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

February 1983

Gregory P. Streveler and Craig O. Matkin

A Contract Paper Completed by the North Gulf Oceanic Society for the Alaska Department of Fish and Game Regional Office, Game Division, Juneau, Alaska Contract No. 82-0848

CONTENTS

Introduction	1
Methods	1
Results and Discussion	2
Physiography and Vegetation	2
Dude Creek Uplands (Subunit IX).	3
Gustavus Beach	3
Human lise	5
Rirds	6
Reach Surveys - Fall and Winter	ñ
Avian lice Datterns - Late Winter and Spring	7
Avian use raccerns - Lace winter and spring	7
Avian Species Accounts	0
	0
	0
	9
Mallard	9
Other Anatinae (Pintail, Wigeon, Teal)	10
Surf Scoter	10
Merganser (Red-breasted and Common)	11
Baïd Eagle	11
Winter Shorebirds (Sanderling, Rock Sandpiper) 1	11
Fall Shorebirds (Dowitcher, Least/Western	
Sandpiper, Snipe)	11
Large Gulls (Glaucous-Winged Gull, Herring Gull)	12
Mew Gull.	12
Bonaparte's Gull.	12
Mammals	12
General Description.	12
Species Accounts by Family	13
Dhocidae (Harbor Seal)	12
Ursidae (Brown Bear Black Bear)	13
Capidae (Wolf Covete Ped Fox)	13
Mustalidae (Short Tailed and Loast Mercal Diver	10
Musteridae (Short-Tailed and Least Weaser, Kiver	1 /
Outer, Marien, Mink, Wolverine)	14 18
Cervidde (Mouse, Deer)	14 15
Erethizontidae (Porcupine).	10
Sciuridae (Red Squirrei, Flying Squirrei)	15
	15
Soricidae (Shrews).	15
Domestic Animals.	15
Further Discussion and Conclusions	16
The Outlook for Cranes	16
Birds of the Beach	17
Mammals	17
Recommendations	18
Acknowledgements	19
Literature Cited	19

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

-1-







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

-2-

Fig. 3. Winter mammal survey itinerary.



Creek uplands and the Gustavus Beach. In order to more specifically characterize avian distribution, the beach has been further divided into 9 subunits (Fig. 2).

Dude Creek Uplands (Subunit IX):

Dude Creek bisects a low gradient alluvial fan formed by the outwash from the Glacier Bay ice sheet at its Neoglacial maximum. Outwash formation ceased and revegetation began approximately 200 years ago following ice recession from the Bartlett Cove lateral moraine.

A generally high water table has favored the development of extensive wet meadows dominated by several species of sedge, moss, and horsetail (Fig. 4). Willow thickets, scrub forests, then luxuriant Sitka spruce stands, are roughly arrayed in bands paralleling the creeks. This pattern is in response to the increasingly depressed water table as the creeks are approached. To the seaward, meadows grade into a broad band of shrublands and scrub forests. This band approximately parallels the present beach and occupies former tidelands that have risen isostatically in response to the recession of the Neoglacial ice in nearby Glacier Bay.

Vegetative succession appears to be proceeding toward forest over much of the Dude Creek uplands. Perhaps this is a result of creek entrenchment and improved drainage in response to land uplift. Two processes seem to be occurring: spreading of the shrub and forest zones, and establishment of pine and willow seedlings throughout much of the meadowlands. These trends are reducing the size and openness of the meadows.

Gustavus Beach:

Seaward from the broad shrub and forest zone flanking lower Dude Creek are the open communities of the Gustavus beach. This beach segment of the study area extends approximately nine miles between the boundaries of Glacier Bay National Park (Fig. 2). Although the beach has been divided into eight subunits for analysis of wildlife distribution, it will be described here as four physiographic units: western silt/sand/ boulder beach; central estuaries; central sand beach; and eastern silt beach.

At the western extreme (subunit I) of the "western silt/sand/boulder beach" the beach slopes gently seaward from a pronounced sandy strand at about present mean higher high water. Surficial sand quickly gives way to exposed Neoglacial silt in the broad mid-tide regions then reappears below mean higher low water as a discontinuous veneer (Fig. 5). Numerous ice-rafted boulders host moderately diverse assemblages of rockweed, dulse, sea lettuce, barnacles, mussels and associated species. In the silt are found colonies of burrowing anemones, piddocks, soft shell clams, and polychaete worms. Above the high tide strand are occasional narrow strawberry/ryegrass meadows then lush sedge sloughs and shallow ponds, backed by young spruce forest. Several small estuaries breach the strand and meander across the flats.

-3-





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.

-4-

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 forseeable 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, kelping, 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 easy 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).

	•			Beach Su	bunit				
Species		II	III	17	>	IV	IIA	<u>VIII</u>	Total
Common loon	·		•	7		2			4
Horned grebe	-			2	4	10	15		31
Whistling swan		•		1		•			
CANADA GUOSE	528	140	270	355	341	. 14	3//	193	2,218
MALLARD	469	369	482	48	293	260	1,055	134	3,110
PIRTAIL.	75	60	26		71	37	15	190	440
GREEN-WINGED TEAL	169	68	ω	40	28	,		12	358 3
Shoveler							9		9 9
WIGEON	232	230	183	153	162	130	68	51	1,209
Goldeneye spp.	7				4	ۍ	10	4	26
Bufflchead	•		ო		4		2	8	17
liarlequin supr scorre	. 2 4	000				00			0 00F
SUKF SCUTEK MERANGER ERR	cu/, 2		550		c J	02	160	~	2,323 1 643
MEKGANSEK SPP.	300	10	503	123	00	+00	001	ŋ	1,076
Sudry-Sulined nawk	•					•	-		- 0
kougn leg nawk		J	•	c	-	-	u	٨1	י ע ע י
UMLU EAULE Naveh haul	0 ¹	סע	÷ 0	n	01	- 1		• -	212
мегііл Мегііл	.	ה ה		-4		4	ი ო	• ~	1
G. blue heron		•	I				2		2
SANDHILL CRANE	d .							9	+9
Semipalm. plover	10								10
Killdeer		į	m			c	c		ν υ
Golden plover	č	61		•		V	v c		00
Black bell. plover	22						ά		2,
Bar-tailed godwit	و						•	¢	و د
Snipe			ı				-	2	ייס ע
Yellowlegs spp.			9						0 u
ROCK SANDPIPER	812	122			1		385	206	1,525 077
"Peeps" 1	68	081	L	L J	-		5/U 22	64 7 1	0//
Pectoral sandp1per	104	4/ 10/ ,	٥	C 0			77 75	1/	271
DOWLTCHER	12	168	53	95	15		567	160	535
		I							

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

343 330+ 2 Total 1,419 2,855 772 406 P 33 33 8 2 519 2 899 530 937 78 319 185 238 20 - N 1,5813,653 184 227 59 10022 2 [<u>9</u>3 130 300 441,678 G 845 2,608 296 371 187 403 40 352 + LO Beach Subunit 596 ,672 40 87 523 116 3 3 ω 969 40 21 127 304 63 867 2,350 22 30 Q р. 3 160+ 480 990 99 1,4737,821 357 152 2 $m \odot \circ \circ \circ$ 0 D D Hunted Species GLAUC. W/HERRING GULL All Species Bl. leg. kittiwaké Ch. bk. chickadee N. shrike Parasitic jaeger BONAPARTE'S GULL Savannah sparrow Short-eared owl Species d. Front goose free sparrow Snow bunting Unl.D. Ducks later pipit fox sparrow SANDERLING Kingfisher Plover sp. N.W. Crow Longspur VEW GULL TOTALS: Magpie Javen

¹ Western, least and Bairds sandpipers.

P Present but uncounted.



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

Probable Status* ო ო 3 \sim m m March Week 1 2 3 4 \times \times $\times \times$ February 4 \times \times $\times \times \times$ <u>Week</u> 1 2 3 4 January Week 1 2 3 4 \times \times \times \times \times \times $\times \times$ December 4 \times \times Weck 2 3 4 ----1 November 4 Neek 1 2 3 4 × \times \times \times × × × × ~ \times \times × October Week 1 2 3 4 \times \times \sim × \sim × \times \times \sim \times \times \times \times × \times \times \times \times × \times \times \times \times ×× ×× × \times September Meek 1 2 3 4 \times \times \times \times \times \times \times × \times \times \times \times × \sim ×××× ×××× \times ~ Red-breasted merganser White-frunted goose Golden plover Black bell. plover Sharp-shinned hawk Bar-tailed godwit Green-winged teal Semipalm. plover Blue-winged teal Species Whistling swan Rough leg hawk Bald eagle Sandhill crane Rock sandpiper G. blue heron yellowlegs Horned grebe Canada goose C. Goldeneye Goldeneye C. Merganser Surf Scoter Common loon Bufflehead Marsh hawk llarlequin Shoveler Killdeer Hallard Pintail Gadwall Wigeon Merlin Snipe

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

Probable Status* 3 o 4 400 ົຕ March Week 1 2 3 4 \times \times ~ February Week 1 2 3 4 $\times \times$ January Neek × × 4 \times \times \times × 3 2 ----December Week 1 2 3 4 \times \times \times \times \times \times November $\frac{2}{3}$ $\frac{3}{4}$ Week × × ~ \times \times \sim October Week 1 2 3 4 \times \times >< ×× × \times \times × ~ \times \times \times September Woek 4 \times \times × $\times \times$ × \times 2 2 × × \sim × × × Bonaparte's gull Bl. leg. kittiwake Pectoral sandpiper Western sandpiper Ch. bk. chickadee Parasitic jaeger Glaucus W. gull Savannah sparrow Species Least sandpiper Short-eared owl Lap. longspur Herring gulĨ Mew gull free sparrow Snow bunting Fox sparrow Water pipit Sanderling Kingfisher N. shrike N.W. crow Dowitcher Dunlin Nagpie Raven

- based on authors' general knowledge of the area;

0 - summer/fall resident.

- fall/winter resident.

2 -^Iwinter resident.

--migrant.



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 overflew 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) m.s...1922research 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.



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).

-9-

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 greenwinged, 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.

1 200

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 sandlance 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.

i jostofi

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 fail 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 sununits 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 forseeable 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 shorttailed 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. Bude 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 machanized 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 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

We thank Senator Richard Eliason for his concern over the fate of State lands in the Gustavus area and his support of research efforts. Don McKnight of the Alaska Department of Fish and Game was instrumental in assuring support for our efforts. Bob Howe provided information on his crane sightings in Gustavus. Dena Matkin assisted on several surveys, and Barb Streveler typed the original manuscript. Dara Miller, ADF&G typed the final report.

LITERATURE CITED

Lovvorn, J. R. and C. M. Kirkpatrick. 1981. Roosting Behavior and Habitat of Migrant Greater Sandhill Cranes. J. Wildl. Manage. 45(4):842-857.

Herter, D.R. 1982. Habitat use and harassment of Sandhill Cranes staging on the eastern Copper River Delta, Alaska. M.S. Thesis Univ. Alaska, Fairbanks, 170 pp.