# ALASKA DEPARTMENT OF FISH AND GAME

## JUNEAU, ALASKA

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## REPORT OF SURVEY AND INVENTORY

## ACTIVITIES-WATERFOWL

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Volume IX Project Progress Report Federal Aid in Wildlife Restoration Project W-17-10, Job No. 10.0

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(Printed November 1978)

### STATEWIDE WATERFOWL SEASONS

1977-78

Area	NOR	THERN	GULF	COAST	SOUT	THEAST	ALEU	JTIANS	ко	DIAK
State Game	11	-13 &	5-7,9,	14-16 &			10	except		
Management Units	17	-26	Unima	k Island	1	4	Unii	mak Isi.)	1527	8
	Se	pt. 1 -	Se	pt. 1 -	Sep	t. 1 -	00	et. 8 -	Sep	t. 10 - Oct. 9
Open Seasons	De	ec. 16	De	ec. 16	Dec	. 16	Ja	n. 22	8 N	lov. 5 - Jan. 20
	BAG	POSS.	BAG	POSS.	BAG	POSS.	BAG	POSS.	BAG	POSS.
Ducks	10	30	8	24	7	21	7	21 ·	7	21
Sea Ducks* &										
Mergansers	15	30	15	30	15	30	15	30	15	30
Geese * *	6	12	6	12	6	12***	6	12****	6	12
Emperor Geese	6	12	6	12	. 6	12	6	12	6	12
Brant	4	8	4	8	4	8	4	8	4	8
Snipe	8	16	8	16	8	16	. 8	16	8	16
Crane	2	4	2	4	2	4	2	4	2	4

\* Sea Ducks: Eiders, Scoters, Old Squaw, Harlequin.

\*\* No more than 4 daily, 8 in possession may be Canada and/or white-fronted geese.

••• ovided that Unit 1C is closed to the taking of snow geese.

\*\*\*\* The taking of Canada geese in the Aleutian Islands, except on Unimak, is illegal. (To protect the Aleutian Canada goose.)

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#### WATERFOWL HARVEST AND HUNTER ACTIVITY

A marked change occurred this year in the method used to determine waterfowl harvest and hunter activity in Alaska. Since 1971 A.D.F.&G. conducted a mail survey of about 10 percent of all residents licensed to hunt (Timm 1972). Although judged to be the most accurate assessment of hunter activity and harvest available, in some respects our survey was a duplication of the U.S.F.W.S. mail surveys.

In 1976 we contacted S.M. Carney, Chief, Section of Mail Surveys for the U.S.F.W.S. After lengthy discussions, Carney agreed to modify the Federal survey and make it suitable for State needs. He agreed to: (1) change the harvest location codes for duck wings and goose tails so places of harvest could be more accurately determined; (2) continue to increase their sample of Alaskan hunters in the mail questionnaire and parts collection surveys; and (3) provide us with data printouts annually.

In 1977 I recoded all towns in Alaska where duck stamps are sold and harvest locations by region and specific location (Table 1). Previously, the U.S.F.W.S assigned birds harvested to large geographic regions. I also attended the wing bee in February 1978 to assist with the coding for Alaska. The State was divided into 11 harvest areas (Fig. 1) to facilitate data analysis and interpretation. These are the same regions used for data analysis of previous State mail surveys.

01d	New	ADFG Region (R)	Original FWS	Harvest
Code	Code	and Place Names	"County" Name	Zone
0001_	0000	Unknown	Unknown	_Unknown
0011	0101	North Slope (R)	Arctic Slope	NW
0031_	_ <u>0301</u>	<u>Seward Peninsula (R)</u>	<u>Seward Peninsula</u>	· ···· ····
0051	0502	Yukon Valley (R)	Upper Yukon-Kuskokwim	Central
0051	0512	Yukon Flats	11	**
0071	0702	Central (R)	Fairbanks-Minto	**
0071	0712	Minto Flats	**	11
0071	0722	Eielson AFB	11	11
0071	0732	Salchaket Slough	11	
0071	0742	Healy Lake	**	11
0071	0752	Delta Area	11	**
0071_	0762	Tok-Northway		11
<u>0091</u>	0901	Yukon Delta (R)	<u>Yukon-Kuskokwim Delta</u>	<u>NW</u>
0111	1103	Cook Inlet (R)	Anchorage-Kenai	SE
0111	1113	Susitna Flats	**	••
0111	1123	Palmer-Hay Flats	11	**
0111	1133	Goose Bay	11 .	
0111	1143	Potter Marsh	"	11
0111	1153	Chickaloon Flats	11	**
0111	1163	Portage	"	•1
0111	1173	Trading Bay	11	**
0111	1183	Redoubt Bay	11	11
0111	1193	Kachemak Bay	**	*1
0131	1303	Gulf Coast (R)	Cordova-Copper River	11
0131	1313	Copper River Delta	**	11
0131	1323	Yakutat Area	11	11
0131	1333	Prince William Sound	11	• •
0151	1503	Southeast Coast (R)	J <b>uneau-</b> Sitka	11
0151	1513	Chilkat River	11	71
0151	1523	Blind Slough	*1	**
0151	1533	Rocky Pass	11	* *
0151	1543	Duncan Canal	**	,,
0151	1553	St. James Bay	11	**
0151	1563	Mendenhall Wetlands	**	11
0151	1573	Farragut Bay	11	81
0151	1583	Stikine River Delta	11	11
0171	-1704	$\frac{1}{Kodiak} (R)$	Kodiak Island	SW
0171	1714	Kalsin Bay	**	11
0191	1904	AK Peninsula (R)	Cold Bay-AK Peninsula	**
0191	1914	Cold Bay	11	11
0191	1924	Pilot Point	11	
0191	1934	Port Moller	11	11
0191	1944	Port Heiden	**	**
0211	2104	Aleutian Chain (R)	Aleutians-Pribilofs	11

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



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### Results

### Hunter Activity

There were 19,222 duck stamps sold in Alaska. After corrections were made for people buying two stamps, there were a projected 18,889 potential hunters in Alaska. During the 1977-78 season 13,222 people (70.0 percent) hunted waterfowl 1 or more days, and hunted a total of 82,571 hunter days. Table 2 summarizes these data. The U.S.F.W.S. survey does not allow for a breakdown of hunting effort by harvest area.

### Duck Harvest

Magnitude of the Harvest (Table 2)

Hunters reported taking an average of 7.9 ducks each during the season, after corrections for reporting bias were made. Reported daily success was 1.3 ducks per day.

The projected statewide duck harvest was 104,639 birds. Game ducks represented 98.5 percent (103,069) of the bag and sea ducks and mergansers comprised 1.5 percent (1,570).

### Species Composition of Harvest (Table 3)

As in previous years, mallards, pintails, green-winged teal and wigeons comprised the bulk of the harvest (81.5 percent). Dabblers made up 88.2 percent of the total kill and divers and sea ducks-mergansers comprised 10.3 percent and 1.5 percent, respectively. Mallards comprised a significantly larger portion of the harvest in Southeast Alaska, while pintails were more prevalent on the Yukon-Kuskokwim Delta and Alaska Peninsula. Relatively uncommon ducks (redhead, ringneck, blue-winged teal) occurred in widely scattered locations.

### Location of Harvest (Table 4)

According to the Federal mail survey, about 50 percent of the harvest occurred in the Cook Inlet area while no ducks were killed on the North Slope, Seward Peninsula and in the Yukon Valley. These abberant data are the result of a lack of hunters sampled from these areas. For comparative purposes the 1974-76 3-year average distribution of harvest data, as obtained from State mail surveys, are also presented in Table 4. These data portray a more accurate picture of the duck harvest by harvest area and specific location than does the U.S.F.W.S. survey.

### Time of Harvest (Tables 5 and 5a)

Although the Federal survey does not provide some kinds of data obtained from the State survey, it did provide other kinds of information unobtainable by methods employed by A.D.F.&G. in the past. The determination of duck harvest by time period is one example.

On envelopes hunters receive from the U.S.F.W.S. for wings and goose tails, a question about date and time of kill is asked. The

Table 2. Summary of waterfowl hunter success and activity, 1977-78 season (Carney et al. 1978).  $\frac{1}{2}$ 

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Number	of duck stamps sold	19,222 (18,889 potential hunters)
Number	of mail questionnaries	1,192
Number	of duck wings received	1,647
Number	of goose tails received	222
Number	of active hunters	13,222 (70.0 percent)

Calculated statewide harvests:

Ducks:	Ducks: Game 103,069; Sea ducks and mergansers $1,570$ ; Total $104,639$					
Geese:	Canada <u>11,309;</u> Emperor <u>2,198</u> ; Brant <u>2,041</u> Snow <u>628</u> ; Total <u>17,433</u>	L; White-fronted 1,257				
Ducks p	Ducks per active hunter 7.9					
Cranes:	:: <u>619</u> (Sorensen 1978)					
Calculated h	hunter days <u>82,571</u>					
Days pe	per active hunter <u>6.2</u>					

 $\underline{1}$ / For hunters 16 years of age and older

Table 3. Species composition of the duck harvest, 1977-78 waterfowl season.

		Percent	of Total	Harvest	by Area			
		Y-K	Cook	Gulf			Ak.	% of Total
Species	Central	Delta	Inlet	Coast	Southeast	Kodiak	Pen.	Statewide
Mallard	28 1	8 ģ	25 9	34 6	47 8	28 0	25.2	20 7
Pintail	20.1	65 2	23.7	12 5	12 5	10 5	46 2	29.7
C-w Tool	13 0	6.3	11 9	12.5	12.J 25.0	21 5	10.5	20.0
Uigoon	14.2	4.5	12 1	13.4	23.0	51.5	10.5	14.9
Showeler	14.5	4.5	13.1	7.7	2.2	2.3	3.3	10.4
Coducili	5.9	12.0	0.0	2.9	5.4	1.0	2.1	2.2
	<u> </u>	-	0.0	-	-	7.0	2.0	0.8
B-W Teal	0.4		0.4		2.2		-	0.0
Total Dabbler	80.9	95.7	89.7	73.1	93.1	84.1	90.3	88.2
Lesser Scaup	8.7	_	0.8	2 9	0.4	1.8		1 9
Barrow's G F	-	_	1.8	2.)	3.0	-	_	1 7
Common C F	0 9	_	1.0	2.9	0.6	1 9		2.4
Creator Secur	6.2	- / 2	4.0	3.0	1 2	1.0		2.4
Pufflohood	4.5	4.5	1.9	1.9	1.5	1.0	2.0	1.7
Courseal as la	2.2	-	1.0	0./	0.4	3.5	-	1.0
Canvaspack	0.9	-	0.1	-	0.9		_	0.3
Ringneck	0.4	-	0.4	1.0	-	-	-	0.3
Kedhead	_		0.5	_	-			0.2
Total Diver	17.4	4.3	10.3	24.0	6.4	8.9	2.8	10.3
Old Squaw	1.7			_			1.4	0.4
Harlequin	-	_	_	_	0.4	3.5	2.8	0.4
W W. Scoter	-	-	-	2.9	-	1.8	1 4	0.4
Steller's Fider		_	_	-	_	-	1 4	0 1
Common Eider	_	-	_	_	-	1.8	±•7	0 1
Am. Merganser	-		0.1	-	-	-	-	0.1
Total Sea Ducks & Mergansers	1.7		0.1	2.9	0.4	7.1	7.0	1.5
Sample Size	231	23	794	104	232	57	143	1,647 <sup>1/</sup>

1/ Includes birds harvested in unknown locations.

Percent of				Perc	ent of
	Statewi	ide Harvest		Statewi	de Harvest
Harvest Area	ADFG	USFWS	Specific Location	ADFG	USFWS
North Slope	0.2	0	Susitna Flats	10.6	13.3
Seward Pen.	1.4	0	Minto Flats	7.3	4.2
Yukon Valley	2.5	0	Palmer Hay Flats	7.3	10.9
Central	18.0	14.6	Copper River Delta	5.6	2.8
Yukon Delta	1.4	1.5	Mendenhall	4.1	4.2
Cook Inlet	39.2	50.1	Stikine River Delta	3.6	8.0
Gulf Coast	8.4	6.6	Kachemak Bay	2.6	0.4
Southeast	20.6	14.6	Redoubt Bay	2.5	1.0
Kodiak	2.7	3.6	Trading Bay	2.1	2.5
Alaska Pen.	5.1	9.0	Portage Flats	2.1	0.9
Aleutian Chain	0.5	0	Pilot Point	1.8	1.0
	100.0	100.0	Chickaloon Flats	1.3	0.1
			Potter Marsh	1.2	0.5
			Duncan Canal	1.1	0
			Eagle River Flats		1/
			(Cook Inlet)	1.1	$0^{\pm \prime}$
			Kal <b>si</b> n Bay	1.1	0
			Yakutat Area	1.0	1.3
			Roc <b>k</b> y P <b>ass</b>	0.9	0
			Blind Slough	, 0.9	0.5
			Cold Bay Area	0.8	4.6
			Eielson AFB	0.8	2.6
			Salchaket Slough	0.6	0
			Healy Lake	0.5	0
			Goose Bay	0.4	1.5
			Farragut Bay	0.4	0
			St. James Bay	0.4	0
			Chilkat River	0.2	0
			Delta Area	TR	1.6
			Tok-Northway Area	TR	4.3
	÷		Prince William Sound	0	2.4
				62.3	68.6

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Table 4. A comparison between reported duck harvest from the 1977-78 USFWS parts collection survey and the ADFG mail survey, 1974-76 three year average.

1/ Eagle River Flats was closed to hunting in 1977-78.

	Percent o	f Total Duck	Harvest by Ti	me Period
Harvest Area	9/1-10	9/11-20	9/21-30	10/1-on
Central	60.5	14.9	12.6	12.1
Y-K Delta	60.9	21.7	13.0	4.4
Cook Inlet	50.7	5.8	13.3	30.2
Gulf Coast	15.4	19.2	1.9	63.5
Southeast	17.0	6.1,	15.6	61.3
Kodiak	_	57.1 <u>1</u> /	-	42.9 <u>1</u> /
Ak. Peninsula	23.1	6.3	6.3	64.3

Table 5. Distribution of total duck harvest by time period in seven harvest areas in Alaska, 1977-78 season.

1/ Harvest periods were 9/10-10/9 and 11/5-1/20/78.

Table 5a. Distribution of mallard and pintail harvest by time period in seven harvest areas in Alaska, 1977-78 season.

	]	Percent of Mallard and Pintail Harvest By Time Period						
	9/1·	-10	9/11	-20	9/2	1-30	10/1	-on
Harvest Area	Mall.	Pint.	Ma11.	Pint.	Ma11.	Pint.	Ma11.	Pint.
Central	46.8	54.5	17.7	25.0	17.7	15.9	17.7	4.5
Y-K Delta	-	66.7	_	13.3		13.3	_	6.7
Cook Inlet	51.3	46.3	10.9	5.7	3.6	17.2	34.2	30.8
Gulf Coast	25.0		19.4	-	-	_	55.6	_
Southeast	6.4	44.8	2.8,	13.81/	9.2	17.2	81.6, /	24.1,
Kodiak	-	-	26.7 <u>1</u> /	$16.7^{\pm 1}$	_	_	$73.3^{\pm/}$	83.3-1/
Ak. Peninsula	2.8	37.9	· · ·	12.1	2.8	12.1	94.4	37.9

1/ Harvest periods were 9/10-10/9 and 11/5-1/20/78

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results of these data, summarized by four time periods, are presented in Tables 5 and 5a. It would be possible to break down these data further by specific location, in areas where significant harvest occurred (eg. Susitna, Stikine River Delta and Minto).

Data in Tables 5 and 5a are biased for some harvest areas because relatively few hunters turned in large numbers of duck wings. However, for the Cook Inlet, Central, Gulf Coast and Southeast harvest areas, this bias did not occur to a significant degree.

### Goose Harvest

In Table 2 a breakdown by species of the 1977-78 statewide goose harvest of 17,433 birds is provided. Although data for goose harvest by location were obtained, they were not available from the U.S.F.W.S. at the time of the report. Those data will be provided next year.

### Crane Harvest

A harvest of 619 cranes by 328 hunters was calculated by Sorensen (1978) for the 1977-78 season in Alaska. Information on crane harvest by area was not obtained from the U.S.F.W.S. survey, but it was obtained from past A.D.F.&G. mail surveys.

### Discussion

The elimination of the State survey and redesign and use of U.S.F.W.S. surveys to obtain waterfowl harvests and hunter activity were accomplished with the knowledge that some data could no longer be obtained. For example, harvest information for ducks and geese and hunter activity in specific locations or even by harvest area can not be assessed accurately with the U.S.F.W.S. surveys. However, information on the duck species composition of the harvest and harvest by time period are obtained from the Federal surveys. Because the U.S.F.W.S. has been increasing (and will continue to increase) their sampling base in Alaska, they now sample more hunters than were contacted by the State mail survey.

In Table 6, comparisons are made between State and Federal surveys for the 3-year period 1974-77. These three years were selected because during this period the U.S.F.W.S. significantly increased their sampling base in Alaska and results were likely to be most comparable to those for future years. The U.S.F.W.S. does not correct for a hunter days reporting bias, but A.D.F. & G. used an 8.0 percent reduction factor. When the 64,390 average hunter days (U.S.F.W.S.) are reduced by 8.0 percent, their estimate of 59,240 average days hunted per year is comparable to the State estimate of 59,165 days per year.

A.D.F.&G. estimates of average duck kill per active hunter and total duck harvest have consistently been greater than U.S.F.W.S. estimates, except for the 1976-77 season. Although the exact reasons for this are unknown, Federal estimates in recent years have been closer to ours, likely as a result of a increased sample of Alaskan hunters in the Federal survey.

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Table 6.	A comparison between ADF&G and USFWS waterfowl hunter such	cess an	d
	harvest estimates in Alaska, 1974-76 three-year average.		

	ADFG	USFWS
Percent active hunters	67.9	69.7
Number of active hunters	11,095	11,445
Days per active hunter	5.3	5,6 <sup>1/</sup>
Total hunter days	59,165	64,390 <sup>1</sup> /
Duck bag per active hunter	7.8	6.6
Total duck harvest	87,225	76,855
Goose bag per active hunter	1.4	1.2
Total goose harvest <sup>2/</sup>	15,465	14,284

Goose harvest by species: 2/

Canada	10,030	9,150
Emperor	2,515	2,120
Whitefronted	1,310	952
Black Brant	850	1,240
Snow	760	822
Snow	760	

 $\underline{1}$  The USFWS did not correct hunter days for reporting bias, ADFG did (see text).

2/ The USFWS corrected for reporting bias, ADFG did not.

Federal estimates of total goose harvest have consistently been lower than ours except for the 1976-77 season. Also, their estimates of emperor goose, brant and snow goose kill have been significantly below State estimates. S.M. Carney (pers. comm.) believes that the State's mail survey provided the best estimate of goose harvest by species. Apparently the Federal survey is becoming more accurate in estimating goose harvest as the sample of hunters increases.

We believe that the Federal waterfowl harvest survey in Alaska is adequate to meet State needs. However, the State must continue to work with the U.S.F.W.S. in administering their program and we must also urge them to maintain adequate sampling intensity. Although the cost of the State survey wasn't great (about \$3,000 plus salaries), the time necessary to administer it was significant. When a need arises for more precise harvest location data, the averages from past years (Table 4) can be used in conjunction with current duck harvest data. Data for geese, similiar to those for ducks in Table 4, can be found in past Waterfowl S&I Reports.

### DUSKY CANADA GOOSE STUDIES

### Production, Fall Flight and 1977 Breeding Population

Determining the size of the breeding population of Dusky Canada geese is becoming more difficult. Increasing numbers of lesser Canadas (*B. parvipes* and *taverneri*) in the Willamette Valley (Jarvis 1978) complicate the inventory of duskys in January. Also, the 1978 mid-winter inventory of 31,000 Canada geese in the Willamette Valley was, for unknown reasons, perhaps 50.0 percent low. The proportion of duskys in the wintering population is now about 42.5 percent (Jarvis 1978); only 5 years ago it was over 90.0 percent. The 1977 breeding population estimate of 21,650 dusky geese was derived by taking an average of the predicted population of 20,200 geese and the 23,100 geese that Jarvis (1977) calculated on the wintering grounds. Table 7 summarizes population data since 1971.

Production in 1977 was excellent. Snow and ice were nearly gone when the birds arrived on the Copper River Delta and nest initiation began shortly after arrival (R.G. Bromley, pers. comm.). Bromley reported a large average clutch size (5.4), nesting by several two-year old birds, and a significant amount of renesting by older known-age birds.

On May 15, 1978 Dan Timm and Bob Bromley flew a survey on the Delta over predetermined flight lines, at 100'-125' elevation. Geese were counted within 220 yards of both sides of the aircraft. Prior to the flight the west side of the Delta was stratified on a 1 inch: 1 mile map, according to high, moderate and low goose densities. The area and the percent sampled for each stratum were: high density--33.96 mi.<sup>2</sup>, 34.1 percent sample; moderate--47.36 mi.<sup>2</sup>, 24.5 percent sample; and low--53.02 mi.<sup>2</sup>, 14.4 percent sample.

Table 7. Summary of population data for dusky Canada geese, 1971-78.

Year	Mid- winter	Breeding Pop.2	<u>% Yg.</u>	% Non- Prod. Ad. <u>3</u> /	No. Yg. Produced	Fall Flight	<u>Harvest<sup>4</sup></u>
1971	20,850	20,065	16.2	79.8	3,880	23,945	5,995
19 <b>72</b>	17,950	17,275	10.6	71.7	2,050	19,325	3,450
1973	15,875,	15,280	36.0	64.6	8,595	23,875	4,875
1974	$19,000^{1/2}$	18,290	51.4	35.7	19,345	37,635	12,070
1975	26,550,	25,565	17.9	84.5	5,575	31,140	9,010
1976	$22,725^{1/}$	21,870	24.2	54.2	6,890	28,850	6,350,
1977	22,500,	21,650,	44.3	56.9	17,225	38,875	15,100 <sup>5/</sup>
1978	23,775 <u>-</u> 7	23,000 <u>5</u> /			·	-	

## From Aerial Surveys

 $\frac{1}{2}$  Calculated from breeding grounds survey.  $\frac{1}{2}$  Mid-winter less 0.0375 mortality (Chapman et al. 1969).

3/ Percent adults in flocks having no young.
4/ Fall flight less mid-winter inventory.
5/ Preliminary estimates pending further analyses.

Within a few days after the aerial survey Bromley utilized a crew of YACC people to locate goose nests on about 2.9 square miles of habitat. Both high and moderate density areas were sampled. Nesting densities were also known for his study areas so the number of nests on over four  $4 \text{ mi.}^2$  of the Delta were known and could be used for air to ground comparisons.

A preliminary analysis of data indicates that as the number of geese present increases, the proportion of geese counted decreases. However, nest density data from past years must be analyzed and compared to previous aerial counts before final conclusions can be drawn regarding the reliability of this survey for calculating breeding populations.

### Banding and Recoveries

During summer 1977, 1,112 dusky geese were banded by personnel from A.D.F.& G., U.S.F.W.S, U.S.F.S. and the University of Alaska and Oregon State University. Large numbers of people (Y.A.C.C.) herded the birds into sloughs and then boats were employed to drive the geese into a trap.

The following number of geese banded in 1977 were recovered during the 1977-78 season (thru 6/16/78 IBM run):

	Leg Band	ed Only	Neck-Collared Birds			
	Adults	Young	Adults	Young		
Number banded	229	291	133	461		
Number recovered	15	40	7	69		
Percent recovered	6.6	13.7	5.3	15.0		

The following are first year recovery rates for dusky Canada geese banded since 1971:

	Leg Ban	ded	Neck Co	llared
Year	Locals A	dults	Locals	Adults
1971	15.5%	2.8%		
1972		7.7		
1973	10.0*	3.4	16.7%	7.1%
1974	17.1	7.6	16.0	4.1
1975	8.3	8.0	16.4	14.0
1976	13.8	9.2	12.4	13.0
1977	13.7	6.6	15.0	5.3

\* Small sample size

The recovery distribution of bands reported from birds shot or found dead during hunting seasons by state-province since 1973 is as follows (thru 6/16/78 IBM run):

	Oregon	Alaska	Washington	British Columbia
1973	68.1%	17.4	10.1	4.4
1974	67.8	11.5	14.4	6.3
1975	67.3	14.0	13.5	5.2
1976	65.5	10.0	13.3	11.2
1977	71.5	17.2	3.8	7.5

Recovery distribution data above indicate that in 1977, Alaska took a greater proportion of the harvest than at any time since 1973. However, band reporting rates by area are unknown. Canada goose harvest on the Copper River Delta has been increasing during the past five years, due primarily to increasing numbers of hunters. Harvest in Oregon, however, was apparently down from that of 1976-77 (Jarvis 1978). If this is the case, the kill in Washington and British Columbia must have been proportionately less than indicated by the recovery data.

### COOK INLET WATERFOWL SURVEYS

### Breeding Waterfowl Survey

As part of efforts to document waterfowl values on coastal marshes of Cook Inlet, especially in view of the recently created and proposed refuges, a breeding waterfowl survey was made on May 26, 1978. Areas surveyed in 1978 were: Goose Bay, Susitna Flats, Trading Bay and Redoubt Bay.

Spring chronology in the Cook Inlet area in 1977 was 10-14 days "early," and nesting conditions should have been excellent. However, from the third week of May through July the weather was cool and wet which adversely affected production to an unknown degree.

Coastal waterfowl habitat (sedge flats) was first encompassed by lines drawn on 1 inch: 1 mile maps (see Timm 1976). The land area within these lines was then determined using a planimeter. Transect lines were drawn on the maps in an attempt to sample representative habitat types in each area. Each transect was broken into four-mile segments which were individually numbered, and data were recorded by segment number.

Dan Timm and Dick Sellers (both ADF&G) conducted the surveys and the same survey techniques were used as are employed by the USFWS, except the pilot did no counting. Data were analyzed for each area and then expanded for a total of all areas. Visibility rates were applied for each species observed; rates were provided by Jim King, USFWS.

### Results

Total 1978 calculated duck breeding populations were: Palmer Hay Flats--2,293; Goose Bay--294; Susitna--6,108; Trading Bay--5,723; and Redoubt Bay--5,522. Dabblers (15,731) comprised 77.0 percent of the 20,390 ducks on all areas. Pintails, green-winged teals, mallards, shovelers and scaups comprised over 70.0 percent of the ducks present. Table 8 summarizes species composition and numbers of birds for the areas surveyed.

Table 9 presents the amount of habitat, sample size and duck densities for each area surveyed during the 4-year period 1975-1978. In 1978 the Palmer Hay Flats and Trading Bay had the greatest duck densities (53 birds/mi.<sup>2</sup>) and Redoubt Bay had the lowest (22 birds /mi.<sup>2</sup>). The average density of ducks on all coastal habitat surveyed in 1978 (542.9 mi.<sup>2</sup>) was 37.6 birds/mi.<sup>2</sup>.

### Discussion and Conclusions

The 1978 survey confirmed findings of 1975, 1976 and 1977: coastal marshes in Cook Inlet are much more important to breeding birds than surrounding habitats of similar size. King and Lensink (1971) estimated an average of 12.1 ducks were present per mi.<sup>2</sup> in Kenai-Susitna habitat and 26,700 total birds in 2,200 mi.<sup>2</sup> of habitat. The 1978 statewide breeding pairs survey (King and Conant 1978) indicated a population of 24,868 ducks in the 2,200 mi.<sup>2</sup> of habitat (11.3 ducks/mi.<sup>2</sup>). In 1978 our survey of coastal habitat indicated a population of over 20,000 birds on just 543 mi.<sup>2</sup> of habitat.

The 1978 survey indicated a substantial reduction in breeding ducks (Table 9). A comparison for comparable areas shows declines in 1978 of 51.3 percent and 54.0 percent from 1977 and 1976, respectively. The U.S.F.W.S. survey in 1978 showed a decline in breeding duck populations in the Kenai-Susitna area of 70.0 percent from 1977 (King and Conant 1978). U.S.F.W.S data for this area are not readily available for the 1976 survey.

It is not known why 1978 breeding population estimates were much lower than those during the 1975-77 period. One possible reason is a change in observers on the left side of the aircraft. However, Timm counted all four years as right side observer and his observations alone also indicated a comparable decline in the duck population.

An indication of spring chronology and/or overflight from southern nesting areas may be obtained by comparing the ratios of birds observed to be in pairs, flocks, or as lone males. These ratios in 1976, 1977 and 1978 were:

	Lo	Lone Male			Pairs		Flocked Birds			
	1976	<u>1977</u>	1978	1976	<u>1977</u>	1978	1976	1977	<u>1978</u>	
Dabbler	54%	48%	67%	28%	23%	31%	18%	2 <b>9</b> %	2%	
Diver	14%	21%	24%	39%	33%	19%	47%	47%	57%	

The above data clearly demonstrate two things: (1) the early spring in 1978, as reflected by the low proportion of flocked dabblers,

	Palm	er-Hay Flats	Goos	e Bay	Susi	tna	Trad	ing Bay	Redou	ibt Bay	To	otal
Species	No.	% of Total	No.	%	No.	%	No.	%	No.	%	No.	%
Pintail	331	14.4	95	32.3	1581	25.9	829	14.5	1504	27.2	4340	21.3
Mallard	507	22.1	116	39.5	1004	16.4	1083	18.9	886	16.0	3596	17.6
Green-winged Tea	al 102	4.4	59	20.1	863	14.1	1835	32.1	1027	18.6	3886	19.1
Shoveler	533	23.2	24	8.2	348	5.7	739	12.9	662	12.0	2306	11.3
Wigeon	173	7.5	0	0	428	7.0	231	4.0	349	6.3	1181	5.8
Gadwall	0	0	0	0	216	3.5	103	1.8	103	1.9	422	2.1
Total Dabbler	1646	71.6	294	100.1	4440	72.6	4820	84.2	4531	82.0	15731	77.2
Scaups	258	11.3	0	0	974	15.9	373	6.5	522	9.6	2127	10.4
Goldeneves	117	5.1	0	0	374	6.1	530	9.3	237	4.3	1258	6.2
Canvasback	272	11.9	0	0	110	1.8	0	0	0	0	832	4.1
Mergansers	0	0	Ò	0	181	3.0	0	0	0	0	181	0.9
Redhead	0	0	0	0	0	0	0	0	232	4.2	232	1.1
W.W. Scoter	0	0	0	0	29	0.5	0	0	0	0	29	0.1
Total Divers	647	28.3	0	0	1668	27.3	903	15.8	991	18.1	4659	22.8
Total Ducks	2293	99.9	294	100.1	6108	99.9	5723	100.0	5522	100.1	20390	100.0
Swan	5		0		23		86		75		189	
Canada Goose	91		52		147		0		0		290	
Sandhill Crane	0		18		23		0		0		41	

Table 8. Calculated bird populations on Cook Inlet coastal marshes, May 26, 1978.

· | |

		% of					Bi	rds Pe	er Mil	.e <sup>2</sup>				
	Size in	Area		Dab	blers			Dive	ers		• • • • • • • • • • • • • • • • • • •	То	tal	<u> </u>
Area	Mile	Sampled	75	76	77	78	75	76	77	78	75	76	77	78
Palmer-Hay Flats	42.7	18.7	62.1	37.1	70.8	38.5	14.4	11.5	9.4	15.2	76.5	48.6	80.2	53.7
Goose Bay	9.2	32.6	70.1	42.4	84.6	32.0	3.7	4.0	0.9	0	73.8	46.4	85.5	32.0
Susitna Flats	136.0	8.8	54.2	83.6	95.4	32.6	6.7	12.7	2.2	12.3	60.9	96.3	97.6	44.9
Chickaloon	39.0	12.8	39.4	21.6	45.0	NS	0	0	0	NS	39.4	21.4	45.5	NS
Trading Bay	107.0	9.3	NS	93.5	102.7	45.0	NS	7.7	5.4	8.4	NS	101.2	108.0	53.4
Redoubt Bay	248.0	9.3	NS	65.5	67.8	18.3	NS	9.2	9.7	4.0	NS	74.7	78.5	22.3
Fox River Flats	16.6	36.1	NS	26.4	NS	NS	NS	19.7	NS	NS	NS	46.1	NS	NS
Portage	18.3	32.8	NS	101.8	NS	NS	NS	21.6	NS	NS	NS	123.4	NS	NS

Table 9.	Total area,	_sam <sub>e</sub> le	size and	l breeding	birds	per	square	mile	on	Cook	fnlet	coastal	marshes,	1975,	1976,
	1977 and 19	78.													

Note: NS = Not surveyed

and high proportion of lone male dabblers; and (2) the effects of overflight from southern areas in 1977. Even though spring conditions were comparable in 1977 and 1978, the relative proportions of birds seen in 1977 as lone males and as flocked birds were reversed in 1978. Spring chronology in 1976 was "average". The survey in 1977 was conducted about 10 days later than the surveys in 1976 and 1978.

An indicated total of 161 trumpeter swans were present on Trading and Redoubt Bays (Table 9). This, in part, is based on a brood of three young observed. A projection based solely on adults showed a calculated spring population of 129 swans. On July 5, 1978 a comprehensive swan survey resulted in 124 adult swans being counted on these two areas (unpublished data).

The projected population for Canada geese is known to be low for the Palmer-Hay Flats where an estimated 150 adult geese were present in May. On July 19, 1978, 149 adult Canada geese were counted (plus 411 young) on Susitna Flats, compared to the projected population of 147 adults in May (Table 9). Also, there were an estimated 75 adults on Potter Marsh and the Airport Flats and 100-150 birds on Chickaloon Flats during 1978. On Potter Marsh 35 adults with 65 young were counted in July 1978. The total Canada goose population on Upper Cook Marshes in 1978 was estimated to be a minimum of 550 adults and 1,425 young, for a total of 1,975 birds.

### Bird Banding

During summer 1977, the following ducks were banded by Air Force and A.D.F.&G. personnel (all birds were young of the year):

Location	<u>Mallard</u>	Wigeon	<u>Pintail</u>	<u>G-W Teal</u>	Ringneck	<u>Total</u>
Elmendorf AFB	13	3	-	-	1	17
Potter Marsh		_2	_2	_1		
Totals	13	5	2	1	1	22

See Timm (1975, 1976) for a summary of the recoveries from birds banded in the Anchorage area through 1976.

### Refuge Studies

In early June 1977 intensive ground studies were initiated on the Susitna Flats, Palmer-Hay Flats and Goose Bay refuges. The major objective of this work was to measure bird use in various habitat types, particularily in areas where we knew habitat alteration and additional human use would occur. Also, the effects of aircraft on bird behavior and the effects of cabins on waterfowl were studied. Results of these studies will be reported next year.

### LESSER CANADA GOOSE STUDIES

### Cook Inlet

In 1974 an aerial survey documented a large breeding population of lesser Canada geese on tidal areas of Upper Cook Inlet (Timm 1975). Efforts to elucidate some aspects of these birds' life history were made in 1974, 1975, 1976 and 1977 through banding on Potter Marsh, the Anchorage Airport Flats and the Palmer-Hay Flats. A helicopter was used during all years to help capture the geese (Timm and Bromley 1976).

Adult birds captured during the banding operations were measured and these measurements compared to those of birds of known subspecies. Dr. John Aldrich of the National Museum, Washington, D.C., also examined the measurements and two specimens. Both Aldrich and I agree that the subspecies of Canada geese nesting in Upper Cook Inlet is  $B.\ c.$ parvipes.

The number of geese banded and the number shot during open hunting seasons and reported follow:

	Number			<u></u>	<u>IIGHTCZH</u>	5 00000	II INCOV	01.04		<u> </u>
Year	Number Banded		74-	75	75-76		76-	77	77-78 <sup>1/</sup>	
Banded	Adult	Local	Adult	Local	Adult	Local	Adult	Local	Adult	Loca1
1974 1975 1976 1977	53 18 25 <u>26</u> 122	122 35 67 <u>88</u> 312	5 - -	3 - - -	4 0 -	3 1 -	6 3 2 -	0 2 18 -	3 0 2 1	1 0 0 12

Hunting Sesson Recovered

### 1/ Recoveries through 6/16/78 U.S.F.W.S. IBM Run

The most recent recovery distribution is similar to earlier years. About 90.0 percent of the birds were shot at Sauvie Island in Oregon and in the Willamette Valley (Baskett Slough NWR in particular); 8.0 percent came from the immediate Anchorage area; and 2.0 percent were taken in Washington along the Columbia River near Sauvie Island.

Each year of banding in the Anchorage area produces a number of band returns (15 in 1977) from previous years of banding. Interestingly, of the 15 returns, 12 were females and all had brood patches. Twelve unbanded adult females captured in 1977 also had brood patches, indicating an average brood size of 3.7 goslings (24 females with 88 young).

### Cold Bay

After three years of failure, Canada geese were finally captured at Cold Bay in 1977 by attracting the geese to a planted and

baited field of oats and wheat. Rocket nets were used on October 7 and 19 which produced a total of 110 geese captured and banded. On October 19,61 geese were captured and dyed with picric acid on their upper tail coverts and belly. Weights and measurements of geese were also taken.

The recovery distribution (through 6/16/78 IBM run) has been most interesting. Nine birds were shot and reported during the 1977-78 season and five additional colored birds were reported (G. Simpson pers. comm.). The following is a summary of the recoveries:

Location	NO. Birds	Date	Comments
Willapa Bay, WA	1	Nov. 12, 1977	
Sauvie Island, OREG Finley and Baskett Slough	2	Nov. 3 and Dec. 12	
N.W. Refuges	5	Early DecFeb. 1978	Sight records
Tule Lake 60 miles SW Klamath Falls	2	Nov. 17 (both)	
(Shasta River)	1	Dec. 22	Same location as an Aleutian Canada goose recovery
75 miles south of Tule Lake	2	Nov. 20 (both)	

On October 21, 22 and 23, 1978 we observed about 8,200 Canadas leaving Cold Bay in a southward direction. These birds passed near the refuge headquarters and, of 700 birds close enough to observe yellow dye, three dyed birds were seen.

On October 24, 1978 John Sarvis and I flew a survey of Izembek Lagoon and nearby bays and observed 29,000 Canada geese, 7,000 emperor geese and 149,000 brant. Past surveys have shown Canada goose populations of 73,500 birds in 1975 and 29,000 birds in 1976. During the October 24 aerial survey, eight geese with yellow rumps were observed. The birds were easily identified at distances of 200 to 300 feet. Banding efforts will continue in 1978.

### INGESTED LEAD SHOT STUDIES

During the 1974 waterfowl season the first ingested lead shot study in Alaska was conducted (Timm 1975). The results of that study indicated that on many areas in Alaska ducks were not ingesting lead shot through normal feeding activities. However, a few of the heavily hunted areas in Southcentral Alaska were identified as being possible problem locations. For example, in 1974, 25.3 percent of all duck gizzards collected from the Palmer-Hay Flats carried ingested shot. Also, those ducks in Alaska found with shot apparently had the highest average number of pellets per gizzard of ducks examined anywhere. However, from the birds' good physical condition and lack of gizzard stress, it appeared that ducks in Alaska were not being poisoned by the ingested pellets. During the 1975 season, additional gizzards were collected as well as livers and wing bones from ducks shot on the Susitna Flats and the Palmer-Hay Flats. Analyses of these tissues indicated that most ducks which were ingesting lead shot were not being harmed in Alaska, probably due to biochemical dietary influences (Timm 1976).

During the 1976-77 waterfowl season emphasis was placed on collecting gizzards from areas where few had been collected in 1974 and 1975. The methods used since 1974 for collecting gizzards and analyzing them were described by Timm (1975).

During the 1977-78 season efforts were again directed towards gizzard collecting from areas where few had been collected before, and at potential "hot spot" locations. A total of 439 gizzards were collected and examined for lead shot. Mendenhall Flats represented the largest sample (281), followed by Susitna Flats (49) and Salchaket Slough (25). Other gizzards were collected at various locations throughout the State.

Rather than presenting individual years' data, it is appropriate to combine years which will outline a more comprehensive picture of the lead shot studies to date. Since 1974, 2,696 duck gizzards have been analyzed from over 30 hunting locations in Alaska. A summary of the number collected by area and the percent ingestion rate of lead shot is presented in Table 10.

U.S.F.W.S. personnel have collected 41 Steller's eiders, 11 common eiders, 1 King eider at Nelson Lagoon, and 8 Steller's eiders at Izembek Lagoon since 1974 (unpublished data, Office of Biological Services, Anchorage, Alaska). One Steller's eider from Izembek had two pellets in its gizzard. However, these pellets were apparently not examined to determine whether they were ingested or shot into the gizzard.

Table 11 presents a summary of the ingestion rates by duck species by area where ingested shot was found. As seen in Table 11 the ingestion rates for mallards, pintails and divers on some areas are quite high.

The incidence of shot ingestion in Cook Inlet varies significantly by time period (Table 12). Although more samples collected after Sept. 15 are needed, apparently the ingestion rate in early September is greater than the rate later in the season. The majority of birds examined from the Palmer-Hay Flats were shot September 1.

Table 13 shows the frequency of lead pellets per gizzard for ducks from Cook Inlet. Birds with ingested pellets in Cook Inlet have the highest average number of shot per gizzard of ducks taken anywhere in the United States.

In November 1977 the U.S.F.W.S. proposed that non-toxic shot be used on all areas within 10 miles of salt water in Upper Cook Inlet during the 1978-79 season (Federal Register, Vol. 42, No. 226). In late December 1977 the Department sponsored a public hearing on the non-toxic shot proposal. About 60 members of the public attended this meeting, besides State and Federal representatives. The rationale behind the

Total Number	With In	rested Shot
Gizzards Examined	Number	% of total
422	2	0.5
490	19	3.9
96	0	0
109	0	0
1,117	21	1.9
220	8	3.6
99	0	0
229	8	3.5
287	65	22.6
244	28	11.5
59	3	5.1
29	2	6.9
47	1	2.1
24	0	0
690	99	14.3
49	1	2.0
22	Ō	0
8	0	0
79	1	1.3
102	٥	0
116	0	0
77	0	0
225	0	0
	10	3 0
36	10	2.2 13.0
6	0	0
356	15	4.2
	Total Number Gizzards Examined 422 490 96 109 1,117 220 9 229 287 244 59 29 47 24 59 29 47 24 690 690 49 22 8 79 102 116 7 7 225 314 36 6 356	Total Number     With Ingligitards Examined     With Ingligitards       422     2       490     19       96     0       109     0       1,117     21       220     8       9     0       229     8       229     8       287     65       244     28       59     3       29     2       47     1       24     0       690     99       49     1       22     0       8     0       79     1       102     0       116     0       7     0       225     0       314     10       36     5       6     0       356     15

Table 10.	Incidence	of ing	ested lead	shot :	in duck	gizzards	by	area:	1974,
	1975, 1976	and 19	7 seasons	•			-		

2,696

Table 11. Incidence of ingested lead shot by duck species by area in Alaska: 1974, 1975, 1976 and 1977 waterfowl seasons.

	Unknown											
	Mallard		Pintail		Shoveler		Dabbler		Scaup		Canvasback	
	Sample	Percent	Sample	Percent	Sample	Percent	Sample	Percent	Sample	Percent	Sample	Percen
Area	size	with shot	size	with shot	size	with shot	size	with shot	size	with shot	size	with sh
Palmer-Hay Flats	73	41.1	86	31.4	38	0	0	-	10	40.0	9	33.3
Susitna Flats	31	25.8	57	15.8	16	0	83	8.4	19	21.1	4	25.0
Minto	64	7.8	73	2.7	32	3.1	0	-	15	13.3	4	0
Salchaket Slough	15	13.3	7	43.0	4	0	8	0	0	-	0	-
Potter Marsh	13	7.7	19	5.3	0	-	0	-	0	-	0	-
Copper River Delta	74	1.4	42	2.4	15	6.7	0	-	10	50.0	0	-
Chickaloon Flats	6	0	7	14.3	0	-	0	-	10	0	1	0
Eagle River Flats $\frac{1}{}$	16	6.2	1	100.0	0	-	8	0	0	-	0	-
Stikine River Delta	120	0.8	85	1.2	11	0	91	0	1	0	0	-
Mendenhall Wetlands	48	2.0	38	2.6	4	0	62	0	151	12.0	5	0
Kodiak <sup>2/ .</sup>	15	6.7	5	0	1	0	0	-	2	0	0	-

1/ In Cook Inlet

2/ Primarily Kalsin and Middle Bays

	Sept.	1-15	Sept.	16-30	Oct. 1 on		
Area	% With Shot	Sample Size	% With Shot	Sample Size	% With Shot	Sample Size	
Palmer-Hay Flats	45.1	122	12.5	8	6.7	15	
Susitna Flats	31.0	29	12.0	25	16.7	30	
Potter Marsh	10.7	31	0	2	_	0	
Chickaloon Flats	25.0	4	0	1	_	0	
Eagle River Flats	50.0	4	-	0	· _	0	
Total	36.8	190	11.1	36	13.3	45	

Table 12. Incidence of ingested lead shot in mallards and pintails by time period for Upper Cook Inlet: 1974, 1975, 1976 and 1977 waterfowl seasons.

Table 13. Frequency of ingested lead pellets per gizzard for ducks from Upper Cook Inlet: 1974-1977 waterfowl seasons.

No. Ingested Pellets	Frequency	No. Ingested Pellets	Frequency
1	27	15	2
2	13	18	1
3	9	19	2
4	7	21	1
5	3	22	1
6	6	28	1
7	3	33	1
9	3	43	1
11	6	58	1
12	2	64	1
13	3	84	1
14	2	98	1
	-	154	1
	То	<b>tal pellets =</b> 1055 Total gizz	ards= 99
		x = 10.7	

proposed regulation was questioned, and it was doubtful whether wholesalers in Alaska could get steel shot before the season opened in September 1978. By early December two of the three biggest wholesalers in Alaska had already placed their 1978 orders for lead shot.

The Department, in response to the U.S.F.W.S. proposal, prepared an in-depth analysis of ingested shot studies in Alaska (Timm 1977a). A summary of this document was presented at the public hearing. Data collected since 1974 demonstrated that the U.S.F.W.S. could do little else but withdraw their steel shot proposal in Alaska, either permanently or temporarily pending further study.

In January 1978 the U.S.F.W.S. postponed the final decision on use of steel shot in Alaska and a joint study for the 1978-79 waterfowl season has been agreed to. This study will determine the lead content in up to 500 wing bones, livers and gizzards from mallards and pintails taken in Upper Cook Inlet. Food habits of ducks will also be analyzed and live weights of birds will be recorded.

### PACIFIC BRANT

In July 1976 the Pacific Flyway Council, in response to a recommendation of the Technical Committee, directed the Committee to form a brant subcommittee. The principal mission of the subcommittee was to prepare a management plan for the brant population (Branta bernicla) of the Pacific Flyway.

During this reporting period I was active in tabulating and analyzing data, and in writing parts of the management plan. In March 1978 a final draft was completed and final copy will be ready for Council review and approval in July 1978.

This plan consists of a summary of past and current brant studies, and suggested management policies and objectives. Specific management actions are recommended to meet objectives. Perhaps most significantly, a population objective of 185,000 wintering birds is established. The anticipated population increase of about 45,000 will occur north of Mexico. If the population, as measured by the mid-winter inventory, drops below a 3-year average of 120,000 birds, hunting will cease that same spring and fall (at least north of Mexico).

### ALEUTIAN CANADA GOOSE STUDIES

Timm (1977) described the responsibilities and objectives of the Aleutian Canada Goose Recovery Team and the objectives of the Recovery Plan for the subspecies. During this reporting period three Recovery Team meetings were attended. Travel expenses for all meetings were paid by the U.S.F.W.S.

As part of the Team's efforts, Timm assumed the responsibility for coordinating radio-telemetry work and taxonomic studies. Although it

appeared that a radio-neck collar was feasible, the Team decided to discontinue telemetry work. The problems and costs of tracking geese between the Aleutian Islands and California were not worth the knowledge gained.

Morphological measurements of the six subspecies of Canada geese in Alaska are being analyzed by Doug Johnson, biometrician for the U.S.F.W.S. and me. It appears that Aleutian Canada geese can be identified by measurements with over 95.0 percent accuracy. A paper describing the technique will be presented at the Pacific Flyway Goose Symposium in February 1979 (Johnson et al. in prep.).

The first verified report of Aleutian Canada geese in Alaska outside of the Aleutian Islands occurred in late May 1978 (W. Rodstrom pers. comm.). An Aleut on St. George Island in the Pribilofs shot a two-year old male goose which had been banded on Buldir Island in 1976. At this time no additional information about the recovery is available.

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