ALASKA DEPARTMENT OF FISH AND GAME

JUNEAU, ALASKA

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ANNUAL REPORT OF SURVEY-INVENTORY ACTIVITIES

PART ~~XIV~~. XIII WATERFOWL

By

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Volume XVI

Federal Aid in Wildlife Restoration

Project W-22-4, Job 11.0

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(Printed January 1986)

CONTENTS

1984-85

ALASKA WATERFOWL REGULATIONS SUMMARY - SEASONS AND LIMITS

AREA	NORTHERN	GULF COAST	SOUTHEAST	KODIAK & ALEUTIANS
State Game Management Units	11-13 & 17-26	5-7, 9, 14-16 & Unimak Island	1-4	8 & 10 (except Unimak Island)
Open Seasons[a]	Sept. 1-Dec. 16	Sept. 1-Dec. 16	Sept. 1-Dec. 16	Oct. 8-Jan. 22

	LIMIT BAG	POSS.	LIMIT BAG	POSS.	LIMIT BAG	POSS.	LIMIT BAG	POSS.
Ducks	10	30	8	24	7	21	7	21
Sea Ducks[b] & Mergansers	15	30	15	30	15	30	15	30
Geese[c]	6	12	6	12	6	12	6	12
Emperor Geese	2	4	2	4	2	4	2	4
Brant	2	4	2	4	2	4	2	4
Snipe	8	16	8	16	8	16	8	16
Crane	2	4	2	4	2	4	2	4

[a] In Unit 1(C), the taking of snow geese is prohibited.
In Units 9(E), 10 (except Unimak) and 18, the taking of Canada geese is prohibited.
In Units 5 and 6, the taking of Canada geese is prohibited Sept. 1 - Sept. 14.

[b] Sea Ducks: Eiders, Scoters, Old Squaw, Harlequin.

[c] No more than 4 daily, 8 in possession may be Canada and/or white-fronted geese, except that:

In Units 1-9, 14-16, and 18, no more than 2 daily, 4 in possession may be whitefronted geese.

(a) WEAPONS: Waterfowl may be taken with a shotgun (not larger than 10 guage) or bow and arrow, but not rifle or pistol.

(b) PLUGS: Shotguns must be plugged to a 3-shell capacity or less for waterfowl hunting.

(c) CONVEYANCES: Hunting is not permitted from an aircraft, motor driven vehicle, airboat, jet boat, or propellor driven boat, which the motor of such has not been completely shut off and its progress therefrom has ceased.

(d) POSSESSION: No state tagging requirements, see Federal Regulations.

(e) TRANSPORTATION: Waterfowl may be plucked in the field but one fully feathered wing or the head must remain attached while being transported.

(f) SHOOTING HOURS: One half hour before sunrise to sunset.

(g) STAMPS: No person 16 or more years of age may take waterfowl unless he carries a current validated Federal migratory bird hunting stamp (Duck Stamp) on his person.

(h) Special Restrictions: The use of an airboat or aircraft engine propelled boat for retrieval of waterfowl, transportaion of waterfowl or parts of waterfowl, waterfowl hunters, or waterfowl hunting gear within the Palmer Hay Flats State Game Refuge (except for the Matanuska River) and that portion of Unit 14A within the north bank of Knik River and east and south bank of the Matanuska River are prohibited.

WATERFOWL HARVEST AND HUNTER ACTIVITY

Introduction

A state waterfowl hunter survey was conducted in 1984 by the ADF&G. This was the 3rd year of the state survey program which was reinstituted in 1982. The state survey, used in conjunction with the data from U. S. Fish and Wildlife Service (FWS) survey, provides a more accurate estimate of hunter activity and harvest in Alaska. Due to the time schedule for this report, final FWS survey data for the reporting period are not available. Since FWS 3rd quarter harvest data for Alaska typically do not vary significantly from final survey data, 3rd quarter harvest estimates and hunter activity summaries are used in this report.

Survey Procedures

A computerized list of all residents legally licensed to hunt in 1984 was used as a sampling base. Eight thousand five hundred and thirty individuals (11.0% sample) were randomly selected by computer and mailed a survey form (Fig. 1). Fifty-one hundred reminder notices were sent to nonrespondents approximately 2 months after the initial survey mailing. Forms were self-contained inside a snap-open envelope, and a postage-paid return address was printed on the form's reverse side.

To standardize results, survey data were categorized according to location codes used in the FWS parts collection survey (Table 1). Data were coded to either specific locations (Table 1) within harvest areas (Fig. 2) or, if birds were not reported taken at specific locations, then the general harvest area code was assigned (Fig. 2). For example, a duck shot in the Kasilof Flats, an unspecified location, would be coded to general harvest area 06 (Cook Inlet). Timm (1978) provided a more detailed description of the coding system. Reporting bias was corrected during data analysis as described by Timm (1977).

Results

Number of Hunters:

Because of the number of people in Alaska hunting without duck stamps and the incidence of hunting outside legal season limits, the assessment of waterfowl hunter activity and waterfowl harvest is complicated (Timm 1972). While 34 people reported hunting waterfowl without purchasing a duck stamp, these data were not included in the analyses. Data on number of hunters, harvest, etc., in this report are based solely on duck stamp sales and, therefore, reflect only the fall sport hunting harvest.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

WATERFOWL HUNTER SURVEY
1984 - 1985

DEAR HUNTER:

Your cooperation is needed to better manage Alaska's waterfowl. By accurately answering the questions below concerning your hunting activities in 1984, you can help insure continued liberal bag limits and good hunting for the future. If you can't remember exact numbers, give your best estimate. Complete the form printed below and drop this card in the mail. No stamp is necessary. Thank you for your cooperation.

1.

PART I (ALL HUNTERS COMPLETE)

2. DID YOU BUY A FEDERAL DUCK STAMP IN 1984? ..... YES ☐ NO ☐

3. DID YOU HUNT FOR WATERFOWL DURING THE 1984-85 SEASON? YES ☐ NO ☐

PART II (COMPLETE ONLY IF YOU BOUGHT A STAMP OR HUNTED)

4. HOW MANY DAYS DID YOU HUNT WATERFOWL? ☐

AT WHAT PLACE DID YOU HUNT FOR MOST OF YOUR DUCKS?

5. _____

(E.G. PILOT POINT, MINTO FLATS, PYBUS BAY, ETC.)

AT WHAT PLACE DID YOU HUNT FOR MOST OF YOUR GEESE?

6. _____

COMMENTS _____

PART II (CONT.) HOW MANY OF THE FOLLOWING BIRDS DID YOU SHOOT AND RETRIEVE?

DUCKS	☐	7.
SEA DUCKS AND MERGANSER	☐	8.
CANADA GEESE	☐	9.
SNOW GEESE	☐	10.
WHITE-FRONTED (SPECKS) GEESE	☐	11.
BRANT	☐	12.
EMPEROR GEESE	☐	13.
UNKNOWN KIND OF GEESE	☐	14.
CRANE	☐	15.
SNIPE	☐	16.
HOW MANY DAYS DID YOU HUNT WITH A RETRIEVING DOG?	☐	

Figure 1. Waterfowl hunter survey form.

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

FWS code	ADF&G code	ADFG Region (R) and area names	Original FWS "county" name	Harvest zone
0000	00	Unknown	Unknown	Unknown
0101	01	North Slope (R)	Arctic Slope	NW
0301	02	Seward Peninsula (R)	Seward Peninsula	
0502	03	Yukon Valley (R)	Upper Yukon-Kuskokwim	Central
0512	12	Yukon Flats		
0702	04	Central (R)	Fairbanks-Minto	"
0712	13	Minto Flats	"	"
0722	14	Eielson AFB	"	"
0732	15	Salchaket Slough	"	"
0742	16	Healy Lake	"	"
0752	17	Delta Area	"	"
0762	18	Tok-Northway		
0901	05	Yukon Delta (R)	Yukon-Kuskokwim Delta	NW
1103	06	Cook Inlet (R)	Anchorage-Kenai	SC
1113	19	Susitna Flats	"	"
1123	20	Palmer-Hay Flats	"	"
1133	21	Goose Bay	"	"
--	22	Eagle River	"	"
1143	23	Potter Marsh	"	"
1153	24	Chickaloon Flats	"	"
1163	25	Portage	"	"
1173	26	Trading Bay	"	"
1183	27	Redoubt Bay	"	"
1193	28	Kachemak Bay	"	"
--	46	Jim-Swan area	"	"
1303	07	Gulf Coast (R)	Cordova-Copper River	"
1313	29	Copper River Delta	"	"
1323	30	Yakutat Area	"	"
1333	31	Prince William Sound	"	"
1503	08	Southeast Coast (R)	Juneau-Sitka	SE
1513	32	Chilkat River	"	"
1523	33	Blind Slough	"	"
1533	34	Rocky Pass	"	"
1543	35	Duncan Canal	"	"
1553	36	St. James Bay	"	"
1563	37	Mendenhall Wetlands	"	"
1573	38	Farragut Bay	"	"
1583	39	Stikine River Delta	"	"
1704	09	Kodiak (R)	Kodiak Island	SW
1714	40	Kalsin Bay	"	"
1904	10	AK Peninsula (R)	Cold Bay-AK Peninsula	"
1914	41	Cold Bay	"	"
1924	42	Pilot Point	"	"
1934	43	Port Moller	"	"
1944	44	Port Heiden	"	"
--	45	Cinder River	"	"
2104	11	Aleutian Chain (R)	Aleutians-Pribilofs	"

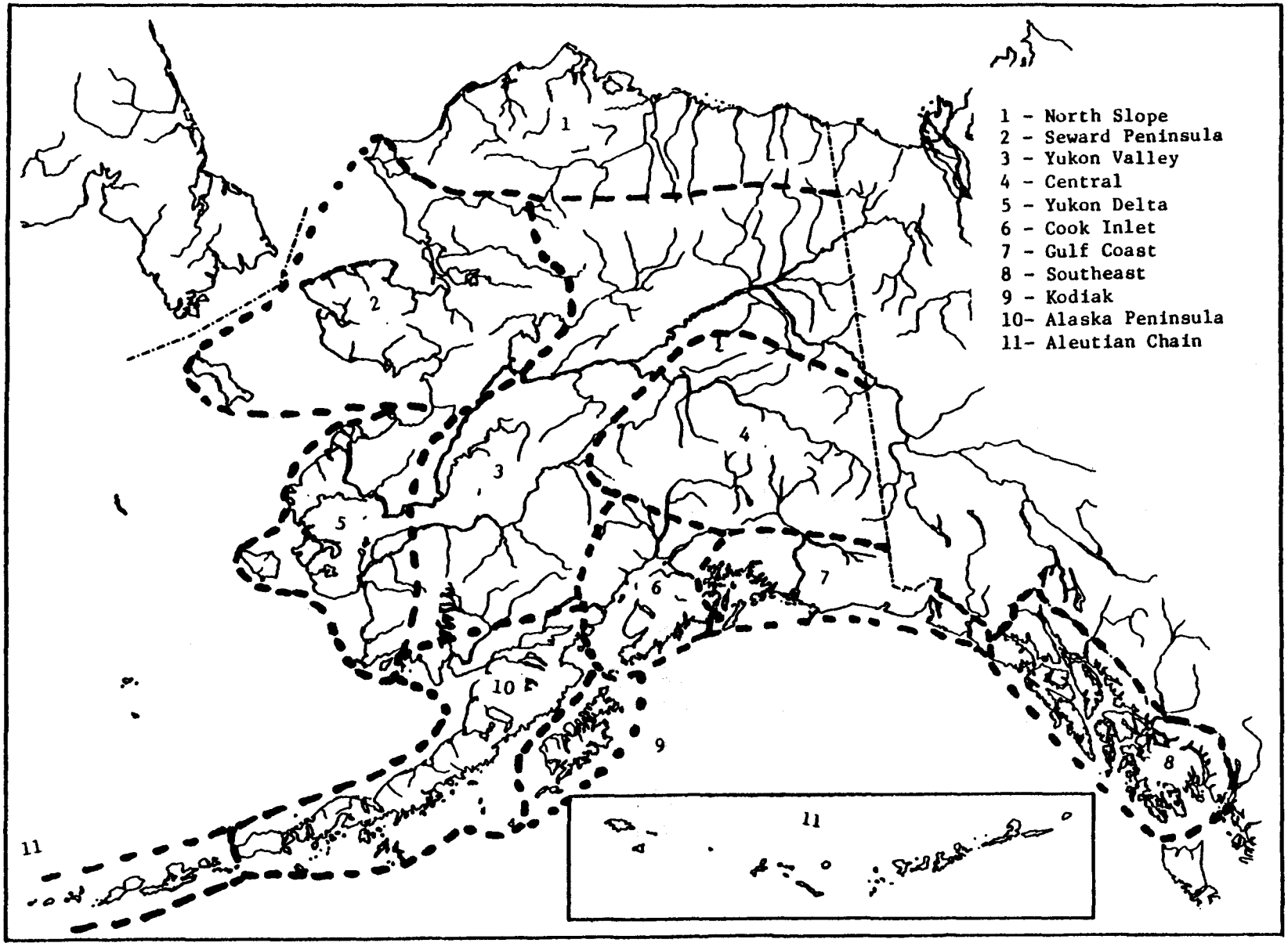

Figure 2. Harvest areas used in data analysis.

A total of 4,881 people returned the questionnaire for a response rate of 57%. Of the 1,107 individuals indicating that they had purchased a duck stamp, 743 reported hunting 1 or more days (67% active hunters). Based on the sale of 18,485 federal duck stamps in Alaska, adjusted for sales to nonhunters, approximately 11,879 people hunted waterfowl during the 1984-85 season (Table 2).

Hunting Activity:

Hunters reported hunting an average of 6.4 days during the 1984-85 season. This projects to a total of 76,026 waterfowl hunter-days (Table 2), compared with 75,963 hunter days in 1983. The distribution of hunter days and resulting harvest are summarized by region in Table 3 and by specific hunting area in Table 4.

Duck Harvest:

An average of 7.9 ducks/active hunter was taken in 1984. This compares with 9.6 ducks/active hunter in 1983 and the 1973-83 average of 6.5 ducks/active hunter. Calculated average daily hunting success was 1.2 ducks/hunter in 1984 compared with 1.6 in 1983.

The projected statewide duck harvest was 101,610 of which 94,380 (93%) were dabblers and divers and 7,230 (7%) were sea ducks (Table 2). This estimate is comparable to a Fish and Wildlife Service estimated harvest of 89,715, of which 79,218 (88%) were dabblers, 8,792 (10%) were divers and 1,704 (2%) were sea ducks and mergansers (Carney et al. 1985). The 1984 state survey estimated harvest was 18% less than 1983 but 1% above the 1973-83 average harvest of 100,260 ducks.

Based on the FWS parts collection survey, which is believed to provide the best estimate of species composition in the harvest, the mallard (Anas platrhynchos) was the most important game duck in 1984, composing about 31% of the harvest, followed by green-winged teal (Anas crecca) (19%), pintail (Anas acuta) (18), and American wigeon (Anas americana) (15%) (Table 5). Species composition of the statewide duck harvest has remained relatively constant during the past 10 years (1975-84) with 86% (±2.5) of the harvest composed of dabbling ducks, 10% (±2.5) diving ducks and 4% (±2.2) sea ducks and mergansers (Table 6). As calculated from the State Waterfowl Hunter Survey, nearly 33% of the duck harvest occurred in Cook Inlet, with the state's central region contributing an additional 23% (Table 7).

Goose Harvest:

Hunters reported taking an average 1.3 geese/active waterfowl hunter in 1984. This was slightly higher than the 1.1 geese/hunter reported in 1983, and the 10-year average of 1.1 geese/hunter. The calculated 1984 statewide goose harvest was 15,227,

Table 2. Summary of Alaska waterfowl hunter activity and harvest from the state mail questionnaire survey, 1984-85.

Number of licensed resident hunters (all classes): 76,981

Number of license buyers sampled: 8,531 (11%)

Number and proportion of respondents from survey[a]: 4,881 (57.2%)

Number of returns usable for data analysis: 743 (15.2%)

Projected number of fall sport hunters:

Total duck stamps sold[b]: 18,485

Duck stamps sold to potential hunters in Alaska[c]: 17,699

Number of active hunters: 11,879 (67.1%)

Calculated statewide fall sport harvests:

Ducks: Dabblers/divers: 94,380; sea ducks: 7,230; Total 101,610

Geese: Canada: 9,503; emperor: 1,188; brant: 1,544; white-fronted: 2,019

snow: 617; unknown species: 356; Total: 15,227

Cranes: 2,376

Snipe: 3,564

Calculated Hunter Days: 76,026

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[a] Estimated rate of deliverable questionnaires only; excludes change of address,insufficient address, deceased hunter, etc.

[b] Carney et al. 1985.

[c] Total stamp sales minus 4.25% sold to nonhunters (Carney et al. 1985).

Table 3. Calculated duck, crane, and snipe fall sport harvests and sport hunter activity by harvest area, 1984-85.

Harvest area	Hunter days		Dabblers/divers		Sea ducks		Crane		Snipe	
	No.	%	No.	%	No.	%	No.	%	No.	%
North Slope	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Seward Peninsula	1,749	2.3	2,643	2.8	275	3.8	40	1.7	0	0.0
Yukon Valley	1,977	2.6	1,888	2.0	0	0.0	52	2.2	0	0.0
Central	13,989	18.4	22,651	24.0	398	5.5	1,390	58.5	185	5.2
Yukon Delta	1,977	2.6	4,813	5.1	788	10.9	506	21.3	107	3.0
Cook Inlet	32,615	42.9	32,089	34.0	1,424	19.7	230	9.7	905	25.4
Gulf Coast	5,778	7.6	6,701	7.1	1,193	16.5	26	1.1	606	17.0
Southeast	13,533	17.8	14,251	15.1	2,082	28.8	0	0.0	1,764	49.5
Kodiak	2,281	3.0	2,548	2.7	759	10.5	0	0.0	0	0.0
Alaska Peninsula	2,129	2.8	7,079	7.5	311	4.3	133	5.6	0	0.0
Aleutian Chain	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Statewide	76,026	100.0	94,380	100.3	7,230	100.0	2,376	100.1	3,564	100.1

Table 4. Calculated hunting activity and harvest for specific locations in Alaska, 1984-85.

Location	Calculated duck harvest and hunter days: Ducks N	Ducks % of state total	Hunter days N	Hunter days % of state total	Location	Calculated goose harvest N	Goose % of state total
Minto Flats	11,685	11.5	5,094	6.7	Delta Area	1,995	13.1
Susitna Flats	8,129	8.0	5,701	7.5	Cold Bay	1,462	9.6
Palmer Hay Flats	7,214	7.1	6,614	8.7	Chickaloon Flats	807	5.3
Chickaloon Flats	5,385	5.3	1,673	2.2	Minto Flats	777	5.1
Copper River Delta	4,674	4.6	2,357	3.1	Copper River Delta	563	3.7
Prince William Sound	2,845	2.8	1,444	1.9	Susitna Flats	487	3.2
Healy Lake	2,032	2.0	608	0.8	Stikine River Delta	320	2.1
Pilot Point	1,931	1.9	532	0.7	Palmer Hay Flats	213	1.4
Mendenhall	1,829	1.8	1,977	2.6	Blind Slough	198	1.3
Tok-Northway	1,727	1.7	760	1.0	Goose Bay	167	7.1
Kachemak Bay	1,727	1.7	1,825	2.4	Rocky Pass	152	1.0
Delta Area	1,626	1.6	3,497	4.6	Prince William Sound	122	0.8
Stikine River Delta	1,626	1.6	608	0.8	Port Heiden	107	0.7
Portage	1,423	1.4	2,281	3.0	Trading Bay	76	0.5
Redoubt Bay	915	0.9	532	0.7	Portage	76	0.5
Port Heiden	711	0.7	76	0.1	Pilot Point	61	0.4
Eielson AFB	610	0.6	380	0.5	Duncan Canal	61	0.4
Goose Bay	508	0.5	912	1.2	Mendenhall	61	0.4
Trading Bay	508	0.5	760	1.0	Yakutat	61	0.4
Duncan Canal	508	0.5	532	0.7			
Jim-Swan Lakes	508	0.5	380	0.5			
Potters Marsh	305	0.3	760	1.0			
Yakutat	305	0.3	304	0.4			
Cold Bay	305	0.3	608	0.8			
Salchaket Slough	102	0.1	228	0.3			
Blind Slough	102	0.1	228	0.3			
Rocky Pass	102	0.1	76	0.1			
Kalsin Bay	102	0.1	304	0.4			
Subtotals	59,444	58.5	41,051	54.0		7,766	51.0
Statewide totals	101,610	100.0	76,026	100.0		15,227	100.0

Table 5. Species composition of the 1984-85 duck harvest, by region, based on the 3rd quarter Fish and Wildlife Service parts collection survey report (N = 1,385 wings).

Species	% Total harvest by area											
	North Slope[a]	Seward Pen.	Yukon Valley	Central	Yukon Delta	Cook Inlet	Gulf Coast	South-east	Kodiak[a]	Alaska Pen.	Aleutian Chain	% Total statewide
Mallard	0	0	22.3	21.8	24.7	29.0	73.5	39.7	0	26.4	58.3	30.7
American wigeon	0	0	17.5	24.8	15.5	14.2	7.4	5.6	0	19.5	8.4	14.5
Pintail	0	63.1	24.5	20.5	0	14.4	7.2	14.8	0	30.9	8.4	18.3
Green-winged teal	0	13.3	18.3	11.2	53.3	25.5	11.9	20.6	0	17.6	8.4	18.7
Shoveler	0	5.3	5.2	6.3	6.2	5.9	0	6.8	0	1.3	0	5.3
Gadwall	0	0	0	0		1.1	0	0.4	0	0	0	0.5
Blue-Winged teal	0	0	0	0.5	0	0.2	0	0.4	0	0	0	0.3
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Total dabblers	0	81.7	87.8	85.0	99.7	90.3	100.0	88.4	0	95.6	83.5	88.3
Lesser scaup	0	5.3	7.0	5.1	0	1.4	0	0.4	0	0.6	0	1.9
Barrow's goldeneye	0	0	0	2.6	0	0.8	0	4.0	0	0	0	1.6
Greater scaup	0	2.6	0	1.0	0	1.1	0	0.4	0	3.8	0	1.2
Bufflehead	0	0	0	4.1	0	1.1	0	1.2	0	0	0	1.4
Common goldeneye	0	0	1.7	0.8	0	4.1	0	1.2	0	0	0	1.9
Canvasback	0	0	1.7	0	0	1.4	0	0.8	0	0	0	0.7
Redhead	0	0	0	0	0	0.9	0	0	0	0	0	0.3
Ringneck	0	0	0	0.3	0	1.6	0	0	0	0	0	0.6
Total divers	0	7.9	10.4	13.9	0	12.4	0	8.0	0	4.4	0	9.6
White-Winged scoter	0	0	0	0	0	0.2	0	0.8	0	0	16.6	0.4
Harlequin	0	2.6	0	0	0	0.5	0	0.4	0	0	0	0.3

Table 5. Continued.

Species	% Total harvest by area											
	North Slope[a]	Seward Pen.	Yukon Valley	Central	Yukon Delta	Cook Inlet	Gulf Coast	South-east	Kodiak[a]	Alaska Pen.	Aleutian Chain	% Total statewide
Common merganser	0	0	0	1.0	0	0	0	0.4	0	0	0	0.3
Oldsquaw	0	5.3	0	0	0	0.5	0	0.4	0	0	0	0.3
Red-breasted merganser	0	2.6	0	0	0	0	0	0	0	0	0	<0.1
Black scoter	0	0	1.7	0	0	0	0	0	0	0	0	<0.1
Surf scoter	0	0	0	0.3	0	0.2	0	1.6	0	0	0	0.5
Total seaducks/ Mergansers	0	10.5	1.7	1.3	0	1.4	0	3.6	0	0	16.6	1.8

[a] No duck harvest reported by FWS parts collection survey.

Table 6. Species composition of the statewide duck harvest in Alaska, based on FWS parts collection surveys, 1975-84.

Category	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	$\bar{x}$	± SD
Dabbling ducks (%)	88.0	82.6	88.2	82.5	87.5	85.0	87.8	5.4	82.7	88.3	85.8	2.5
Diving ducks (%)	5.8	9.5	10.3	11.1	8.2	12.5	9.9	11.0	15.3	9.6	10.3	2.5
Sea duck/ mergansers (%)	6.2	7.9	1.5	6.5	4.2	2.5	2.3	3.6	2.2	1.8	3.9	2.2

Table 7. Projected distribution of 1984 duck harvest, by harvest area, compared with the ADF&G mail survey 1972-76 and 1982-83 averages.

Harvest area	1984 (%)	1972-76 and 1982-83 Average (%)
North Slope	0.0	0.2 ± 0.2
Seward Peninsula	2.8	2.0 ± 1.2
Yukon Valley	1.8	2.3 ± 0.7
Central	22.5	18.7. ± 3.3
Y-K Delta	5.5	1.9 ± 1.1
Cook Inlet	32.8	41.9 ± 5.4
Gulf Coast	7.7	7.2 ± 1.8
Southeast	16.0	18.6 ± 2.7
Kodiak	3.3	3.0 ± 0.7
Alaska Peninsula	7.2	3.9 ± 2.0
Aleutian Chain	0.0	0.4 ± 0.4

an increase from 14,678 in 1983 and 6% above the 10-year average of 14,396. The state harvest estimate was 97% greater than the Fish and Wildlife Service estimate of 7,713 (Carney et al. 1985).

As in previous years, the Canada goose (Branta canadensis) was the most common goose harvested by sport hunters in 1984 (Table 2). This species made up 62% of the harvest, followed by white-fronts (Anser albifrons) (13%), brant (Branta bernicle) (10%), emperor (Philacte canagica) (8%), snow (Chen caerulescens) (4%), and unknown species (2%). This compares with a 1983 harvest of 61% Canadas, 11% emperors, 13% brant, 8% white-fronts and 4% snow geese.

Crane Harvest:

Hunters reported taking an average of 0.2 sandhill cranes (Grus canadensis)/active hunter in 1984. This compares with an average of 0.4 in 1983. The calculated statewide crane harvest was 2,376 (Table 2) as compared with 1,805 in 1983 and a 10-year average of 1,040 birds/year. Over 58% of the 1984 crane harvest occurred in the central region of the state (Table 3).

Snipe Harvest:

An average of 0.30 snipe (Capella gallinago) was harvested/active hunter in 1984 for a calculated statewide harvest of 3,564 birds (Table 2). This compares to 0.27 birds/hunter and a calculated harvest of 3,476 snipe in 1983. About half of the 1984 harvest occurred in southeastern Alaska, with Cook Inlet contributing an additional 25% (Table 3).

Discussion

In contrast to national and Pacific Flyway trends over the past decade, the number of waterfowl hunters and the level of hunting effort, as measured by stamp sales and hunter days, continues to hold steady or increase in Alaska. The number of active hunters was down 7.7% from 1983, but was still within 1% of the 1974-83 average; hunting effort was up 8.5% from both the 1983 and 1974-83 averages. This steady-to-increasing trend in the number of hunters and hunting effort reflects human population growth in Alaska.

Distribution of the 1984 waterfowl harvest reflects habitat and regulation changes. While the regional distribution of the duck harvest was not significantly different ($X^2 = 13.41$, $df = 10$, $P > 0.20$) than the 1972-76 and 1982-83 ADF&G survey average, the regional distribution of the goose harvest was significantly different ($X^2 = 34.18$, $df = 10$, $P < 0.005$). Most of this difference is attributed to 52% and 50% reductions in goose harvest in the Alaska Peninsula and Gulf Coast regions, respectively, and a

119% increase in harvest in the Central region from the 7-year state survey average. Reduced harvest in the Alaska Peninsula and Gulf Coast regions were the result of regulation changes instituted in 1984.

The Canada goose season was closed on much of the Alaska Peninsula (Subunit 9E) to protect cackling Canada geese. The estimated 1984 harvest of all goose species at Pilot Point, the principal harvest location in this unit, was only 61 birds (Table 4), a reduction of over 90% from 1983. Bag limit restrictions of 2 daily and 4 in possession, instituted on brant and emperor geese, produced harvest reductions of 20 percent and 29 percent, respectively (Table 8), compared with 1983.

Canada goose season was postponed by 2 weeks in the Gulf Coast region to reduce the harvest of dusky Canada geese. Compared with 1983, Gulf Coast harvests were down 17 percent for Canada geese and 25 percent for all goose species (Table 8).

The dramatic increase in goose harvest in the Central region resulted from habitat change. A major agricultural area has developed in the Delta Junction area on the upper Tanana River 85 miles southwest of Fairbanks. This area is on one of the primary fall migration routes out of interior and northern Alaska and is apparently becoming an important staging area for geese. Road access and increasing numbers of geese available to hunters have resulted in an increase from less than 1% of the statewide harvest in the mid-1970's to the top goose harvest location (13% of statewide harvest) in 1984.

A similar trend is evident in the harvest of sandhill cranes. From 1971 to 1977 about 30% of the crane harvest was from the Pacific Coast population taken on the Alaska Peninsula, Cook Inlet, and the Gulf Coast. Seventy percent were from the mid-continent population taken in the Central, Seward Peninsula and Yukon Delta areas. By 1983 the mid-continental cranes composed 85% of the statewide harvest and by 1984 the harvest numbered 1,988 cranes (Table 3), over twice the average from 1971-77. Although much of the increase in harvest is from the Delta agricultural area in the Central region, a marked increase from 166 to 506 cranes harvested in the Yukon Delta was recorded in 1984.

DUSKY CANADA GOOSE STUDIES

Production

Conditions on the Copper River Delta were poor for nesting in 1985. Spring weather was cold and wet with the last measurable snowfall occurring on 16 May. The coastal Delta, where most nesting occurs, was not free of ice and snow until late May and "green-up" occurred 2-3 weeks later than normal. Weather during nesting was cold and wet.

Table 8. Magnitude and distribution of the fall goose sport harvest by species and harvest area, 1984-85.

Region	Canada		Emperor		Brant		Snow		Whitefront		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
North Slope	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Seward Peninsula	855	9.0	0	0.0	386	25.0	14	2.2	188	9.3	0	0.0	1,431	9.4
Yukon Valley	399	4.2	0	0.0[a]	96	6.2[a]	0	0.0	52	2.6	0	0.0	548	3.6
Central	1,787	18.8	43	3.6	42	2.7	40	6.5	1,030	51.0	61	17.2	3,015	19.8
Yukon Delta	741	7.8	587	49.4	523	33.9	510	82.6	147	7.3	135	37.9	2,649	17.4
Cook Inlet	1,920	20.2	43	3.6	28	1.8	14	2.2	133	6.6	12	3.4	2,132	14.0
Gulf Coast	684	7.2	0	0.0	28	1.8	0	0.0	26	1.3	12	3.4	761	5.0
Southeast	1,977	20.8	0	0.0	96	6.2	40	6.5	67	3.3	135	37.9	2,315	15.2
Kodiak	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Alaska Peninsula	1,131	11.9	514	43.3	344	22.3	0	0.0	372	18.4	0	0.0	2,345	15.4
Aleutian Chain	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Statewide	9,503	99.9	1,188	99.9	1,544	99.9	617	100.0	2,019	99.8	356	99.8	15,227	99.8

[a] Probable reporting error, species rare in these regions.

The 1st dusky geese (Branta canadensis occidentalis) were observed on the Delta on 12 April (K. Giezentanner, USFS, pers. commun.) and a major build-up was reported during the 3rd week of April (J. Reynolds, ADF&G, pers. commun.). Geese fed and roosted in partially snow-free open meadows along the Copper River Highway and on coastal mudflats until mid-May when pairs began establishing nesting territories on still frozen and snow-covered coastal marshes. Peak nest initiation, as determined by back dating the age of floated eggs from 77 nests, was 27 May-1 June. This was the latest nest initiation recorded since 1971.

The late spring was reflected in a low productive effort by the breeding population (Table 9). Average clutch size on the study plots was 4.4 ± 1.5 (N = 64) eggs per nest. Average nest success was 8.9%. Both averages are the lowest ever recorded. However, in contrast to other very late springs, such as 1971 (Timm 1972) nest density was not lower than in previous years. The 1985 calculated nest density of 97 nests/mi² was slightly higher than in 1984 (which had an early spring); was similar to the 1980-84 average of 99 nests/mi²; but was appreciably below the 1975-84 average of 136 nests/mi².

Predation was the primary cause of nest failure in 1985. About 79% of the 168 nests on the study plots and 81% of the 258 nests visited at various locations on the west Delta (Figure 3) were destroyed (Table 10). This was the highest nest predation rate on record. Over 76% of the nest destruction was attributed to coyotes and brown bears, with avian predators destroying an additional 19%. However, because of the high predation rate and complete nest destruction by large mammals, avian predation may have been masked and underestimated. While final classification of specific predatory agents is not yet complete, a major portion of the nest predation by mammals is attributed to brown bears.

A production survey was conducted on 17 July 1985. Parallel transects at ¼- to ½-mile intervals were flown in a Cessna 185 between saltwater and shrub-bog habitat. Two observers and a pilot were used, with the pilot and front seat observer searching for flocks and navigating. The 3rd observer, seated behind the front passenger seat, assisted with the search until geese were spotted. At that time, passes or circles were flown so the 2 observers on the right-hand side of the aircraft had an unrestricted view. The front observer counted adults and took photographs, while the rear observer counted young geese and recorded data. Elevation and speed of the aircraft varied according to conditions and group size. Flock searches were conducted at 500-800 foot altitude and at approximately 100 mph. Once flocks or family groups were spotted, airspeed and altitude were reduced to allow adequate counts and classification. All flocks larger than 50 geese were photographed to double check visual estimates and to test the feasibility of photocensusing the molting goose population.

Table 9. Dusky Canada goose nest densities, hatching success, and average clutch size on the West Copper River Delta study area, 1959-85.

Year	$\bar{x}$ nest density/mi²	Nest success		Clutch size	
		N	%	N	$\bar{x}$
1959-74	ND[a]	ND	82.9	ND	5.0
1975	179	ND	31.6	215	4.8
1976	156	ND	ND	168	4.8
1977	175	229	79.0	181	5.4
1978	183	390	56.2	ND	ND
1979	133	409	18.8	338	5.7
1980	108	ND	ND	152	5.4
1981	ND	ND	ND	28	4.9
1982	102	151	49.8	135	4.8
1983	91	162	51.9	87	5.5
1984	95	161	75.8	123	5.6
1975-84 $\bar{x}$	136		56.3		5.2
1985	97	168	8.9	64	4.4

[a] ND = No data.

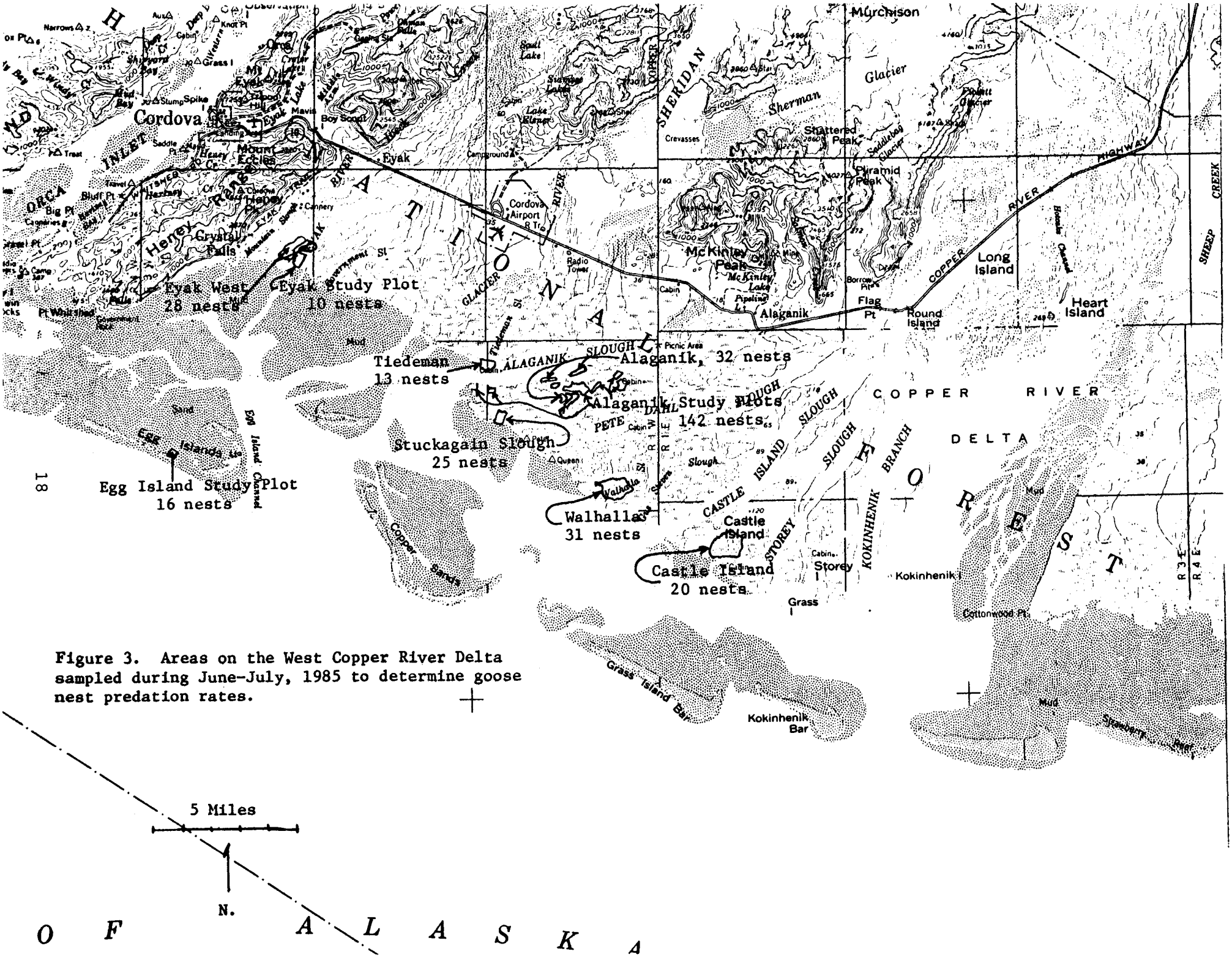

Figure 3. Areas on the West Copper River Delta sampled during June-July, 1985 to determine goose nest predation rates.

Table 10. Fate of dusky Canada goose nests on the west Copper River Delta study area, 1959, 74-75 and 1982-85.

Year	No. nests	% Successful	% Abandoned	% Fate unknown	% Destroyed	Type destruction: % Mammal	% Avian	% Flooded	% Unk
1959[a]	1,162[b]	79.6	1.8	2.0	6.0	0[d]	11.4[e]	88.6	0[d]
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[f]	161	75.8	3.1	6.2	14.9	62.4	37.6	0	4.0
1985[f]	168 (258)[g]	8.9 (7.0)	3.6 (1.9)	6.5 (10.9)	78.6 (81.0)	76.6	19.1	0	4.3

[a] Trainer, 1959.

[b] Eggs rather than nests.

[c] Bromley, 1976.

[d] Not reported.

[e] Percentages not given, but major losses attributed to avian predators.

[f] Preliminary, pending further data analysis.

[g] Numbers in parentheses are for the study area plus additional sample areas on the CRD (Fig. 3).

An estimated total of 13,780 geese were observed during 3.5 hours of flying. The low nest success, and possibly, poor brood survival were reflected in an estimated population composition of only 3.7% young, the lowest production effort on record. The absence of young geese in the population was confirmed during banding in late July when very few young, or flocks with young, were observed. Banding efforts also confirmed that a large majority of the Canada geese counted on the production survey were duskys, although the broad variation in sizes and plumage shading raises questions about the homogeneity of that subspecies.

For the 4th consecutive year, a segregation of barren flocks and flocks with young geese were observed during the production survey and banding operation. Virtually all of the family groups and flocks with young birds were observed on Egg Island or the western, mainland coast between Mountain Slough and Alaganik Slough. Large flocks comprising 1,000+ adult geese and no young were observed to the east of Alaganik Slough on larger coastal lakes. Major concentrations occurred between Pete Dahl and Story Sloughs.

Although faulty photography equipment prevented completion of the test photocensus, sufficient information was gained to indicate that a photocensus is feasible, at least in years of poor production when nonbreeders or unsuccessful breeders are concentrated along the coast, and would supplement the mid-winter index. The photocensus will be repeated in 1986 to further test reliability and methodology. Spring aerial surveys are also being refined by the USFWS and may eventually provide a 3rd dusky population index.

Population Status

As specified in the Dusky Canada Goose Management Plan (Pacific Flyway Council, 1985), the mid-winter inventory is used to estimate the post-season population size of duskys. The 1984-85 post-season population estimate of 7,500 geese (Cornely and Jarvis 1985) compared with a calculated 1984 fall flight estimate of 11,900, indicates that 4,400 geese were unaccounted for in late winter 1985 (Table 11). Due to a wide disparity between the calculated fall flight, which is based on the calculated breeding grounds population plus estimated production of young, and actual number of geese observed in July, the 1985 fall flight estimate ranges between 7,730-14,000 geese. The disparity between the calculated fall flight and the actual number of geese observed on the Copper River Delta in July sheds some doubt on the usefulness of the mid-winter inventory in estimating the size of the dusky population.

Table 11. Summary of population and production data for dusky Canada geese, 1971-85.

Year	Mid-winter population index	Spring population[a]	Young produced	Fall flight	Fall - spring losses[b]
1971	19,800	19,060	3,690	22,750	4,850
1972	17,900	17,230	2,045	19,275	3,475
1973	15,800	15,210	8,560	23,770	5,170
1974	18,600	17,900	18,935	36,835	10,335
1975	26,500	25,510	5,565	31,075	8,075
1976	23,000	22,140	6,975	29,115	5,015
1977	24,100	23,200	18,460	41,660	17,660
1978	24,000	23,100	7,635	30,735	5,235
1979	25,500	24,545	4,680	29,225	7,225
1980	22,000	21,175	6,575	27,750	4,750
1981	23,000	22,140	4,830	26,970	9,230
1982	17,740	17,075	5,310	22,385	5,385
1983	17,000	16,360	2,890	19,250	9,150
1984	10,100	9,720	2,180	11,900	4,400
1985	7,500	7,220[c]	510[d]		

[a] Mid-winter less 0.0375 mortality (Chapman et al. 1969).

[b] Fall flight forecast minus mid-winter population estimate.

[c] An estimated 13,780 geese were observed on the Copper River Delta in July 1985.

[d] Based on a sample of 13,780 geese.

Banding

As recommended by the Dusky Subcommittee of the Pacific Flyway Technical Committee, duskys were banded and collared for the 2nd consecutive year. A total of 2,151 geese was captured between 20-21 July using portable drive nets and a Bell 206 Jet Ranger helicopter. Fifty-seven of these were geese collared in 1984, 214 were geese banded in 1984 or marked (banded and/or collared) prior to 1984, 91 were recaptures of birds marked in 1985 and 1,789 were unmarked geese (Table 12).

One thousand nine hundred fifty-eight geese were collared: 212 previously-banded birds (including 1 lesser Canada goose banded in Cook Inlet in 1980), 23 collar replacements (worn or lost collars), and 1,723 unmarked geese. Age and sex of geese marked in 1985 was 1,056 "after hatching year males" (AHYM), 911 "after hatching year females" (AHYF), 14 "after hatching year unknown sex "(AHYU), 8 male goslings (LM), 22 female goslings (LF), and 7 goslings of unknown sex (LU). Of the 57 geese collared in 1984 and recaptured in 1985, 13 were missing collars for a 1st year collar loss rate of 22.8%. An additional 6 collars placed on geese in 1984 were replaced due to severe cracking and breakage.

All band return data, since banding was initiated in 1951, has been obtained from the USFWS Bird Banding Laboratory and is currently being analyzed. Analysis should be complete by late winter or early spring 1986. A preliminary distribution of band returns is presented in Table 13.

Table 12. Summary of dusky Canada geese captured and marked on the Copper River Delta, 1985.

Banding location	Total captured	No. collar recaptures[a]	Adults marked[b]			Goslings marked			Mortalities
			Male	Female	Unk	Male	Female	Unk	
Glacier Slough	293	53	134(3)	104	3(1)	0	0	0	1
Mountain Slough	165	31	67(10)	49(1)	0	7	18	4	0
Tiedeman Slough	213	6	113(1)	89	6	0	0	0	0
Egg Island	56	0	28	20	0	1	4	3	0
Walhalla Slough	326	1	167(1)	158	1	0	0	0	0
Pete Dahl Slough	463	7	245	207	3(1)	0	0	0	1
Stuckagain Slough	134	46	48	40(1)	1	0	0	0	0
Castle Island	501	7	254(4)	244	0	0	0	0	0

[a] Includes geese collared in 1970's and 1984.

[b] Numbers in parentheses are for replaced collars.

Table 13. Preliminary distribution of band recoveries from dusky Canada geese harvested since 1951, as of 2 September 1985.

Hunting season	N	Alaska	British Columbia	Washington	Oregon	Other
1951	3	0	0	0	100.0	0
1952	35	17.1	2.9	5.7	74.3	0
1953	105	8.6	24.8	8.6	58.1	0
1954	201	10.0	7.0	18.4	64.2	0.5[a]
1955	92	5.4	4.3	9.8	80.4	0
1956	86	4.7	26.7	9.3	59.3	0
1957	172	4.1	22.1	8.1	64.5	1.2[a]
1958	135	4.4	14.1	11.1	70.4	0
1959	140	7.1	22.1	4.3	66.4	0
1960	156	5.1	19.9	17.3	57.7	0
1961	48	12.5	18.8	12.5	56.3	0
1962	105	13.3	11.4	11.4	63.8	0
1963	123	5.7	15.4	6.5	69.9	2.4[a]
1964	64	4.7	7.8	18.8	68.8	0
1965	112	7.1	14.3	14.3	63.4	0.9
1966	95	9.5	7.4	3.2	80.0	0
1967	73	8.2	6.8	16.4	68.5	0
1968	96	9.4	17.7	10.4	62.5	0
1969	97	10.3	10.3	11.3	68.0	0
1970	159	10.7	8.2	8.8	72.3	0
1971[b]	67	11.9	6.0	9.0	73.1	0
1972	103	9.7	0	8.7	80.6	1.0[a]
1973	66	18.2	4.5	10.6	66.7	0
1974	191	13.6	5.2	13.6	67.5	0
1975	194	13.9	5.2	13.9	67.0	0
1976	235	10.2	10.6	14.0	64.7	0.4[c]
1977	243	16.5	4.9	9.1	69.1	0.4[a]
1978	236	24.2	2.1	13.6	57.6	2.5[a], [d]
1979	98	16.3	2.0	12.2	69.4	0
1980	104	2.9	2.9	8.7	84.6	1.0[a]
1981	69	4.3	0	10.1	85.5	0
1982	33	24.2	0	9.1	63.6	3.0[e]
1983	76	6.6	0	5.3	88.2	0
1984	56	19.6	8.9	8.9	62.5	0
$\bar{x}$ ± SD		10.6±5.7	9.5±7.8	10.7±3.8	68.8±8.3[f]	

[a] California.
[b] Incomplete recovery listing for this year. A corrected listing is currently being incorporated into the data base and may slightly change distribution in previous years.
[c] Minnesota.
[d] Utah.
[e] Idaho.
[f] Excluding 1951.

BROWN BEAR ACTIVITY AND IMPACTS ON NESTING GEESE ON THE WEST COPPER RIVER DELTA

Introduction

A 3-year investigation of the activity of brown bears (Ursus arctos) and their impact on nesting dusky Canada geese, was initiated in 1984 (Campbell and Rothe 1985). A comprehensive progress report for the 1st year of this study was completed in early 1985. Data collection and analysis for the 2nd year of the study are currently underway and will be summarized in a progress report in early 1986. The following is a brief, preliminary summary of activities during the period covered by this annual report of survey and inventory activities (1 Sep 1984-31 Aug 1985).

July-Winter 1984 and Spring 1985 Investigations

Bears that were radio-tagged in the spring of 1984 were relocated 9 times during late summer through fall of 1984 to determine fall home ranges, habitat use, denning areas, and denning dates. Unfortunately, due to at least a 50% radio failure rate (Table 14) and inability to locate dens, these objectives were not fully accomplished. Average summer-through-fall home ranges for 7 bears that were relocated through September were 91.2 mi^2 (Table 14). Because the locations of the few dens that were found extended home ranges, it is likely that the actual average home range size for the summer-to-denning period was larger. Male bears maintained an average home range of 127 ± 10.7 mi^2 while the average female home range was 64 ± 28.8 mi^2. Centers of activity shifted inland appreciably in July when bears moved onto interior Delta salmon streams (Figure 4). This shift was reflected in habitat selection with over 87% of the late summer and fall relocations occurring in inland tall-shrub or forest habitats (Table 15) as compared with 24% in the same habitats during May-June (Campbell, unpubl. data).

Dens of 2 marked bears, an adult male and an adult breeding female, and of 3 unmarked bears, were located during the winter of 1984-85. Elevation of these dens ranged from 600 to 2,400 feet. Based on the location of dens, late fall bear observations, spring bear observations, and sign, at least 2 areas in the foothills of the Chugach Mountains are important denning areas for brown bears. These are the upper Ibeck Creek-Scott Glacier area and the Sheridan Glacier-Sherman Glacier-McKinley Peak area. The 2 marked bears entered dens sometime after 11 November 1984. Signs of activity were observed at the adult male's den on 18 April and signs of activity or bears were observed at all 6 den sites by 6 May 1985.

Brown bears moved onto the Delta in mid-May in 1985, about 2 weeks later than in 1984. Eight animals, 4 males and 4 females, were captured and marked between 20-23 May 1985 (Table 16). Two of these were immature bears that had dropped breakaway collars

Table 14. Sex, age, breeding condition, seasonal home ranges, and status of radio-collared brown bears on the Copper River Delta, 1984.

Bear	Sex	Age	Reproductive condition	May-June area (mi^2)	Summer-fall area (mi^2)	Date of last relocation	Current status
013	F	10.5	Breeding	50.3	103.6[a]	8/15/84	Transmitter failure, observed with 3 cubs-of-the-year on CRD 7/18/85.
017	M	12.5	Breeding	121.6	139.2	11/9/84	Unknown, suspected transmitter failure, possible obs. 10/17/85.
040	F	15+	Breeding	39.2	39.2	9/21/84	Transmitter failure, observed on CRD 8/29/85.
091	F	2.5	Inactive	84.8	105.6	11/9/84	Unknown, breakaway collar dropped fall 1984.
102	F	12.5	With unk age cub until Aug, breeding	24.2	58.8	10/23/84	Transmitter failure, observed on CRD 7/25/85 with cub-of-the-year.
104	M	6.5	Breeding	53.8	118.5	Relocated all winter, den located.	Shot 5/12/85.
105	F	5.5	Lost yrlg cub, breeding	37.5	53.0	Relocated all winter, den located.	Unknown, suspected transmitter failure 9/85.
106	M	2.5	Inactive	92.2	124.4	11/9/85	Alive, transmitter functioning.
108	F	3.5	Inactive	57.8	57.8[a]	8/15/85	Recaptured 1985, transmitter functioning.
$\bar{x}$				62.4±31.1	91.2±39.9		

[a] Not used to compute average home ranges, data incomplete due to early disappearance from study area in 1984.

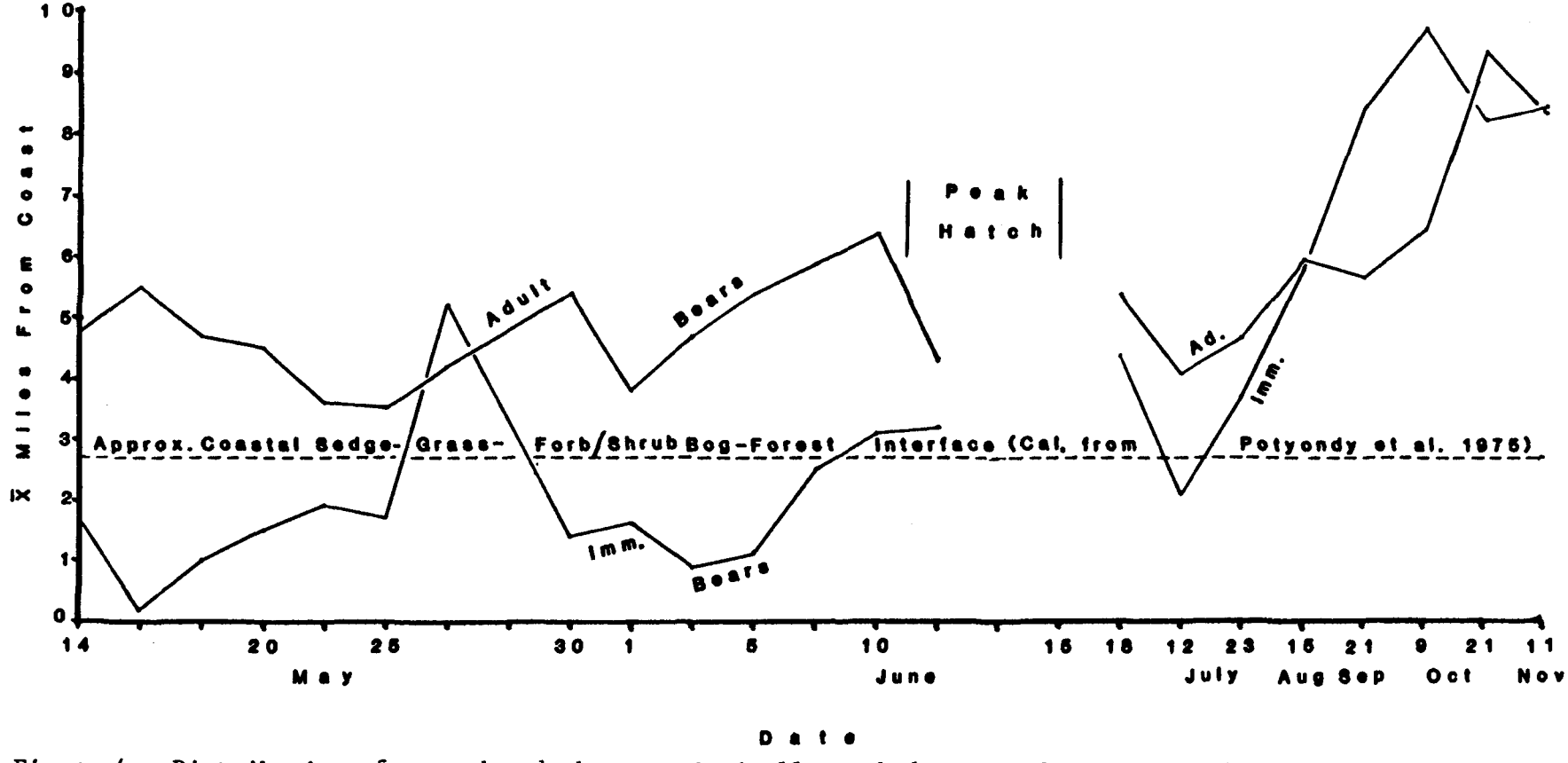

Figure 4. Distribution of tagged and characteristically marked untagged bears in relation to the coast and general habitat types on the west Copper River Delta, 14 May-11 Nov. 1984 (Campbell 1985).

Table 15. Distribution of brown bear relocations, by habitat type, on the West Copper River Delta, July-November 1984.

Age class	No. relocations	Habitat Type						
		Coastal sedge meadow %	Coastal alder/willow %	Inland alder/willow %	Lowland spruce forest %	Upland spruce forest %	Montaine meadow %	Other %
All	54	7.4	1.9	48.1	7.4	31.5	1.9	1.9
Adults	35	5.7	0	57.1	2.9	28.6	2.9	2.9
Immatures	19	10.5	5.3	31.6	15.8	36.8	0	0

Table 16. Association, sex, age, and current status (as of 1 September 1985) of brown bears captured on the West Copper River Delta during 1985.

Date	Bear no.	Sex	Age	Association at capture	Status
20 May	010	F	7.5	2 yearling cubs	Adult tagged.
	108	F	4.5	none	Retagged, original breakaway collar missing.
21 May	011	F	10.5	2 yearling cubs	Adult tagged.
	020	M	5.5	none	Tagged.
	106	M	3.5	none	Retagged, original breakaway collar missing.
22 May	014	F	10.5	2 yearling cubs	Adult tagged.
23 May	015	M	1.5	sibling	Separated from No. 014 on 5/22, tagged to determine fate.
	016	M	5.5	none	Tagged.

during the previous winter and one was a yearling cub. The yearling cub and sibling were separated from the adult during her capture and remained separated by 5-7 miles for 48 hours. The larger (male) cub was captured and outfitted with a breakaway collar to determine the fate of the apparently deserted cubs. Within 48 hours of their capture the cubs had rejoined the female.

May-June 1985 Investigations

Based on the number of radio-collared bears, distinguishable untagged bears, and offspring, a minimum of 33 brown bears were active on the west Copper River Delta during the May-June goose nesting period. Of these, 40% were 1.5-or-less years old and an additional 15% either appeared, or were known to be, immature (4.5-or-less years old).

Radio-tagged animals were relocated a total of 231 times between 22 May-7 July when geese were nesting. Each bear was relocated an average of 26 times. Home ranges averaged 51 ± 33.8 mi^2 (Table 17) compared with 59 mi^2 during the same period in 1984 (Table 14). Average home range for age classes and reproductive status were adult males: 95 ± 49.0 mi^2, all adult females: 32 ± 15.7 mi^2, females with cubs: 27 ± 16.3 mi^2, and immature bears 58 ± 7.1 mi^2.

A zonation of bear activity by age class and reproductive condition, similar to that in 1984 (Campbell, unpubl. data) was observed on the Delta during the period when geese were nesting. The average distance from the coast, for all relocations of immature and female bears with cubs, was 1.9 miles compared with 4.6 miles for adult males and breeding females. Zonation of activity was also reflected in habitat use (Table 18). Fifty-nine percent of the relocations of immature bears and females with cubs were in coastal sedge marshes (29%) or alder/willow thickets (30%), while over half (54%) of the relocations for breeding bears were in inland alder/willow thickets.

Nest predation was high in 1985 (Table 10). While data analysis is not yet complete, a major portion of the 81% nest loss is attributed to brown bears. Since 91% of the 120 bear relocations in or near major goose nesting areas were of either immature animals or sows with cubs, a relationship between high nest predation and the activities of immature or female bears with cubs is probable.

1986 Work Plan

Radio-collared brown bears will be relocated twice per month until they have denned to determine late summer and fall home ranges, habitat use, denning time, and location of den sites. If necessary, a late winter search for dens will be conducted to

Table 17. Home range of radio-tagged brown bears on the West Copper River Delta, 22 May-7 July 1985.

Bear	Sex	Age	Reproductive condition	Number of relocations	Area (mi^2)
010	F	7.5	With 2 yearling cubs	26	24.4
011	F	10.5	With 2 yearling cubs	26	11.6
014	F	10.5	With 2 yearling cubs	25	44.0 (60.0)[a]
015	M	1.5	Cub of No. 014	25	41.2 (60.0)[a]
016	M	5.5	Breeding	25	60.4
020	M	5.5	Breeding	25	129.7
105	F	6.5	Estrus	27	32.6
106	M	3.5	Inactive	26	63.3 (286.8)[a]
108	F	4.5	Estrus (?)	26	53.3
$\bar{x}$					51.2±33.8

[a] Area in parentheses are home ranges including major waterbodies such as Prince William Sound and Gulf of Alaska.

Table 18. Distribution of radio-collared brown bear relocations, by habitat type, on the West Copper River during May-June 1985.

Age or breeding class	Number of relocations	Coastal delta			Inland delta				Upland		
		Sedge meadow %	Alder/ willow %	Low-shrub %	Shrub bog %	Alder/ meadow %	Low-shrub %	Spruce forest %	Spruce forest %	Alder/ willow %	Mountaine meadow %
All bears	257	19.1	20.6	4.7	4.7	26.1	2.3	6.6	13.2	2.3	0.4
Bears active on Delta[a]	228	21.1	21.9	5.3	5.3	29.4	2.6	7.5	5.3	1.8	0
Males	113	19.5	27.4	3.5	5.3	33.6	2.7	5.3	2.7	0	0
Adult males	56	10.7	12.5	1.8	5.4	53.6	1.8	8.9	5.4	0	0
Females[a]	117	22.2	16.2	6.8	6.8	24.8	2.6	9.4	7.7	3.4	0
Females[a] with cubs	58	37.9	29.3	6.9	6.9	17.2	0	1.7	0	0	0
Immature bears	85	22.4	30.6	8.2	3.5	12.9	2.4	4.7	10.6	4.7	0

[a] Excluding a female with 2 yearling cubs that spent over 90% of her time to the west of the Delta on the Heney Mtn. range and Point Whiteshed.

locate dens not located during the fall through early winter of 1985. Denned bears will be checked periodically during April-May in 1986 to determine approximate emergence dates. Once bears become active, additional animals will be tagged, with emphasis on 2½-year-olds accompanying marked sows. Radio-tracking will be intensified when geese begin to nest. At that time data pertinent to seasonal home range, habitat selectivity, and nest predation will be collected. After the peak of goose nesting, radio tracking will occur twice per month to determine bear activity on the Delta during the remainder of their annual activity cycle.

SPRING GOOSE MIGRATION IN COOK INLET

Since 1982, there has been a concerted effort to document the magnitude and timing of spring goose migrations through Cook Inlet and to assess the importance of the area's coastal marshes to staging geese (Campbell and Rothe 1985; Campbell, unpubl. data; Timm, unpubl. data; Petersen and Handel, unpubl. data; Handel and Gill, unpubl. data). In 1985, coordinated surveys were conducted at 4 field sites and 5 aerial surveys were flown by U. S. Fish and Wildlife Service (USFWS) personnel, 18 April-22 May (Butler and Gill, unpubl. data). Alaska Department of Fish and Game crews were located at west Susitna Flats (28 April-10 May) and Redoubt Bay between the Kustatan and Big Rivers (30 April-10 May). The USFWS crews were at Trading Bay and Redoubt Bay (between Big and Drift Rivers, 25 April-10 May) (Loranger and Eldridge, unpubl. data). The major objectives were to document numbers and subspecies composition of staging geese; to record habitat use patterns; observe major movements into and out of staging areas; and read as many neck-collar codes as possible on cackling Canada geese (Branta canadensis minima).

Snow-melt and spring phenology was over 2 weeks late in comparison with 1980-84; especially in Redoubt Bay where snow cover persisted beyond 22 May. The lack of open coastal habitats contributed to a dramatic concentration of over 44,000 geese, mostly large Canadas, on sheltered agricultural fields and adjacent tide flats in the Matanuska Valley during the last 2 weeks of April. All areas west of the Susitna River, where most goose staging has occurred in the past, remained about 90 percent snow-covered through nearly all of the migration period. From 25 April-5 May available habitat was very limited, consisting of tide flats, river mouths, and narrow zones along the berms of sloughs and rivers. High tides (30.9-33.2 feet) driven by southwest winds cleared zones along the shore of Cook Inlet and opened a large portion of the east Susitna Flats on 6 and 7 May. Consequently, most habitat use by staging geese was confined to the outer Puccinellia-Triglochin plant community. Field observations indicate that lesser Canada geese (B. c. parvipes) and tule white-fronts (Anser albifrons gambelli) followed the snowline inland farther than other geese.

Canada geese accumulated rapidly in upper Cook Inlet during the 3rd week of April and peaked at 70,516 as determined from a 25 April aerial survey (Butler and Gill, unpubl. data). These early birds were predominately B. c. parvipes, although B. c. taverneri and a few cacklers were observed. On 29 April, a major southwesterly movement of over 12,500 Canada geese, including 366 cacklers, was recorded passing the western edge of Susitna Flats from the direction of the Susitna River mouth.

Cacklers were first recorded on the ground by field crews at Susitna (100+) and Redoubt (100) on 30 April and were seen arriving from the southeast (Turnagain Arm) at high altitude on 3 May. The number of cacklers on the west side of Cook Inlet peaked on 5 May at west Susitna Flats (1,500) and on 6 May at Redoubt Bay (800). The 1st movements out of Cook Inlet were observed on 4 May when 300 dark geese and over 1,000 pintails went through Lake Clark Pass. Cacklers were seen leaving through the pass on 5 May (300-400) and 6 May (230) in front of a major weather system. By 9 May, a few cacklers were still arriving, but area estimates were: less than 500 at Susitna, 650 at Trading Bay, and about 1,300 at Redoubt Bay. Cackler departures from Redoubt Bay were noted on 10 May when crews left field sites.

Over the study period, 73 individual cacklers were identified from yellow neck collars: Susitna, 42; Redoubt Bay, 31; and Trading Bay, 0. None of the cacklers identified at any of the sites were recorded elsewhere (Susitna, 42; Kustatan River, 14; Big River, 10; Montana Bill Creek, 9) indicating there was little lateral mixing of cacklers along the coast. In addition, turnover rates on study sites appeared high; 74 percent of the collars were read only once. Eleven birds were seen twice, 5 were seen over 3-day periods, and one each was seen over 4-, 5-, and 7-day periods.

These observations indicate that, in 1985, cacklers arrived on a broad front from the east, spent little time staging in Cook Inlet and departed through several passes in the Alaska Range. Birds identified only at Susitna could have departed, undetected, through Merrill Pass between the Susitna and Trading Bay study sites. From over 13,000 observations of cacklers, ratios of collared:uncollared birds were: Susitna 1:68, Big River (north Redoubt) 1:105, and Montana Bill Creek (central Redoubt) 1:140. These observed collar ratios indicate that approximately 7,500 cacklers occurred in the Susitna and Redoubt study areas.

Aerial surveys were especially useful in documenting the number and distribution of white-fronted and snow geese (Butler and Gill, unpubl. data). Snow geese accumulated on the Kenai and Kasilof Flats from mid-April to a peak of 15,350 on 26 April. Snows increased steadily on west Cook Inlet areas through

29 April when net movement across Susitna Flats was southwesterly. On 1 May, a net movement to the northeast was recorded and snow geese accumulated rapidly on Susitna Flats. A concurrent build-up at Redoubt Bay reached 11,800 on 3 May and peaked about 6 May. Snows diminished on west Susitna Flats after 5 May and apparently moved east of the Susitna River where a peak of 20,800 was recorded on 9 May. Peak numbers of snow geese in Cook Inlet were tallied on aerial surveys 2-3 May (34,000) and 9-10 May (32,100) indicating that major departures occurred after the ground crews left field sites.

As in past years, observations of white-fronted geese were insufficient to detect major migration patterns. White-front chronology generally resembled that of other geese and a peak of about 1,900 was recorded on the 2-3 May survey, mostly at Trading and Redoubt Bays. An unknown but considerable portion of these birds could have been tule white-fronts that breed locally in these areas. Black brant also were seen at Redoubt Bay from 1-10 May, the largest group being about 100 birds at the mouth of the Kustatan River.

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