ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

STATE OF ALASKA
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WATERFOWL REPORT

by

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Volume VIII
Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-13-R-1 and 2, Work Plan C

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CORRECTION NOTICE

Corrections in Annual Project Segment Reports, W-13-R, for 1967 (Vol. VII) and 1966 (Vol. VIII) are necessary and should be noted as follows:

Vol. VII, page 7. Summer Population Gains should read:

1.	Adults alive in late May	126
2.	Est. loss of adults to August (10 percent)	13
3.	Adults alive in August	113
4.	Nests started	55
5.	Nests hatching	44
6.	Chicks per brood early in August	6.2
7.	Total chicks alive in August	275+
8.	Adults plus chicks in August	385+
9.	Factor of summer gain	3.0-3.1

Vol. VIII, page 13. Mortality, August 1965 to May 1966

Second paragraph should read:

"About 113 adult ptarmigan (59 males, 54 females) were on the area in August 1965. About 57 old birds (27 males, 30 females) were present in the spring of 1966. The indicated mortality is 50 percent (54 percent for cocks, 44 percent for hens). The mortality rate was the same in 1964-65 as in 1965-66 for cocks, but was lower in 1965-66 among females."

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT: W-13-R-1 and 2 TITLE: Small Game and Furbearer Investigations

WORK PLAN: C TITLE: Waterfowl

JOBS: 1,2,3,4 (W-13-R-1); 1,2,3,4,5,6 (W-13-R-2)

PERIOD COVERED: January 1, 1966 to December 31, 1966

ABSTRACT

Studies of plant communities on the Copper Delta suggest that plant succession may be somewhat accelerated after land uplift due to omission of seral stages. Forest may invade nesting habitat quickly.

The average clutch size of 100 dusky Canada goose nests was one egg less than 1965. Nesting success was good but nesting was apparently delayed by inclement weather and resulted in a prolonged hatching period.

Past study reports concerning wetlands inventory and management were used to develop a system for cataloging and mapping waterfowl habitats in Alaska. Field reconnaissance work was done on the Juneau-Mendenhall Tidelands.

Excellent weather conditions in interior Alaska, following a late spring, led to a rapidly developing vegetation and better water levels than in past years. The nesting efforts of an increased breeding population of ducks (51 percent more than in 1965) in response to these conditions resulted in the best production in the past five years. Widgeon, green-winged teal, and scaup made up the bulk of the brood crop in 1966. Production of dusky Canada geese on the Copper River Delta was good, with 35 percent of the mid-summer population composed of goslings.

Waterfowl hunting success in 1966 was good but was adversely influenced in some areas by mild fall weather and a late movement of migrants. Bag composition confirmed good production of widgeon and green-winged teal. The two-scaup daily bonus again did not seem to provide the added incentive to increase the kill of this species or bolster the statewide kill. The estimated legal kill in 1966 was close to that of 1965 or an estimated 80,000 ducks and geese. A special study of waterfowl hunting on the Juneau Tidelands suggested that a hunting population of about 900 local hunters (300 under 16 years of age) took over 4,000 ducks and geese while deriving nearly 10,000 recreational hours of benefit from these flats.

Increasing concern over the development and changing land uses on the Juneau-Mendenhall Tidelands prompted studies to determine land use conflicts, evaluate recreational use, and to propose a land management plan. The Juneau Tidelands cover an area of around 6,000 acres and provide recreation and natural product values exceeding $150,000. An annual harvest of over 4,000 ducks and geese is taken by nearly 900 hunters. Hunting pressure on weekends reduces the total acreage available per hunter to about 12 acres. Over two-thirds of the sport fish caught in the Juneau-Douglas area are provided by streams flowing across the tidelands. The tidelands are also used by bird watchers, dog owners, flower pickers, wildlife photographers, tourists, and hikers. Most outstanding of the land use conflicts are those concerning: (1) the dredging of a deep-water channel from Fritz Cove to the Gastineau Channel, (2) planning for expansion of the Juneau Municipal Airport in view of increased air traffic, (3) the proposed highway route from Norway Point to Vanderbilt Hill, and (4) the present land zoning of the study area which is not compatible with long-range recreational planning, especially waterfowl-based recreation. Land management planning includes the possibility of buying lands through Wetlands Acquisition Funds provided by Duck Stamp money, or Federal Aid in Wildlife Restoration matching monies. Developmental projects which need most attention are those concerned with access, dispersing hunting pressure, providing more nesting habitat, creating more resting and feeding areas, particularly away from the Airport, and protecting resident sport fish stocks.

RECOMMENDATIONS

(Management recommendations relative to waterfowl harvest regulations are presented each summer to the Pacific Flyway Council and Regulations Committee by a representative of the State of Alaska.)

Recommendations stemming from the Juneau Tidelands study are listed in this report at the end of the section on this job.

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT: W-13-R-1 and 2 TITLE: Small Game and Furbearer Investigations

WORK PLAN C TITLE: Waterfowl

JOBS: 1,2,3,4 (W-13-R-1); 1,2,3,4,5,6 (W-13-R-2)

PERIOD COVERED: January 1, 1966 to December 31, 1966

OBJECTIVES

To determine the effect of land uplifting associated with the earthquake of March 27, 1964 on the production of waterfowl on the Copper River Delta.

To inventory, catalogue, map, and otherwise identify all types of waterfowl habitat in regard to the present or future use of these habitats as nesting, hunting or migrant areas.

To provide the Pacific Flyway Council and Regulations Committee with annual estimates of statewide waterfowl production.

To determine annual take, crippling loss, hunter success, species composition, and sex and age ratios of birds harvested.

To write publications suitable for presentation in technical journals using data from completed Federal Aid Investigations.

To make a general ecological survey of waterfowl habitats in the Juneau-Mendenhall area.

TECHNIQUES

Qualitative analysis of 52 ecological sites with approximately 1,905 plots was accomplished during June, July and August, 1966 in representative ecotypes throughout the Copper River Delta. The plots were marked with numbered stakes painted orange, with locations noted on a topographic map to facilitate re-examination at a future date.

Plots were established in the various plant communities and included Hemlock, Spruce, Alder, Willow, Sweet Gale, Forb-Grass, Sedge and Pond ecotypes.

At each site the plots were analyzed for percentage of plant coverage by species, average height of each species, and number of inflorescences of each species (the procedure for plant coverage analysis was described in Progress Report W-6-R-6, 1965).

Soil samples were also taken from representative sites, with a common gardener's hand trowel. The samples were placed in plastic bags and marked as to date, site, and plot number. These samples will be analyzed at the Soils Laboratory at Washington State University.

A spruce stand far out into the Delta was examined for age and height above water of the trees. Age of each tree was determined by using increment borings and then counting annual rings. The height above water was determined with an Abney level.

The detailed analysis of the Forb-Grass plant community, started in 1965 and continued in 1966, will be concluded in 1967. This study will define as precisely as possible the parameters of this Forb-Grass type so essential to nesting dusky Canada geese.

Evaluation of the nesting success of dusky Canada geese, Branta canadensis occidentalis, continued during the spring and summer of 1966. Methods for nest marking and recording data were the same as described in Progress Report W-6-R-6 and W-13-R-1, Vol. VII, June 1966.

At the request of the Bureau of Sport Fisheries and Wildlife, Project personnel banded dusky Canada geese on the Copper River Delta to aid in population studies being conducted in the Willamette Valley in Oregon.

On July 28, 1966, a wing trap and holding pot were erected on Alaganik Slough and 354 Canada geese were banded. The method of driving geese, construction of the trap and materials used were described by Shepherd in Progress Report W-6-R-2, 1960.

Aerial breeding pair censuses were conducted in cooperation with the Bureau of Sport Fisheries and Wildlife during May and June. An amphibious Cessna 180 aircraft was used to cover over 200 standard 16-mile by 1/4-mile transects. The number and species of waterfowl observed on these transects were recorded on separate tape recorders by the pilot and observer. Each evening these tapes were transcribed and recorded on data sheets provided by the Bureau.

Ground breeding pair and brood censuses were again conducted at Minto and on the Copper River Delta. In addition, nesting studies and aerial counts were made on the Copper River Delta. Techniques were the same as described in the 1966 Waterfowl Report (Vol. VII, Annual Project Segment Report, June 1966).

Waterfowl bag checks were made by State and Bureau of Sport Fisheries and Wildlife personnel on key marshes near Anchorage, Cordova, Fairbanks, Ketchikan, Juneau, and Wrangell. A record of the number of hunters, days and hours hunted, method of hunting, birds lost, birds killed by sex, age, and species etc., was kept on standard forms supplied to all cooperators. This season all wing collections were made by the Bureau of Sport Fisheries and Wildlife with a State Biologist participating in the evaluation of this sample at the Annual Wing Analysis Meeting.

A vegetation cover map of the Juneau-Mendenhall Tidelands was prepared during July and August 1966. Cover type boundaries were plotted on notebook-size field maps and transferred to a larger map in the office. Eighteen random transects studies of vegetation stands were made by using the Braun-Blanquet technique for coverage evaluation as modified by R. F. Daubenmire (Northwest Science, 33:43-64:1959). Study sites were permanently marked or precisely described and marked on maps. Fifty-foot lines of twenty-five, 20 cm x 50 cm plots were run through each stand. Coverage value, frequency, and constancy were recorded for each transect. Salinity tests were based on the electrical conductivity method of measuring normal salinities. These salinities were corrected for temperature differences and later converted to salinity in parts per million. Bag checks were conducted from September 1, 1966 to November 13, 1966 by State and Federal personnel. Standard checking procedure was to contact hunters in the early morning and late afternoon. Routine data such as hunter names and addresses, species, time, method of hunting, crippling losses, etc. were recorded on the standard mimeographed form used for all bag checks. Waterfowl census counts were made periodically at a series of pre-determined observation points to record composition, numbers, and movements of migrants on the tidelands.

FINDINGS

Ecological Studies of the Copper River Delta

Vegetation

Since the ecological study is a three-year project, it will not be finished until late next summer. This section of the report will be completed at the next reporting date, March 1968. Certain aspects of the ecological study have, however, progressed far enough to be discussed, and these are mentioned here briefly. John Crow, doctorate candidate in botany at Washington State University, is conducting the ecological studies for the Department and is responsible for writing a full report in the summer of 1967.

The increment borings from the spruce stand were analyzed along with the elevation of the trees above the water line to see if a correlation existed between age and height above water. It appears quite likely that a definite relationship between age and elevation does exist, as the oldest trees are on the highest ground and the youngest on the lowest.

This information has been compared with topographic data from the Forb-Grass goose nesting habitat to attempt to predict the type of vegetation which could and would develop there. Data from these two areas indicate that the height of the goose nesting area above the water does not preclude the possibility of invasion by spruce and perhaps even hemlock.

From examination of adjacent plant communities, more advanced than on the nesting area, it appears that one or more seral stages may be omitted on recently uplifted land, and hence the plant succession there may be somewhat accelerated.

Waterfowl

Nesting histories of 100 dusky Canada goose nests followed to the end of activity in each nest revealed that hatching success was much better than in 1965. The average clutch of 4.8 eggs per nest in 1966 was smaller than the 1965 average of 5.8 eggs. A comparison of the 1966 and 1965 nesting success is as follows:

Year	No. Nests	Hatched		Abandoned		Flooded		Destroyed	
		No.	%	No.	%	No.	%	No.	%
1965	221	139	62.9	15	6.8	0	0.0	67	30.3
1966	100	97	97.0	3	3.0	0	0.0	0	0.0

A severe storm front along the Gulf of Alaska in mid-May apparently caused considerable abandonment of early nest attempts and undoubtedly caused nesting to be delayed as late as two weeks or more behind that encountered in 1965.

The drive in late July to band juvenile geese revealed three separate and definite age classes of goslings on that date. Almost 50 percent of the young were approximately one month old, but about 25 percent were between two and three weeks of age, and 25 percent were still downy or at most one to two weeks old. This factor would indicate that incubation of approximately 25 percent of the goose nests during 1966 started no earlier than June 10, with the majority of incubation starting no earlier than mid-May.

Inventory of Wetlands

Work on the statewide inventory of wetlands was confined to studying methods and techniques used by other states to implement wetland inventories. These publications concerning wetlands inventory and management were used to outline a system for cataloging and mapping waterfowl habitats in Alaska. The system for cataloging wetland areas will be based on drainages and coastal topography. Further classification will be based on the type of use, i.e., nesting, migratory wintering, hunting, or combinations of these uses. A systematic sampling of little known areas is contemplated and involves field checks to be made on a priority basis over the next few years.

Data will be standardized and tabulated on a special form. The form will be divided into three parts, each of which is essentially a completed phase of the job. These phases include (1) that work which is accomplished in the office, i.e. map location, area, size, etc; (2) type, use, vegetation data, water types, species composition, productivity, ownership, etc; and (3) acquisition and management. When a data sheet is completed it will be punched onto an IBM card and numbered to correspond with an index listing. Upon request, data on areas under question can be made available for immediate use by lands personnel.

Preliminary Reports

Reconnaissance reports are now available for the Copper River Delat, Juneau-Mendenhall Tidelands, Nelchina Basin, and the Susitna River Flats. Field work contemplated for the summer of 1967 will include limited habitat studies in selected areas of the interior of Alaska, using float aircraft and canoes.

Statewide Waterfowl Production

Breeding Ground Conditions

A late spring, especially in the coastal areas, confronted returning migrants and early-nesting species. However, this condition was apparently alleviated by excellent weather conditions during June and July. Vegetation growth was rapid and water levels dropped throughout the summer. Plant and animal food species appeared much more abundant than in previous years and were readily available to waterfowl as water levels receded.

Breeding Pair Counts

Ground breeding pair censuses were conducted over the Minto Flats and on the Copper River Delta. Counts at Minto showed a 51 percent increase in breeding drakes over the 1965 population (Table 1). This is still 7 percent below the five-year average. The combined air-to-ground visibility index for the species over this habitat was 0.35 to 1.0 compared to 0.5 to 1.0 in 1965. Early flooding and considerable ice may have influenced visibility in 1966.

Aerial counts of the dusky Canada goose breeding population on the Copper River Delta suggested a slight decrease in breeding pairs. Nest initiation in this area was delayed at least five days over 1965 and inclement weather during the early nesting period appeared to have caused an irregular progression of nesting. Duck populations were again low in this area, but possibly exceeded 1965 levels.

Brood Surveys

The most encouraging aspect of this summer's production studies was the response of interior waterfowl populations to the improved habitat conditions. Brood surveys over study plots on the Minto Flats revealed an average brood density of 14 broods per square mile. This brood crop was the largest encountered on the study plots in the past five years (Table 2). The average Minto brood (6.3 ducklings) was slightly smaller than in 1965.

Nesting success of early nesting species was good, but still appears to have been influenced by low initial breeding populations and the delayed spring. Production of widgeon, green-winged teal, and scaup was excellent and made up the bulk of the brood crop.

Table 1. Survey of Breeding Drakes on Minto Flats, Alaska, 1962-1966. [1]

Species	1962	1963	1964	1965	1966	5 yr. average	Percent change from 1965	Percent change from average
Dabblers:								
Mallard	65	83	45	28	37	52	+32	-29
American widgeon	73	75	73	44	69	67	+57	+ 3
Green-winged teal	50	43	34	28	42	39	+50	+ 8
Shoveler	25	24	27	22	10	22	-55	-55
Pintail	201	97	78	43	42	92	- 2	-54
Subtotal	414	332	257	165	200	272	+21	-26
Divers:								
Canvasback	10	4	16	4	14	10	+250	+40
Scaup	158	152	202	103	215	166	+109	+30
Goldeneye	4	5	17	5	1	6	- 80	-83
Bufflehead	15	35	20	19	17	21	- 11	-19
Subtotal	187	196	255	131	247	203	+ 88	+22
Scoter	9	5	7	--	--	4	--	--
TOTAL DUCKS	610	523	519	296	447	479	+ 51	- 7

[1] These data are from ground counts over three 4-square-mile plots.

Table 2. Comparison of Brood Counts on Minto Flats, Alaska Study Plots, 1962-1966.

Species	1962	1963	1964	1965	1966
Pintail	8	14	7	8	8
Mallard	2	13	3	8	6
Widgeon	10	39	18	16	39
Shoveler	4	8	0	3	3
Green-winged teal	11	8	7	12	16
Scaup	39	71	27	12*	86
Canvasback	4	2	1	2	4
Bufflehead	6	3	2	5	8
Goldeneye	1	4	2	1	1
Redhead	1	0	0	0	1
Scoter	1	0	0	0	0
TOTAL	87	162	67	67	172

* Hatch not complete

Comparison of field measures which were obtained from the random plot data over the past five years is presented in Table 3. Of note is the apparent high nesting success in 1966 and the realized production of 1.4 immatures per adult. This level of productivity is more reminiscent of the late and mid-fifties in the Interior; however, comparative data is not available to verify this assumption. Regardless, any trend in the present direction is entirely welcome.

Table 3. Comparison of Waterfowl Productivity on Minto Flats, Alaska, 1962-1966.

	1962	1963	1964	1965	1966
Number of broods per square mile	5.4	9.0	5.7	5.6	14.3
Percent females with broods	18.7	30.6	24.5	31.7	42.0
Brood size	6.0	6.8	5.5	6.7	6.3
Immatures per adult	0.39	0.73	0.52	0.87	1.4

Special Studies

Nesting studies of dusky Canada geese on the Copper River Delta suggested excellent hatching success. In a sample of 100 nests 97 percent of the nests successfully hatched. The average clutch size of 4.8 eggs was down from the 1966 clutch of 5.8 eggs. This may have been a result of the delayed spring nesting. (The uneven age distribution in goose broods further suggests nesting was delayed and extended well into late May and early June.) Predation was negligible and was possibly related to heavy hunting pressures on bear and coyote over the flats during the spring. Goslings composed 35 percent of the goose population in 1966 as compared to 26 percent in 1965. Age ratios from hunter bag checks in Oregon suggested that the 1966 population was composed of 48 percent immatures as opposed to 40 percent in 1965 (in. corr.).

Waterfowl Publications

A paper entitled "Current Status of the Copper River Delta Waterfowl Habitat and the Dusky Canada Goose Nesting Population" was written and presented at the Northwest Section meeting of the Wildlife Society, at LaGrande, Oregon, June 1966.

Statewide Waterfowl Harvest

Weather and Habitat Conditions

Water levels continued to drop during the summer of 1966 in many of the popular hunting areas and again created excellent conditions for hunting waterfowl. A rapid drop in water levels at Minto Lakes beginning in July resulted in excellent feeding conditions for geese, but drastically exposed shorelines which left little feed for dabbling ducks. Consequently, duck shooting was not as productive around the larger, well-drained lake systems. The lack of migrant ducks created little hunter interest and hunting was light after the first weekend of shooting.

Elsewhere, fall weather and water conditions were good to poor. In south-central Alaska, mild "bluebird" weather kept hunting to a minimum. Moreover, migrant ducks did not arrive in any numbers until late September, and were largely unavailable to hunters because the lack of storms allowed the waterfowl to feed and rest in the bays and on the outer shores of Cook Inlet instead of the onshore water areas.

Hunting in the Cordova area was reported to be poor due to a late migration and a rapid freeze-up, which resulted in most ducks bypassing this fine shooting area. Goose hunting was highly popular and the Dusky goose population took most of the hunting pressure.

In southeastern Alaska (Juneau and Stikine) hunting was a little better than in 1965, but not encouragingly so. The final southern movement of waterfowl caused a flurry of hunting during the last two weekends in October. Hunting effort declined sharply in November as a result of cold weather and the lack of birds.

Bag Checks

A total of 380 hunters who spent 428 days in the field and bagged 1,260 ducks and geese were checked by State and Federal personnel. An area and statewide summary of these bag checks is as follows:

	Hunters	Days Hunted	Ducks
Interior	86	151	415
Southcentral	138	183	562
Southeastern	156	94	283
Statewide	380	428	1,260

Duck wings were solicited by the Bureau of Sport Fisheries and Wildlife through a random mail survey of duck stamp purchasers. A State Biologist (Ben Hilliker) attended and assisted in the wing analysis meeting in 1966. Results of this wing survey are available each year in the Administrative Report series of the Bureau of Sport Fisheries and Wildlife.

Bag check statistics as presented in the following tabulation suggested hunting success was similar to that of 1965, but that hunting effort may not have been as intensive in 1966.

	Days Per Hunter	Ducks Per Day	Ducks Per Hunter
Interior	1.8	2.7	4.8
Southcentral	1.3	3.0	4.1
Southeastern	0.6	3.0	1.8
Statewide	1.1	2.9	3.3

These statistics also show a decrease in success in the southcentral as noted by Hilliker (in. corr.) in 1966. This was apparently a result of the lack of hunter interest which is evident in the drop in days per hunter.

Species Composition

Examination of the 1966 statewide and area bag composition brought to light some changes over 1965 bags (Table 4). The change of greatest interest included an increase in widgeon, green-winged teal and geese which was largely a result of abundance and/or availability. Production of widgeon and green-winged teal was good this past summer and this abundance appears to be reflected in hunter bags. Canada geese were especially available to Interior hunters. The shoveler kill was again down as was production in this species. Scaup were not nearly as important to hunters as in 1965 and contributed little to bolster hunter bags. It would appear that bonus scaup in the bag have little or no influence in the total kill. Pintail and mallard still seem to supply the greater portion of the harvest, but were not nearly as abundant as in past years.

Harvest Summary

Kill statistics for 1965 based on the Bureau of Sport Fisheries and Wildlife survey of duck stamp purchasers suggested that a hunting population of 9,160 hunters took 71,700 ducks and 8,600 geese (Administrative Report No. 115, Migratory bird populations station, July 18, 1966). This seems to be a realistic figure for the statewide kill, but may be a low estimate because hunters under 16 years of age are not included. Intensive bag checks on the Juneau Tidelands revealed that nearly one third the hunters in the area are under 16. While this may be an exceptional area, it certainly points out the potential harvest capabilities of the youngsters and the recreational value of the waterfowl resource.

Special Harvest Studies

Juneau-Mendenhall Tidelands

During the fall and early winter of 1966 an intensive survey of hunters

Table 4. Relative Species Composition of 1965 Alaska Waterfowl Bag Checks.

Species	Interior		Southcentral		Southeastern		Statewide	
	No.	%	No.	%	No.	%	No.	%
Pintail	68	22.0	224	39.9	71	11.8	363	23.3
Mallard	75	19.2	126	22.4	65	10.8	266	17.1
Widgeon	73	18.7	76	13.5	100	16.6	249	16.0
Green-winged teal	33	8.5	62	11.0	157	26.0	252	16.2
Shoveler	16	4.1	22	3.9	9	1.5	47	3.0
Gadwall	0	0.0	10	1.8	0	0.0	10	0.6
Scaup	11	2.8	13	2.3	36	6.0	60	3.9
Ring-necked duck	1	trace	0	0.0	4	0.7	5	trace
Canvasback	4	1.0	2	trace	2	trace	8	0.5
Goldeneye	12	3.0	13	2.3	11	1.8	36	2.3
Bufflehead	17	4.4	1	trace	1	trace	19	1.2
Old-squaw	0	0.0	1	trace	0	0.0	1	trace
Scoter	0	0.0	0	0.0	122	20.2	122	7.8
Merganser	0	0.0	0	0.0	4	0.7	4	trace
White-fronted goose	11	2.8	2	trace	0	0.0	13	0.8
Canada goose	66	16.9	10	1.8	21	3.5	97	6.2
Snow goose	1	trace	0	0.0	0	0.0	1	trace
Brant	2	0.5	0	0.0	0	0.0	2	trace
	390		562		603		1,555	

was made on the Juneau-Mendenhall Tidelands as a part of a biological study of this habitat. Some aspects of this study are worthy of presentation because of their statewide application.

A total of 253 waterfowl bags were checked between September 27 and November 13, 1966. These checks represented 3,120 hours of hunting. Converting hours to days we find that the average Juneau hunter spent 0.6 days per hunt during the 1966 season. This type of hunt is expected with as easy access to hunting as can be found in Juneau; moreover, in comparison to other areas, hunter success is high on the Juneau-Mendenhall Tidelands.

The estimated season kill for the 900 Juneau hunters was 3,750 ducks and geese, based on the assumption that nearly 10,000 hunter hours or 1,250 hunter days were spent hunting in 1966 (3.0 ducks x 1,250 days = 3,750 ducks). An estimate based on the 1965 Bureau of Sport Fisheries and Wildlife Alaska Waterfowl Harvest Survey Data (loc. cit.) suggested that the 600 (over 16) Juneau hunters (6.6% of State duck stamp holders) would have taken 5,280 ducks and geese. To this, one would have to add several thousand birds to account for the juvenile hunters kill. Therefore, it would seem that the Federal estimate is not applicable to the Juneau kill. A possible source of error may be in the average days hunted. This was given as 4.2 days in the Federal report and was found to be 4.2 in the 1966 Juneau survey. However, 4.2 days actually represent a total of 12 hours of hunting activity in Juneau, or 1.5 days. A seasonal bag per hunter on this basis would be 4.5 ducks and geese (3.0 per day) in comparison to 7.4 waterfowl as shown by the Bureau survey. The estimated Juneau kill based on these data would be: 4.5 ducks x 900 hunters = 4,050 ducks and geese per hunter.

Other data of interest were those pertaining to the percentage of rechecks. The Juneau-Mendenhall Tideland checks revealed that 38 percent of the hunters made more than one hunting trip seasonally. This group also apparently takes the greater part of the waterfowl harvest. Bureau of Sport Fisheries and Wildlife Administrative Report No. 100 shows that 75 percent of the ducks killed are taken by 37 percent of the hunters. The comparison here is not entirely valid, but supports previous thinking along these lines.

Waterfowl Use of the Juneau-Mendenhall Tidelands

Ground studies on the Juneau Tidelands in the summer of 1966 were done by Ray Hadley, temporary employee of the Department of Fish and Game. Data in the following sections are from a report written by Peter Shepherd and Ron Somerville.

Location of Study Area

The study area (Figure 1, Appendix) is located northwest of Juneau, Alaska with its easterly boundary beginning approximately 2-1/2 miles northwest of the Juneau city limits (near Salmon Creek). The Glacier Highway forms the northerly border of the study area to the east shoreline of the Mendenhall Peninsula (which constitutes the west boundary). The study area boundary then crosses Fritz Cove to the North Douglas Highway, ending at Falls Creek.

Physical Characteristics

Soil

Within the study area there are over 6,000 acres of intertidal flats plus several thousand acres of uplands. This area is covered with an overburden of highly saturated, fine silty soils, largely of glacial origin, overlain by a thin layer of organic matter. Much of the tidal flats are composed of mixed silty sands and sandy gravels, largely near the stream mouths and tidal guts.

Drainages

The largest drainage entering and flowing over the tidal flats is the Mendenhall River which enters Gastineau Channel west of the Juneau Municipal Airport. Other streams entering the flats include Salmon Creek, Jordan Creek, Lemon Creek, Fish Creek, and many small brooks and creeks important to substantial sport fish populations. These streams also have contributed the bulk of the surface soil deposits on the tidelands and to the basic fertility of the area.

Tides

The Juneau-Mendenhall Tidelands are subject to daily tidal action throughout the study area. These tides display a diurnal inequality typical of the Pacific Ocean; that is, of the two high tides within any 24-hour period, one will generally exceed the other by several feet and the same is true of the low tides. The mean tide range at Juneau is 14.0 feet; however, the diurnal range (from mean higher high water to mean lower low water) is 16.6 feet. The extreme tidal range is about 26.5 feet, and the extreme high water elevation is 21.1 $\pm$ feet from mean lower low water.

VEGETATION AND ECOLOGY

The Juneau Tidelands, like many other intertidal marshes, are endowed with a high basic fertility. Because of this high fertility, productivity of animal life is many times greater than on the uplands. Even in the winter, when the uplands are covered with snow, the salt flats produce limited amounts of feed. Natural tidal impoundments are important to small fish that furnish food for birds and mammals. The salt marsh vegetation is the basic component of the salt marsh since it forms a protective cover over the soil and prevents erosion, furnishes shade and concealment to birds and small animals, and provides seeds, leaves, and roots which are food for migratory birds and other birds.

Vegetation Description

A noticeable characteristic of the Juneau Tidelands is the strikingly uniform distribution and community composition of the plant cover. This suggests that conditions favoring the particular stands of vegetation on the flats have

been fairly uniform; otherwise the vegetative cover would be of a more mixed composition. The salt marsh plant cover begins at the 10- to 11-foot tide level and extends to the mean higher high tide mark.

The predominant terrestrial plant cover occurring on the tidelands are sedges (Carex lynbeyi, C. aquatilis, and several other species. These sedges appear in dense, uniform stands on wet, saturated soils which are inundated daily. Other plant communities of significance on the flats and adjacent uplands include the following: (1) beach rye (Elymus mollis) on sites infrequently inundated; (2) sedge/spike-rush/five-finger (Carex spp., Eleocharis sp., Potentilla sp.) on wet locations; (3) sedge/mud/grass (Carex spp., Deschampsia sp.) on frequently inundated sites; (4) arrow grass/five-finger/sedge (Triglochin sp., Potentilla sp., Carex spp.) with daily inundation; and (5) upland mixed stands of beach rye, lupine (Lupinus sp.), fireweed (Epilobium sp.) and many other annual forbs.

Few naturally formed tidal ponds are present on the flats with the exception of the tidal marsh to the west of the Mendenhall River. These ponds are shallow (6-12 inches), brackish, and support stands of pondweeds (Potamogeton spp.), mares tail (Hippuris vulgaris), salt wort (Glaux maritima), widgeon grass (Ruppia sp.), spike rush (Eleocharis spp.), goose-tongue (Plantago maritima), and several other aquatic perennials.

Some of the large man-made ponds in the airport vicinity support extensive stands of the above aquatics plus several species of pondweeds, water milfoil (Myriophyllum sp.), bullrush (Scirpus sp.), and burreed (Sparganium sp.). Distribution of the various species depends largely on the amount of tidal flooding of the ponds and the range of salt tolerance of the vegetation. Investigation of salinities on the tidelands at high and low tide levels suggests considerable variance in salt concentrations. Sampling at 30 points in early November provided measurements of salinities ranging from a low concentration of 250 ppm to a high of 12,000 ppm. The mean salinities for low tides was 3,000 ppm and the high tide mean was 5,000 ppm. Most of the above mentioned vegetation flourishes in salinities within the given ranges and some of the important waterfowl food species are highly salt tolerant. However, sampling of salinities will have to be conducted periodically to determine seasonal salinity changes which affect the distribution, abundance, and productivity of the vegetation.

Nearly all the plants mentioned have value as wildlife foods. The most important food plants are the pondweeds, widgeon grass, goose-tongue, arrow grass, spikerush, and the sedges.

Wildlife of the Juneau Tidelands

Of the many kinds of wildlife utilizing the Juneau Tidelands, waterfowl and fish have the greatest influence on human recreation in the area. Waterfowl are attracted to the tidelands throughout the entire year and the projected day use of the area by both ducks and geese exceeds 1,000,000 days (Table 5). This use is greater than that of many refuges in the other states. Data concerning sport fish numbers and use are not presently available; however, considering the fact that the trout and salmon reared in local streams provide over two-thirds of the freshwater sport fishing in the Juneau-Douglas area, these fish populations must be substantial (Sport Fish Division, Alaska Department of Fish and Game).

Table 5. Day-use by Waterfowl, Mendenhall Flats 1/

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
Swan										7,500	3,500		11,000
Canada geese	7,500	7,500	7,500	7,500	1,000	1,000	1,000	7,500	1,000	1,000	1,000	3,500	47,000
Snowgeese					10								10
White-fronted geese					30								30
Total geese													47,040
Mallard	15,500	15,500	15,500	15,500	30,000	3,000	3,000	5,000	10,000	16,500	15,500	15,500	300,000
Pintail					30,000			1,000	10,000	10,000			51,000
Widgeon					15,000			1,000	1,000	10,000			27,000
Shoveler					1,000			500	500	2,000			4,000
Teal					15,000			15,000	15,000	30,000	15,000		90,000
Total dabblers													472,000
Scaup	3,000	3,000	3,000	3,000	10,000	1,000	1,000	1,000	3,000	3,000	3,000	3,000	37,000
Canvasback					200				200				400
Ringneck					50				100				150
Goldeneye	12,000	12,000	12,000	12,000	25,000	6,000	6,000	6,000	12,000	12,000	12,000	12,000	139,000
Bufflehead	3,000	3,000	3,000	3,000	6,000	1,000	1,000	1,000	3,000	3,000	3,000	3,000	33,000
Scoter	27,000	27,000	27,000	27,000	40,000	10,000	10,000	10,000	40,000	27,000	27,000	27,000	299,000
Total divers	68,000	68,000	68,000	68,000	173,290	22,000	22,000	48,000	95,800	122,000	66,500	64,000	508,550
Merganser	300	300	300	3,000	300	300	300	300	3,000	3,000	300	300	11,700
GRAND TOTAL	68,300	68,300	68,300	71,000	173,590	22,300	22,300	48,300	98,800	125,000	66,800	67,000	1,060,290

1/ Data supplied by U. S. Bureau of Sport Fisheries and Wildlife, Juneau, Alaska.

Small birds and mammals are common throughout much of the intertidal and upland cover. Brood observations were few, but during July, eight mallard broods, four green-winged teal broods, one shoveler, and one harlequin brood were seen. Bird numbers and species composition vary with the seasons, with the greatest influx of species occurring in the spring and fall. A chronological listing of fall waterfowl species and numbers is presented in Table 6. Recreational use of the tidelands is keyed to these movements and increases measurably with bird abundance. Fur mammals such as coyotes, mink, otter, and muskrats are found fairly commonly in the tidal areas and provide limited recreation.

PUBLIC RECREATION EVALUATION

The Juneau Tidelands are highly important to many people for recreational, economic, and aesthetic values. The estimated annual economic benefit of this resource to Juneau and its citizens resulting from recreational uses of the tidelands exceeds $150,000. Waterfowl hunting ranks first in total recreational hours and economic return, with sport fishing and other activities contributing the remainder. No one has yet been able to place dollar signs on aesthetic values; however, in this sense the existence of a natural area so close to our State Capitol deserves recognition for its value to tourism. Tourists do not come to this State to see housing developments and filled-in swamps. They are here to see the things denied them in the densely-populated and highly-developed areas of other states. Duplication in Alaska of these same undesirable conditions hardly seems compatible with the development of an economy keyed to the growth of tourism.

Recreational Values of the Waterfowl Resource

An annual harvest of approximately 4,000 ducks and geese is taken on the Juneau Tidelands by nearly 900 local hunters. These hunters spent an average of three hours daily in the field for at least four trips during a season of 12 weeks duration. Hunter success is good in comparison with many other heavily utilized waterfowl areas. This success is largely due to the dispersal of hunting pressure over four major units of the tidelands. These study area sub-units 1, 3, 4, and 5 (Figure 1, Appendix) compose about one-half of the 6,000 acres of tidelands. However, at present, only half of these sub-units are huntable. Heavy hunting pressure on weekends reduces the total acreage available per hunter to about 12 acres. This situation is rarely conducive to quality hunting and on an unmanaged area often becomes disasterous to hunter success. Any loss of present usable habitat would crowd hunting populations into smaller acreages, reduce success, and discourage many prospective hunters.

Sport Fisheries and the Juneau Tidelands

Over two-thirds of the sport fish caught in the Juneau-Douglas area are provided by several streams which flow across the tidelands. This suggests that several thousand fishermen derive recreational benefits from these waters. The economic value of this fishery to the local economy may possibly exceed the waterfowl recreational benefit. Precise data, however, concerning these values are not available.

Table 6. Species Total by Observation, Juneau-Mendenhall Tidelands, 1966.

Date	Pin-tail	Mallard	Widgeon	G.W. Teal	Shoveler	Gad-wall	Scaup	Golden-eye	Buffle-head	Scoter	Geese	Swan	Crane
9/27	22			50			40						
28													
29													
30													18
10/1													
2	8												
3													
4		20	66				120						
5	150												
6											7	140	
7	99	32	70	55									
8													
9													
10													
11	16	23	96	176			20			200			
12													
13													
14		90	91	12						150			
15													
16													
17													
18													
19		41	143	69			250						
20													
21		103	62	93			25	36	51	278			
22													
23													
24													
25		245	60	99	2		26	1	56	266	64		
26													
27													
28		62	41	30			3		12	220	135		
29													
30													
31													
11/1		8	31	14			42	38	3	202	199		
2													
3													
4		98	58	43		3	25	40	15	170	103		
5													
6													
7		51	40					5	30	170	260		

Aesthetic and Tourism Values

Bird watchers, hikers, flower pickers, and tourists can, and do, spend many hours on the tidelands. The value of these forms of recreation or their indirect benefit to the community is not possible to measure at present. However, the knowledge that at least one-quarter of the attraction Alaska holds for tourists is contained in the wildlife to be seen in the State suggests that considerable income is derived through tourism.[1]

LAND USE CONFLICTS

Channel Dredging

The public benefits of a deep-water navigable channel from Fritz Cove to the Gastineau Channel are easily recognized because of the heavy water traffic near Juneau and the 15-mile shortcut provided for boats traveling north. Unfortunately, the channel has been inadequate to handle large craft at all tides.

During 1959-60 the U. S. Army Corps of Engineers constructed a navigational channel through the shoal area, but the project was considered semi-permanent due to the continual sloughing of the side slopes.

In 1961 a Committee on Tidal Hydraulics reviewed the shoaling problem and recommended measures which might resolve the problem. The most promising solution was the isolation of the navigational channel by means of a continuous dike. The proposed dike would be open at both ends to allow continual tidal action north of the dike.

Construction of the dike (Figure 2, Appendix) would, of course, cover a considerable amount of valuable waterfowl habitat. Tidelands adjacent to the dike could possibly be developed to produce even more accessible waterfowl hunting provided that: (1) the dike was stabilized by seeding; (2) tidal action was not seriously altered north of the dike; (3) the dike was situated as close to the channel as possible; (4) access was provided to the dike.

If, however, tidal action is delayed and/or large sediment deposit areas are constructed, the wetland vegetation would change and land surface alterations would most likely make the affected area completely unproductive and unusable in a total management plan.

Airport Expansion

The present Juneau Municipal Airport and adjacent facilities already cover a considerable portion of the tidelands. As air traffic to the area increases, the airport will undoubtedly expand further. Proper land planning would minimize future expansion costs and also make the project compatible with surrounding land use.

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[1]Buckley, John L. 1957. Wildlife in the Economy of Alaska. Biological papers of the University of Alaska. No. 1. 33 pp.

Further airport expansion and other land development in the area must take into consideration the problem of bird-aircraft hazards. Fortunately, the Juneau airport has experienced little problem in this regard. Proper planning concerned with the location of dump areas will reduce the greatest potential problem of sea gull concentrations near the approach and departure zones. Similar consideration would be given, in the development of a total management plan, to minimizing waterfowl movement across and within these areas.

Highway Construction

The proposed highway from Norway Point to the Airport will undoubtedly provide quicker, safer, and more efficient service for the community. As in the planning of other public facilities, however, due consideration should be given not only to initial construction costs, but to maintenance factors, adjacent land development, aesthetics, recreation, wildlife, and many other social and developmental factors. The willingness of our present society to pay additional costs for recreation and aesthetics is illustrated by the "Highway Beautification Programs," Federal mitigation and enhancement projects, and special consideration to these natural resources in planning.

The obligation of Federal Aid projects to fish and wildlife considerations was clearly stated by the Bureau of Public Roads in an Instructional Memorandum,[1] which stated:

> . . . The highway agencies must realize that fish and game are a natural resource belonging to all the people of the country and the preservation of their habitat must be taken into consideration along with other values of public interest to arrive at determinations which are economical for all public interests, Public Roads supports that every effort should be made in the planning, design, and construction of highway projects that cause a minimum of disturbance to and reasonable preservation of the nation's wildlife and related natural resources.
>
> The Secretary, in exercising his authority to approve projects pursuant to Section 106 of Title 23, United States Code, thereby obligating the Federal Government for the payment of its proportional contribution thereto, will take into account the effects of the proposed construction upon fish and wildlife, and the necessary measures to be incorporated into the project to provide for the protection of these resources . . .

In the reconnaissance report for the new Norway Point-Airport Road Highway, three alternative routes were presented. Two routes or combinations of each were indicated as preferred (Figure 1, Appendix). Although the proposed route from Norway Point to Vanderbilt Hill would seriously affect valuable tidelands, the greatest detrimental effects on the total waterfowl management program would occur with the selection of the outer route, if land to the north (shoreward) were filled and commercially developed. This route would not only cover valuable wetlands, but would limit access in the areas, cause tidal lags, and result in the

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[1]Instructional Memorandum 21-5-63, U. S. Department of Commerce, Bureau of Public Roads, June 12, 1963.

eventual loss of the entire tidelands and uplands north of the highway. Selection of the inner route would involve an increase of $42,983.53 in initial construction cost, [1] but would not result in the loss of all the tidelands and uplands east of the airport and their important recreation potential.

Much of the fill required for the project is proposed to be taken from the tidal flats which would also affect aesthetic values, waterfowl production, and the recreation potential of the area. Borrow pit location and design could, however, prove to be beneficial if consideration is given improvement with the overall planning of this important area of the Borough.

Other Problems

The present zoning of the area within the planning unit by the Greater Juneau Borough is not generally compatible with long-range recreational land planning, and especially those related to waterfowl. The existing Agriculture-Forestry, Residential, and Commercial zoning allows for further development and eventual reduction in some of the tideland and upland areas considered to be essential for proper waterfowl and recreational management. Special land use permits have also been issued which allow further depreciation of the area's potential.

PROJECTIONS AND PLANNING

It is a fact that land uses such as channel dredging, diking, highway construction, and airport expansion will all result in a restriction in size of the wetlands area. Any loss in the existing wetlands will correspondingly decrease the recreational potential, which is presently most prominently associated with migratory waterfowl.

If it is determined to be in the best interest of the public to maintain this recreation, the only reasonable approach is to design a long-range land management plan which will provide the maximum recreation benefits possible with those lands that can be conserved.

The construction of a waterfowl-orientated land management plan involves many intricate details. Before the actual commitment of funds can be made for area development and enhancement, the tidelands and uplands areas to be included must be secured with guarantees that they will be dedicated for this purpose.

Studies must be initiated to determine precisely what uplands are desirable to be purchased, how each section of land should be developed to enhance the present recreational benefits, and what type of development is most compatible with other important land uses in the area.

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[1] Route Reconnaissance Report; Norway Point to Airport Road, Project F-095-8(3), by Schuyler J. Steven, Alaska Department of Highways, 1965 (unpublished report, 75 pp.).

Tidelands

The most essential land area in this planning unit is the tidelands. The waterfowl management plan will depend, to a large degree, on the following factors: (1) the proposed improved production will depend on the nesting areas available; (2) the degree of control of bird movement within the airport approach and departure zones will depend on the number and size of outer development areas; (3) plans to provide longer and better waterfowl hunting will depend on the size and attractiveness of the area to waterfowl, the area available for dispersing hunters, and the size and selection of feeding and resting sites.

In order that maximum considerations and guarantees are provided the tidelands, the Alaska Department of Fish and Game entered, on November 10, 1966, a request for an "Inter-Agency Land Management Transfer" of all the tidelands within the planning unit. Since Borough lands are involved, the State Division of Lands refused to grant the ILMT until Borough concurrence was sought and obtained. The Department presented the plan to the Greater Juneau Borough Planning and Zoning Commission. After a series of meetings and hearings, the Commission voted March 27, 1967 to oppose the transfer.

Purchasing

Assuming that positive guarantees can be obtained concerning tideland control, the practicality of purchasing certain key uplands for development and management purposes can be studied. Provided that study showed some acquisition to be necessary, the purchasing of lands for the protection and management of waterfowl could be funded through one of two Federal programs: (1) Wetlands Acquisition Funds provided by Duck Stamp money; or (2) Federal Aid in Wildlife Restoration matching monies.

The Wetlands Acquisition Fund would be preferable in that 100 percent of the money could be furnished by the Federal Government. The P. R. funds, on the other hand, are matched on a 75 percent Federal-25 percent State basis, and the State portion would have to be appropriated by the State Legislature. Should the purchasing not qualify under a Wetlands Acquisition program, however, a proposal for State matching monies could be submitted to the Governor for consideration in his budget.

Development and Enhancement

At present the Juneau Tidelands are being heavily utilized for waterfowl hunting. Hunting pressures may soon exceed the limits of space necessary to provide quality waterfowl hunting. Moreover, the number of waterfowl available to hunters is presently limited by space, food, and lack of sufficient stable impoundments. These problems can be resolved through a continuing program of development and enhancement. Such a program would depend on acquisition of the tidelands and several key upland sites.

Years of experience in waterfowl and game management has demonstrated that in order to satisfy all the continuing requirements of wildlife, a mixture of habitat types and water areas must be provided. This concept is especially true

in the case of waterfowl. A contiguous area of tideland interspersed with several highly developed and managed units would serve this purpose admirably. Field studies conducted by Federal and State game biologists have suggested that the several key areas necessary for a feasible management unit are contained in portions of areas 1, 3, 4, and 5 (as shown in Figure 1, Appendix).

Access

A major problem related to waterfowl management will be the establishment of proper access corridors for public use. The necessary dispersal of hunting pressure over the entire area will be directly related not only to the availability of birds, but the parking areas provided and the accessibility of hunting areas.

At present, access to the tidelands is restricted due to private ownership of the uplands and limited routes to the tidelands. A few access points are now available from the Mendenhall Peninsula (Fritz Cove Road), near the Airport (limited parking), from the Glacier Highway (roadside parking) and the North Douglas Highway (roadside parking). As the anticipated waterfowl activity and related hunter use increases, these access facilities will be highly inadequate. Undoubtedly, leasing or acquiring additional parking areas and access corridors will be necessary to realize the full enjoyment of these recreational opportunities.

Types of Development

Developmental projects should be geared to meet certain specific objectives. In the case of the Mendenhall River wetlands area, these objectives would be:

(1) To disperse hunting pressure over a much broader area

(2) To provide more nesting habitat

(3) To create more attractive feeding and resting areas for migrant waterfowl away from airport approach and departure zones.

(4) To protect resident sport fish stocks.

Dispersal of hunting pressure is possible through development of adequate parking and access routes and through providing a well-dispersed supply of birds. It is important, however, to avoid any semblance of artificiality when attaining this goal.

Waterfowl production may be increased by creation of many small impoundments to correct the present shortage of brood habitat. These impoundments could be created by low tidal guts equipped with tidal gates, and by digging small, shallow ponds. Local plants of high waterfowl value could be introduced in these ponds to provide for food and cover. A system of brood ponds and some deep larger ponds that could be provided by planned placement of borrow pits is considered sufficient to attract and hold migrants in each waterfowl management unit. These units would be located in the best interests of hunter convenience and for dispersal of birds away from the Juneau Municipal Airport approach and departure corridors.

Several closed areas near highway systems would be considered in the developmental planning. At least one of these areas might be made suitable for roadside viewing and photographing of ducks and geese.

Projections of Use Demands and Management Benefits

In this growing community we expect hunter use of the tidelands will double in the next ten-year period. Planning of the management units would necessarily be based on satisfying the demands of this much increased hunting population.

The present production of waterfowl on the Juneau Tidelands is very low. A sound management plan, however, could increase this production many times, and would, in turn, increase the harvestable portion of birds, thus adding to the overall value of the planning unit.

Creation of more and better quality habitat will no doubt increase the attractiveness of the tidelands to migrant waterfowl. Abundant food and cover will hold these birds for longer periods, thus providing more hunting opportunities. Considerable study would be required to find out if the above habitat improvements, and subsequent increased waterfowl use, could be accomplished without increasing airport safety problems.

Other Recreation Potentials

As it has been pointed out, the primary recreational use within the planning unit has been related to waterfowl, although sport fishing plays a major role as well as bird watching, photography and hiking. The dedication of this area to these primary uses does not mean that other recreational possibilities do not exist. Because of the increasing community population and the associated demand for diversified outdoor recreation, it seems feasible to study the possibilities of developing other compatible recreational uses.

Many matching Federal grants are available for community planning, of which recreation and open-space are important primary considerations. In addition, the Alaska Department of Natural Resources is staffed with personnel qualified in public recreation planning. A combined effort of all agencies concerned could undoubtedly create additional public benefits in outdoor recreation.

The following recommendations were made by the Department of Fish and Game regarding the Juneau Tidelands:

1. That the Greater Juneau Borough and the Parks and Recreation Branch of the Alaska Department of Natural Resources initiate a joint study to determine the overall recreational needs of the community, and the compatible recreational opportunities that exist within the wetlands area.

2. That a study be initiated by the Alaska Department of Fish and Game and the U. S. Fish and Wildlife Service to determine what waterfowl habitat development projects are most feasible, and what uplands might be needed for such projects.

3. That the expansion plans of the Juneau Municipal Airport be considered and incorporated in the coordinated planning of the area.

4. That a study be jointly initiated by the Alaska Department of Fish and Game, the U. S. Fish and Wildlife Service and the Federal Aviation Agency to determine how the area can be developed to assure that bird-aircraft conflict will be kept at a minimum.

5. That the U. S. Army Corps of Engineers be requested to locate its proposed Gastineau Channel Dike as close to the Channel as possible, and that any such dike be stabilized and seeded.

6. That the Alaska Department of Highways be requested to give serious consideration to the northern highway route from Vanderbilt Hill to the Airport as the prime selection for construction alignment.

7. That the Greater Juneau Borough urge the consideration of highway pull-outs, access corridors and parking facilities in the design and construction of the proposed highway improvement.

8. That the Greater Juneau Borough consider the creation of a Public Recreation zoning classification which might be applied to portions of the planning unit.

9. That the selection and design of any necessary borrow pits on the Mendenhall flats be planned and coordinated with the waterfowl management plan.

10. That the management responsibilities for the Juneau Tidelands be transferred from the State Division of Lands to the Alaska Department of Fish and Game by means of an "Inter-Agency Land Management Transfer."

11. That it be declared public policy to oppose the creation of any blockage of normal tidal action over the Mendenhall flats.

12. That the use of Federal funds be considered for utilization in the purchase of any upland areas determined by the studies as being essential in a recreation management plan.

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APPENDIX

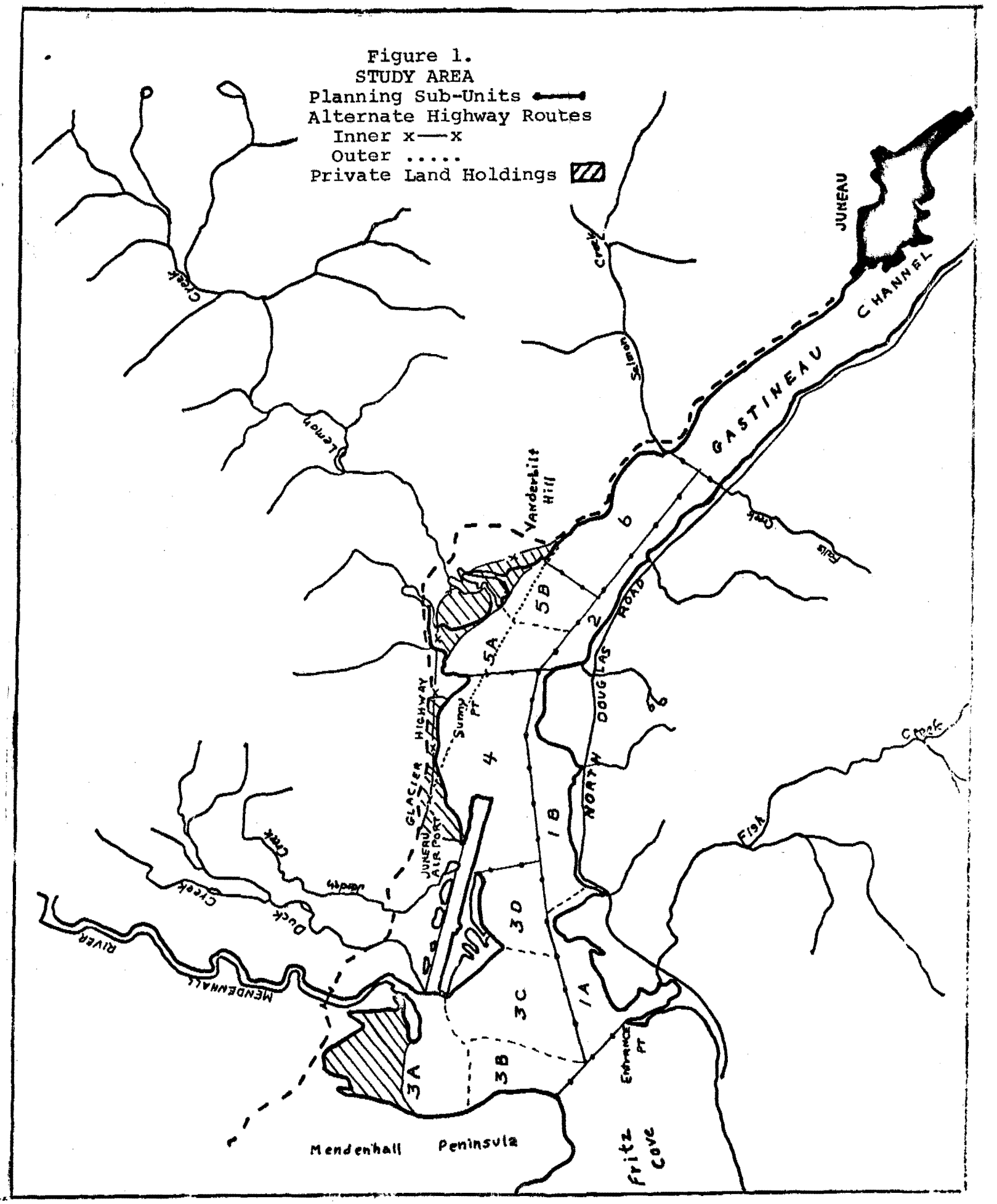
Figure 1.
STUDY AREA
Planning Sub-Units
Alternate Highway Routes
Inner x—x
Outer .....
Private Land Holdings
JUNEAU
CHANNEL
GASTINEAU
Vanderbilt Hill
DOUGLAS ROAD
NORTH
GLACIER HIGHWAY
JUNEAU AIR PORT
MENDENHALL RIVER
Duck Creek
Fish Creek
Sumdum Pt
Entrance Pt
Fritz Cove
Mendenhall Peninsula
1A
1B
2
3A
3B
3C
3D
4
5A
5B
6

Figure 2.
PROPOSED DIKE LOCATION
Channel
Dike ----
Alternate Dikes. _._
Spoil Banks