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NORTHERN ALASKA PENINSULA ✓

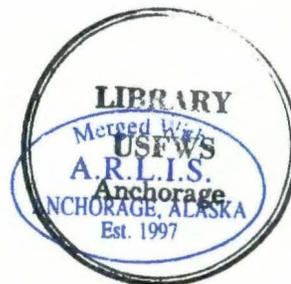
TUNDRA SWAN SURVEY

JUNE-AUGUST, 1984.

BY

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## INTRODUCTION

Tundra swan nesting and production surveys on the Alaska Peninsula were conducted by aerial survey crews between 6-22 June and 15 July to 2 August 1984, respectively. The survey area include the northern peninsula delimited by the Aleutian Mountains, extending from the Naknek River to Port Moller (Figure 1). Weather conditions were highly variable, particularly during the production counts. Surveys were conducted under conditions ranging from clear, unlimited visibility, to intermittent fog and rain squalls, with limited visibility. The nesting surveys covered the total estimated tundra swan habitat for the northern two-thirds of the survey area, requiring approximately 12 days of flying. The production survey covered 65% of the same area, requiring approximately 9 days. Twelve-hundred to thirteen hundred possible breeding pairs were recorded during the nesting census, and 862 possible pairs were counted during the production survey. Forty-two percent of the breeding pairs produced broods averaging 3.32 cygnets.

Information on distribution, abundance and productivity are included in tables and figures and recommendations for more accurately collecting data and assessing the variables are discussed.

## METHODS

The survey was accomplished by flying predesignated transect lines and meander routes over tundra swan habitat with a Cessna 180, pilot and two observers. On at least one occasion, a pilot with one observer was used. Weather often dictated survey altitude, but generally from 300-500 feet AGL was maintained when possible. Tundra swan habitat surveyed included wet tundra located from sea level to approximately 350 feet elevation. Observers recorded swan observations on U.S. Geological Survey 1:63,360 quadrangle maps (Figure 2) and the data was later transcribed onto master map copies. Single swan observations were totaled, then halved to be included in the breeding pair data, since we assumed all nesting swans were observed in the areas surveyed. Seven pilots and six observers were used to complete the 1984 survey.

Entire quadrangle maps were designated as "sampling units" to facilitate data storage in the Alaska regional office migratory birds section tundra swan computer data base. Not all maps were thoroughly canvassed since some areas included non-viable habitat. However, relatively thorough flights were conducted over all areas suspected to harbour swans.

Start and stop times for each map or survey portion were recorded, as were general weather conditions. Air speed was dictated by visibility conditions and generally ranged from 110-140 mph.

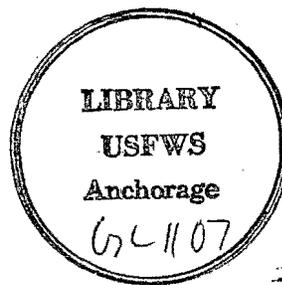
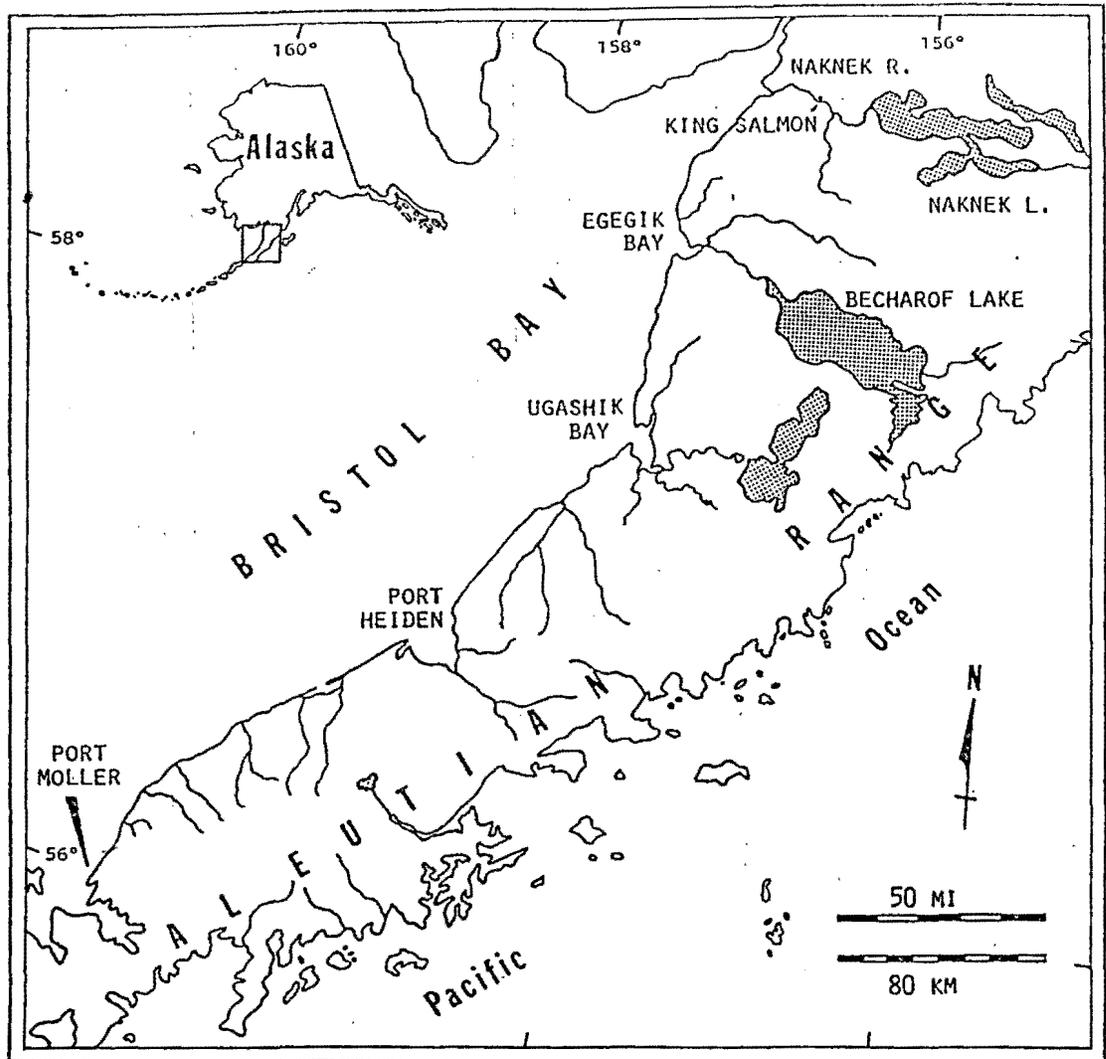


FIGURE 1. Alaska Peninsula study area for 1984 aerial Tundra Swan surveys. Study area included the north side of the Naknek River to Port Moller, delimited on the Bristol Bay side by the Aleutian Range.

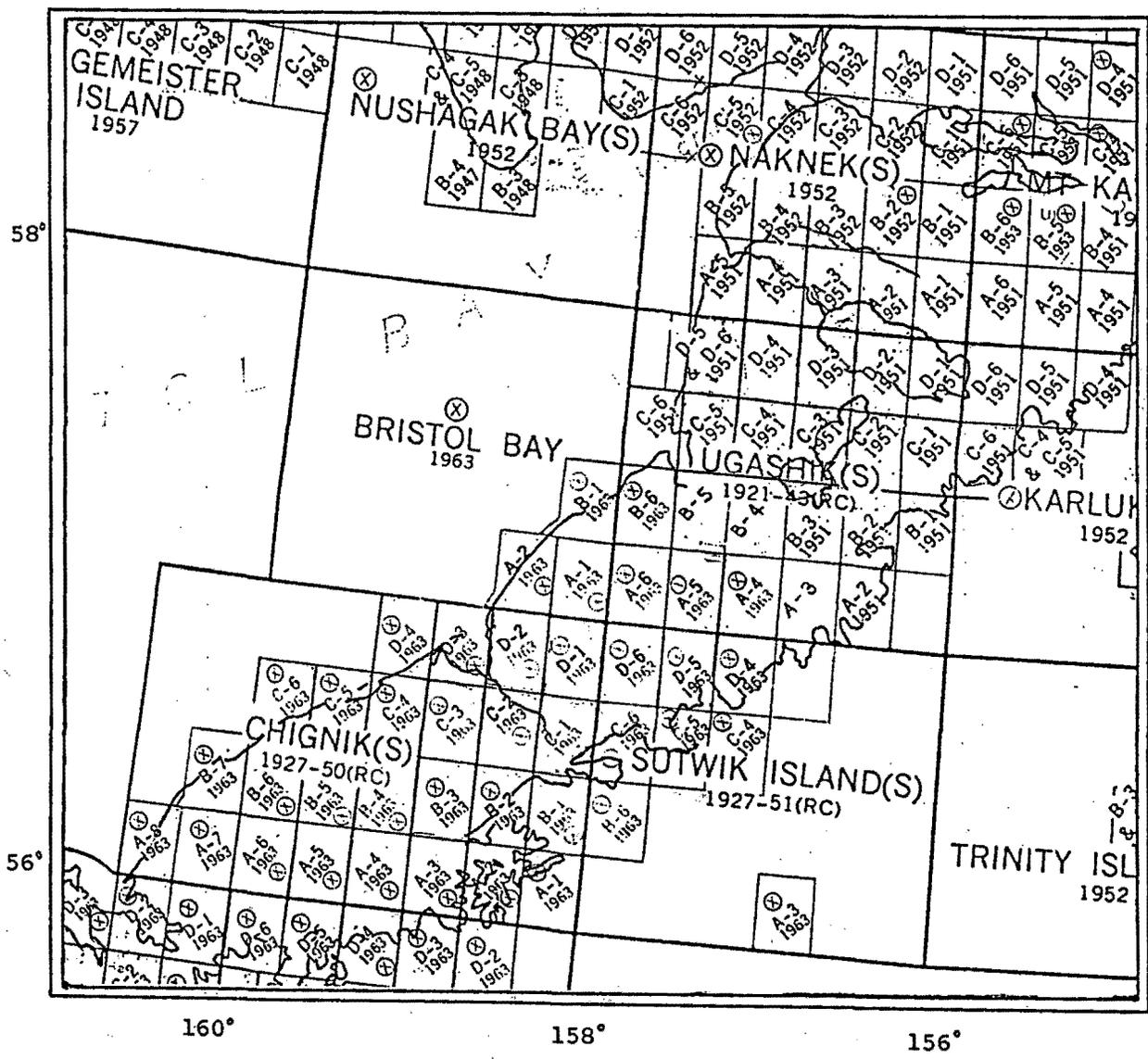


FIGURE 2. Key to U. S. Geological Survey map sampling units used in 1984 aerial Tundra Swan surveys on the northern Alaska Peninsula.

## RESULTS AND DISCUSSION

To the best of our knowledge, the 1984 nesting portion of the survey was the most thorough and extensive census effort for the Alaska Peninsula on record. Unfortunately, our goal to similarly "cross census" production over the same area fell 1/3 short of total coverage. Thus, distribution and production were assessed on a comparative-extrapolation basis.

Swans were observed in all wet tundra habitats below an elevation of approximately 350 feet (Figure 3). Highest densities occurred in the wet lowlands proximal to the Naknek, Egegik, Ugashik and Meshik (Port Heiden) estuaries (see Figure 1 for place names).

Swan abundance and productivity based on counts from both surveys is shown in Tables 1 and 2. The data were adjusted and extrapolated to determine total pre- and post hatching populations (Table 4). Production totals were extrapolated from population structure data from the production survey. Nesting survey totals were determined by coupling actual count data with extrapolated nest success and brood size data from the production survey. Specific production data for 35% of the survey area was lacking. This is disappointing since single and flocked swans accounted for almost half of the birds recorded during the nesting census (Tables 3 and 4). The two are still highly mobile groups during the early nesting season, thus flocking, pairing and/or nest locations status was apt to develop or change during the surveys interlude (e.g., only 6% of the swan pairs had cygnets during the June nesting survey, and only 26% were observed with nests). A production census would provide exact ecological data on pre- and post-nesting emigration/immigration, flocked bird pairing, regrouping, population shifts within and between sampling units, and total nest success and cygnet production

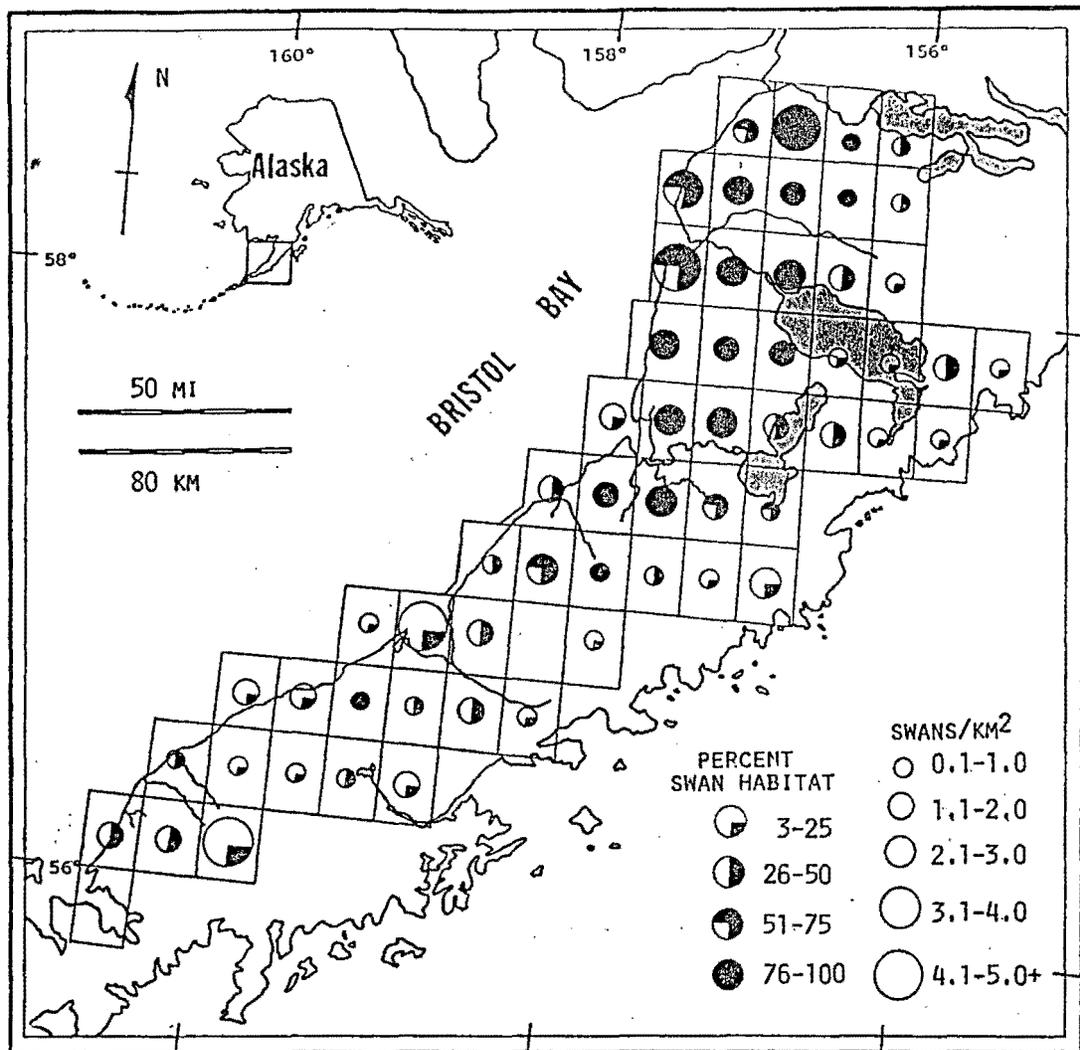


FIGURE 3. Alaska Peninsula Tundra Swan densities and habitat censused from June-August, 1984 aerial nesting surveys. Each block corresponds to U. S. Geological Survey 1:63,360 topographic quadrangle maps ( $559.60 \pm 33.42 \text{ km}^2$  in area). Units without symbols were not surveyed.

Table 1. Tundra Swan abundance and density from 1984 aerial nesting survey on the northern Alaska Peninsula.

Map sampling unit	Singles and pairs <sup>a</sup>	Flocked swans	Total all swans	Area surveyed (mi <sup>2</sup> )	Swans per square mile
NC-4	79	3	82	136	0.60
NC-3	138	0	157	208	0.75
NC-2	60	315	373	209	1.78
NC-1	15	-	15	102	0.15
NB-5	98	125	223	117	1.90
NB-4	157	3	160	210	0.76
NB-3	78	3	81	210	0.39
NB-2	50	3	53	210	0.25
NB-1	13	-	13	84	0.15
NA-5	58	29	87	124	0.70
NA-4	94	5	99	212	0.47
NA-3	89	198	287	180	1.59
NA-2	16	8	24	57	0.42
NA-1	2	-	2	27	0.07
UD5&6	142	9	151	194	0.78
UD-4	111	14	125	193	0.65
UD-3	58	3	61	164	0.37
UD-2	9	-	9	54	0.17
UD-1	8	-	8	36	0.22
UC-6	11	8	19	32	0.59
UC-5	99	35	134	189	0.71
UC-4	177	12	189	210	0.90
UC-3	52	-	52	108	0.48
UC-2	29	-	29	90	0.32
UC-1	6	-	6	35	0.17
UB-6	95	4	99	197	0.50
UB-5	165	14	179	212	0.84
UB-4	82	67	149	133	1.12
UB-3	43	-	43	115	0.37
UA-6	17	6	23	169	0.14
UA-5	6	-	6	83	0.07
UA-4	6	-	6	40	0.15
UA-3	4	-	4	5	0.80
KD-6	43	17	60	88	0.68
KD-5	4	-	4	26	0.15
KC-6	2	-	2	8	0.25
BB-1	39	91	130	73	1.78
BA-2	10	-	10	74	0.14
BA-1	74	46	120	114	1.05
SD-6	0	-	-	6	-

(continued on following page)

Table 1 (continued)

CD-4	6	-	6	20	0.30
CD-3	42	50	92	51	1.80
CD-2	38	7	45	102	0.44
CC-6	13	6	19	32	0.59
CC-5	53	23	86	123	0.70
CC-4	58	11	69	198	0.35
CC-3	20	-	20	60	0.33
CC-2	59	11	70	101	0.68
CC-1	12	-	12	53	0.23
CB-7	4	-	4	43	0.09
CB-6	1	-	1	32	0.03
CB-5	0	-	-	9	-
CB-4	14	3	17	59	0.29
CB-3	5	15	20	27	0.74
CA-8	14	-	14	24	0.58
CA-7	15	-	15	57	0.26
CA-6	0	-	38	7	5.42
Totals/Means	2601	1182	3783	5732	0.66

<sup>a</sup>Totals include all paired individuals and lone singles, and (singles w/nest or brood) X 2.

Table 2. Tundra swan production from 1984 Alaska Peninsula aerial surveys.

Map sampling unit	Total possible pairs <sup>a</sup>	Singles/pairs w/cygnets	Successful pairs (%)	Total cygnets	Mean brood size	Cygnet: adult ratio
NC-4	35	23	65.7	81	3.52	1:0.86
NC-3	67	36	53.7	141	3.92	1:0.95
NC-2	23	10	43.5	41	4.10	1:1.22
NC-1	4	1	25.0	1	1.00	1:8.00
NB-5	51	25	49.0	97	3.88	1:1.05
NB-4	60	26	43.3	88	3.38	1:1.36
NB-3	44	18	40.9	52	2.89	1:1.69
NB-2	23	10	43.5	33	3.30	1:1.39
NB-1	3	1	33.3	1	1.00	1:6.00
NA-5	44	18	40.9	59	3.28	1:1.49
NA-4	59	27	45.8	101	3.74	1:1.17
NA-3	36	18	50.0	63	3.50	1:1.14
NA-2	7	3	42.9	7	2.33	1:2.00
NA-1	1	0	-	-	-	-
UD5&6	50	19	38.0	69	3.63	1:1.45
UD-4	39	16	41.0	44	2.75	1:1.77
UD-3	20	11	55.0	29	2.64	1:1.38
UD-2	2	0	-	-	-	-
UD-1	1	1	100.0	3	3.00	1:0.67
UC-5	54	23	42.6	61	2.65	1:1.77
UC-4	62	22	35.5	65	2.95	1:1.91
UC-3	21	7	33.3	22	3.14	1:1.91
UC-2	8	5	62.5	12	3.64	1:1.33
UC-1	0	-	-	-	-	-
UB-6	47	14	29.8	51	2.88	1:1.84
UB-5	60	17	28.3	47	2.76	1:2.55
UB-4	23	8	34.8	23	2.88	1:2.00
KD-6	14	1	7.1	3	3.00	1:9.33
KD-5	5	0	-	-	-	-
KC-6	0	-	-	-	-	-
Totals/Means	850	360	41.8	1194	3.32	1:1.44

<sup>a</sup>Figure includes all lone singles, pairs, and (singles w/nest or brood) X 2.

Table 3. Tundra swan observations from 1984 Alaska Peninsula aerial surveys. Percentages are in parentheses.

Survey type	Total observations	Total singles	Total pairs	Total flocks
Nesting	1579	551 (35)	962 (61)	65 ( 4)
Production	1180	168 (14)	850 (72)	162 (14)

Table 4: Total abundance and population structure for nesting Tundra Swans on the northern Alaska Peninsula from 1984 aerial surveys. Percentages are in parentheses.

Swans				
Swans	Nesting	Production	Differences	Totals
	survey	survey		
Flocked	1182 (31.2)	1068 (36.2)	147 (5.0)	1329 (25.0)
Paired	2176 (57.5)	1724 (58.5)	29 (1.0)	2205 (41.5)
Lone	425 (11.2)	156 ( 5.3)	-174 (-5.9)	251 ( 4.7)
Subtotals		2948 (71.2)		
Cygnets		1194 (28.8)		1527 <sup>1</sup> (28.7)
Totals	3783 (99.9)	4142 (100.0)	2 (0.1)	5312 (99.9)

<sup>1</sup> Number based on 41.76% pair success and 3.32 mean brood size.

## CONCLUSIONS AND RECOMMENDATIONS

In order to understand the tundra swan's habitat needs, populations parameters and role as an ecological indicator by monitoring its nesting on the Alaska Peninsula, total censuses must be accomplished to build an initial data base, thus establishing a basis for comparison for future years. This data will also form the nucleus for a quadrant stratified sampling scheme that could become almost equally as reliable as census data, while ultimately expending a fraction of the time and manpower. Future survey data short of this goal will remain vulnerable to data discrepancy and open to speculative interpretation.

The annual tundra swan surveys on the north side of the Alaska Peninsula should continue with the following recommendations:

1. Survey area extension should include the area north of the Naknek River to Kvichak Bay.
2. Total nesting and production censuses should be accomplished during at least one good season with experienced, dedicated crews of at least four observers (2 per plane), and 2-3 pilots (2 planes) intensively involved.
3. If two same-season censuses cannot be accomplished, one combined nesting-production survey should commence mid-July until completed (15-25 days, accounting for weather).
4. Once reliable census data is collected, a stratified sampling scheme should be developed, with total censuses again run every 3-5 year.

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