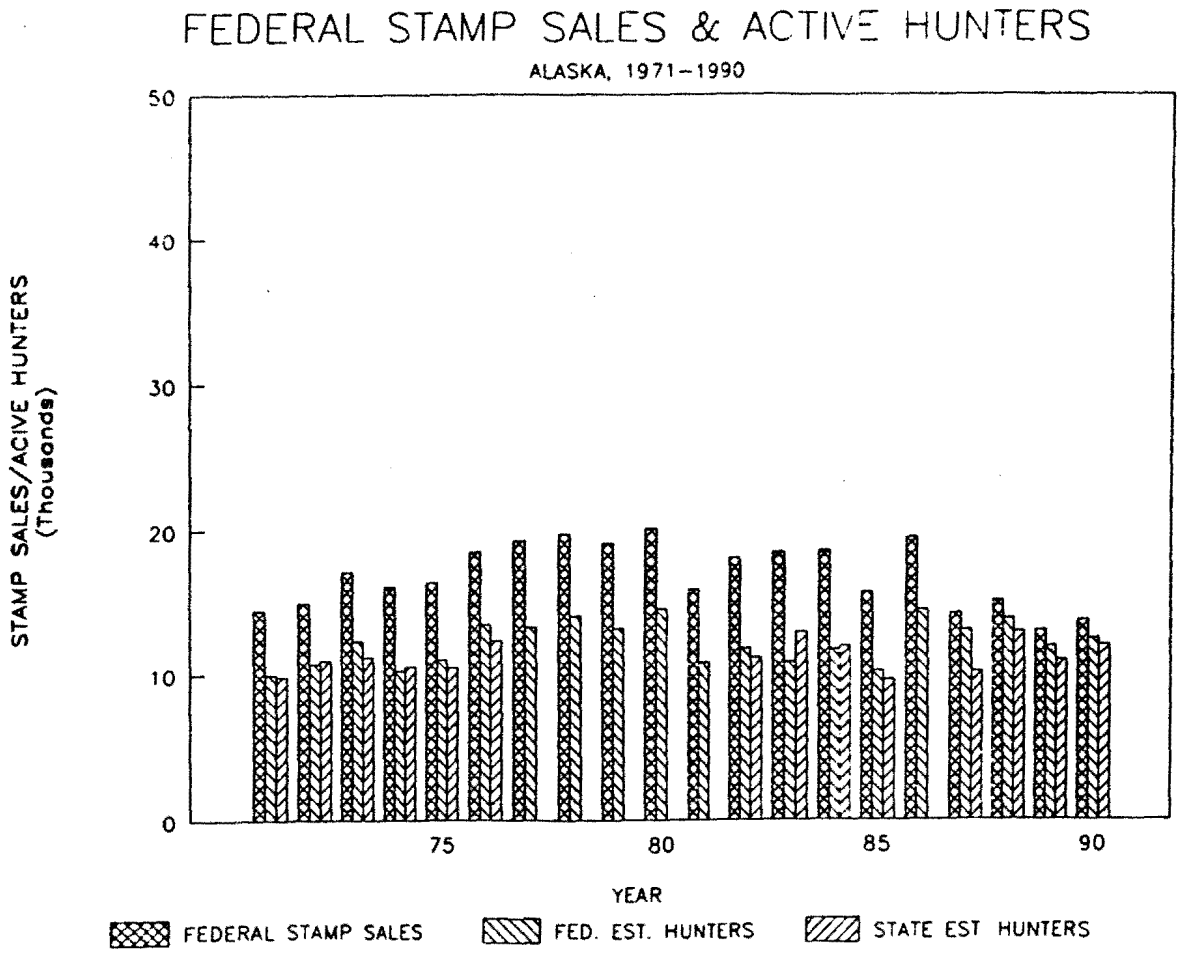

Figure 3. Twenty year trend in duck stamp sales and potential hunters in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

Hunting Activity:

Hunters reported hunting an average of 5 days during the 1990-91 season, representing a total of 44,346 waterfowl hunter days (Table 2), considerably lower than the federal estimate of 57,758 days. The state estimate was down about 21% from the 14-year average and the FWS estimate was down 20% 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 8.9 and 5.6 ducks, respectively (Martin et al. 1991), compared with a FWS 20-year average of 5.3 ducks/active hunter and a 14-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 1990-91.

The projected statewide harvest was 79,817 ducks, of which 74,003 (92.7%) were dabbling and diving ducks and 5,814 (7.3%) were sea ducks and mergansers (Table 4), compared with the FWS estimate (Martin et al. 1991) of 75,327, of which 73067 (97.5%) were dabbling and diving ducks and 1,883 (2.5%) were sea ducks and mergansers. The 1990-91 state duck harvest was up nearly 53% from 1989-90 but still 10% below the 14-year average (Fig. 6).

As calculated from the state survey, about 42% of the statewide duck harvest occurred in Cook Inlet, followed by about 23% in the central region and 16% in Southeast Alaska (Table 4). Nearly 15% of the statewide harvest and 26% 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 half of the statewide sea duck and merganser harvest occurred on Kodiak Island (23.3%) and in Southeast Alaska (24%).

Goose Harvest. Hunters reported taking an average 0.9 geese/active hunter in 1990; this was above the 20-year FWS average of 0.6 geese/hunter but somewhat below the 14-year state survey average of 1.1 geese/hunter (Fig. 7). The FWS estimate of 0.5/hunter (Martin et al. 1991) was also considerably below both the state and FWS averages.

The calculated 1990 goose harvest was 8,084 (Table 2), up 38% from 1989 but well below the 14-year average of 11,920. The FWS estimated harvest of 5,969 was down from the 1989 estimate of 6,972 and well below the 20-year average (Fig. 8).

Based on the state survey, which had a sample size 6 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 80% of the

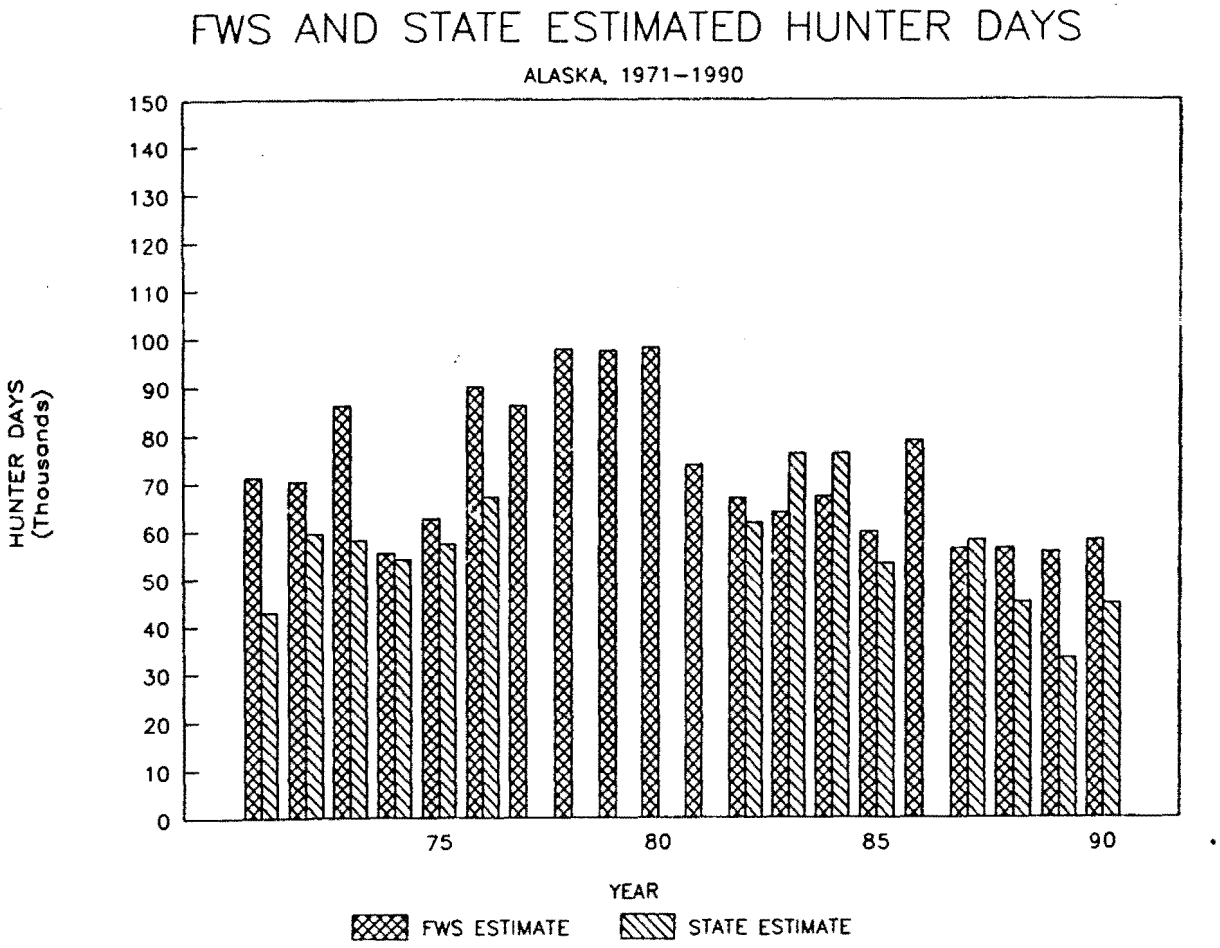

Figure 4. Twenty year trend in hunter days for Alaska as estimated by the State and U.S. Fish and Wildlife Service.

Table 3. Calculated hunting activity and duck harvest for specific locations in Alaska where more that 0.1% of the harvest occurred in 1990-91.

Location	Ducks		Hunter days	
	Calculated harvest	% of state total	Calculated days	% of state total
Susitna Flats	13,737	17.2	5,045	11.4
Minto Flats	5,684	7.1	16,538	3.7
Palmer hay Flats	4,589	5.7	3,161	7.1
Stikine River Flais	2,608	3.3	918	2.1
Mendenhall	2,528	3.2	1,264	2.9
Copper River Delta	2,389	3.0	1,455	3.3
Portage	2,120	2.7	1,551	3.5
Tanana Flats	2,021	2.5	1,014	2.3
Healy Lake	1,891	2.4	823	1.9
Trading Bay	1,533	1.9	453	1.0
Kenai River/Flats	1,424	1.8	751	1.7
Yakutat	1,294	1.6	525	1.2
Tok/Northway	1,284	1.6	322	0.7
Pilot Point	1,185	1.5	250	0.6
Knik River	1,135	1.4	763	1.7
Anchorage Coast. Ref.	1,115	1.4	1,741	3.9
Cold Bay	946	1.2	1,789	4.0
Naknek River	896	1.1	298	0.7
Redoubt Bay	846	1.1	286	0.6
Denali Highway	826	1.0	322	0.7
Kake	816	1.0	274	0.6
Eielson AFB	727	0.9	525	1.2
Ketchikan	707	0.9	417	0.9
Prince william Snd.	667	0.8	573	1.3
Kachemack Bay	647	0.8	203	0.5
Delta	607	0.8	2,219	5.0
Dillingham	607	0.8	143	0.3
Seward	577	0.7	262	0.6
Duncan Canal	557	0.7	203	0.5
Kasilof River	538	0.7	274	0.6
Ugashik	538	0.7	167	0.4
Blind Slough	518	0.6	537	1.2
Goose Bay	508	0.6	239	0.5
Lynn Canal	468	0.6	95	0.2
Seymore Canal	448	0.6	143	0.3
Petersburg	329	0.4	310	0.7
Chickaloon Flats	319	0.4	298	0.7
Adak	319	0.4	573	1.3
Valdez	319	0.4	215	0.5
Women Bay	299	0.4	250	0.6
Old Harbor	299	0.4	60	0.1
Jim Ck./Swan Lk.	239	0.3	203	0.5

Table 3. (Cont).

Location	Ducks		Hunter days	
	Calculated harvest	% of state total	Calculated days	% of state total
Prince of Whales Is.	209	0.3	262	0.6
Sitka	209	0.3	203	0.5
Tenakee Springs	209	0.3	95	0.2
Paxson	199	0.2	95	0.2
Montague, Hawkins, and Hitchinbrook Islands	199	0.2	203	0.5
Icy Striat	189	0.2	143	0.3
Chilkat River	179	0.2	143	0.3
Tetlin Flats	179	0.2	36	0.1
Chena River	159	0.2	107	0.2
Egegik River	149	0.2	36	0.1
Farragut Bay	149	0.2	107	0.2
Ft. Wainright	129	0.2	72	0.2
Admiralty Cove	129	0.2	36	0.1
Ft. Greely	119	0.1	286	0.6
Skilak Lake	110	0.1	48	0.1
China Poot Bay	100	0.1	48	0.1
Pagadshak	80	0.1	48	0.1
Creamer's Field	50	0.1	83	0.2
Greater Kenai Peninsula	50	0.1	36	0.1
Raspberry striat	50	0.1	12	0.0
Subtotals	63,928	80.3	34,673	78.1
Statewide Totals	79,817	100	44,346	100

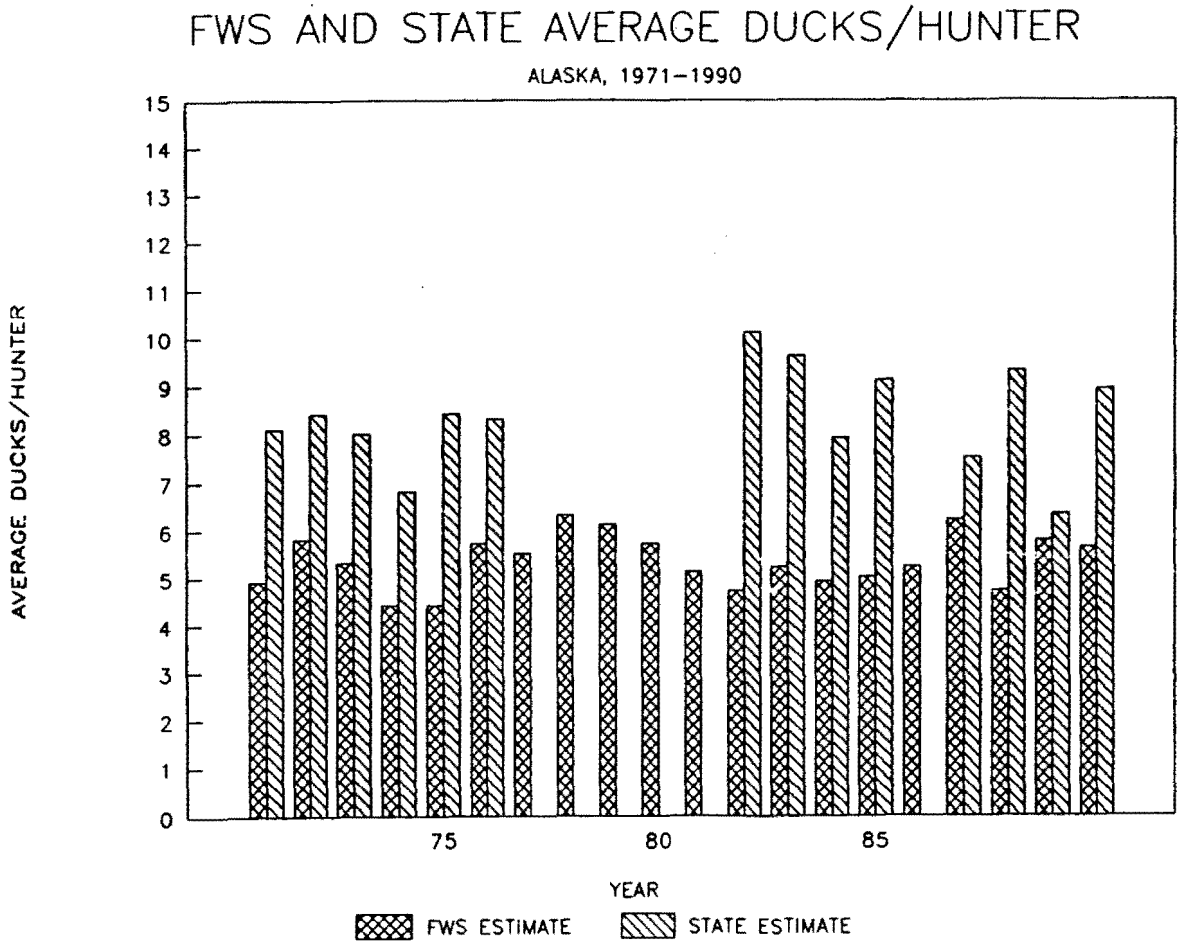

Figure 5. Twenty year trend in average ducks per hunter in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

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 1990-91.

Harvest Region	Hunter Days	Dabblers/ Divers	Sea Ducks	Geese	Cranes	Snipe
North Slope	0.1	0.0	0.0	0.0	0.0	0.0
Seward Peninsula	0.5	0.4	0.0	0.2	1.2	0.0
Upper Yukon Valley	2.7	2.3	4.5	8.2	0.0	0.0
Lower Yukon Valley	0.2	0.3	0.0	0.7	0.0	0.0
Central	22.2	22.6	5.7	19.8	89.4	6.7
Yukon Delta	1.5	1.3	2.9	0.6	0.0	15.8
Cook Inlet	37.9	42.2	15.4	18.8	5.9	60.0
Gulf Coast	6.7	5.6	12.8	2.8	0.0	6.1
Southeast	15.2	15.9	24.0	16.2	2.4	1.2
Kodiak	2.1	1.4	23.3	0.0	0.0	0.0
Alaska Peninsula	7.9	6.6	9.6	31.9	1.2	10.3
Aleutian Chain	1.4	0.4	1.7	0.0	0.0	0.0
Unknown	1.7	1.2	0.2	0.8	0.0	0.0
Statewide Days/Harvest	44,346	74,003	5,814	8,084	1,014	1,968

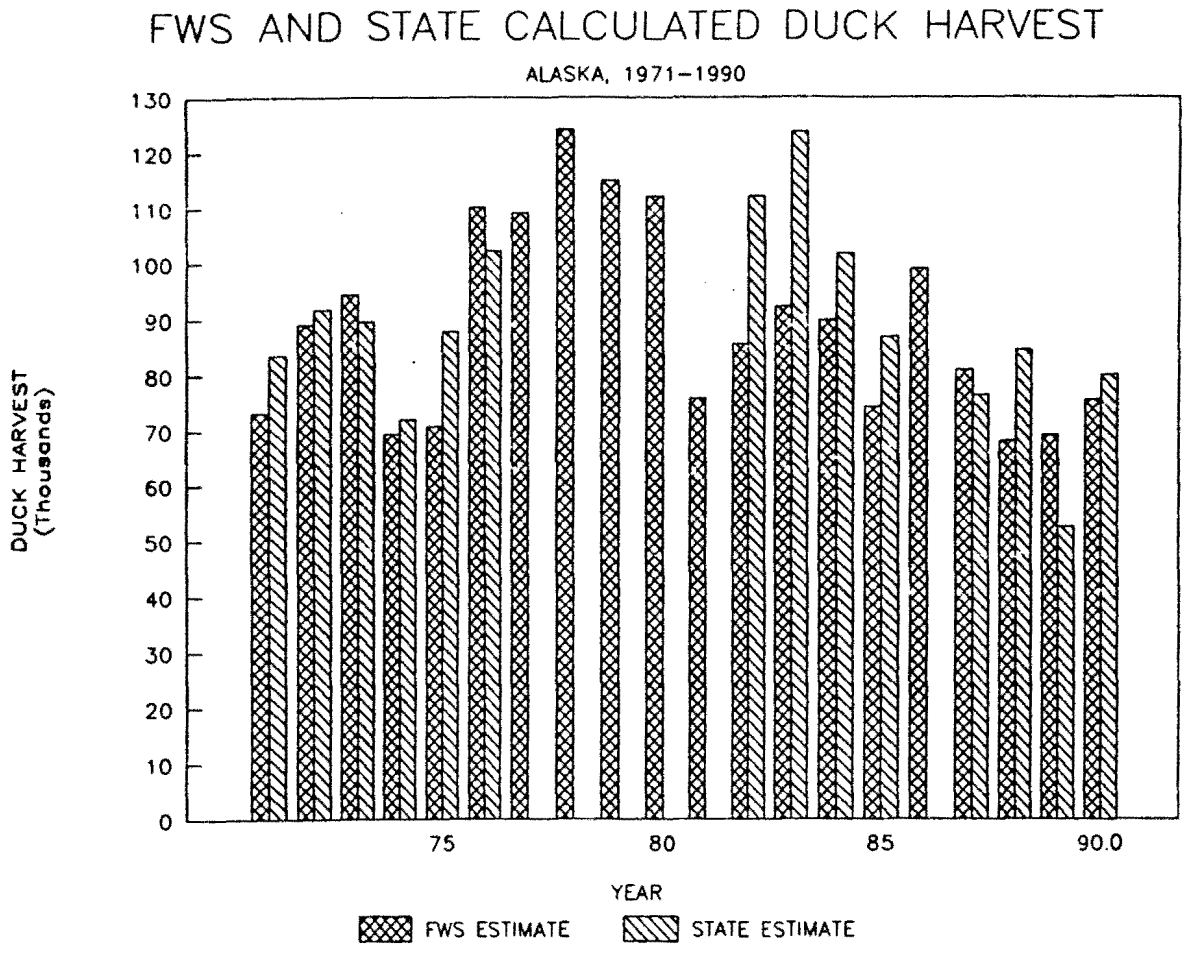

Figure 6. Twenty year trend in the duck harvest in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

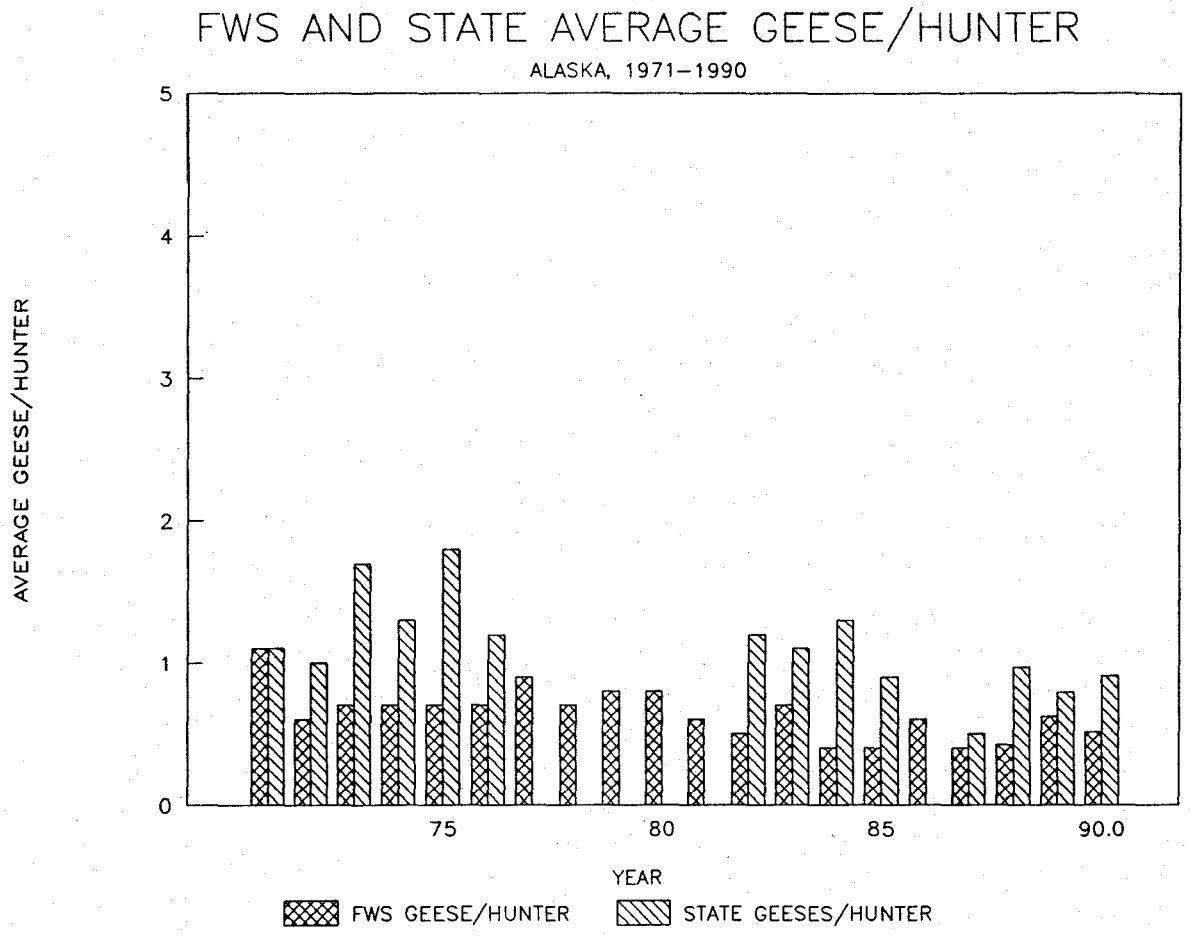

Figure 7. Twenty year trend in average geese harvested per hunter in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

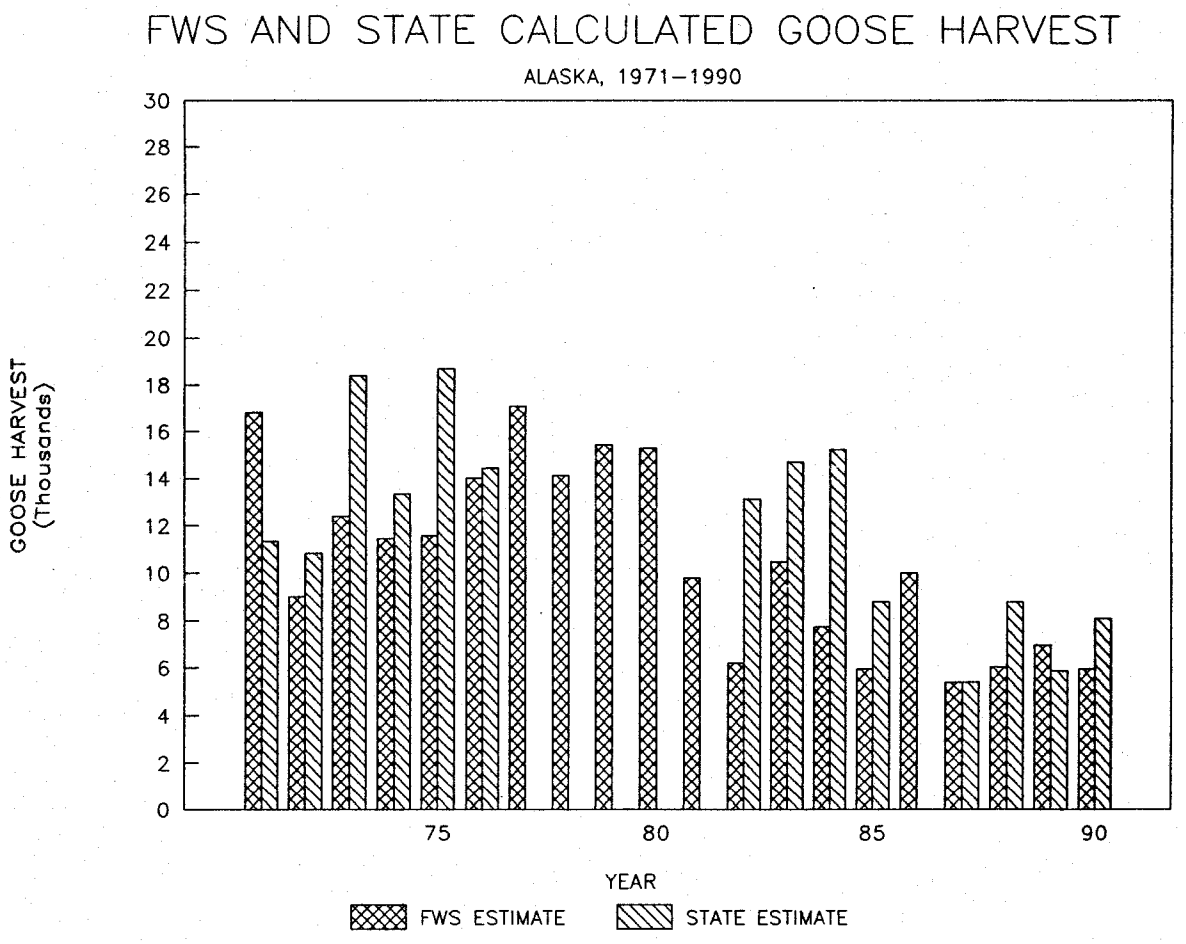

Figure 8. Twenty year trend in the goose harvest in Alaska as estimated by the State and U.S. Fish and Wildlife Service.

harvest, followed by the white-fronted goose (Anser albifrons) (9.8%), Pacific brant (Branta bernicula) (5.7%), and snow goose (Chen caerulescens) (0.3%). A portion of the harvest (2.9%) was composed of unknown geese and Emperor geese (0.6%). This compares with a 1989 harvest composition of 68% Canadas, 19% white-fronts, 7% Pacific brant, 2% snow geese, and 4% unknown (Campbell 1991). The FWS estimated that the 1989 goose sport harvest was composed of 89% Canada geese, 11% white-fronted geese (Martin et al. 1991).

A regional breakdown of the 1990 goose harvest indicates that nearly one-third of the harvest occurred on the Alaska Peninsula, primarily Cold Bay. An additional 20% of the harvest occurred in the central region of Alaska, followed by 19% in Cook Inlet, and 16% in Southeast Alaska (Table 5). Major regions for the Canada goose harvest were the Alaska Peninsula (33%), Cook Inlet (22%), Southeast Alaska (19%), and central Alaska (16%). Most of the white-fronted goose harvest (68%) occurred in the central region (midcontinent population), followed by Cook Inlet (13%) (Pacific white-fronts). Most of the Pacific brant harvest took place on the Alaska Peninsula (85%). Snow geese were harvested primarily in Southeast Alaska (50%). Table 6 summarizes the 1990-91 goose harvest by specific location.

Crane Harvest. A calculated 1,014 sandhill cranes (Grus canadensis) were harvested in 1990 (Table 2); a 60% increase from 1989, but similar to the 1971-90 average of 1,166 birds (Table 7). Approximately 90% of the harvest were from midcontinent populations and 10% were from the Pacific Flyway population of lesser sandhill cranes (Table 4).

Snipe Harvest. The calculated snipe (Capella gallinago) harvest for 1989 was 1,968 (Table 2), up 40% from 1989 but 55% below the 14-year average (Table 7).

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Table 5. Distribution (%) of the fall goose harvest by species and harvest region, 1990-91.

Region	Canada	White-fronts	Pacific brant	Snow	Emporer	Uknown	Total
North Slope	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Seward Peninsula	0.3	0.0	0.0	0.0	0.0	0.0	3.1
Upper Yukon Valley	6.0	5.6	0.0	0.0	0.0	95.2	0.0
Lower Yukon Valley	0.9	0.0	0.0	0.0	0.0	0.0	0.3
Central	16.0	67.6	2.4	0.0	0.0	4.8	35.7
Yukon Delta	0.0	2.8	4.9	0.0	0.0	0.0	1.4
Cook Inlet	21.6	12.7	2.4	0.0	0.0	0.0	18.2
Gulf Coast	3.1	1.4	2.4	0.0	0.0	0.0	5.5
Southeast	19.0	7.0	0.0	50.0	0.0	0.0	20.0
Kodiak	0.0	1.7	0.0	0.0	0.0	0.0	1.1
Alaska Peninsula	32.8	0.0	85.4	0.0	100.0	0.0	14.2
Aleutian Chain	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unknown	0.3	2.8	2.4	50.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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 1990-91.

Location	Calculated harvest	%of state total
Cold Bay	2,519	31.2
Delta	683	8.4
Palmer Hay Flats	593	7.3
Susitna Flats	425	5.3
Chickaloon Flats	224	2.8
Minto Flats	168	2.1
Tanana Flats	146	1.8
Stikine River Flats	124	1.7
Copper River Delta	146	1.8
Mendenhall	90	1.1
Blind Slough	90	1.1
Healy Lake	67	0.8
Portage	67	0.8
Petersburg	67	0.8
Montague, Hawkins, & Hitchenbrook Islands	67	0.8
farragut Bay	56	0.7
Prince of Whales	56	0.7
Kake	56	0.7
Ketchemak Bay	45	0.6
Anchorage Coastal Refuge	45	0.6
Lynn Canal	45	0.6
Eielson AFB	34	0.4
Kenai River Flats	34	0.4
Ketchikan	34	0.4
Kink River	22	0.3
Prince William Sound	22	0.3
Yakutat	22	0.3
Valdez	22	0.3
Duncan Canal	22	0.3
Icy strait	22	0.3
Salcha River	11	0.1
Goose Bay	11	0.1
Jim Creek/Swan Lake	11	0.1
Sitka Area	11	0.1
Tenakee Inlet	11	0.1
Subtotals	6,080	75.2
Statewide Totals	8,084	100.0

Table 7. State estimated crane and snipe harvest in Alaska, 1971-1990

Year	Crane	Snipe
1971	502	3,087
1972	765	3,498
1973	602	1,661
1974	640	2,205
1975	1,642	4,318
1976	873	7,003
1977	--	--
1978	--	--
1979	--	--
1980	--	--
1981	--	--
1982	1,746	4,833
1983	1,805	3,476
1984	2,376	3,564
1985	1,270	1,597
1986	--	--
1987	1,014	2,654
1988	1,443	1,807
1989	625	1,170
1990	1,014	1,968
$\bar{x}$	1,166	3,060
SD	$\pm$ 564.6	$\pm$1574.3

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

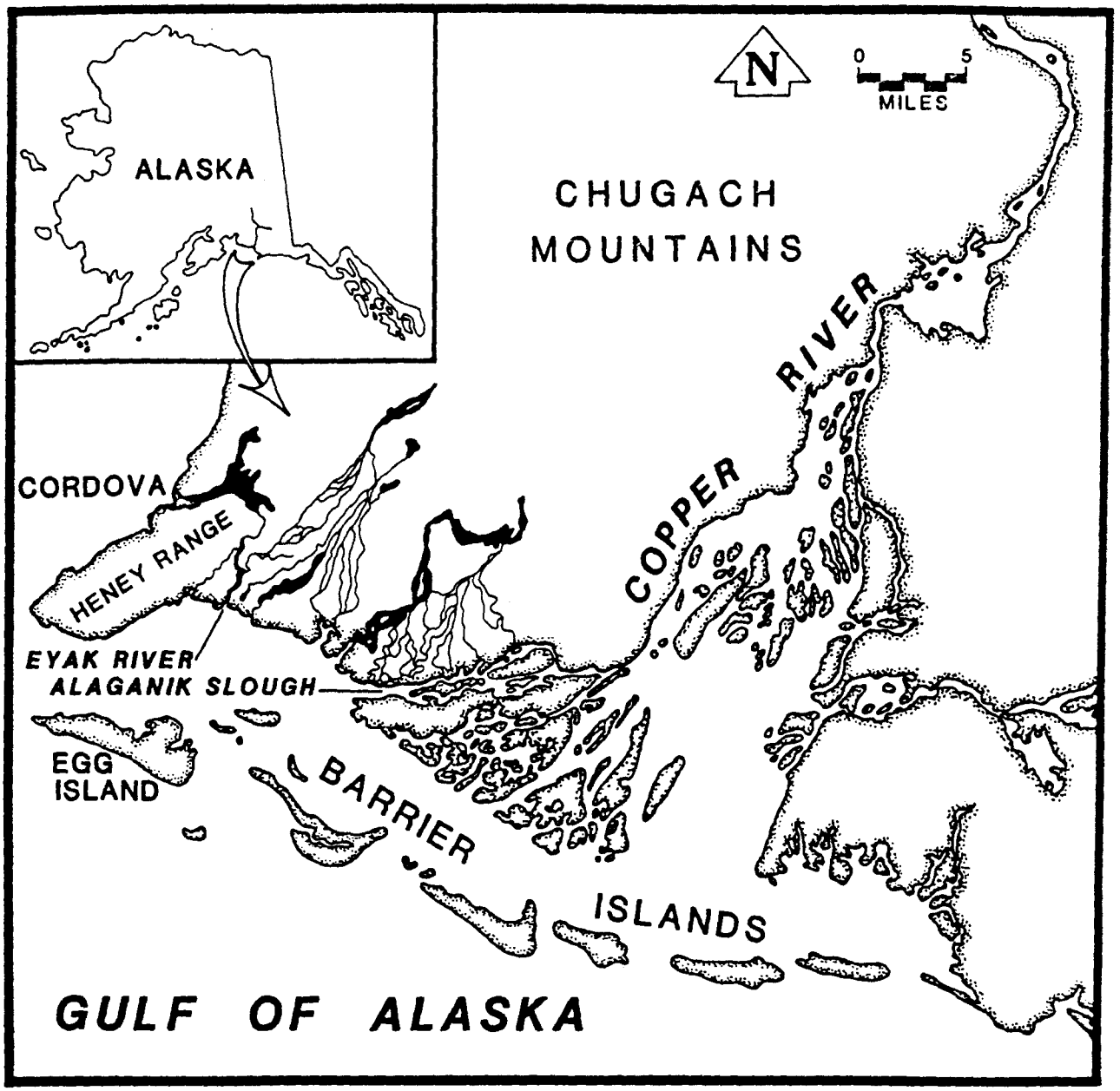

Figure 1. Copper River Delta, Alaska.

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 and a final report entitled "Factors Affecting the Nesting Success of Dusky Canada Geese, Branta canadensis occidentalis, on the Copper River Delta, Alaska" was published in the Canadian Field Naturalist, 104:567-574.

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

A paper entitled "Activities of Brown Bears on the Copper River Delta, Alaska and Their Impacts on Nesting Canada Geese" is being published in the Northwestern Naturalist, 72:in press.

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

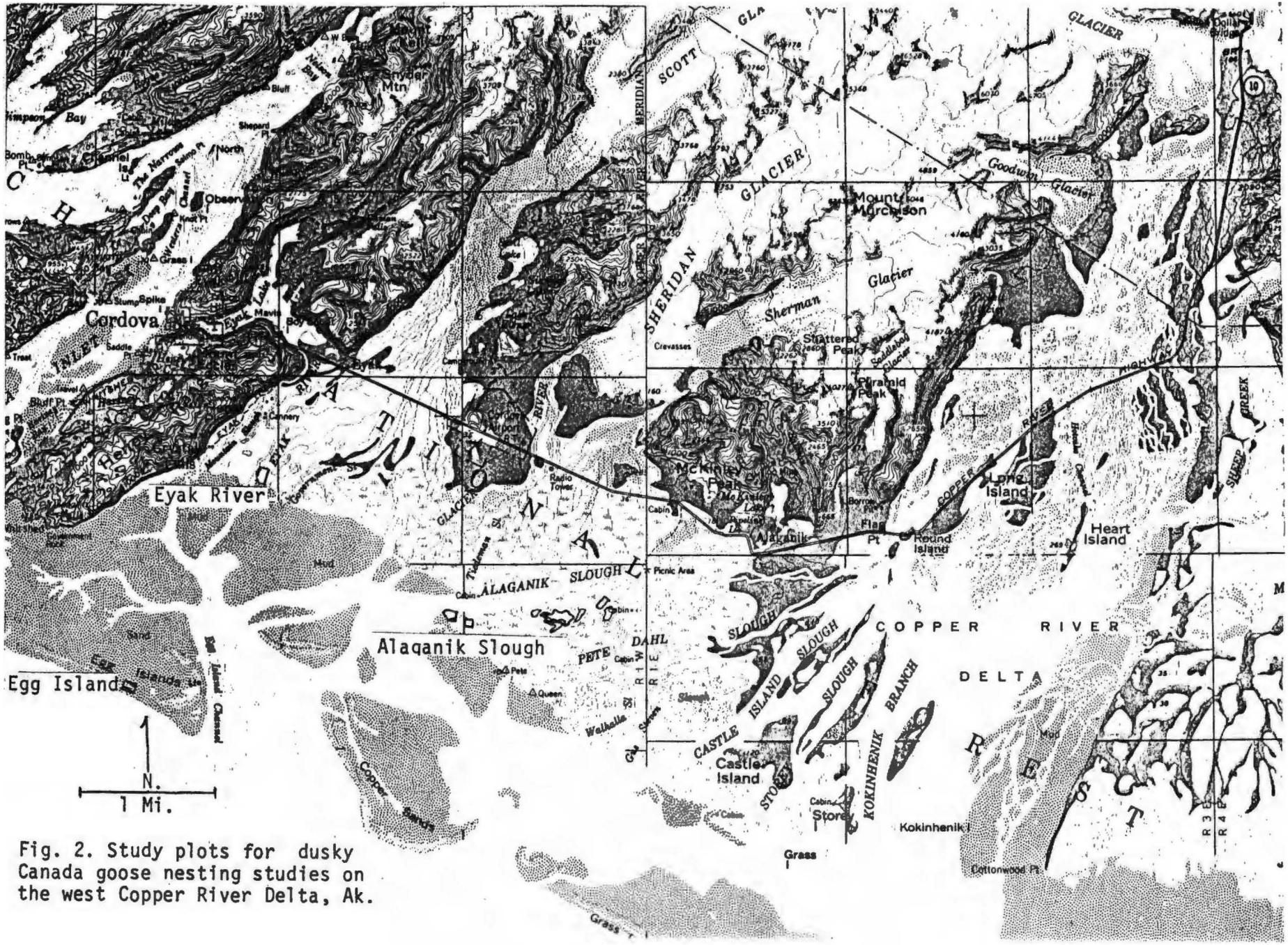

Fig. 2. Study plots for dusky Canada goose nesting studies on the west Copper River Delta, Ak.

Table 1. Dusky Canada goose nest densities, nest success, and average clutch size on the west Copper River Delta, 1959-91.

Year	Nest density nests/mi^2	Nest Success N	Nest Success %	Clutch Size N	Clutch Size $\bar{x}$
1959	105	222	89.2	194	5.6
1964	--	102	82.4	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
1991	95	91	31.9	46	5.4

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 April 4, 1991. Conditions on the nesting grounds were poor with a heavier-than-normal spring snow pack and cool temperatures persisting well into May.

With the exception of Egg Island where nest initiation was at least a week late, the "late spring" apparently had little affect on the timing of nest initiation. On the mainland, initiation peaked between 10-16 May, 1991 (Fig. 3), similar to "average" to "early springs." Distribution of nests was: 26% in tall shrub communities, 28% in low shrub communities, and 24% in meadow communities.

The calculated density of nests was 95/mi^2, up slightly from 1990 but below the 1980-90 average of 103/mi^2, (Table 1). This density must be used with caution, however, as it likely reflects a high incidence of renesting. On Egg Island and a mainland study plot (plot 6), where nest destruction was high in May (70% and 78%, respectively), the number of nests nearly doubled between the first and second nest search. Most of the new nests were still under incubation in June, indicating initiation after the May sampling period, and had smaller clutches ($\bar{x}$ = 5.1 $\pm$ 0.9), indicative of renests. Calculated nest density for the mainland plots was 76.5/mi^2, identical to 1990. Average clutch size for the entire study area was 5.4 $\pm$ 1.0 eggs.

While the fate of a relatively large number of nest still under incubation (23%) was not determined, measured nest success was quite good. Nearly 32% of the nests were successful (Table 2). Over all nest success could have easily exceeded this rate as late nests typically have a high rate of success. Avian predators were responsible for nearly all of the identifiable nest losses (92.9%) while bears, the primary source of nest losses during the past decade, were responsible for only 3.6% of the nest destruction (Table 2).

As has been the case four of the last six years, predation on adult geese was apparently a problem during the spring of 1991. A calculated 18.8 goose carcasses or kill sites were observed per sq. mi. (Table 3). Birds of prey, most likely Bald eagles based on their abundance, are responsible for most of the losses. Egg Island is of special concern since calculated carcass/kill site densities have been 33/mi^2 and 73/mi^2 the past 2 years. This high rate likely reflects the high density of geese (Butler and Eldridge 1991) and Bald eagles in the spring (pers. obs.).

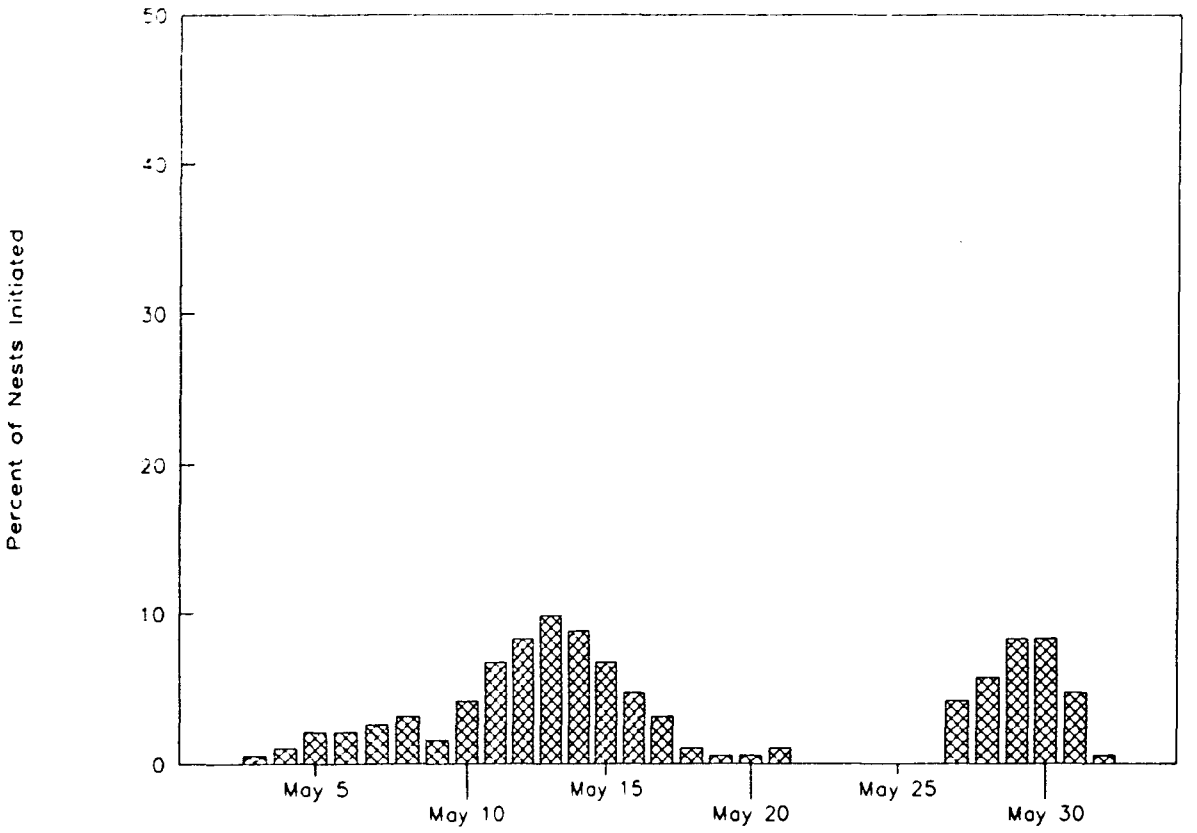

Figure 3. Frequency distribution of nest initiation dates for dusky Canada geese in 1991.

Table 2. Fate of dusky Canada goose nests on the west Copper River Delta study area, 1958, 1974-75, 1982-91.

Year	No. nests	% Successful	% Abandoned	% Fate unknown	% Destroyed	Type destruction: % 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
1991	91	31.9	6.6	26.4	35.2	7.2	92.9	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, 1983-91.

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
1991	2,100	4	1.90	18	18.8

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

Production Survey:

Methods. A production survey was conducted on 24 July 1991 using methods described by Campbell et al. (1988). Because of limited biometrics staff and program priorities, statistical analyses and correction factors for visual estimates have not been completed. The production estimate for 1991 is based on visual estimates only.

Results. Conditions were acceptable for flying but marginal for surveying. Skies were overcast, with occasional rain squalls, variable 1,500-3,000 foot ceiling, <2-25 miles visibility, moderate winds form the southwest, and 50 F^{o}. An estimated 7,098 geese were observed during 3 hours and 20 minutes of flying. Of these, 5,574 were adults and 1,524 were young for an uncorrected production estimate of 21.5%.

Goose Banding and Collaring:

This project has two objectives: (1) maintain a sample of collared 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) maintain a sample of marked geese to delineate annual harvest distribution. In 1991 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 703 geese were captured at four locations on the delta between 23 and 25 July, 1991 (Fig. 4). One hundred and forty-three had been previously marked and the remaining 560, including 44 young, were unmarked. Seventy-nine birds were marked with only FWS leg bands and the remaining 481 geese were marked with FWS leg bands, plastic collars, and plastic tarsus bands (Table 4).

One hundred and forty-three geese marked between 1984 and 1990 were recaptured in 1991, bringing the 6-year total for recaptures of previously marked geese to 1,260.

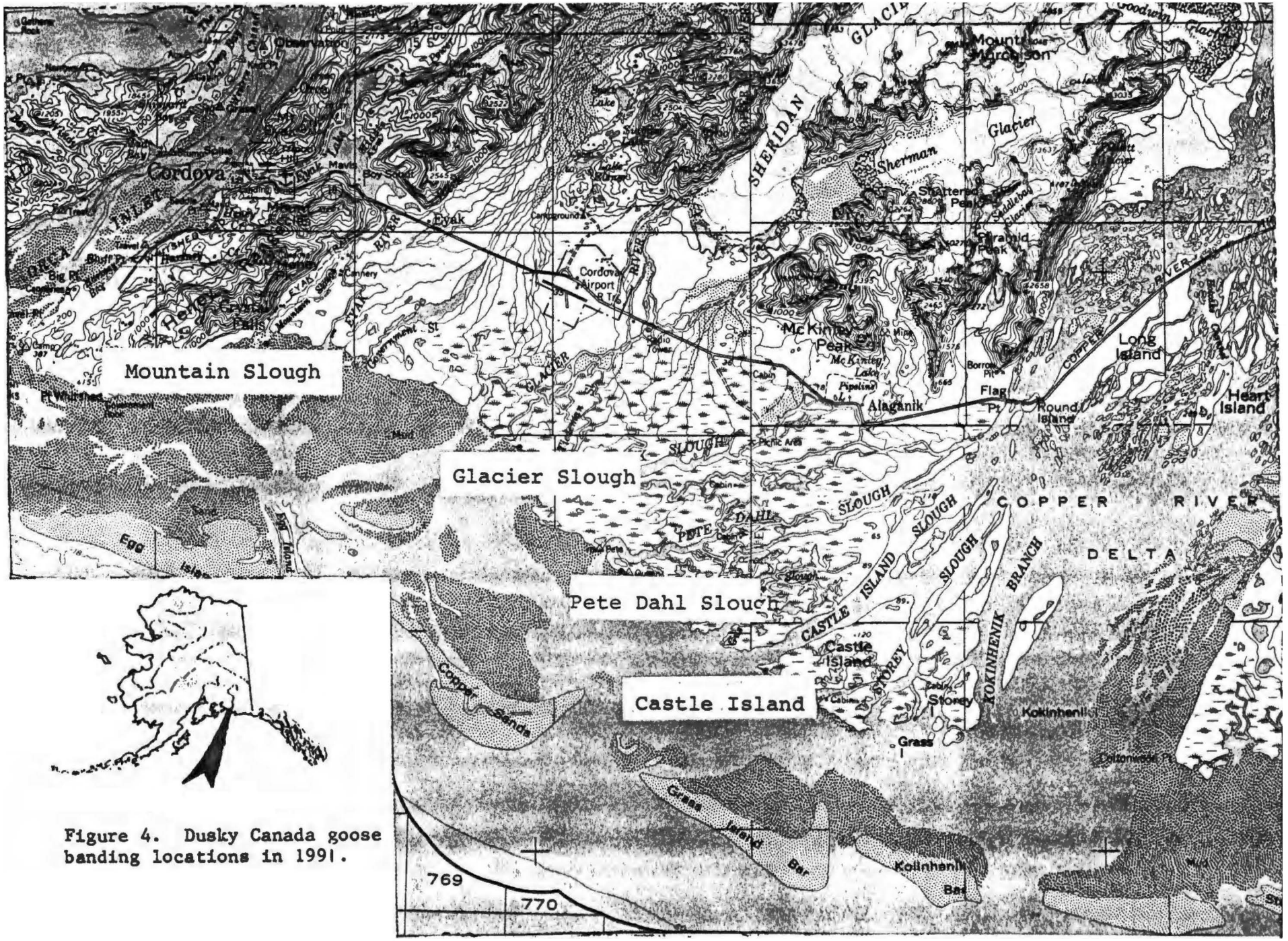

Figure 4. Dusky Canada goose banding locations in 1991.

Table 4. Summary of dusky Canada geese captured and marked on the Copper River Delta, Alaska in 1991

Capture location	Total geese captured	Number of recaptures	Banded only[a]					Banded and collared			
			AHYM	AHYF	LM	LF	LU	AHYM	AHYF	LM	LF
Mountain Slough	103	30	0	0	2	4	34	15	18	0	0
Glacier Slough	162	27	1	0	2	0	2	85	45	0	0
Pete Dahl Slough	210	51	8	7	0	0	0	87	57	0	0
Castle Island	228	35	6	13	0	0	0	102	72	0	0
Total	703	143	15	20	4	4	36	289	192	0	0

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

A detailed analysis of collar retention rates has being completed and is being published in the Journal of Field Ornithology, (62:in press) under the title "Neck Collar Retention in Dusky Canada Geese."

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. The island was covered by foot on 10-11 July, 1991. Geese were counted, classified as adults or young of the year, and habitats used for brooding and molting noted.

Results. A total of 353 geese were observed, primarily in large (>50) flocks, in salt water along southern portions of the island (Fig. 6). Of these, 104 were goslings for a production estimate of 29.5%. This was down considerably from the 1990 production estimate of 72%. 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 10-15 adults and 45-50 young. A marked female (M12) with a brood was observed in this area in 1989 (Schmutz pers. comm.) and a collared bird was observed in a large brooding flock in 1990 (Campbell 1991).

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.

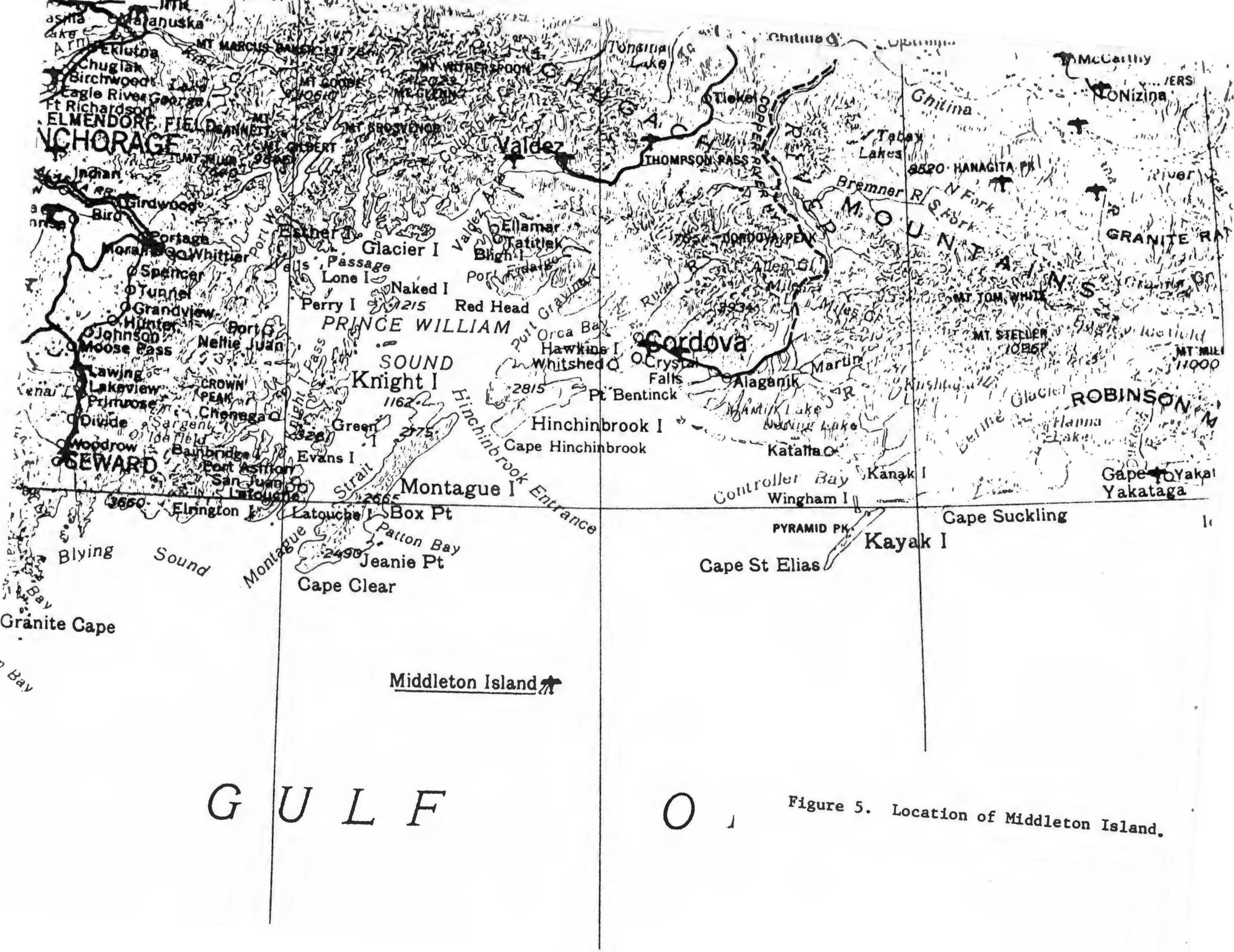

Figure 5. Location of Middleton Island.

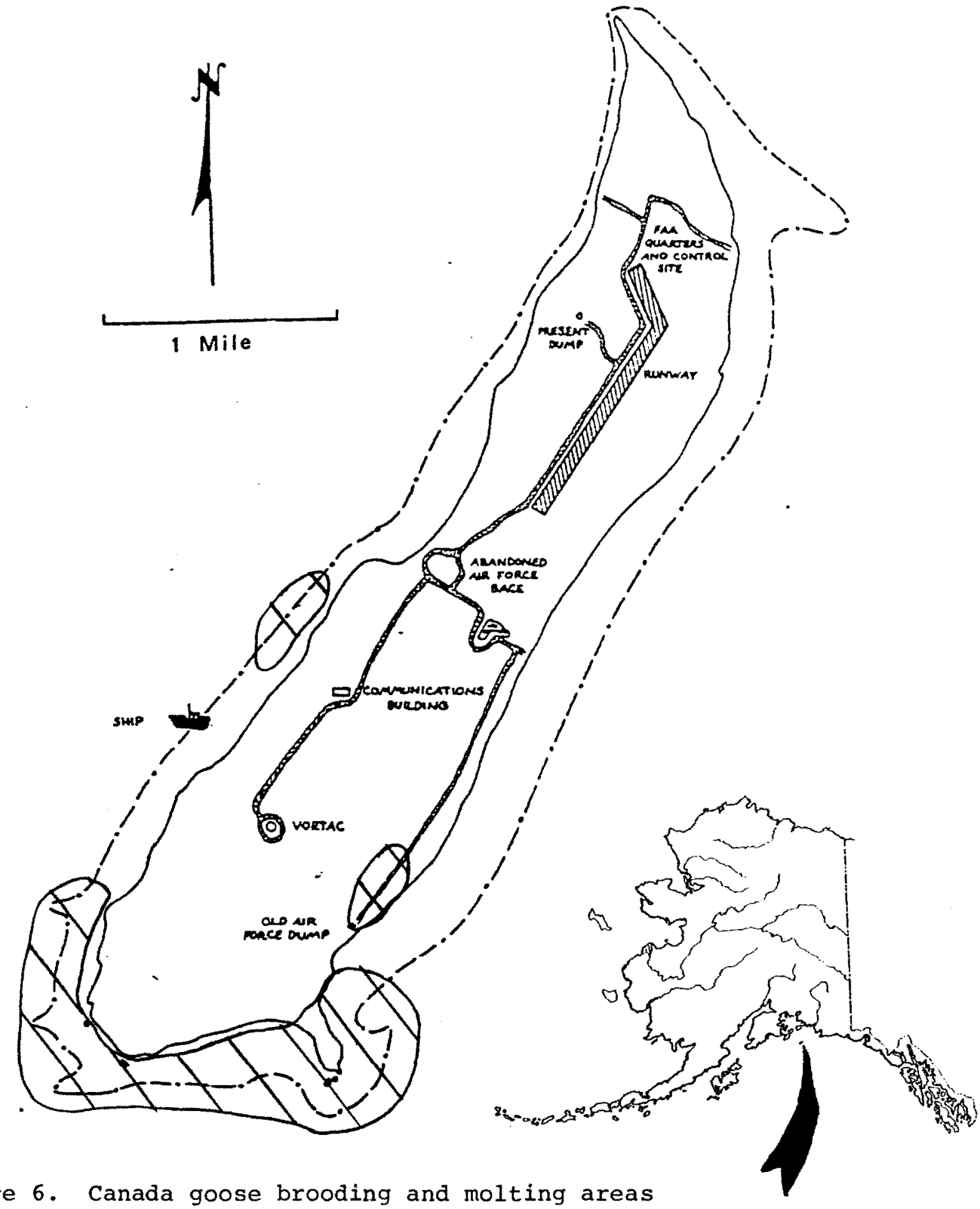

Figure 6. Canada goose brooding and molting areas on 10-11 July, 1991.

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