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JUNEAU, ALASKA

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ANNUAL REPORT OF SURVEY & INVENTORY ACTIVITIES

WATERFOWL

By

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Volume X
Project Progress Report
Federal Aid in Wildlife Restoration
Project W-17-11, Job No. 10.0

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(Printed November 1979)

1978-79 WATERFOWL SEASON

Area	NORTHERN	GULF COAST	SOUTHEAST	ALEUTIANS	KODIAK
State Game Management Units	11-13 & 17-26	5-7, 9, 14-16 & Unimak Island	1-4	10 (except Unimak Is.)	8
Open Seasons	Sept. 1- Dec. 16	Sept. 1 - Dec. 16	Sept. 1 - Dec. 16	Oct. 8 - Jan. 22	Sept. 10- Oct. 9 &Nov. 5- Jan. 20

	LIMIT BAG	POSS.	LIMIT BAG	POSS.	LIMIT BAG	POSS.	LIMIT BAG	POSS.	LIMIT 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.
*** Provided 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).

(a) WEAPONS: Waterfowl may be taken with a shotgun (not larger than 10 gauge) 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, air boat, jet boat, or propellor driven boat which the motor of such has not been completely shut off and its progress therefrom has ceased.

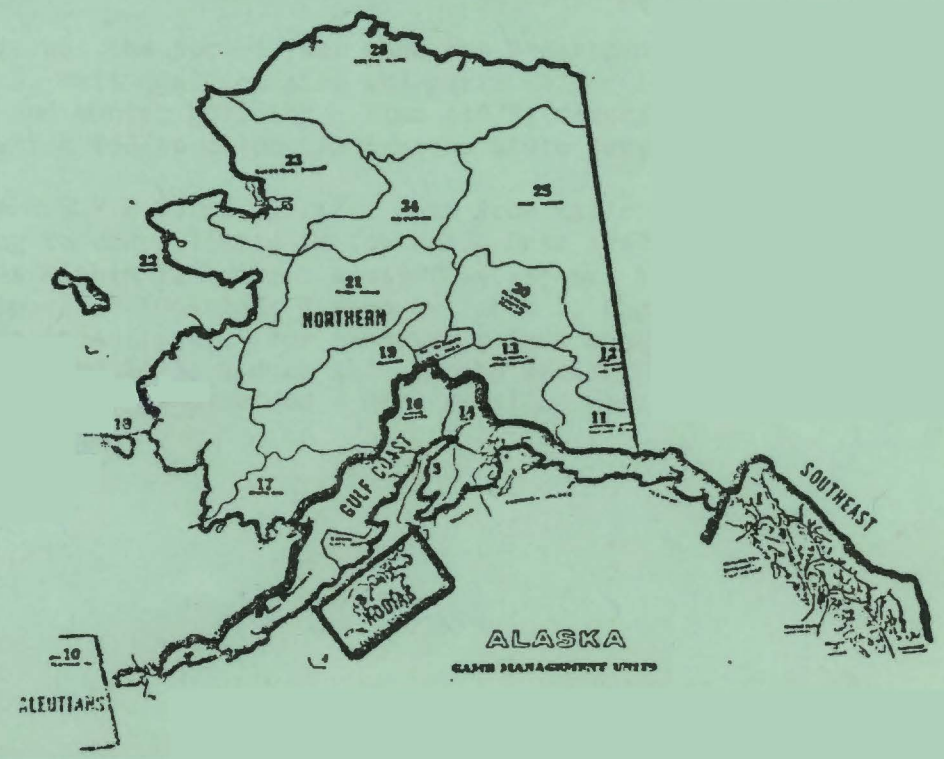
(d) POSSESSION: No person may receive or possess any migratory game bird belonging to another unless such birds have a tag attached with the signature of the hunter, his address, the date and total number and kinds of birds taken.

(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.

For additional and more complete information refer to Federal regulatory announcement available on request from Fish and Wildlife Service, 1011 E. Tudor, Anchorage, 99507.



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WATERFOWL HARVEST AND HUNTER ACTIVITY

This was the second year that the Department has utilized the U.S.F.W.S. mail questionnaire and parts collection surveys to estimate harvest and hunter activity. Timm (1978) described the progression of events which led to discontinuing the State survey of waterfowl hunters.

The U.S.F.W.S. categorizes data from their parts collection survey according to codes listed in Table 1. Data are coded to either specific locations within 11 harvest areas (Fig. 1) or, if birds were not taken at the specific locations listed in Table 1, then the general harvest area code is assigned. For example, a duck shot at Palmer Hay Flats would be coded 1123; a duck shot on the Kasilof Flats would be coded 1103. Timm (1978) provided a more detailed description of the coding system.

Figure 1. Harvest areas used in data analysis.

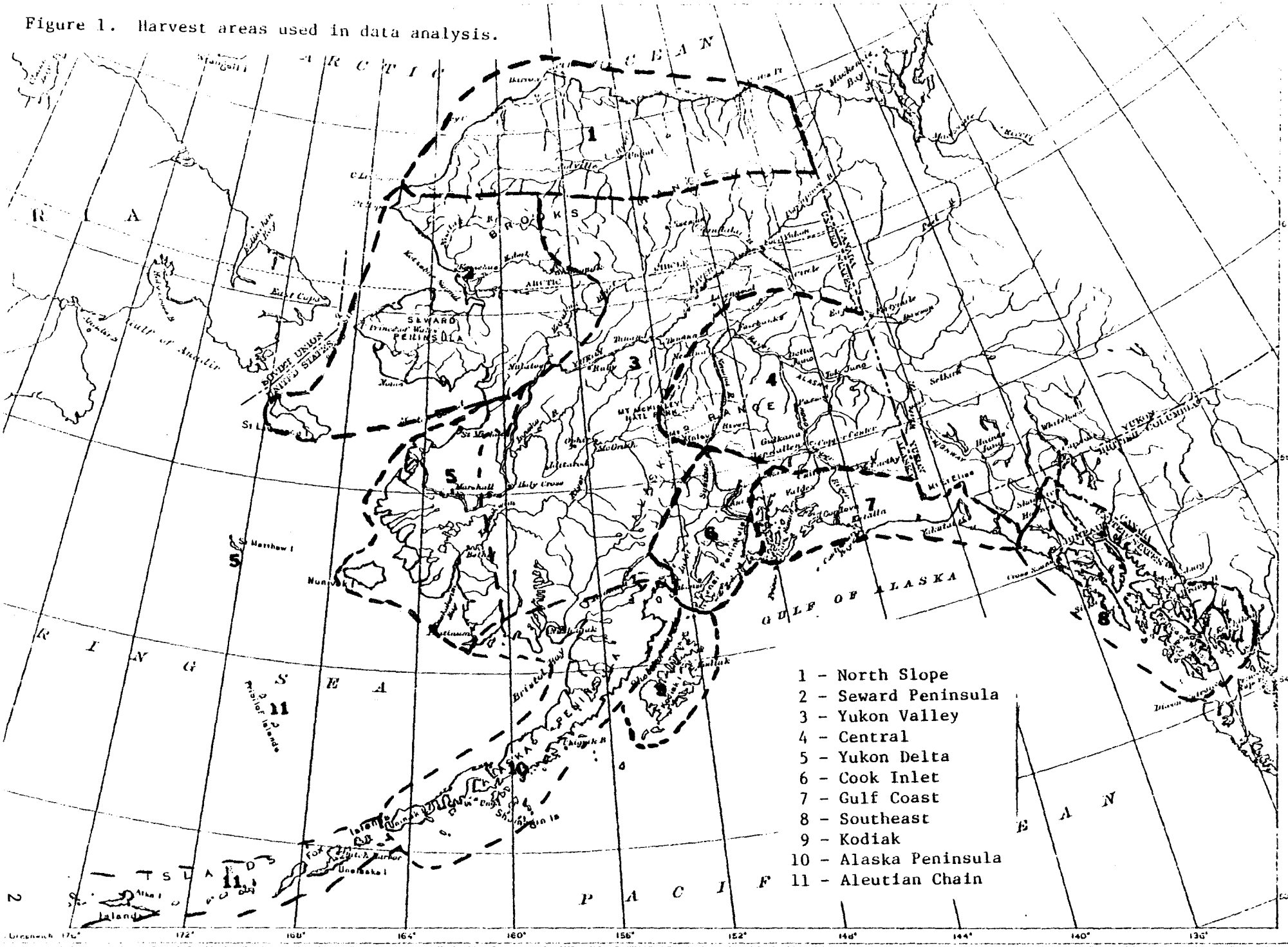

Table 1. Summary of FWS codes used to assign harvest locations in Alaska.

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

Results

Hunter Activity

There were 19,468 duck stamps sold in Alaska. After corrections for people buying two stamps, there were a projected 18,868 potential hunters in Alaska. During the 1978-79 season 13,811 (73.2%) hunted waterfowl 1 or more days. This compares to 13,244 active hunters a year ago. Table 2 summarizes these data. The U.S.F.W.S. survey does not allow for a breakdown of hunting effort by area.

Duck Harvest

Magnitude of the Harvest (Table 2)

Hunters reported taking an average of 8.9 ducks each, after corrections for reporting bias were made. Reported daily success was 1.4 ducks per day.

The projected total statewide harvest was 122,431 ducks, of which 7,958 (6.5%) were sea ducks and mergansers.

Location of Harvest (Table 3)

According to the U.S.F.W.S. survey, about 55 percent of the kill occurred in the Cook Inlet area, while no birds were shot on the North Slope, Aleutian Chain or on the Seward Peninsula. These aberrant data are the result of small sample sizes from these areas. For comparative purposes the 1974-76, 3-year average distribution of harvest data, as obtained from state mail surveys, is also presented in Table 3. These data are believed to more accurately portray harvest by location than does the Federal survey.

Species Composition of Harvest (Table 4)

As in previous years, mallards, pintails, green-winged teal and wigeons comprised the bulk of the harvest (78.0%). Dabblers made up 82.5 percent of the total kill, divers 11.1 percent and sea ducks and mergansers 6.5 percent. Mallards comprised a significantly larger portion of the harvest in Cook Inlet, Gulf Coast, Southeast and Kodiak harvest areas, while pintails were more prevalent on the Alaska Peninsula and Yukon-Kuskokwim Delta. Relatively uncommon ducks (blue-winged teal, ring-necked duck and redhead) occurred in scattered locations.

Time of Harvest (Tables 5a, 5b, 5c)

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. These data, summarized by seven time periods, are presented in Tables 5a, 5b and 5c. It would be possible to break down these data further by specific locations, at places where significant harvest occurred. The timing of harvest varies markedly by area. However, except for Southeast Alaska and the Alaska Peninsula, a significant amount of the total kill occurred during the early part of the season.

Table 2. Summary of waterfowl hunter success and activity, 1978-79 season (after Carney el al. 1979[1/])

Number of duck stamps sold	19,468 (18,868 potential hunters)
Number of mail questionnaires	1,491
Number of duck wings received	1,565
Number of goose tails	163
Number of active hunters	13,811 (73.2 percent)

Calculated statewide harvests:

Ducks 114,473; Sea ducks and mergansers 7,958; Total 122,431

Geese: Canada 8,986; Emperor 2,968; White-fronted 1,156; Brant 738; Snow 84; Total 13,932

Ducks per active hunter 8.9

Percent successful hunters 58.8

Cranes: 312 (Sorensen 1979)

Calculated hunter days 88,680

Days per active hunter 6.4

1/ For hunters 16 years of age and older

Table 3. A comparison between reported duck harvest from the 1977-78 and 1978-79 USFWS parts collection survey and the ADFG mail survey, 1974-76 three year average.

Harvest Area	Percent of Statewide Harvest ADFG	USFWS		Specific Location	Percent of Statewide Harvest ADFG	USFWS	
North Slope	0.2	0.0	0	Susitna Flats	10.6	13.3	13.3
Seward Pen.	1.4	0.0	0	Minto Flats	7.3	4.4	4.2
Yukon Valley	2.5	0.3	0	Palmer-Hay Flats	7.3	2.7[1/]	10.9
Central	18.0	14.1	14.6	Copper River Delta	5.6	4.6	2.8
Yukon Delta	1.4	1.3	1.5	Mendenhall	4.1	8.6	4.2
Cook Inlet	39.2	55.6	50.1	Stikine River Delta	3.6	4.4	8.0
Gulf Coast	8.4	4.9	6.6	Kachemak Bay	2.6	9.3	0.4
Southeast	20.6	15.9	14.6	Redoubt Bay	2.5	4.7	1.0
Kodiak	2.7	2.2	3.6	Trading Bay	2.1	0.9	2.5
Alaska Pen.	5.1	5.7	9.0	Portage Flats	2.1	1.7	0.9
Aleutian Chain	0.5	0.0	0	Pilot Point	1.8	1.9	1.0
	100.0	100.0	100.0	Chickaloon Flats	1.3	0.0	0.1
				Potter Marsh	1.2	0.0	0.5
				Duncan Canal	1.1	0.0	0.0
				Eagle River Flats (Cook Inlet)	1.1	not	coded
				Kalsin Bay	1.1	0.0	0.0
				Yakutat Area	1.0	0.3	1.3
				Rocky Pass	0.9	0.0	0.0
				Blind Slough	0.9	0.0[2/]	0.5
				Cold Bay Area	0.8	3.6	4.6
				Eilson AFB	0.8	0.0	2.6
				Salchaket Slough	0.6	0.0	0.0
				Healy Lake	0.5	0.0	0.0
				Goose Bay	0.4	0.3	1.5
				Farragut Bay	0.4	0.0	0.0
				St. James Bay	0.4	0.0	0.0
				Chilkat River	0.2	0.6	0.0
				Delta Area	TR	0.5	1.6
				Tok-Northway Area	TR	1.9	4.3
				Prince William Sound	0	0.0	2.4
					62.3	62.7	68.6

1/ In 1978 the FWS apparently assigned many ducks shot at Palmer to the general Cook Inlet code.

2/ Blind Slough was closed to all hunting in 1978-79

Table 4. Species composition of the duck harvest, 1978-79 waterfowl season.

Species	Percent of Total Harvest by Area								
	Yukon Valley	Central	Y-K Delta	Cook Inlet	Gulf Coast	Southeast	Kodiak	Alaska Peninsula	Percent of Total Statewide[1/]
Mallard	-	30.9	-	36.3	44.0	36.1	32.4	15.9	34.3
Pintail	-	11.5	40.0	19.9	20.0	5.7	2.9	45.5	17.6
G-W Teal	-	7.8	35.0	11.9	4.0	20.9	32.4	25.0	13.7
Wigeon	100.0	24.0	5.0	11.3	25.3	4.5	-	8.0	12.4
Shoveler	-	6.9	10.0	3.6	4.0	1.2	-	-	3.8
Gadwall	-	-	-	0.5	1.3	-	2.9	2.3	0.6
B-W Teal	-	-	-	0.1	-	-	-	-	0.1
Total Dabbler	100.0	81.1	90.0	83.6	98.6	68.4	70.6	96.7	82.5
Barrow's Goldeneye	-	0.9	-	3.6	-	1.6	5.9	-	2.5
Common Goldeneye	-	0.5	-	2.8	-	0.8	-	-	1.7
Bufflehead	-	6.5	-	1.2	-	9.0	11.8	-	3.2
Greater Scoup	-	3.7	5.0	1.3	1.3	-	-	3.4	1.5
Lesser Scoup	-	4.6	-	1.4	-	0.4	-	-	1.5
Canvasback	-	0.9	-	0.1	-	-	2.9	-	0.3
Ring-necked Duck	-	0.5	-	0.3	-	-	-	-	0.3
Redhead	-	-	-	0.2	-	-	-	-	0.1
Total Diver	0.0	17.6	5.0	10.9	1.3	11.8	20.8	3.4	11.1
Surf Scoter	-	-	-	1.3	-	9.4	-	-	2.2
W-W Scoter	-	-	-	2.1	-	3.3	-	-	1.7
Harlequin	-	-	-	1.8	-	2.5	8.8	-	1.5
Mergansers	-	1.4	-	0.1	-	0.4	-	-	0.3
Old Squaw	-	-	5.0	0.1	-	4.1	-	-	0.8
Total Sea Ducks and Mergansers	0.0	1.4	5.0	5.4	0.0	19.7	8.8	0.0	6.5
Sample Size	75	217	20	855	75	244	34	88	1565

[1/] Includes birds harvested in unknown locations

Table 5a. Distribution of total duck harvest by time period in eight harvest areas in Alaska, 1978-79 season.

Harvest Area	Percent of Total Duck Harvest by Time Period							Sample Size
	9/1-10	9/11-20	9/21-30	10/1-10	10/11-20	10/21-31	11/1-on	
Yukon Valley	100.0	-	-	-	-	-	-	5
Y-K Delta	100.0	-	-	-	-	-	-	20
Central	72.4	2.3	9.7	9.2	-	6.4	-	217
Cook Inlet	40.2	15.6	11.1	14.0	10.1	5.0	4.0	855
Gulf Coast	32.0	10.7	10.7	41.3	-	5.3	-	75
Southeast	8.6	4.1	8.6	12.3	22.1	6.1	38.2	244
Kodiak[1/]	20.6	26.5	5.9	17.6	-	-	29.4	34
AK Pen.	8.0	8.0	17.0	29.5	23.9	13.6	-	88

1/ Hunting season dates were 9/10 - 10/9 and 11/5 - 1/20/79.

Table 5b. Distribution of mallard harvest by time period in six harvest areas in Alaska, 1978-79 season.

Harvest Area	Percent of Total Mallard Harvest by Time Period							Sample Size
	9/1-10	9/11-20	9/21-30	10/1-10	10/11-20	10/21-31	11/1-on	
Central	51.5	2.9	17.6	7.4	-	20.6	-	68
Cook Inlet	31.6	12.1	10.7	18.6	16.0	7.2	3.8	307
Gulf Coast	28.6	20.0	11.4	34.3	-	5.7	-	35
Southeast	8.1	5.7	2.3	16.1	28.7	10.3	28.7	87
Kodiak[1/]	-	45.4	-	27.3	-	-	27.3	11
AK. Pen.	13.3	13.3	13.3	33.5	13.3	13.3	-	15

1/ Hunting season dates were 9/10 - 10/9 and 11/5 - 1/20/79.

Table 5c. Distribution of pintail harvest in six harvest areas in Alaska, 1978-79 season.

Harvest Area	Percent of Pintail Harvest by Time Period							Sample Size
	9/1-10	9/11-20	9/21-30	10/1-10	10/11-20	10/21-31	11/1-On	
Y-K Delta	100.0	-	-	-	-	-	-	9
Central	82.6	-	4.3	13.1	-	-	-	23
Cook Inlet	58.8	16.3	10.0	9.4	2.4	3.1	-	160
Gulf Coast	40.0	13.3	13.3	33.4	-	-	-	15
Southeast	15.4	-	7.7	-	30.7	7.7	38.5	13
AK Pen.	7.7	2.6	17.9	35.9	12.8	23.1	-	39

Data in Tables 5a, 5b and 5c are biased for harvest areas where a sample of wings was obtained. These generally came from only a few hunters. This bias was not a major factor in the Central, Cook Inlet, Gulf Coast, Southeast, and Alaska Peninsula areas.

Goose Harvest

A breakdown by species and area of the 1978-79 statewide goose harvest of 13,932 birds is provided in Table 6. This represented a decrease in harvest of 16 percent from last year. Canada, emperor, white-fronted, brant and snow geese comprised 64.5 percent, 21.3 percent, 8.3 percent, 5.3 percent, and 0.6 percent, respectively, of the statewide kill. According to the Federal survey, over 50 percent of the harvest occurred on the Alaska Peninsula, while no geese were killed on the Seward Peninsula, in the Yukon Valley, on the Aleutian Chain or on Kodiak Island (Table 7). These aberrant data resulted from the same biases which were described for the duck harvest. We believe that a more accurate picture of the location of goose harvests is portrayed by 3-year average data obtained from past State mail surveys.

Crane Harvest

A retrieved take of 312 cranes by 243 successful hunters was calculated by Sorensen (1979) for the 1978-79 season in Alaska. Information on the location of crane harvest was not obtained from the U.S.F.W.S. survey, but averages are available from past State surveys.

Discussion

The U.S.F.W.S. now samples more hunters in a mail questionnaire survey than were sampled by State mail surveys. Compared to other states in the Pacific flyway, sample size is proportionately much larger in Alaska.

As discussed by Timm (1978), the Department believed that the major compromise made when the State survey was dropped, was the loss of annual estimates of harvest and hunter days by specific location. However, it is believed that 3-year average estimates of these data, based on State surveys made during 1974-76, will be adequate until a need for more precise data arises. Periodic State surveys could be used to update these data.

Table 6. Species composition of the goose harvest, 1978-79 waterfowl season.

Species	Percent of Total Harvest by Area							
	North Slope	Central	Y-K Delta	Cook Inlet	Gulf Coast	South-east	Alaska Peninsula	Percent of Total Statewide
Canada	-	90.9	100.0	57.7	100.0	96.3	47.7	64.5
Emperor	-	-	-	-	-	-	41.9	21.3
White-fronted	100.0	9.1	-	42.3	-	-	-	8.3
Brant	-	-	-	-	-	-	10.4	5.3
Snow	-	-	-	-	-	3.7	-	0.6
Sample Size	2	11	3	26	8	27	86	163

Table 7. A comparison between reported retrieved goose harvest from the 1978-79 USFWS parts collection survey and the ADFG mail survey, 1974-76 three year average.

Harvest Area	Percent of Statewide Harvest		Specific Location	Percent of Statewide Harvest	
	ADFG	USFWS		ADFG	USFWS
North Slope	0.4	1.2	Izembek Lagoon	21.3	45.4
Seward Peninsula	4.4	0.0	Pilot Point	11.5	6.7
Yukon Valley	4.4	0.0	Copper River Delta	9.4	3.1
Central	8.1	6.7	Minto Flats	4.9	1.8
Y-K Delta	7.3	1.8	Chickaloon Flats	2.1	3.7
Cook Inlet	10.1	16.0	Susitna Flats	1.8	5.5
Gulf Coast	13.6	4.9	Delta Area	1.8	3.1
Southeast	13.1	16.6	Stikine River Delta	1.5	6.7
Kodiak	0.2	0.0	Redoubt BAy	1.5	0.0
Alaska Peninsula	38.2	52.8	Mendenhall Wetlands	1.1	6.7
Aleutian Chain	0.1	0.0	Duncan Canal	1.1	0.0
	99.9	100.0	P. Moeller & Nelson Lagoon	1.0	0.0
			Trading Bay	0.8	5.5
			Palmer-Hay Flats	0.8	0.0
			Kachemak Bay	0.8	0.0
			St. James Bay	0.8	0.0
			Portage Area	0.4	0.0
			Port Heiden	0.4	0.0
				63.0	88.2

Production, Fall Flight and Breeding Population Size

Timm (1978) described the growing difficulties of determining the size of the breeding population, due to increasing numbers of lesser Canadas (*B. c. parvipes* and *taverneri*) in traditional dusky Canada goose (*B. c. occidentalis*) wintering areas. Simpson and Jarvis (1979) described some aspects of this change in subspecies composition in western Oregon.

Production in 1978 was less than average. Although the spring of 1978 was early and production prospects looked excellent, the weather was inclement from the late stages of egg laying into late July. On July 21, 1978 Palmer Sekora - USFWS, Bob Bromley-Oregon State University and I counted over 11,000 geese from the air and subsequently calculated 24.8 percent young in the population. Table 8 summarizes population data since 1971.

Table 8. Summary of population data for dusky Canada geese, 1971-78.

Year	Mid-winter	Breeding Pop.[2/]	% Yg.	% Non-Prod. Ad.[3/]	No. Yg. Produced	Fall Flight	Harvest[4/]
1971	20,850	20,065	16.2	79.7	3,880	23,945	5,995
1972	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/]	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[5/]
1978	23,775[5/]	23,000[5/]	24.8	71.8	7,600	30,600	5,100[5/]
1979	25,500[5/]	24,500[5/]					

1/ Calculated from spring breeding grounds survey
2/ Mid-winter less 0.0375 mortality (Chapman et al. 1969)
3/ Percent of total adults in flocks with no young
4/ Fall flight less mid-winter inventory
5/ Preliminary estimates pending further analyses

On May 21, 1979, the authors flew surveys on standard flight lines over the Copper River Delta. The mechanics of the survey and sampling design were described by Timm (1978). Two back-to-back counts were made in 1979; geese were first counted on either side 110 yards from the aircraft and then the flight lines were reflown and geese were counted to 220 yards.

In 1978, some air-to-ground comparisons were made and the tentative conclusions were that, as the number of geese present increased, the proportion of geese counted decreased (Timm 1978). The ground counts were of nesting birds only, so only minimum estimates of geese present were possible. The survey in 1979 further defined and complicated the problem of counting geese from the air.

A comparison of total observations of geese for the 110 yard and 220 yard surveys indicated that only 41 percent more geese were seen at 220 yards. A comparison of birds seen in singles, pairs and flocks indicated that 12 percent, 43 percent and 75 percent more geese, respectively, were seen at 220 yards. This indicates the importance of conducting annual surveys at comparable phenological periods.

A comparison of the surveys between areas having moderate and high densities of geese indicated that 58 percent more geese were seen at 220 yards in moderate density areas compared to 39 percent more in high density areas. This supports the hypothesis that, as goose densities increase, proportionately fewer birds are seen from the air. In the low density area 31 percent more geese were seen at 220 yards, but sample size was small.

A comparison of observers showed little difference (3.5 %) in birds observed for the 110 yard count. However, one observer saw 24.7 percent more geese than the other during the 220 yard survey. This probably resulted from over or underestimating 220 yards, or a combination of both. Because a distance of 110 yards should be easier to estimate than 220 yards and because the observers had nearly equal competence at seeing geese at 110 yards, surveys at 110 yards appear superior.

Until air-ground correction factors for geese on the Delta are obtained, it is impossible to accurately project population size. The collection of these data is planned for 1980.

Band Recoveries

During summer 1978, 1529 dusky geese were banded by personnel from A.D.F.&G., U.S.F.W.S., U.S.F.S., the University of Alaska and Oregon State University. Y.A.C.C. people assisted in herding the geese into sloughs and then boats were employed to drive the geese into a trap.

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

	Leg Banded		Neck Collared	
Year	Locals	Adults	Locals	Adults
1971	15.5	2.8	-	-
1972	-	7.7	-	-
1973	10.0*	3.4	16.7*	8.2
1974	17.1	6.4	16.0	4.1
1975	7.5	8.0	16.4	14.0
1976	14.4	8.1	12.0	13.0
1977	14.1	6.6	15.6	6.0
1978	7.4	7.3	11.8	11.1

*Small sample size

The recovery distribution of bands reported from birds shot or found dead during hunting seasons by state - province since 1974 is as follows (through 7-10-79 IBM run):

Year	Oregon	Alaska	Br. Columbia	Washington
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	71.4	17.0	4.1	7.5
1978	63.3	19.3	14.2	3.2

During 1978 there were, in addition to the above recoveries, five recoveries in California and one in Utah. In 1977 there was one recovery from San Francisco Bay. The five recoveries in 1978 came from Tule Lake (1) and the Redding area (4). Prior to 1977 there was a total of 8 "abnormal" recoveries, 7 in California and 1 in Utah.

The influx of lesser Canadas into western Oregon dusky wintering areas may have resulted in an overcrowded situation. This situation may have been caused by a gradual change in cropping practices from grass to grain, which favors lesser Canadas.

Cold Bay

For the second consecutive year, Canada geese (*B.c. taverneri*) were captured and banded in the Cold Bay area. A planted and baited field of wheat was used to attract the geese within range of a rocket net. One hundred and forty-three geese (46 adults and 97 young) were captured in 4 days during mid to late October.

The presence or absence and size of white neck rings was recorded to further refine the differences between *taverneri* and *leucopareia*. The results of this study were:

Ring Size	Percent of Birds With Adults	Young
None	28.3	58.8
Trace[1/]	37.0	32.0
1-5 mm	21.7	6.2
6-10 mm	8.7	3.0
11-15 mm	4.3	0.0

1/ Individual white feathers.

The differences between adults and young have been noted in other studies of *taverneri* and *leucopareia* (Johnson et al. 1979).

In 1977 and 1978 a total of 253 geese were banded at Cold Bay. As of the July 1979 U.S.F.W.S. IBM run, there have been 15 recoveries of shot geese, and five sightings of dyed geese from 1977 banding. The recovery distribution of these 21 geese is shown on Fig. 2.

From these data it is apparent that a portion of the lesser Canada geese now wintering in the Willamette Valley are geese which fall stage near Cold Bay.

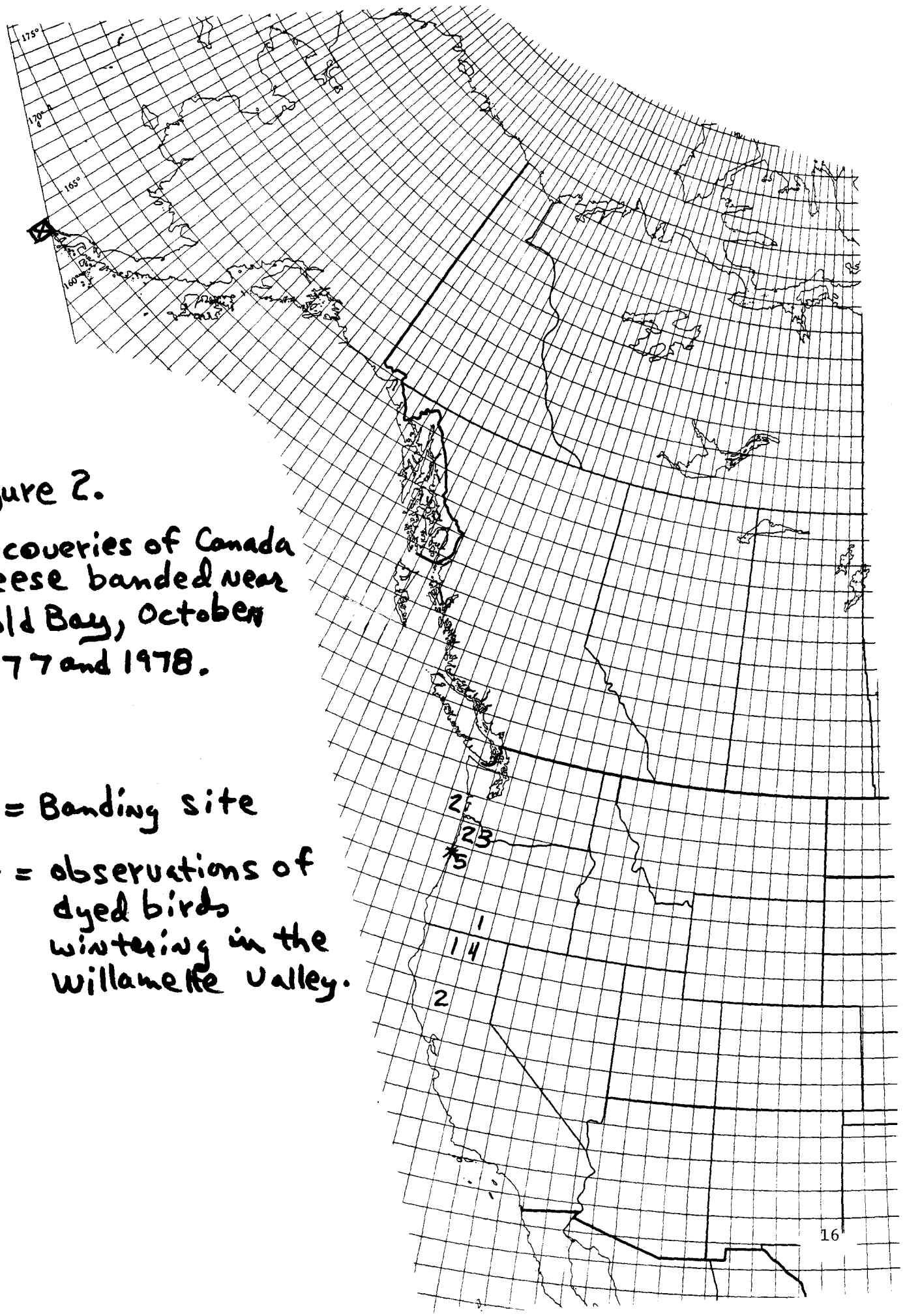

Figure 2.

Recoveries of Canada geese banded near Cold Bay, October 1977 and 1978.

X = Banding site

* = observations of dyed birds wintering in the Willamette Valley.

INGESTED LEAD SHOT STUDIES

Timm (1978) summarized the ingested shot studies conducted in Alaska since 1974. These studies led to a joint A.D.F.&G. - U.S.F.W.S. study to determine the effects of ingested lead shot in mallards and pintails in Upper Cook Inlet during the 1978-79 season. Basically, A.D.F.&G. was to do the work and the U.S.F.W.S. was to provide funds for the analysis of livers and wings for lead content.

Study objectives were:

(1) To ascertain lead levels in livers and wing bones from immature mallards and pintails collected during the summer and fall; the desired sample was 250 of each species. Lead levels of 30 ppm in bones or 6 ppm in livers, in 10 percent or more of the birds of each species, would be considered significant. In that case additional studies, such as a dosing experiment, may be warranted or the use of steel shot may be required.

(2) To determine the relationships between body weight, the amount of lead in bone and tissue, and shot ingestion.

(3) To determine food habits of mallards and pintails in Upper Cook Inlet during late summer and fall.

During the 1978-79 season, 375 mallards and pintails were analyzed for the presence of ingested lead shot. Wings (287) and livers (120) from 287 immature mallards and pintails were sent to Wisconsin for lead content analysis. This work has not been completed at this writing, so complete analysis is impossible. However, ingested shot studies and the analysis of food habits are complete. The incidence of ingested shot will be reported here and food habits results will be reported in a separate section.

For all areas and age classes, 16.6 percent of the mallards and pintails had ingested lead shot (Table 9). The incidence during summer (July 21 - August) and throughout September was similar; during October the incidence of ingested shot decreased significantly. This trend held for most individual areas.

There was no significant difference in ingestion rates between mallards (15%) and pintails (18%). Total sample size was 189 mallards and 186 pintails.

There was a significant difference between the ingestion rates for adults (6.5%) and immatures (19.0%). This difference occurred primarily because none of the 10 adults collected in summer had ingested shot while 26.0 percent of the 89 immatures during that period had ingested pellets. Over 63 percent of the adults were collected after 1 October; after 1 October the ingestion rate for adults (10.0%) was the same as that rate for immatures (9.0%). There were 53 adults in the sample.

Table 9. Incidence of ingested lead shot in mallards and pintails by time period for Upper Cook Inlet, 1978-79 season.

Area	Summer % With Shot	Summer Sample Size	Sept. 1-15 %	Sept. 1-15 SS	Sept. 16-30 %	Sept. 16-30 SS	Oct. 1 On %	Oct. 1 On SS	Total %	Total SS
Palmer-Hay Flats	34.5	29	47.4	19	0.0	5	11.0	64	22.2	117
Susitna Flats	19.0	58	24.3	37	28.0	25	2.0	56	15.9	176
Chickaloon Flats	-	-	5.0	20	-	-	18.2	11	9.7	31
Goose Bay	33.3	3	8.3	24	-	-	-	-	11.1	27
Potter Marsh	-	-	16.7	6	-	-	0.0	8	7.1	14
Trading Bay	11.1	9	-	-	-	-	-	-	11.1	9
Total	23.2	99	19.8	106	23.3	30	7.2	139	16.6	374

The average number of ingested pellets per gizzard was similar for all time periods except September 16-30 (Table 10). However, sample size was small during that period. The average number of ingested pellets for all periods (3.5) was significantly less than the average number observed during studies in previous years (10.7) (Timm 1978). Since the technique used to ascertain the number of pellets per gizzard was identical, we cannot adequately explain the low number of pellets per gizzard. Birds collected during the summer tended to have fewer pellets per gizzard than those collected later. In past years, no birds were collected before 1 September, which partially explains the discrepancy.

Table 10. Frequency of ingested lead shot for mallards and pintails by area by time, Upper Cook Inlet, 1978-79 season.

No. of Pellets	Frequency By Time Period: Summer	Sept. 1-15	Sept. 16-30	Oct. 1 On	Total
1	13	12	2	6	33
2	4	2			6
3		3		1	4
4	5	2		1	8
6			1		1
7	1		1		2
8		1			1
10			1		1
11				1	1
12			1		1
13			1		1
15		1		1	2
25		1			1
					Total= 62
Ave. No. Per Gizzard	2.1	3.7	7.1	3.9	3.5

FOOD HABITS OF MALLARDS AND PINTAILS ON COOK INLET COASTAL MARSHES

The lack of quantitative or even descriptive studies of waterfowl food habits in subarctic coastal marshes prompted us to combine the 1978 lead ingestion study with an analysis of food contents of esophagi and gizzards. Specimens were taken from mallards and pintails collected between 13 July and 21 October 1978 on Palmer Hay Flats, Susitna Flats, Goose Bay, Chickaloon Flats and Trading Bay. Gizzards were obtained from each bird. For about half the birds no useful data were obtained from esophagi, either because no food was present or esophagi were not extracted from the carcasses. Specimens were frozen as soon as practical, although in some instances several days elapsed before freezing. Post-mortem digestion resulted from a delay in preserving specimens, which diminished the abundance of animal and fragile plant material in the digestive tracts. Food items were identified by comparison with plant samples collected on the marshes or from identification manuals.

Time, budget constraints, Department needs and collecting procedures did not justify the effort required to separate and measure the volume of each food item in 355 gizzards and 174 esophagi. Instead, contents were spread in a petri dish, food items were identified and their relative abundance (0-5) was visually estimated. This rating of occurrence was quick but not precise. Food items were then analyzed using the aggregate percent method (Swanson et al. 1974).

Four genera of plants (*Carex, Scirpus, Potomogeton* and *Hippuris*) comprised between 52 and 83 percent of the esophageal contents of mallards and pintails (Tables 11 and 12). These plants comprised between 82 and 96 percent of gizzard contents.

Seeds of these plants were dominant in both summer and fall, although tubers of *Scirpus paludosus* and *Potomogeton* were important in fall on Susitna Flats and Goose Bay. Seeds of *Potomogeton* and *Hippuris* were more important during summer than during fall, while the inverse was true for *Carex* seeds. Mallards relied more heavily on *Carex* and less heavily on *Scirpus* seeds than did pintails.

The Chickaloon Flats and Trading Bay do not have extensive stands of bulrush (*Scirpus validus*) and consequently birds collected there were nearly devoid of bulrush seeds. Palmer Hay Flats contains more bulrush than any other marsh in Cook Inlet and the ducks collected there fed more heavily on this food item than did birds elsewhere. Because of biases in procedures for collecting and processing samples, the importance of animal foods was undoubtedly underestimated.

Although not reflected in this study, ducks spent more time on intertidal areas as the hunting season progresse . Since birds were relatively invulnerable while feeding on the tide flats, few were included in our sample. Small mollusks and algae are probably the major foods consumed by ducks in the exposed tidal zone.

While this survey of food habits of mallards and pintails provides some insight into what is consumed during late summer and fall, we have little knowledge of the feeding behavior of spring migrants, breeding birds or for other species. Comprehensive studies are not planned, but some of these gaps will be filled on an opportunistic basis.

Table 11. Summer and fall food habits of pintails on Cook Inlet coastal marshes expressed as aggregate percent.

	Palmer-Hay Flats				Susitna Flats				Goose Bay		Chickaloon		Trading Bay		Total-Cook Inlet[1/]			
	Summer		Fall		Summer		Fall		Fall		Fall		Summer		Summer		Fall	
Food Idem	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard
Potomogeton seeds	18	27	11	18	50	51	18	36	22	18	14	32	10	11	39	47	16	27
Potomogeton tubers				tr	1		13	7							1		4	3
Carex	3	2	10	9	5	8	9	10		4	14	8	6	16	4	2	8	8
Hippuris	5	14	10	18	20	24	2	13		6		5	84	69	15	19	4	15
Scirpus validus	33	42	26	47	3	5	2	3	17	31					17	21	16	25
Scirpus paludosus	5	6	3	2	8	4		2	11	20		5			7	5	4	4
Scirpus tubers							2	2		1							tr	1
Zannichellia			5	1	6	1	2	3	5	8	14	18				tr	4	3
Triglochin											29	26					3	2
Grass	3	1			3	2		1	22	4					3	1		tr
Misc. seeds	5	2	4	2			22	8		6				2	2	1	7	5
Misc. foliage			1	1				2			29						3	2
Total Plant	72	94	70	98	96	97	70	87	77	98	100	94	100	98	88	96	71	95
Chrionomid larvae			11	1	3		13	1	17	tr				2	1		12	1
Other insect larvae	6		3			1	2	2							2	tr	2	tr
Adult insects	3		1		1	1	4	tr	5	tr					2	tr	3	tr
Claims							9	9				3			tr		3	3
Snails	5	1	16	1											2	tr	8	tr
Crustaceans								tr				3			tr		1	tr
Sticklebacks																		
Stickleback eggs	13	5													4	2		
Total Animal	27	6	30	2	4	2	28	13	22	1	0	6	0	2	12	4	29	5
Sample Size	16	20	12	35	21	40	16	53	11	21	3	6	6	8	38	62	41	113

1/ Does not include Trading Bay data

Table 12. Summer and fall food habits of pintails on Cook Inlet coastal marshes expressed as aggregate percent.

	Palmer-Hay Flats				Susitna Flats				Goose Bay		Chickaloon		Trading Bay		Total-Cook Inlet[1/]			
	Summer		Fall		Summer		Fall		Fall		Fall		Summer		Summer		Fall	
Food Idem	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard	Esophagus	Gizzard
Potomogeton seeds	21	31	7	19	27	31	14	28	20	20	22	32	5		25	30	14	24
Potomogeton tubers				tr			5	2			10	4					4	1
Carex	21	19	54	30	41	55	14	25	20	14	20	22	88	100	36	42	27	25
Hippuris		6	14	15	7	7	6	12		1	10	4	2		5	7	8	11
Scripus validus	42	37	4	28		2	tr		7	27	0	1			11	15	2	14
Scripus paludosus	7	1		1	2	1	tr	1	7	9	5	7			4	2	2	3
Scripus tubers				1			30	7	27	11	7	2					18	4
Zannichellia	7				2	2	1		7	1	10	18			4	1	4	3
Triglochin				1				1										1
Grass												1						tr
Misc. seeds		1	2	3			5	12	7	15	2	2				tr	3	9
Misc. foliage			1	tr			2	5	2	2	2						2	2
Total Plant	98	95	82	98	79	98	78	93	97	100	8	93	95	100	85	97	84	97
Chrionomid larvae	tr	1	3	tr			2	tr			5	tr					3	tr
Other insect larvae	tr	3	6		7	1	12	1			2				5	2	5	tr
Adult insects	tr	1	1	tr			5	tr	2		2	tr	5				5	tr
Claims					2			4			2	2					tr	2
Snails			7	1											4		2	tr
Crustaceans			1	tr			1	1				2					tr	tr
Sticklebacks					10										7			
Stickleback eggs															0			
Total Animal	2	5	18	2	19	1	20	7	2	0	11	5	5	0	16	2	16	3
Sample Size	5	9	27	48	10	19	24	62	10	13	12	20	1	1	15	29	73	142

1/ Does not include Trading Bay data

PACIFIC FLYWAY WATERFOWL MANAGEMENT PLANS

In late November 1978, the USFWS initiated management planning for geese, swans and cranes of the Pacific Flyway. The management plans are being written by State, Federal and University affiliated personnel.

The A.D.F.&G. and U.S.F.W.S. have signed a cooperative agreement concerning the Department's involvement in these plans. Up to 75 percent of the waterfowl project coordinator's time may be involved, but the salary will be paid by the U.S.F.W.S. Additionally, all travel costs to planning workshops will be paid by the U.S.F.W.S.

Although up to 75 percent of the coordinator's time could have been spent during December 17, 1978 to June 30, 1979, only 50.4 percent was actually involved.

The Department is assisting in the writing of the following management plans: white-fronted geese, cackling Canada geese, dusky Canada geese, lesser Canada geese, Vancouver Canada geese, Aleutian Canada geese, Wrangell Island snow geese, emperor geese, lesser sandhill crane, whistling swan and trumpeter swan.

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1/ Some data in this report were modified by a memo. from M.F. Sorensen, U.S.F.W.S., 13 August 1979.

APPENDIX I

TRUMPETER SWAN STUDIES

The relationship between human disturbance and its effects on trumpeter swans (*Olor buccinator*) has been known generally for sometime (Hansen et al. 1971 and Peter E. K. Shepherd personal communication). Because of demands for private land, the Department of Natural Resources adopted a policy of transferring public land to private ownership. In view of this policy, we felt that some relationships between swans and human disturbance should be better quantified.

The following paper was presented at the Sixth Trumpeter Swan Conference, held in Anchorage. It was prepared after an extensive aerial survey of swans and cabins in the Sustina Basin was made by ADF&G in 1978. The results of this survey were compared to observations of swans made by Jim King, USFWS in 1968 and 1975.

RELATIONSHIPS BETWEEN TRUMPETER SWAN DISTRIBUTION AND CABINS IN THE SUSITNA BASIN, ALASKA[1/]

"Hiline Lake: 45 minutes flying time from Anchorage; 26 acres with 1,025 ft. of lake frontage; large trees; no marsh; beautiful building sites; good subdivision potential." This ad, in a recent edition of the Anchorage Times, typifies the boom in recreational site development which has occurred in parts of Alaska.

After flying a statewide trumpeter swan survey in 1975, King et al. (1976) said this about the possible effects of cabin development on swans: "In the Cook Inlet unit disturbance from recreational cabin building may be a problem. Adjacent to the road system there are cheek-to-cheek cabins around all the major lakes and no swans were seen on any of these lakes. Throughout the rest of the Cook Inlet area every lake large enough to land a float plane has one or more cabins mostly built in the last ten years since the State selected these lands. A few swans were seen on lakes with cabins; however, this was the exception and numbers of lakes with good-looking habitat, some of which had swans in 1968, are now swanless."

Hansen et al. (1971) also discussed some implications of human disturbance and its effects on swans. However, they did not specifically address the effects of human disturbance which results from cabin construction.

The purposes of this paper are to: 1) quantify the relationships between swan distribution and increased human disturbance which results from cabin construction in the Anchorage area; and 2) discuss some long-term implications of this and other sources of trumpter swan habitat alteration.

ACKNOWLEDGMENTS

I am grateful to James G. King, Donald E. McKnight, Peter E.K. Shepherd and my wife, Karen, for reviewing this paper. Lita Lewis provided typing skills and patience. Jim King prompted me to address this problem and he provided data freely from statewide surveys in 1968 and 1975 (King 1968 and King et al. 1976). A portion of the costs necessary to write this paper were paid by Federal Aid in Wildlife Restoration, Project W-17-9. The remaining costs were paid by sport hunters in Alaska.

AREA DESCRIPTION

The Susitna Basin trumpeter swan habitat unit lies to the west and north of Cook Inlet and is bounded by Redoubt Bay on the south, the Alaska Mountain Range on the west and north, and the Talkeetna Mountain Range and Cook Inlet on the east. King (1968) estimated that there were 5,625 square miles of potential trumpeter swan habitat in the area. The Basin is a composite of land covered by spruce, birch and aspen, lakes and muskeg-covered lowlands, large coastal river deltas and numerous river valleys beginning at glaciers and ending at salt water. This region is in a rain shadow and the combination of warm, dry summers and numerous large lakes make the Susitna Basin a summer playground for residents of the Anchorage area where over half of all Alaskans live.

METHODS

To evaluate the hypothesis that cabin construction was altering the distribution of swans, it was necessary to know the locations of swans observed in the 1968 and 1975 surveys relative to cabin locations at the time of each survey. Although the exact locations of swans were plotted on 1 inch:1 mile maps, cabin sites were not recorded in either survey.

Land status records were reviewed at the State Division of Lands, Bureau of Land Management, Chugach National Forest, and the Matanuska-Susitna and Kenai Boroughs. However, these records proved inadequate to allow determination in most instances where, when, or even if cabins had been built.

On July 6 and 7, 1978 I conducted an aerial survey of the Susitna Basin. At the sites where swans were seen in 1968, 1975 and in 1978, the following data were recorded: number of swans seen, number and approximate age of cabins, distance between swans and cabins, and the presence and approximate age of roads or other developments. Land status records supplemented some of the visual observations. A subjective determination was also made of whether a float plane could operate on lakes or streams where swans were seen.

When comparing individual swan observations for each of the three surveys, I assumed a single use area occurred when adult birds were 1.0 mile or less apart and adults with young were 2.5 miles or less apart. The size of family group territories was provided by Hansen et al. (1971). This

assumption doesn't necessarily mean that the same birds returned to a given location over a 10-year period. It does, however, indicate habitat acceptable to trumpeter swans.

One practical limitation of the 1978 survey was that cabins were readily detected only on the same lake that swans occurred or within 0.5 miles overland from the birds. Cabins were recorded, however, when observed at distances up to 2 miles overland from the swans.

RESULTS

On the basis of the criteria described, swans were seen at 343 different swan use areas during the 1968, 1975 and 1978 surveys. In 1978, 303 (88 percent) of these areas were inspected and swans were present at 170 sites. Cabins were present at 30 (10 percent) of these 303 locations.

In Tables 13 and 14 the reuse rates of swan use areas are provided for adult birds, adults with young and all birds. In both 1975 and 1978, swans were seen in 47 percent of the swan use areas observed first in 1968 and in which no cabins were present through 1978 (Table 13). Fifty-seven percent of the swan use areas with no cabins present, which were observed in 1975, were occupied by swans in 1978. Adults with broods had an average return rate of 62 percent while the return rate for adults without young averaged 46 percent. Hansen et al. (1971) recorded an average annual return rate of 80 percent for mated pairs to established nest sites on the Kenai Peninsula.

Determining the reoccupancy rate by swans of areas associated with cabins was complicated by several factors. In some instances swans were observed near existing cabins, while in other instances cabins were built between survey years. Also, the relative age of cabins may have been incorrectly determined in 1978. As seen in Table 14 for occupied swan use areas in 1968 with one or more cabins nearby, 35 percent were reoccupied in 1975 and only 22 percent had swans in 1978. For occupied swan use areas in 1975, the reuse rate in 1978 was 32 percent compared to 57 percent for areas with no cabins. The lowest incidence of swan reuse (13 percent) occurred for adult birds in areas surveyed in 1968 and again in 1978.

The number of cabins had a marked effect on the return rate of swans, as demonstrated in Table 15. Where one or two cabins were present the rate of reuse was 48 percent, compared to a 50 percent rate for areas without cabins. However, in areas with three to five cabins the reuse rate was 36 percent. When six or more cabins existed the probability of swans returning to that area was only 8 percent.

For all surveys an average of 2.3 adult swans were seen per observation in areas with no cabins. As seen in Table15, in areas with cabins an average of 0.95 adult swans were seen per observation. Depending on the number of cabins present, there were from 43 percent to 93 percent fewer swans present in areas with cabins, compared to those areas without cabins. Although individual situations vary, it seems apparent that the

amount of human disturbance associated with one or two cabins is not sufficient to displace swans. However, when three or more cabins are present the area rapidly becomes unacceptable to the birds.

In 1978, 15 percent of the 170 observations of swans occurred on lakes large enough for float plane operation, while 18 percent of the total birds were seen in these areas. This habitat type is selected against by adults with broods, paired adults without broods and single adults. However, adults in flocks (three or more birds) appear to prefer this habitat type as 33.1 percent of grouped birds were seen on larger lakes. In 1978 five instances of new roads were recorded in swan use areas. In two instances cabins had been built on the road and in both cases swans were displaced. The roads had no apparent effect on swan distribution in the other three instances.

DISCUSSION AND PREDICTIONS

Although the number of cabins near the 303 swan use areas evaluated in 1978 has increased from 21 to 75 (257 percent) since 1968, swans have continued to increase in the Susitna Basin. Direct comparisons of populations between survey years were impossible due to different sampling intensities and survey design. However, for adult swans only, a population increase of 33.6 percent was indicated between 1968 and 1975; between 1975 and 1978 an increase of 22.7 percent occurred. When young of this year were included, I projected the population in 1978 to be 766 birds, compared to 617 in 1975. These figures were based on 79 percent habitat coverage; the actual population in 1978 was conservatively estimated to be 800 birds.

On the Copper River Delta, Alaska, pairs of trumpeter swans with nests or young were more sensitive to human disturbance than adults without young (Peter E. K. Shepherd, pers. comm.). In the Susitna Basin the reoccupancy rate of areas with cabins was 25 percent for adult birds and 38 percent for adults with young. However, only 10 family groups were observed in areas with cabins. Furthermore, only four of the observations occurred in areas where three or more cabins were present.

The proportions of pairs with broods in 1968, 1975 and 1978 were 32 percent, 36 percent and 42 percent, respectively. This may indicate increasing productivity. However, 1978 was an early year for ice and snow melt while 1968 and 1975 were average (J. G. King, pers. comm.). This probably contributed to the greater percentage of pairs with broods in 1978.

As explained previously, cabins were readily located if they occurred on the same lake or 0.5 miles or less overland from swans. However, cabins were recorded up to 2.0 miles overland from the birds. It appeared that swans were apt to be displaced when cabins occurred on the same lake where swans were found, regardless of the size of the lake. However, an overland separation of even 0.5 miles appeared to be an adequate buffer to human disturbance. This is reasonable because even one-half mile of muskeg or dense spruce forest presents a formidable obstacle to human travel during summer months.

It is inevitable that the Susitna Basin trumpeter swan population, as well as other expanding populations across Alaska, will eventually reach levels limited to a large extent by human disturbance. At that point each successive expansion of permanent human disturbance will reduce the number of trumpeter swans in Alaska.

Roads will be established, power lines erected, new communities created and perhaps thousands of new cabins built within trumpeter swan habitat. For example, a voter initiative, which is currently blocked in the courts, provides for up to 30 million acres of State land to be given to Alaskan residents. Up to 160 acres could be obtained by each citizen, depending on residency. Even if this initiative fails, Alaskans are demanding—and politicians are responding—that more land should be transfered to private ownership.

Fortunately, a large proportion of the trumpeter swans in Alaska prefer habitat that has little appeal to most urbanites seeking recreation during the summer months. Cabins built in the future will, in most cases, be restricted to larger lakes and rivers which afford aircraft access. Even if roads open up habitat, few people will build cabins for summertime recreation in mosquito-infested swampy areas with poor building sites, no view and little or no water recreation potential. Such areas are preferred by waterfowl, including trumpeter swans.

I believe that there will be trumpeter swans in Alaska 10, 100, and 1,000 years from today. Whether there will be more or fewer will depend on the dynamic balance struck between economic, political and social needs and attitudes. For example, although the State may transfer millions of acres of land to private individuals, concurrent events dictate that management authority for up to 120 million acres of (d)(2) lands will be placed under various Federal resource managing agencies.

At this point in Alaska's history, Hansen's et al. (1971) statement has never been more appropriate: "Perhaps the most we dare hope for the future of the trumpeter swan as well as for many other of earth's threatened species is a partially satisfying 'half-load' predicated upon the current man/environment relationship."

I, for one, am confident that if we who are interested in the welfare of the trumpeter swan remain vigilant, there will be a balance struck and the welfare of the trumpeter swan will be assured. The challenge will be to use knowledge such as that presented here, to temper the actions of those who have little regard for nature or understanding of its complexities, and to insure that such a balance is truly achieved in the future.

Table 13 Reuse rates for trumpeter swans in areas with no cabins present.

Year Resurveyed	1968 Survey (%) Adults Only	Ad/Yg	All Birds	1975 Survey (%) Adults Only	Ad/Yg	All Birds
1975	39	67	47	-	-	-
1978	44	54	47	54	65	57

All Years Average: Adults Only = 46%; Ad/Yg = 62%; All Birds = 50%

Table 14 Reuse rates for trumpeter swans in areas with cabins present.

Year Resurveyed	1968 Survey (%) Adults Only	Ad/Yg*	All Birds	1975 Survey (%) Adults Only	Ad/Yg*	All Birds
1975	25	75	35	-	-	-
1978	13	40	22	37	0	32

* Small Sample

All Years Average: Adults Only = 25%; Ad/Yg = 38%; All Birds = 30%

Table 15 Number of cabins related to trumpeter swan use, 1968, 1975, and 1978 surveys.

No. Of Cabins Present	Reuse of Swan Use Areas	Ave. No. Adult Swans Per Use Area
1-2	48%	1.3
3-5	36%	0.5
6+	8%	0.15
Average	30%	0.95
No Cabins Present	50%	2.3