A FISH AND WILDLIFE RESOURCE INVENTORY OF THE COOK INLET - KODIAK AREAS

1976

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WATERFOWL RECREATION AND SUBSISTENCE USE

Waterfowl Sport Hunting

Waterfowl sport hunting statistics in Alaska are generated from a combination of two sources. Total duck harvest, number of hunter days, snipe and crane harvest and goose harvest by species is calculated from an annual mail survey of ten percent of all licensed buyers in Alaska. Duck species composition information are derived from the U.S. Fish and Wildlife Survey where hunters send in duck wings.

Sport hunting in Cook Inlet represents the greatest concentration of duck hunters and consequently duck harvest of any area in Alaska. The combination of a large number of local residents around Cook Inlet and abundance of coastal saltwater marshes and intertidal lands are responsible for the large amount of hunting which occurs here.

A much smaller amount of hunting and harvest occurs on Kodiak due to the lesser number of people living on the island. On Kodiak however, two areas of hunter concentration are Kalsin and Middle Bays. These are on the short road system out of town and receive most of the hunting pressure from Kodiak city residents. All of the good hunting areas around Cook Inlet can be in many cases reached by private automobile on the road systems or by a short airplane trip.

The average seasonal take per active duck hunter in the Cook Inlet area is about seven ducks per season. However, the average take by a hunter on Kodiak amounts to over ten ducks per season. Kodiak duck hunters experience the highest average seasonal success of any other hunters in Alaska. About one half of the ducks bagged by Kodiak hunters are non-game species. Non-game ducks constitute a small (about five

percent) portion of the hunters' bags in the Cook Inlet area. Non-game species are scoters, eiders, harlequins and old squaws. Many of these species are quite abundant around Kodiak, especially later in the season when some excellent hunting for these birds is available. Relatively few of these species are available near the major hunting areas in Cook Inlet.

In Table 1, the sport hunting statistics for Cook Inlet, Kodiak and for the entire State of Alaska are given for the past four years. Waterfowl sport hunters in the Cook Inlet area annually spend nearly 35% of the total hunting days in Alaska and take about 38% of the duck harvest and 14% of the annual goose harvest. Hunters on Kodiak annually contribute about 3.5% of the State's total hunter days, and 4% of the annual duck harvest, but less than 1% of the annual goose harvest. In total, Cook Inlet and Kodiak hunters annually combine to represent about 40% of the State's total hunter days and duck harvest, while they take about 14% of the annual goose harvest. Although not depicted in Table 1, many hunters who reside in the Cook Inlet area and on Kodiak annually travel to the north side of the Alaska Peninsula for goose hunting trips. Harvest and hunter days represented in Table 1 is therefore only that which occurs in the respective geographic areas.

In the Cook Inlet area over 85% of the duck harvest is comprised of mallards, pintails, american widgeon, greenwinged teal, and shovelers. These same six species represent nearly half of the annual duck harvest on Kodiak.

As can be seen from Table 1, goose harvest on Kodiak-Afognak Island is not large. Very few geese stop on these islands on their way south in the fall. About 2,000 emperor geese annually overwinter on the

TABLE 1. Sport Hunting Statistics, Cook Inlet, Kodiak and Statewide.

1971-74 Four Year Average Per Year Statistics	Cook Inlet	Kodiak	Total Kodiak & Cook Inlet	Statewide Totals
Hunter Days	18,500	1,910	20,410	53,500
Ducks Shot	32,000	3,100	35,100	83,370
Geese[1/]				
Canada	1,640	0	1,640	9,730
Emperor	0	40	40	2,095
White-fronted	150	0	150	840
Brant	10	10	20	1,140
Snow	50	0	50	370
Total Geese	1,850	50	1,900	14,175
Cranes shot	95	0	95	620
Snipe shot	895	220	1,115	14,175

1/ 1972-74 3 year average.

southern part of Kodiak Island, but few hunters go to this area for waterfowl hunting.

Table 2 shows the waterfowl sport hunting statistics by major hunting location in Cook Inlet and on Kodiak. Susitna Flats and Palmer Hay Flats are the two major hunting areas in Cook Inlet and annually rank among the top three for total hunter days and duck harvest in Alaska. Waterfowl harvest data and hunter days which occur on the areas in Table 2 must be considered minimum. Many hunters in Anchorage hunt on Susitna Flats for example, but do not indicate on the mail survey form that they hunted there. These hunters are put in an unknown category within the Cook Inlet region where they reside. Actual duck harvest and hunter days on most of these areas could in actuality be increased by about 10%.

It is estimated that waterfowl hunters on Kodiak spend an average of $47,750 per year in pursuit of their sport. The meat from the birds which they harvest is calculated to value $10,200 for a total of $57,950 on Kodiak. In the Cook Inlet area it is estimated that duck hunters on the average spend annually $832,500 to hunt waterfowl. The birds which they harvest are worth $236,950 in meat value for a combined total of $1,069,450. Combining meat values and dollars spent waterfowl hunting in both areas it is estimated that a total of $1,127,400 is the amount which waterfowl hunting is "worth" in these two areas. This amounts to 45.8 %of the total dollars generated for Alaska.*

Nonconsumptive Recreational Use

Nonconsumptive human recreational use of waterfowl and seabirds or

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*Alaska Department of Fish and Game, 1976. A compilation of Fish and Wildlife Resource Information for the State of Alaska. Vol. I - Wildlife.

TABLE 2. Waterfowl sport hunting statistics by major hunting location, Cook Inlet-Kodiak.

	Specific Location				
1971-1974; Four Year Average	Susitna Flats	Palmer Hay Flats	Potter Marsh	Kachemak Bay	Trading Bay
Hunter Days	4,465	3,950	885	975	645
Ducks Shot	10,070	6,290	1,050	2,260	1,620
Geese Shot[1/]	520	165	5	230	185

1/ 1972-1974; three year average

1971-1974; Four Year Average	Eagle River	Chickaloon	Portage	Redoubt Bay	Goose Bay
Hunter Days	1,185	955	800	200	500
Ducks Shot	1,160	1,705	600	525	1,000
Geese Shot[1/]	10	520	25	25	10

1/ 1972-1973; three year average

any wildlife is a very difficult thing to quantify under most circumstances. Under highly controlled situations such as National Parks, visitor days can be measured and outdoor activities evaluated by questionaires. In the Cook Inlet-Kodiak area, only descriptions of the nonconsumptive values can be provided.

Possibly the single most heavily used area in the Cook Inlet-Kodiak area is Potter Marsh, near Anchorage. The Seward Highway which runs through a portion of the marsh provides access to excellent waterfowl viewing, photography opportunities, and other nonconsumptive uses of waterfowl. A portion of Potter Marsh which adjoins the Seward Highway has been closed to waterfowl hunting to facilitate viewing. It is estimated that annually over 10,000 people purposely visit Potter Marsh to view and photograph waterfowl and other birds. This area also serves as an excellent outdoor classroom for the numerous schools and other nature students in Anchorage.

The Palmer Hay Flats and Matanuska Valley around Palmer are also a popular viewing area, especially in the spring. Duck and goose numbers in this area peak at something over 100,000 birds during a one to two week period each spring. Many of these birds use green fields in the Matanuska Valley and areas having shallow water. Perhaps 5-10,000 or more people annually visit these areas to view and photograph waterfowl.

The Portage area located near the mouths of Portage Creek, Twenty-Mile River and Placer Creek also receive heavy nonconsumptive recreational use. This area is a popular one for outside tourists, as well as local residents. Possibly five thousand people annually visit the Portage area to view and photograph birds, however, the major noncomsumptive use is made by people traveling on the Seward Highway and viewing birds incidental to their travel. The Alaska Department of Fish and Game is

cooperating with the Bureau of Land Management in a habitat enhancement program on the Portage area which will facilitate nonconsumptive as well as consumptive use.

Much incidental viewing of waterfowl also occurs on the Seward Highway between Anchorage and Homer. Many lakes and ponds along this highway have a few ducks, loons, gulls, etc. and some degree of enjoyment is experienced by many people viewing these birds while traveling on the road.

Good viewing opportunities are available at the town of Homer. Because the Homer Spit extends several miles into Kachemak Bay a variety of waterfowl, shorebirds and seabirds can be seen and photographed from the spit. Boat tours are also available. These are used primarily by outside visitors to take them through Kachemak Bay where a variety of waterfowl and seabirds are present and are readily seen.

Incidental viewing of waterfowl occurs throughout the Cook Inlet area. For example, large numbers of ducks, geese and swans can be seen at various times of the year by people traveling in aircraft in this area. The value of such observations is difficult to determine, but the presence of numerous birds, or in some cases just one swan, undoubtedly adds something to the experience of traveling in the Cook Inlet region.

On Kodiak Island the majority of purposeful nonconsumptive bird viewing is done from the road system out of Kodiak. Because the road traverses a number of habitat types (salt marsh, tidelands, rocky shores and beaches) a variety of waterfowl, seabirds and other birds can be seen. One of the major recreational pastimes in Kodiak is to get out on a nice day, regardless of the time of year, and drive the road system. The presence of sometimes large numbers and always a variety of birds available undoubtedly adds to the pleasantness of the drive " out the road."

Much incidental viewing and photography of seabirds also occurs by the many boat and aircraft travelers around Kodiak and Afognak Islands. Travellers on the State Ferry system going in and out of Kodiak can frequently see large numbers of seabirds on trips between Seward and Kodiak.

In aggregate the noncomsumptive use of waterfowl and other birds in both the Cook Inlet and Kodiak areas far exceeds the use by waterfowl hunters. However, the Alaska Department of Fish and Game believes these two uses are entirely compatable and will try to provide for both uses where conflicts might occur.

Subsistence Use

Subsistence hunting (that occurring outside of the legal season dates) is not believed to be either extensive or occurring in great magnitude in any location throughout the Cook Inlet-Kodiak Region. Probably the only area where subsistence hunting occurs to any degree is around the small villages located on Kodiak-Afognak Islands. However, this subsistence hunting is not believed to be great and it certainly has not adversely affected the welfare of any population or species of waterfowl or other birds.

WATERFOWL PRODUCTION

Cook Inlet Coastal Marshes

Since the mid 1950's the U.S. Fish and Wildlife Service has been conducting estimates of the breeding duck populations in Alaska. They annually fly some one hundred hours over flight lines that cover most of the major duck breeding habitat in the State. The paths flown are the

same each year so that estimates of breeding ducks are comparable and lend themselves to long term average estimates. Most of the aerial surveys done in the Cook Inlet area are conducted over upland (above 600 feet MSL).

In 1975 the Department of Fish and Game initiated a series of breeding waterfowl surveys which are identical to those used by the Fish and Wildlife Service. These surveys have been conducted over the coastal marshes in Cook Inlet in an attempt to better document waterfowl nesting and production which is occurring in these areas. Maps depict the areas surveyed. Land within the heavy outlying border on each area is that habitat which estimates of nesting waterfowl are made. The numbered transverse lines across each area are the survey flight lines. Ducks are counted on one-eighth of a mile either side of the aircraft along these lines.

In Table 3 the results of these aerial surveys are shown. The number of birds by species which are calculated to occur on each area are presented as well as what proportion of the total duck population each species represents. At the bottom of Table 3 are the calculated populations of swans, geese, cranes and loons by area.

In Table 4 the size of each area in square miles is listed. Also shown in Table 4 are the square mile densities of nesting ducks located on each area. The Jim-Swan Lake area, Portage Flats, and Trading Bay areas each have over 100 breeding ducks per square mile. These nesting duck densities exceed densities in other areas of Alaska. The Yukon Flats which has over 10,000 square miles of habitat has about 100 ducks per square mile. However, the calculated populations in both Table 3 and 4 represent in some cases only one year and at the most two

TABLE 3. Calculated breeding bird populations on coastal Cook Inlet marshes and on the Jim Swan Lakes area.

	Palmer Hay 1/		Goose Bay 1/		Susitna 1/		Chickaloon 1/		Portage Area 2/	
	No.	% of Total	No.	%	No.	%	No.	%	No.	%
Pintail	850	32	108	20	5,268	49	542	46	567	25
G-W Teal	109	4	234	42	1,756	16	296	25	522	23
Mallard	488	18	116	21	1,043	10	74	6	637	28
Am. Widgeon	144	5	-	-	759	7	234	20	67	3
Shoveler	451	17	60	11	436	4	-	-	70	3
Gadwall	77	3	-	-	108	1	39	3	-	-
Total Dabbler	2,119	79	518	94	9,370	87	1,185	100	1,863	82
Scaups	267	10	12	2	883	8	-	-	24	1
Goldeneyes	235	9	17	3	250	2	-	-	268	12
Mergansers	-	-	6	1	68	1	-	-	104	5
Bufflehead	-	-	-	-	27	1	-	-	-	-
Canvasback	50	2	-	-	85	1	-	-	-	-
Scoters	-	-	-	-	-	-	-	-	-	-
Total Divers	552	21	35	6	1,313	13	0	0	396	18
Total Ducks	2,671	100	553	100	10,683	100	1,185	100	2,259	100
Swan	5		-		68		-		12	
Canada Goose	211		14		1,110		55		9	
White-fronted Goose	-		-		-		-		-	
Sandhill Crane	22		12		23		15		-	
Common Loon	42		12		-		-		12	
Red-throated Loon	-		-		17		-		-	
Arctic Loon	-		4		17		-		-	

1/ 1975-76 two year average
2/ 1976 only

TABLE 3 (CONT'D.). Calculated breeding bird populations on coastal Cook Inlet marshes and on the Jim Swan Lake area.

Species	Trading Bay 2/		Redoubt Bay 2/		Fox River Flats 2/		Jim Swan Area 1/		Total Except Jim Swan	
	No.	% of Total	No.	%	No.	%	No.	%	No.	%
Pintail	4,890	45	6,015	33	150	20	504	27	18,390	39
G-W Teal	2,750	25	6,468	35	158	20	89	5	12,293	26
Mallard	471	5	2,458	13	69	9	345	18	5,356	11
Am. Widgeon	1,209	11	1,110	6	61	8	481	25	3,584	8
Shoveler	578	5	-	-	-	-	-	-	1,595	3
Gadwall	107	1	205	1	-	-	-	-	536	1
Total Dabbler	10,005	92	16,256	88	438	57	1,419	75	41,754	88
Scaups	374	4	1,100	6	-	-	256	13	2,660	6
Goldeneyes	235	2	711	4	183	24	128	7	1,899	4
Mergansers	214	2	474	2	144	19	-	-	1,010	2
Bufflehead	-	-	-	-	-	-	12	1	27	Tr
Canvasback	-	-	-	-	-	-	51	3	135	Tr
Scoters	-	-	-	-	-	-	18	1	18	Tr
Total Divers	823	8	2,285	12	327	43	465	25	5,749	12
Total Ducks	10,828	100	18,541	100	765	100	1,884	100	47,503	100
Swan	21		356		-		4		462	
Canada Goose	-		-		-		-		1,399	
White-fronted Goose	289		172		-		-		461	
Sandhill Crane	642		86		-		-		800	
Common Loon	86		-		-		-		152	
Red-throated Loon	385		43		-		-		445	
Arctic Loon	-		-		-		-		21	

1/ 1975-76 two year average
2/ 1976 only

TABLE 4. Total land area and breeding ducks per square mile of habitat on coastal marshes in Cook Inlet and the Jim Swan Lakes area.

Area	Size in Mi.^{2}	Birds per mi.^{2}		
		Dabblers	Divers	Total Ducks
Redoubt Bay	248.0	65.6	9.2	74.7
Susitna Flats	136.0	68.9	9.7	78.6
Trading Bay	107.0	93.5	7.7	101.2
Palmer-Hay Flats	42.7	49.6	12.9	62.5
Chickaloon Flats	39.0	30.4	0	30.4
Portage Area Flats	18.3	101.8	21.6	123.4
Fox River Flats	16.6	26.4	19.7	46.1
Goose Bay	9.2	56.3	3.8	60.1
Total Cook Inlet Marshes	616.8	67.7	9.3	77.0
Jim Swan Area	14.0	101.4	33.2	134.6

years of survey information. These are, however, our best estimates of nesting duck numbers on Cook Inlet marshes. The average of 77 ducks per square mile on all Cook Inlet marshes exceeds nesting duck densities on almost all other breeding habitat in Alaska.

Good estimates of waterfowl produced on these areas are unavailable However, a reasonable assumption for Cook Inlet is that dabblers produce one duckling for each adult bird present and divers produce 0.8 ducklings for each adult bird present. If this assumption is true, then total duckling production on Cook Inlet marshes exceeds 46,350 birds yearly. Duckling production and total fall flight can be calculated for individual areas listed in Table 3 by using the 1.0 and 0.8 figures for dabblers and divers respectively.

Duck Production On Cook Inlet Uplands

About 2,000 square miles of upland Cook Inlet waterfowl production habitat exists. Using U. S. Fish and Wildlife estimates (see 1971 USFWS Report by J. G. King and C. J. Lensink, An Evaluation of Alaskan Habitat for Migratory Birds) a total calculated duck breeding population of 24,700 birds is annually present in this area. They estimate that 13,500 dabblers, 9,400 divers, and 1,800 nongame ducks occur on these uplands. This amounts to a breeding duck density of 12.4 birds per square mile. Using production figures of 1.0, 0.8, and 0.6, for dabblers, divers and nongame species, respectively, a total duckling production of 22,100 birds is indicated. The value of near coastal Cook Inlet marshes to waterfowl production is easily seen by considering that over twice as many ducks are produced here on slightly over 600 square miles of habitat than on about 2,000 square miles of surrounding upland habitat.

Other Production Areas

Definitive surveys of ducks and other waterfowl produced in other areas of this region have not been conducted because duck production is minimal. However, a substantial but unmeasured number of birds are produced on Kodiak Island. On Kodiak Island 10-20,000 ducklings of the game species are annually produced at the heads of small bays and along habitat bordering streams and rivers. Duckling production by nongame species such as harlequins and mergansers is undoubtedly substantial on Kodiak and other areas within the Kodiak-Cook Inlet region. Because most of these groups nest in obscure isolated places such as wooded streams and rivers, even a guess of the number of birds present or produced is impossible.

Goose Production

Before the 1964 earthquake very few Canada geese existed in Cook Inlet. However, since the earthquake-apparently in response to habitat change-a mushrooming population of lesser Canadas has become established. A July 1974 survey in Cook Inlet showed a population in excess of 2,000 birds (see Table 3 for relative distribution by area). Although unconfirmed, these geese probably nest some distance back from saltwater in the low, brushy areas. Flocks of nonbreeding geese are conspicuous and spend the summer closer to saltwater and frequent tide influenced streams and rivers. Initial but limited morphology and banding studies on these geese in the Anchorage area indicates they are Parvipes sp. and are wintering in Oregon's Willamette Valley along with dusky Canada geese from the Copper River Delta near Cordova.

A small population of geese, numbering about 1,000, are present during the summer in the Trading Bay and Redoubt Bay areas. These birds

generally occur several miles from saltwater and inhabit small ponds and lakes. Although unconfirmed, the production of goslings probably occurs in this area. However, the bulk of the population appears to be non-breeding adults or sub adult white fronted geese.

In 1973, 13 Vancouver Canada geese from Southeast Alaska were shipped to Kodiak. These birds were held in captivity for several months and then released. It was anticipated that this group of birds would be the first of a series of releases of Vancouver geese designed to create a resident, nonmigratory population of Canada Geese on Kodiak Island. However, since then the Fish and Wildlife Service policy has been to not sanction this project until the determination of what species of Canada goose is nesting in Prince William Sound is made. With this determination a better indication of whether Vancouvers from Southeast or the Canadas from Prince William Sound should be transplanted to Kodiak. Should the transplant project eventually proceed, the people on Kodiak-Afognak islands could have an additional waterfowl resource available for both noncomsumptive and consumptive users. Although unconfirmed, we do not believe any of the original 13 Canada geese have sucessfully nested and reared young, although a few of the birds can still be occassionally seen around Kodiak.

Swans

Trumpeter swans are associated with interior, forested habitat while whistling swans occur primarily on coastal tundra areas. Swans in the Cook Inlet-Kenai Peninsula area are the trumpeter species while the few swans which nest on Kodiak are whistlers.

There have been two nearly complete inventories of trumpeter swans in Alaska, in 1968 and in 1975. Both surveys were conducted in late

August and early September by personnel of the U.S. Fish and Wildlife Serivce. Survey data from the 1975 survey are not yet available. Eventually swans seen by location will be provided on 1:63,360 scale maps and compared to 1960 observations. Also, observations by specific location in 1968 are not readily available but totals by regional areas of observation are. On the western side of the Kenai Peninsula (upland, but generally below six hundred feet MSL) 181 swans were seen in 1968. There were 21 pairs of swans in this total and an aggregate of 65 young birds. Apparently the Kenai Peninsula population has stabilized since 1968 as the 1975 count showed about the same number of birds present (J. G. King, pers. comm.). On the west side of Cook Inlet from Redoubt Bay west to the Alaska Mountain Range and north, 1,022 trumpeter swans were observed in 1968. However, this figure represents swans seen north of Willow to Talkeetna, but the proportion of birds very probably represents little more than 10 % of the total population. These birds were composed of 91 adult pairs and in aggregate they had 362 young birds. The number of birds observed in the same area in 1975 is substantially above what was seen in 1968 (J. King, pers. comm.). Apparently either a population increase on the west side of Cook Inlet has occurred or birds were missed in 1968. On both the Kenai Peninsula and on the west side of the Cook Inlet most of the swan observations occurred on shallow water areas of five acres or less which were surrounded by sedge. Most observations were also made at elevations below 300 feet MSL, however, observations of swans on water areas of over 1,000 feet MSL were made.

The only swans which overwintered in the Kodiak-Cook Inlet Region are found on Kodiak Island. During the winter of 1975 an observation of 12 different swans were made on Kalsin and Middle Bays. A local bird-watcher identified these birds as whistlers and said that all birds were

adults and remained throughout the winter of 1974-75. This wintering area is quite abnormal, but these birds are probably the same birds which nested on Kodiak Island.

GENERAL WATERFOWL DISTRIBUTION

Winter

In Cook Inlet, near shore wintering waterfowl are found primarily from Kachemak Bay south, around the Kenai Peninsula and on the west side of the Inlet from Kamishak Bay south. However, a few birds can be found from Kenai south from Kamishak Bay, but these birds are limited primarily to scoters and a few eiders. Offshore populations of scoters eiders and seabirds are numerous. The largest waterfowl concentration of wintering birds in Cook Inlet is found in Kachemak Bay. However, too few winter bird surveys have been done to adequately assess the importance of lower Cook Inlet to wintering populations. A survey of Kachemak Bay, conducted in 1968, showed about 10,000 waterfowl were present during the winter. A mid-February survey in 1976 in Kachemak Bay showed about 8,000 waterfowl present (Table 7) and a total bird population of about 10,000. Table 5 shows the number of birds counted along the coastal areas and both the west and east sides of Cook Inlet during early February 1976. This survey showed a wintering bird population in lower Cook Inlet, including Kachemak Bay, of 21,071 birds of which 13,920 were waterfowl. Again this includes only nearshore bird populations. A significant, but unknown proportion of birds are missed during the aerial surveys. Table 6 also contains estimates of waterfowl found in lower Cook Inlet during early February 1971. In Table 8 the results of the waterfowl survey conducted in the third week of March 1970 in bays

along the south side of the Alaska Peninsula are shown.

Wintering birds in Cook Inlet are confined primarily to Kachemak Bay and south on the east side and south of Kamishak Bay on the west side of the inlet. This is because areas to the north have heavy shore ice during the winter and the birds cannot find adequate food and resting cover.

More surveys of wintering waterfowl have been conducted on Kodiak Island than in any other area of Alaska. However, results of the most extensive survey, which was conducted in late winter 1975, are yet unavailable. This survey sampled various portions of Kodiak and Afognak Island and relates bird population to shoreline habitat type. Results of this survey which was conducted by Department of Fish and Game personnel will be available during the early fall 1976.

In Table 9 a summary of wintering waterfowl surveys conducted since 1966 is presented. The largest number of birds occur in the bigger bays where a substantial amount of the shoreline remains ice free.

In Table 10 a summary of two winter surveys made in 1973 and 1975 by U. S. Fish and Wildlife Service personnel is presented. This survey includes all birds and encompasses most of the nearshore area adjacent to the Kodiak National Wildlife Refuge. As can be seen on Tables 9 and 10 the number of waterfowl and other birds wintering in nearshore areas around Kodiak and Afognak Island is substantial. More definitive information will be available when results of the 1976 survey are analyzed.

Spring and Fall

Unlike winter periods, extremely large concentrations of ducks, geese, swans, and other birds occur during the spring and fall in some areas in the northern part of Cook Inlet. The most important of these

TABLE 5. Winter Survey of Waterfowl and Seabirds of Lower Cook Inlet Feb. 9, 10 and 18, 1976

The following is a breakdown of the number of birds observed in the major bay located within the surveyed areas plus the combined total of all Lower Cook Inlet

LOCATION (East side of Cook Inlet)	No. of birds
Takoma Cove	
Goldeneze	20
Harlequin duck	16
Unid. sea duck	1
Bufflehead	12
Cormorant	3
Glaucous-winged Gull	7
Sunday Bay	
Goldeneze	2
Oldsquaw	42
Harlequin	3
Unid. sea duck	11
Bufflehead	17
Merganser	2
Small alcid	1
Glaucous-winged Gull	18
Mew Gull	2
Unid. gull	3
Loon	2
Cormorant	1
Mature Bald Eagle	1
Taylor Bay	
Goldeneze	4
Oldsquaw	1
Harlequin	4
Unid. sea duck	15
Bufflehead	18
Merganser	1
Small shorebirds	40
Small alcids	11
Mew Gull	2
Glaucous-winged Gull	24
Unid. gull	3

Taylor Bay, Con't.

Cormorant	6
Northwest Crow	4
Mature Bald Eagle	3
Immature Bald Eagle	1

West Arm Port Dick

Goldeneze	259
Unid. bay ducks	15
Harlequin	82
White-winged Scoter	2
Surf Scoter	59
Unid. Scoter	50
Unid. sea duck	51
Mallard	107
Unid. dabbler	40
Bufflehead	5
Red-breasted Merganser	9
Unid. Merganser	16
Small alcid	7
Mew Gull	4
Glaucous-winged Gull	2
Loon	2
Cormorants	23
Mature Bald Eagle	5
Immature Bald Eagle	1

Rocky Bay

Goldeneze	232
Oldsquaw	1
Surf Scoters	90
Unid. Scoter	26
Unid. sea duck	13
Bufflehead	44
Unid. Merganser	20
Small shorebird	10
Small alcid	4
Glaucous-winged Gull	5
Cormorant	16
Raven	1
Loon	1
Magpie	2

Windy Bay

Goldeneze	46
Harlequin	11
Surf Scoter	134
Common Scoter	15
Common Eider	216
Unid. Scoter	14

Windy Bay, Con't.

Unid. sea duck	11
Mallard	15
Bufflehead	9
Unid. Merganser	6
Small shorebirds	30
Small alcid	3
Grebe	1
Cormorant	1
Magpie	1
Mature Bald Eagle	1

Chugach Bay

Harlequin	10
Surf Scoter	308
Common Scoter	45
Unid. Scoter	65
Unid. sea duck	64
Bufflehead	1
Red-breasted Merganser	4
Small alcid	1
Grebe	1
Glaucous-winged Gull	1
Cormorant	6
Northwest Crow	3

East Chugach Island

Harlequin	28
White-winged Scoter	1
Surf Scoter	52
Common Scoter	2
Unid. Scoter	4
Unid. sea duck	2
Small shorebird	1
Glaucous-winged Gull	2
Cormorant	89
Northwest Crow	54

Perl Island (seaward side only)

Unid. Scoter	10
Unid. sea duck	2
Cormorant	48
Northwest Crow	10

Elizabeth Island

Harlequin	19
Surf Scoter	2
Common Scoter	7

Elizabeth Island, Con't.

Unid. Scoter	31
Unid. sea duck	6
Unid. Merganser	1
Small shorebird	23
Loon	1
Cormorant	25
Northwest Crow	26
Mature Bald Eagle	1

Port Chatham

Scaup	10
Goldeneze	128
Harlequin	36
Surf Scoter	122
Common Scoter	26
Unid. Scoter	22
Unid. sea duck	24
Mallard	232
Bufflehead	27
Red-breasted Merganser	9
Common Merganser	2
Small shorebird	50
Small alcid	1
Greb	1
Glaucous-winged Gull	12
Loon	4
Cormorant	17
Magpie	4
Mature Bald Eagle	1
Immature Bald Eagle	1

Koyukotolik Bay

Scaup	40
Goldeneze	123
Harlequin	50
Surf Scoter	42
Common Scoter	23
Common Eider	71
Unid. Scoter	176
Unid. sea duck	1
Mallard	95
Bufflehead	11
Red-breasted Merganser	5
Small alcid	1
Glaucous-winged Gull	2
Loon	3
Cormorant	4
Northwest Crow	25
Mature Bald Eagle	1

Port Graham

Goldeneze	176
Unid. duck	4
Oldsquaw	2
Harlequin	39
White-winged Scoter	1
Surf Scoter	11
Common Scoter	2
Common Eider	16
Unid. Scoter	52
Unid. sea duck	13
Bufflehead	26
Red-breasted Merganser	27
Common Merganser	3
Unid. Merganser	4
Medium-size shorebird	150
Glaucous-winged Gull	2
Cormorant	5
Northwest Crow	13

Seldovia Bay

Scaup	68
Goldeneze	93
Unid. duck	19
Oldsquaw	46
Harlequin	11
White-winged Scoter	8
Surf Scoter	26
Common Scoter	2
Common Eider	4
Unid. Scoter	70
Bufflehead	16
Red-breasted Merganser	2
Unid. Merganser	6
Medium-sized shorebird	1
Small alcid	4
Mew Gull	5
Glaucous-wing Gull	1
Cormorant	7

Kasitsna Bay

Scaup	26
Goldeneze	31
Unid. duck	4
Oldsquaw	3
Harlequin	3
White-winged Scoter	2
Surf Scoter	48
Unid. Scoter	28
Bufflehead	70

Kasitsna Bay, Con't.

Small alcid	3
Glaucous-winged Gull	1
Cormorant	1
Northwest Crow	40

Jakolof Bay

Scaup	2
Goldeneze	33
Unid. duck	21
Harlequin	33
Surf Scoter	27
Common Eider	3
Unid. Scoter	17
Bufflehead	6
Red-breasted Merganser	1
Unid. Merganser	1
Loon	2
Raven	3

Tutka Bay (shoreward side only)

Goldeneze	166
Unid. duck	74
Oldsquaw	3
Harlequin	51
Surf Scoter	136
Unid. Eider	2
Unid. sea duck	22
Red-breasted Merganser	13
Unid. Merganser	17
Small alcid	1
Greb	1
Cormorant	2
Magpie	5
Mature Bald Eagle	1

Sadie Cove

Goldeneze	111
Unid. bay duck	18
Unid. duck	24
Oldsquaw	2
Harlequin	61
White-winged Scoter	43
Surf Scoter	70
Common Eider	12
Unid. Scoter	46
Mallard	18
Bufflehead	5
Red-breasted Merganser	1

Sadie Cove, Con't..

Unid. Merganser	1
Small alcid	84
Large alcid	1
Mew Gull	1
Loon	20
Cormorant	8
Mature Bald Eagle	2

China Poot Bay

Goldeneye	333
Unid. duck	38
Harlequin	4
White-winged Scoter	5
Surf Scoter	520
Unid. Eider	1
Unid. Scoter	503
Unid. sea duck	6
Mallard	898
Bufflehead	3
Red-breasted Merganser	5
Small shorebird	420
Mew Gull	21
Glaucous-winged Gull	8
Cormorant	1
Raven	9
Northwest Crow	111
Magpie	1
Mature Bald Eagle	7
Immature Bald Eagle	3

Peterson Bay

Goldeneze	61
Unid. duck	26
Oldsquaw	5
Harlequin	1
Mallard	7
Red-breasted Merganser	8
Small alcid	2
Cormorant	3

Halibut Cove

Goldeneye	311
Unid. ducks	25
Oldsquaw	16
Harlequin	6
Surf Scoter	77
Common Scoter	14
Unid. Scoter	161
Mallard	69

Total for Kachemak Bay, Con't.

Northwest Crow	277
Mature Bald Eagle	17
Immature Bald Eagle	4

LOCATION (west side Cook Inlet)

Redoubt Bay

Oldsquaw	1
Glaucous-winged Gull	2

Tuxedni Bay

Oldsquaw	6
Unid. sea duck	137
Large shorebirds	1,600
Glaucous-wing Gull	2

Tuxedni Channel

Oldsquaw	4
Large shorebirds	11,775
Magpie	1

Chinitna Bay

Oldsquaw	2

Oil Bay

Goldeneze	1
Oldsquaw	6
Unid. sea ducks	12
Raven	2

Iniskin Bay

Oldsquaw	805
Unid. sea ducks	87

Cottonwood Bay

Oldsquaw	4
Unid. sea duck	4

Iliamna Bay

Oldsquaw	104
Small alcid	1

Ursus Cove

Oldsquaw	60
Unid. sea duck	45

Bruin Bay

Oldsquaw	24
Small alcid	4
Pelagic Cormorant	2
Northwest Crow	2

Kamishak Bay

Oldsquaw	247
Unid. sea ducks	51
Small alcid	1
Northwest Crow	1

Totals for all Lower Cook Inlet

Scaup	147
Goldeneze	2,646
Unid. duck	752
Oldsquaw	1,911
Harlequin	734
White-winged Scoters	77
Surf Scoters	2,135
Common Scoters	410
Common Eider	349
Unid. Eider	5
Unid. Scoter	2,719
Mallard	1,445
Unid. dabblers	40
Bufflehead	307
Red-breasted Merganser	146
Common Merganser	5
Unid. Merganser	92
Small shorebirds	490
Medium shorebirds	162
Large shorebirds	3,375
Small alcid	699
Large alcid	47
Gillimot	1
Grebe	5
Mew Gull	288
Glaucous-winged Gull	413
Unid. Gull	662
Loon	53
Cormorant	440
Raven	17
Northwest Crow	445
Magpie	11
Mature Bald Eagle	35
Immature Bald Eagle	8

Table 6. Ducks and geese found in bays in Lower Cook Inlet by aerial survey.

Location	8-25-69	9-9-69	10-2-69	4-16-70	6-1-70	8-12-70	9-28-70	2-9-71	5-12-71	10-5-71	11-3-72
Redoubt Bay	1626	2632	2630	1170		1917	2587			3531	
Kalgin Island				50	39	71					
Fox River Flats								915	1650		1950
Aurora Lagoon								50	0		334
Halibut Cove								185	250		408
China Poot Bay								110	0		682
Neptune Bay											18
Sadie Cove								56	5		
Tutka Bay								165			
Kasitsna Bay											390
Jackolof Bay								160			
Seldovia								195	128		
Port Graham								208	1025		

TABLE 7 Winter and Spring Survey of Waterfowl and Seabirds along the Shoreline of Kachemak Bay

Feb. 18 and May 3, 10, 1976

The survey was conducted by the Department of Fish and Game utilizing a de Havilland "Beaver" with Paul Arneson, Game Biologist III, Warren Ballard, Game Biologist II and David Erickson, Technician III, as observers.

The area survey included all birds from the storm zone on the beach to a distance of 200 M on the seaward side of the aircraft. The height above the water was 100 feet.

The following is a breakdown of the species and number found in Kachemak Bay.

Species	Number	
	Winter	Spring
Greater Scaup	97	2,730
Goldeneye	1,791	894
Unid. Bay Ducks	18	---
Unid Ducks	348	167
Oldsquaw	430	1,026
Harlequin	315	505
White-winged Scoter	70	724
Surf Scoter	1,195	3,433
Common Scoter	289	1,367
Common Eider	48	89
Steller's Eider	---	8
Unid. Eider	5	10
Unid. Scoter	1,993	669
Unid. sea duck	176	58
Mallards	996	214
Pintail	---	334
Green-wing Teal	---	24
Widgeon	---	89
Unid. dabblers	---	151
Bufflehead	158	170
Red-breasted Merganser	51	85
Common Merganser	1	94
Unid. Merganser	35	---
Small Shorebirds	747	4,553
Medium Shorebirds	1	808
Large Shorebirds	---	6
Marbled Murrelets	---	8
Common Murrelets	---	20
Guillemot	---	158
Common Loon	---	14
Unid. Loon	---	38

Table 7 Cont'd.

Species	Number	
	Winter	Spring
Horned Grebe	---	12
Unid. Grebe	---	25
Bonaparte's Gull	---	42
Mew Gull	268	442
Glaucous-winged Gull	306	1,854
Herring Gull	---	32
Unid. Gull	608	1,942
Pelagic Cormorant	---	7
Double-created Cormorant	---	12
White-flanked Cormorant	---	10
Unid. Cormorant	51	143
Black Brant	---	2
Lesser Canadian Geese	---	1,033
Immature Bald Eagle	---	2
Mature Bald Eagle	---	5
Northwestern Crow	---	73
Raven	---	2
Total	9,997	24,085
Total Waterfowl	8,016	12,842

Table 8.
Ducks and geese found in bays of the south side of the Alaska Peninsula by aerial survey.

Location	Date of Survey 3/20-23/70	10/11-12/72
Puale Bay		685
Portage Bay		184
Wide Bay	462	631
Agripina Bay area	465	200
Chiginagak Bay area	505	352
Yantarni Bay area	623	141
Amber Bay	465	240
Aniakchak Bay	1145	449
Cape Kumlik	198	
Sutwik Island	263	
Kujulik Bay	3915	391
Cape Kumlin	250	
Hood Bay	20	
Chignik Bay	430	35
Chignik Lagoon		1153
Castle Bay	95	287
Castle Cape to Seal Cape	65	
Kuiukta Bay	5	
Mitrofania Bay & Island	38	
Ivanoff Bay	65	1043
Stepovak Bay	42	862
Grub Gulch Bay		241
Clark Bay		104
Orzinski Bay	124	85
American Bay		62
Chichagof Bay		76
Dorenoi Bay	295	32
Balboa Bay	510	
Beaver Bay	123	224
Shumagin Islands	4086	
Canoe Bay		1362
Pavlof Bay		715
Pavlof Islands	1118	
Deer Island	345	
Sandman Reefs	412	
Sanak Islands	2762	
Cold Bay	462	3057
Morzhovoi Bay	2925	4439
Otter Cove	434	

Table 9. Ducks and geese found in bays of Kodiak Island by aerial survey.

Location	Date of Survey 1-19-66	2-11-66	3-14-66	11-11-66	3-12-69	1-21-71	2-18-72
Sharatin Bay			30		2	175	
Kizhuyak Bay			149		4	79	
Settler Cove					8		
Spruce Bay					75		
Viekoda Bay			2		30	85	
Terror Bay	270	385	616	288	102	155	
Uganik Island			231		23		
N. E. Arm Uganik			205				
E. Arm Uganik	573	392	489	229	125	576	
S. Arm Uganik			15				
Spiridon Bay			101		6	138	
Zachar Bay	111	668	470	612	235		
Larsen Bay	197		6	184		1058	
Uyak Bay	991	1237	1378	1325	490		
Karluk Lagoon			90				
Sturgeon Lagoon					235		
Halibut Bay					75		
Sukoi Lagoon					300		
Alitak Lagoon					150		85
Tugidak Island					600		390
Sitkanak Lagoon					50		
Deadman Bay							125
Olga Bay							170
Portage Bay					75		145
Kaiugnak Bay					175		175
Three Saints Bay							310
Barling Bay					100		50
Midway Bay					30		120
Amee Bay					15		
Port Holbron					8		
McDonald Lagoon					45		
Hidden Basin	NOT SURVEYED	NOT SURVEYED	NOT SURVEYED		123	NOT SURVEYED	
Kiliuda Bay					410		528
Shearwater Bay					130		
Gull Cape							75
Eagle Harbor					50		
Ugak Bay						469	
Saltery Cove					60		
Pasagshak Bay						125	
Narrow Cape						258	
Chiniak Cape						257	
Kalsin Bay				35		360	
Middle Bay			261	175		181	
Women's Bay			30			375	
Monashka Bay					160		

Table 10. Marine bird survey via M/V Aleutian Tern by Kodiak National Wildlife Refuge personnel, Jan. 25-Feb. 8, 1973 and Feb. 5-22, 1975.

	1973	1975
Loon sp.	424	83
Grebe sp.	7	72
Red-necked	1	
Cormorant sp.	1982	1728
Emperor Geese	621	52
Mallard	700	2556
Pintail	200	4
Gadwall	30	75
Dabbler sp.	-	50
Scaup (Greater)	80	15
Goldeneye sp.	1142	1205
Common	146	
Barrows	24	30
Bufflehead	36	27
Harlequin	691	675
Eider sp.	67	1745
Common	4512	58
King		4654
Steller's	340	1176
Old squaw	7863	9410
Scoter sp.	3192	984
Black	2154	1402
White-winged	3059	2073
Surf	1194	327
Merganser sp.	39	27
Common	21	21
Red-breasted	13	34
Hawk sp.		3
Marsh		1
Bald Eagle age?	4	8
Adult	183	179
Immature	37	50
Golden Eagle		1
Sandpiper sp.		50
Gull sp.	124	1589
Glaucous-winged	32	923
Mew	356	731
Murre sp.	8420	14,994
Common		179
Thick-billed	66	
Pigeon Guillemot	46	106
Horned Puffin		1
Tufted Puffin		1
Crested Auklet	15,083	7011
Murrelet sp.	63	280
Ancient	3	
Magpie	28	84
Raven	8	3
Crow	524	879

areas are: Chickaloon Flats, Portage Flats, Potter Marsh, Eagle River Flats, Palmer Hay Flats, Goose Bay, Susitna Flats, Trading Bay and Redoubt Bay. Large numbers of migrant waterfowl can also be found in Kachemak Bay on the Fox River Flats and in some of the smaller bays on the south side of Kachemak Bay. Kamishak Bay on the west side of Cook Inlet is also a heavily used waterfowl and shorebird migration stopping area. Birds utilizing Kamishak Bay have followed the coastal route from the lower Pacific flyway wintering grounds. Many of these birds will cross the Alaska Range and fly up Lake Iliamna to more interior and western Alaska breeding grounds. Other areas of lesser importance to waterfowl, but of local importance to birdviewers include the Kenai River and Kasilof River Flats on the east side of Cook Inlet. All of the above areas mentioned receive heavy bird use during both spring and fall periods.

In Tables 6, 7 and 8 various waterfowl surveys conducted in lower Cook Inlet and on the south side of Alaska Peninsula are summarized for both spring and fall periods. Complete coverage was not made for most surveys in some areas so these figures must be considered very minimum. Relatively few surveys have been made on Kodiak Island during spring and fall migration periods. However, all bays and estuaries which have a small salt marsh or intertidal land are undoubtedly used by substantial numbers of ducks, geese, shorebirds and other birds. A general assumption is that the larger the salt marsh or intertidal area exposed, the greater number and diversity that will occur. Some species that frequent the Kodiak-Afognak Islands in the spring, such as black brant, bypass the island in their southerly fall migration. Black brant during the fall are extremely rare, but during the spring perhaps several tens of thousands use a number of bays and estuaries in the island group.

RARE AND ENDANGERED SPECIES

Arctic Peregrine Falcon are classified rare and endangered by the Federal Government and the State of Alaska. Although Arctic Peregrines do not nest in the Cook Inlet-Kodiak region, some birds are known to utilize the coastal areas during spring and fall migration periods on their way to and from wintering grounds to the south. Probably any area in Cook Inlet could receive use by small numbers of Arctic Peregrines, however, they would be uncommon on Kodiak Island.

Although no endangered waterfowl species have been verified in the Cook Inlet-Kodiak region, there is a strong possibility that the Aleutian Canada goose may occur there, especially on Kodiak Island. The Aleutian Canada is a small goose with a wide white neck ring at the base of its black neck. The entire world population (Spring population of about nine hundred birds) apparently breeds on Buldir Island in the Western Aleutian Islands.

The birds migration route from Buldir Island to Crescent City, California is unknown. It is possible that the geese follow the Gulf Coast during the fall. However, it is most probable that they take this route during spring migration. Many of the small islands around Kodiak and Afognak Islands appear to be a stopping place for Aleutian Canada geese. As more geese are banded in future years, and when radio transmitters are placed on the birds during the fall of 1976, the probability of Aleutian geese being verified in this area increases.

If Aleutian Canada geese are verified, perhaps the most significant event which may occur is that the areas frequented may be judged to be critical and subsequently classified as critical habitat under federal

law. Lands judged to be critical may be purchased, leased or otherwise controlled. It is also against federal law to use federal funds on critical habitat for projects that will adversely affect the geese. This could include such things as roads, airports, logging activities, etc. At this time, the probability of Aleutian geese being verified in this region is high; but the probability of lands being designated critical is low.

CRITICAL HABITAT

The term critical habitat can have very general or very precise connotations. For example, fertile water areas with adjacent nesting cover are critical for production of waterfowl each year. Specifically, a given precise area may be critical to large numbers of birds or even entire species, subspecies, or populations. Critical habitat as will be delineated here is that habitat or land area which is necessary for the survival or well being of large numbers of birds. Critical habitat could also be that area used by rare and endangered species, but no such areas have been identified as yet in the Cook Inlet-Kodiak region.

A given area may be critical to birds during the summer for nesting purposes, but not for example, during the fall or spring for feeding and resting. A given area may be critical for an individual bird, but if that area were removed or adversely altered, the species of which that individual bird is a part may not be affected. Unfortunately, few studies in Alaska have been made which actually identify precisely why an area is critical or very important. We can usually say only that many birds occur where they do and generally why they do occur there.

Intertidal areas with broad mud flats and sedge-grass flats which

flood at higher high tides are, taken as a whole, essential to the survival of many waterfowl, shorebirds and indirectly many seabirds in this region. Exceptions are probably swans which could survive exclusively on upland areas. It is a rational generalization that the bigger such intertidal zones are, the more important they are. One major reason for the intertidal flats importance is the quantity of food which is produced there. Tidal action creates a constant interchange of nutrients and organic matter for plant and animal growth. Freshwater streams are equally also associated with these flats. Brackish water (mixed salt and fresh) is more productive than either salt or fresh water. Varying tide levels create a change of plant and animal communities from mud (most frequently flooded) to grass-sedge and finally spruce forest (never flooded). The species of plants and animals within each "life zone" are often different and thus create very diverse food sources for birds.

It is difficult in most instances to say, for example, that the loss of a given tide flat would result in a number of birds disappearing. In many cases the birds can go elsewhere. However, exactly what the carrying capacity for birds is for any given area of tidal flats would be difficult to determine.

The critical function in the life history of waterfowl which intertidal areas fulfill is that they provide good places for birds to use during the spring and fall, before and after inland nesting areas are ice and snow free. Because the nesting season in Alaska is so short, it is imperative that waterfowl and shorebirds arrive on their breeding grounds ready to nest as soon as conditions allow. If intertidal areas were not available, waterfowl and shorebirds would have to overfly from their wintering grounds to their nesting areas. If such were the case, far fewer waterfowl would be in Alaska than are here today. Likewise

during the fall, intertidal areas serve as a safe resting and feeding area for the birds to gain strength and body fat for their long flight south after their inland nesting areas have become ice covered.

There are a number of areas within the Cook Inlet-Kodiak Region which have some state or federal land protection existing now. There are five areas currently designated as state refuges. These are: the Palmer Hay Flats, Goose Bay, Potter Marsh, Susitna Flats, and the Trading Bay area. The Redoubt Bay area has also been nominated as state refuge, but the current year's legislature did not so designate the area. There are two areas which have critical habitat classification under state law - Kachemak Bay and Kalgin Island. The U. S. Fish and Wildlife Service has land management authority on most of the southern end of Kodiak Island which is in the Kodiak National Wildlife Refuge. Under authority of the Native Land Claims Settlement Act, the Fish and Wildlife Service has requested two additional refuges in this region; the Barren Islands and the Shumagin Islands. All intertidal lands surrounding or adjacent to federal refuges are state owned. There are two additional areas within this region which have special classification. The Chickaloon Flats intertidal lands are owned by the State while the Fish and Wildlife Service and Forest Service currently own the uplands. This area is under cooperative management agreement between the State of Alaska and the two federal managing agencies. On the Portage Flats area the State also owns intertidal lands while the Bureau of Land Management and U.S. Forest Service own most of the upland marsh area. A cooperative management agreement between state and federal managing agencies is currently being drafted by the Bureau of Land Management and this area will eventually be placed in cooperative management status.

Specific Critical Habitats

In this region there are six areas that are critical to the welfare of waterfowl. There are also a number of other areas which can be considered very important to waterfowl and sea birds; the difference between very important and critical could well be a matter of opinion depending on who is designating them as such. The areas we deem critical are the Palmer Hay Flats, Susitna Flats, Trading Bay, Redoubt Bay, the Chickaloon Flats, and Kachemak Bay (Dan Timm, ADF&G, Anchorage).

The Palmer Hay Flats are inside of a line bounded by the mouth of Cottonwood Creek on the southwest, across Knik Arm to Eklutna on the east, and north and westward along the railroad tracks on the east and north, to the base of the bluff bordering the Palmer Hay Flats on the west. Critical area is within this described boundary. This area is deemed critical due to the combination of heavy public use on the area, the waterfowl production which occurs here and the large numbers of birds which use Palmer Hay Flats both spring and fall. These three criteria-public use, waterfowl production and use by migrating waterfowl-are the criteria used to designate all six critical habitats. Numerous inventories of spring and fall waterfowl using the area have been conducted. In the fall it is estimated that over 50,000 ducks, over 10,000 geese and an excess of 15,000 swans (both species) use the Palmer Hay Flats. This use by migrating waterfowl extends from about mid August to October 10. Spring bird populations are more spectacular as larger concentrations occur during a shorter time period. Estimated spring use includes over 100,000 ducks, over 50,000 geese and over 5,000 swans. Spring bird use occurs from about April 10 to about May 10, with peak populations occurring around May 1.

The Susitna Flats includes the area beginning due north of Point Campbell, including all intertidal lands between there and Beluga on the south, and north including all salt marsh below the 100 foot contour. This area is delineated with legal descriptions in the Susitna Flats Refuge Bill which passed the Legislature in 1976. During both the spring and fall seasons estimated total duck use exceeds 150,000 birds; geese exceed 50,000 and over 10,000 swans use the area each year. Not only does this area produce a significant number of ducks, geese and swans each year, but it is also the number one hunting area in Alaska.

Trading and Redoubt Bays include all intertidal lands plus the lowland salt marsh areas north and west of the ocean beach to about the 100 foot contour line. These two areas both produce substantial numbers of waterfowl and sustain moderate hunting pressure. Few spring and fall waterfowl surveys have been conducted on these areas, but numbers of birds are known to be quite substantial. Estimated total duck, goose and swan use is very similar to that received on the Susitna flats.

Chickaloon Flats is bordered by Burnt Island on the east to about Bedlam Creek on the west and includes all tidal lands south to about the 100 foot contour line. This area receives heavy hunting pressure during the fall as described earlier in this report. Extensive spring and fall bird surveys have been conducted here and the estimated total fall waterfowl use includes about 150,000 ducks and about 100,000 geese. Swan use both spring and fall is not great, perhaps 1,000 birds each period. Spring bird use is somewhat less than the fall and includes an estimated 50,000 ducks and 25,000 geese. On certain days during the fall the waterfowl concentrations can be quite spectacular on Chickaloon Flats. During the peak of migration if Portage Pass at the head of

Turnagain Arm becomes clouded in, birds will "pile up" on the Chickaloon Flats. They can number in the tens of thousands for short time periods until the path clears.

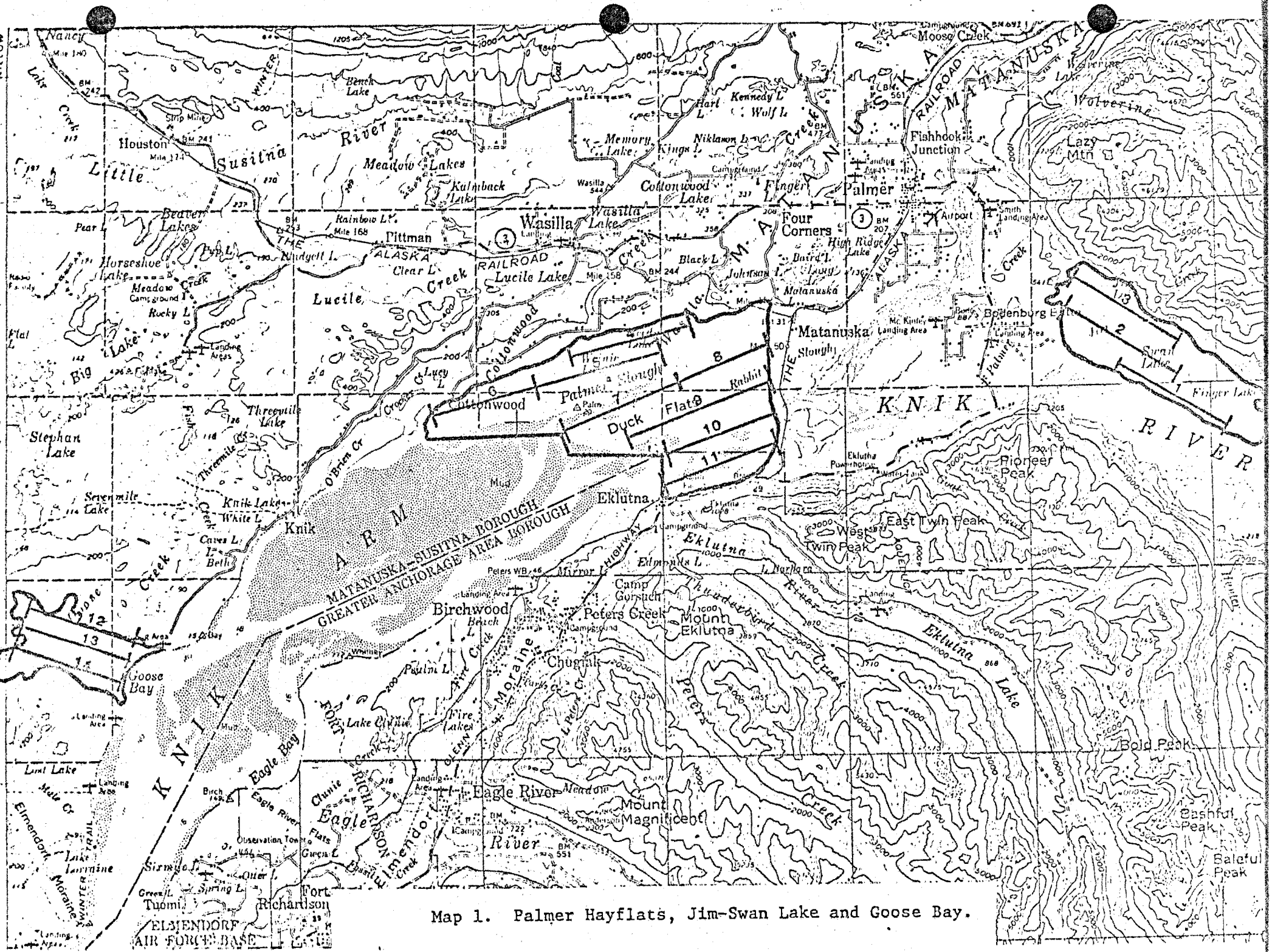
Although the entire Kachemak Bay is considered critical, the intertidal areas of Fox River Flats and the intertidal areas associated with the bays and estuaries on the south side of Kachemak Bay (particularly Chinapoot Bay) are the most valuable areas to waterfowl. Although waterfowl production in Kachemak Bay is low, large numbers of waterfowl utilize these intertidal areas during spring and fall migration. During the 1976 spring migration in early May an estimate was made of one million shorebirds using Fox River Flats on one day. Depending on weather systems, bird concentrations can be very large during the spring and fall. Birds are known to fly directly over the mountains in their migration during spring and fall. During periods of low clouds the piling up of birds can and does occur similar to the phenomenon on Chickaloon Flats. Kachemak Bay also sustains a wintering population of approximately 10,000 waterfowl and other birds.

Other Important Habitats

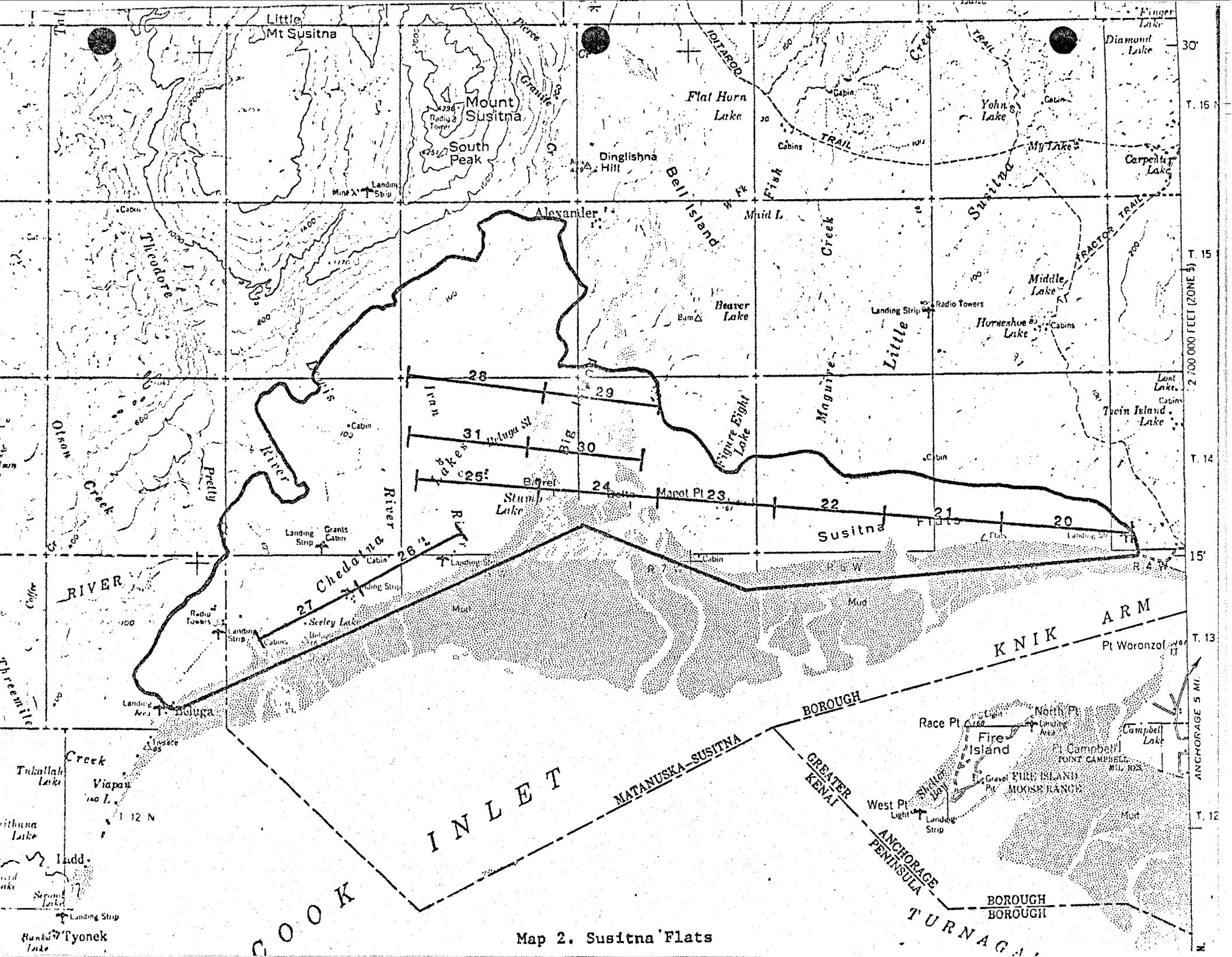
For waterfowl the following areas are very important. These areas generally sustain less public, relatively few birds are annually produced and they receive less bird use during spring and fall migration periods than do the critical habitat areas. These areas are Cordova, Goose Bay, Potter Refuge, Portage Flats, Kenai River Flats, Kasilof River Flats, Kamishak Bay, and all intertidal lands generally located at the heads of bays and estuaries on Kodiak and Afognak Islands. Kamishak Bay could well be a critical habitat area because apparently large numbers of waterfowl

and shorebirds pass through this area on their way to and from Alaska breeding grounds each spring and fall. However, new information on bird numbers will not be available until late Fall 1976. A "piling up" of birds could exist here as exists on the Chickaloon Flats and Fox River Flats, depending on weather conditions.

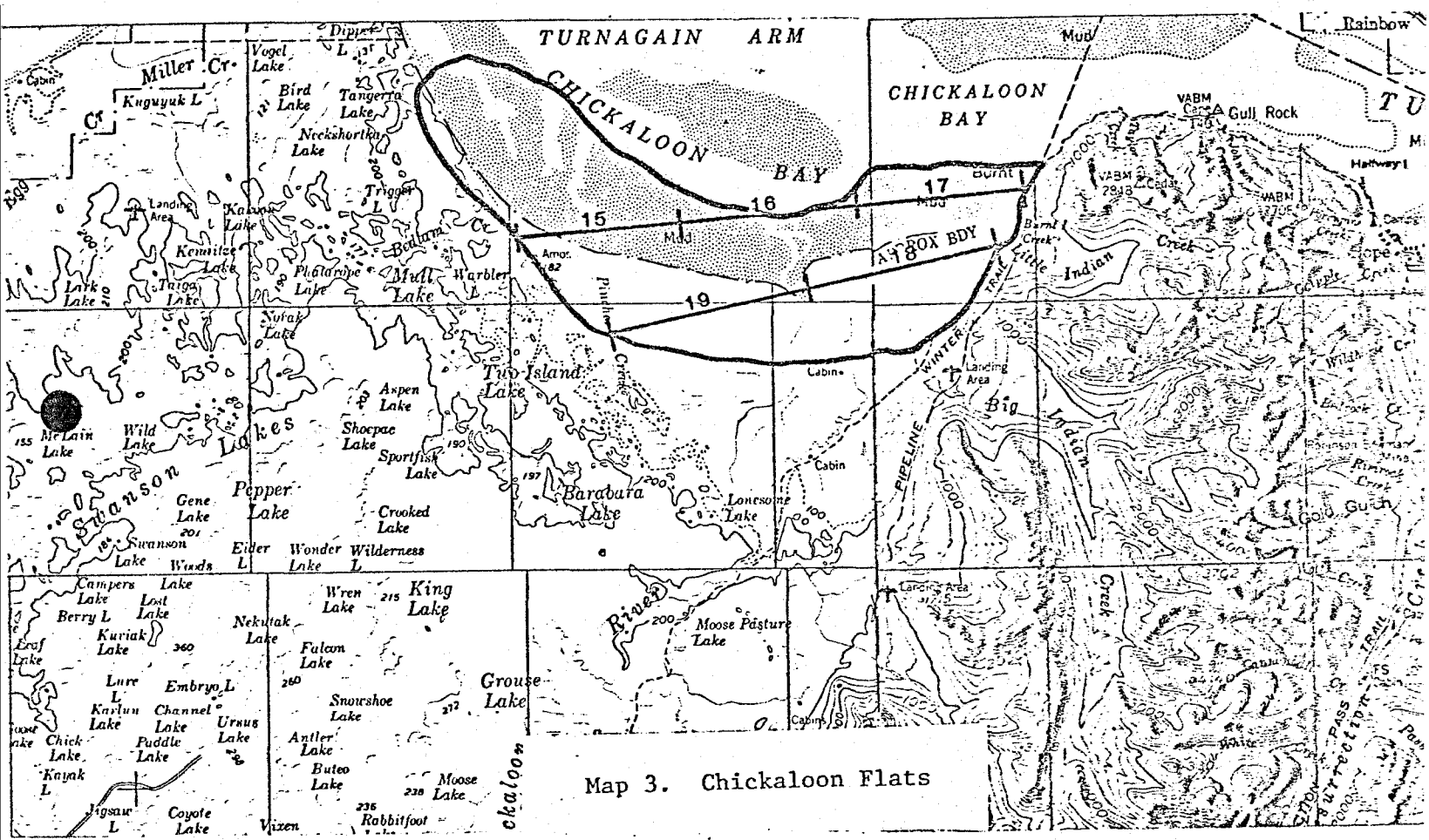
From the seabird standpoint, the Barren Islands, Shumagin Islands, Chirikof Island and Semidi Islands are all very important. Not only are the islands themselves important as nesting areas but the state-owned waters around each island for perhaps a radius of ten or more miles are also important as foraging areas for the birds nesting on each island.



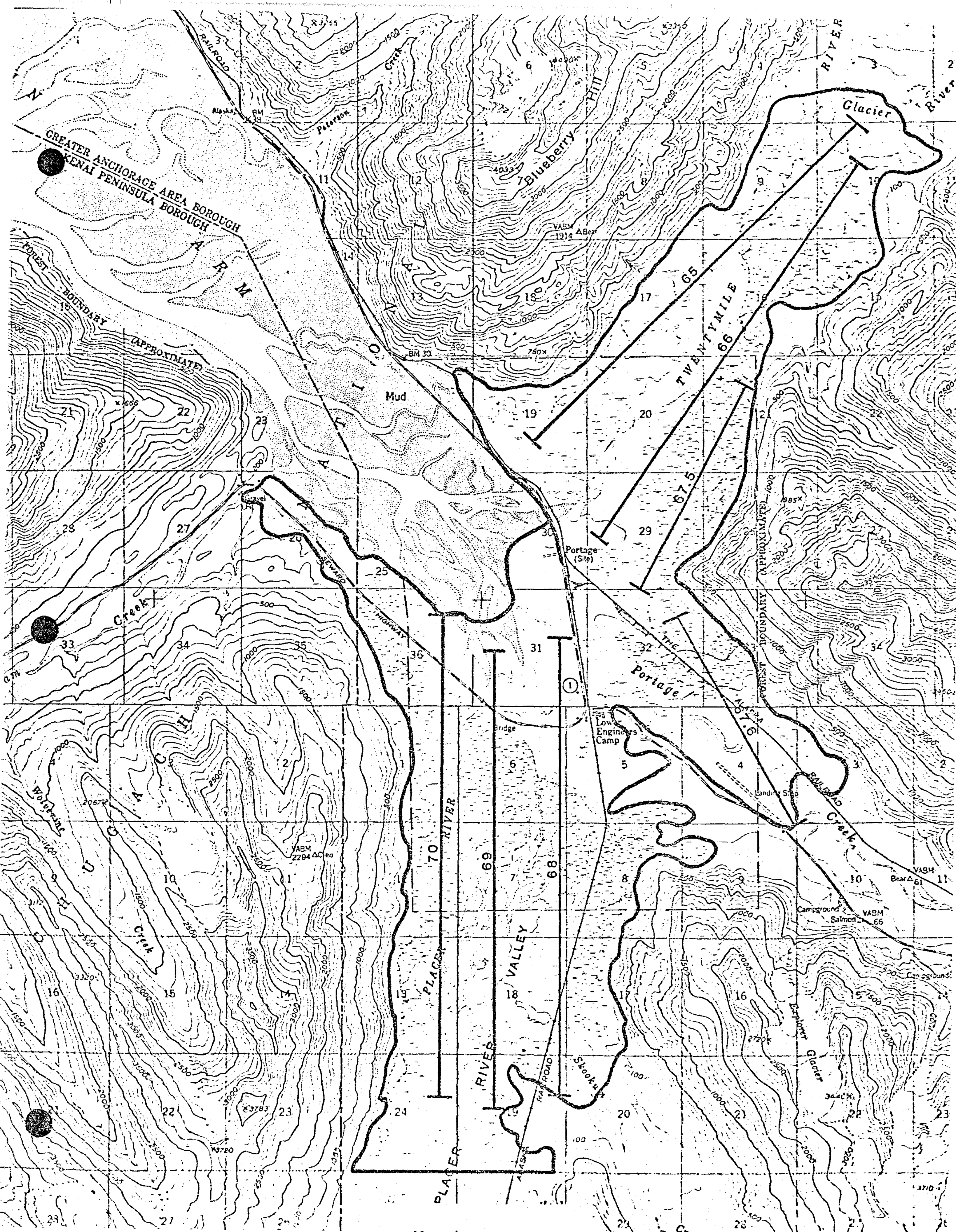
Map 1. Palmer Hayflats, Jim-Swan Lake and Goose Bay.



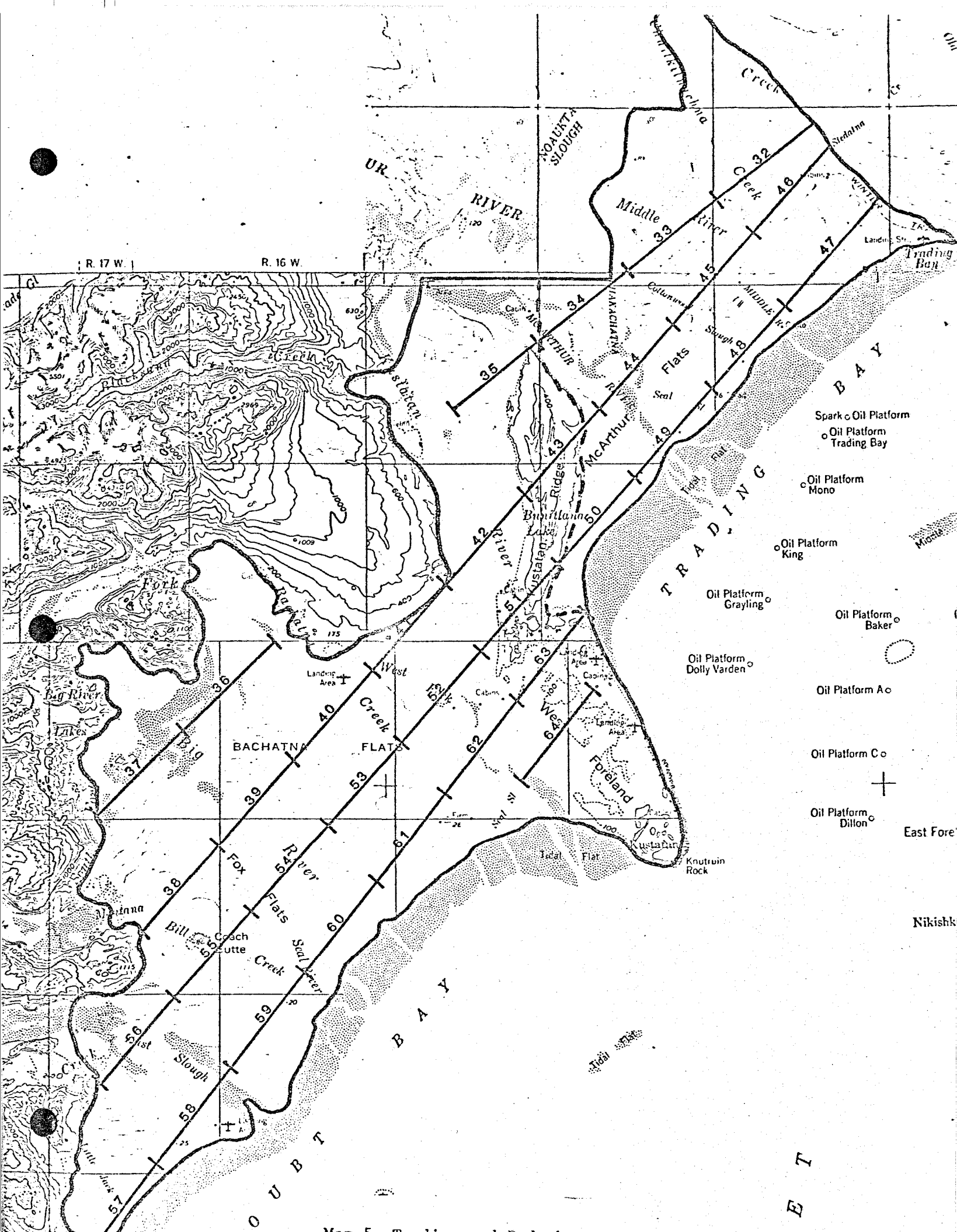
Map 2. Susitna Flats



Map 3. Chickaloon Flats



GREATER ANCHORAGE AREA BOROUGH
KENAI PENINSULA BOROUGH
FOREST BOUNDARY (APPROXIMATE)
RAILROAD
Peterson Creek
Blueberry Hill
Glacier
RIVER
River
TWENTYMILE
65
66
67.5
67.6
Mud
Portage (Site)
Lower Engineers Camp
Bridge
SEWARD HIGHWAY
THE
Portage
Creek
ALASKA RAILROAD
Landing Strip
Campground
Salmon
Explorer Glacier
Skookum
PLACER RIVER VALLEY
PLACER RIVER
70
69
68
Creek
Wolverine
Gravel Pit
FOREST BOUNDARY (APPROXIMATE)
Mud


R. 17 W.
R. 16 W.
Creek
NOAUKTA SLOUGH
UR RIVER
Middle River
Stedatna
Trading Bay
Flats
Seal
Slough
Spark Oil Platform
Oil Platform Trading Bay
Oil Platform Mono
Oil Platform King
Oil Platform Grayling
Oil Platform Baker
Oil Platform Dolly Varden
Oil Platform A
Oil Platform C
Oil Platform Dillon
TRADING BAY
Tidal Flat
Ridge
Lake
River
Fork
Big River
Lakes
BACHATNA
FLATS
Creek
Foreland
Fox
Flats
Bill
Coach
Creek
Slough
Knutsen Rock
Nikishk
East Fore
OUBT BAY
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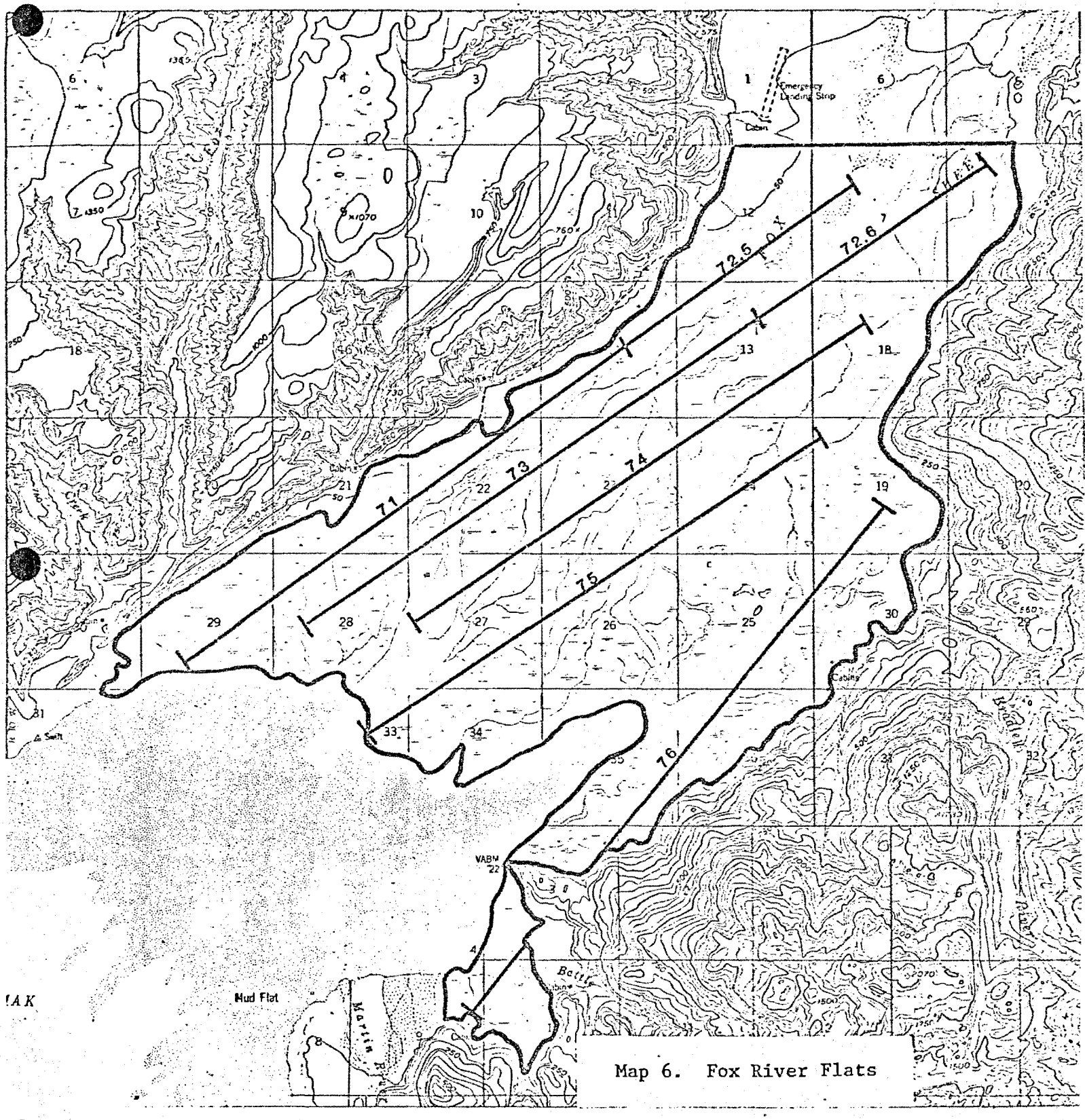

Map 6. Fox River Flats

NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
-E	241	43009	W. Amatuli Is.	Cormorant	870		
				Glaucous-Winged Gull	2,300		
				Black-Legged Kittiwake	300		
				Common Murre	10		
				Parakeet Auklet	120		
				Horned Puffin	1,300		
				Tufted Puffin	93,000		
	242	43010	E. Amatuli Is.	Northern Fulmar	20		
				Cormorant	30		
				Glaucous-Winged Gull	450		
				Black-Legged Kittiwake	13,000		
				Common Murre	61,000		
				Pigeon Guillemot	50		
				Parakeet Auklet	120		
				Horned Puffin	13,000		
				Tufted Puffin	95,000		
	243	43006	Sugarloaf Is.	Cormorant	240		
				Glaucous-Winged Gull	1,600		
				Pigeon Guillemot	16		
				Horned Puffin	600		
				Tufted Puffin	9,500		
	244	43007	Sud Is.	Red-Faced Cormorant	70		
				Glaucous-Winged Gull	500		
				Pigeon Guillemot	20		
				Parakeet Auklet	20		
				Rhinocerous Auklet	1,000		
				Horned Puffin	400		
				Tufted Puffin	1,000		
	245	43005	Carl Is.	Cormorant	50		
				Horned Puffin	40		
				Tufted Puffin	1,000		

NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
-E	246	43008	Ushagat Is.	Cormorant	200		
				Glaucous-Winged Gull	240		
				Pigeon Guillemot	100		
				Parakeet Auklet	10		
				Horned Puffin	250		
				Tufted Puffin	100		
	247	43002	Middle Latax Rock	Cormorant	250		
				Glaucous-Winged Gull	200		
	248	43003	North Latax Rock	Sea Birds	Present		
	249	43001	South Latax Rock	Glaucous-Winged Gull	500		
				Pigeon Guillemot	400		
	250	43004	Douglas Reef	Glaucous-Winged Gull	200		
46-E	251	42011	Unnamed Is.	Glaucous-Winged Gull	100		
	252	42010	Aguchik Is.	Bald Eagle			1
	253	42008	Cape Gull	Cormorant	100		
				Glaucous-Winged Gull	100		
				Black-Legged Kittiwake	50		
	254	42007	Gull Reef	Cormorant	75		
				Glaucous-Winged Gull	100		
	255	42006	Geographic Harbor	Glaucous-Winged Gull	150		
	256	42005	Unnamed Is.	Cormorant	Present		
	257	42003	Unnamed Is.	Cormorant	Present		
	258	42002	Cape Ilktuitak	Cormorant	150		
				Glaucous-Winged Gull	600		
				Tufted Puffin	1,000		

AP NO.	COLONLY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
46-E	259	42001	Mount Pedmar	Cormorant	50		
				Glaucous-Winged Gull	200		
40-E	260	36012	Kelp Point	Glaucous-Winged Gull	50		
	261	36011	Mt. Becharof	Horned Puffin	Present		
	262	36010	Kanatak Lagoon	Glaucous-Winged Gull	3,000		
	263	36009	Cape Iguak	Glaucous-Winged Gull	3,000		
	264	36008	Slaughter Is.	Glaucous-Winged Gull	1,700		
	265	36007	Wide Bay	Cormorant	600		
	266	36006	Imuya Bay	Glaucous-Winged Gull	100		
	267	36005	Cape Kilokak	Cormorant	150		
				Glaucous-Winged Gull	150		
				Tufted Puffin	1,300		
	268	36004	Agripina Bay	Cormorant	100		
				Glaucous-Winged Gull	300		
				Horned Puffin	300		
	269	36003	Ashiiak Is.	Glaucous-Winged Gull	500		
				Horned Puffin	5,000		
				Tufted Puffin	20,000		
	270	36002	David Is.	Cormorant	1,000		
				Glaucous-Winged Gull	1,000		
				Horned Puffin	4,000		
				Tufted Puffin	12,000		
	271	36001	Poltava Is.	Cormorant	500		
				Glaucous-Winged Gull	1,000		
				Horned Puffin	2,000		
				Tufted Puffin	5,000		

AP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
39-E	272	35002	Gull Is.	Mew Gull	100		
	273	35018	Bear Is.	Cormorant	Present		
	274	35016	Cape Kubugaki	Cormorant	Present		
				Glaucous-Winged Gull	Present		
	275	35014	Alinchak Bay	Pigeon Guillemot	50		
				Tufted Puffin	500		
	276	35012	Puale Rocks	Cormorant	1,200		
				Glaucous-Winged Gull	1,000		
				Murre	200		
				Horned Puffin	1,500		
				Tufted Puffin	10,000		
	277	35010	Cape Aklek	Horned Puffin	4,000		
	278	35008	Oil Creek	Cormorant	2,000		
				Murre	200,000		
	279	35005	Cape Unalishaguak	Glaucous-Winged Gull	2,000		
				Black-Legged Kittiwake	3,000		
				Murre	275,000		
				Horned Puffin	2,000		
	280	35004	Jute Is.	Glaucous-Winged Gull	2,500		
				Tufted Puffin	15,000		
	281	35003	Portage Bay	Cormorant	3,000		
38-D	282	34009	East Boulder Bay	Black-Legged Kittiwake	Present		
	283	34001	Kivak Benchmark	Black-Legged Kittiwake	Present		
				Glaucous-Winged Gull	Present		
	284	34017	Queer Is.	Sea Birds	Present		
	285	34031	Ram Site	Pelagic Cormorant	15		

AP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
38-D	286	34030	Blow Benchmark	Double-Crested Cormorant	15		
	287	34036	Otmeloi Point	Cormorant	2		
				Glaucous-Winged Gull	5		
				Tufted Puffin	30		
	288	34037	Low Is.	Cormorant	10		
				Glaucous-Winged Gull	10		
				Black-Legged Kittiwake	50		
				Horned Puffin	10		
				Tufted Puffin			900
	289	34044	Whale Is.	Black-Legged Kittiwake	3,000		
	290	34045	Treeless Is.	Cormorant	400		
				Tufted Puffin	130		
	291	34042	Chernof Point	Horned Puffin	7		
	292	34028	Barbara Cove Pt.	Cormorant	40		
				Black-Legged Kittiwake	1,300		
	293	34029	Trout Benchmark	Black-Legged Kittiwake	120		
	294	34021	Reef Two	Cormorant	20		
				Glaucous-Winged Gull	30		
				Tufted Puffin			200
	295	34027	Barbara Cove	Cormorant	15		
				Glaucous-Winged Gull	20		
				Tufted Puffin	25		
	296	34034	Nangolka Pt.	Glaucous-Winged Gull	100		
	297	34035	Nangolka Pt. Is.	Cormorant	40		
				Glaucous-Winged Gull	120		
				Black-Legged Kittiwake	1,500		
				Horned Puffin	4		
				Tufted Puffin	1,800		

AP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
38-D	298	34026	Uganik Passage	Cormorant	5		
				Glaucous-Winged Gull	470		
				Black-Legged Kittiwake	850		
				Tufted Puffin	690		
	299	34025	Gull Light	Cormorant			5
				Glaucous-Winged Gull	50		
				Tufted Puffin			15
	300	34023	Rock Pt.	Cormorant	25		
	301	34048	Uganik Bay Islets	Black-Legged Kittiwake	300		
				Tufted Puffin	220		
	302	34024	Village Is.	Cormorant	335		
				Glaucous-Winged Gull	962		
				Black-Legged Kittiwake	25		
				Pigeon Guillemot	10		
				Tufted Puffin	2,095		
	303	34039	South Noisy Is.	Cormorant	70		
				Glaucous-Winged Gull	160		
				Black-Legged Kittiwake	100		
				Horned Puffin	7		
				Tufted Puffin	2,500		
	304	34038	North Noisy Is.	Cormorant	100		
				Glaucous-Winged Gull	1,100		
				Black-Legged Kittiwake	1,100		
				Tufted Puffin	14,000		
	305	34020	Chief Point	Black-Legged Kittiwake	Present		
	306	34012	Carlsen Point	Sea Birds	Present		
	307	34011	Alf Is.	Black-Legged Kittiwake	Present		

MAP NO.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
37-B	308	33001	Cape Kiavak	Cormorant	Present		
36-B	309	32002	Geese Is.	Cormorant	Present		
				Glaucous-Winged Gull	Present		
	310	32001	Sundstrom Is.	Glaucous-Winged Gull	500		
				Tufted Puffin	800		
	311	-	Tugidak Is.	Cormorant	100		
35-E	312	31001	South Is.	Northern Fulmar	5,000		
				Black-Legged Kittiwake	30,000		
				Murre	50,000		
	313	31029	Navy Is.	Cormorant	150		
				Glaucous-Winged Gull	300		
				Horned Puffin	1,200		
				Tufted Puffin	3,500		
	314	31027	Derickson Is.	Cormorant	60		
				Horned Puffin	100		
	315	31028	Chiginagak Bay	Glaucous-Winged Gull	590		
				Horned Puffin	2,000		
				Tufted Puffin	15,000		
	316	31026	Unnamed Is.	Black-Legged Kittiwake	Present		
	317	31025	Cape Kuyuyukak	Cormorant	500		
				Glaucous-Winged Gull	1,400		
				Black-Legged Kittiwake	17,000		
				Murre	9,000		
				Tufted Puffin	2,000		

O.	COLONY NO.	USFWS NO.	NAME	SPECIES	COLONY ESTIMATE	NESTING PAIRS	NESTS
	318	31024	Central Is.	Horned Puffin	3,000		
				Tufted Puffin	90,000		
	319	31022	Ugaiushak Is.	Pelagic Cormorant	600		
				Glaucous-Winged Gull	2,500		
				Black-Legges Kittiwake	7,000		
				Murre	13,000		
				Horned Puffin	14,000		
				Tufted Puffin	10,000		
				Common Eider	300		
	320	31020	Hydra Is.	Tufted Puffin	4,500		
	321	31023	Unnamed Is.	Glaucous-Winged Gull	400		
				Pigeon Guillemot	3,000		
				Horned Puffin	2,000		
				Tufted Puffin	5,000		
	322	31021	Unnamed Is.	Glaucous-Winged Gull	300		
				Pigeon Guillemot	300		
				Horned Puffin	500		
				Tufted Puffin	7,000		
	323	31016	Foggy Cape	Cormorant	300		
				Glaucous-Winged Gull	400		
	324	31015	Volcanic Dike	Glaucous-Winged Gull	700		
	325	31014	South Sutnik Is.	Glaucous-Winged Gull	200		
	326	31019	Garden Is.	Glaucous-Winged Gull	500		
	327	31018	Kunuk Is.	Sea Birds	Present		
	328	31017	Cape Kumlik	Tufted Puffin	2,000		