

Productivity Surveys of Geese, Swans and Brant

Wintering in North America 2007

Department of the Interior

U. S. Fish and Wildlife Service

Division of Migratory Bird Management

Arlington, Virginia



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Table of Contents	Page
Report Summary	iv
I. Atlantic Flyway Productivity Surveys	1 – 5
A. Atlantic Brant	1
B. Tundra Swan	2
II. Mississippi/Central Flyway Productivity Surveys	7 – 10
A. Mid-continent Lesser Snow Goose	7
B. Mid-continent White-fronted Goose	9
III. Western Central Flyway Light Goose Productivity Surveys	11 – 32
A. Western Central Flyway Lesser Snow Goose	13
B. Western Central Flyway Ross's Goose	15
C. Light Geese in New Mexico and Mexico	23
IV. Pacific Flyway Productivity Surveys	33 – 45
A. Lesser Snow Goose	33
B. Ross's Goose	34
C. Greater White-fronted Goose	34
D. Tule Greater White-fronted Goose	34
E. Tundra Swan	34
F. Trumpeter Swan (Rocky Mountain Population)	35
V. Alaska Productivity Surveys	46 – 58
A. Pacific Brant	48
B. Trumpeter Swan	48
C. Emperor Goose	49
D. Dusky Canada Goose	49

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Waterfowl productivity analyses are conducted annually to monitor selected goose, swan, and brant populations. Methods used include satellite imagery of nesting habitat, inventory of staging concentrations, determination of percent juvenile and family size in fall and winter concentrations, as well as analysis of harvest data.

This report summarizes productivity data obtained during fall 2006 and winter 2007, and is grouped according to flyway and population. Data for 2007 will be forthcoming in April 2008.

Thanks to all biologists and volunteers for their dedication to collect the data reported in this document. Without your tireless efforts this data set and tradition of knowledge of waterfowl would not be possible. Thank you to the many supervisors both public and private to allow your employees to collect this information so we can better understand the outcome of the past year's production efforts of waterfowl.

A special thanks to the Flyway coordinators for their willingness to accept this additional burden in their already full schedules. To assemble each Flyway's data in one location for publication and for their efforts to strive for accuracies in the presentation of the data sets.

Any inaccuracies in the representation of the data in this report are my responsibility and I would appreciate notification of errors so we may make the necessary corrections. Comments and suggestions are always welcome in our effort to make the report more presentable!

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2007 PRODUCTIVITY REPORT SUMMARY

Flyway	Population	Per Cent Productivity	Type of year	Per Cent change from 2006
Atlantic	Atlantic Brant	31.1%	Above Average	28.0%
	Tundra swan	12.2%	Below Average	-58.1%
Mississippi/Central				
	MC lesser snow geese (LA - pre season)	23.1%	Below Average	-20.6%
	MC lesser snow geese (LA - in season)	20.3%	Below Average	18.5%
	MC lesser snow geese (TX - pre season)			
	MC lesser snow geese (TX - in season)			
	MC White-fronted geese ²	24.7%	Below Average	-34.3%
	WCF Lesser snow geese	24.0%	Above Average	-14.6%
	WCF Ross's geese	20.2%	Above Average	71.2%
Pacific				
	Lesser snow geese (Mixed flocks)	24.2%	Average	-13.0%
	Lesser snow geese (Wrangel Island)		No Report	
	Ross's geese	15.4%	Below average	-39.3%
	Greater white-fronted geese	29.3%	Average	5.7%
	Tule Greater whitefronted geese	32.4%	Average	6.3%
	Tundra swan	11.2%	Below Average	-63.0%
	RMP Trumpeter swan	22.0%	Above average	22.6%
Alaska				
	Pacific Brant (Fall)	28.2%	Above Average	39.0%
	(Winter)	-		-
	Trumpeter swan	18.9%	Below Average	-33.0%
	Emperor geese (Fall ground)	18.3%	Below Average	-52.0%
	(Fall photo)	17.4%		-51.0%
	Cackling Canada geese		No Data	
	Dusky Canada geese	20.9%	Average	-10.0%

¹ MC = Mid-continent, WCF = Western Central Flyway, RMP = Rocky Mountain Population

² Starting in 2000, the Mississippi/Central Flyway report combines eastern and western segments of White-fronted geese into one population: MC Greater White-fronted geese.

TITLE Waterfowl Productivity Surveys for the Atlantic Flyway – 2007

SPECIES SURVEYED: Atlantic Brant (*Branta bernicla bernicla*)

Tundra Swan (*Cygnus columbianus*)

COOPERATORS: Connecticut Department of Environmental Protection
Maryland Department of Natural Resources, Wildlife and Heritage Service
New Jersey Department of Environmental Protection, Division of Fish, Game, and Wildlife
New York State Department of Environmental Conservation
North Carolina Wildlife Resources Commission
Pennsylvania Game Commission
U.S. Fish and Wildlife Service
Back Bay National Wildlife Refuge
Mattamuskeet National Wildlife Refuge
Pocosin Lakes National Wildlife Refuge

COMPILED BY: Carl Ferguson, Division of Migratory Bird Management

ADSTRACT:

Atlantic Flyway productivity surveys for Atlantic brant and tundra swans were conducted during November and December, 2007 and January, 2008. The data indicates that productivity for Atlantic brant. These waterfowl species were surveyed in six States and on three National Wildlife Refuges within the Atlantic flyway.

METHODS:

The procedures followed in conducting the surveys are contained in the draft Standard Operating Procedures for Productivity Surveys of Geese, Swans, and Brant, USFWS.

Atlantic Brant (Table 1.)

Productivity Appraisals: A total of 20, 818 brant were aged in Connecticut, New Jersey, and New York. The percent of juvenile birds observed in 2007 was 31.1

percent as compared to 24.3 percent in 2006; an increase of 28.0%. The number of young per family group was 2.2 in 2007; a decrease from 2.8 in 2006.

Tundra Swan (Table 2.)

Productivity Appraisals: A total of 11,484 swans were aged in Maryland, North Carolina, and Pennsylvania, with two-thirds of the observations coming from North Carolina. The percent of immature swans observed was 12.2 percent, a decrease of 58 percent from 2006. Juvenile swans observed per family group were 1.7, a slight increase from 2006 (1.6). Swans arrived during the normal time period this fall on the Atlantic Flyway.

DISCUSSION:

Atlantic Brant: For 2007, production (31.1%) as indicated by the percent of immature birds increased from 2006 (24.3%). Young observed per family group was 2.2, a decrease from 2006 (2.8).

Tundra Swan: This species showed a decrease in 2007 (12.2%) of 58.1 percent from 2006 (29.1%). Young observed per family group was 1.7, a slight increase from 2006 (1.6).

A swan addendum to the Service’s Productivity Sop for fall productivity surveys has been approved for the Flyway for next year (2008). Training workshops should be held to insure that cooperators are using the same standards and protocols.

Productivity 2007 – Percent Immature

<u>Species</u>	<u>2007</u>	<u>% Change from 2006</u>	<u>Mean</u>	<u>% Change from Mean</u>	<u>Type of year</u>
Atlantic Brant	31.1%	+28.0%	19.0%	+63.7%	Good
Tundra Swan	12.2%	-58.1%	13.8%	-11.6%	Below Average

LITERATURE CITED:

U.S. Fish and Wildlife Service, Standard Operating Procedures for Productivity Surveys of Geese, Swans, and Brant (Draft) 52pp

ACKNOWLEDGEMENTS

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U.S. Fish and Wildlife Service:

Pocosin National Wildlife Refuge - W. Stanton

Back Bay National Wildlife Refuge - D. Stolley, C. Sweeney, D. Hughes, B. Sweeney, B. Ake, and J. Gallegos

Mattamuskeet National Wildlife Refuge

Table 1. Historical Population and Productivity Data for the Atlantic Flyway - Atlantic Brant

Year	Number	Families		Other		Total	Total	Total	Percent	Average Young Per Family
	Families	Adults	Immature	Adults	Immature	Adults	Immature	Birds	Immature	
1978	144	284	308	10,362	361	10,646	669	11,315	5.9	2.1
1979	703	1,381	1,955	7,233	4,024	8,614	5,979	14,593	41.0	2.8
1980	622	1,232	1,637	15,247	6,733	16,479	8,370	24,849	33.7	2.6
1981	523	1,040	1,249	11,444	2,124	12,484	3,373	15,857	21.3	2.4
1982	429	1,002	1,009	14,863	3,853	15,865	4,862	20,727	23.5	2.4
1983	292	581	780	12,172	5,293	12,753	6,073	18,826	32.3	2.7
1984	335	655	789	11,310	2,456	11,965	3,245	15,210	21.3	2.4
1985	283	560	674	14,701	2,179	15,261	2,853	18,114	15.8	2.4
1986	105	210	263	19,690	506	19,900	769	20,669	3.7	2.5
1987	313	601	801	11,634	3,599	12,235	4,400	16,635	26.5	2.6
1988	274	542	667	12,068	3,856	12,610	4,523	17,133	17.0	2.4
1989	466	905	1,174	12,957	2,514	13,862	3,688	17,550	21.0	2.5
1990	387	732	838	15,777	1,176	16,509	2,014	18,523	10.9	2.2
1991	710	1,265	1,396	5,845	911	7,110	2,307	9,417	24.5	2.0
1992	124	242	212	19,510	230	19,752	442	20,194	2.2	1.7
1993	1,679	3,237	3,371	15,042	1,544	18,279	4,915	23,194	21.2	2.0
1994	619	1,203	1,210	18,029	968	19,232	2,178	21,410	10.2	2.0
1995	1,242	2,470	2,788	11,556	1,071	14,026	3,859	17,885	21.6	2.2
1996	830	1,637	1,826	19,523	2,011	21,160	3,837	24,997	15.3	2.2
1997	1,502	2,888	3,299	19,683	1,479	22,571	4,778	27,349	17.5	2.2
1998	1,006	1,990	2,621	15,545	2,942	17,535	5,563	23,098	24.1	2.6
1999	185	364	320	36,639	235	37,003	555	37,558	1.5	1.7
2000	1,305	2,542	2,769	15,098	3,155	17,640	5,924	23,564	25.1	2.1
2001	811	1,571	1,738	15,308	3,787	16,879	5,525	22,404	24.7	2.1
2002	637	1,214	1,157	55,047	3,045	56,261	4,202	60,463	6.9	1.8
2003	1,022	1,983	2,184	19,460	2,276	21,443	4,460	25,903	17.2	2.1
2004	848	1,672	1,663	22,337	1,950	24,009	3,613	27,622	13.1	2.0
2005	522	1,023	1,125	14,950	2,050	15,973	3,175	19,148	16.6	2.2
2006	785	1,572	2,213	14,153	2,842	15,725	5,055	20,780	24.3	2.8
2007	262	523	573	13,829	5,893	14,352	6,466	20,818	31.1	2.2
									% change from 2006	28.0
									% change from mean	63.7
MEAN*	632	1,237	1,420	16,700	2,502	17,938	3,922	21,860	19.0	2.3

*(1978-2007)

** NY - average young/family from entire survey area; percent immature from Middle & West Bays only in 2006

Table 2. Historical Population and Productivity Data for the Atlantic Flyway - Tundra Swan

Year	Number		Families		Other		Total		Total Birds	Percent Immature	Average Young Per Family
	Families	Adults	Immature	Adults	Immature	Adults	Immature				
1978	6	10	8	433	176	443	184	627	29.3	1.3	
1979	15	27	24	1,280	102	1,307	126	1,433	8.8	1.6	
1980	19	36	35	1,807	182	1,843	217	2,060	10.5	1.8	
1981	16	32	37	1,000	410	1,032	447	1,479	30.2	2.3	
1982	144	281	282	4,656	357	4,937	639	5,576	11.5	2	
1983	448	889	880	5,152	616	6,041	1,496	7,537	19.8	2	
1984	240	467	516	6,682	1,248	7,149	1,764	8,913	19.8	2.2	
1985	716	1,313	1433	7,397	1,251	8,710	2,684	11,394	23.6	2	
1986	235	464	311	10,405	723	10,869	1,034	11,903	8.7	1.3	
1987	109	203	179	7,199	629	7,402	808	8,210	9.8	1.6	
1988	247	566	471	8,172	1,051	8,738	1,522	10,260	14.8	1.9	
1989	461	883	791	10,856	1,306	11,739	2,097	13,836	15.2	1.7	
1990	297	541	562	9,872	629	10,413	1,191	11,604	10.3	1.9	
1991	139	261	219	3,002	237	3,263	456	3,719	12.3	1.6	
1992	125	241	197	11,070	292	11,311	489	11,800	4.1	1.6	
1993	434	858	418	10,462	1,582	11,320	2,000	13,320	15	1	
1994	497	1,099	635	3,115	365	4,214	1,000	5,214	19.2	1.3	
1995	234	475	268	8,458	519	8,933	787	9,720	8.1	1.1	
1996	922	1,800	1,114	11,956	420	13,756	1,534	15,290	10	1.2	
1997	846	1,707	697	8,974	174	10,681	871	11,552	7.5	0.8	
1998	1,411	2,325	1,697	8,675	345	11,000	2,042	13,042	15.7	1.2	
1999	700	1,244	1,097	10,993	326	12,237	1,423	13,660	10.4	1.6	
2000	676	1,375	577	5,117	160	6,492	737	7,229	10.2	0.9	
2001	947	1,904	1,147	10,169	166	12,073	1,313	13,386	9.8	1.2	
2002	1,276	2,783	1,149	20,402	878	23,185	2,027	25,212	8	0.9	
2003	694	1,276	929	31,927	887	33,203	1,816	35,019	5.2	1.3	
2004	535	1,829	1,301	9,067	784	10,896	2,085	12,981	16.1	2.4	
2005	477	941	538	5,350	132	6,291	670	6,961	9.6	1.1	
2006	767	1,480	1,275	3,599	205	5,079	1,480	6,559	29.1	1.6	
2007	49	82	81	9,891	1,320	9,983	1,401	11,484	12.2	1.7	
									% change from 2006	-58.1	
									% change from mean	-11.6	
MEAN*	456	913	629	8,238	582	9,151	1,211	10,366	13.8	1.5	
*(1976-2007)											

Title: Lesser Snow Goose Productivity Surveys for the Central and Mississippi Flyways – 2007

Submitted by: Fred Roetker, Flyway Biologist, Lafayette, LA

Abstract: Louisiana lesser snow geese (blue phase dominant) provided the following productivity data: pre-season, 23.1% immature birds, young/family 1.54; in-season, 20.3% immature birds, young/family 1.35.

Methods: The procedures used in conducting these appraisals were developed by Lynch (1969) and are outlined in the Standard Operating Procedures for Productivity Surveys of Geese, Swans, and Brant (Draft) 1977. Louisiana in-season data was collected from November, 2007 through February, 2008.

Results: Lesser snow geese wintering in Louisiana are primarily blue phase, ranging from 90-95% blue at Delta NWR located at the mouth of the Mississippi River to 65-80% blue in southwestern Louisiana, or west of the Atchafalaya River. The mid-continent lesser snow geese which winter in other regions of the Central and Mississippi Flyways, except New Mexico, 90-95% white, indicate the white phase to be dominant, 55-65%. The 14,510 in-season records from fifteen flocks showed 20.3% to be immature geese with an average young/family of 1.35 goslings.

Discussion: The trend for large numbers of snow geese to arrive late in southwestern Louisiana continued in 2007. Enough birds were present in Louisiana to obtain pre-season productivity data, however not enough snow geese were present in Texas for sampling during the time crews were in the field to survey both white-fronts and snows.

Literature Cited:

Lynch, J. J. 1969. Appraisals of annual productivity and mortality among geese, swans, and other birds. Annual Report, Part II and Appendix A. U. S. Fish and Wildlife Service. 26pp.

U. S. Fish and Wildlife Service, 1977. Standard Operating Procedures for Productivity Surveys of Geese, Swans, and Brant (Draft) 52 pp.

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Texas Parks and Wildlife:

Kevin Hartke

Table 1. Historical Lesser Snow Goose age ratios (% Imm.) and average young per family (Y/F) for Louisiana and Texas. n = number of geese sampled. n* = number of families sampled

Year	Pre-Season LA				In-Season LA				Pre-season TX				In-season TX			
	n	% Imm.	n*	Y/F	n	% Imm.	n*	Y/F	n	% Imm.	n*	Y/F	n	% Imm.	n*	Y/F
1984		31.4		1.76		22.3		1.44		--		--		26.5		1.76
1985		33.4		1.96		28.9		1.84		--		--		24.5		1.62
1986		20.0		1.92		12.6		1.55		--		--		8.4		1.45
1987		34.9		2.25		24.0		1.81		--		--		12.2		1.73
1988		35.6		2.00		28.5		1.61		--		--		25.2		--
1989		34.5		1.91		29.4		1.67		--		--		27.4		--
1990		29.0		1.61		23.0		1.52		--		--		20.1		2.10
1991		30.3		1.73		29.1		1.50		31.4		2.60		17.7		1.64
1992		8.6		1.43		8.1		1.36		10.8		1.30		2.3		--
1993		29.4		1.83		32.9		1.52		--		--		22.8		1.43
1994		29.5		1.76		29.6		1.51		27.7		1.78		28.3		1.80
1995		37.1		1.82		30.5		1.49		--		--		--		--
1996		30.6		1.70		27.5		1.47		--		--		34.5		1.65
1997		27.3		1.53		31.4		1.28		28.7		1.95		--		--
1998		25.6		1.54		29.4		1.43		--		--		40.2		2.05
1999		26.3		1.61		24.2		1.40		23.5		1.69		25.2		1.80
2000		32.5		1.61		23.9		1.42		--		--		28.5		1.67
2001		29.2		1.63		30.2		1.29		--		--		26.9		1.61
2002		--		--		22.5		1.33		--		--		19.6		1.75
2003		--		--	12526	25.0	648	1.37		--		--	2472	17.2	39	1.54
2004		--		--	11768	19.0	562	1.25		--		--	2989	12.7	26	1.42
2005		--		--	14502	21.8	714	1.31		--		--	2004	15.0	--	--
2006	1736	29.1	90	1.52	9987	24.9	457	1.37	4699	24.9	127	2.05	2770	25.2	--	--
2007	996	23.1	37	1.54	14510	20.3	609	1.35		--		--		--		--

Title: Mid-Continent White-fronted Geese Productivity Report - 2007

Submitted by: Fred Roetker, Flyway Biologist, Lafayette, LA

Abstract: Productivity appraisals of Mid-Continent White-fronted Geese were conducted in Texas and Louisiana. The percentage of immature birds was 24.7. The average number of young per family was 1.44.

Methods: The procedures used in conducting these appraisals were developed by Lynch (1969). The Texas data was collected during the period October 29-31, 2007. Fourteen state and federal cooperators put forth an excellent effort to obtain representative data near Eagle Lake, Nada, and El Campo, Texas. In Louisiana, the sampling occurred during October, November, 2007; and January, February 2008 in southwestern Louisiana near Gueydan and Lake Arthur.

Results: The sample of 28084 birds indicated 24.7% were immature. The average young per family was 1.44, based on 736 families observed. The 2006 data reflected 37.6% immature (30,784) and 1.91 goslings per family.

Discussion: Similar to last year, some white-fronts were present by mid October. Dry fall conditions combined with decreased rice acreage in southwest Louisiana reduced the quality of prime early habitat. The lingering after effects of Hurricane Rita may continue to cause redistribution of geese in southwestern Louisiana. Birds seem to be more prevalent further north in the rice-marsh interface. Marshes and agricultural fields along and especially south of the Gulf Intercoastal Waterway are still somewhat influenced by saltwater from the storm surge.

Literature Cited:

Lynch, J. J. 1969. Appraisals of annual productivity and mortality among geese, swans, and other birds. Annual Report, Part II and Appendix A. U. S. Fish and Wildlife Service. 26pp.

U. S. Fish and Wildlife Service, 1977. Standard Operating Procedures for Productivity Surveys of Geese, Swans, and Brant (Draft) 52 pp.

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Cooperators:

U. S. Fish & Wildlife Service:

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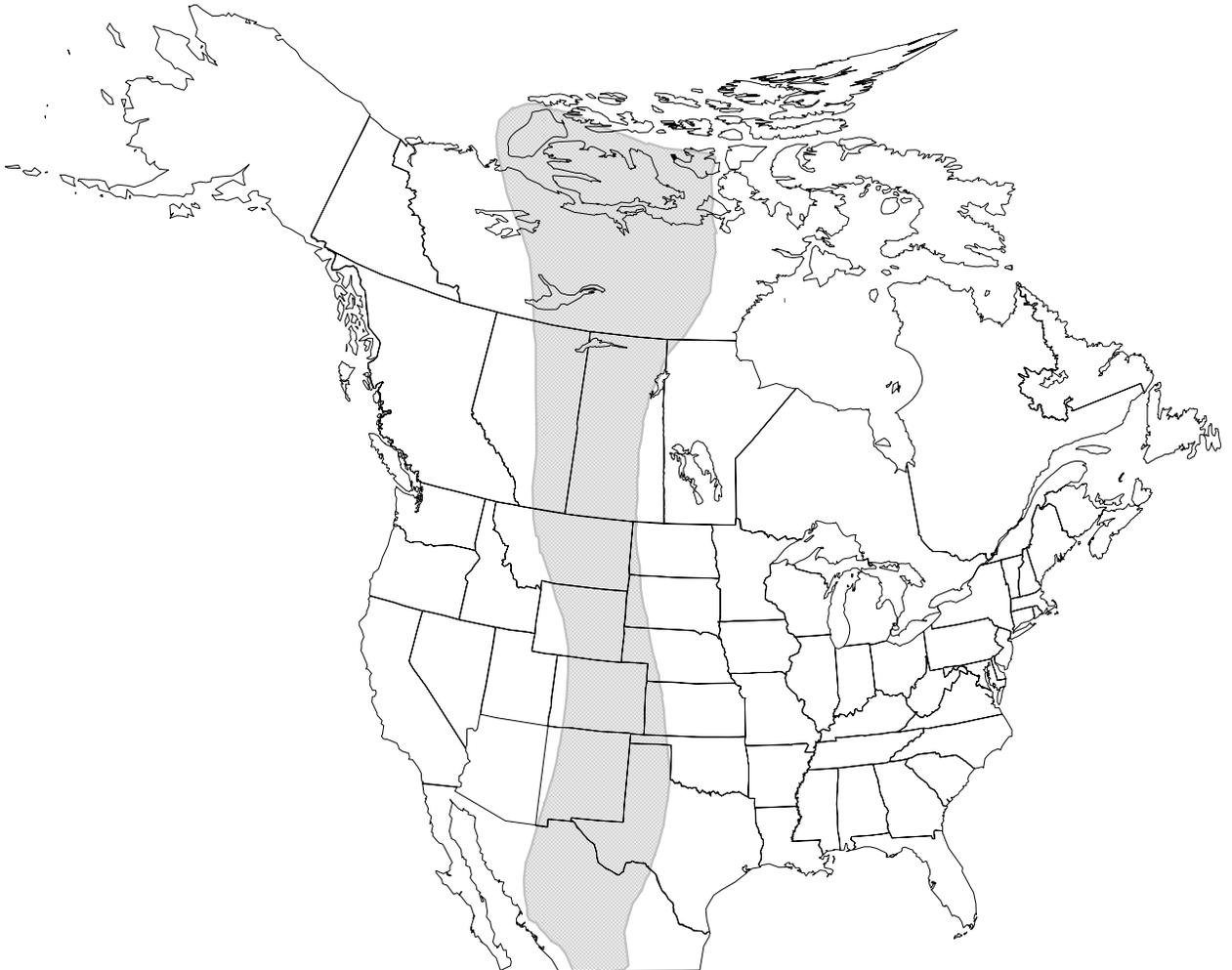
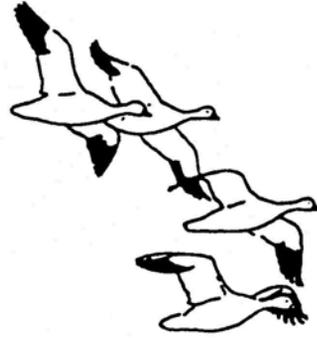
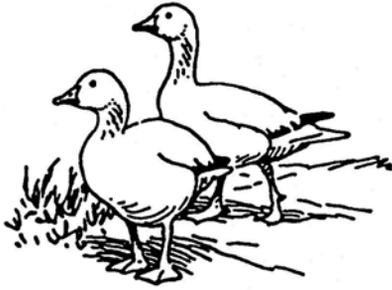
Texas Parks and Wildlife:

Kevin Hartke

Table 1. Historical Mid-Continent White-fronted Goose age ratios (% Imm.) and average young per family (Y/F). Data for 1979 and after are weighted by flock size. n = number of geese sampled. n* = number of families sampled

Year	n	% Imm	n*	Y/F
1956		33.8		1.18
1957		46.3		1.80
1958		42.8		2.30
1959		51.6		2.58
1960		50.4		2.83
1961		19.7		2.04
1962		36.4		2.08
1963		49.7		2.82
1964		28.9		2.37
1965		36.8		2.75
1966		43.8		2.92
1967		36.2		2.57
1968		34.4		2.80
1969		41.2		2.87
1970		44.5		2.72
1971		34.4		2.36
1972		28.4		2.29
1973		42.8		2.70
1974		32.6		2.37
1975		41.9		2.29
1976		21.2		2.18
1977		38.1		2.35
1978		8.9		1.49
1979		33.0		3.18
1980		34.0		2.26
1981		36.6		2.04
1982		29.9		1.80
1983		38.0		2.15
1984		44.7		1.79
1985		30.9		1.62
1986		29.5		1.61
1987		24.6		1.39
1988		28.5		1.52
1989		32.2		1.87
1990		29.2		1.69
1991		29.4		1.76
1992		21.2		1.61
1993		29.2		1.45
1994		33.0		1.70
1995		40.2		1.82
1996		40.7		1.52
1997		30.8		1.46
1998		34.7		1.88
1999		37.2		1.83
2000		36.9		1.96
2001		32.1		1.73
2002		34.1		1.94
2003	17658	40.0	1289	1.91
2004	14726	31.7	715	1.68
2005	23360	38.3	786	1.68
2006	30784	37.6	1674	1.91
2007	28084	24.7	736	1.44

2007- 2008
Western Central Flyway Light Goose
Productivity Report



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WESTERN CENTRAL FLYWAY LIGHT GOOSE PRODUCTIVITY REPORT – WINTER 2007-2008

Philip Thorpe, Division of Migratory Bird Management, Lakewood, CO

ABSTRACT: Productivity appraisals of the Western Central Flyway Light Goose Population (WCFP) were conducted in 3 U.S. States and 1 Mexican State between 26 November 2007 and 22 January 2008. These surveys yielded a combined population estimate of 225,015 light geese. We estimate the WCFP was composed of 66.7% adult snow/blue geese and 33.3% adult Ross's geese. The blue morph comprised 3.2% of the adult snow goose population. The average percentage of immatures in our samples was 11.4% for snow/blue geese and 9.7% for Ross's geese. The average number of immatures per snow goose family was 1.7. Productivity of snow geese was 52.5% and 44.1% lower than 2006 and the 1984-2006 average, respectively. The productivity of Ross's geese was 52.0% and 42.9% lower than 2006 and the 1984-2006 average, respectively. A colder than normal spring and more snowfall during the nesting period in the central and western Arctic delayed nesting for both light goose species and resulted in below average production for the WCFP this year.

Surveys assessing flock characteristics of light geese have been conducted on migration and wintering grounds in the Central Flyway since 1978. The procedures for these appraisals are from Lynch and Singleton (1964) and Lynch (1969). The method of flock sampling was described by Drewien (1988). Flock size, species composition, color morph, adult: immature ratio, and family size are collected at major migration and wintering areas in Colorado, New Mexico, Texas, and Chihuahua, Mexico. Habitat conditions and specific information on surveys in the Middle Rio Grande Valley, NM and in Chihuahua are reported in Appendix A.

RESULTS AND DISCUSSION

The 2007-2008 productivity appraisals for the WCFP involved Colorado, Texas, New Mexico, and Chihuahua, Mexico and included 17 concentration areas (Fig. 1). Light goose flocks were surveyed during the following dates: Texas, 3-5 December; New Mexico, 4-6 December (Bitter Lake and Maxwell NWRs), 21-24 December (Rio Grande Valley, Appendix A); Colorado, 26-29 November; and Chihuahua, 11-22 January (Appendix A).

The WCFP breeds primarily in the central and western Canadian Arctic and have large nesting colonies near the Queen Maud Gulf and on Banks Island. A colder than normal spring, more snow cover than average, and snow fall during the nesting period, delayed nesting for both Ross's and snow geese from Queen Maud Gulf and areas to the east. Biologists predicted well-below average production for the WCFP of light geese based on these factors (U.S. Fish and Wildlife Service 2007). Our estimates reflected these predictions and were well-below average for both species (Table 2).

According to the National Drought Mitigation Center (2008), light goose wintering areas in Colorado, Texas, and eastern New Mexico were abnormally dry during

November through January. Across the U.S. portion of the WCFP wintering range, mean temperatures varied. Mean temperatures in Colorado remained below average during November, December, and January (National Oceanic and Atmospheric Administration 2008). Texas had mean temperatures that were above average in November and December and average in January. Mean temperatures in New Mexico were average in November and December and below average in January (National Oceanic and Atmospheric Administration 2008).

Food supplies in the tri-state survey area appeared to be adequate for migrating and wintering populations of light geese this year. The counties of Hartley, Moore, Sherman and Dallam have the highest concentrations of light geese in the Texas Panhandle and all have had increases in cotton production during the last 5 years. Cotton acreage in Moore County, where Cactus Playa is located, has increased from 2,800 acres planted in 2003 to 32,400 acres planted in 2006, the last year reported (U. S. Department of Agriculture 2008). Similarly, Sherman County, just north of Cactus Playa, reported 1,400 acres planted in 2003 and 23,700 acres planted in 2006 (U. S. Department of Agriculture 2008). With the construction of a cotton gin 2 miles southwest of Cactus Playa in 2006, it does not appear that the increasing trend in Panhandle cotton production is going to change soon.

At Bitter Lake NWR, we found fewer light geese and a smaller proportion of Ross's geese than in previous years. Our samples were taken from geese loafing on the refuge pools late in the day rather than while feeding because the geese were feeding and loafing on private land that was inaccessible in the morning. Due to a change in farming practices, most of the White Farm unit of the refuge is now planted in alfalfa. In the past, the refuge managed the White Farm unit using corn and sorghum to lure geese and control off refuge crop depredation and our samples were easily taken on the refuge. Although appraisals are better when taken while geese are feeding in the field, I believe the lower Ross's goose proportion was real and not a survey bias. Sampling on the water can lead to some bias because Ross's geese form clusters within snow goose flocks, but I believe we were able to get a representative sample (36%) of the total population estimate. The lower light goose estimates and fewer Ross's geese may be a result of the change in refuge farming practices or simply survey timing in relation to goose migration this year.

An 18.7% sample ($n = 41,988$) of the total light goose population estimate was classified by species, age, and color morph (white or blue) (Table 1). Snow/blue and Ross's geese comprised 66.7% and 33.3% of the adults sampled, respectively (Table 1, Fig. 2). The proportion of adult Ross's geese (33.3%) was 41.1% higher than the 2006 estimate and reflected the increasing trend of Ross's geese in the population (Table 2). The total 2007 WCFP estimate was -20.4% lower than the 2006 estimate, but remained 14.0% higher than the 1984-2006 average (Table 2, Fig. 3).

Lesser Snow Geese

Immature snow/blue geese accounted for 11.4% ($n = 3,217$) of 28,173 snow/blue geese sampled (Table 1). Of 24,956 adult snow/blue geese sampled, 3.2% ($n = 798$) were blue morph (Table 1). Average family size was 1.7 immatures/family ($n = 808$ families), a 26.1% decrease from 2006 and 36.6% lower than the 1984-2006 average (Table 2). We

observed 5 snow goose neck-collars during the survey, 1 in New Mexico and 4 in Colorado (Table 3).

Ross's Geese

Immature Ross's geese represented 9.7% ($n = 1,343$) of the 13,815 Ross's geese sampled (Table 1). This was 52.0% and 42.9% lower than the 2006 estimate and the 1984 - 2006 average, respectively (Table 2). Estimates of immatures ranged from 13.6% in Colorado to 8.6% in Texas (Table 1). We observed 9 Ross's goose neck-collars during the survey this year including 2 in eastern New Mexico, 4 in Colorado, and 3 in Texas (Table 3).

I want to thank the agencies and field stations listed as contributors for their support of this survey. Thanks to landowners in Texas and Colorado for allowing access to their land. I thank Tim Moser and Rod Drewien for comments that helped improve this report.

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Table 1. Distribution and flock characteristics of the Western Central Flyway Light Goose Population, winter 2007-2008.

Location	Population estimate ¹	Flock composition by area, state/country, and flyway											
		Species composition			Snow/blue goose age ratios and flock composition				Ross's goose age ratios		Snow/blue family size		
		<i>n</i>	% snow/blue ²	% Ross's ²	Adult snow/ blue	Immature snow/ blue	% imm. snow/blue	% blue ²	Ad.	Imm.	% imm.	No. of families	Avg. imm./ family
COLORADO													
Lamar Area	20,500	4,334	85.6	14.4	3,168/142	318/ 38	9.7	4.3	559	109	16.3	8	1.6
Rocky Ford Area	9,000	3,273	90.3	9.7	2,506/89	359/ 18	12.7	3.4	278	23	7.6	3	1.3
Colorado total	29,500	7,607	87.6	12.4	5,674/231	677/ 56	11.0	3.9	837	132	13.6	11	1.5
TEXAS													
Cactus Lake	24,500	4,117	70.0	30.0	2,488/139	247/ 12	9.0	5.3	1,125	106	8.6	8	1.5
Dalhart Area	28,200	6,082	43.3	56.7	2,246/123	305/ 8	11.7	5.2	3,106	294	8.6	-	-
Texas total	52,700	10,199	54.1	45.9	4,734/262	552/ 20	10.3	5.2	4,231	400	8.6	8	1.5
NEW MEXICO													
Bitter Lake NWR	3,200	1,159	77.1	22.9	801/29	58/ 0	6.5	3.5	247	24	8.9	30	1.8
Rio Grande Valley	57,925	10,906	67.1	32.9	6,331/150	915/ 27	12.7	2.3	3,181	302	8.7	241	1.8
Maxwell NWR ³	40	0											
New Mexico total	61,165	12,065	68.1	31.9	7,132/179	973/ 27	12.0	2.4	3,428	326	8.7	271	1.8
MEXICO													
Mexico total ⁴	81,650	12,117	62.9	37.1	6,618/126	893/ 19	11.9	1.9	3,976	485	10.9	518	1.7
Western Central Flyway total	225,015	41,988	66.7	33.3	24,158/798	3,095/ 122	11.4	3.2	12,472	1,343	9.7	808	1.7

¹ Estimate was from partial ground surveys and is independent of the official winter waterfowl survey.

² Generated using adult component only.

³ Data from refuge surveys, flocks were not appraised.

⁴ See Appendix A for flock characteristics by individual survey area.

Table 2. Population estimates and productivity data for the Western Central Flyway Light Goose Population, winters 1960-2007.

Year	Population estimate ¹	Average flock composition				% Immature		Snow/blue family size		
		No. geese		% Snow/blue ²	% Ross's ²	% Blue ²	Snow/blue	Ross's	Avg. imm./	No. families
		sampled							family	sampled
1960	5,826 ³									
1961	12,349 ³				2.5					
1962	7,997 ³				3.0					
1963	44,402 ³				2.3	17.0				
1964	23,321 ³				1.8	12.0				
1965	38,167 ³									
1966	231 ³				2.3					
1967	123 ³				1.3	50.0				
1968	5 ³				1.1					
1969	0 ³				0.8					
1970	34,806 ³				0.6					
1971	35 ³				1.0	47.0				
1972	0 ³				1.7	40.0				
1973	1,719 ³				1.0	13.0				
1974	16,341 ³				2.5	52.0				
1975	42,330				0.5	21.7				
1976	66,326				0.5	61.1				
1977	72,617				2.5	42.0				
1978	85,390 ³	5,787			1.0	39.3				
1979	94,283 ³	6,776	86.7	13.3	2.2	20.6	21.6			
1980	98,996 ³	8,833	85.6	14.4	3.5	35.2	30.7			
1981	75,073	5,705	84.4	15.6	2.6	25.1	22.1			
1982	141,702	2,512				12.7				
1983	36,493	8,988	71.1	28.9	1.8	39.9	19.2			
1984	63,043 ³	15,453	93.6	6.4	1.8	24.9	22.1			
1985	176,713	25,217	91.9	8.1	1.4	30.1	22.9			
1986	121,395	23,721	85.3	14.7	0.9	3.7	12.2	2.0	378	
1987	120,655	29,548	86.5	13.5	1.1	19.4	8.1	2.1	2,185	
1988	134,352 ³	27,241	86.2	13.8	1.1	27.3	16.3	2.3	1,603	
1989	172,813	31,689	89.1	10.9	1.7	21.0	27.2	2.1	1,214	
1990	166,900	28,321	84.2	15.8	1.3	21.5	12.3	1.9	1,297	
1991	91,739 ³	22,918	84.8	15.2	1.8	11.7	11.4	1.8	812	
1992	139,162	21,629	80.1	19.9	1.0	15.6	8.0	1.9	850	
1993	196,700	35,538	76.4	23.7	1.7	34.2	20.3	2.4	1,414	
1994	161,290	26,531	74.4	25.6	1.3	18.9	13.8	2.0	916	
1995	193,915	33,648	75.5	24.5	2.4	22.3	18.2	2.1	1,302	
1996	183,290	37,005	82.0	18.0	1.7	29.0	20.9	2.4	2,019	
1997	218,658	41,183	70.2	29.8	2.4	15.8	14.0	1.8	1,364	
1998	240,410	43,771	75.4	24.6	1.9	31.8	24.9	2.1	2,202	
1999	309,861	44,072	78.9	21.1	3.1	27.3	27.4	2.2	2,161	
2000	221,736	40,270	75.9	24.1	2.3	12.6	12.8	1.8	1,066	
2001	211,640	37,783	76.0	24.0	1.9	9.8	18.7	1.8	816	
2002	236,775	47,868	69.0	31.0	1.8	7.8	14.9	1.6	841	
2003	192,132	33,537	73.2	26.8	2.0	20.6	21.1	1.9	1,140	
2004	228,065	32,089	63.2	36.8	3.7	14.9	10.5	1.9	991	
2005	173,708	35,959	63.4	36.6	3.1	28.1	11.8	2.3	982	
2006	282,680	40,304	76.4	23.6	3.0	24.0	20.2	2.3	1,094	
2007	225,015	41,988	66.7	33.3	3.2	11.4	9.7	1.7	808	
Average, 1975-83 ⁴	72,424	6,434	82.0	18.1	2.2	28.8	23.4	-	-	
Average, 1984-06 ⁵	197,425	34,484	77.4	22.7	2.0	20.4	17.0	2.0	1,275	
% change from 2006	-20.4	4.2	-12.7	41.1	6.7	-52.5	-52.0	-26.1	-26.1	
% change, '84-'06 avg.	14.0	21.8	-13.8	46.7	60.0	-44.1	-42.9	-15.0	-36.6	

¹ Population estimates preceeding 1978 are from the Mid-winter Waterfowl Survey, estimates following 1978 are from ground and aerial estimates made during productivity surveys. Coverage in Chihuahua, Mexico initiated in 1984.

² Generated using adult component only.

³ Incomplete survey coverage.

⁴ Average for surveys prior to the initiation of the Mexico survey in 1984. Population estimate average only includes years of complete survey coverage. Flock characteristic averages include 1978 - 1983 (years with a sample).

⁵ Average reflects the addition of the Mexico productivity survey that began in 1984. Population estimate average only includes years of complete survey coverage. Flock characteristic averages include all years from 1984 to 2006.

Table 3. Location and number of neck-collared lesser snow and Ross's geese observed during productivity surveys in Colorado, Texas, and New Mexico, December 2007 ¹.

Location	Snow					Ross's		Total
	Red ²	Black ³	Yellow ⁴	Green ⁵	Blue ⁶	Blue ⁴	Yellow ²	
COLORADO								
Lamar Area							3	3
Rocky Ford Area	1	1		2			1	5
NEW MEXICO								
Bitter Lake NWR		1					2	3
TEXAS								
Rita Blanca Res.							2	3
Cactus								0
TOTAL	1	2	0	2	0		4	14

¹ See Appendix A for location and number of collars seen in the Rio Grande Valley, NM and Chihuahua, Mexico.

² Baffin Island, West Hudson Bay, La Perouse Bay, Wrangel Island.

³ Western Arctic.

⁴ Central Arctic.

⁵ Akimiski Island, Cape Henrietta Maria, Southampton Island.

⁶ Alaska

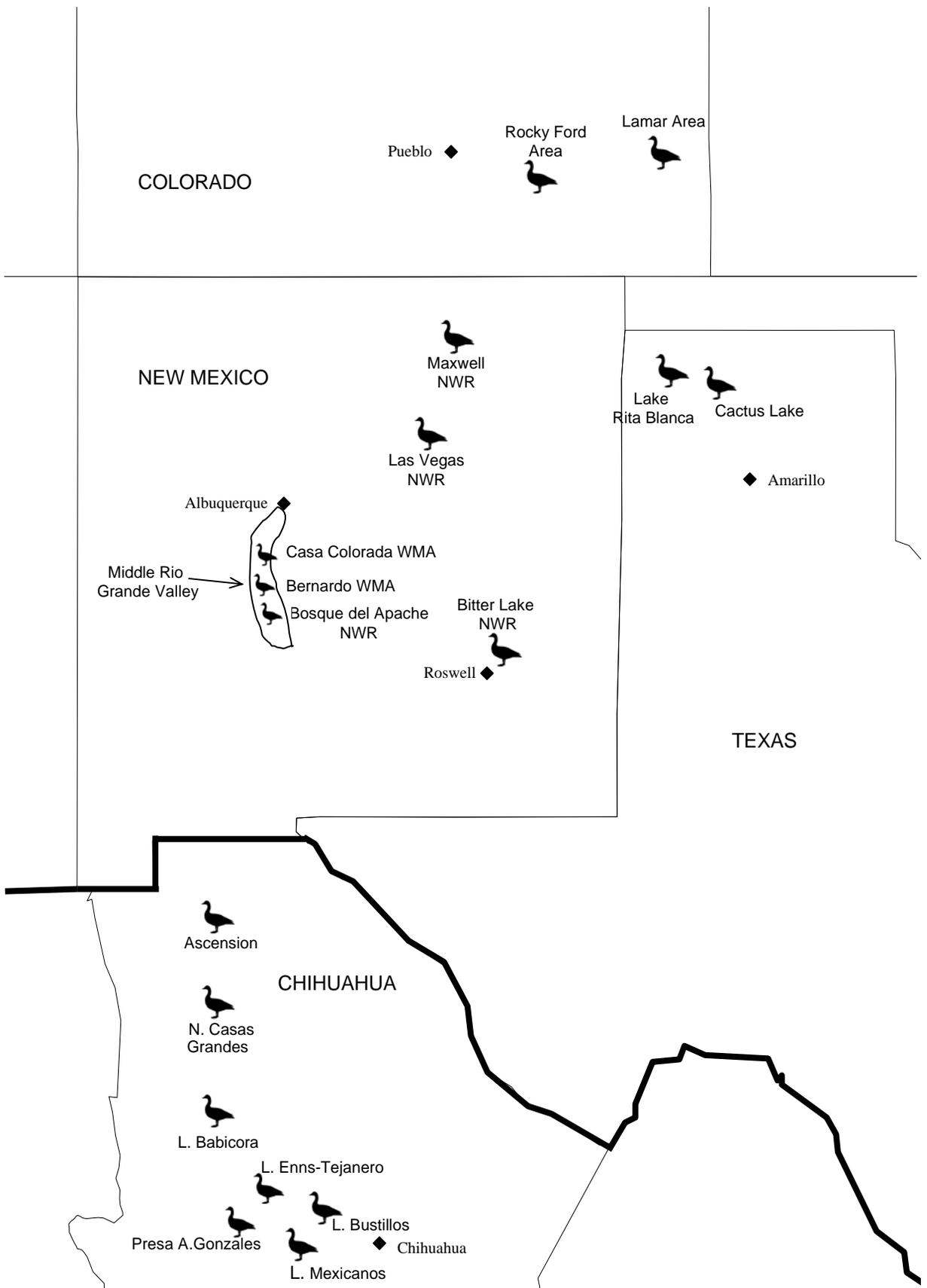


Fig. 1. Locations surveyed in the Western Central Flyway to assess species composition and productivity of lesser snow and Ross's geese, fall and winter, 2007-2008.

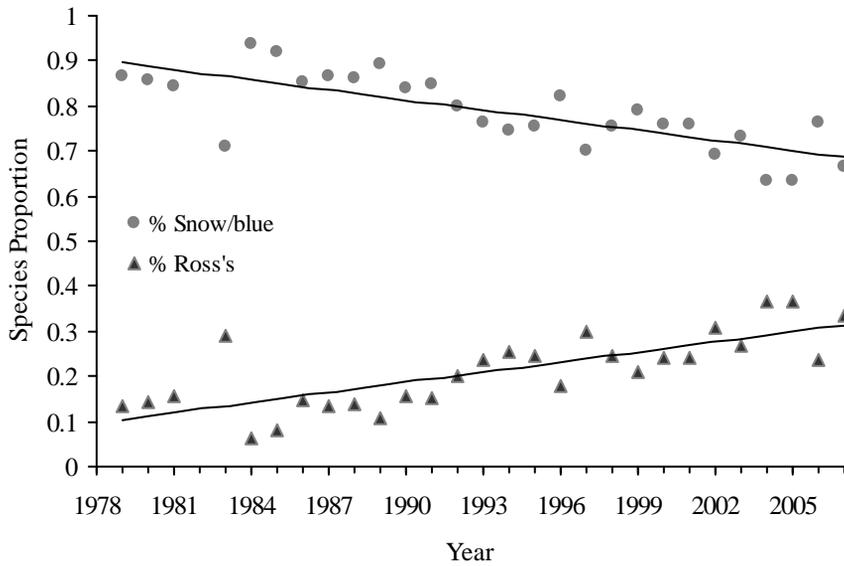


Fig. 2. Proportion of adult snow and Ross's geese in the Western Central Flyway Population, winters 1979–2007. Data for 1982 were unavailable.

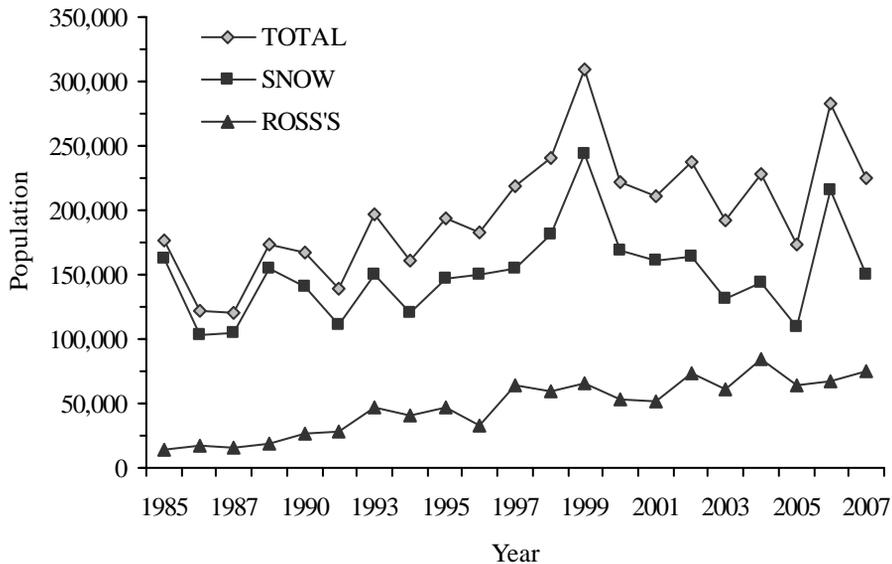


Fig. 3. Population estimates of Western Central Flyway light geese during winters 1985–2007. Incomplete survey years, 1988 and 1991, were excluded. Population estimates for each species were calculated using species compositions weighted for the Central Flyway based on annual estimates from this survey (see Table 2).

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**SNOW AND ROSS'S GEESE SURVEYS IN THE MIDDLE RIO GRANDE VALLEY,
NEW MEXICO, AND IN CHIHUAHUA, MEXICO, WINTER 2007-08**

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February 2008

ABSTRACT: Flocks of lesser snow geese and Ross's geese (light geese) were surveyed in the Middle Rio Grande Valley, New Mexico and at 7 areas in Chihuahua, Mexico during winter 2007-08. In New Mexico, geese peaked at 57,925 on 7 December, +25.3% above the 23-year mean. In Chihuahua, 81,650 geese were recorded at 7 areas during 11-22 January and numbers were +6.8% above the mean. An estimated $\approx 135,700$ light geese were at survey sites in the Rio Grande Valley, New Mexico and at 7 areas in Chihuahua in mid January 2008. Samples of geese (New Mexico-10,906, Chihuahua-12,117) were classified by species, color morph and age. Species composition of adults in New Mexico was 67.1% snow geese and 32.9% Ross's geese; 2.31% of adult snow geese were blue morph. In Chihuahua, 62.9% of adults were snow geese and 37.1% were Ross's geese; 1.87% of adult snow geese were blue morph. The percentages of immature snow geese were 12.7% in New Mexico and 11.9% in Chihuahua, and were -36.8% below and -42.0% below the 23-year means, respectively. The mean number of immatures per family was 1.78 in New Mexico and 1.69 in Chihuahua. Ross's geese averaged 8.7% and 10.9% immatures in New Mexico and Chihuahua; recruitment was -37.4% and -37.8% below average, respectively. Six rare blue morph Ross's geese were recorded during surveys.

Snow and Ross's geese wintering in New Mexico and the Northern Highlands of Mexico, including the state of Chihuahua, belong to the Western Central Flyway Light Goose Population (Central Flyway Council 1982). Most originate from nesting colonies in the western and central Canadian Arctic with smaller numbers from Alaska and west Hudson Bay colonies. Rare neckbanded individuals from Wrangel Island, Russia and eastern Arctic colonies on Baffin and Southampton Islands, LaPerouse Bay and Cape Henrietta Maria also have been recorded. The author has monitored wintering light geese flocks for various population parameters in the Middle Rio Grande Valley, New Mexico annually since 1978 and at 5-7 locations in Chihuahua, Mexico since 1984.

Locations surveyed in the Middle Rio Grande Valley in 2007 included the Bosque del Apache NWR (Bosque Refuge), the State Waterfowl Management Area at Bernardo (Ladd S. Gordon SWMA), and the Edeal Dairy near Los Lunas. These winter sites were described by Taylor and Kirby (1990). In Chihuahua, 7 wetland units were surveyed (Ascension; N. Casas Grandes; Babicora-Madera valleys; Lagunas Tascate-Tejanero-Enns; Laguna Bustillos, Laguna de los Mexicanos; A. Gonzales Reservoir). Laguna Encinillas has not been surveyed since 1996 and in 1997-98 we substituted a new unit consisting of 3 adjacent wetlands, Lagunas Enns, Tejanero and Tascate (Drewien and Shea 1998). These 3 smaller wetlands are in the north end of the Cuauhtemoc Valley in west-central Chihuahua and northwest of Laguna Bustillos in the Mennonite farm country. Various areas surveyed in Chihuahua were described by Saunders and Saunders (1981), Drewien and Brown (1985, 1987, 1993), Turner et al. (1994) Drewien et al. (1996, 2003), and Drewien and Shea (1998).

Information collected from flocks at each location included estimates of total numbers, species composition, color morph (white:blue), adult:immature composition, and family size for snow geese; neckband sightings were also recorded. Proportions of snow:Ross's geese and % blue morphs were calculated from samples of adults only. Flock survey methods have been described elsewhere (e.g., Drewien and Brown 1985, 1993, Drewien et al. 2003) and include recording spot samples of 50-150 geese at intervals along a continuous "W" pattern to insure sampling along edges and within interior of flocks. This is important for

sampling Ross's geese as they often concentrate in the interior of mixed light geese flocks, and juveniles can gather in aggregations (10-100s) on occasion. We surveyed geese in the Middle Rio Grande Valley on 21-24 December 2007 and in Chihuahua from 11-22 January 2008.

Surveys were funded by the U.S. Fish and Wildlife Service, Division of Migratory Bird Management. We thank Philip Thorpe for providing funds for the survey. John Vradenberg, Bosque Refuge, and Tim Mitchusson and Dave Wilson, New Mexico Department of Game and Fish, kindly provided goose count data and other information for the Middle Rio Grande Valley. I thank Tom Drewien for assisting with field surveys in Chihuahua and Dr. Alberto Lafon for providing information on wetland habitat conditions and goose distribution.

RESULTS AND DISCUSSION

Habitat and Survey Conditions

Wetland habitat conditions were good in the Middle Rio Grande Valley and corn production at the Bosque Refuge was average (J. Vradenberg, pers. comm.). New Mexico Game and Fish Wildlife Management Areas (Bernardo, Belen, Casa Colorada) had excellent corn yields (T. Mitchusson and D. Wilson, pers. comm.).

Some 2,000 light geese died during January-February 2008 from avian cholera at Bosque Refuge and hundreds more at the state management area at Bernardo. Much effort was expended picking up birds and attempting to improve habitat conditions to reduce mortality. Higher mortality rates in 2008 were believed to be related to abnormal increase in inclement and colder winter weather.

In Chihuahua, wetland water levels were variable but generally average to low. At Ascension, Laguna Paraje was dry and Laguna San Juan almost dry; most geese and other waterfowl and cranes were at Laguna Colorada where water levels were low. The two adjoining reservoirs at N. Casas Grandes had low water levels. At Laguna de Babicora very little water was present and Laguna Golondrinas in the adjacent Madera Valley was dry although the small Penitas Reservoir was full. No geese, however, were found in the Babicora-Madera valleys. A park employee at Penitas Reservoir reported that light geese had been present in December but had left the area by January; several residents in the Babicora Valley also reported that geese had been present earlier in the winter but had left before mid-January. We visited these valleys twice (14, 22 Jan) and did not locate any geese. Water levels were variable in the Cuauhtemoc Valley with low water and much exposed mud flats at Laguna de los Mexicanos to high water levels at Laguna Enns. High water levels prevailed at A. Gonzales Reservoir.

In recent years, fewer geese have been found at Abraham Gonzales Reservoir. Recently constructed recreation facilities including a shoreline park with picnic facilities and a boat launch have encouraged increased human use of the reservoir, especially by motor boats for winter fishing. The decline in geese and other waterfowl using the reservoir in recent years appear to be related to the increase human use. For 19 years (1985-2003) an average of 10,629 light geese (peak-23,000, 1992) have been recorded at the reservoir but numbers have declined to a mean of 1,913 (range, 400-3,400) since winter 2004. Sharp declines in other waterfowl species use has also been noted in recent years; formerly Sandhill cranes roosted there but none have been recorded recently.

Pintail was the most abundant and widely distributed duck species observed, with an estimated 49,000 recorded during the survey. All locations held >5,000 except N. Casas Grandes and Abraham Gonzales Reservoir; the largest concentration (12,500) was at Laguna Tejaneros. Some 4,500 white-fronted

geese were in the Cuauhtemoc Valley with the largest concentration (1,900) at Laguna Tejanero. One small Canada goose was observed at Laguna Tejanero associated with snow and Ross's geese.

Laguna Tejanero appears to be still threatened by drainage. A partially constructed drainage ditch was dug during January 2007 leading to a nearby major drain in an arroyo (Fig. 1). Little additional work had been done on this drain by January 2008. The drain dead ends in marsh vegetation near the northern shore and acts as a spillway to maintain lower water levels. In a period of high runoff it could incise and further lower water levels. A water control structure would be beneficial to regulate water levels and prevent additional down cutting that would further reduce water levels or drain the wetland. This important wetland receives very high use by wintering geese and other water birds, and is farmed during drought years. In January 2007, an estimated 13,500 light geese, 3,500 white-fronted geese, and >8,000 pintail were present. In January 2008, 11,800 light geese, 1,900 white-fronted geese, 12,500 pintail, 2,500 other ducks (mainly Mexican duck, shoveler, green-winged teal, wigeon), 280 long-billed curlews, and hundreds of other shorebirds. This wetland is privately owned by two Mennonite families and hunting is not allowed due to the proximity of their dwellings. Efforts to preserve this important wetland should be undertaken by cooperative agreement or easement by federal or state agencies or NGOs (e.g., DUMAC, PROFAUNA, PRONATURA).

Lesser Snow Goose and Ross's Goose Populations

New Mexico: A peak winter population of 57,925 light geese was recorded in the Middle Rio Grande Valley on 7 December (Tables 1 and 2). The peak population estimate was +25.3% above the 23-year mean (46,237). A population of 49,100 was present in the Rio Grande Valley during the 3rd week of the December when this survey was conducted and 54,075 were in the Valley during the mid January survey period in Chihuahua (Table 2). On 20 February 2008, a record high 75,000 light geese was recorded in the Middle Rio Grande Valley and apparently included large numbers of migrants moving north from the Mexican Interior Highlands. The large population increase in February is not considered part of the normal over-wintering population.

A total of 10,906 light geese was classified by species and age (Table 2). Classification of 9,662 adults yielded 67.1% snow geese and 32.9% Ross's geese (Table 2). The proportion of Ross's geese in 2007 was +60.9% above the 21-year mean (\bar{x} =20.5%). Of 6,481 adult snow geese classified, 2.31% (n=150) were blue morph (Table 2). During 23 winters, the percent blue morph averaged 1.74%, (sd=0.19) and has remained relatively constant (range, 1.5-2.1%) but increased to a record high of 2.31% this winter. Three adult blue morph Ross's geese were observed at Bernardo (1) and Bosque Refuge (2).

Chihuahua: A total of 81,650 light geese was recorded at survey units or +6.8% above the 23-year mean (76,440) (Tables 1 and 2). Largest numbers were at N. Casas Grandes (19,300) and Ascension (15,800).

We classified 12,117 light geese by species and age. Classification of 10,720 adults revealed that 62.9% were snow geese and 37.1% were Ross's geese (Table 2). Ross's geese comprised \geq 54.0% of light goose flocks at 3 sites (N. Casas Grandes, L. Bustillos-south, A. Gonzales Res.). The proportion of Ross's geese by site ranged from a low of 0% at L. Bustillos-north and 1% at L. Tascate to a high of 65.0% at A. Gonzales Reservoir. The proportion of adult Ross's geese is +59.8% higher than the 21-year mean. Three blue morph Ross's geese were observed at N. Casas Grandes (2) and Ascension (1).

Classification of 6,744 adult snow geese showed that 1.87% (n=126) were blue morph (Table 2), the highest proportion recorded in 24 years. The percentage of blue morph in Chihuahua averaged 0.60% (sd=0.11) between 1984-96 and had remained relatively constant over 13 years (range, 0.43-0.82) but increased to 1.13 during 1997-1998 winters and increased again averaging 1.51% during winters 1999-2005.

The blue morph continues to increase in proportion to white morph snow geese in Chihuahua. Presence of the blue morph during January 2008 varied by location with lows of 0.64% at Laguna Bustillo-north to a high of 2.49% at N. Casas Grandes (Table 2).

Recruitment Estimates

Snow Geese: Samples totaling 7,423 snow geese (includes blue morph) in New Mexico contained 12.7% immatures (Table 2) and was -40.7% below the previous 23-year mean (20.1%, 1984-06). The percent immatures for the small sample of blue morphs (n=129) was 16.3%. The mean number of immatures/family was 1.78 (Table 3). In Chihuahua, samples totaling 7,656 snow geese (includes blue morph) contained 11.9% immatures (Table 2) or -41.9% below the 23-year mean (20.5%). The percent immatures in a small sample of blue morphs (n=145) was 13.1%. The mean number of immatures/family was 1.69 (Table 3).

Ross's Geese: The percent immatures in a sample of 3,483 Ross's geese in New Mexico was 8.7% (Table 2), or -37.4% below the 21-year (1986-06) mean (13.8%). In Chihuahua, immatures averaged 10.9% and varied by location from 8.5% at L. Bustillos-south to 17.0% at Laguna Tejanero (Table 2). The 10.9% immatures was -37.8% below the 21-year mean (17.5%). Most immatures were not associated in family units during winter and data on family size were not collected (Drewien and Brown 1987).

Observations of Neckbanded Lesser Snow Geese and Ross's Geese

We observed 93 neckbanded geese (54-snow, 39-Ross's) including 46 in New Mexico and 47 in Chihuahua (Table 4). Neckbanded snow geese were mainly from western (black) and central (yellow) Canadian Arctic colonies, except for 2 red collars from eastern Arctic colonies (K. Meeres, CWS, pers. comm.). Six green collared snow geese were all banded during 2005-06 in the Queen Maud Gulf in the central Canadian Arctic (Table 4). Neckbanded Ross's geese were from the central Canadian Arctic (blue) and west Hudson Bay (yellow); the alpha-numeric codes on 2 white collared Ross's geese could not be read to determine marking locations.

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Table 1. Counts of lesser snow geese and Ross's geese in the Middle Rio Grande Valley, New Mexico, and at 5-7 sites in Chihuahua, Mexico, winters 1984-2007.

Year	Rio Grande Valley, NM ^{1/}	Chihuahua Mexico	Areas surveyed In Mexico	Comments
1984	41,375	25,800	6	Partial counts-Ascension & Babicora; NS 2/ A. Gonzales Reservoir
1985	62,399	90,900	7	
1986	36,902	56,129	7	
1987	39,400	56,175	7	
1988	42,367	73,900	5	NS-Bustillos, Mexicanos
1989	47,800	96,718	7	
1990	55,275	74,550	7	
1991	38,920	30,205	6	Partial count-Ascension, NS-Babicora
1992	31,000	88,562	7	
1993	46,200	105,700	6	NS-Encinillas
1994	47,950	81,140	6	Severe drought; NS-Encinillas, Partial count-Ascension
1995	45,082	57,715	7	Extreme drought-Babicora & Mexicanos dry
1996	49,200	87,100	7	Water levels low
1997	39,960	105,700	7	Water levels below normal, NS- Encinillas ^{3/}
1998	50,650	91,050	7	Extreme drought-Ascension, Babicora, Mexicanos dry
1999	56,400	86,600- 102,050	7	Partial count-Mexicanos
2000	55,600	78,905	7	Water levels very low, several wetlands dry
2001	59,050	85,930	7	Extreme drought, several wetlands dry
2002	38,000	133,975	7	Drought, water levels very low, Babicora dry
2003	34,900	60,225	7	Extreme drought-Ascension, Babicora, Mexicanos dry
2004	39,150	75,100	7	Water levels low but improved water levels in Dec due to heavy precipitation
2005	44,553	54,150	7	Water levels variable but all areas had water
2006	61,317	61,900	7	Water levels very high, heavy winter precipitation, geese widely dispersed and counts minimal
2007	57,925	81,250	7	Water levels low to average; no geese in the Babicora-Madera valleys

^{1/} Peak counts; data provided by J. Taylor, C. Lee, B. Lujan, J. Vradenberg, Bosque del Apache NWR, and T. Mitchusson, NMDGF (pers. comm.);

1986 count includes only the Bosque del Apache NWR

^{2/} NS = No Survey

^{3/} Lagunas Tejanero-Tascate-Enns substituted for L. Encinillas starting 1997-99.

Table 2. Population estimates and numbers of lesser snow geese and Ross's geese sampled in the Middle Rio Grande Valley, New Mexico, and Chihuahua, Mexico, winter 2007-08.

Location	Pop.	Adult	Snow/Blue geese Immature <u>1</u> / (%)	Total	Adult	Ross's geese Immature (%)	Total	Total geese
	Est.	snow/blue	snow/blue					
NEW MEXICO								
Rio Grande Valley	57,925 <u>2</u> / (54,920) <u>3</u> /	6,331/150	915/27 (12.7)	7,423	3,181	302 (8.7)	3,483	10,906
CHIHUAHUA								
Ascension	15,800	922/ 16	126/ 3 (12.1)	1,067	647	80 (11.0)	727	1,794
N. Casas Grandes	19,300	1,565/ 40	214/ 4 (12.0)	1,823	1,885	253 (11.8)	2,138	3,961
L. Babicora-Madera Valley	0							
L. Tascate	8,600	441/ 9	49/ 3 (10.4)	502	5	0 (0.0)	5	507
L. Tejanero	11,800	1,816/ 33	250/ 5 (12.1)	2,104	78	16 (17.0)	94	2,198
L. Enns	0							
L. Bustillos-north	9,500	620/ 4	78/ 2 (11.4)	704	0		0	704
L. Bustillos-south	6,800	566/ 10	78/ 2 (12.2)	656	717	67 (8.5)	784	1,440
L. Mexicanos	8,400	518/ 11	79/ 0 (13.0)	608	323	37 (10.3)	360	968
A. Gonzales Res.	1,450	170/ 3	19/ 0 (9.9)	192	321	32 (9.1)	353	545
Total/X	81,650	6,618/126	893/19 (11.9)	7,656	3,976	485 (10.9)	4,461	12,117

1/ % immatures include blue morph.

2/ Peak count in Valley, 1st week Dec 2007, (J. Vradenberg, pers. comm.).

3/ Estimated number of light geese in Middle Rio Grande Valley, New Mexico in mid Jan 2008 during Mexico survey.

Table 3. Family sizes of lesser snow geese in the Middle Rio Grande Valley, New Mexico, and in Chihuahua, Mexico, winter 2007-08.

Location	Immatures/family						Total families	Mean immatures per family
	1	2	3	4	5	6		
NEW MEXICO								
Rio Grande Valley	109	87	34	11			241	1.78
CHIHUAHUA								
Ascension	18	14	4	3			39	1.79
N. Casas Grandes	89	55	22	7	1		174	1.71
L. Babicora-Madera Valley							0	
L. Tascate	18	10	1	1			30	1.50
L. Tejanero	64	42	18	4	1		129	1.73
L. Enns							0	
L. Bustillos	47	33	13	1			94	1.66
L. Mexicanos	23	15	3	1			42	1.57
A. Gonzales Res.	4	5	1				10	1.70
Total Families (Mex)	263	174	62	17	2		518	1.69

Table 4. Locations and numbers of neckbanded lesser snow geese and Ross's geese observed in the Middle Rio Grande Valley, New Mexico and Chihuahua, Mexico, winter 2007-08.

Location	Snow geese				Ross's geese		Total
	Yellow	Black	Red	Green	Blue	Yellow	
<u>NEW MEXICO</u>							
Bosque NWR	14	11	1	3	4	4	37
Bernardo	3	2		1	2	1	9
Subtotal	17	13	1	4	6	5	46
<u>CHIHUAHUA</u>							
Ascension	2	1		1	1	4	9
N. Casas Grandes	1	2			7	5	17
L. Babicora-Madera Valley							
L. Tascate		1				2	2
L. Tejanero	4	6		1	1		12
L. Enns							
L. Bustillos			1			3	4
L. Mexicanos						2	2
A. Gonzales Res.					1		1
Subtotal	7	9	1	2	10	16	47
TOTAL	24	22	2	6	16	21	93



Figure 1. New drainage ditch constructed in January 2007 along right side of road at Laguna Tejanero, Chihuahua, Mexico. The ditch acts as a spillway to reduce high flows.

TITLE: Pacific Flyway Goose and Swan Productivity Surveys – 2007

SPECIES SURVEYED: Lesser Snow Goose (Chen caerulescens)
Ross's Goose (Chen rossii)
Greater White-fronted Goose (Anser albifrons albifrons)
Tule Greater White-fronted Goose (Anser albifrons gambelli)
Tundra Swan (Cygnus columbianus)
Trumpeter Swan (Cygnus buccinator)

COMPILED BY: Elizabeth Huggins, Flyway Biologist, USFWS/Division of
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ABSTRACT:

Pacific Flyway productivity surveys for lesser snow geese, Ross's goose, greater white-fronted geese, Tule greater white-fronted geese, and tundra swans were conducted during October 2007 to February 2008. Survey areas included British Columbia, Washington, Oregon, California, Utah and Wrangel Island, Russia. The data indicates that productivity for lesser snow geese decreased 13%, decreased 39.3% for Ross's geese, increased 5.7% for Greater white-fronted geese, increased 6.3% for Tule greater white-fronted geese, decreased 63% for tundra swans from 2006 estimates and increased 22.6% for trumpeter Swans. Above average precipitation was recorded throughout much of the Pacific Northwest during the 2007-2008 fall and winter. Below average precipitation was recorded in northern California during the 2007/2008 winter and 2008 spring.

METHODS:

The procedures followed in conducting these appraisals are found in Lynch and Singleton (1964) and (1969). Additional techniques include analyzing aerial photographs and ocular sightings from aircraft. For this report the terms juvenile, immature, and young all refer to birds hatched in 2007.

RESULTS:

Lesser Snow Goose:

Western Arctic: No report

Mixed flocks: Table 1.

A total of 12,607 lesser snow geese were observed at the Sacramento and Delevan NWR from October to November 2007 with a result of 24.2% juvenile lesser snow geese (n= 9547 adults and 3060 juveniles). This was a decrease of 13% from the 2006 observations.

Wrangel Island: Table 2 and 3.

Data collected on Wrangel Island in 2007 indicated a total spring population of 140 thousand lesser snow geese. Age ratio data was not reported this year. The breeding population of 79 thousand was 15.2% lower than last year. The percentage of successful nests (84.4%) was 3.8% lower than last year.

Data collected for the Fraser/ Skagit deltas winter 2007 indicate 21.8% young. This is a slight decrease from last years count (21.2% juvenile). Total population estimates this year were 94,859 snow geese compared to last years count of 83,148.

Ross' Goose: Table 4.

Ross's goose data was collected at Sacramento NWR in November 2007. A total of 2277 total birds were observed and aged which revealed 15.4% juvenile Ross's geese (n=1926 adults and 351 juveniles). This was a 39.3% decrease from last year estimate of 25.4% juvenile birds.

Greater White-fronted Goose: Table 5.

Greater white-fronted goose data was collected at Colusa, Delevan NWR, Sacramento, Sutter, and Butte Sink NWR from October to November 2007 with a result of 29.3% juvenile Pacific greater white-fronted geese(n=4365 adults and 1807 juveniles). This was a 5.7% increase in productivity from last years observations.

Tule Greater White-fronted Goose: Table 6.

Tule greater white-fronted geese were observed at Sacramento, Delevan and Colusa NWR from September to November 2007 with a result of 32.4% juvenile geese (n= 2117 adult and 1016 juvenile geese). This was a 6.3% increase from last years observations.

Tundra Swan: Table 7 & 8.

Tundra Swan data collected in Utah had a result of 11.2% juvenile Tundra Swans (n= 17,692 adults and 2232 juveniles) with 1.6 young/family.

Tundra Swan data was collected in the Summer Lake Wildlife Area from November 2007 to January 2008 with a result of 13% juvenile Tundra Swans (n= 7733 adults and 1153 juveniles) with 1.95 young/family.

Combined Tundra Swan surveys conducted in the Sacramento Valley from November 2007 to January 2008, revealed a productivity rate of 12 % juveniles (n = 9873 total birds consisting of 8814 adults and 1059 juveniles) which was a 400.6% improvement from last years estimates of 2.4% juvenile swans. Two-hundred twenty-two broods were observed from an average family size of 1.8 and was similar to the average brood size of 1.7 from 2006.

Combined production for the Utah, Summer Lake and Sacramento areas was 11.2%. This is a decrease of 62.9% from last year.

Trumpeter Swan (Rocky Mountain Population): Table 9.

Data are provided from the annual fall survey and report, Trumpeter Swan Survey of the Rocky Mountain Population (RMP), Fall 2007. This report was formerly the Tristate Trumpeter Swan Survey Report (1967-1991) and was written and distributed by personnel from Red Rock Lakes NWR. The following is an excerpt from the 1993 report:

The current survey includes traditional Trumpeter Swan habitat in Montana (Centennial Valley, Madison River, upper Yellowstone River and surrounding area), Idaho (and area north of the south Fork of the Snake River and east of Camas NWR) Wyoming (Yellowstone National Park, Grand Teton National Park, National Elk Refuge, the South Fork of the Snake River and surrounding areas), the East Rocky Mountain Front in Montana, Gray's Lake NWR and lower Snake River in Idaho, Ruby Lake NWR in Nevada, Malheur NWR and Summer Lake WA in Oregon, and the Salt and Green Rivers in Wyoming.

The primary purposes of the survey are to document the size of the resident trumpeter swan flocks and to enumerate the annual production of cygnets to fledgling age. The survey also provides some information on territorial occupancy and the distributions of failed breeders and non-breeders from year to year.

Observers from the Fall 2007 RMP survey counted 527 total swans in the U.S. Breeding segment of this population, a count 4% higher than last year(507) and the highest count since 1992. The number of white birds (411) was similar to last year (416) but the number of signets (116) was 40% higher compared to counts in 2006.

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Table 1. Historical productivity records for Lesser snow geese in the Pacific Flyway 1961 to present.																					
Year	Population* Indices	Western Arctic					Miscellaneous Flocks			Summer Lk., OR			Mixed Flocks Klamath Basin, OR & CA			Sacramento Valley, CA			Mixed Flocks Productivity		
		(thousands)	Ad.	Juv.	%Juv**	Yg/Fam	Ad.	Juv.	%Juv.	Ad.	Juv.	%Juv.	Ad.	Juv.	%Juv.	Ad.	Juv.	%Juv.	Yg/Fam	% Juv.	
1961	541														6428	1665	20.6		1.8	20.6	
1962	483						4008	1673	29.5										2.1	29.5	
1963	454						3050	1336	30.5										2.1	30.5	
1964	483														10882	3262	23.1		1.8	23.1	
1965	294											3276	165	4.8	5646	276	4.7		2.0	4.7	
1966	441						4785	4594	49.0										2.6	49.0	
1967	747						17929	3494	16.3										1.7	16.3	
1968	506						9904	3042	23.5										1.9	23.5	
1969	413						5595	2192	28.2										2.1	28.2	
1970	462						3394	2001	37.1										2.2	37.1	
1971	513						4565	1170	20.4										1.7	20.4	
1972	436						6030	895	12.9										1.7	12.9	
1973	324																		2.2	39.1	
1974					1.0														1.0	1.0	
1975																			2.2	46.9	
1976					75.1														2.0	44.8	
1977																			1.8	35.1	
1978																			1.9	35.7	
1979	528				3.1														1.7	24.6	
1980	204				3.3		2400	1238	34.0						1037	426	29.1		2.0	32.6	
1981	760				11.3				29.9				1580	420	21.0	2595	1202	31.6			
1982	354	8640	7360	46.0								3221	227	6.6	2666	232	8.0			7.2	
1983	548				26.8																
1984	466				32.0	2.6			25.6											31.0	
1985	550				40.0	2.3														44.0	
1986	522				2.6				5.0											5.0	
1987	525				37.0															22.0	
1988	441				42.0															35.0	
1989	464				19.3,28	2.1														24.0	
1990	709														1382	620	31.0			31.0	
1991	690														2372	610	7.8			7.8	
1992	639																			18.0	
1993	569						889	1011	53.2	653	595	47.7			3865	1917	33.2			39.5	
1994	478									1354	312	18.7			3360	538	13.8			15.3	
1995	501														544	227	29.4			29.4	
1996	366									3567	1130	24.0								24.0	
1997	416																				
1998	354									4168	1185	22.1			197	41	20.8			21.9	
1999	579									9775	2669	21.4								21.4	
2000	657									858	444	34.1								34.1	
2001	448									3077	828	21.2			6259	638	10.2	1.9		13.6	
2002	597									2957	1766	37.4			7697	1082	12.3			21.1	
2003	588									1269	255	16.7	10356	2754	21.0	4921	1491	23.3		21.4	
2004	750									1429	442	23.6				6848	2368	25.7		25.3	
2005	711									822	606	42.4				6537	3527	35.0		36.0	
2006	800														15064	5802	27.8			27.8	
2007	1074														9547	3060	24.2			24.3	
Mean	533	8640	7360	27	2		5686	2059	28	2911	963	27	4608	892	18	4906	1440	24	2	25	
% change from mean	101														95	112	1			-4	
% change from 2006	34														-37	-47	-13			-13	

See individual Annual Winter Productivity Report narrative which credits participants with their respective data set for each area.

For Wrangel Island Lesser snow goose age ratio data see Table 2.

*Population indices include Western Arctic Snow/Ross's geese combined & Wrangel Island Snow geese compiled from surveys conducted in December.

**Percent Juv. columns with more than one estimate of productivity included sample sizes that are not available.

Table 2. WRANGEL ISLAND SNOW GOOSE POPULATION / PRODUCTIVITY DATA (FROM V. BARANYUK)

YEAR	TOTAL SPRING POP.	ADULTS SPRING	%JUV SPRING	BREED POP	COLONY SIZE (HA)	NESTS	%SUCC. NESTS	CLUTCH SIZE	BROOD SIZE LV COLONY	BROOD SIZE LV ISLAND
1966								3.6		
1967								4.9		
1969				114.0	1962	58.2		3.7		
1970	150.0	120.0	20.0	120.0	2600	60.0	96.0	3.7	3.5	2.5
1971	132.0	120.0	9.1	24.0	825	12.0	55.0	4.7	3.4	2.3
1972	107.0	106.0	0.6	36.0	950	18.0	45.0	4.2	3.5	2.3
1973	86.0	85.9	0.0	12.0	200	6.0	67.0	6.0	3.9	
1974	70.0	69.5	0.7	32.0	800	15.0	0.0	4.7		
1975	56.0	56.0	0.0	56.0		28.0	74.4	3.8	3.4	2.4
1976	58.0	46.0	20.7	46.0	1840	23.0	79.0	3.7	3.2	2.8
1977	68.2	57.2	16.1	10.0	400	5.0	76.8	5.0	3.7	
1978	65.4	64.9	0.8	42.0	2200	21.0	80.0	4.2	3.7	2.4
1979	84.5	62.1	26.5	60.0	1860	30.0	90.0	3.8	3.6	
1980	90.7	80.3	11.5	20.0	315	10.0	70.0	5.4	3.3	
1981	89.0	86.2	3.2	78.0	2118	39.0	95.0	4.0	3.7	3.1
1982	100.0	81.0	18.5	28.0	688	14.0	65.0	4.1	3.2	2.8
1983	95.0	92.8	2.4	3.4	125	1.7	5.9	4.8		
1984	85.0	85.0	0.0	42.0	1500	21.0	83.3	3.7	3.2	2.1
1985	85.0	80.0	5.4	50.0	1457	25.0	87.7	3.7	3.2	2.4
1986	90.0	70.0	20.4	58.0	2100	29.0	90.0	3.9	3.6	3.2
1987	100.0	85.0	15.0	47.0	1900	23.5	80.0	3.7	3.4	2.8
1988	80.0	80.0	17.7	13.0	675	6.5	51.0	5.2	3.4	2.7
1989	70.0	70.0	1.4	60.0	1025	30.0	60.0	3.8	3.3	
1990	60.0	60.0	0.0	53.0	940	26.5	49.2	3.8	3.2	2.2
1991	60.0	56.0	6.6	41.6	888	20.8	82.0	4.1	3.4	2.7
1992	70.0	56.0	20.0	46.2	742	23.1	70.1	4.0	3.5	3.5
1993	65.0	64.5	0.8	52.2	910	26.1	85.1	3.9	3.2	
1994	70.0	52.5	25.0	30.0	1000	15.0	13.0	2.8	2.1	
1995	65.0	64.0	0.8	8.8	430	4.4	50.0	4.7	2.8	
1996	75.0	75.0	0.0	75.4	740	37.7	75.4		3.7	2.4
1997	85.0	70.0	15.0	55.2	628	22.6	71.2	4.0	3.5	
1998	90.0	80.0	10.0	31.8	750	15.9	66.0	4.6	3.5	
1999	90.0	85.0	5.6	20.8	278	10.4	75.0	4.7	3.3	
2000	95.0	87.4	8.0	49.6	738	24.8	87.8	3.5	3.2	2.8
2001	105.0	92.4	12.0	48.0	900	24.0	87.0	3.6	3.2	2.3
2002	110.0	100.0	10.0	60.6	855	30.3	81.5	4.0	3.5	3.1

Table 3. Midwinter counts and harvest data for Lesser Snow Geese wintering in British Columbia, 1948-2007.

Fall Year	British Columbia			Fraser-Skagit Estuaries		Fraser River Delta	
	Estimated Harvest ¹	Hunter Effort ²	Hunter Success ³	Total Population ⁴	Percent Juvenile ⁴	Local Harvest ⁵	% Juvenile ⁵
1948	-	-	-	29400	34.9	-	-
1949	-	-	-	18200	10	-	-
1950	-	-	-	16100	5.5	-	-
1951	-	-	-	25700	34.6	-	-
1952	-	-	-	17200	25	-	-
1953	-	-	-	22700	14.6	-	-
1954	-	-	-	19100	18.8	-	-
1955	-	-	-	15100	22.7	-	-
1956	-	-	-	20400	-	-	-
1957	-	-	-	27000	33	-	-
1958	-	-	-	14200	2	-	-
1959	-	-	-	-	36	-	-
1960	-	-	-	22200	3.4	-	-
1961	-	-	-	-	25	-	-
1962	-	-	-	23600	0	-	-
1963	-	-	-	-	-	-	-
1964	-	-	-	26100	30.3	-	-
1965	-	-	-	-	0	-	-
1966	-	-	-	20900	35.4	-	-
1967	-	-	-	-	2.6	-	-
1968	-	-	-	-	0	-	-
1969	-	-	-	31700	25	-	-
1970	-	-	-	36000	25	-	-
1971	-	-	-	-	1	-	-
1972	-	-	-	19000	1	-	-
1973	-	-	-	12500	0	-	-
1974	-	-	-	12400	0	-	-
1975	2972	53.61	0.18	16000	37.8	-	-
1976	1102	137.10	0.06	24900	36.3	-	-
1977	576	284.58	0.03	16100	3.4	-	-
1978	401	399.02	0.02	26900	40	-	-
1979	1917	75.00	0.11	39700	36.4	-	-
1980	1725	86.06	0.10	40500	11	-	-
1981	3378	45.49	0.19	43100	49.5	-	-
1982	2666	57.07	0.15	40900	17	-	-
1983	0	-	-	31600	-	-	-
1984	2700	46.21	0.19	40200	16.3	-	-
1985	3972	27.14	0.32	40500	32	-	-
1986	0	-	-	39600	29	-	-
1987	2329	39.81	0.21	55400	30	-	-
1988	1556	53.74	0.17	43700	6	-	-
1989	926	74.33	0.10	33800	0	-	-
1990	137	506.25	0.02	32100	10	748	31.0
1991	2619	24.15	0.32	39200	28	1642	49.6
1992	467	133.15	0.06	33300	2	1246	24.6
1993	2094	27.62	0.30	47000	40	2232	66.6
1994	2174	18.21	0.46	41900	6	1838	20.4
1995	1589	28.12	0.25	39600	5	750	26.2
1996	2863	16.0	0.47	45200	23	1869	56.9
1997	0	-	-	44,084	14	1536	52.9
1998	1797	29.4	0.27	45,944	13.9	1351	49.7
1999	1990	23.9	0.33	50,533	15.6	1380	57.8
2000	2559	17.5	0.43	56,270	20.3	1893	56.3
2001	2354	16.3	0.46	57,143	21.1	1458	54.0
2002	2536	15.6	0.51	73,138	26.7	2230	59.7
2003	1897	16.9	0.47	66,798	12.8	2387	47.5
2004	1188	21.5	0.32	68,141	15.3	978	39.5
2005	6906	4.02	1.81	80,040	39.0	4231	70.2
2006				83,148	21.2	2909	65.9
2007				94,859	21.8		

Table Notes: 1) Canadian Wildlife Service National Harvest Survey; 2) Hunter Effort = Hunter Days (from Table 6) / Estimated Harvest; 3) Hunter Success = Est. Harvest / Active Hunters (from Table 6); 4) Compiled by S. Boyd, CWS (Washington State Wildlife Service prior to 1987, CWS Aerial Surveys from 1987-1996, S. Boyd, unpubl. data); 5) CWS Harvest Questionnaire, includes estimated 20% cripple loss; 6) Preliminary Results for fall of 2000 season only.

Table 4. Historical productivity records for Pacific wintering Ross's geese, 1965 to present.

Year	Miscellaneous Areas				Saskatchewan				Sacramento Valley, CA			
	Ad	Juv	%Juv.	Yg/Fam	Ad.	Juv.	%Juv.	Yg/Fam	Ad.	Juv.	%Juv.	Yg/Fam
1965			27.1									
1966			53.2	2.9								
1967			25.4	2.6								
1968			32.4	2.6								
1969												
1970												
1971												
1972			0.4									
1973			45.1	2.7								
1974			13.7	1.8								
1975			41.5	2.7								
1976												
1977			38.5	2.3								
1978			4.1	1.6								
1979												
1980			24.0									
1981												
1982												
1983			23.0									
1984			35.6									
1985			20.0									
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994							26.0					
1995					4941	2040	29.2					
1996					459	446	46.9					
1997					4976	1539	23.6	0.33				
1998									197	76	27.8	
1999												
2000												
2001									1023	179	14.9	
2002									6371	1202	15.9	
2003									4274	844	16.5	2.65
2004									1991	304	13.2	
2005									1045	431	29.2	
2006									2018	687	25.4	
2007									1926	351	15.4	
Mean			27.429	28.256	3458.7	1341.7	33.24		2664	571.14	18.646	2.65
% change from mean									-27.7	-38.54	-17.3	
% change from 2006									-4.56	-48.91	-39.29	

Data on Ross' geese of the Western Central Flyway are included in the "Western Central Flyway Light Goose Productivity Surveys", section of this North American Productivity Report.
 See individual Annual Winter Productivity Report narratives which credit participants with their respective data set for each area.

Table 5. Historical productivity records for Greater white-fronted geese in the Pacific Flyway 1961 to present.

Year	Population Indices* (thousands)	Misc. Areas				Klamath Basin, OR & CA				Sacramento Valley, CA				Combined Productivity
		Ad.	Juv.	%Juv.	Yg/Fam	Ad.	Juv.	%Juv.**	Yg/Fam	Ad.	Juv.	%Juv.	Yg/Fam	% Juv.
1961	193.3	2407	1383	36.5	2.27									
1962	127.7	3587	2289	38.9	2.52									
1963	171.8	5653	2401	29.8	2.27									
1964	99.9	8270	3834	31.7	2.29									
1965	69.3					11461	7303	38.9	2.6					
1966	67.0	2847	2045	41.8	2.5									
1967	185.6	3716	1682	31.2	2.49									
1968	70.9	2663	1826	40.7	2.39									
1969	114.2	3071	1821	37.2	2.35									
1970	206.7	2734	1073	28.2	2.21									
1971	106.3	2171	1314	37.7	2.37									
1972		2028	1483	42.2	2.07									
1973				38.6	2.47									
1974				28.6	1.81									
1975				41.2	1.9									
1976				49.9	2.48									
1977				39	2.01									
1978				37.7	2.02									
1979	73.1			38.4	1.82			22	2.32					
1980	93.5					7380	2620	26.2	2.18					
1981	116.5					29480	10520	26.3	1.9					
1982	91.7					3770	460	10.9	2	1465	383	20.7	1.9	13.9
1983	112.9			19.7	2.9			29				29		
1984	100.2							20.5	3.24			28		
1985	93.8			15.5				13.5,15.1	1.92			33		
1986	107.1							26.7,35	1.8			28-32	2.3	
1987	130.6											37		
1988	161.5											33-35		
1989	218.8	3300	1700	34.0								25		
1990	240.8									98	60	38.6		
1991	236.5									1079	531	33		
1992	230.9									7290	2835	28		
1993	295.1					3239	1137	26		2947	1146	28		27.0
1994	324.8					1127	264	19	1.38	1350	588	30.3		25.6
1995	277.5					587	263	31		1706	927	35.2		34.2
1996	344.1					1153	260	18.4	3.54	1967	411	17.3		17.7
1997	319.0					757	371	32.9	2.13	2085	384	15.6		21.0
1998	413.1					410	78	16.0	1					16.0
1999	393.9					1569	323	17.1						17.1
2000	353.6					383	67	14.9		360	81	18.4		16.6
2001	433.4					1478	287	16.3		2981	834	21.9		20.1
2002	358.5					1090	315	22.4		3418	511	13		15.5
2003	422.2									1575	206	11.6		11.6
2004	374.9					536	164	23.4		1096	536	32.8		30.0
2005	443.9					981	491	33.4		1936	899	31.7		32.3
2006	509.3					757	248	24.7		5970	2289	27.7		27.4
2007	604.7									4365	1807	29.28		29.3
Mean	232.2	3537.3	1904.3	35.2	2.3	3892	1481	23.5	2.1	2452	849	26.6	2.1	22.2
% change from mean	160.4									78.0	112.9	10.1		31.9
% change from 2006	18.7									-26.9	-21.1	5.7		6.9

*Population indices from Pacific Flyway Data Book (Trost, et al). Indices after 1998 are based on number of total indicated birds from breeding ground survey and calculated according to guidelines established in the Flyway management plan.

**For %Juv. columns with more than one estimate of productivity, sample sizes were not available.

See individual Annual Winter Productivity Report narratives which credit participants with their respective data set for each area.

Table 6. Historical productivity records for Tule greater white-fronted geese, 1964 to present.

Year	Miscellaneous Areas			Summer L.ake, OR			Klamath Basin, OR & CA			Sacramento Valley, CA				Combined Productivity				
	Ad.	Juv.	%Juv.	Ad.	Juv.	%Juv.	Ad.	Juv.	%Juv.	Ad.	Juv.	%Juv.	Yg/Fam	% Juv.				
1964													99	26	21.7	2		21.7
1965																		
1966																		
1967																		
1968																		
1969																		
1970																		
1971																		
1972																		
1973																		
1974																		
1975																		
1976																		
1977																		
1978						35.4												
1979						28.9												
1980	1324	213	13.9										1653	847	33.8			26.3
1981	847	437	34										1449	851	37.0	1.85		35.9
1982	833	167	16.7													2.01		16.7
1983																		
1984																		
1985																		
1986																18.0		18.0
1987																37.0		37.0
1988																28.0		28.0
1989																27.0		27.0
1990													863	234	21.4			21.4
1991													680	222	24.6			24.6
1992													546	128	19.0			19.0
1993													295	77	20.7			20.7
1994					183	101	35.6						182	94	34.0			34.8
1995													70	30	30.0			30.0
1996					293	181	38.2						529	136	20.5			27.8
1997					278	76	21.4						117	12	9.3			18.2
1998					528	109	17.1	427	98	18.6			69	11	13.7			17.6
1999					591	139	19						873	556	39.0			32.2
2000					807	233	22.4	1038	292	22.0			619	152	19.7			21.6
2001					294	105	26.3						384	78	16.9			21.3
2002	441	126	22.2		491	134	21.4	22	10	31.3			664	139	17.3			20.2
2003					629	154	19.7						450	123	21.5			20.4
2004					468	144	23.5						606	300	33.1			29.2
2005					498	104	17.3						1056	372	26.1			23.4
2006					560	256	31.4						1953	857	30.5			22.5
2007													2117	1016	32.4			32.4
Mean	861.25	235.75	25.18		468.33	144.67	24.4	495.67	133.33	24.0			727.33	298.1	25.29	2.0		24.9
% change from mean					19.6	77.0	28.5						191.1	240.8	28.2			28.2
%change from 2006					12.4	146.2	81.5						108.4	18.6	6.3			44.1

See individual Annual Winter Productivity Report narratives which credit participants with their respective data set for each area.

Table 7. Historical productivity records for Tundra swans in the Pacific Flyway, 1961 - present.

Year	Population* Indices (thousands)	Miscellaneous Areas				Utah				Summer Lk., OR				Sacramento Valley, CA				Combined Productivity % Juv	
		Ad.	Juv.	%Juv.	Yg/Fam	Ad.	Juv.	%Juv.	Yg/Fam	Ad.	Juv.	%Juv.	Yg/Fam	Ad.	Juv.	%Juv.	Yg/Fam		
1961	40.8			8.0	2.3														
1962	32.4			10.6	2.3														
1963	46.4			14.4	2.1	1595	745	31.8	2.2										
1964	40.5			13.9	1.9	1937	888	31.4	1.9										
1965	42.6			14.7	2.2	1165	903	43.7	2.6										
1966	34.8			8.5	2.2	5578	3466	38.3	2.3										
1967	48.9			25.0	2.5	5943	5697	48.9	2.9										
1968	35.6			21.3	2.6	12463	9288	42.7	2.8										
1969	74.9			34.3	2.7	20801	17445	45.6	3.2										
1970	31.0			19.5	2.4	29478	8088	21.5	2.4										
1971	98.9			20.6	2.3	6497	2587	28.5	2.3										
1972	82.8			15.3	2.1	5982	2160	26.5	2.2										
1973	33.9			34.9	2.6	5036	3654	42.0	2.3										
1974	69.8			18.0	2.3	10764	3066	22.2	2.3										
1975	54.9			19.6	2.5	2879	702	19.6	2.5										
1976	51.4			39.7	2.6	1947	811	29.4	2.6										
1977	47.3			23.8	2.4	3878	1214	23.8	2.4										
1978	45.6			8.2	2.3	5040	1685	25.1	2.3										
1979	53.5					9130	4654	33.8	2.6										
1980	65.2					9242	4710	33.8	2.3										
1981	83.6					14128	6552	31.7	2.1										
1982	91.3	250	87	25.8	2.5	4715	1905	28.8	2.2										
1983	67.3	252	119	32.1	2.5	14004	8602	38.1	2.9									20.0	
1984	61.9	237	41	14.7	2.3	1428	798	35.8	2.5									18.0	
1985	48.8	238	74	23.7	2.6	824	449	35.3	2.3									13.0	
1986	66.2	245	28	10.3	2.0	1144	977	46.1	2.4									25.0	
1987	52.8	223	68	23.4	2.3	538	399	42.6	2.6									27.0	
1988	59.2	624	131	17.4	2.2	1834	1318	41.8	2.4									22.0	
1989	78.7	8628	1438	14.3	2.2	1551	1048	40.3	2.4									11.0	
1990	40.1	5440	1236	22.2	2.8	4250	2610	38.0	2.6									19.1	
1991	47.6	821	283	25.6	2.7	2750	1770	39.2	2.6					616	89	12.7			33.8
1992	63.7	797	268	25.2	2.7	3250	1396	28.4	2.3					1386	304	18.0			26.6
1993	62.2	1410	414	22.7	2.6	2169	1079	33.2	2.5					13182	4393	25.0	2.4		26.0
1994	79.4	2116	470	18.2		3958	1979	33.3	2.4	6037	947	13.6		15254	3813	20.0	2.4		20.9
1995	52.9					7221	3955	35.4	2.3	2666	713	21.1	2.0	4358	1644	27.4			30.7
1996	98.1	492	42	7.9		8493	3559	29.5	1.9	1390	355	20.3	1.7	3695	1036	21.9	2.2		26.2
1997	122.5	570	119	17.3		110336	24968	18.5	2.4	4498	780	14.8	2.0						18.3
1998	70.0	1167	164	12.3		88631	14132	13.8	2.2	8333	737	8.1	1.9						13.3
1999	119.8	1221	103	7.8		68594	11814	14.7	2.2	8717	1305	13.0	2.2						14.4
2000	89.6					48098	3695	7.1	1.9	4704	585	11.1	1.8	2525	200	7.3	1.6		7.5
2001	87.3					26996	2174	7.5	2.0	6952	747	9.7	1.6	7431	706	8.7	1.4		8.1
2002	58.7					45069	9942	18.1	2.1	6371	1198	15.8	1.9	4736	997	17.4	1.8		17.8
2003	102.7					18517	6018	24.5	2.6	5485	1182	17.7	2.0	8681	2177	20.1	2.2		22.3
2004	83.0					13148	6109	31.7	2.9	3093	698	18.4	1.9	11061	2672	19.5	2.17		25.8
2005	92.1					6038	3412	36.1	2.1	1529	300	16.4	1.8	8798	1624	15.6	1.7		24.6
2006	106.9					23142	3004	11.5	1.9	5695	987	14.8	1.8	14563	367	2.4	1.7		9.1
2007	109.4	4128	372	9.0	1.7	17692	2232	11.2	1.6	7733	1153	13.0	2.0	8814	1059	12.0	1.8		11.2
Mean	66.5	1603	303.2	18.9	2.4	15063.8	4392.4	30.2	2.4	5228.8	834.8	14.8	1.9	7507.1	1506	17.4	2.0		19.8
%change from mean	64.4					17.4	-49.2	-63.0	-32.0	47.9	38.1	-12.6	3.0	17.4	-29.7	-31.0	-7.7		-53.9
% change from 2006	2.3					-23.6	-25.7	-2.6	-15.8	35.8	16.8	-12.3	8.3	-39.5	188.6	400.6	5.9		-62.9

*Population indices are from Pacific Flyway Data Book (Troost, et al) and are conducted in January.
See individual annual Winter Productivity Report narratives which credits participants with their respective data set for each area.

Table 8. Age ratios and family group size of tundra swan flocks in northern Utah.

YEAR	Grouped Birds				Family Associations				Combined Totals			
	ADULTS	JUVENILES	% YOUNG		FAMILIES	YOUNG	YOUNG/FAMILY		ADULTS	JUVENILE	% YOUNG	
1963	1397	527	0.274		99	218	2.2		1595	745	0.318	
1964	1193	171	0.125		372	717	1.93		1937	888	0.314	
1965	883	541	0.380		141	362	2.57		1165	903	0.437	
1966	4326	2002	0.316		626	1464	2.33		5578	3466	0.383	
1967	4753	3975	0.455		595	1722	2.89		5943	5697	0.489	
1968	10597	6679	0.387		933	2609	2.80		12463	9288	0.427	
1969	19527	15414	0.441		637	2031	3.19		20801	17445	0.456	
1970	28478	6907	0.195		500	1181	2.36		29478	8088	0.215	
1971	5465	1422	0.206		516	1165	2.26		6497	2587	0.285	
1972	5102	1193	0.190		440	967	2.20		5982	2160	0.265	
1973	3696	2105	0.363		670	1549	2.31		5036	3654	0.420	
1974	9610	1733	0.153		577	1333	2.31		10764	3066	0.222	
1975	2443	163	0.063		218	539	2.47		2879	702	0.196	
1976	1457	171	0.105		245	640	2.61		1947	811	0.294	
1977	2960	123	0.040		459	1091	2.38		3878	1214	0.238	
1978	3848	342	0.082		596	1343	2.25		5040	1685	0.251	
1979	7210	2198	0.234		960	2456	2.56		9130	4654	0.338	
1980	7868	3116	0.284		687	1594	2.32		9242	4710	0.338	
1981	11636	3917	0.252		1246	2635	2.11		14128	6552	0.317	
1982	4173	1305	0.238		271	600	2.21		4715	1905	0.288	
1983	12456	6373	0.338		774	2229	2.88		14004	8602	0.381	
1984	1298	639	0.330		65	159	2.45		1428	798	0.358	
1985	670	276	0.292		77	173	2.25		824	449	0.353	
1986	754	513	0.405		195	464	2.38		1144	977	0.461	
1987	402	224	0.358		68	175	2.57		538	399	0.426	
1988	1364	762	0.358		235	556	2.37		1834	1318	0.418	
1989	1263	696	0.355		144	352	2.44		1551	1048	0.403	
1990	3548	1708	0.325		351	902	2.57		4250	2610	0.380	
1991	2286	1176	0.340		232	594	2.56		2750	1770	0.392	
1992	3102	920	0.229		209	476	2.28		3520	1396	0.284	
1993	1809	630	0.258		180	449	2.49		2169	1079	0.332	
1993 Aerial Photography	2380	598	0.201		143	381	2.66		2666	979	0.269	
1994	3434	1346	0.282		262	633	2.42		3958	1979	0.333	
1995	5655	2178	0.278		783	1777	2.27		7221	3955	0.354	
1996	7317	2434	0.250		588	1125	1.91		8493	3559	0.295	
1997	108626	22934	0.174		855	2034	2.38		110336	24968	0.185	
1998	87629	13033	0.129		501	1099	2.19		88631	14132	0.138	
1999	67388	10481	0.135		603	1333	2.21		68594	11814	0.147	
2000	47752	3371	0.066		173	324	1.87		48098	3695	0.071	
2001	26836	2012	0.070		80	162	2.025		26996	2174	0.075	
2002	43301	8115	0.158		884	1827	2.07		45069	9942	0.181	
2003	18103	5485	0.233		207	533	2.57		18517	6018	0.245	
2004	13072	6000	0.315		38	109	2.87		13148	6109	0.317	
2005	5198	2544	0.329		420	868	2.07		6038	3412	0.361	
2005 Aerial Photography	11115	1493	0.118		530	988	1.86		11115	1493	0.118	
2006	21660	1594	0.069		741	1410	1.9		23142	3004	0.115	
2006 Aerial Photography	10042	989	0.090		559	986	1.76		10042	989	0.09	
2007	16324	1170	0.067		684	1062	1.55		17692	2232	0.112	
2007 Aerial Photography	7291	431	0.056		241	431	1.79		7291	431	0.056	

Table 9. Historical records for the Rocky Mountain Population of Trumpeter Swans, 1967 to Present.*

Year	Area	White birds	Cygnets	Total	% Juv.	Ave. Brood Size
1967	Tristate Survey	580	58	638	9.1	
1968	Tristate Survey	489	174	663	26.2	
1969						
1970						
1971	Tristate Survey	477	95	572	16.6	
1972						
1973						
1974	Tristate Survey	492	89	581	15.3	
1975						
1976						
1977	Tristate Survey	454	90	544	16.5	
1978						
1979						
1980	Tristate Survey	533	49	582	8.4	
1981						
1982						
1983	Tristate Survey	471	76	547	13.9	
1984	Tristate Survey	496	67	563	11.9	
1985	Tristate Survey	431	144	575	25.0	3.1
1986	Tristate Survey	365	87	452	19.2	2.7
1987	Tristate Survey	417	194	611	31.8	3.5
1988	Tristate Survey	513	146	659	22.2	2.9
1989	Tristate Survey	535	63	598	10.5	2.5
1990	Tristate Survey	468	158	626	25.2	3.0
1991	Tristate Survey	446	109	555	19.6	3.3
1992	RMP Survey**	465	98	563	17.4	3.5
1993	RMP Survey	303	51	354	14.4	2.2
1994	RMP Survey	302	152	454	33.5	2.2
1995	RMP Survey	365	62	427	14.5	
1996	RMP Survey	380	78	458	17.0	2.6
1997	RMP Survey	358	69	427	16.2	1.0
1998	RMP Survey	364	105	469	22.4	2.0
1999	RMP Survey	347	70	417	16.8	2.3
2000	RMP Survey	372	109	481	22.7	2.3
2001	RMP Survey	416	71	487	14.6	1.2
2002	RMP Survey	311	60	371	16.2	
2003	RMP Survey	321	96	417	23.0	
2004	RMP Survey	318	99	417	23.7	
2005	RMP Survey	404	106	510	20.8	
2006	RMP Survey	416	91	507	17.9	
2007	RMP Survey	411	116	527	22.0	
Mean		399.8	99.1	498.9	19.7	2.5
% change from mean		2.8	17.1	5.6	11.7	
% change from mean		-1.2	27.5	3.9	22.6	

*As reported by Red Rock Lakes National Wildlife Refuge.

** Name changed to Trumpeter Swan Survey of the Rocky Mountain Population (RMP)/U.S. Flocks Fall 1992.

Note: It is the opinion of the author of table (see narrative) that a better method to assess annual productivity is to estimate the number of young produced per breeding pair because a proportion of white birds each year are subadults or adults that did not nest. However, this data is not collected as a part of the Fall survey.

TITLE:

Waterfowl Productivity Surveys for Alaska – 2007

SPECIES SURVEYED:

Pacific Brant (*Branta bernicla nigricans*)

Trumpeter Swan (*Cygnus buccinator*)

Emperor Goose (*Chen canagica*)

Dusky Canada Goose (*Branta canadensis occidentalis*)

CONTRIBUTORS:

U.S. Fish and Wildlife Service (USFWS)

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 Koyukuk/Nowitna National Wildlife Refuge Complex

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 Migratory Bird Management, Fairbanks

 Migratory Bird Management, Juneau

Alaska Department of Fish and Game

 Division of Wildlife Conservation, Statewide Waterfowl Program

Comox Valley Naturalists Society – British Columbia

Graeme Fowler – British Columbia

Russ Canniff – Washington

REPORT COMPILED BY:

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ABSTRACT:

Productivity surveys were conducted by several agencies and individuals during late summer, fall, and/or winter of 2007 and early 2008 to estimate juvenile-to-adult age ratios for Pacific brant (*Branta bernicla nigricans*), the Pacific Coast population of trumpeter swans (*Cygnus buccinator*), emperor geese (*Chen canagica*), and dusky Canada geese (*Branta canadensis occidentalis*). The results of these surveys appear in the tables of this report, along with short narratives in the Results section. No productivity data were reported for cackling cackling geese (*Branta hutchinsii minima*) in 2007.

The following productivity measures were estimated for 2007:

Species	Type of Year	Productivity Estimate	% Change From 2006	% Change From Mean
Pacific Brant	Above Average			
Fall % Juv.		28.2%	+39%	+25%
Fall Juv./Fam.		2.53	-4%	-4%
Winter % Juv.		---	---	---
Trumpeter Swan	Below Average			
Late Summer Brood Size		2.8	-10%	-13%
Late Summer % Juv.		18.9%	-33%	-26%
Late Summer % Prs. w/ Brd		25.9%	-34%	-20%
Winter % Juv.		11.6%	-27%	-38%
Winter Juv./Fam.		2.24	0%	-3%
Emperor Goose	Below Average			
Fall % Juv.				
From ground counts		18.3%	-52%	-23%
From aerial photos		17.4%	-51%	-9%
Fall Juv./Fam.		2.16	-4%	-23%
Cackling Cackling Goose	No Report			
Dusky Canada Goose	Average			
Late Summer % Juv.		20.9%	-10%	+10%

METHODS:

Fall and winter productivity appraisals generally followed procedures developed by Lynch (1969) and outlined in the Standard Operating Procedures for Productivity Surveys of Geese, Swans and Brant (Draft) 1977. Additional survey methods included late-summer aerial surveys of trumpeter swans (King 1973) and dusky Canada geese (Petrula 2007), analysis of aerial photographs of emperor geese (Dau et al. 2006), and ocular sightings from the ground (e.g. Audubon Christmas Bird Counts).

RESULTS:

Pacific Brant:

Fall Productivity: Table 1.

Kristine Sowl of Izembek National Wildlife Refuge (NWR) reported that 28.2% juveniles were estimated from a sample of 31,269 brant during ground surveys conducted at Izembek Lagoon, Alaska in September and October. She also estimated a mean of 2.53 juveniles per family group from a sample of 208 families. The proportion of juveniles was 39% above the 2006 estimate and 25% above the 44-year mean. The mean family group size was 4% below the 2006 estimate and 4% below the 41-year mean.

Winter Productivity: Table 2.

No winter productivity data were reported in 2007.

Summary: Pacific brant experienced above-average production in 2007.

Trumpeter Swan:

Late-Summer Productivity: Tables 3 and 4.

Late-summer productivity surveys were conducted in Alaska between 31 July and 29 August by Koyukuk/Nowitna NWR Complex and USFWS Region 7 Migratory Bird Management. All surveys were flown using methods described by King (1973), with modifications that allowed capture of observation locations directly from the aircraft's global positioning system unit. Thirty one 1:63,360-scale topographic maps were surveyed in 2007. Combining the results from all areas yielded a mean brood size of 2.8 (n=124 broods), 18.9% juveniles in the population (n=1,851 total swans), and 25.9% pairs with a brood (n=455 pairs) (Table 3). The mean brood size was 10% lower than in 2006 and was 13% below the 31-year mean (Table 4). The proportion of juveniles was 33% lower than in 2006 and 26% below the mean. The percentage of pairs with a brood was 34% lower than in 2006 and 20% below the mean.

Winter Productivity: Table 5.

On Vancouver Island, British Columbia, Graeme Fowler reported the results of swan surveys conducted from November 2007 through February 2008 by the Comox Valley Naturalists Society. The mean percent juvenile was 10.5% (n = 907) in November, 15.8% (n = 2,397) in

December, 14.8% (n = 2,444) in January, and 12.0% (n = 2,274) in February. Note that only the February figure was included in Table 5.

In northwest Washington, Russ Canniff recorded age ratios for trumpeter swans in Skagit Valley and Port Susan in February 2008. He found that 11.4% were juveniles from a sample of 3,303 swans. He also collected data on family group size from November 2007 through February 2008 and found a mean of 2.24 juveniles per family group from a sample of 45 families.

Data from all winter survey areas combined resulted in an estimate of 11.6% juveniles from a sample of 5,572 swans. This was 27% below the 2006 estimate and 38% below the 30-year mean. The mean family group size was 2.24 from a sample of 45 families. This was equal to the 2006 estimate and 3% below the 25-year mean.

Summary: Trumpeter swans experienced below-average production in 2007.

Emperor Goose: Tables 6 and 7.

Kristine Sowl reported that 18.3% juveniles were estimated from a sample of 6,270 emperor geese during ground surveys conducted at Izembek NWR, Alaska in September and October (Table 6). She also estimated a mean of 2.16 juveniles per family group from a sample of 179 families. The proportion of juveniles was 52% lower than in 2006 and 23% below the 40-year mean. The mean family group size was 4% lower than in 2006 and 23% below the 40-year mean.

Bob Stehn of USFWS, Migratory Bird Management Anchorage reported the results of aerial photo work on the Alaska Peninsula conducted in late September. He estimated the proportions of juveniles in seven major lagoons from aerial photos and then weighted the proportions by the population counts of those lagoons from an independent aerial population survey. The result was a weighted-mean estimate of 17.4% juveniles for the 2007 fall population, 51% lower than in 2006 and 9% below the 22-year mean (Table 7).

Summary: Emperor geese experienced below-average production in 2007.

Cackling Cackling Goose: No Report.

Dusky Canada Goose: Table 8.

Tom Rothe of the Alaska Department of Fish and Game reported the results of an aerial production survey that was flown over the west Copper River Delta on 17 July. Of a total count of 4,741 geese, 20.9% were identified as juveniles. The proportion of juveniles was 10% below the 2006 estimate and 10% above the 36-year mean.

Summary: Dusky Canada geese experienced average production in 2007.

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Graeme Fowler – Comox, British Columbia

Russ Canniff – Snohomish, Washington

Table 1. Historical fall productivity records for Pacific brant at Izembek Lagoon, AK, 1963-2007. ^a

Year	Grouped Birds			Family Associations		
	Adults	Juveniles	% Juv.	Families	Juveniles	Juv./Family
1963	3968	1243	23.9			
1964	13324	4577	25.6			
1965	21210	5050	19.2			
1966	9927	7134	41.8	195	557	2.86
1967	15219	3081	16.8	359	926	2.58
1968	15110	3117	17.1	145	377	2.60
1969	12829	3577	21.8	293	780	2.66
1970	12104	6256	34.1	148	476	3.22
1971	4820	1953	28.8	295	716	2.43
1972	6599	3698	35.9	153	416	2.72
1973	12025	4999	29.4	327	938	2.87
1974	13118	632	4.6	105	239	2.28
1975	9396	5452	36.7	189	543	2.87
1976	7962	4340	35.3	237	674	2.84
1977	8856	4092	31.6	240	603	2.51
1978	10696	1842	14.7	110	326	2.96
1979	13674	2349	14.7	146	361	2.47
1980	9618	3341	25.8	177	489	2.76
1981	4109	936	18.6	154	431	2.80
1982	11509	1213	9.5	89	237	2.66
1983	6149	1947	24.0	173	515	2.98
1984	9451	1499	13.7	192	564	2.94
1985	12032	1915	13.7	624	1538	2.46
1986	15621	2823	15.3	137	352	2.57
1987	17411	7882	31.2	948	2587	2.73
1988	16138	3847	19.2	263	633	2.41
1989	13654	4281	23.9	303	914	3.02
1990	24215	5750	19.2	349	894	2.56
1991	31432	12127	27.8	415	1066	2.57
1992	55795	11044	16.5	404	1127	2.79
1993	103254	31942	23.6	979	2727	2.79
1994	21371	2808	11.6	353	735	2.08
1995	26964	15240	36.1	78	218	2.79
1996	15148	4201	21.7	50	152	3.04
1997	15216	3105	16.9	40	106	2.65
1998	8214	2836	25.7	220	488	2.22
1999	12500	3450	21.6	111	254	2.29
2000	6669	2982	30.9	91	202	2.22
2001	14829	1198	7.5	68	167	2.46
2002	18441	4751	20.5	92	222	2.41
2003	27517	4371	13.7	197	446	2.26
2004	19715	4384	18.2	129	322	2.50
2005	16906	8455	33.3	89	257	2.89
2006	26684	6798	20.3	222	583	2.63
2007	22450	8819	28.2	208	526	2.53
Mean ^b			22.5			2.64
% Change from:						
2006			39%			-4%
Mean			25%			-4%

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

^b Mean excludes 2007.

Table 2. Historical winter productivity records for brant in the Pacific Flyway, 1983-2007.

Year ^a	Birch/Oak Bays, WA ^b			Padilla/Samish Bays, WA ^b			Willapa Bay, WA ^c			Olympic Peninsula, WA ^d			Oregon Coast ^e			Combined Productivity
	Ad.	Juv.	% Juv.	Ad.	Juv.	% Juv.	Ad.	Juv.	% Juv.	Ad.	Juv.	% Juv.	Ad.	Juv.	% Juv.	% Juv.
1983							982	166	14.5							14.5
1984							2605	251	8.8							8.8
1985																
1986				3731	292	7.3	1925	186	8.8	217	11	4.8				7.7
1987				3110	1242	28.5	997	196	16.4	1540	306	16.6				23.6
1988				2003	297	12.9	1167	184	13.6	1544	311	16.8				14.4
1989				4928	622	11.2	982	88	8.2	2231	232	9.4				10.4
1990				3047	837	21.5				2013	88	4.2				15.5
1991				2464	336	12.0	1189	126	9.6	913	123	11.9				11.4
1992				6294	669	9.6	944	88	8.5	839	46	5.2				9.0
1993				3032	1074	26.2				1299	265	16.9				23.6
1994				3771	197	5.0	937	97	9.4	1034	26	2.5				5.3
1995				1083	185	14.6				634	15	2.3				10.4
1996				1964	530	21.3	70	12	14.6	793	20	2.5				16.6
1997				1660	189	10.2				779	50	6.0				8.9
1998				2573	466	15.3	125	19	13.2							15.2
1999				1199	349	22.5				386	29	7.0				19.3
2000				877	337	27.8	1818	183	9.1	430	32	6.9				15.0
2001				1089	11	1.0				361	24	6.2				2.4
2002										368	28	7.1				7.1
2003				752	48	6.0				551	25	4.3	476	51	9.7	6.5
2004				647	85	11.6										11.6
2005				97	22	18.5							60	7	10.4	15.6
2006	422	33	7.3													7.3
2007 ^f																
Mean ^g			7.3			14.9			11.2			7.9			10.1	12.2
% Change from:																
2006			N/A			N/A			N/A			N/A			N/A	N/A
Mean			N/A			N/A			N/A			N/A			N/A	N/A

^a Surveys conducted some time between November of the stated year and March of the next year.

^b Data supplied by Russ Canniff and Washington Department of Wildlife. A high proportion of birds at Padilla/Samish bays were the "gray-bellied" variety.

^c Data supplied by Willapa National Wildlife Refuge and Washington Department of Wildlife.

^d Data supplied by Washington Maritime National Wildlife Refuge Complex.

^e Data supplied by Oregon Coast National Wildlife Refuge Complex.

^f No data were reported in 2007.

^g Mean excludes 2007.

Table 3. Results of late-summer 2007 productivity surveys for trumpeter swans in Alaska.^a

Area	Number of 1:63,360 Maps Surveyed	Dates Surveyed	Adults and Subadults				Cygnets	Total Swans	Broods	Mean Brood Size	% Juv.	% Pairs w/ Brood
			In Pairs	As Singles	In Flocks	Subtotal						
Koyukuk/Nowitna/ Kaiyuh Flats	6	7/31-8/15	336	47	181	564	188	752	66	2.8	25.0	39.3
Copper River Delta	11	8/20-8/24	486	30	260	776	125	901	43	2.9	13.9	15.6
Southeast Alaska	14	8/28-8/29	88	4	69	161	37	198	15	2.5	18.7	31.8
Total	31		910	81	510	1501	350	1851	124	2.8	18.9	25.9

^a Data supplied by Koyukuk/Nowitna NWR Complex and USFWS Migratory Bird Management in Anchorage, Fairbanks, and Juneau.

Table 4. Historical late-summer productivity records for trumpeter swans in Alaska, 1968-2007.^a

Year	Number of 1:63,360 Maps Surveyed	Adults and Subadults				Cygnets	Total Swans	Broods	Mean Brood Size	% Juv.	% Pairs w/ Brood
		In Pairs	As Singles	In Flocks	Subtotal						
1968	181	1320	108	496	1924	923	2847	257	3.6	32.4	35.4
1975	285	2102	151	740	2993	1177	4170	378	3.1	28.2	35.4
1978	13	284	36	130	450	116	566	37	3.1	20.5	26.1
1979	13	264	26	229	519	164	683	46	3.6	24.0	32.6
1980	297	3324	169	1766	5259	2437	7696	683	3.6	31.7	40.3
1981	19	632	23	673	1328	547	1875	136	4.0	29.2	41.5
1982	36	1164	97	443	1704	421	2125	138	3.1	19.8	23.4
1983	46	1260	69	488	1817	903	2720	230	3.9	33.2	35.7
1984	43	1358	125	780	2263	755	3018	230	3.3	25.0	33.1
1985	425	5120	449	2204	7773	1686	9459	588	2.9	17.8	22.6
1986	113	2560	184	678	3422	1349	4771	438	3.1	28.3	33.3
1987	73	1640	108	760	2508	1030	3538	294	3.5	29.1	35.7
1988	54	1610	103	1203	2916	1087	4003	322	3.4	27.2	39.1
1989	63	1150	105	295	1550	488	2038	158	3.1	23.9	26.8
1990	625	7056	647	2039	9742	3595	13337	1124	3.2	27.0	31.2
1991	61	1968	123	936	3027	923	3950	322	2.9	23.4	32.1
1992	80	1592	119	819	2530	825	3355	270	3.1	24.6	32.9
1993	76	1766	127	663	2556	1080	3636	341	3.2	29.7	37.0
1994	69	1982	128	1094	3204	1196	4400	374	3.2	27.2	37.2
1995	674	7946	859	3184	11989	3834	15823	1218	3.1	24.2	30.1
1996	50	1624	116	1042	2782	814	3596	256	3.2	22.6	30.5
1997	46	1212	72	566	1850	584	2434	189	3.1	24.0	30.5
1998	51	1702	104	740	2546	976	3522	281	3.5	27.7	32.4
1999	27	508	36	212	756	228	984	71	3.2	23.2	26.0
2000	733	9986	899	3049	13934	3223	17157	1149	2.8	18.8	22.4
2001	22	1164	66	491	1721	531	2252	168	3.2	23.6	28.0
2002	35	1118	111	521	1750	488	2238	165	3.0	21.8	28.3
2003	55	2066	206	844	3116	1212	4328	407	3.0	28.0	37.5
2004	39	1086	118	792	1996	529	2525	177	3.0	21.0	30.8
2005	780	11940	1157	4148	17245	6447	23692	2084	3.1	27.2	33.9
2006	43	1962	188	1051	3201	1246	4447	396	3.1	28.0	39.4
2007	31	910	81	510	1501	350	1851	124	2.8	18.9	25.9
Mean ^b									3.2	25.6	32.3
% Change from:											
2006											
									-10%	-33%	-34%
Mean											
									-13%	-26%	-20%

^a Complete statewide censuses were conducted in 1968, 1975, 1980, 1985, 1990, 1995, 2000, and 2005 (shaded in gray). In other years, surveys were conducted by various agencies to meet local objectives.

^b Mean excludes 2007.

Table 5. Historical winter productivity records for trumpeter swans in the Pacific Flyway, 1977-2007.

Year ^a	Alaska ^b					SE Vancouver Island, BC ^c			Skagit Valley/Port Susan, WA ^d					Combined Productivity
	Ad.	Juv.	% Juv.	No. Fam.	Juv./Fam.	Ad.	Juv.	% Juv.	Ad.	Juv.	% Juv.	No. Fam.	Juv./Fam.	% Juv.
1977									214	70	24.6			24.6
1978						384	134	25.9	218	76	25.9			25.9
1979	431	129	23.0	15	2.60	459	158	25.6	273	82	23.1			24.1
1980	167	65	28.0	27	2.41	499	211	29.7	310	127	29.1	45	2.82	29.2
1981									316	92	22.5	41	2.24	22.5
1982	110	35	24.1	14	2.50				339	56	14.2	24	2.33	16.9
1983	115	29	20.1	4	1.50	533	113	17.5	330	94	22.2	39	2.41	19.4
1984	109	79	42.0	5	2.40	1101	216	16.4	359	62	14.7	29	2.14	18.5
1985	95	14	12.8	1	2.00	1336	98	6.8	340	44	11.5	22	2.00	8.1
1986	146	40	21.5	7	1.29	1228	280	18.6	356	113	24.1	49	2.31	20.0
1987	146	52	26.3	20	2.60	1081	334	23.6	347	133	27.7	49	2.71	24.8
1988	164	52	24.1			1353	304	18.3	473	111	19.0	48	2.31	19.0
1989	239	55	18.7			1209	194	13.8	568	128	18.4			15.8
1990	266	57	17.6	14	2.21	1553	295	16.0	678	111	14.1			15.6
1991	696	267	27.7	21	2.67	1049	165	13.6	810	155	16.1	64	2.42	18.7
1992	578	169	22.6	19	2.53	1639	149	8.3	905	94	9.4	45	2.09	11.7
1993	667	322	32.6	30	2.70	1801	530	22.7	762	233	23.4	167	2.40	25.1
1994	562	190	25.3	15	3.27	1543	536	25.8	927	242	20.7	112	2.41	24.2
1995	294	61	17.2			1427	398	21.8	1187	239	16.8	83	2.46	19.4
1996						1307	195	13.0	1774	312	15.0	93	2.31	14.1
1997						1540	272	15.0	1569	249	13.7	102	2.23	14.4
1998	272	35	11.4			1427	286	16.7	2180	381	14.9	76	2.34	15.3
1999	338	59	14.9			1380	198	12.5	2384	336	12.4	67	2.03	12.6
2000	585	118	16.8			1612	275	14.6	2256	355	13.6	84	2.04	14.4
2001	191	79	29.3			1763	204	10.4	1936	366	15.9	53	2.19	14.3
2002	76	17	18.3			1659	263	13.7	2256	521	18.8	149	2.31	16.7
2003	580	151	20.7			1479	339	18.6	4158	912	18.0	210	2.19	18.4
2004	508	84	14.2			1886	377	16.7	3301	706	17.6	106	2.50	17.0
2005	548	98	15.2			1820	485	21.0	2758	761	21.6	28	2.35	20.8
2006						1632	297	15.4	2958	567	16.1	117	2.24	15.8
2007						2001	273	12.0	2927	376	11.4	45	2.24	11.6
Mean ^e			22.1		2.36			17.5			18.5		2.31	18.6
% Change from:														
2006			N/A		N/A			-22%			-29%		0%	-27%
Mean			N/A		N/A			-31%			-38%		-3%	-38%

^a Surveys conducted between November of the given year and February of the next year.

^b Data supplied by AK Dept. of Fish and Game, USFS Cordova and Yakutat, AK, USFWS Region 7 Migratory Bird Management, Peter Walsh, and Paul Meyers.

^c Data supplied by British Columbia Ministry of Environment, Land, and Parks, Comox Valley Naturalists Society, and Graeme Fowler.

^d Data supplied by Russ Canniff.

^e Mean excludes 2007.

Table 6. Historical fall productivity records (from ground counts) for emperor geese at Izembek Lagoon, AK, 1966-2007.^a

Year	Grouped Birds			Family Associations ^b		
	Adults	Juveniles	% Juv.	Families	Juveniles	Juv./Family
1966	699	265	27.5	132	331	2.51
1967	1457	585	28.6	66	215	3.26
1968	1195	585	32.9	40	112	2.80
1969	4149	2980	41.8	161	530	3.29
1970	9722	4933	33.7	383	1115	2.91
1971	8142	3458	29.8	484	1318	2.72
1972	4680	2270	32.7	210	641	3.05
1973						
1974	2025	377	15.7	50	130	2.60
1975	744	405	35.2	51	149	2.92
1976	1923	324	14.4	207	567	2.74
1977	996	683	40.7	108	302	2.80
1978	1395	495	26.2	62	188	3.03
1979	841	113	11.8	117	329	2.81
1980	1446	454	23.9	40	93	2.33
1981	1527	747	32.8	235	750	3.19
1982	1653	140	7.8	32	85	2.66
1983	1326	543	29.1	192	612	3.19
1984	2753	795	22.4	80	230	2.88
1985	2245	503	18.3	125	354	2.83
1986	3283	1381	29.6	266	794	2.98
1987	1706	808	32.1	305	993	3.26
1988	3884	1242	24.2	200	616	3.08
1989	3811	1136	23.0	145	455	3.14
1990	4002	1068	21.1	97	309	3.19
1991	8599	2882	25.1	147	480	3.27
1992	9291	1347	12.7	151	451	2.99
1993	13976	2176	13.5	161	441	2.74
1994	4658	792	14.5	301	702	2.33
1995	6434	1618	20.1	99	319	3.22
1996	3128	631	16.8	125	330	2.64
1997	1345	144	9.7	43	114	2.65
1998	1595	432	21.3	97	239	2.46
1999	2395	527	18.0	82	200	2.44
2000	1870	410	18.0	93	192	2.06
2001	1232	228	15.6	42	103	2.45
2002	4789	1842	27.8	260	696	2.68
2003	5744	785	12.0	218	439	2.01
2004	4600	1288	21.9	235	568	2.42
2005	2844	1139	28.6	131	365	2.79
2006	3360	2062	38.0	476	1074	2.26
2007	5124	1146	18.3	179	387	2.16
Mean ^c			23.7			2.79
% Change from:						
2006			-52%			-4%
Mean			-23%			-23%

^a Data supplied by Izembek National Wildlife Refuge, USGS Alaska Science Center, and USFWS Region 7 Migratory Bird Management.

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

^c Mean excludes 2007.

Table 7. Historical fall productivity records (from aerial photos) for emperor geese on the Alaska Peninsula, 1985-2007.^a

Year	No. Photos	No. Birds	
		Aged in Photos	% Juvenile ^b
1985	155	3193	16.5
1986	311	6380	25.4
1987	703	10177	22.8
1988	483	11180	24.4
1989	390	12718	21.9
1990	474	13541	24.1
1991	412	14569	23.2
1992	403	14832	15.5
1993	255	5735	24.2
1994	479	16881	22.8
1995	361	11664	25.5
1996	182	10793	17.8
1997	205	11138	11.1
1998	336	16544	11.8
1999	392	13489	17.8
2000	263	7748	11.2
2001	365	11186	11.5
2002	402	6458	17.8
2003	421	8686	9.3
2004	370	6237	11.1
2005	500	6563	18.5
2006	469	9773	35.2
2007	347	12134	17.4
Mean ^c			19.1
% Change from:			
2006			-51%
Mean			-9%

^a Data supplied by USFWS Migratory Bird Management, Anchorage and Fairbanks, AK.

^b Mean of % juvenile in each of 7 lagoons from photo samples, weighted by the population counts of those lagoons from an independent aerial survey.

^c Mean excludes 2007.

Table 8. Historical productivity data for dusky Canada geese on the Copper River Delta, AK, from July aerial surveys, 1971-2007.^a

Year	% Juvenile	No. Geese Sampled
1971	16.2	5717
1972	10.6	8193
1973	36.0	5873
1974	51.4	8199
1975	17.9	8990
1976	24.2	7092
1977	44.3	----
1978	24.8	----
1979	16.0	12700
1980	23.7	7500
1981	17.9	8740
1982	23.7	8473
1983	15.0	7740
1984	18.3	11913
1985	3.7	13780
1986	10.7	13309
1987	9.8	12448
1988	22.5	6917
1989	8.6	6114
1990	23.5	5530
1991	21.5	7098
1992	23.1	7633
1993	5.0	4542
1994	5.7	6977
1995	3.9	5818
1996	21.7	6329
1997	10.5	6253
1998	11.7	4919
1999	14.7	4156
2000	24.1	4397
2001	25.4	3165
2002	30.5	3708
2003	7.2	5929
2004	27.8	5678
2005	11.8	5364
2006	23.1	6261
2007	20.9	4741
Mean ^b	19.1	
% Change from:		
2006	-10%	
Mean	10%	

^a Data supplied by Alaska Department of Fish and Game.

^b Mean excludes 2007.