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# STATE OF ALASKA

## DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE COMMISSIONER

BILL SHEFFIELD, GOVERNOR

POUCH M  
JUNEAU, ALASKA 99811  
PHONE: 907-465-2400

April 10, 1985

The Honorable Richard Shultz, Co-Chair  
The Honorable Adelheid Herrmann, Co-Chair  
House Resources Committee  
Alaska State House of Representatives  
Pouch V  
Juneau, Alaska 99811

Dear Representative Shultz and Representative Herrmann:

I am writing with regard to two bills scheduled for hearing in your committee on Wednesday, April 10, 1985, House Bill 312, creating the Dude Creek Critical Habitat Area, and House Bill 316, relating to navigable or public waters. The department provides the following information for the committee's consideration.

### Dude Creek Critical Habitat Area (CHA)

This proposed 3,730 acre critical habitat area includes 3,090 acres of mental health land. Though these lands were redesignated and have been managed as general grant lands since 1978, the recent concern about mental health lands heard by this committee in House Bill 128 suggested that I point out this fact. Designation as CHA is not inconsistent with general grant land management.

The Department has received a 640 acre grazing lease application within the proposed CHA which is being held pending the outcome of this legislation. While grazing is listed as a permitted use it may be considered unacceptable with ground nesting-cranes. This could be considered in the management plan.

Section 1(b) states that the Department of Fish and Game will develop a management plan in consultation with the community of Gustavus. I believe the Department of Natural Resources, as the land manager, should also be consulted in development of that management plan. Section 1(c) specifies that the Department of Fish and Game will manage the critical habitat. In other refuge and critical habitat

Richard Shultz  
Adelheid Herrmann

-2-

April 10, 1985


areas in the state, the Department of Fish and Game prepares the management plan, and the Department of Natural Resources manages the land in accordance with that plan. This same approach could be considered within the Dude Creek CHA.

House Bill 316, Public and Navigable Waters

House Bill 316 undertakes to make more explicit the State Constitution's provision assuring access to the navigable or public waters of the State, and we defer to the legislature as to whether such legislation is required. In describing a right to use privately owned land beneath public waters, section 1(c) may be subject to challenge as a taking of land without compensation.

Thank you for the opportunity to comment on these two pieces of legislation.

Sincerely,

  
Esther C. Wunnicke  
Commissioner

Attachment

cc: Representative Goll  
Representative Cotten  
Don W. Collinsworth, Commissioner, Department of Fish  
and Game  
Tom Hawkins, Director, Division of Land and Water  
Management

STATE OF ALASKA 1985 LEGISLATIVE SESSION  
FISCAL NOTE

Revision Date: \_\_\_\_\_

**REQUEST**

Bill/Resolution No.: HB 312  
Title: Dude Cr. CHA

**FISCAL DETAIL**

Agency Affected: Natural Resources  
Program Category Affected: NRMEC

Sponsor: Coll. Duncan, MM Miller &  
Requestor: Binkley  
Date of Request: \_\_\_\_\_

BRU, Program or Subprogram(s) Affected: Land & Water Management

**EXPENDITURES/REVENUES: (Thousands of Dollars)**

	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90
<b>OPERATING</b>						
100 PERSONAL SERVICES						
200 TRAVEL						
300 CONTRACTUAL						
400 SUPPLIES						
500 EQUIPMENT						
600 LAND & STRUCTURES						
700 GRANTS, CLAIMS						
800 MISCELLANEOUS						
<b>TOTAL OPERATING</b>		-0-	-0-	-0-	-0-	-0-

<b>CAPITAL</b>		-0-	-0-	-0-	-0-	-0-
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<b>REVENUE</b>		-0-	-0-	-0-	-0-	-0-
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**FUNDING: (Thousands of Dollars)**

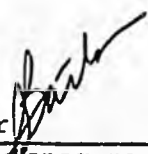
GENERAL FUND						
FEDERAL FUNDS						
OTHER						
<b>TOTAL</b>		-0-	-0-	-0-	-0-	-0-

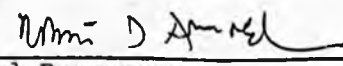
**POSITIONS:**

FULL-TIME						
PART-TIME						
TEMPORARY						

**ANALYSIS:** Attach a separate page if necessary

No fiscal impact

Prepared By: Mike Vediner  Phone: 465-2400  
Division: Land & Water Management Date: April 9, 1985

Approved by Commissioner: Wm. D. Amundson  Date: April 9, 1985  
Agency: Department of Natural Resources

Distribution (by Agency preparing fiscal note):

- Legislative Finance
- Legislative Sponsor
- Requestor
- Office of Management and Budget
- Impacted Agency(ies)

7/1/84

# EYED TOWNSHIP 40 SOUTH RANGE 58 EAST OF THE COPPER RIVER MERIDIAN, ALASKA

OFFICIALLY FILED 5/1/1980

STATUS OF PUBLIC DOMAIN  
LAND AND MINERAL TITLES

Proposed Dude Creek Critical Habitat Area

MTP

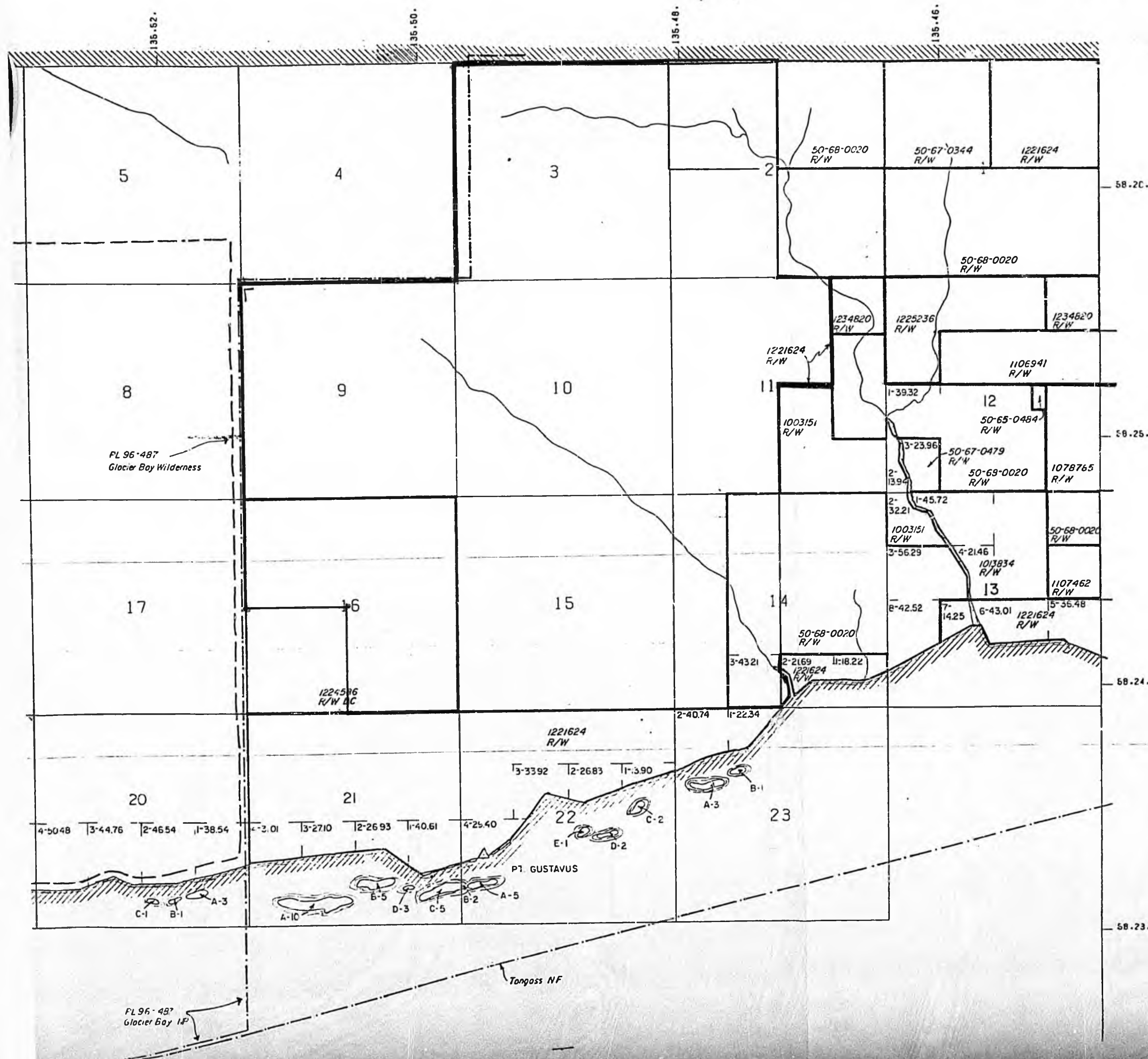
FOR ORDERS EFFECTING DISPOSAL OR USE OF  
UNIDENTIFIED LANDS, REFER TO INDEX OF  
MISCELLANEOUS DOCUMENTS.

AA 12503 SS entire Tp Amdt

WARNING  
THIS PLAT IS THE BUREAU'S RECORD OF TITLE AND SHOULD  
BE USED ONLY AS A GRAPHIC DISPLAY OF TOWNSHIP SURVEY  
DATA. RECORDS HEREON DO NOT REFLECT TITLE CHANGES  
WHICH MAY HAVE BEEN EFFECTED BY LATERAL MOVEMENT  
OF RIVERS OR OTHER BODIES OF WATER. REFER TO THE  
CADASTRAL SURVEY FOR OFFICIAL SURVEY INFORMATION

CURRENT TO

JUL 20 1982





STATE OF ALASKA  
OFFICE OF THE GOVERNOR  
BILL ANALYSIS

DEPARTMENT Fish and Game	DIVISION Habitat	BILL NUMBER HB312	SPONSOR Goll, Duncan, Miller, Binkley
DEPARTMENT POSITION  Strongly Support			
PREPARED BY Habitat Division/Debra Clausen	DATE 4/2/85	COMMISSIONER'S SIGNATURE <i>Chris Callenworth</i>	DATE 4-5-85

SUMMARY

OTHER AGENCIES AFFECTED BY BILL Department of Natural Resources	CONSTITUENT GROUP(S) AFFECTED BY BILL Community of Gustavus
ORGANIZATIONAL SUPPORT FOR BILL Community of Gustavus	ORGANIZATIONAL OPPOSITION TO BILL None known

FISCAL IMPACT:  NONE  FISCAL NOTE ATTACHED

BACKGROUND/LEGISLATIVE INTENT

The purpose of establishing the Dude Creek Critical Habitat Area is to protect and enhance the wet meadow habitat that is the key roosting area for migrating lesser sandhill cranes, to protect lesser sandhill cranes, and for the continued public use and enjoyment of the area.

ANALYSIS OF BILL/PROGRAM EFFECTS

1. Establishes the Dude Creek Critical Habitat Area.
2. Identifies the purpose for which the area is established.
3. Provides for the management of the Dude Creek Critical Habitat Area including the development of a management plan.

AMENDMENTS PROPOSED

None

PLEASE ATTACH A SEPARATE SHEET FOR ADDITIONAL COMMENTS OR ANALYSIS.

STATE OF ALASKA 1985 LEGISLATIVE SESSION  
FISCAL NOTE

Revision Date: \_\_\_\_\_

REQUEST

Bill/Resolution No.: HB312  
Title: Dude Creek Critical

Habitat Area

Sponsor: Goll, Duncan, Miller, Rinkley

Requestor: \_\_\_\_\_

Date of Request: \_\_\_\_\_

FISCAL DETAIL

Agency Affected: Dept. of Fish and Game

Program Category Affected: \_\_\_\_\_

BRU, Program or Subprogram(s) Affected: \_\_\_\_\_

EXPENDITURES/REVENUES: (Thousands of Dollars)

	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90
<b>OPERATING</b>						
100 PERSONAL SERVICES						
200 TRAVEL						
300 CONTRACTUAL						
400 SUPPLIES						
500 EQUIPMENT						
600 LAND & STRUCTURES						
700 GRANTS, CLAIMS						
800 MISCELLANEOUS						
<b>TOTAL OPERATING</b>		0				
<b>CAPITAL</b>		0				
<b>REVENUE</b>						

FUNDING: (Thousands of Dollars)

GENERAL FUND						
FEDERAL FUNDS						
OTHER						
<b>TOTAL</b>		0				

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: Attach a separate page if necessary

Prepared By: Truce H. Baker Phone: \_\_\_\_\_  
Division: Habitat Division Date: 6/3/85

Approved by Commissioner: Orin Belenewitz Date: 4.5.85  
Agency: \_\_\_\_\_

Distribution (by Agency preparing fiscal note):  
Legislative Finance  
Legislative Sponsor  
Requestor  
Office of Management and Budget  
Impacted Agency(ies)



STATE OF ALASKA  
HOUSE OF REPRESENTATIVES

MEMORANDUM

April 1, 1985

TO: House Resources Committee  
FROM: Representative Peter Goll *Peter*  
SUBJECT: Briefing Paper for House Bill 312

DUDE CREEK CRITICAL HABITAT AREA

Location

Gustavus, Alaska

Land Status

There are no in-holdings; the parcel proposed for the critical habitat area is state-owned or selected.

History

The residents of Gustavus have been working on the proposal for the past three years. The critical habitat status was selected after a careful review of the available land management options.

The concept was endorsed in a community-wide January, 1984, referendum by a 66-25 vote. A committee of resident citizens was formed to work with the Alaska Department of Fish and Game to develop proposed legislation.

The resulting legislation (House Bill 312) and accompanying letter of intent received the unanimous endorsement of the Gustavus Community Association on March 4, 1985.

## Purpose

The wet meadow at the western edge of the community of Gustavus is a major resting area for the Pacific population of Lesser Sandhill Cranes during their annual migration between western Alaska and southern California.

Research shows that half or more of the entire Pacific population of Lesser Sandhill Cranes uses the Dude Creek meadow during the September and April-May migratory periods. The adjacent national park is little used by the cranes.

The crane habitat at Gustavus has been greatly reduced in recent years by development and natural reforestation. The proposed critical habitat area includes the largest remaining block of appropriate habitat in the area. The wet meadow favored by the cranes is very susceptible to alteration by draining. The birds also are very easily disturbed by human presence.

The proposed legislation requested by Gustavus is designed to give the Alaska Department of Fish and Game authority to manage human uses of the Dude Creek wet meadow to protect the habitat needed by the cranes. The legislation and letter of intent also make it clear that existing compatible human uses will be accommodated. The letter of intent also gives ADF&G clear direction to work in close cooperation with Gustavus residents in drafting a management plan.

## DUDE CREEK CRITICAL HABITAT AREA

### Letter of Intent

It is the intent of the Legislature that surface vegetation and soils be maintained to preserve the wetlands nature of the critical habitat area and provide protection to migrating lesser sandhill cranes.

In creating the Dude Creek Critical Habitat Area, the Legislature also intends that hunting, fishing and trapping activities will continue to occur in accordance with harvest regulations as established by the Boards of Fisheries and Game. The following public uses of the area are recognized as historic and traditional: wildlife viewing, firewood harvesting, public access, hiking, berry picking, and grazing. It is the intent of the Legislature that the listed uses will continue unless they are determined to be incompatible with the purpose for which the area is established. The Department of Fish and Game will conduct specific fact finding, including public hearings in Gustavus, prior to making final determination of the compatibility of the listed uses during various times of the year.

The Department is to consult with the community of Gustavus in the preparation and implementation of a management plan for the Dude Creek Critical Habitat Area. In the event that the community forms a local fish and game advisory committee or a critical habitat advisory group, the Department will work closely with those entities in preparation of the plan.

Representative Peter Goll  
Alaska House of Representatives  
Pouch V, Juneau, AK 99811

February 25, 1985

Dear Representative Goll,

The committee which has been working towards the creation of the Dude Creek Critical Habitat Area gives its full endorsement to the draft letter of intent, dated February 21, 1985. We feel that this second draft expresses our desire to provide habitat for the sandhill crane while ensuring human usage of the area in consultation with Fish and Game.

We appreciate the help that you and your staff have given us and are looking forward to the enactment of this legislation.

Sincerely,

*Morgan DeLoe*  
*Debrah D. Woodruff*  
*Royd E. Prouty*

Gustavus Community Assoc.  
Box 62  
Gustavus Ak. 99826

Representative Peter Goll  
Alaska House of Representatives  
Pouch V, Juneau, Ak 99811

March 4, 1985

Dear Representative Goll,

The Gustavus Community Association gives its full support to the second draft letter of intent, as approved by the committee working for the creation of the Dude Creek crane habitat.

We feel that this draft meets the criteria of continued human useage of the Dude Creek meadows in conjunction with the sandhill crane, as desired by a survey of registered voters in 1983.

Thank you for your help and let us know if we can be of any further assistance.

Sincerely,

*Sally C Leeh* president

Gustavus Community Association

# Alaska State Legislature



## House of Representatives House Judiciary Committee

Pouch V  
State Capitol  
Juneau, Alaska 99811  
(907) 465-4990

March 28, 1985

The Honorable Richard Schultz  
House of Representatives  
Pouch V  
Juneau, Alaska 99811

Re: HB 312

Dear Dick:

I would like to ask your help in scheduling HB 312 for an early hearing in the Resources Committee. HB 312 would establish the "Dude Creek Critical Habitat Area" on state land in Gustavus, sixty miles west of Juneau.

This land is wet and marshy, not used for any other purpose and unfit for disposal as homesites. Because of its open, wet and marshy nature, it is a major stopover point for migratory waterfowl in fall and spring, including very large numbers of Sandhill Cranes (as many as 13,000 at a time), other crane species, several species of ducks and geese, and swans.

A very large majority of the people of Gustavus support this proposal, as do the state Departments of Fish and Game and Natural Resources. There is no significant opposition to the establishment of this critical habitat area.

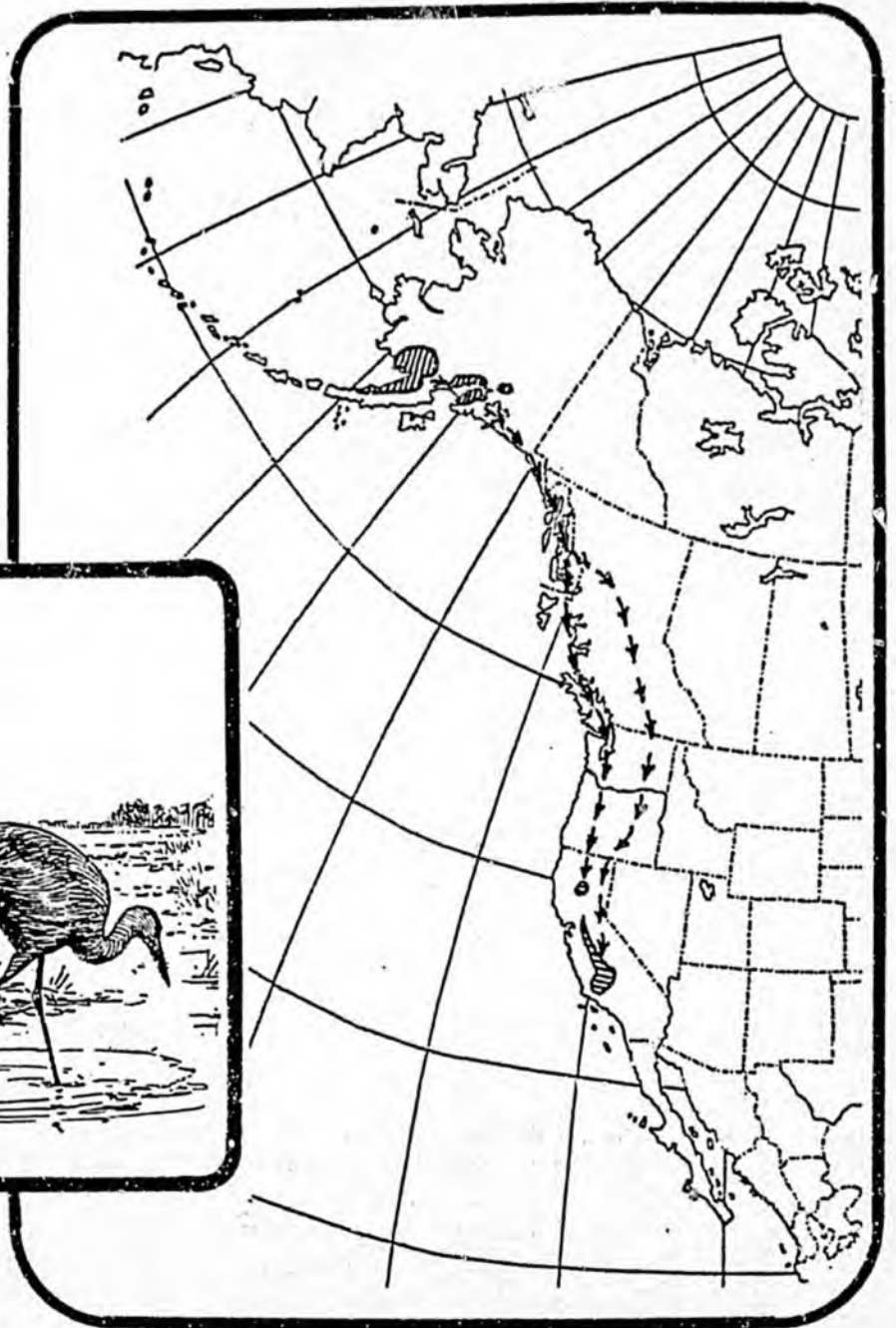
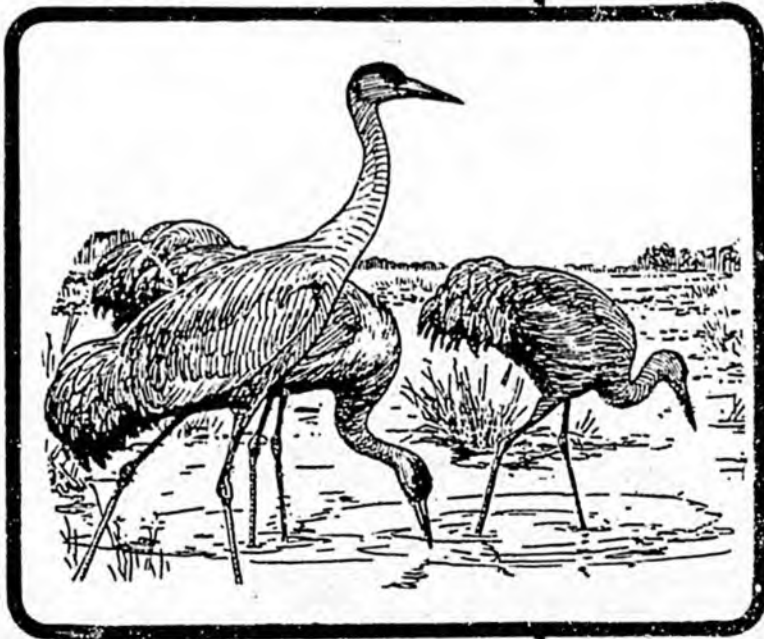
The proposed area is a waterfowl treasurehouse. Even though it is not in my district, it is an area I have long been interested in. I would very much like to get the bill moving and would appreciate whatever help you could give to that end.

Sincerely,

A handwritten signature in dark ink, appearing to read "M.M. Miller".

M.M. Miller

# Pacific Flyway Population of Lesser Sandhill Cranes



PACIFIC FLYWAY MANAGEMENT PLAN  
FOR THE  
PACIFIC FLYWAY POPULATION OF  
LESSER SANDHILL CRANES

Prepared for the:

Pacific Flyway Council  
Canadian Wildlife Service  
U. S. Fish and Wildlife Service

March 1983

PACIFIC FLYWAY MANAGEMENT PLAN  
FOR THE  
PACIFIC FLYWAY POPULATION OF  
LESSER SANDHILL CRANES

Prepared by the Subcommittee on the Pacific Flyway Population of Lesser Sandhill Cranes of the Pacific Flyway Study Committee:

Gary W. Kramer, U.S. Fish and Wildlife Service, Delano, CA,  
Subcommittee Chairman  
Bruce Conant, U.S. Fish and Wildlife Service, Juneau  
Gary Kaiser, Canadian Wildlife Service, Delta, B.C.  
Carroll D. Littlefield, Arizona Cooperative Wildlife Research Unit,  
Tucson  
Ronald W. Schlorff, California Department of Fish and Game,  
Sacramento  
Daniel E. Timm, Alaska Department of Fish and Game, Anchorage

Approved by:

William A. Molini 3/20/83  
Chairman, Pacific Flyway Council Date

\_\_\_\_\_  
Director General, Canadian Wildlife Service Date

\_\_\_\_\_  
Director, U.S. Fish and Wildlife Service Date

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## I. INTRODUCTION

The lesser sandhill crane (Grus canadensis canadensis) as its common name implies is the smallest race of the species. The race nests throughout north-central and northwestern Canada, Alaska, and into the extreme northeastern portion of the U.S.S.R., and winters in southern portions of both the Pacific and Central Flyways. Relationships between breeding areas, migration routes and wintering areas are poorly defined.

The purpose of this management plan is to provide guidelines for the cooperative management of the Pacific Flyway Population (PFP) of lesser sandhill cranes which winters in California and breeds probably in southwestern and south-central Alaska (Fig. 1). Management of the larger Mid-Continent Population is being covered in another plan.

## II. GOALS AND OBJECTIVES

The goals of this management plan are to maintain and enhance the Pacific Flyway Population of lesser sandhill cranes for its intrinsic values as well as for its direct benefits to man.

Objectives of this plan are to:

- A. Maintain the wintering population of lesser sandhill cranes in California at the current level of an estimated 20,000 to 25,000 birds. (This objective may be modified pending results from more complete inventories of the population.)
- B. Maintain production, migration, and wintering habitat for lesser sandhill cranes in adequate quantity and quality to support the population at levels and distribution shown in Figures 1-3 and listed in Table 1. (Because relationships between production, migration, and wintering areas are so poorly defined, the objective for distribution as listed in Table 1 will certainly be changed pending results from banding investigations and population surveys.)
- C. Maintain consumptive and nonconsumptive uses of this population at their current levels (See III Status, Use, Table 2). (Changes in levels of use would be dependent upon more definitive estimates of population status.)

## III. STATUS

### Population and Distribution

#### Summer

The nesting areas used by those lesser sandhill cranes wintering in California have not been confirmed by banding or color-marking information. Lesser sandhill cranes nest at scattered locations throughout

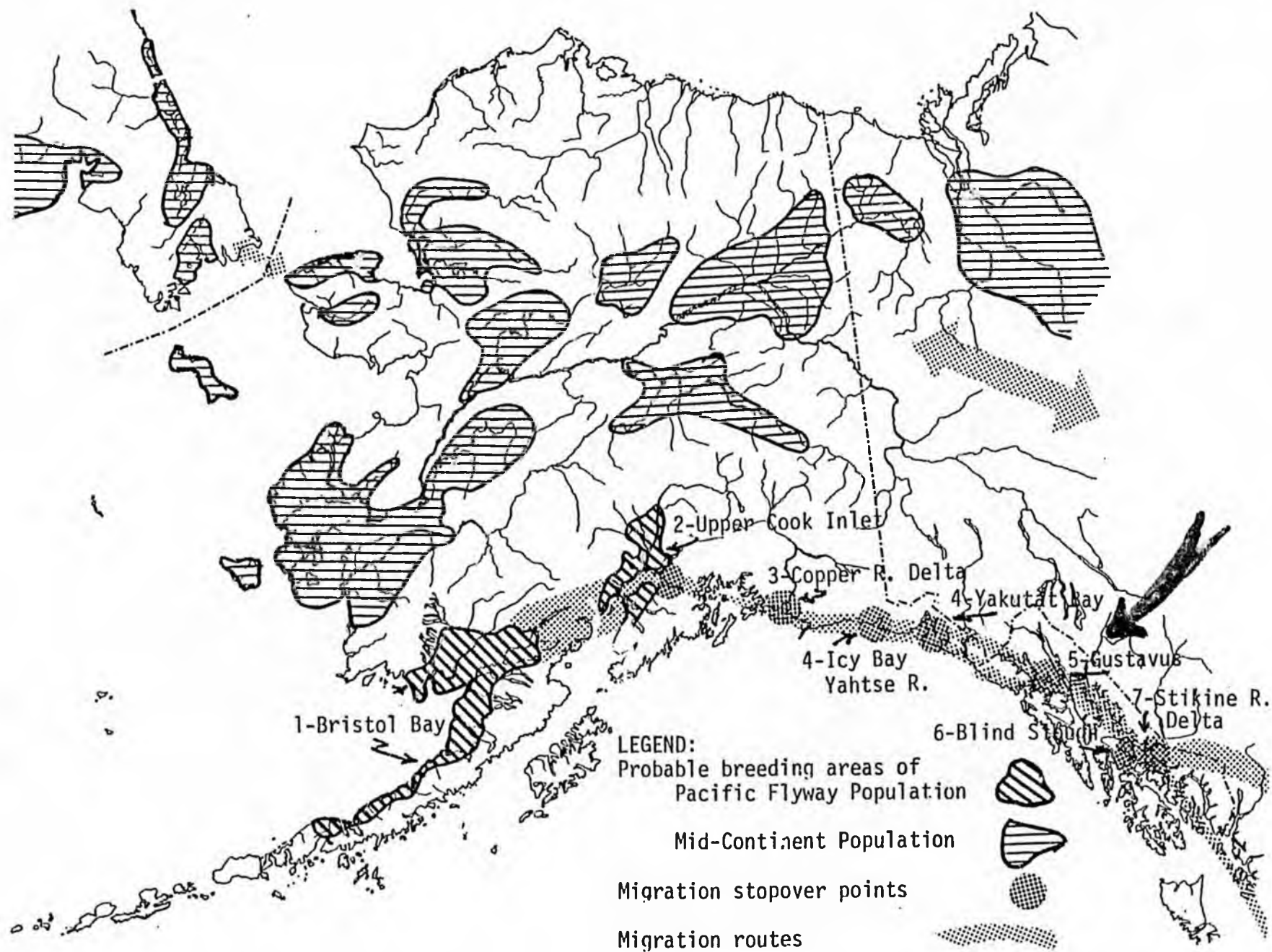


Figure 1. Major breeding grounds of lesser sandhill cranes in Alaska and portions of the U.S.S.R. and Canada. Probable breeding areas for both the Pacific Flyway and Mid-Continent Populations are shown. Migration stopover points and routes for only the PFP cranes are shown.

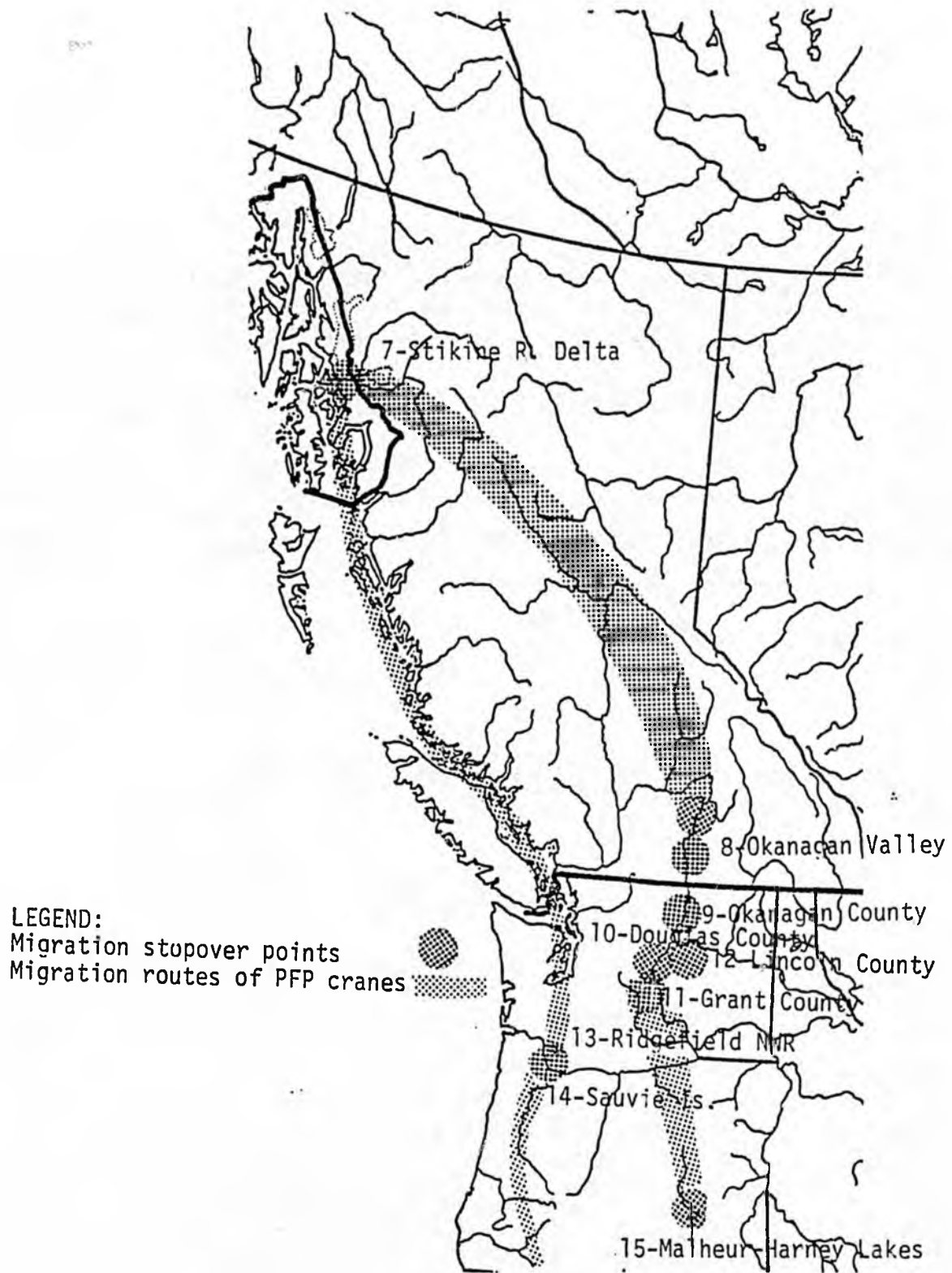


Figure 2. Migration routes and stopover points of the Pacific Flyway Population of lesser sandhill cranes.

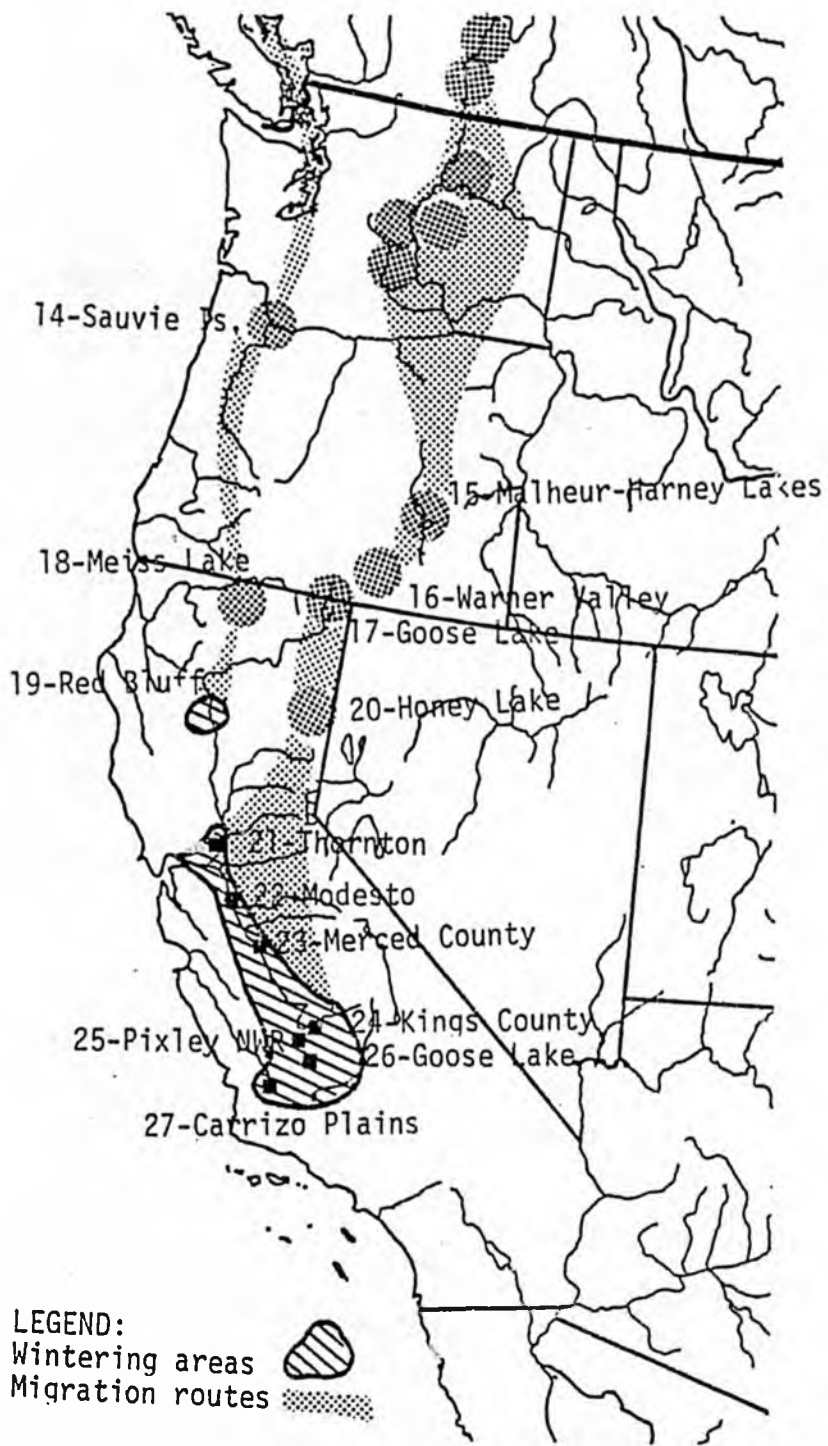


Figure 3. Migration routes, stopover points and wintering areas of Pacific Flyway Population of lesser sandhill cranes.

Table 1. Principal locations used by the Pacific Flyway population (PFP) of lesser sandhill cranes, use of those areas and estimated numbers of cranes. Map numbers correspond to locations shown on Figures 1-3.

Map Number	Location	Use by Cranes	Estimated Number of Cranes & Remarks
<b>ALASKA</b>			
1	Bristol Bay Lowlands	Nesting	Unknown numbers; presumably the major breeding grounds for PFP cranes; about 2,400 counted in spring Breeding Waterfowl Survey
2	Upper Cook Inlet-Susitna River Marshes	Limited nesting; major migration stopover	Estimated 500-1,000 cranes summer in Cook Inlet marshes; estimated 10,000+ cranes stopover in fall, with fewer stopping in spring; Portage Flats is a particularly important stopover point.
3	Copper River Delta	Major stopover	20,000+ cranes stopover both in spring and fall
4	Icy Bay, Yahtse River, & Yakutat Bay	Migration stopover	Unknown
5	Gustavus Area	Migration stopover	Unknown
6	Stikine Slough	Migration stopover	Unknown
7	Stikine River Delta	Migration stopover	Unknown
<b>BRITISH COLUMBIA</b>			
8	Okanagan Valley	Migration stopover	Unknown
<b>WASHINGTON</b>			
9	Okanagan County	Migration stopover	1,200 cranes stopping in October 1978; numerous sightings of small numbers stopping and repeated sightings of 1,000-2,000 cranes resting on pond near St. Andrews; numerous sightings of cranes feeding and in migration.
10	Douglas County	Migration stopover	1,000 cranes at Banks Lake in October 1967
11	Grant County	Migration stopover	Numerous records of cranes feeding and in migration, with flock size upwards of 500 birds.
12	Lincoln County	Migration stopover	Cranes are found in the vicinity of Woodland and on Ridgefield NWR (feeding area).
13	Cowlitz County	Migration stopover	large numbers in flight.
<b>OREGON</b>			
14	Sauvie Island, Columbia County	Migration stopover	1,400 cranes
15	Malheur-Harney Lakes area, Harney Co.	Migration stopover	Major stopover point; 14,000+ cranes
16	Warner Valley, Lake County	Migration stopover	10,000+ cranes
17	Goose Lake, Lake County	Migration stopover	4,000+ cranes
<b>CALIFORNIA</b>			
17	Goose Lake, Modoc County	See above	See above
18	Meiss Lake, Siskiyou County	Migration stopover	Unknown
19	Red Bluff, Siskiyou County	Wintering	About 1,400 cranes; probably a distinct sub-population.
20	Honey Lake, Lassen County	Migration stopover	10,000+ cranes
21	Thornton, San Joaquin County	Wintering	4,100 cranes in winter of 1969-79*
22	Modesto, Stanislaus County	Wintering	2,400 cranes in winter of 1969-70**
23	Merced County	Wintering	9,800 cranes in winter of 1969-70*
24	Kings County	Wintering	325 crane in winter of 1969-70*
25	Pixley NWR, Tulare County	Wintering	8 cranes in winter of 1969-70*
26	Goose Lake, Kern County	Wintering	630 cranes in winter of 1969-70**
27	Carrizo Plains, San Luis Obispo Co.	Wintering	2,765 cranes in winter of 1969-70*

\*Examination of these areas in 1970, 1971, and 1976 showed that they were still being used by lesser sandhill cranes in about the same numbers as during the survey of 1969-70.

\*\*During 1978 and 1979, respectively, peak populations were 1,300 (13 December) and 1,200 (14 December).

much of northern Canada, Alaska and the Chukotsk-Kolyma region of the U.S.S.R. Almost three-fourths of the cranes breeding in surveyed portions of Alaska do so on the Yukon-Kuskokwim Delta (Conant et al. 1981). The principal nesting areas of the PFP cranes, however, are presumably to the south in the lowlands of Alaska's Bristol Bay and Upper Cook Inlet where an estimated 8.3% and 0.3%, respectively, of cranes from surveyed areas are found (Figure 1). PFP cranes may also nest further north in areas used by the Mid-Continent Population. As with other populations of birds of the same subspecies that nest in close proximity, a small percentage of cranes from the Pacific Flyway Population probably exchange with those of the Mid-Continent Population. A very few cranes have been reported as nesting or suspected to be nesting on Kupreanof, Kuiu, and Sergief islands in southeastern Alaska (Gabrielson and Lincoln 1959) and could belong to either the PFP cranes or to the Central Valley Population of greater sandhill cranes (G. c. tabida) whose northern range extends into British Columbia and is also poorly defined.

### Winter

Wintering PFP cranes within the Central Valley of California are separated into two groups or subpopulations (Figure 3, Table 1). The northernmost and smallest group, about 1,400 birds, winters just east of Red Bluff, Tehama County. These birds loaf and roost near the Sacramento River north of Red Bluff. The southern group, about 20,000 to 24,000 birds, winters from near Thornton, southeast to the Carrizo Plains in San Luis Obispo County (Littlefield and Thompson 1982). A majority of this group winters on and near Merced and San Luis NWRs, but during the winter of 1979-80 when conditions were unusually dry large numbers wintered in the Delta-Grizzly Island area. Up to 6,500 lesser sandhill cranes winter in the Carrizo Plain and use the shallow waters of Soda Lake for roosting (Bowen 1982).

Few PFP cranes have been seen between Red Bluff and Thornton, and apparently there is no interchange, at least in the wintering ground, between these two wintering groups. Appendix A contains more detailed information on population size and distribution in winter.

### Migration

Confirmation of the migration routes used by PFP cranes is based partly upon conjecture and part by limited observations of marked birds. Forty-three cranes were color-marked at Merced NWR in February and March 1980 which resulted in three sightings in spring east of Klamath Falls, Oregon, four sightings on or near Malheur NWR in spring, two sightings in spring and two in fall on the Copper River Delta, a fall sighting near Gustavas in southeastern Alaska, and three sightings in the Central Valley during the subsequent fall and winter (Herter 1982). Bandings of cranes breeding on the Yukon-Kuskokwim Delta showed an affinity for migrating east of the Rocky Mountains (Boise 1979). Herter (1982) reviews information on sightings of lesser sandhill cranes along the Pacific Coast states and in British Columbia.

During late February and March, PFP cranes leave the Central Valley in a northward direction (Figure 30). The migration route for the southern group of the population crosses the Sierra Nevada Mountains over Placerville. From there they continue north to Honey Lake, near Susanville. After leaving Honey Lake the migration slows as birds spend time feeding. The cranes enter Oregon south of Lakeview and in Warner Valley, and further to the west through Klamath County (Littlefield and Thompson 1982).

The major spring stopover area for the southern group is in Harney County where the birds spend a few weeks feeding in the native-grass meadows south and east of Burns (Figure 3). About 6,000 cranes are normally present during peak periods. However, when inclement weather persists their departure is delayed; and up to 14,000 birds may be present. Migration progresses rapidly through eastern Oregon after the cranes leave Harney County (Littlefield and Thompson 1982). The cranes fly north between John Day and Dayville, to the west of Pendleton, and enter Washington in the vicinity of Pasco. PFP cranes regularly stop near Moses Lake and Ephrata, Grant County, and near Mansfield, Douglas County, central Washington.

Upon leaving central Washington the migration of the southern group continues north into British Columbia through the Okanagan Valley (Figure 2). Where these birds go through British Columbia is uncertain, but they likely follow routes shown in Figure 2.

Cranes have been reported stopping in spring near the Stikine River Delta and at Gustavus in Alaska (Figure 1). They apparently follow a coastal route to the Copper River Delta and from there spread across the Kenai Peninsula and Upper Cook Inlet area before going to the various breeding areas mainly to the west. The reverse is true during fall, although more use is made of staging areas than in spring for at least Portage Flats (D. E. Timm pers. comm.).

The small northern group of PFP cranes that winters near Red Bluff apparently uses a separate route. From Red Bluff this group migrates north to Meiss Lake, enters the Willamette Valley near Eugene, and stages on Sauvie Island in the Columbia River. From there they move to the Puget Sound region of Washington and then migrate along the coast of British Columbia and Alaska (Figure 1). The fall migration route is probably the reverse of that of spring, and Sauvie Island is again an important use area. During mild winters a few birds remain on Sauvie Island, but normally all continue south to Red Bluff (Littlefield and Thompson 1982). The nesting population in Cook Inlet and the group wintering near Red Bluff are approximately the same size and may be synonymous (D. E. Timm pers. comm.).

#### Uses

Legal hunting of PFP cranes occurs only in Alaska. The season opens on 1 September in most portions of the State and extends as late as 22 January. All birds, however, have migrated from Alaska by early November. The daily bag and possession limits are 2 and 4, respectively. The past 10-year average harvest of cranes in Alaska was about 765, with an

Table 2. Retrieved sport harvest of lesser sandhill cranes in Alaska as measured by State Mail Surveys (1971-77) and Federal Mail Survey (1978 to date). Ratio of cranes belonging to the Pacific Flyway Population and the Mid-Continent Population is estimated to be 3:7.

Year	Estimated Sport Harvest of Cranes		Total
	Pacific Population	Mid-Continent Population	
1971	145	345	490
1972	230	535	765
1973	180	420	600
1974	190	450	640
1975	490	1,150	1,640
1976	200	615	875
1977	185	435	620
1978	90	220	310
1979	205	470	675
1980	315	735	1,050
Average	230	535	765

estimated 230 cranes being PFP birds and the remaining 535 birds belonging to the Mid-Continent Population (Table 2). Hunting of this particular population is prohibited in all other states and in British Columbia.

Subsistence harvest of PFP cranes is believed to be negligible. Two estimates of subsistence harvest have been made on the Yukon-Kuskokwim delta, Alaska, where in 1965 an estimated 1,033 cranes were taken from spring through fall (Klein 1966) and in 1981 an estimated 1,477 were taken in spring (Copp and Smith 1981). Additional subsistence harvest may occur in Canada and the U.S.S.R. Birds from these areas, however, probably belong to the Mid-Continent Population.

Observing sandhill cranes is an important pastime through the birds' southern range. It is particularly important in Central Douglas County, Washington, in migration near Portland, Oregon, near Thornton and at the Merced and San Luis NWRs in the San Joaquin Valley. Fewer people have opportunities for observing cranes on their breeding grounds, but for many in the North seeing and hearing cranes contribute towards a truly "wilderness experience."

#### Management

Lesser sandhill cranes have benefited largely from measures taken to manage migratory birds in general, e.g. protection afforded by State and Federal regulations and habitat protection through refuges, the Grassland Easement Program, and the Water Bank Program. The Bureau of Land Management is considering implementing cooperative management practices at Soda Lake in the Carrizo Plain that would benefit cranes and other wildlife (Bowen 1982). The PFP cranes have benefited directly by cereal grain production on Merced NWR and warning markers on powerlines. Breeding populations of lesser sandhill cranes have been surveyed annually in portions of Alaska since 1957 as part of the continental Waterfowl Breeding-pair Survey (Conant et al. 1981). The PFP cranes have been studied on one of their principal staging grounds, the Copper River Delta (Herter 1982). Forty-three cranes were color-marked in California to obtain information on their migration and relationships to staging and man-caused disturbances on the Copper River Delta (Herter 1982). Inferences on breeding biology of PFP cranes can be drawn from a study of cranes of the Mid-continent Population on the Yukon-Kuskokwim delta (Boise 1979).

#### IV. PROBLEMS

The breeding origin of PFP cranes and most northern routes and stopovers of their northern migration to and from California have not been verified. Stopover points and their relative importance to the birds have been only cursorily identified.

Estimates of population size, production, and sport harvest are not precise. The lack of field identification techniques for distinguishing between lesser and greater sandhill cranes makes it difficult to accurately gather population data in areas where they mingle.

Unregulated spring and summer harvests of lesser sandhill cranes occur in Alaska, and possibly in Canada and U.S.S.R.; and likely exceeds the legal sport harvest. The harvest is believed to be proportionately greater on the Mid-Continent Population than on the PFP. The magnitude and consequence of this harvest on either population are unknown; and, lack of harvest data confounds purposeful management efforts.

With increasing human populations and expanded natural resource exploitation, disturbances of PFP cranes throughout their range is an increasing problem. Loss of wintering habitat, particularly roost sites, from various forms of land development in California poses the most serious threat. Depredation on grain fields by PFP cranes is now a minor problem that could change under different circumstances.

Cranes collide with transmission lines and fences. There remains a potential for disease outbreaks in wintering areas where cranes concentrate, but presently the impact is minor.

#### V. RECOMMENDED MANAGEMENT PROCEDURES

The following management procedures are recommended. The degree and timing of their implementation by the various lead agencies will be influenced by manpower, fiscal, and legislative constraints. Whenever possible, management procedures in this plan should be coordinated and incorporated into those procedures recommended in plans for other species and populations of Pacific Flyway birds.

##### Habitat

1. Inventory of Habitats.--Identify and catalog the habitats used by PFP cranes in order to facilitate protection of these areas.

Lead Agencies: USFWS, ADFG (State lands), CWS, BCFWB, WDG, ODFW, CDFG

Participating: BLM

Priority: 1

Schedule: 1984-85

2. Habitat Preservation.--Acquire through either fee title, easements, or cooperative agreements protection for key wintering habitats of PFP cranes, particularly roost sites. Continue to provide suitable habitat for cranes on National Wildlife Refuges in California and in Alaska.

Lead Agencies: USFWS and CDFG

Participating: Other State and Federal land-managing agencies and citizen organizations will be invited to participate in providing protection to these habitats.

Priority: 1

Schedule: Ongoing.

3. Utility Corridors.--Assist utility companies in planning corridors that would avoid primary migration pathways and concentration areas of cranes. Where construction of new transmission lines would pose hazards to cranes, efforts would be made to have them buried, rerouted or strung with highly visible markers.

Lead Agencies: USFWS, ADFG (State and private lands), CWS, BCFWB  
WDG, ODFW, CDFG

Participating:

Priority: 2

Schedule: Ongoing

4. Disturbance.--Disturbance to cranes, particularly in staging and wintering areas, should be minimized, unless it is purposefully intended to alleviate crop depredations. Pilots should be advised as to recommended minimum altitudes to be flown over areas used by cranes. As appropriate, minimum altitude requirements over refuges should be enforced and other human disturbances minimized.

Lead Agencies: USFWS, ADFG (State lands), CWS, BCFWB, WDG,  
ODFW, CDFG

Participating: BLM

Priority: 1-3

Schedule: Ongoing.

#### Uses

1. Interpretive Programs.--The Subcommittee will develop written and pictorial information of the life history of PFP cranes and on the nature and necessity for a cooperative program. State, Provincial, and Federal agencies, schools and citizen groups could use these materials, in part, to develop interpretive programs that include cranes.

Lead Agencies/Group: Subcommittee develop materials.  
USFWS, CWS, BCFWB, WDG, ODFW, CDFG develop  
and implement interpretive programs

Participating: Citizens' organizations

Schedule: Develop material by 1984  
Develop and begin implementing interpretive programs  
by 1986.

2. Sport Harvest.--Maintain the sport harvest of PFP cranes within limits of harvest potential and in consideration of other uses of the population.

Lead Agencies: USFWS and ADFG

Priority: 1

Schedule: Ongoing

3. Subsistence Harvest.--The size and distribution of subsistence harvest of PFP cranes should be assessed and related to the annual harvestable surplus. Recommendations for allowable spring and summer harvest should be made in consideration of these other factors.

Lead Agency: USFWS

Participating: ADFG

Priority: 2

Schedule: Ongoing.

#### Surveys and Research

- I. Delineation of Populations.--Cranes should be color-marked or telemetered first in the Bristol Bay and Cook Inlet-Susitna lowlands and second in the areas where they could belong to either the PFP or the Mid-continent Population. Searching for and making observations on marked cranes is an obligate part of this task.

Lead Agencies: USFWS, CWS, BCFWB, WDG, ODFW, CDFG

Participating: ADFG

Priority: 1

Schedule: 1984-86

2. Winter Population Survey.--Either aerial or ground surveys of PFP cranes wintering in California should be conducted biannually. This survey could be done during either the periodic fall waterfowl surveys or during the midwinter waterfowl survey. Appropriate timing will be determined through trial uses of both types of surveys.

Lead Agencies: CDFG and USFWS

Priority: 1

Schedule: Evaluate appropriateness of various surveys during 1982-84.

Implement survey in fall and winter of 1984-85 and conduct at 2-year intervals, thereafter.

3. Field Identification Technique.--A field identification key will be developed to distinguish between lesser and greater sandhill cranes.

Lead Agencies/Group: Subcommittee

Participating:

Priority: 1

Schedule: 1984

4. Productivity Survey.--Obtain productivity data at Merced NWR and if it can be done incidental to other surveys also on the Copper River Delta. Surveys in California should be conducted prior to December because afterwards it becomes increasingly difficult to distinguish birds of the year from older birds.

Lead Agencies: USFWS and CDFG

Priority: 3

Schedule: Ongoing

5. Development and Review of Research Proposals.--The Subcommittee shall propose or develop as necessary research projects for Federal, State, or other source funding, recommend needed research, and review unsolicited research proposals. The Subcommittee shall consider priorities of that information needed on the population as a whole, rather than on a local or provincial basis.

Lead Agency/Group: Subcommittee

Priority: 1

Schedule: Ongoing

#### Annual Review of Plan

The Subcommittee shall meet annually or as needed to measure progress toward achieving the goal and objectives of this plan and to recommend revisions. The Subcommittee shall report on accomplishments and shortcomings of the cooperative management efforts to the Pacific Flyway Council (through the Western Migratory Upland Game Bird Technical Committee), those State, Provincial and Federal agencies having management responsibilities, and those agencies and organizations interested or cooperating in the management of cranes. Composition of the Subcommittee should be comprised of, but not limited to, representatives from those agencies having management responsibility for PFP cranes.

Lead Agencies/Group: Subcommittee

Priority: 1

Schedule: Annually (March meeting of the WMUGBTC) or as needed.

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APPENDIX A. Winter distribution of the Pacific Flyway Population of lesser sandhill cranes (Littlefield and Thompson 1981).

During the winters of 1969-70 and 1970-71 all areas in California known to be used by cranes were examined for their presence.

Upon entering the Central Valley in the fall most lesser sandhill cranes concentrate near Merced, then disperse northwest and southeast after spending 3 to 4 weeks in the Merced area.

Near Thornton, San Joaquin County, 828 lessers were counted on 14 December 1969. After this date a substantial increase was recorded. By late December over 2,000 were there, and an estimated 4,100 were present on 7 January.

In Stanislaus County, the subspecies winter about 8 to 10 mi west of Modesto on the Faith and Mape's Ranches at the confluence of the Tuolumne and San Joaquin Rivers. In 1969, lesser sandhill crane numbers fluctuated through mid-November, but stabilized in December. Dates of counts and numbers were:

October 31	404
November 4	2,403
November 14	617
December 12	898
February 3	800

The peak number was on 4 November when cranes were decreasing in Merced County.

Five roost sites in Merced County were periodically surveyed during the winter of 1969-79. Counts at these sites tallied the following:

Merced NWR and vicinity

24 October	5,934	10 December	1,042
25 November	2,600	26 January	2,253

Greenhouse (2 mi west and 4 mi north of Merced NWR)

1 December	754	8 December	864
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Bowles Farm (8 mi east and 2 mi north of Los Banos)

2 November	4,000	11 December	573
16 November	2,500	29 January	0
2 December	597		

San Luis NWR

6 November	599	12 December	802
19 November	2,838	2 February	52
30 November	56	18 March	30

Kesterson NWR

31 October	800	11 December	183
12 November	121	1 February	540
29 November	790		

Merced County is the most important wintering region for PFP cranes in the Central Valley. Estimated peak numbers of cranes at the Merced NWR (from Refuge Narrative Reports) were:

1951	3,000	1961	9,000	1971	1,500
1952	1,500	1962	21,000	1972	750
1953	2,000	1963	15,000	1973	2,000
1954	5,000	1964	9,000	1974	10,000
1955	5,000	1965	4,000	1975	10,000
1956	1,200*	1966	6,500	1976	5,000
1957	30,000**	1967	6,000	1977	5,250
1958	21,500	1968	2,500	1978	8,000
1959	15,000	1969	5,950	1979	8,000
1960	15,000	1970	1,460	1980	5,400

On 23 November 1969, 324 PFP cranes were using Melga Reservoir, 12 mi south of Hanford, Kings County. By 15 December their numbers had dropped to four, and none was recorded on 26 January.

In Tulare County, 8 PFP cranes were observed on Pixley NWR on 22 November 1969, for the only record. However, southwest of this refuge at Goose Lake, 11 mi west and 4 mi south of Wasco, Kern County, cranes wintered in large numbers. On 21 November, 223 were using the area, increasing to 415 on 16 December and 628 on 26 January.

West of Goose Lake large numbers of cranes usually winter at the Carrizo Plains, San Luis Obispo County. In the winter of 1969-70, three counts were made: on 24 November, 1,011 cranes were counted; 17 December, 1,439; and 25 January, 2,763.

In addition to those that winter in the Central Valley a few are sometimes seen in the Imperial Valley. Four were seen 7 mi southeast of Brawley, Imperial County, on January 1971, and one was recorded near Blythe, Riverside County, on 31 January 1976. These birds probably migrate south along the east side of the Sierra Nevada Mountains.

\*Population was reported in the Refuge narrative report to be 50,000 cranes, but this number was believed to be grossly overestimated.  
 \*\*Believed to be an overestimation of the true population size.

A Preliminary Evaluation of Wildlife Populations and Habitats  
on Gustavus Beaches and Dude Creek Uplands

February 1983

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and  
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## INTRODUCTION

There has been concern both within the Gustavus community and from others over the fate of the State-owned beaches and wetlands that flank the Gustavus community to the west and south. The potential of these lands for subsistence, recreational, agricultural, mineral and commercial use has often been cited, but to this point they have not been placed into an appropriate classification and management framework. Intelligent selection among the many potential combinations of uses is dependent on specific knowledge of existing resources. Our study was designed as a step in gathering this information.

Objectives were to:

1. identify the species of birds and mammals inhabiting the study area and provide indices of abundance for key species during the fall and winter months.
2. describe the localities and habitats used by key species.
3. describe the present physiography and vegetation, noting tendencies for change as they may relate to habitat quality and species diversity.
4. draw conclusions and make general recommendations based on the completion of the first 3 objectives.

The study period covered one year beginning 7 September 1981. Intensive surveys were limited to the fall 1981 period although regular monthly surveys continued through the winter. Spring and summer observations were made opportunistically. Information from other areas and from other years was collected as available and appropriate.

## METHODS

The study area (Figures 1 and 2) roughly coincided with lands once proposed for a State Game Refuge. This area was divided into 9 subunits, eight along the beach and one encompassing the uplands flanking Dude Creek. To aid in description of physiography, the beach subunits were also grouped into four physiographic units (Fig. 2). Survey data were logged by subunit and survey date.

Surveys of beaches were made approximately every 10 days during September and October 1981 and approximately once a month thereafter until late March 1982. Each survey covered the entire beach and took portions of 2 to 3 days to complete due to constraints of tide and daylight. All surveys were conducted on foot at low tide except for the short segment between the Good River and the Salmon River which was occasionally done by skiff at high water.

The September and October surveys were performed by two observers; one observer walked the low tide margin, while the other observer walked the high tide margin. Avian counts were tallied separately for the upper

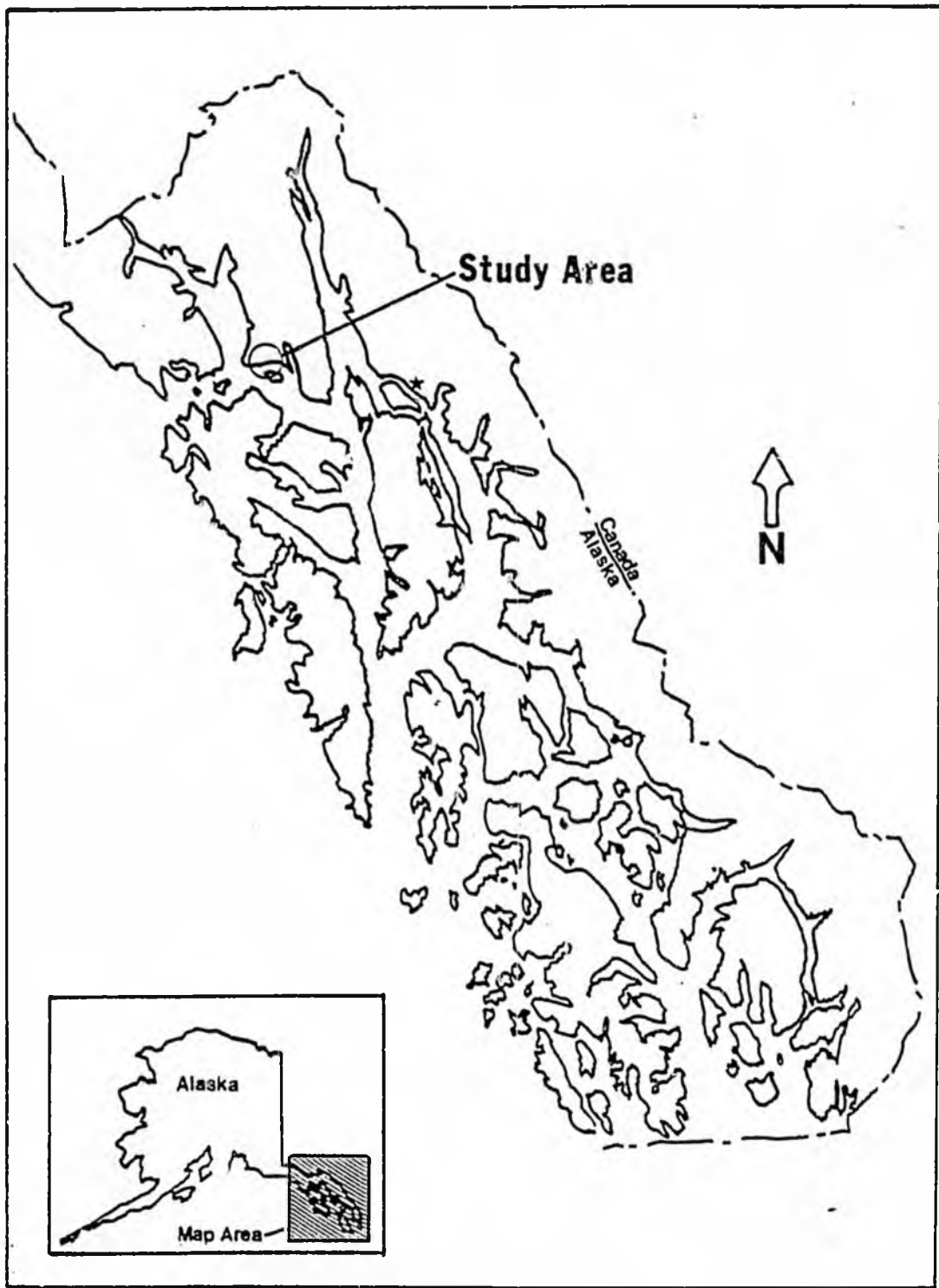
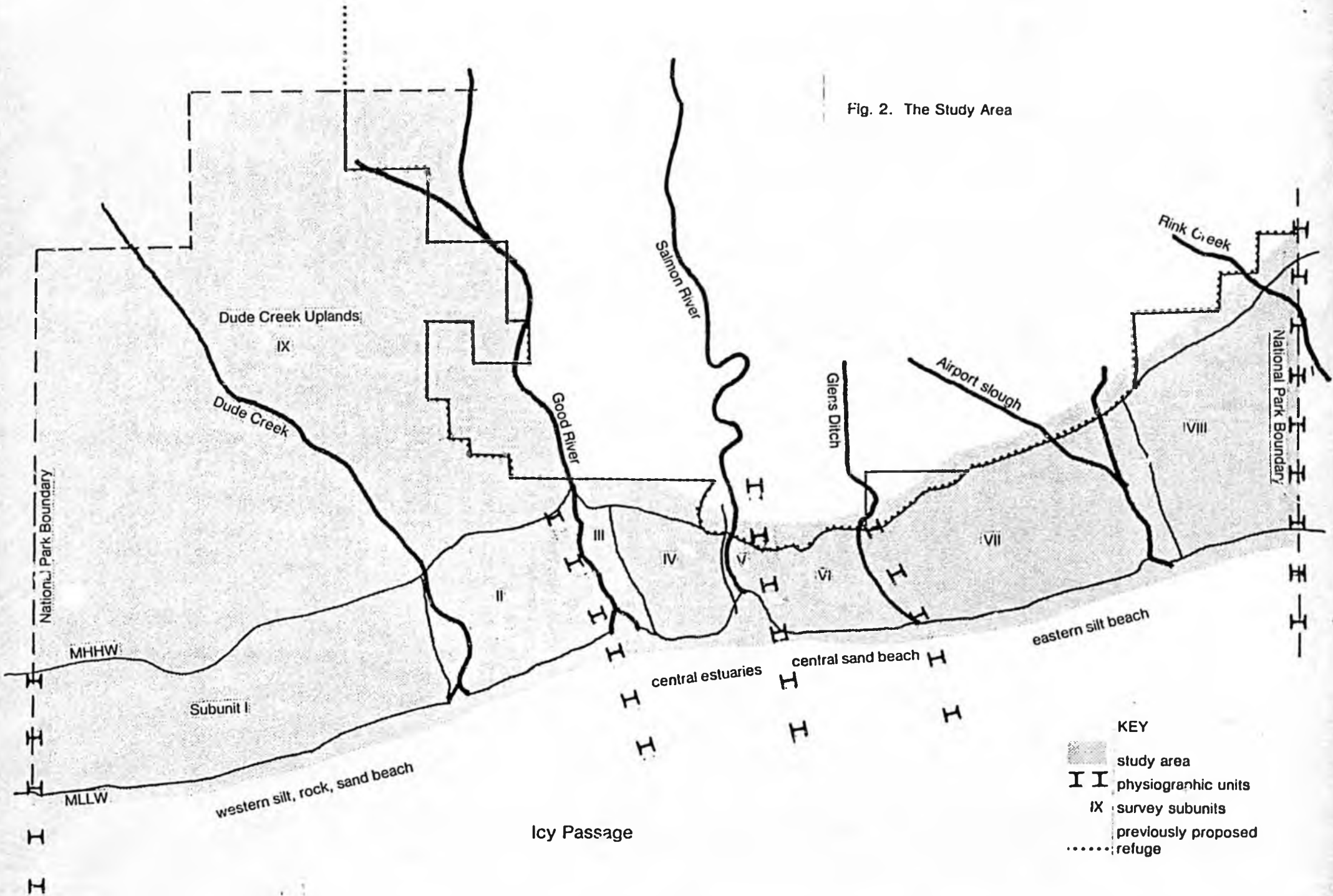






Fig. 1. Location of the Study Area in Northern Southeast Alaska.

Fig. 2. The Study Area



- KEY
-  study area
  -  physiographic units
  -  survey subunits
  -  previously proposed refuge

Icy Passage

beach and lower beach when possible. During winter surveys, a single observer walked the lower tide margins and on return spot-checked the generally ice-choked and empty upper beach margin.

All birds sighted during the surveys were identified and recorded by subunit of occurrence. Since birds often flushed ahead into the next subunit, two totals for each species were kept when this occurred: first, the total of all individuals sighted regardless of the possibility of their having been previously counted and, second, that number minus the number of individuals that flew ahead (and possibly landed). In calculations the mean of these two totals were used.

Observations were made along beaches during spring migration and occasionally in summer. These general observations were not systematic.

All cranes observed in flight in the Gustavus area were recorded by the authors and by Bob Howe in fall 1981. Daily comparison of totals yielded an estimate of the total number of cranes passing over the Gustavus area. From Matkin's residence, cranes that used the Dude Creek uplands could be heard arriving in the evening. As time allowed on mornings following a landing of cranes, a foot survey and crane count on the Dude Creek uplands was conducted. Crane sign was noted and care taken not to flush the birds. The birds were then counted as they left their roosting area and headed southeast over Icy Strait.

Crane observations were most intensive and systematic in the fall. Although there appears to be a substantial spring migration, observations and counts were opportunistic at that time.

On all foot surveys, each mammal sighting or instance of identifiable mammal sign was recorded. Additional foot surveys in the Dude Creek uplands, including the game trails along Dude Creek and Good River, were made approximately once monthly during winter. These surveys were timed to coincide with good tracking conditions when possible. A standard itinerary for such surveys (Fig. 3) was followed except when traveling conditions made the route impractical.

A vegetation map was prepared using aerial photos provided through courtesy of the State Department of Transportation. Interpretation was based on examination of plant communities during foot surveys. Beach physiography was also examined in the field, described in the report, and depicted in conceptualized cross sections. Bird and mammal observations were discussed in relation to the vegetation and physiography of the study area.

## RESULTS AND DISCUSSION

### Physiography and Vegetation

The location of the study area in southeast Alaska is illustrated in Figure 1. Study area boundaries enclose two landscape units: the Dude

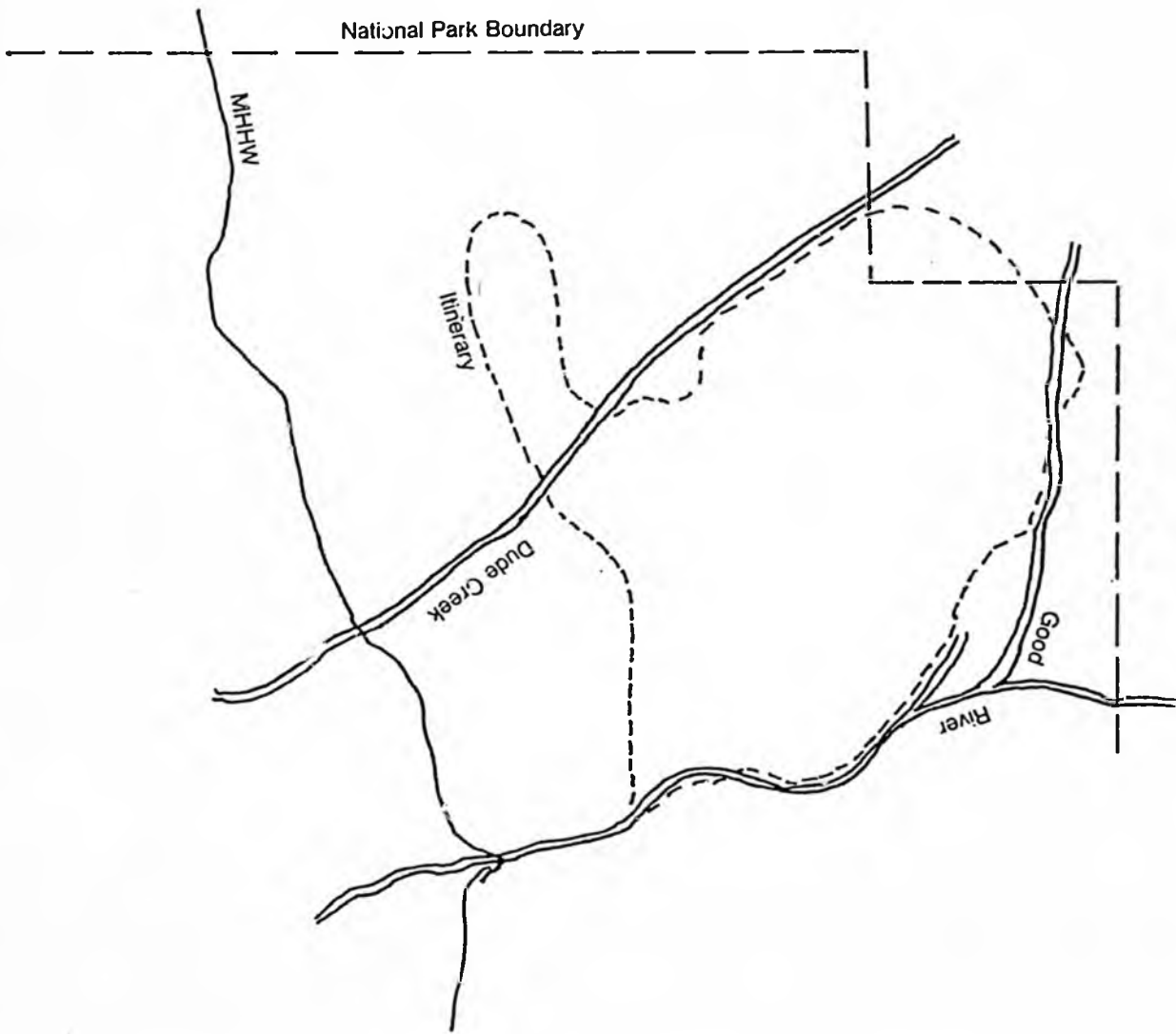


Fig. 3. Winter mammal survey itinerary.

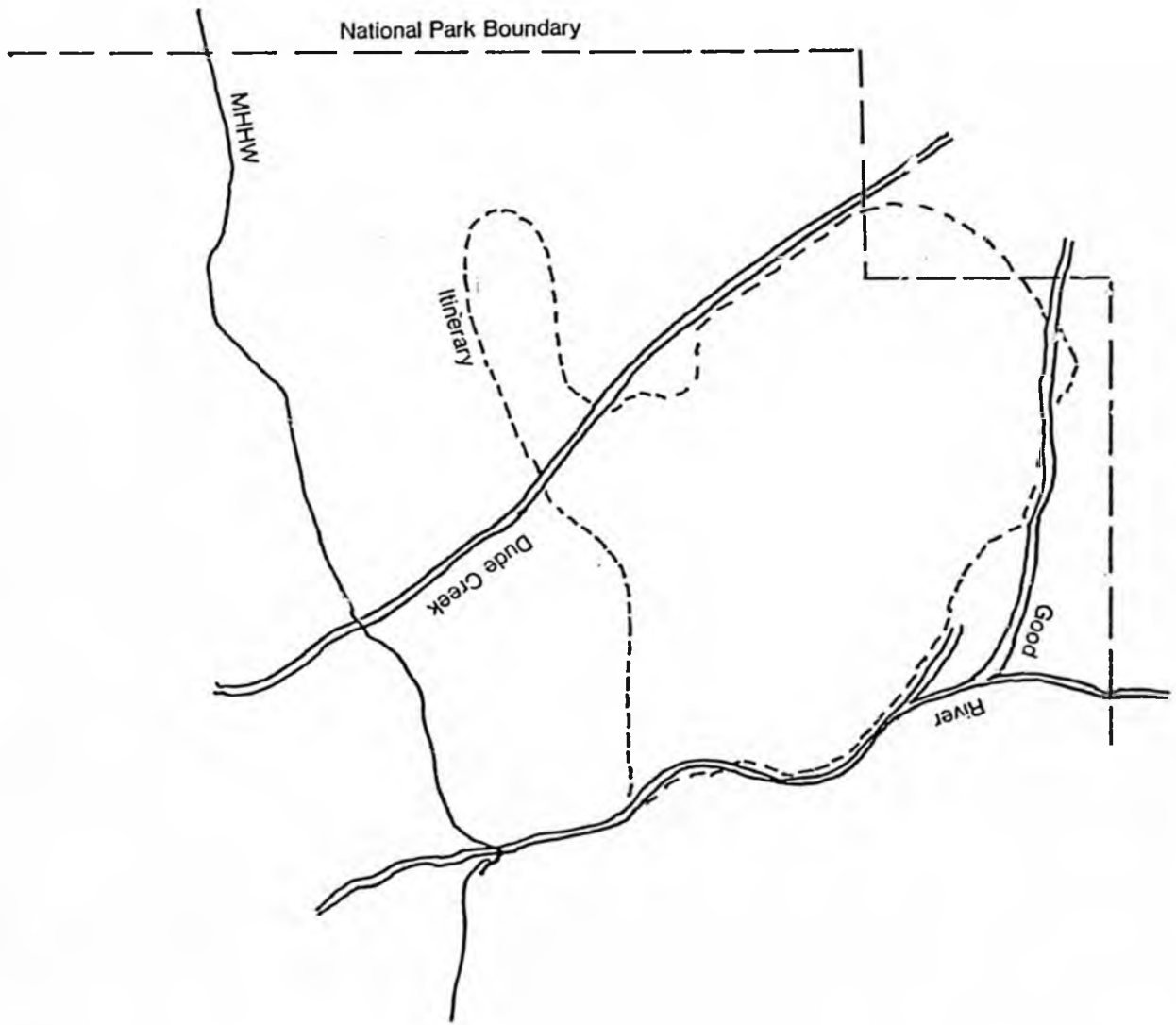










Fig. 3. Winter mammal survey itinerary.

Fig 4 Vegetation of the Study Area

Key

- —upland wet meadow
- —forest
- —shrubland and brushy meadow
- —intertidal sedge meadow
- —intertidal ryegrass meadow
- —other intertidal vegetation
- —watercourses
- —roads

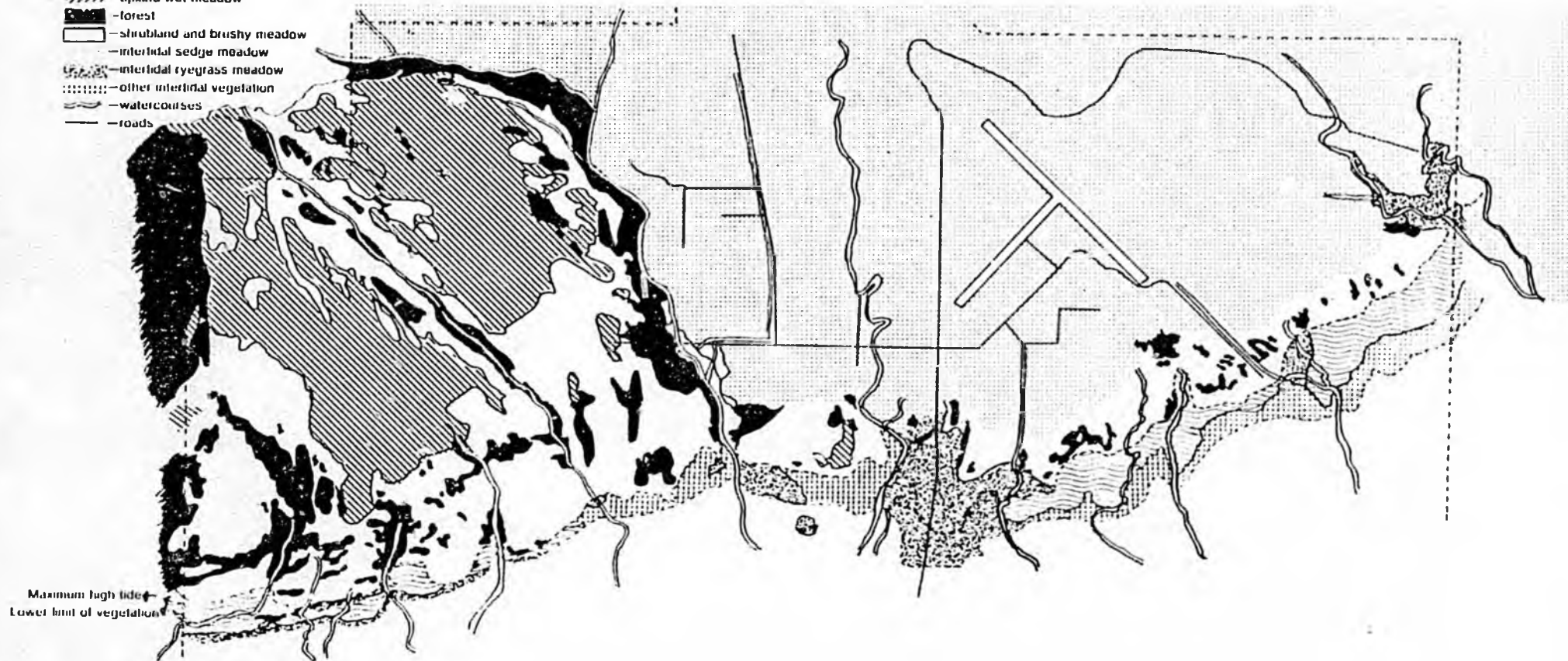
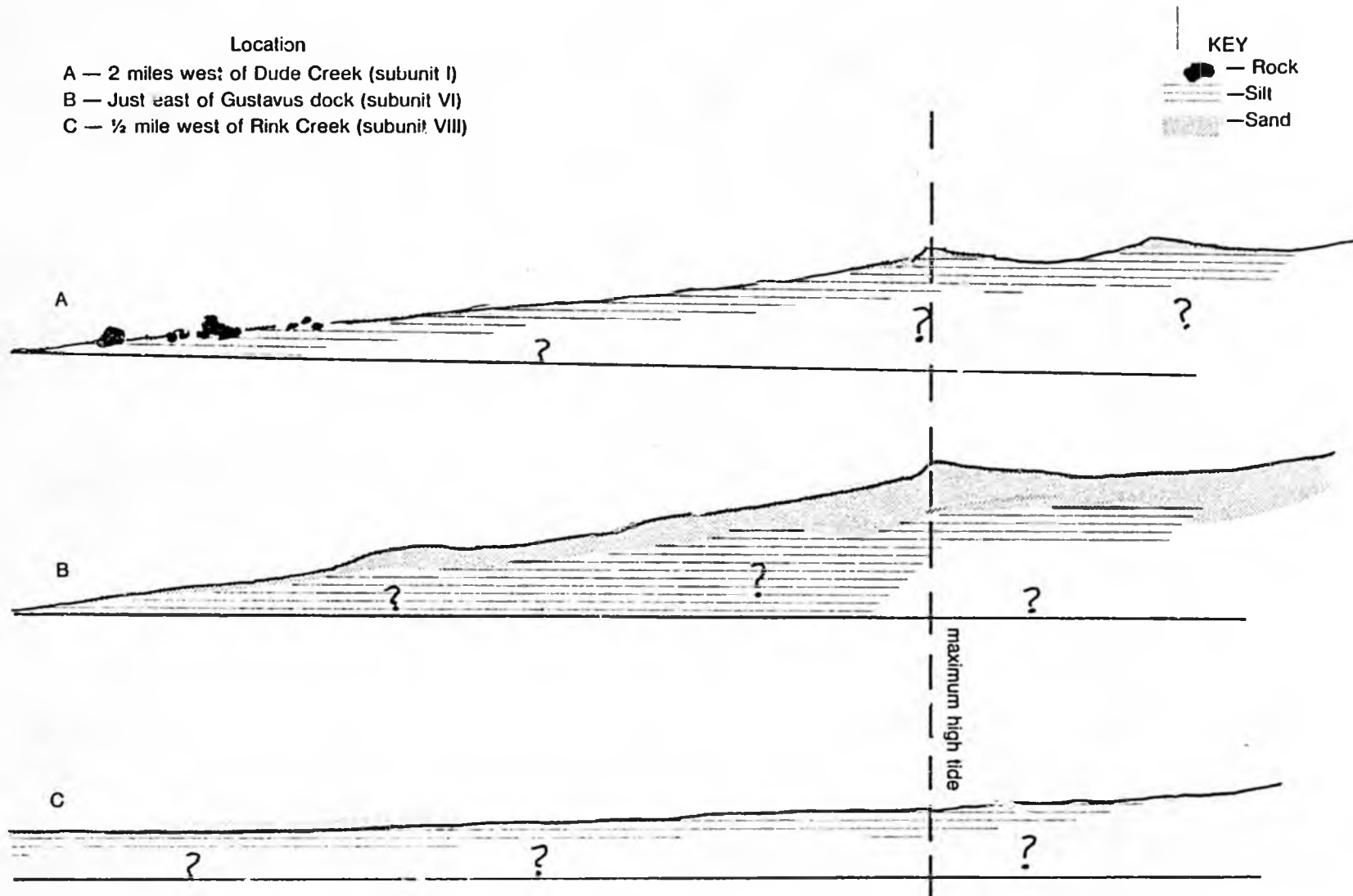


Fig. 5. Diagrammatic cross sections of the Gustavus beach.



As one proceeds eastward past the mouth of Dude Creek, the high tide strand disappears and is replaced by a silty upper beach occupied by willows and mats of moss and horsetail (subunit II). Glacial boulders decrease in frequency until the Good River estuary is encountered (subunit III). This large entrenchment of the beach forms the western limit of deposition of the superficial sands deposited by the Salmon River approximately 3/4 mile further east.

East of the Good River the beach remains essentially the same except for the increased superficial sands deposited throughout the intertidal zone (subunit IV). The Salmon River estuary (subunit V) cuts down through these sands well into the underlying silts. These "central estuaries" (the Good and Salmon Rivers) extend the intertidal zone inland into upland vegetation types including sedge and ryegrass meadows, horsetail/moss mats, willow shrubland and pine-spruce forest.

East of the Salmon River estuary is the "central sandy beach" (subunit VI) which stretches from this estuary to Glen's Ditch, an estuary draining the ditches of Glen Parker's homestead. This is a sand-dominated area; only at the low tide margins does one encounter small amounts of surficial silt (Fig. 5). Surf clams and horse clams may reach peak abundance in this subunit, but in general its invertebrate fauna seems depauperate.

The causeway to the Gustavus dock has apparently impeded sand transport eastward from the Salmon River, causing the formation of a secondary strand well seaward of the original high tide line. Large amounts of sand have been deposited behind this strand. This sandy region is occupied by beach ryegrass meadow and open sand flat. Although partially inundated by extreme tides, the area was not included in our surveys; this should be recalled when interpreting data from Unit VI.

The "eastern silt beach" (subunit VII) begins to the east of Glen's Ditch. This beach has an even more gradual slope than the western units. Small volumes of superficial sand are restricted to dune-like structures in the upper intertidal and a discontinuous, often shell-covered veneer in the lower intertidal. Rocks are nearly absent and silt predominates. The intertidal and supratidal zones tend to merge without an intervening strand (Fig. 5). High intertidal sedge meadows are often extensive; they merge into supratidal moss-horsetail-willow mats or silty flats or into beach ryegrass meadows on sandy dunes. Three creek estuaries meander across subunit VII; the easternmost and largest is Airport Slough. Beyond this estuary is the last mile of beach to the Park boundary (subunit VIII). This area is a vast, nearly horizontal silt flat and extensive sedge meadow. Here at the eastern margin of the Gustavus flats wave action is minimal and the Salmon River sand source is remote. Consequently, landforms are extremely subdued (Fig. 5) and probably most closely resemble the conditions at the close of the Neoglacial, when the silt deposition and leveling effect of glacial outwash rivers were the predominant beach-shaping forces. Softshell clams and small members of the clam genus Macoma may reach peak abundance in this subunit.

Superimposed on the dynamic forces of sand deposition and wave action on the Gustavus beach is the uplift due to isostatic rebound. As a consequence of uplift beach landforms are being moved into the supratidal, plant communities are marching seaward, and on any given spot there is a succession from beach to meadow to shrubland and finally to forest. The result is a striking zonation, especially in areas not altered extensively by erosion or sand deposition.

Uplift will favor continued erosion of the beach surface (this is now quite evident during the winter) inhibiting the organic enrichment of surface sediments and exposing beach invertebrates to frost and predation. Erosion, mobility of sand deposits and the down-beach shifting of plant communities all appear to favor retention of a relatively immature, moderately productive beach ecosystem into the foreseeable future.

#### Human Use

The Dude Creek uplands were used to some extent by the original homesteaders in the first half of this century. Cattle were run in the open meadows; two cabins on Dude Creek (now defunct) were briefly occupied; and a field along the eastern margin of the meadows was cultivated.

By the mid 1960's all these uses had ceased and the area was seldom visited. A subdivision was planned by Glacier Bay Land Company in the late 1970's, but this has not yet occurred. State land disposals in 1980 placed several parcels along the eastern meadows' southern margin in private hands. One parcel is now occupied; the owner has built a large ditch along the north edge of the property and plans to clear about 100 acres (proposed State land lease) for cattle grazing. This will probably not greatly affect the eastern meadow. An agricultural parcel let at the same time straddles the Good River and projects slightly into the study area.

Gustavus beaches have always been used by local residents for a variety of purposes. This has been documented in the context of a legal suit concerning land accretion and in the recent proposal by the Gustavus Community Association to disallow mining. Uses include hunting, fishing, clamming, berry picking, collection of beach logs, kulping, grazing, hiking, and use of recreational vehicles.

Present road access to the beaches and Dude Creek area is diagrammed in Figure 4. In recent years, road access has been supplemented to an increasing (but still small) degree by use of ATCs and trail bikes. The beaches are not easily accessed by boat; only the central estuaries and sandy beach are visited by vessels with regularity, although trolling and crabbing occurs in the immediately adjacent waters.

## Birds

### Beach Surveys - Fall and Winter:

Beach survey data are summarized in Table 1. Of the 59 species recorded, 12 were sighted more than 500 times. These 12 species, the species that are hunted, and the major avian predators are considered "important" and discussed in more detail.

Survey data are further condensed and represented geographically in Figure 6. The greatest number of bird sightings were made on the western silt/sand/rocky beach, due in part to the size of the area and to contribution by scoters, gulls and shorebirds - birds often associated with rocky beach habitat. Hunted bird species (geese, mallards, pintail, teal and wigeon) were also most numerous on the western beaches, but were most densely distributed in the relatively small central estuaries unit. In contrast, the central sand beach was relatively poorly represented both in total birds and in numbers of species. Numbers in this area would have been even less if not for the attractiveness of Glen's Ditch to waterfowl, the use of the Gustavus dock as a gull roost, and the single occurrence of a very large flock of migratory mergansers.

There was a tendency for birds to be grouped along the water's edge on beaches and estuaries. To some degree, bird densities in each unit may have been proportional to the extent of the land/water interface at low tide (the apparent principal avian foraging period).

However, other factors affected avian use of a beach area. The type of beach edge seemed important, the silt/rock/sand areas being more popular with many species than open silty beach or sandy beach. Larger estuaries supported higher waterfowl densities than smaller estuaries. Remoteness from human activity was probably significant for some species. High tide sedge meadows were also attractive to waterfowl.

The timing of avian species occurrence on Gustavus beaches during fall and winter 1981-82 is shown in Table 2. Most species were represented in the initial surveys. Early migrants such as the least sandpiper and semipalmated plover soon disappeared. By the end of October most migrant shorebirds were gone and were replaced by the winter resident rock sandpipers and sanderlings. By late October raptors were reduced to the ever present bald eagles and ravens. By December the migrant avian population was gone and the avifauna reached its winter makeup of about 25 species.

The five hunted species displayed varying patterns of abundance (Fig. 7). All were present in the fall, but only the Canada geese and mallards were common after November and were classified as winter residents.

Almost all species varied considerably in number from survey to survey and from subunit to subunit. This indicated a generally mobile avian population that was not tied in any strict sense to the study area, but shifted and moved on a larger scale.

Table 1. Summary of nine fall/winter bird surveys of Gustavus beach, 1981-82 (total no. of observations).

Species	Beach Subunit								Total
	I	II	III	IV	V	VI	VII	VIII	
Common loon				1		2	1		4
Horned grebe				2	4	10	15		31
Whistling swan	1								1
CANADA GOOSE	528	140	270	355	341	14	377	193	2,218
MALLARD	469	369	482	48	293	260	1,055	134	3,110
PINTAIL	75	60	26		21	37	37	190	446
GREEN-WINGED TEAL	169	68	8	40	28		33	12	358
Blue-Winged Teal							3		3
Shoveler							6		6
WIGEON	232	230	183	153	162	130	68	51	1,209
Goldeneye spp.	7				4	5	10		26
Bufflehead			3		4		2	8	17
Harlequin	4								4
SURF SCOTER	2,705	200				20			2,925
MERGANSER SPP.	300	18	263	123	63	604	168	3	1,542
Sharp-shinned hawk	1								1
Rough leg hawk						1	1		2
BALD EAGLE	16	6	4	9	10	2	5	14	66
Marsh hawk	5	5	2	1		1	6	1	21
Merlin		1	1				3	2	7
G. blue heron							2		2
SANDHILL CRANE	P							6	6+
Semipalm. plover	10								10
Killdeer			3						3
Golden plover		61				2	2		65
Black bell. plover	22						8		30
Bar-tailed godwit	6								6
Snipe							1	2	3
Yellowlegs spp.			6						6
ROCK SANDPIPER	812	122					385	206	1,525
"Peeps" <sup>1</sup>	68	80			7		570	45	770
Pectoral sandpiper	104	74	6	65			22	17	288
Dunlin	12	184					75		271
DOWITCHER	15	168	53	95	15		29	160	535

Table 1 (Cont'd). Summary of nine fall/winter bird surveys of Gustavus beach, 1981-82 (total no. of observations).

Species	Beach Subunit								Total
	I	II	J	IV	V	VI	VII	VIII	
SANDERLING	357		40	40		6	193	238	899
Parasitic jaeger						1	1		9
GLAUC. W/HERRING GULL	489	127	37	87	296	130	184	78	1,419
MEW GULL	990	304	21	523	371	100	227	319	2,855
BONAPARTE'S GULL	99	63	18	116	187	45	59	185	772
Bl. leg. kittiwake				3	403				406
Short-eared owl							1		1
Kingfisher			1		1				2
Magpie	3		4		1				8
Raven	5	2	4	3	5	7	2	1	30
N.W. crow	2	30						2	34
Ch. bk. chickadee	P								P
N. shrike			1						1
Savannah sparrow	P								P
Fox sparrow	P								P
Tree sparrow	6								6
Water pipit	P								P
Snow bunting	3				40	300			343
Longspur	160+						100	70	330+
W. front goose							2		2
Unī.D. Ducks	152	6		8	352	1			519
Plover sp.	2								2
TOTALS: Hunted Species	1,473	867	969	596	845	441	1,581	580	
All Species	7,821	2,350	1,436	1,672	2,608	1,678	3,653	1,937	

<sup>1</sup> Western, least and Bairds sandpipers.

P Present but uncounted.

Fig. 5. Bird survey totals by subunit for nine beach surveys and miscellaneous upland counts.

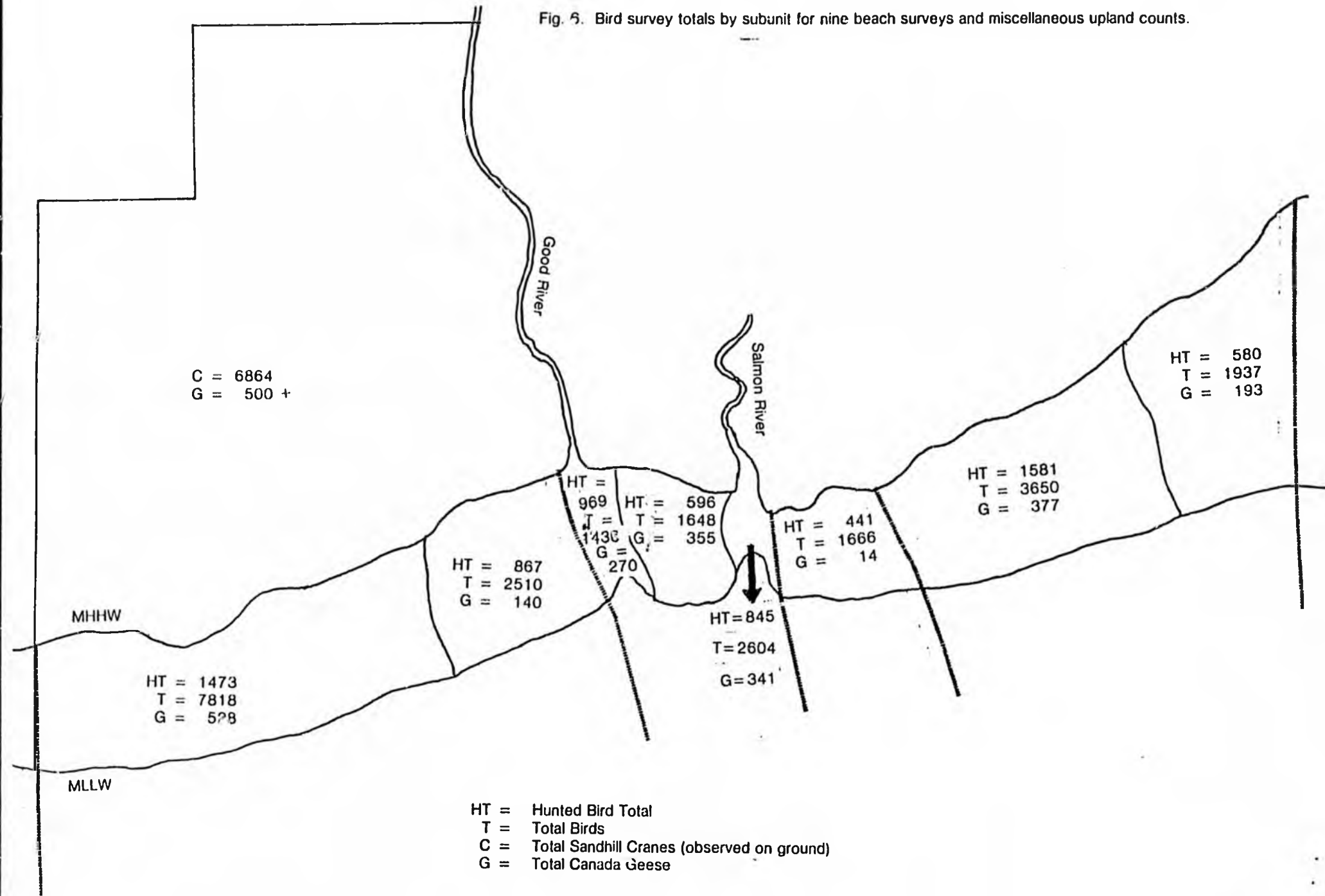


Table 2. Timing of bird species occurrence on Gustavus beaches, 1981-82.

Species	September				October				November				December				January				February				March				Probable Status*				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4					
Common loon																																	1, 4
Horned grebe			X		X																		X						X				1, 4
Whistling swan							X																										1
Canada goose	X	X	X		X	X	X		X	X	X			X			X					X							X				0, 1, 3
Mallard	X	X	X		X	X	X		X	X	X			X			X					X							X				0, 1, 3
Pintail	X	X	X		X	X	X			X																							3
Green-winged teal	X	X	X		X	X	X																										0, 1, 3
Blue-winged teal	X	X	X		X	X	X		X	X	X			X			X					X							X				3
Shoveler	X																																3
Wigeon	X	X	X		X	X			X	X	X			X			X					X											1, 3
Gadwall		X																															3
White-fronted goose	X																																3
C. Goldeneye																						X											1, 4
B. Goldeneye																																	1, 4
Bufflehead						X				X				X			X										X						2
Harlequin																	X																0, 1, 4
Surf Scoter																	X					X											0, 1, 4
C. Merganser			X		X	X	X							X			X					X											1, 3
Red-breasted merganser	X	X	X		X	X	X		X	X	X			X			X					X							X				0, 1, 3
Sharp-shinned hawk	X	X																															3
Rough leg hawk	X																																3
Bald eagle	X	X	X		X	X	X		X	X				X			X					X					X		X				0, 1
Marsh hawk	X	X	X		X	X	X																										3
Merlin	X	X	X																														3
G. blue heron	X																																4
Sandhill crane	X	X	X																														3
Semipalm. plover	X																																3
Killdeer			X																														3
Golden plover	X				X	X																											3
Black bell. plover			X			X																											3
Bar-tailed godwit			X																														3
Snipe					X	X																											3
G. yellowlegs	X				X																												3
Rock sandpiper						X			X					X			X					X				X			X				2, 3

Table 2 (Cont'd). Timing of bird species occurrence on Gustavus beaches, 1981-82.

Species	September				October				November				December				January				February				March				Probable Status*				
	Week				Week				Week				Week				Week				Week												
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Pectoral sandpiper	X	X	X		X	X																											3
Western sandpiper	X	X	X																														3
Least sandpiper	X	X																															3
Dunlin	X	X	X		X		X																										3
Dowitcher	X	X	X		X		X																										3
Sanderling	X	X	X		X	X	X		X	X			X				X				X				X								1, 3
Parasitic jaeger			X																														3
Glaucus W. gull	X	X	X		X	X	X		X	X	X		X				X				X				X								0, 1, 3
Herring gull		X	X		X	X	X						X				X																1, 3
Mew gull	X	X	X		X	X	X		X	X	X		X				X				X				X								0, 1, 3
Bonaparte's gull	X	X	X		X	X	X																										0, 3
Bl. leg. kittiwake			X		X	X																											0, 3
Short-eared owl					X																												0, 3
Kingfisher	X																																1
Magpie		X	X		X								X								X				X								0, 1
Raven	X		X		X	X			X	X			X				X				X				X								0, 1
N.W. crow			X						X				X																				0, 1, 4
Ch. bk. chickadee										X																							4
N. shrike																	X				X												2, 4
Savannah sparrow	X																																0, 3
Fox sparrow	X																																0, 3
Tree sparrow										X																							4
Water pipit	X				X																												3
Snow bunting						X			X	X							X																2, 3
Lap. longspur	X	X	X		X	X																											3

\* - based on authors' general knowledge of the area.

0 - summer/fall resident.

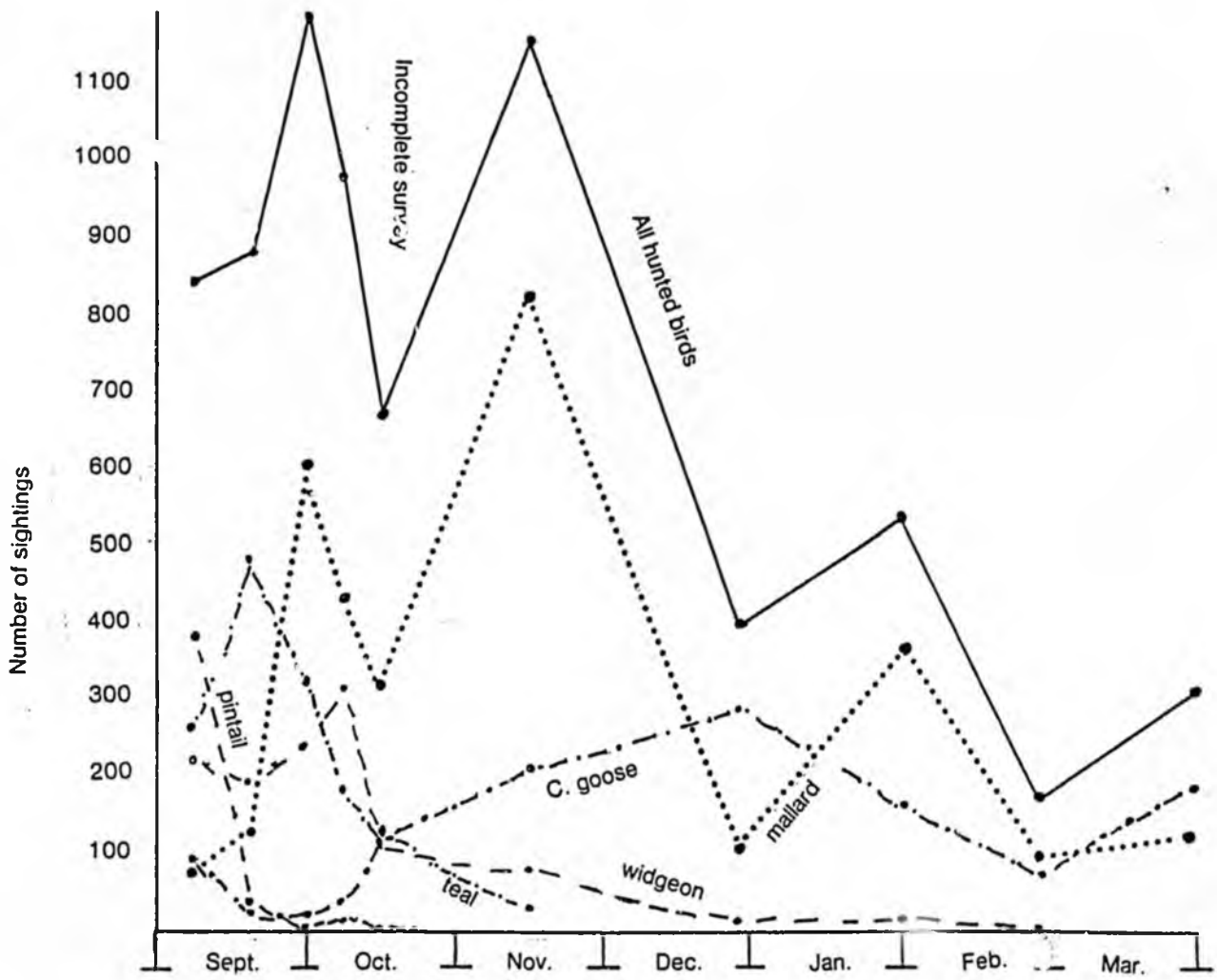
1 - fall/winter resident.

2 - winter resident.

3 - migrant.

4 - in neighborhood, but seldom in study area.

Fig. 7. Numbers of hunted bird species counted during fall/winter surveys of Gustavus beaches. 1981/82.



## Avian Use Patterns - Late Winter and Spring:

Systematic foot surveys ended April 1, 1982. Information on bird populations and distribution for late winter and spring is based on our general knowledge and specific opportunistic observations.

Winter 1981-82 had few thaws and all but the upper beaches were generally coated with ice into March. In early April the upper beaches had thawed, providing foraging habitat for early migrant waterfowl and songbirds. Shorebirds began arriving in late April. By early May many species were present, including several that were scarce or absent in fall (notably whimbrels and yellowlegs). Total shorebird numbers in spring appeared to exceed those of fall migrants; the peak of migration was probably in early May. In spring 1982 foraging in upland habitats by whimbrels, pectoral sandpipers, and dowitchers seemed unusually pronounced.

Spring migration included waterfowl that were scarce or absent during fall; examples were brant, snow geese, white-fronted geese, and harlequin ducks. Migrant Canada geese arrived in May, joining the residents of that species. All geese were found principally on upper beaches and in grassy upland meadows. Marsh hawks and short-eared owls also were prominent in these open areas.

Migration appeared to be over by early June. Our visits to the study area during summer were too limited to provide the basis for generalizations. However, it would appear that the study area is not critical nesting habitat for any shorebird or waterfowl species.

## Avifauna of the Dude Creek Uplands:

Sandhill cranes were the focus of our observations in these uplands. They occurred in large numbers, especially during fall migration (see species accounts below). In the course of crane observations and during winter mammal surveys, data on other birds also was accumulated.

In general, fall and winter bird populations were sparse and poor in species diversity on the uplands. Ravens, magpies and eagles occupied the area in small numbers, and the songbirds typical of Gustavus at this time of year (notably chickadees and crossbills) were present.

Pectoral sandpipers and snipe occurred in modest numbers during migration. Geese of several species, but primarily Canadas, used the meadows in some number during spring and fall; the largest single observation was of 290 Canada geese on 19 September 1981.

In spring, snipes' territorial displays were prominent over the Dude Creek meadows. This species, along with least sandpipers and savannah sparrows, nested there during summer.

## Avian Species Accounts:

### Sandhill Crane.

The magnitude, location, and timing of use by migrating cranes was documented during fall 1981. Observations showed that a minimum of 12,899 cranes passed through the Gustavus area during this period (Fig. 8). Of these at least 6,870 landed, nearly all of these on the Dude Creek uplands. Small groups were also reported from the upland meadows near Gustavus Chapel, Rink Creek and Salmon River, and six were observed on the upper beach in subunit VIII. About 3,500 that overflowed Gustavus appeared to have taken off from the Carolus or Dundas areas of Glacier Bay National Park.

Most cranes observed on the ground were west of Dude Creek (5,926), but the distribution of sign, and discussion with the Prouty family (who can see the eastern Dude Creek Meadows from their home), indicated that substantial use occurred throughout. Use of the open meadows was considerable, but a substantial amount of activity also occurred at meadow margins, even when the mosaic of brush and scrub forest precluded long views. Sightings were scattered, suggesting that no particular localities were consistently favored.

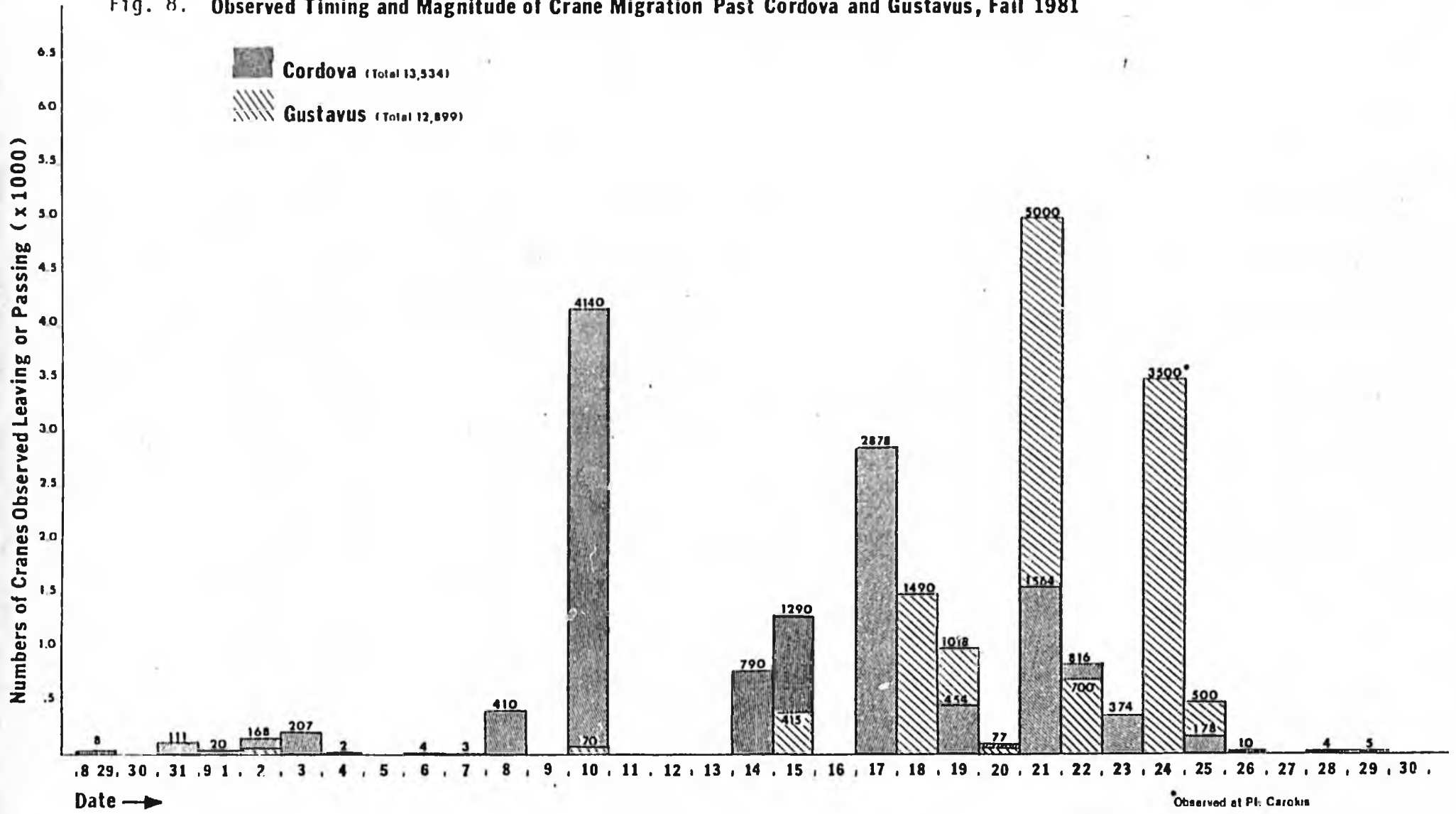
The small number of scats and probings found, even in areas occupied previously by large flocks, indicated light feeding activity, but more observations are needed to confirm this. Food preferences were not determined.

The fall 1981 crane migration occurred almost entirely during September (Fig. 8). Flocks moved through in pulses, often just after a period of bad weather and during either calm or northerly winds. Typically, large flocks arrived during the evening, then lifted off in late morning or early afternoon the next day.

Although they cannot be considered complete, our count totals are remarkably similar to those of Dale Herter's (University of Alaska) research group for the eastern Copper River delta (Fig. 8). This similarity, plus the temporal differences in occurrence of peak numbers observed, strongly suggest that the two counts refer to substantially the same population of birds. If so, the shift in peaks indicates that cranes took about a week, on average, to move from the eastern Copper River delta to the Gustavus area.

Observations of cranes during the spring of 1982 were infrequent and opportunistic; they provide an incomplete picture of this migration period. Cranes were first observed on 21 April and last seen in number on 21 May, although a group of three stayed at Gustavus into July. The spring migration seemed less voluminous than that of the previous fall; however, the recorded spring total of 1,295 is certainly an underestimate.

Fig. 8. Observed Timing and Magnitude of Crane Migration Past Cordova and Gustavus, Fall 1981



A single foot survey of the Dude Creek uplands during spring 1982 (27 May) documented the presence of 530 cranes in the eastern meadows. Sign of other crane activity was found at that time both to the east and west of Dude Creek. The Proutys reported frequent crane activity in the eastern meadows within view of their property throughout the spring migration period.

#### Canada Goose.

Canada geese were resident in the study area, but did not appear to nest there. Only a few evidently unpaired birds were observed during the summer, but our observations were too few to be conclusive in this respect. Goose numbers appeared to increase to some extent during fall, perhaps mainly due to the return of local birds (little of the increase was due to the influx of the small-bodied races). By early December the populations consisted of the winter residuum which on 27 December 1981 numbered at least 265 birds, judging from the counts made that day in subunits IV and V.

Canada geese used all beach subunits as well as upland areas (Table 1), but the distribution of concentrations varied. Some of the variation appeared seasonal. The Dude Creek uplands were deserted by geese when frozen up in winter, while up to 308 were counted in this area during the September 1981 crane surveys. Eastern beaches were deserted during mid-winter, but were concentration areas during fall. It was likely that many geese left for other areas (such as Bartlett Cove in Glacier Bay National Park) during mid-winter cold snaps. In March, goose activity increased on the upper beaches as thaws opened the seaward edges of the sedge meadows.

Some distributional changes may have been related to human activity, however. Geese tended to frequent the more remote beach subunits during fall. During winter and early spring, when hunting, boating and hiking were at a minimum, there was a tendency for the geese to return to the central estuaries and beaches.

This supposition is supported by observed goose sensitivity to human presence. During surveys, geese typically occupied sites with long views. They flushed readily and repeatedly at a distance and often moved to peripheral beach units or left the area altogether.

#### Mallard.

This species was present throughout the study period. Non-breeders were often observed during summer, and it was likely that a few nested along the upland streams and marshes of the study area. Numbers of mallards swelled dramatically in late September 1981, stayed at high levels through November, then declined to a winter population of no less than 150 individuals (subunits I, II, III; 2 February 1982). During the fall period, mallards were almost as numerous as all other hunted waterfowl species combined (Fig. 7).

Mallards were common in all beach subunits except the central sand beach, exclusive of Glen's Ditch (Table 1). They were spread through all beach habitats, being especially common along sloughs and estuaries. Mallards (and pintails) occupied the middle beach more frequently than any other duck species. No seasonal shifts in distribution were perceived. Distribution patterns suggested little tendency to avoid areas of human activity.

Human presence appeared to have less effect on mallards (and other Anatinae) than on Canada geese. Although ducks flushed readily, they often doubled back to the same area after the disturbance (hiker, boater, etc.) had passed.

#### Other Anatinae (Pintail, Wigeon, Teal).

Although all of this group were common spring and fall migrants, they were relatively uncommon in summer months. None were found to nest in the study area.

During migration, these ducks were spread throughout the beach subunits (Table 1). However, there was a general preference for estuaries and sloughs.

Pintails were notable early fall migrants in 1981. Conceivably, many had moved through the area before beach surveys began in early September (Fig. 7). Of all waterfowl, this species showed the greatest tendency to occupy the sedge meadows of the upper beach. By late September, pintails were nearly absent and their ecologically similar relative, the mallard, was appearing in number.

Teal appeared to arrive in two waves during fall migration: one at or before the beginning of the survey period and another in October (Fig. 7). By late December they were absent. Nearly all teal were green-winged, although some blue-winged teal were recorded. The relatively low teal count numbers were surprising.

The abundance of the American wigeon also appeared somewhat bimodal. Wigeons were always more numerous than teal and persisted in small numbers through most of the winter. Wigeon and teal densities appeared to shift from central estuaries to the more remote beaches in October, perhaps in response to human activity.

#### Surf Scoter.

Surprisingly, this was the only species of scoter recorded in the study area; white-winged and black scoters are also present in the Icy Passage area. Surf scoters were often observed in large rafts just offshore. During winter they were found in the rocky shallows of the western beach subunits on several occasions. Most likely they were feeding on organisms of the mussel-barnacle community found on these rocks and almost nowhere else in the study area.

### Merganser (Red-Breasted and Common).

These ecologically similar species are combined here because of difficulty in field separation.

Both species occurred the year around, and a few may have nested in the study area. They were present in number during spring migration, when they congregated around the salmon river estuary, presumably feeding on sand lance and salmon fry.

Substantial groups (primarily red-breasted) occurred during fall in the larger estuaries and low-intertidal margins. Mergansers were among the few species that frequented the central sand beach unit.

### Bald Eagle.

Adult and immature eagles occurred the year around in the study area, but were not found to nest there. The Proutys, however, suspect the presence of a nesting pair near the lower margin of the Dude Creek meadows. At least four individuals were present in the study area during fall and winter.

### Winter Shorebirds (Sanderling, Rock Sandpiper).

These were the shorebirds found in some number on winter beaches of the eastern and westernmost beaches. Although found in the same hundred yards of beach edge, there was some habitat separation. Rock sandpipers tended to occupy rocky patches, while sanderlings were often found in sandier spots. In the absence of rocks on eastern beaches, rock sandpipers tended to use spots with irregular surfaces such as the shell reefs of subunits VII and VIII.

### Fall Shorebirds (Dowitcher, Least/Western Sandpiper, Snipe).

In early fall when sanderlings were scarce and rock sandpipers had not yet arrived, this group of shorebirds (except snipe) was common on study area beach margins and (unlike the winter shorebirds) along estuaries. They often occurred as mixed flocks that included the dunlin. Activity was centered on the silty or sandy intertidal flats.

By October most of these sandpipers were gone (Table 2), although dowitchers were found in small numbers through that month. Like many of the shorebirds, these species appeared to be more common during spring migration. They were essentially absent from the beaches during summer and winter, although least sandpipers appeared to nest in the Dude Creek meadows.

Migratory and summer resident/nesting snipe were conspicuous in study area uplands. Their spring displays were prominent over the Dude Creek meadows. Areas with considerable standing water were points of concentration for snipe in September and October.

### Large Gulls (Glaucous-Winged Gull, Herring Gull).

These two closely related gulls often occurred together on study area beaches, the glaucous-winged being by far the most numerous. Neither was found to nest in the study area, but they (as a group) were abundant and ubiquitous the year round. Large flocks occurred in the spring and at times in the fall.

Their numbers on beaches were probably inversely related to the availability of "balls" of schooling capelin and sandlance offshore. These gulls foraged on all portions of the beach, being particularly active along the water's edge and along the flotsam lines left by recent high tides.

### Mew Gull.

This abundant medium-sized gull was resident in the study area, and may have nested there in small numbers. It was commonly observed in large flocks, particularly in spring. Often it formed mixed flocks with other gulls, foraging on beaches and diving for schooling fishes. It was frequently observed immediately off the beach dabbling for small crustaceans in a few inches of water. Perhaps because of this plasticity in feeding strategy, it was found throughout the study area beaches in the largest numbers of any gull during fall and winter.

### Bonaparte's Gull.

Non-breeding individuals of this small gull species were common during summer and fall. Bonaparte's gulls typically foraged in shallow waters, where they apparently concentrated on small fishes and invertebrates. Beaches appeared to be used only for resting sites: at this time the species formed large mixed flocks with other gulls, typically at estuary mouths.

## Mammals

### General Description:

Because of their generally secretive ways, mammals cannot be visually enumerated as readily as birds. Consequently, much of our data comes from analysis of sign. Because of the small volume of information accumulated per unit effort in this work, general observations from previous years were used to supplement 1981-82 data.

About 17 species of mammal representing nine families have been recorded from the study area. This faunal composition is typical of mainland northern southeast Alaska in most respects.

As the study area's physiography and vegetation are dynamic, so have been the mammal populations. Previously common species (e.g. fox) have died out and new ones (e.g. mink and moose) may be in the process of moving in. Those now established have demonstrated marked yearly variations. Few large mammals could be classified as "common", but a number of smaller ones could.

During the study period, general mammal densities appeared to be low to moderate compared to the previous few years. Densities were typically greatest along: 1) upper beaches, especially in the westernmost subunits remote from human settlement and adjacent to the rich Point Gustavus area, and 2) Dude Creek and portions of Good River, whose game trails link the western beaches with upland sites.

#### Species Accounts by Family:

##### Phocidae (Harbor Seal).

Seal population levels were high in the general area during our study. Consequently, up to a dozen seals were seen frequently in the study area despite scarcity of high-quality feeding or haulout habitat. The major estuaries, notably Salmon River, and western inshore waters were most often utilized. Occasionally, a few seals hauled out on the larger rocks of the western beach subunits.

##### Ursidae (Brown Bear, Black Bear).

Brown bears once occurred in the Dude Creek/western beach area and probably on far eastern beaches in the study area as well. The last record we know of was of a sow and cub along Dude Creek in the late 1960's.

Black bears were at low population levels during the study period; perhaps as few as 3 were present in the Dude Creek/western beach area. Bear tracks were seen on the beach only in subunit III. Sign was noted on the upper Good River and upper Dude Creek in fall 1981. Our last record was on 11 November 1981.

This was in contrast to 1979 and 1980 when black bear populations were higher and game trails along Dude Creek and Good River showed regular use. Highbush cranberries along these watercourses were heavily used by bears in those years.

##### Canidae (Wolf, Coyote, Red Fox).

There were apparently few wolves using the study area during fall/winter 1981-82. Sign of one to two wolves was occasionally noted along the Good River and two individuals were observed at the carcass of a winter-killed horse in February.

Wolf use of the Gustavus area is usually greatest when high population levels in the surrounding National Park combine with difficult winter conditions and low prey availability to force individuals into the proximity of people. This situation did not exist during our study, which perhaps accounts for the low level of documented wolf use.

Coyotes were the most evident large mammals of the beach; they or their sign were observed in all subunits. Although sign was not so frequently observed in the uplands and along watercourses, howling indicated the presence of coyotes in these areas during fall 1981 and

especially in February 1982 (during what is probably their mating time). Scats examined over the years suggest a broad diet emphasizing voles and birds up to the size of Canada goose and blue heron.

The relative prominence of coyotes during the study period underscores their apparent reciprocal relationship with wolves. Observations in past years have suggested that when wolves show regular use of the Gustavus area coyotes are less conspicuous.

Red foxes were once common in Gustavus, but declined around the 1920's, after coyotes became established. The last record in the Gustavus area was in 1968.

Mustelidae (Short-Tailed and Least Weasel, River Otter, Marten, Mink, Wolverine).

Short-tailed weasel sign was abundant, especially in the Dude Creek uplands in winter 1981-82. A recent decline in voles may have forced widespread foraging, notably in the semi-open Dude Creek meadows, where voles were the apparent target species. In previous winters, small tracks, possibly of the least weasel, were observed; however, the presence of this species has not been confirmed.

The often common river otter was relatively scarce in the study area during our period of observation. An otter was seen on lower Good River in September and tracks of one to four were observed on several occasions on the west, and central beach subunits II, III, and IV. Some sign was also noted on Dude Creek in winter. In other years "family" groups of up to six animals have been tracked and observed.

Because the light-footed and often arboreal marten leaves little sign under most conditions, its status is evident only when there is good tracking snow. Although marten can be numerous at times, the study period was a time of apparent average abundance. Tracks were scattered throughout forested areas of the Dude Creek uplands and associated meadow margins and occasionally crossed open meadows.

The mink has apparently moved only recently into the area, and is uncommon. Clear tracks were observed on 11 January 1982 along central Good River at the eastern edge of the study area.

The wolverine is also rare or absent in the study area. The most recent record from the area was on upper Dude Creek several years ago.

Cervidae (Moose, Deer).

Occasional moose wander through the Gustavus area from expanding populations to the north, but they have not yet become established. One set of tracks was observed in subunit VIII in September.

Deer are established on the Excursion ridge to the east and Pleasant Island to the south, but only one record exists for the study area. Sign was noted along lower Dude Creek once in the late 1960's.

#### Erethizontidae (Porcupine).

The porcupine has maintained relatively constant numbers in the study area over the past few years. Porcupine sign was observed in fall and early winter in several areas along Good River and Dude Creek where well-drained denning sites closely adjoin the lush swales preferred for foraging during the growing season. There are a few localized spots, especially along Dude Creek, where porcupine have caused some spruce tree mortality.

#### Sciuridae (Red Squirrel, Flying Squirrel).

Red and (presumably) flying squirrels are common only in the mature spruce forests along Good River and Dude Creek. Red squirrel populations fluctuate substantially; the study period appeared to be a time of "average" numbers. Flying squirrels are secretive and nocturnal; scattered observations were recorded at a feeder near Good River, but their abundance in the study area cannot be estimated.

#### Cricetidae (Voles).

Only the long-tailed vole was recorded from the study area, although certainly the red-backed vole and possibly the tundra vole occur as well. Long-tailed voles are at times very abundant in the Dude Creek and supratidal meadows. The last major population highs were about 1969 and 1974. A moderate peak occurred about 1980. A decline since that time put the population at generally low levels during the study period.

#### Soricidae (Shrews).

Shrews of undetermined species were noted in the study area. Dusky and wandering shrews have been collected from nearby localities, as has been a species of water shrew.

#### Domestic Animals.

Horses have grazed unrestricted for many winters in the upper beach meadows between the Good and Salmon Rivers. About eight individuals were present during our study. One animal that died of natural causes provided a considerable attraction for scavenging birds, coyotes and wolves.

No sign of domestic animals was seen in the Dude Creek uplands, except along lower Good River and in the immediate vicinity of Proutys'. Sign of dogs was noted occasionally in proximity to that of hunters or hikers, but we noted no instances of wide-ranging individuals. Domestic cats have been known to range into the meadow fringes on the west side of Good River.

## FURTHER DISCUSSION AND CONCLUSIONS

In examining the conclusions of this report, the limitations of our data should be kept in mind. Survey methods were designed to generate indices of comparative abundance, rather than actual population estimates. The cumulative observation time was a small fraction of the total study period. And finally, this was a one-year study of a biological system notable for its annual fluctuations. Though we have included some inferences of change over longer periods, much more study is required before firm conclusions on most important topics would be warranted.

### The Outlook for Cranes

As the Glacier Bay ice sheet began its retreat about 200 years ago, outwash rivers ceased their action. The Gustavus area, which had been a barren outwash plain, began to support vegetation. Since then progressive forestation has diminished the area of open meadow, until now only a relatively small proportion of Gustavus (primarily the Dude Creek uplands) remains open (Fig. 4).

Sandhill cranes clearly prefer to use the largest remaining wet, open meadows in the Gustavus area, a habit they adhere to elsewhere along the coastal flyway, as well as in the continental interior (Lovvorn and Kirkpatrick, 1981). Cranes have landed in Gustavus as long as the oldest residents can remember, although areas of concentration may have changed.

Areas remaining as wet meadows are those with the highest water tables. Natural creek entrenchment has lowered the water table in many areas and ditching has lowered it in others. Thus far, no ditches have been dug that interrupt the flow of ground or surface water into the Dude Creek meadows (although a new ditch will affect the country just to the southeast). Any lowering of the water table would accelerate the drying of the surface soils and the advance of forest into open meadows, a process already occurring naturally. Conversely, any activity raising the water table or directly removing trees and shrubs may enhance the habitat for cranes.

Despite the tendency for a few cranes to land in areas of heavy human use, a majority of cranes land in the most remote large meadows in Gustavus. This species also tends to seek remote sites in other areas along the Alaskan coast (notably the Copper River Delta) and in the continental United States (Lovvorn and Kirkpatrick, 1981). Cranes generally show strong fidelity to traditional landing sites (ibid. 1981), and the few that land in the Salmon River area may be the last adherents to an old pattern.

Currently, there is very little human activity on the Dude Creek uplands. Except for a single, newly-resident family, no one lives within sight of the principle crane landing areas. Should this situation change, the tolerance of cranes is uncertain, but very probably low. With substantial human activity or alteration of the upland habitat, abandonment of the area by cranes is a distinct possibility. The proposal for a subdivision at the southeast edge of the major eastern meadow is of concern in this context.

## Birds of the Beach

Beach surfaces and landforms are kept youthful by wave action and isostatic rebound, both of which can be expected to continue into the foreseeable future. Thus, the spectrum of plant communities and intertidal productivity should not change appreciably, although the positions of landforms and communities will change.

There is potential for various human modifications of the beaches. Ditching of uplands would probably channel more water into estuaries and reduce ground water moving through the beaches. The enlargement of existing estuaries might increase the carrying capacity of beaches for waterfowl, since these species seem to be attracted to water edge and large estuary habitat. For instance, Airport Slough and Glen's Ditch have both been enlarged by upland ditching and are important waterfowl habitat. However, ditching or vehicle rutting in sedge meadows may affect these valuable foraging areas detrimentally.

Extensive, uncontrolled use of beach areas by people, their machines, and their pets may also alter bird use of the area. Data suggest that mallards are quite resistant to human displacement; that wigeons and teal may be less so; and that geese likely respond to human presence by shifting their preferred use areas (at least during the hunting season). Current hunting pressure is not a problem because of the moderate number of hunters, limited access, and erratic presence of migratory birds.

## Mammals

Although prediction of changes in mammal populations in response to possible habitat changes is difficult, certain general predictions seem warranted. Shrinkage of the Dude Creek meadows would mean reduction of long-tailed vole populations and a probable subsequent drop in short-tailed weasels and avian predators such as the short-eared owl and marsh hawk. The extension of forest might favor such species as squirrels, marten, and porcupine.

The clearest threat to mammals is habitat preemption by humans. In settled or intensely used portions of Gustavus, mammals larger than squirrels and weasels generally seem to be eliminated. Coyotes provide a partial exception to this rule, perhaps in part due to deriving protection from wolves in the vicinity of people. Yet, even they tend to avoid the most populous parts of Gustavus, including such prime foraging habitat as the Salmon River upland meadows.

Of particular concern are the corridors used by larger mammals to move between uplands and beaches. The major water courses and riverside forests provide such corridors in the Gustavus area. When interrupted by human settlement/activity, they become little used. The lower Salmon River has been almost completely disrupted as a corridor, and Good River and Rink Creek substantially so. Dude Creek is the last corridor to remain intact in the Gustavus area.

## RECOMMENDATIONS

We have found no substantial cause for concern over present human activity in the study area. However, use appears to be increasing. Recent State land disposals and plans for development on private land suggest that this trend will continue. Future land disposal policy and management decisions will determine whether the wildlife and habitat values identified in this study are perpetuated.

We recommend that:

- Key wildlife habitat be retained in public ownership.
- Public lands in the study area be classified to protect and perhaps enhance 1) use of upland meadows by migrating cranes, 2) use of beaches and estuaries by migrating waterfowl, and 3) large mammal access to key habitat. In particular, plans for the area should,

in the case of cranes:

- avoid drainage of the Dude Creek uplands,
- retain levels of human use compatible with continued occupation by cranes during fall and spring,
- place special emphasis on protection of the major crane landing areas west of Dude Creek, and
- allow for the future possibility of maintaining selected meadows free of encroaching brush and trees.

in the case of waterfowl:

- avoid upgrading access, especially to remote beach subunits,
- provide Canada geese protection from excessive disturbance by foot or mechanized traffic,
- avoid drainage changes that diminish the extent or productivity of sedge meadows, and
- provide for the channeling of any new upland drainage into existing sloughs and estuaries.

in the case of mammals:

- protect thoroughfare along Dude Creek, and
- avoid improved access to western beach areas.

These recommendations do not comprise a complete or final list of requirements for successful wildlife management of the study area. For this reason, it is important that provisions be made for monitoring the status of at least the cranes, geese and large mammals as a test of the effectiveness of future management strategies.

#### ACKNOWLEDGEMENTS

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### DUDE CREEK CRITICAL HABITAT AREA: HB312

Even the modest growth and development around small towns can have big consequences for the wildlife of Alaska. The case of Gustavus, in Southeast Alaska, is a good example. Half or more of the entire Pacific population of lesser sandhill cranes stop over in the Gustavus area during their Fall migration South. In years past, the cranes were dispersed over the whole Gustavus area, because wet meadows, their favorite habitat, were plentiful. But the construction of the airport and main roads, combined with natural forest succession, have severely reduced the wet meadows in the area. These meadows provided the cranes with rich food for their migration, shallow water for roosting, visibility for protection from predators, and remoteness from human activity. Most of the migrating cranes now concentrate in the Dude Creek area immediately west of Gustavus, one of the few areas where suitable meadows remain.

House Bill 312 would establish the Dude Creek Critical Habitat Area, for the protection and enhancement of the cranes and of the Dude Creek wet meadows, the key roosting area for the migrating cranes. The State owns almost all of the meadows--about 4100 acres presently managed by the Department of Natural Resources. The rest of the land (160 acres) is federally owned. Under the bill, the meadows would be open to public access, grazing, firewood harvesting, wildlife viewing, hiking and berry picking, as long as those activities didn't harm the cranes or their habitat. The Department of Fish and Game would develop a plan in consultation with the community of Gustavus and approved by the Board of Game for the management of the area.

Similar efforts to protect the flyway of the lesser sandhill cranes are being made in the four Pacific states, as well as in British Columbia. The concept of the Dude Creek Critical Habitat Area was endorsed in a community-wide referendum in Gustavus in January 1984, by a 66-25 vote. This bill has subsequently received the unanimous endorsement of the Gustavus Community Association.

The Alaska Environmental Lobby supports HB312 with enthusiasm. The sandhill cranes that stop over in Gustavus travel nearly statewide. Because of their distinctive profile, these handsome birds are often recognized at great distances as they fly. Although the critical habitat area is in Gustavus, it benefits all of Alaska.

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