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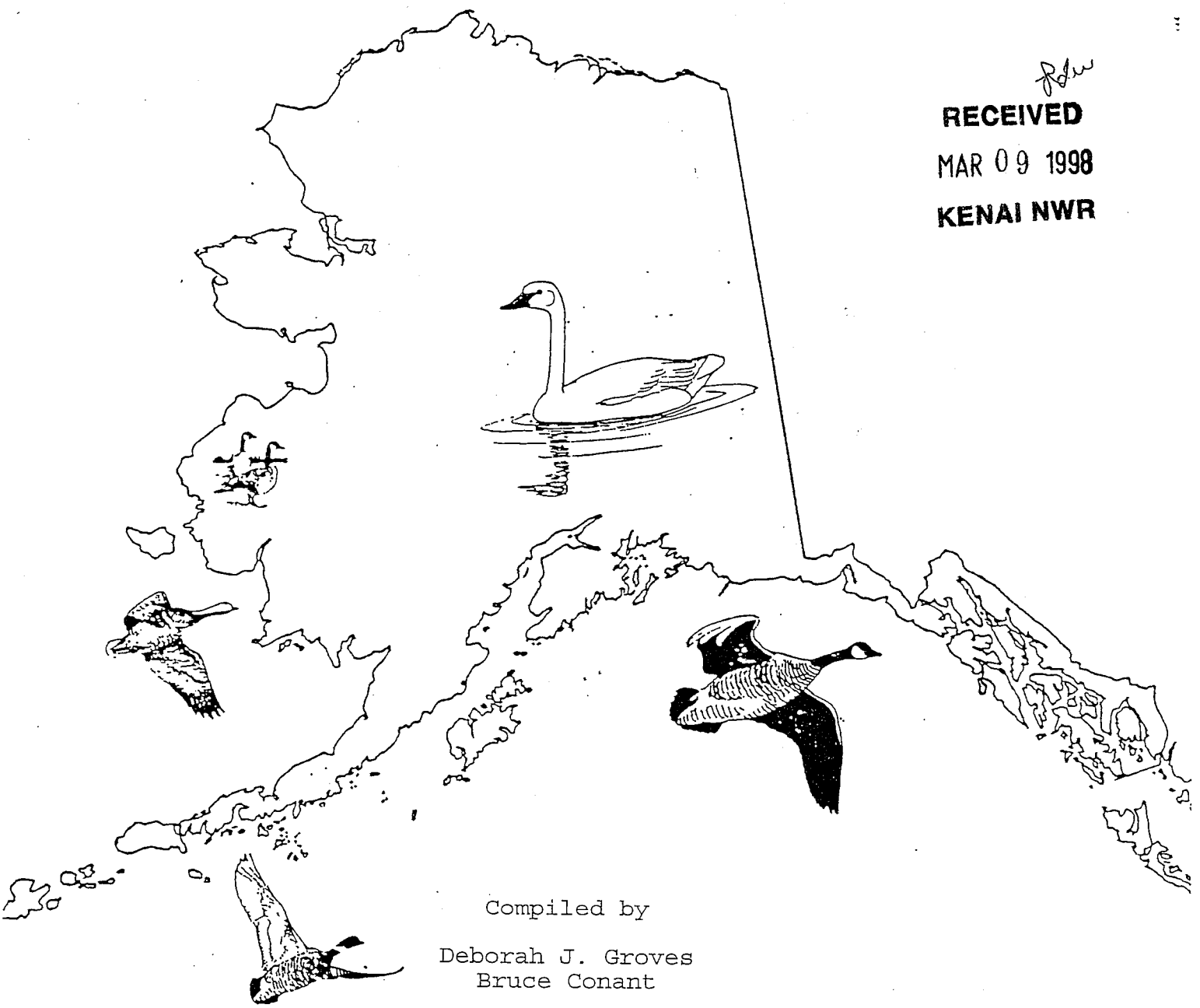
ALASKA

PRODUCTIVITY SURVEYS OF GEESE, SWANS, AND BRANT

1997



Compiled by

Deborah J. Groves
Bruce Conant

Migratory Bird Management
U.S. Fish and Wildlife Service
Juneau, Alaska

March 1998

TITLE: Waterfowl Productivity Surveys for Alaska - 1997

SPECIES SURVEYED: Pacific Brant, Branta bernicla nigricans
Trumpeter Swan, Cygnus buccinator
Emperor Goose, Chen canagica
Cackling Canada Goose, Branta canadensis minima
Dusky Canada Goose, Branta canadensis occidentalis

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ABSTRACTS:

PACIFIC BRANT - a below-average year

Nest success		--	North Slope
Average clutch size		--	
% juvenile (July)		31.7%	
Nest success		0.51	Yukon-Kuskokwim Delta
Average clutch size		3.9	
Average brood size	Class I	2.5	
	Class II	2.2	
Fall counts	% juvenile	16.9%	Izembek
	Avg. family	2.7	
	% juvenile	8.9%	Washington
	Avg. family	--	
Winter population		112,105	Mexico
		8,773	Alaska
		10,881	Washington
		Not Avail.	OR/CA

TRUMPETER SWAN - An average year

Alaska summering population	14,614
Average brood size	3.1
% Juveniles in population	26%
Broods/Pair	0.33
Pacific wintering population	N/A
% Juveniles in population	16%
Average family size	2.2

EMPEROR GOOSE - a below-average year

Spring survey		57,100	Unimak Island to Y-K Delta
Fall survey		86,669	
Nest success		0.84	Yukon-Kuskokwim Delta
Average clutch size		4.9	
Viable eggs		30,309	
Fall ground counts-	% juvenile	9.7%	Izembek
	Avg. family	2.7	
Fall aerial photos-	% juvenile	11.1%	Alaska Peninsula

CACKLING CANADA GOOSE - apparently an average year

Nest success		0.66	Yukon-Kuskokwim Delta
Average clutch size		4.5	
Viable eggs		112,660	
Fall survey		Not Avail.	Oregon/Washington
		--	California
		--	Total

DUSKY CANADA GOOSE

Spring index		2,587	Copper River Delta
Nesting success		--	
Average clutch size		--	
Production survey -	% juvenile	Not Avail.	
Summer population -	Adults	N/A	
	Juveniles	N/A	

NARRATIVE:

I. Methods: Because Alaska is a major production area for geese, swans, and brant, and because it is remote, many of the procedures used in conducting productivity surveys in Alaska have been developed here or adapted from standard procedures used in the "Lower 48" states (Lynch 1969). A techniques manual for Alaska is needed.

The productivity survey results included in this report are summarized largely in tabular format for the reader's convenience. The historical tables should be considered only a general guide to productivity trends, however, due to occasional minor changes in survey areas, sample sizes, etc.

II. Results:

PACIFIC BRANT

The Yukon-Kuskokwim Delta is a major breeding ground for Pacific brant with smaller populations breeding on the western Canadian Arctic, the North Slope of Alaska, on Wrangel Island, and west to the delta of the Lena River in Siberia. Pacific brant winter mainly on the west coast of Mexico and on Baja California with lesser numbers wintering in California, Oregon, Washington, British Columbia, Alaska, and Japan (Bellrose 1976).

Mike Wege of the Yukon Delta National Wildlife Refuge reported an average clutch size of 3.9 (long-term avg. - 3.6) and a nest success of 0.51 (long-term avg. - 0.66) for the Yukon-Kuskokwim Delta breeding grounds (Table 1). He also reported average brood sizes of 2.5 and 2.2 for Class I and Class II broods, respectively (long-term avg. - 3.0, 2.7)(Table 1). Production was reduced by storm tides on 19 May that flooded nesting areas

and by a record early river breakup and nest initiation that made some nests vulnerable to flooding (Mike Wege, pers. comm.).

Alice Stickney of ABR, Inc. reported 31.7% juveniles out of a sample of 848 brant in July on her study area between the Miluveach and Sagavanirktok Rivers (Table 2). Although no nesting surveys were conducted this year, she reported that production was likely below average, due in large part to substantial nest predation and a late spring breakup.

Mike Roy of Izembek National Wildlife Refuge reported 16.9% juveniles (35 year average - 22.9%) out of a sample of 18,321 brant and an average family size of 2.65 (32 year average - 2.70) for 40 broods at Izembek Lagoon (Tables 3, 4, and 5).

Russ Canniff and Ulrich Wilson reported a combination of 8.9% juveniles (1996 - 16.6%) in a sample of 2,678 brant in Washington (Tables 3 and 4). It should be noted that a high proportion of the brant at Padilla Bay are the "light bellied" variety.

Bruce Conant and Jim Voelzer tallied 112,105 brant in western Mexico in 1998 compared to 130,738 in 1997 and the previous 10-year average of 108,397 (Table 6).

Mike Roy reported 8,773 brant (1997 - 13,147) were counted in Izembek Lagoon and nearby bays on 8 January 1998 (Table 6).

Don Kraege of the Washington Department of Fish and Wildlife reported a 1998 mid-winter estimate of 10,881 brant in Washington (Table 6). Results of the mid-winter survey from Oregon and California were not available for this report.

Production decreased from 1996 on the Yukon-Kuskokwim Delta and the North Slope. Overall, Pacific brant apparently experienced below-average production and recruitment to the population in 1997.

No significant problems were reported in 1997.

TRUMPETER SWAN

Alaska Breeding Population

Trumpeter swans nest in the Interior and Gulf Coast regions of Alaska and winter primarily in coastal southeast Alaska, British Columbia, and south to the Columbia River (Bellrose 1976).

A complete census of trumpeter swans on Alaska summering grounds is conducted every five years by the U.S. Fish and Wildlife Service and other cooperating agencies. The last census was completed in 1995 (Conant et al. 1996). During intervening years, surveys are conducted by various agencies to meet local objectives. All surveys are flown using methods described in King 1973. In 1997, surveys were conducted in five of the eleven

production units, though at different intensities. The total number of maps sampled in late summer 1997 (46) represented 7% of the total number of maps surveyed in 1995 (674) but represented 16% of the total white swans observed in 1995. Table 7 presents values that are not actual totals, but ones computed using proportional changes in the maps surveyed applied to the 1995 census totals. A survey sample was extrapolated to its entire unit only if the sampled area contained at least 15% of the total white swans observed in the unit in 1995. Based on this procedure, 8179 single and paired swans, 10,776 white swans, 3838 cygnets, and 14,614 total swans were estimated for the Alaska summering grounds in 1997 (Table 7). It should be noted that these estimates do not have confidence limits. The estimated average brood size was 3.1 (1996 - 3.2), broods per pair was 0.33 (1996 - 0.28), and the proportion of juveniles in the population was 0.26 (1996 - 0.22)(Table 7).

Ground data (Wilk 1989, Loranger and Lons 1988) indicate that swans in the Koyukuk area, previously tallied as all trumpeters (966 total swans in 1995), are mixed with an unknown but probably substantial proportion being tundra swans. Due to the difficulty of distinguishing species from the air, however, all swans tallied in the Koyukuk area during the 1995 census were included in the trumpeter swan summary. More speciation data are needed to develop comprehensive proportions.

Trumpeter swans generally experienced average production in Alaska in 1997. Although trumpeters summering in Alaska continue to increase, a comprehensive Alaska Trumpeter Swan Management Plan is needed to ensure they remain an integral part of each geographical unit of their present distribution.

We did not receive any detailed breeding ground information from western Canada for 1997.

Pacific Wintering Population

No information on wintering swans in Alaska was available this year.

From wintering areas further south, Graeme Fowler reported the results of trumpeter swan surveys conducted on Vancouver Island, British Columbia between November 1997 and February 1998, and Russ Canniff recorded age ratios for trumpeters in northwest Washington in February 1998 (Tables 8 and 9). Together these surveys found that 16% were juveniles for a geographically dispersed sample of approximately 1/4 of this population (Table 8). Russ Canniff also reported an average family size of 2.23 (16-year average - 2.35) from a sample of 102 broods in northwest Washington (Table 10).

Significant problems in 1997 were the continued loss of wintering habitat, especially in Washington, and crop depredation concerns on Vancouver Island.

EMPEROR GOOSE

The emperor is an Alaskan-Russian goose with probably 90% of the breeding population nesting on the Yukon-Kuskokwim Delta. The bulk of the population winters from Port Moller west along the entire Aleutian chain of islands (Bellrose 1976).

Annual aerial migration surveys were conducted along the coastline from the south side of the Yukon-Kuskokwim Delta to the northeast coast of Unimak Island during the spring and fall migration in 1997 with enumerating emperor geese being the primary goal. In the spring, 57,100 emperors (1996 - 80,034) were recorded (King and Dau 1998). In the fall, 86,669 emperors (1996 - 87,018) were estimated (King and Eldridge 1998). The southern coastline of the Alaska Peninsula was not surveyed this fall, so the fall estimate was generated by adding the number of birds recorded on the north side of the Peninsula (80,809) to the 15-year mean of birds recorded on the south side (5860).

Mike Wege reported an average clutch size of 4.9 (long-term average - 5.2) and nest success of 0.84 (long-term average - 0.78) on the Yukon-Kuskokwim Delta (Table 11). He also reported 30,309 extrapolated viable eggs (12-year average - 54,247) from a set of random plots on the Yukon-Kuskokwim Delta (Table 12). Storm tides that occurred on 19 May flooded some nesting areas, reducing production. The apparent proportion of active nests (Table 18) was biased high due to the inability to detect nests destroyed by flooding (Mike Wege, pers. comm.).

Ground counts at Izembek Lagoon reported by Mike Roy found 9.7% juveniles (31-year average - 24.1%) with an average family size of 2.7 (31-year average - 2.9)(Tables 13, 15, and 16). Aerial photo work on the Alaska Peninsula reported by Tim Tiplady and Rod King tallied 11.1% juveniles (Tables 14 and 15).

No winter age-ratio data on emperor geese in the west-central Aleutians were available this year.

Emperors experienced a below-average year for production and recruitment to the population in 1997.

The significant problem in 1997 continued to be the reduced population size of this special goose.

CACKLING CANADA GOOSE

Cackling Canada geese breed exclusively on the Yukon-Kuskokwim Delta and winter in the Pacific Flyway (Bellrose 1976).

Mike Wege reported an average clutch size of 4.5 (long-term average - 4.7) and nest success of 0.66 (long-term average - 0.62) on the Yukon-Kuskokwim Delta (Table 17). He also reported 112,660 extrapolated viable eggs (12-year average - 95,360) from a set of random plots on the Yukon-Kuskokwim Delta (Table 18).

Cackler production was likely impacted to some extent by the storm tides that occurred on the Yukon-Kuskokwim Delta on 19 May.

The 1997 results of the annual fall survey of cacklers in Washington, Oregon and California was not available for this report.

Cacklers apparently experienced average production in 1997.

The significant problem in 1997 was crop depredation concerns in southwestern Washington and the Willamette Valley in Oregon and their possible effect on population goals for this species.

DUSKY CANADA GOOSE

The dusky Canada goose breeds on the Copper River Delta and on Middleton Island in the Gulf of Alaska (Bellrose 1976, Rosenberg et al. 1996). It winters primarily in the Willamette Valley in Oregon (Bellrose 1976).

The annual aerial breeding population survey conducted by USFWS on the Copper River Delta tallied a spring index of 2,587 (1996 - 2,919) for an expanded area in 1997 (Table 19). Note that the historical figures for the spring index in Table 19 have been revised in 1997 due to restratification of the survey area boundaries.

A nest survey was not conducted on the breeding grounds this year. It is next scheduled for 1998.

The results of the annual July composition survey conducted on the Copper River Delta and Middleton Island by the Alaska Department of Fish and Game were not available for this report.

The lack of information available for this report precludes an assessment of dusky Canada goose production in 1997.

No significant problems were reported for 1997.

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Attachment 1. List of Contributors (We apologize for any omissions)

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Table 1. Pacific Brant - Nesting Grounds Data.[a]

Localities/Dates	Nest Success	(n)	Average Clutch	(n)	Average Brood Size Class I	(n)	Class II	(n)
Yukon-Kuskokwim Delta								
1965-79 Average	--	--	3.7	(1457)	2.8	(2353	--	--
1980	--	--	4.1	(196)	2.7	(269	--	--
1981	0.58	(1016)	2.5	(1349)	3.0	(310	--	--
1982	0.36	(4080)	2.9	(3235)	2.3	(160	--	--
1983	0.53	(3914)	3.4	(1194)	2.8	(454	--	--
1984	0.14	(1321)	3.0	(986)	2.7	(45	--	--
1985	0.37	(1242)	3.4	(798	--	--	--	--
1986	0.52	(1162)	3.6	(857)	4.0	(67)	2.8	(60)
1987	0.90	(571)	4.1	(372)	3.7	(351)	3.5	(214)
1988	0.69	(577)	3.5	(517)	2.9	(75)	2.8	(39)
1989	0.82	(945)	3.8	(1529)	3.2	(329)	2.9	(124)
1990	0.71	(406)	3.5	(544)	2.8	(179)	2.2	(39)
1991	0.90	(332)	3.9	(227)	3.1	(59)	3.3	(10)
1992	0.89	(396)	4.1	(877)	3.6	(355	--	--
1993	0.80	(329)	3.8	(301	--	--	--	--
1994	0.71	(370)	4.0	(112)	2.6	(60)	1.3	(65)
1995	0.83	(139)	3.8	(144	--	--	--	--
1996	0.90	(210)	3.8	(198)	3.5	(474)	3.2	(343)
1997	0.51	(825)	3.9	(1467)	2.5	(271)	2.2	(101)
Long-Term Average	0.66		3.6		3.0		2.7	

a Data supplied by Yukon Delta NWR, Alaska Science Center - USGS, and University of Alaska Fairbanks.

Table 2. Pacific Brant - North Slope Nesting Grounds Data.[a]

Year[b]	Nest[c] Success	(n)	Average Counts[d] Adults	Juveniles	Total	Percent Juveniles
1989	0.78	(212)	912	608	1520	39.8
1990	0.87[e]	(296)	1672	1567	3239	48.4
	0.77[f]	(439)				
1991	0.24	(251)	1116	698	1814	38.5
1992	0.60	(287)	690	237	927	25.6
1993	0.26	(182)	1100	737	1837[g]	40.1
1994	0.47	(77)	879	562	1441	39.0
1995	0.45[h]	(93)	1158	763	1921	40.0
1996	0.57[i]	(67)	606	551	1157	47.6
1997	--	--	579	269	848	31.7

a Data supplied by ABR, Inc., ARCO Alaska,Inc. and BP Exploration (Alaska), Inc.
b 1989-1992: Survey area = Miluveach River to Staines River. 1993-1995 and 1997: Survey area = Miluveach River to Sagavanirktok River. 1996: Survey area = Miluveach River to Kuparuk River.
c Minimum estimate from ground surveys.
d Average of counts on two late July surveys.
e Includes the Howe Island and Surfcote colonies.
f Includes the above nesting locations, plus 13 colonies in the Kuparuk Oilfield.
g Includes two small inland groups located by ground observers.
h Only includes colonies in the Kuparuk Oilfield.
i Nesting information provided by Tim Obritschkewitsch of University of Alaska Fairbanks.

Table 3. Pacific Brant - Fall Productivity Counts 1997.

Localities Dates	In Families[a] # Fam.	# Juv.	Avg. # of Juv. per Family	No. Birds Aged Ads.	Juv.	Total	% Juv. of Total Birds
Izembek							
September	--	--	--	3184	696	3880	17.9
October	40	106	2.7	12032	2409	14441	16.7
Subtotal	40	106	2.7	15216	3105	18321	16.9
Washington							
Padilla-Samish[b]				1660	189	1849	10.2
Willapa				no data			
Olympic Peninsula				779	50	829	6.0
Subtotal				2439	239	2678	8.9
TOTAL	40	106	2.7	17655	3344	20999	15.9

a The figures for families were taken separately from the figures for No. of Birds Aged and are not included in the No. of Birds Aged. They should not be included because not all birds in a flock were not counted, only the family groups.

b A high proportion of these birds are the "light bellied" variety.

Table 4. Pacific Brant - Annual Productivity Counts at Izembek Lagoon.[a]

Year	No. Birds Aged			Percent Juveniles
	Adults	Juveniles	Total	
1963	3968	1243	5211	23.9
1964	13324	4577	17901	25.6
1965	21210	5050	26260	19.2
1966	9927	7134	17061	41.8
1967	15219	3081	18300	16.8
1968	15110	3117	18227	17.1
1969	12829	3577	16406	21.8
1970	12104	6256	18360	34.1
1971	4820	1953	6773	28.8
1972	6599	3698	10297	35.9
1973	12025	4999	17024	29.4
1974	13118	632	13750	4.6
1975	9396	5452	14848	36.7
1976	7962	4340	12302	35.3
1977	8856	4092	12948	31.6
1978	10696	1842	12538	14.7
1979	13674	2349	16023	14.7
1980	9618	3341	12959	25.8
1981	4109	936	5045	18.6
1982	11509	1213	12722	9.5
1983	6149	1947	8096	24.0
1984	9451	1499	10950	13.7
1985	12032	1915	13947	13.7
1986	15621	2823	18444	15.3
1987	17411	7882	25293	31.2
1988	16138	3847	19985	19.2
1989	13654	4281	17935	23.9
1990	24215	5750	29965	19.2
1991	31432	12127	43559	27.8
1992	55795	11044	66839	16.5
1993	103254	31942	135196	23.6
1994	21371	2808	24179	11.6
1995	26964	15240	42204	36.1
1996	15148	4201	19349	21.7
1997	15216	3105	18321	16.9
35 Year Average	17141	5123	22263	22.9

a Data supplied by Izembek National Wildlife Refuge and Alaska Science Center - USGS.

Table 4 (cont'd). Pacific Brant - Annual Productivity Counts at Padilla and Samish Bays, WA.[a]

Year	No. Birds Aged			Percent Juveniles
	Adults	Juveniles	Total	
1986/87	3731	292	4023	7.3
1987/88	3110	1242	4352	28.5
1988/89	2003	297	2300	12.9
1989/90	4928	622	5550	11.2
1990/91	3047	837	3884	21.5
1991/92	2464	336	2800	12.0
1992/93	6294	669	6963	9.6
1993/94	3032	1074	4106	26.2
1994/95	3771	197	3968	5.0
1995/96	1083	185	1268	14.6
1996/97	1964	530	2494	21.3
1997/98	1660	189	1849	10.2
12 Year Average	3091	539	3630	15.0

a Data supplied by Russ Canniff and the Washington Department of Wildlife.

Table 4 (cont'd). Pacific Brant - Annual Productivity Counts at Willapa Bay.[a]

Year	No. Birds Aged			Percent Juveniles
	Adults	Juveniles	Total	
1983/84	982	166	1148	14.5
1984/85	2605	251	2856	8.8
1985/86		no data		
1986/87	1925	186	2111	8.8
1987/88	997	196	1193	16.4
1988/89	1167	184	1351	13.6
1989/90	982	88	1070	8.2
1990/91		no data		
1991/92	1189	126	1315	9.6
1992/93	944	88	1032	8.5
1993/94		no data		
1994/95	937	97	1034	9.4
1995/96		no data		
1996/97	70	12	82	14.6
1997/98		no data		
10 Year Average	1180	139	1319	11.2

a Data supplied by Willapa National Wildlife Refuge Complex and Washington Department of Wildlife.

Table 4 (cont'd). Pacific Brant - Annual Productivity Counts on the Olympic Peninsula, WA.[a]

Year	No. Birds Aged			Percent Juveniles
	Adults	Juveniles	Total	
1986/87	217	11	228	4.8
1987/88	1540	306	1846	16.6
1988/89	1544	311	1855	16.8
1989/90	2231	232	2463	9.4
1990/91	2013	88	2101	4.2
1991/92	913	123	1036	11.9
1992/93	839	46	885	5.2
1993/94	1299	265	1564	16.9
1994/95	1034	26	1060	2.5
1995/96	634	15	649	2.3
1996/97	793	20	813	2.5
1997/98	779	50	829	6.0
12 Year Average	1153	124	1277	8.3

a Data supplied by Washington Coastal National Wildlife Refuge Complex.

Table 5. Pacific Brant - Family Group Counts at Izembek Lagoon.[a]

Year	Frequency by Family Group Size									Total Families	Total Juveniles	Average Family Group
	1	2	3	4	5	6	7	8	9			
1966	31	44	66	34	16	4				195	557	2.86
1967	53	133	115	42	9	3	2	1	1	359	926	2.58
1968	19	54	46	20	5		1			145	377	2.60
1969	48	89	88	53	12	3				293	780	2.66
1970	17	32	34	41	18	3	3			148	476	3.22
1971	69	102	65	49	8	2				295	716	2.43
1972	30	39	45	25	11	3				153	416	2.72
1973	45	95	87	70	22	5	2	1		327	938	2.87
1974	26	44	19	13	2	1				105	239	2.28
1975	22	66	48	31	14	5	3			189	543	2.87
1976	36	59	78	40	19	4	1			237	674	2.84
1977	49	77	71	29	13	1				240	603	2.51
1978	13	31	29	24	10	3				110	326	2.96
1979	22	64	37	17	5		1			146	361	2.47
1980	26	47	57	39	7		1			177	489	2.76
1981	34	38	36	27	10	8	1			154	431	2.80
1982	18	22	25	20	4					89	237	2.66
1983	25	40	55	26	21	6				173	515	2.98
1984	19	49	70	39	10	4	1			192	564	2.94
1985	125	223	173	73	24	6				624	1538	2.46
1986	23	46	43	19	4	2				137	352	2.57
1987	168	263	267	171	66	13				948	2587	2.73
1988	62	91	65	35	6	4				263	633	2.41
1989	42	80	72	65	28	16				303	914	3.02
1990	70	104	106	54	8	7				349	894	2.56
1991	63	144	142	45	18	2	1			415	1066	2.57
1992	59	142	93	72	23	5	8	2		404	1127	2.79
1993	175	289	239	157	89	26	4			979	2727	2.79
1994	129	124	60	27	11		1	1		353	735	2.08
1995	13	25	21	12	2	3		2		78	218	2.79
1996	9	12	13	7	6		2	1		50	152	3.04
1997	9	12	9	5	4	1				40	106	2.65
32 Year Average	48	84	74	43	16	5	1	0	0	271	726	2.70

a Data supplied by Izembek National Wildlife Refuge and Alaska Science Center - USGS.

Table 6. Pacific Brant - Annual Mid-winter Population Survey in the Pacific Flyway.[a]

Year	Washington	West Coast Oregon	California	Total	Mexico	Izembek
1936	8202	3085	19910	31197		
1937	13450	5935	13460	32845		
1938	24560	10475	38200	73235		
1939	25595	9502	16890	51987		
1940	35520	5350	35050	75920		
1941	24100	5000	31785	60885		
1942	53950	6850	28983	89783		
1943	37000	575	18000	55575		
1944	33950	7250	20250	61450		
1945	32650	3000	30100	65750		
1946	25462	55	60452	85969		
1947	20250	8200	39640	68090		
1948	20660	2850	32750	56260		
1949	20650	803	66515	87968		
1950	15574	3600	57792	76966		
1951	21639	2110	48131	71880		
1952	16578	3200	43840	63618		
1953	27473	1509	37557	66539		
1954	15376	1560	28750	45686		
1955	21915	1686	34070	57671		
1956	15914	2073	38510	56497		
1957	20701	1493	35848	58042		
1958	25219	2778	26560	54557		
1959	10815	1121	10750	22686		
1960	17614	652	3771	22037	114202	
1961	16675	1330	6853	24858	142980	
1962	25815	2266	23510	51591	118645	
1963	20400	2639	2388	25427	114815	
1964	34169	2000	8353	44522	140760	
1965	19938	1325	3372	24635	142265	
1966	22175	798	3284	26257	135106	
1967	21235	1523	3824	26582	153070	
1968	15746	865	1729	18340	136000	
1969	10063	382	166	10611	132475	
1970	8916	963	207	10086	131600	
1971	10915	1374	130	12419	136800	
1972	4328	1047	0	5375	119400	
1973	5911	2544	950	9405	115600	
1974	4977	1904	470	7351	123300	
1975	6163	1507	480	8150	115280	
1976	7540	1769	680	9989	112056	
1977	14111	2100	0	16211	130756	
1978	18100	1110	560	19770	143117	
1979	8078	1255	10	9343	120070	
1980	7665	1015	135	8815	137550	
1981	10107	1790	540	12437	181760	
1982	6451	706	485	7642	113402	
1983	3113	718	565	4396	104918	
1984	7097	930	700	8727	124703	
1985	11793	641	800	13234	131568	
1986	12026	1113	706	13845	114725	7665
1987	14371	1133	736	16240	86913	5755
1988	19831	1104	947	21882	116696	8385
1989	18538	871	1033	20442	107721	7050
1990	13756	1399	992	16147	129865	5595
1991	16221	1262	1340	18823	108555	4350
1992	13505	1397	2424	17326	93185	7200
1993	13054	1254	9415	23723	92724	8008
1994	13595	666	2299	16560	100265	13221
1995	20231	708	3987	24926	96815	11978
1996	6941	644	2008	9593	107485	9795
1997	9753	669	3598	14020	130738	13147
1998	10881	Not Avail.	Not Avail.	--	112105	8773

a Data excerpted from the Pacific Flyway Midwinter Waterfowl Survey Report, compiled by the Pacific Flyway Representative, USFWS, Portland, OR.

Table 7. Comparative results of non-random trumpeter swan sample maps surveyed by area. Values are not actual totals, but are computed using proportional changes in the maps surveyed applied to the 1995 census totals. Estimates were computed for a production area only if the sample area contained at least 15% of the total adults counted during the 1995 census.

Unit	Year	Maps Surveyed[a]	Adults and Subadults				Cygnets	Total Swans	Number of Broods	Average Brood Size	Percent Juvenile	% Pairs with Brood
			in Pairs	as Singles	in Flocks	Subtotal						
1 Gulf Coast	95	43	628	72	295	995	150	1145	57	2.6	13	18
	96	21	640	40	284	964	250	1214	69	3.6	21	22
	97	21	608	37	245	890	270	1160	85	3.2	23	28
2 Copper Canyon	95	6	76	7	15	98	21	119	7	3.0	18	18
	96	5	70	2	10	82	24	106	6	4.0	23	17
	97	5	54	6	3	63	23	86	10	2.3	27	37
3 Gulkana	95	82	2332	280	965	3577	1002	4579	310	3.2	22	26
	96[b]	2										
	97	5	1970	104	454	2528	916	3444	300	3.1	27	30
4 Kenai	95	23	130	11	29	170	79	249	29	2.7	32	42
	96	0										
	97	0										
5 Cook Inlet	95	82	838	91	269	1198	330	1528	107	3.1	22	25
	96	0										
	97	0										
6 Lower Tanana	95	118	2268	219	987	3474	1315	4789	426	3.1	27	37
	96	14	2328	200	1406	3934	943	4877	308	3.1	19	26
	97[b]	9										
7 Kuskokwim	95	68	454	42	134	630	248	878	71	3.5	28	30
	96	0										
	97	0										
8 Koyukuk	95	81	524	56	158	738	228	966	85	2.7	24	31
	96	2	416	72	795	1283	248	1531	85	2.9	16	41
	97	0										
9 Yukon Flats	95	101	200	26	107	333	90	423	25	3.6	21	25
	96	0										
	97	0										
10 Southeast Mainland	95	6	58	2	18	78	61	139	19	3.2	44	66
	96	6	54	2	5	61	45	106	16	2.8	42	59
	97	6	46	4	4	54	29	83	10	2.9	35	43
11 Upper Tanana	95	64	438	53	207	698	310	1008	82	3.8	31	37
	96	0										
	97	0										
Total[c]	95	674	7946	859	3184	11989	3834	15823	1218	3.1	24	30
	96	50	7900	819	4211	12930	3569	16499	1108	3.2	22	28
	97	46	7530	649	2597	10776	3838	14614	1230	3.1	26	33

a Surveyed quarter quads are only included here if they collectively contained all swan habitat within a given 1:63,360 scale map.
b Sample size insufficient to extrapolate to entire unit.
c Missing values for units in 1996 and 1997 have been filled with 1995 census data.

Table 8. Trumpeter Swan (Pacific Coast Population) Winter Observations - 1997/1998.[a]

Localities / Dates	No. Birds Aged			% Juv. of Total Birds
	Ads.	Juv.	Total	
Cordova	no data			
Yakutat	no data			
Subtotal				
Vancouver Island				
November	463	106	569	18.6
December	960	180	1140	15.8
January	1226	259	1485	17.4
February	1540	272	1812	15.0
Port Susan				
February	167	25	192	13.0
Skagit Valley				
February	1402	224	1626	13.8
Subtotal	5758	1066	6824	15.6
TOTAL	5758	1066	6824	15.6

a Data supplied by USFS, Comox Valley Naturalists' Society, Ducks Unlimited Canada, and Russ Canniff.

Table 9. Trumpeter Swan (Pacific Coast Population) Winter Productivity Counts from Alaska.[a]

Year	No. Birds Aged[b]			Percent Juveniles
	Adults	Juveniles	Total	
1979/80	431	129	560	23.0
1980/81	167	65	232	28.0
1981/82		no data		
1982/83	110	35	145	24.1
1983/84	115	29	144	20.1
1984/85	109	79	188	42.0
1985/86	95	14	109	12.8
1986/87	146	40	186	21.5
1987/88	146	52	198	26.3
1988/89	164	52	216	24.1
1989/90	239	55	294	18.7
1990/91[c]	266	57	323	17.6
1991/92	696	267	963	27.7
1992/93	578	169	747	22.6
1993/94	667	322	989	32.6
1994/95	562	190	752	25.3
1995/96	294	61	355	17.2
1996/97		no data		
1997/98		no data		
16 Year Average	299	101	400	24.0

a Data supplied by USFS, USFWS and Peter Walsh.
b Figures may represent cumulative totals from multiple surveys.
c New survey area (Yakutat) added beginning in 1990/91.

Table 9 (continued). Trumpeter Swan (Pacific Coast Population) Winter Productivity Counts from Vancouver Island.[a]

Year	No. Birds Aged			Percent Juveniles
	Adults	Juveniles	Total	
1978/79	384	134	518	25.9
1979/80	459	158	617	25.6
1980/81	499	211	710	29.7
1981/82		no data		
1982/83		no data		
1983/84[b]	533	113	646	17.5
1984/85	1101	216	1317	16.4
1985/86	1336	98	1434	6.8
1986/87	1228	280	1508	18.6
1987/88	1081	334	1415	23.6
1988/89	1353	304	1657	18.3
1989/90	1209	194	1403	13.8
1990/91	1553	295	1848	16.0
1991/92[c]	1049	165	1214	13.6
1992/93[d]	1639	149	1788	8.3
1993/94	1801	530	2331	22.7
1994/95	1543	536	2079	25.8
1995/96	1427	398	1825	21.8
1996/97	1307	195	1502	13.0
1997/98	1540	272	1812	15.0
18 Year Average	1169	255	1424	18.5

a Data supplied by British Columbia - Fish and Wildlife, Ducks Unlimited Canada and Comox Valley Naturalists' Society.
b Considered weak data.
c February count used for Oyster River to Royston survey area.
d February figures used beginning in 1992/93.

Table 9 (continued). Trumpeter Swan (Pacific Coast Population) Winter Productivity Counts from Washington.[a]

Year[b]	Peak Counts			Percent Juveniles
	Adults	Juveniles	Total	
1977/78	214	70	284	24.6
1978/79	218	76	294	25.9
1979/80	273	82	355	23.1
1980/81	310	127	437	29.1
1981/82	316	92	408	22.5
1982/83	339	56	395	14.2
1983/84	330	94	424	22.2
1984/85	359	62	421	14.7
1985/86	340	44	384	11.5
1986/87	356	113	469	24.1
1987/88	347	133	480	27.7
1988/89[c]	473	111	584	19.0
1989/90	568	128	696	18.4
1990/91	678	111	789	14.1
1991/92	810	155	965	16.1
1992/93	905	94	999	9.4
1993/94	762	233	995	23.4
1994/95	927	242	1169	20.7
1995/96	1187	239	1426	16.8
1996/97	1774	312	2086	15.0
1997/98	1569	249	1818	13.7
21 Year Average	622	134	756	19.3

a Data supplied by Russ Canniff.
b January counts.
c February counts beginning in 1988/89.

Table 10. Trumpeter Swan (Pacific Coast Population) Winter Family Group Counts from Alaska.[a]

Year	Frequency by Family Group Size									Total Families	Total Juveniles	Average Family Group
	1	2	3	4	5	6	7	8	9			
1979/80	3	2	8	2						15	39	2.60
1980/81	7	7	10	1	2					27	65	2.41
1981/82						no data						
1982/83	5	3	3	2			1			14	35	2.50
1983/84	3		1							4	6	1.50
1984/85	1	2	1	1						5	12	2.40
1985/86		1								1	2	2.00
1986/87	5	2								7	9	1.29
1987/88	6	5	4	3		2				20	52	2.60
1988/89						no data						
1989/90						no data						
1990/91	7	2	2	1	2					14	31	2.21
1991/92	4	6	7	1	3					21	56	2.67
1992/93	9		5	3		2				19	48	2.53
1993/94	7	7	8	4	4					30	81	2.70
1994/95	2	4	3	2	2	2				15	49	3.27
1995/96						no data						
1996/97						no data						
1997/98						no data						
13 Year Average	5	3	4	2	1	1	0	0	0	15	42	2.76

a Data supplied by USFWS, USFS and Peter Walsh.

Table 10 (continued). Trumpeter Swan (Pacific Coast Population) Winter Family Group Counts from Washington.[a]

Year	Frequency by Family Group Size									Total Families	Total Juveniles	Average Family Group
	1	2	3	4	5	6	7	8	9			
1980/81										45	127	2.82
1981/82										41	92	2.24
1982/83										24	56	2.33
1983/84										39	94	2.41
1984/85										29	62	2.14
1985/86										22	44	2.00
1986/87										49	113	2.31
1987/88										49	133	2.71
1988/89										48	111	2.31
1989/90											no data	
1990/91											no data	
1991/92										64	155	2.42
1992/93										45	94	2.09
1993/94										167	401	2.40
1994/95										112	270	2.41
1995/96										83	204	2.46
1996/97										93	215	2.31
1997/98										102	227	2.23
16 Year Average										63	150	2.35

a Data supplied by Russ Canniff.

Table 11. Emperor Goose - Nesting Grounds Data.[a]

Localities/Dates	Nest Success (n)	Average Clutch (n)	Average Brood Size					
			Class I (n)		Class II (n)		Class III/F (n)	
Yukon-Kuskokwim Delta								
1981	0.78 (90)	5.2 (74)	--	--	--	--	--	--
1982	0.70 (178)	5.5 (181)	--	--	--	--	--	--
1983	0.73 (397)	5.4 (287)	3.7	(52)	--	--	--	--
1984	0.60 (371)	5.1 (228)	3.9	(162)	--	--	--	--
1985	0.66 (425)	5.6 (314)	--	--	--	--	--	--
1986	0.55 (570)	5.3 (437)	--	--	--	--	--	--
1987	0.93 (481)	5.1 (195)	--	--	--	--	--	--
1988	0.88 (354)	5.4 (367)	4.5	(23)	3.6	(16)	--	--
1989	0.80 (362)	5.6 (362)	3.6	(109)	3.3	(82)	--	--
1990	0.80 (299)	5.3 (340)	3.3	(188)	3.0	(134)	--	--
1991	0.89 (117)	5.9 (127)	3.5	(21)	3.0	(1)	--	--
1992	0.93 (174)	5.2 (200)	--	--	--	--	--	--
1993	0.78 (462)	5.1 (548)	--	--	--	--	3.5	(393)
1994	0.62 (90)	4.3 (117)	--	--	--	--	3.2	(387)
1995	0.84 (487)	4.9 (196)	--	--	3.4	(112)	--	--
1996	0.89 (358)	4.9 (145)	--	--	--	--	--	--
1997	0.84 (240)	4.9 (295)	--	--	--	--	--	--
Long-Term Average	0.78	5.2	3.8		3.3		3.4	

a Data supplied by Yukon Delta NWR, Alaska Science Center - USGS, and Migratory Bird Management Anchorage.

Table 12. Emperor Goose - Nesting Grounds Data, Random Plot Survey.[a]

Year	Num. Plots	Total Nests	Active Nests	Prop. Active	Eggs	Clutch Size	n
1986	24	9619	7270	0.756	38426	5.40	108
1987	33	11259	10562	0.938	53093	5.19	212
1988	41	8643	7548	0.873	37726	5.10	193
1989	32	16058	14896	0.928	76235	5.12	295
1990	44	11729	10158	0.866	50963	4.95	290
1991	53	15033	14638	0.974	73501	4.97	360
1992	52	13876	13349	0.962	67208	5.02	259
1993	56	12144	11468	0.944	54964	4.86	292
1994	61	16389	15378	0.938	75606	4.92	308
1995[b]	50	9113	8816	0.977	42980	4.88	297
1996	54	10335	9749	0.943	49952	5.12	283
1997	75	6619	6343	0.958	30309	4.78	230
12 Year Average	48	11735	10848	0.921	54247	5.03	261

a Data supplied by Yukon Delta NWR, Alaska Science Center - USGS, and Migratory Bird Management Anchorage.

b Sampling procedure was changed starting in 1995 to maximize the number of eider nests located rather than goose nests.

Table 13. Emperor Goose - Fall Productivity Counts 1997 (from ground counts)[a].

Localities / Dates	In Families[b] # Fam.	In Families[b] # Juv.	Avg. # of Juv. per Family	No. Birds Aged Ads.	No. Birds Aged Juv.	No. Birds Aged Total	% Juv. of Total Birds
Izembek Lagoon							
September	22	59	2.7	336	41	377	10.9
October	21	55	2.6	1009	103	1112	9.3
TOTAL	43	114	2.7	1345	144	1489	9.7

a Data supplied by Izembek National Wildlife Refuge and Alaska Science Center - USGS.

b The figures for families were taken separately from the figures for No. of Birds Aged and are not included in the No. of Birds Aged. They should not be included because not all birds in a flock were counted, only the family groups.

Table 14. Emperor Goose - Fall Productivity Survey 1997 (from aerial photos).[a]

Localities	Adults[b]	Juv.	Total	% Juv. of Total Birds	Fall Population Count[c]
Egegik	409	71	480	14.8	2303
Ugashik	523	20	543	3.7	650
Cinder River	3417	394	3811	10.3	18944
Port Heiden	2021	335	2356	14.2	21717
Seal Islands	1038	118	1156	10.2	9778
Nelson Lagoon	1469	148	1617	9.2	21633
Izembek Lagoon	1078	97	1175	8.3	3416
TOTAL	9955	1183	11138	11.1[d]	78441

a Data supplied by USFWS - Migratory Bird Management Anchorage.
b Number of birds classified from all aerial photos taken in each area.
c Fall aerial population survey conducted by Migratory Bird Management Fairbanks.
d Mean age ratio weighted by fall population count.

Table 15. Emperor Goose - Annual Productivity Counts at Izembek Lagoon (from ground counts).[a]

Year	No. Birds Aged			Percent Juveniles
	Adults	Juveniles	Total	
1966	699	265	964	27.5
1967	1457	585	2042	28.6
1968	1195	585	1780	32.9
1969	4149	2980	7129	41.8
1970	9722	4933	14655	33.7
1971	8142	3458	11600	29.8
1972	4680	2270	6950	32.7
1973	--	--	--	--
1974	2025	377	2402	15.7
1975	744	405	1149	35.2
1976	1923	324	2247	14.4
1977	996	683	1679	40.7
1978	1395	495	1890	26.2
1979	841	113	954	11.8
1980	1446	454	1900	23.9
1981	1527	747	2274	32.8
1982	1653	140	1793	7.8
1983	1326	543	1869	29.1
1984	2753	795	3548	22.4
1985	2245	503	2748	18.3
1986	3283	1381	4664	29.6
1987	1706	808	2514	32.1
1988	3884	1242	5126	24.2
1989	3811	1136	4947	23.0
1990	4002	1068	5070	21.1
1991	8599	2882	11481	25.1
1992	9291	1347	10638	12.7
1993	13976	2176	16152	13.5
1994	4658	792	5450	14.5
1995	6434	1618	8052	20.1
1996	3128	631	3759	16.8
1997	1345	144	1489	9.7
31 Year Average	3646	1121	4804	24.1

a Data supplied by Izembek National Wildlife Refuge and Alaska Science Center - USGS.

Table 15 (continued). Emperor Goose - Annual Productivity Surveys on the Alaska Peninsula (from aerial photos).[a]

Year	Counts			Percent Juveniles[b]
	Adults	Juveniles	Total	
1985	2657	536	3193	16.5
1986	4605	1659	6264	25.4
1987	7761	2417	10178	22.8
1988	8433	2747	11180	24.4
1989	10046	2684	12730	21.9
1990	10123	3418	13541	24.1
1991	10331	3433	13764	23.2
1992	12678	2154	14832	15.5
1993	4363	1372	5735	24.2
1994	12917	3974	16891	22.8
1995	8717	2947	11664	25.5
1996	8946	1847	10793	17.8
1997	9955	1183	11138	11.1
13 Year Average	8579	2336	10916	21.2

a Data supplied by Migratory Bird Management Anchorage and Migratory Bird Management Fairbanks.

b Age ratios are weighted means using weights equal to the fall population count in each lagoon or locality.

Table 16. Emperor Goose - Family Group Counts at Izembek Lagoon.[a]

Year[b]	Frequency by Family Group Size												Total Families	Total Juveniles	Average Family Group
	1	2	3	4	5	6	7	8	9	10	11	12			
1966	27	44	34	22	4	1							132	331	2.51
1967	9	16	13	13	12	1	1			1			66	215	3.26
1968					no family group data								40	112	2.80
1969	13	35	49	34	22	5	2			1			161	530	3.29
1970	69	104	88	77	26	8	4	5		2			383	1115	2.91
1971	96	139	130	65	36	15	1	1	1				484	1318	2.72
1972	32	49	52	45	20	9	3						210	641	3.05
1973					no data										
1974	12	14	13	6	3	2							50	130	2.60
1975	7	13	19	4	7			1					51	149	2.92
1976	39	57	57	34	13	7							207	567	2.74
1977	16	34	34	12	7	3	1	1					108	302	2.80
1978	10	12	17	12	11								62	188	3.03
1979	23	33	24	21	13	2	1						117	329	2.81
1980	12	10	13	4		1							40	93	2.33
1981[c]	36	36	41	27	19	18	3	1					235	750	3.19
1982	8	9	5	6	4								32	85	2.66
1983	30	44	46	33	25	7	3	1	2	1			192	612	3.19
1984	17	27	15	7	8	1	4					1	80	230	2.88
1985	27	28	34	19	10	6	1						125	354	2.83
1986	41	60	76	53	24	11	1						266	794	2.98
1987[c]	33	47	42	24	24	10	4	1				1	305	993	3.26
1988	42	53	29	33	20	18	1	3		1			200	616	3.08
1989	20	31	41	26	17	9	1						145	455	3.14
1990	13	20	26	21	11	4	1	1					97	309	3.19
1991	18	37	37	21	21	8	2	2		1			147	480	3.27
1992	32	32	27	35	21	1	1	2					151	451	2.99
1993	41	45	29	20	16	7	3						161	441	2.74
1994	97	88	64	32	13	5	2						301	702	2.33
1995	9	34	21	18	9	1	4	2				1	99	319	3.22
1996	25	40	29	21	7	2	1						125	330	2.64
1997	7	14	14	5	1	2							43	114	2.65
31 Year Average	29	40	37	25	14	5	2	1	0	0	0	0	155	453	2.90

a Data supplied by Izembek National Wildlife Refuge, Alaska Science Center - USGS, and Migratory Bird Management - Juneau/Anchorage/Fairbanks.

b 1979, 1981 and 1987 data include Izembek Lagoon and Alaska Peninsula; 1984-1995 data include Izembek Lagoon and Nelson Lagoon.

c Figures for Total Families, Total Juveniles and Avg. Family Group do not correspond to Family Group Size figures because AK Peninsula data were not split out by family group.

Table 17. Cackling Canada Goose - Nesting Grounds Data.[a]

Localities/Dates	Nest Success (n)	Average Clutch (n)	Average Brood Size Class I (n)	Average Brood Size Class II (n)
Yukon-Kuskokwim Delta				
1965-79 Average	-- --	4.8 (1877	-- -	-- --
1980	-- --	5.2 (61	-- -	-- --
1981	0.61 (196)	4.0 (185	-- -	-- --
1982	0.25 (586)	4.5 (312	-- -	-- --
1983	0.64 (724)	5.0 (666)	5.0 (46	-- --
1984	0.42 (556)	4.5 (466)	4.0 (68	-- --
1985	0.44 (900)	4.3 (417	-- -	-- --
1986	0.61 (920)	4.7 (684	-- -	-- --
1987	0.92 (534)	5.1 (201	-- -	-- --
1988	0.71 (390)	4.6 (411)	4.0 (45)	4.1 (18)
1989	0.65 (518)	4.9 (419)	3.7 (123)	3.7 (59)
1990	0.54 (541)	4.4 (553)	4.3 (24)	4.1 (22)
1991	0.68 (225)	5.0 (216)	3.4 (56)	4.0 (2)
1992	0.93 (418)	5.1 (457	-- -	-- --
1993	0.64 (411)	5.6 (422	-- -	-- --
1994	0.56 (501)	4.5 (506)	3.6 (156)	3.4 (266)
1995	0.66 (374)	4.5 (356	-- -	-- --
1996	0.62 (356)	4.7 (280	-- -	-- --
1997	0.66 (446)	4.5 (285	-- -	-- --
Long-Term Average	0.62	4.7	4.0	3.9

a Data supplied by Yukon Delta NWR and Alaska Science Center - USGS.

Table 18. Cackling Canada Goose - Nesting Grounds Data, Random Plot Survey.[a]

Year	Num. Plots	Total Nests	Active Nests	Prop. Active	Eggs	Clutch Size	Clutch n
1986	24	11465	7628	0.665	35332	4.82	156
1987	33	12640	11823	0.935	60366	5.08	245
1988	41	9118	6623	0.726	30749	4.59	215
1989	32	18686	15073	0.807	72616	4.84	370
1990	44	20117	15329	0.762	71738	4.58	380
1991	53	22653	19690	0.869	94559	4.66	573
1992	52	29890	26237	0.878	125760	4.75	599
1993	56	25766	23496	0.912	107522	4.51	624
1994	61	31776	26070	0.820	118764	4.59	509
1995[b]	50	40903	35649	0.872	160227	4.49	1201
1996	54	37171	33933	0.913	154024	4.54	985
1997	75	33784	27910	0.826	112660	4.04	1012
12 Year Average	48	24497	20788	0.832	95360	4.62	572

a Data supplied by Yukon Delta NWR, Alaska Science Center - USGS, and Migratory Bird Management Anchorage.

b Sampling procedure was changed starting in 1995 to maximize the number of eider nests located rather than goose nests.

Table 19. Dusky Canada goose population data, 1971-1997.

Year	Spring Index[a]	Percent Juvenile[b]	Winter Index[c]	Winter 3-yr Avg
1971	--	16.2	19,800	--
1972	--	10.6	17,900	--
1973	--	36.0	15,800	17,833
1974	--	51.4	18,600	17,433
1975	--	17.9	26,500	20,300
1976	--	24.2	23,000	22,700
1977	--	44.3	24,100	24,533
1978	--	24.8	24,000	23,700
1979	--	16.0	25,500	24,533
1980	--	23.7	22,000	23,833
1981	--	17.9	23,000	23,500
1982	--	23.7	17,700	20,900
1983	--	15.0	17,000	19,233
1984	--	18.3	10,100	14,933
1985	--	3.7	7,500	11,533
1986	4,946	10.7	12,200	9,933
1987	4,528	9.8	--[d]	9,933
1988	4,194	20.1	12,200	10,633
1989	5,896	8.6	11,800	12,066
1990	4,591	23.5	11,700	11,900
1991	2,985	21.5	--[d]	11,900
1992	5,637	23.1	18,000	13,833
1993	5,618	5.9	16,700	15,466
1994	5,129	7.0	11,000	15,233
1995	3,199	3.9	8,500	12,067
1996	2,919	21.6	--[d]	12,067
1997	2,587	--	--[e]	--
Long Term Average	3,827	19.2	17,157	

[a] Total Canada goose index on Copper River Delta transects by USFWS-MBM.

[b] Late July composition survey by Alaska Department of Fish and Game.

[c] Photo composition (R. Jarvis-Oregon State Univ.) applied to midwinter Canada goose indices in western Oregon and southwest Washington (USFWS refuge personnel).

[d] Weather and/or timing problems precluded estimates.

[e] Survey was not conducted.

Table 20. Dusky Canada goose nest density, nest success, and average clutch size on the West Copper River Delta study area, 1959-1996[a].

Year	Nest Density (nests/km²)	Nest Success % (n)	Clutch Size Avg (n)
1959-74 (avg)	--	82.9	5.0
1975	69.1	31.6 (215)	4.8 (215)
1976	60.2	--	4.8 (168)
1977	67.6	79.0 (229)	5.4 (181)
1978	70.7	56.2 (390)	--
1979	51.4	18.8 (409)	5.7 (338)
1980	41.7	--	5.4 (152)
1981	--	--	4.9 (28)
1982	39.4	49.8 (151)	4.8 (135)
1983	35.1	51.9 (162)	5.5 (87)
1984	36.7	75.8 (161)	5.6 (126)
1985	37.5	9.9 (168)	4.4 (64)
1986	44.8	11.4 (201)	4.9 (78)
1987	44.8	23.7 (194)	5.5 (121)
1988	44.8	17.3 (110)	5.5 (52)
1989	37.8	4.3 (94)	5.3 (25)
1990	35.5	44.3 (88)	5.3 (50)
1991	36.7	31.9 (91)	5.4 (46)
1992	38.6	40.6 (93)	5.1 (41)
1993[b]	--	--	--
1994	17.4[c]	10-23	4.7 (55)
1995	--	12.3 (106)	4.9
1996[b]	--	--	--
1997[b]	--	--	--
1975-95 Average	45.0	34.9[d]	5.2

[a] Data supplied by Alaska Department of Fish and Game and U.S. Forest Service, Cordova, AK.

[b] No survey was conducted.

[c] Data from USFS experimental random plot nest surveys in 4 strata related to USFWS spring aerial survey densities. Density reported for all mainland plots; high-density stratum (35.2/km²) most equivalent to historical plot data. Minimum-maximum range of nest success from limited sample of known-fate nests.

[d] 1994 data not included in calculation of average.