

**Productivity Surveys of Geese, Swans and
Brant
Wintering in North America 2006**



**Department of the Interior
U. S. Fish and Wildlife Service
Division of Migratory Bird Management
Arlington, Virginia**

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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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2006 PRODUCTIVITY REPORT SUMMARY

Flyway	Population	Per Cent Productivity	Type of year	Per Cent change from 2005
Atlantic				
	Greater snow geese	15.5%	Below Average	-26.5%
	Atlantic Brant	15.0%	Average	14.5%
	Tundra swan	9.6%	Below Average	-40.4%
Mississippi/Central				
	MC lesser snow geese (LA - pre season)	29.1%		-
	MC lesser snow geese (LA - in season)	24.9%	Average	14.2%
	MC lesser snow geese (TX - pre season)	24.9%-		68.0%
	MC lesser snow geese (TX - in season)	25.2%	Below Average	18.1%
	MC White-fronted geese ²	37.6%	Average	-1.8%
	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)	27.8%	Above average	-20.5%
	Lesser snow geese (Wrangel Island)	23.9%		
	Ross's geese	25.4%	Above average	-13.0%
	Greater white-fronted geese	27.4%	Average	-15.2.%
	Tule Greater white- fronted geese	22.5%	Below average	-3.8%
	Tundra swan	9.1%	Below Average	-63.0%
	RMP Trumpeter swan	20.8%	Below average	-12.2%
Alaska				
	Pacific Brant (Fall)	20.3%	Below Average	-39.0%
	(Winter)	7.3%		-53.0%
	Trumpeter swan	28.0%	Above Average	0.0%
	Emperor geese (Fall ground)	38.0%	Above Average	33.0%
	(Fall photo)	35.2%		90.0%
	Cackling Canada geese	No Data		
	Dusky Canada geese	23.1%	Above Average	96.0%

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 - 2006

SPECIES SURVEYED Greater Snow Goose (Chen caerulescens atlanticus)
Atlantic Brant (Branta bernicla bernicla)
Tundra Swan (Cygnus columbianus)

COOPERATORS: Maryland Department of Natural Resources, Fish, Heritage,
and Wildlife 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
Alligator River National Wildlife Refuge
Back Bay National Wildlife Refuge
Bombay Hook National Wildlife Refuge
Pea Island National Wildlife Refuge

COMPILED BY: Carl Ferguson, Division of Migratory Bird Management

ABSTRACT:

Atlantic Flyway productivity surveys for greater snow geese, Atlantic brant, and tundra swans were conducted during November and December of 2005 and January of 2006. The data indicates that productivity for greater snow geese increased 74.8 %, increased for Atlantic brant 46.4 %, and decreased 203.1 % for tundra swans from 2005. These waterfowl species were surveyed in five States and on four 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.

Greater Snow Geese (Table 1.)

Productivity Appraisals: A total of 8,823 snow geese were observed and aged in Delaware, New Jersey, Maryland, and North Carolina. The percent of immature birds observed was 27.1 %. This is an increase from 2005, which was 15.5 percent. The number of young per family group observed also increased from 1.2 in 2005 to 1.9 in 2006.

Atlantic Brant (Table 2.)

Productivity Appraisals: During the fall of 2006, a total of 20,780 brant were aged in New Jersey and New York. The percent of juvenile birds observed in 2006 was 24.3 percent as compared to 16.6 percent in 2005; an increase of 46.4 %. The number of young per family group was 2.8 in 2006, an increase from 2.2 in 2005.

Tundra Swan (Table 3.)

Productivity Appraisals: A total of 6,559 swans were aged in Delaware, Pennsylvania, New Jersey, Maryland, and North Carolina, with almost half of the observations coming from North Carolina. The percent of immature swans observed was 29.1 per cent, a 203.1 percent increase from 2005. Juvenile swans observed per family group were 1.6, an increase from 2005 when it was 1.1. Swans arrived during the normal time period this fall on the Atlantic Flyway.

DISCUSSION:

Snow Geese: Production increased from 15.5 % of immature birds observed in 2005 to 27.1 % immature observed in 2006. Young observed per family group was 1.9, which was an increase from last year (2005). The total number of birds observed, (8,823) was well below the 2005 total (11,969) and well below the mean of 18,552 birds observed.

Atlantic Brant: For 2006, production (24.3 %) as indicated by percent of immature birds increased from 2005 (16.6 %). Young observed per family group was 2.8, an increase from 2005 (2.2).

Tundra Swan: This species showed a increase from 2005 (203.1 %). Young observed per family group was 1.6, an increase from 1.1 in 2005.

A much lower than average number of tundra swans (6,559) and an average number of Atlantic brant (20,780) were observed and recorded for this productivity index in 2006. Productivity surveys should be continued in 2007 for tundra swans and Atlantic brant, as there no breeding ground survey for these species in the North. Productivity workshops will be conducted during summer 2008.

Productivity 2006 - Percent Immature

<u>Species</u>	<u>2006</u>	<u>% Change from 2005</u>	<u>Mean</u>	<u>% Change from Mean</u>	<u>Type of Year</u>
Greater Snow Geese	27.1 %	74.8 %	23.6 %	14.8	Above Average
Atlantic Brant	24.3 %	46.4 %	18.6%	30.7	Above Average
Tundra Swan	29.1 %	203.1%	11.5 %	167.7	Above Average

LITERATURE CITED:

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

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

Year	Number	Families		Other		Total	Total	Total	Percent Immature	Average Young Per Family
	Families	Adults	Immature	Adults	Immature	Adults	Immature	Birds		
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
									% change from 2005	46.4
									% change from mean	30.7
MEAN*	645	1,262	1,450	16,799	2,385	18,061	3,835	21,896	18.6	2.3

1978-2006)

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

Title: Lesser Snow Goose Productivity Surveys for the Central and Mississippi Flyways – 2006

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

Abstract: Louisiana lesser snow geese (blue phase dominant) provided the following productivity data: pre-season, 29.1% immature birds, young/family 1.52; in-season, 24.9% immature birds, young/family 1.37; In Texas (white phase dominant) the following results were indicated: pre-season 24.9% immature birds, young/family 2.05; in-season 25.2% immature birds.

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, 2006 through February, 2007. The Texas in-season data was collected during December on and near Anahuac National Wildlife Refuge in Chambers County.

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 9,987 in-season records from twelve flocks showed 24.9% to be immature geese with an average young/family of 1.37 goslings. The 2770 records from Texas during the goose season indicated 25.2% to be immature birds.

Discussion: The trend for large numbers of snow geese to arrive late in southwestern Louisiana continued in 2006. However more birds were in Louisiana and Texas for the season openings this year compared to the recent past. As a result, 2006 was the first year since 1999 that enough birds were present to collect pre-season productivity data in both states.

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.

Acknowledgments:

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David Boudreaux, Matt Whitbeck, Mike Nance, Jena Moon, Tony Breda, Marguerite Breda, Lee Gaston, Keith Ramos, Justin Roach, and Leann Wilkins

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	--	--

Title: Mid-Continent White-fronted Geese Productivity Report - 2006

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 37.6. The average number of young per family was 1.91.

Methods: The procedures used in conducting these appraisals were developed by Lynch (1969). The Texas data was collected during the period November 1-3, 2006. 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, and December, 2006; and January, 2007 in southwestern Louisiana near Gueydan and Lake Arthur.

Results: The sample of 30,784 birds indicated 37.6% were immature. The average young per family was 1.91, based on 1674 families observed. The 2005 data reflected 38.3% immature (23,360 records) and 1.68 goslings per family.

Discussion: Unlike the last several years, some whitefronts responded to early cold fronts and were in south Louisiana by early October. Also dry conditions north of Louisiana may have hastened the migration. The effects of Hurricane Rita continued to cause a redistribution of geese in southwestern Louisiana. Birds seemed to be more prevalent further north in the rice-marsh interface. Marshes and agricultural fields along and especially south of the Gulf Intercoastal Waterway were 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:

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David Boudreaux, Patrick Walther, Mike Nance, Lee Gaston, Stephen LeJeune, Jena Moon, Keith Ramos, Craig Hoffpauir, Justin Roach, Fred Roetker, Tony Breda, Marguerite Breda, Stacie Cossel, and Leann Wilkins.

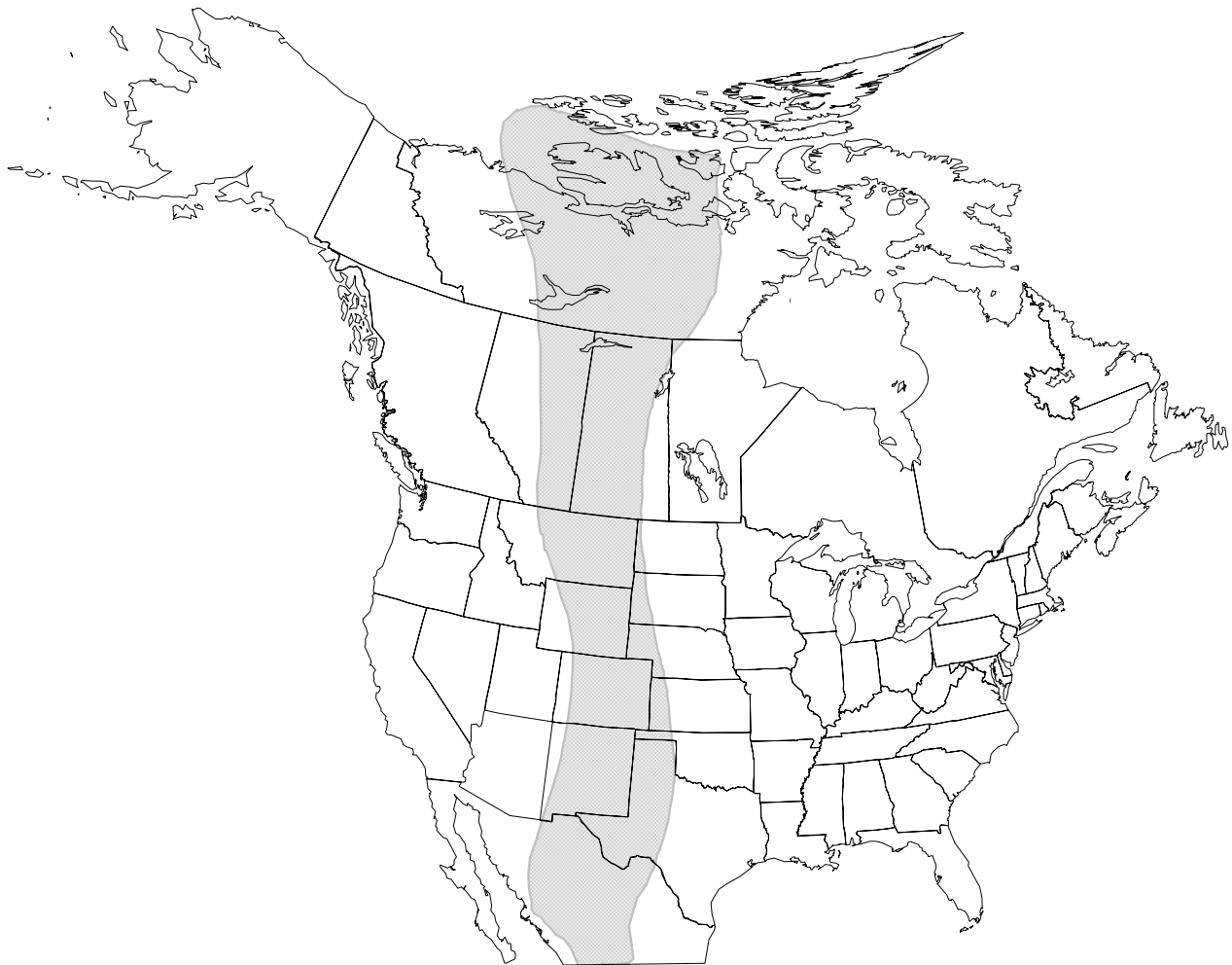
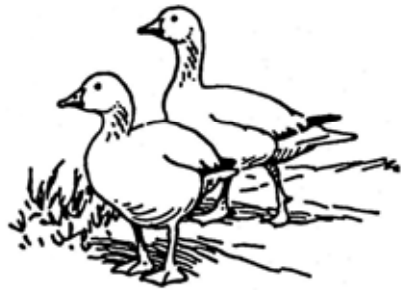
Texas Parks and Wildlife:

David Lobpries and 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

2006-2007
Western Central Flyway Light Goose
Productivity Report



WESTERN CENTRAL FLYWAY LIGHT GOOSE PRODUCTIVITY REPORT – WINTER 2006-2007

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 28 November 2006 and 19 January 2007. These surveys yielded a combined population estimate of 282,680 light geese. We estimate the WCFP was composed of 76.4% adult snow/blue geese and 23.6% adult Ross's geese. The blue morph comprised 3.0% of the adult snow goose population. The average percentage of immatures in our samples was 24.0% for snow/blue geese and 20.2% for Ross's geese. The average number of immatures per snow goose family was 2.3. Productivity of snow geese was 14.6% lower than 2005, but remained 18.8% higher than the 1984-2005 average. The productivity of Ross's geese was 71.2% and 20.2% higher than 2005 and the 1984-2005 average, respectively. Earlier than average nesting phenology and seasonable weather conditions in the central and western Arctic during the nesting period likely contributed to the above average production for both species of geese 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

Below average precipitation was reported for much of the U.S. Southwest during the early summer months, but monsoonal moisture flowed into the region in August and eased the drought in New Mexico and the Texas panhandle by the end of the month. Southeastern Colorado followed the trend and by October normal moisture conditions returned to the state. According to the National Drought Mitigation Center (2006), all light goose wintering areas continued to receive average precipitation for the remainder of the fall and into the early winter. Across the U.S. portion of the WCFP wintering range, mean temperatures were above average in November, average in December, and below average in January (National Oceanic and Atmospheric Administration 2007).

The 2006-2007 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, 28-29 November; New Mexico, 6-9 December (Bitter Lake, Las Vegas, and Maxwell NWRs), 21-23 December (Rio Grande Valley, Appendix A); Colorado, 4-7 December; and Chihuahua, 11-19 January (Appendix A).

A 14.3% sample ($n = 40,304$) 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 76.4% and 23.6% of the adults sampled, respectively (Table 1, Fig. 2). The proportion of adult Ross's geese (23.6%) was 35.5% lower than the 2005 estimate and the lowest estimate since 1999 (Table 2). The total 2005 WCFP estimate was 62.7% and 46.5% higher than the 2005 estimate and the 1984-2005 average, respectively (Table 2, Fig. 3).

Lesser Snow Geese

Immature snow/blue geese accounted for 24.0% ($n = 7,477$) of 31,149 snow/blue geese sampled (Table 1). Of 23,672 adult snow/blue geese sampled, 3.0% ($n = 705$) were blue morph (Table 1). Average family size was 2.3 immatures/family ($n = 1,094$ families), which was the same as 2005 and 15.0% higher than the 1984-2005 average, respectively (Table 2). We observed 6 snow goose neck-collars during the survey, 2 in New Mexico and 4 in Colorado (Table 3).

Ross's Geese

Immature Ross's geese represented 20.2% ($n = 1,853$) of the 9,155 Ross's geese sampled (Table 1). This was 71.2% and 20.2% higher than the 2005 estimate and the 1984 - 2005 average (Table 2). One adult blue Ross's goose was observed in Colorado. We observed 12 Ross's goose neck-collars during the survey this year including 7 in eastern New Mexico, 4 in Colorado, and 1 in Texas (Table 3).

DISCUSSION

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. Biologists predicted above average production for the WCFP of light geese based on an earlier than average spring phenology and warmer than average spring temperatures during the 2006 nesting period (U.S. Fish and Wildlife Service 2006). Our estimates were above average for both species and corroborated the predictions from the Arctic (Table 2).

The percent of Ross's geese in the WCFP was 35.5% lower than the 2005 estimate and represented the lowest Ross's goose composition estimate since 1999. Ross's goose flock characteristics can have biases because they are smaller and can easily be missed in high crop stubble or large flocks of snow geese. As mentioned in the Appendix A report from Mexico, limited access to flocks because of weather may have introduced some bias in our estimates this year, so the decline in Ross's geese in the flyway may not be a biological one.

This survey serves as the only standardized check on species composition for the WCFP. It has become especially important to monitor these species given the population explosion of light geese during the last decade and the implementation of harvest strategies in 1999 to control their populations.

I want to thank the agencies and field stations listed as contributors for their support of this survey. Thanks to Erv Boeker for volunteering his time again to help collect data. Kammie Kruse collected data in New Mexico and Tim Moser assisted with data collection in Texas and I appreciate their help. 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 2006-07.

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	71,000	9,288	71.5	28.5	4,781/275	1,327/111	22.1	5.4	2,016	778	27.9	117	2.0
Rocky Ford Area	31,000	6,061	93.0	7.0	3,937/132	1,498/65	27.8	3.2	305	124	16.7	94	2.2
Colorado total	102,000	15,349	79.7	20.3	8,718/407	2,825/176	24.7	4.5	2,321	902	28.0	211	2.1
TEXAS													
Cactus Lake	35,000	1,817	87.8	12.2	968/36	573/35	37.7	3.6	139	66	32.2	105	2.3
Dalhart Area	12,500	1,950	63.1	36.9	937/39	295/8	23.7	4.0	571	100	14.9	-	-
Texas total	47,500	3,767	73.6	26.4	1,905/75	868/43	31.5	3.8	710	166	18.9	105	2.3
NEW MEXICO													
Bitter Lake NWR	9,243	1,538	47.6	52.4	566/32	193/2	24.6	5.4	658	87	11.7	33	1.4
Rio Grande Valley	61,317	11,759	74.1	25.9	6,952/140	1,688/60	19.8	2.0	2,480	439	15.0	384	2.2
Maxwell NWR ³	120	0											
Las Vegas NWR ³	600	0											
New Mexico total	71,280	13,297	71.0	29.0	7,518/172	1,881/62	20.2	2.2	3,138	526	14.4	417	2.3
MEXICO													
Mexico total ⁴	61,900	7,891	81.1	18.9	4,826/51	1,601/21	25.0	1.0	1,133	259	18.6	361	2.0
Western Central Flyway total	282,680	40,304	76.4	23.6	22,967/705	7,175/302	24.0	3.0	7,302	1,853	20.2	1,094	2.3

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 1960-2006.

Year	Population estimate ¹	Average flock composition				% Immature		Snow/blue family size	
		No. geese sampled	% Snow/blue ²	% Ross's ²	% Blue ²	Snow/blue	Ross's	Avg. imm./ family	No. families 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
Average, 1975-83 ⁴	72,424	6,434	82.0	18.1	2.2	28.8	23.4	-	-
Average, 1984-05 ⁵	192,938	34,178	77.4	22.6	1.9	20.2	16.8	2.0	1,278
% change from 2005	62.7	12.1	20.5	-35.5	-3.2	-14.6	71.2	0.0	11.4
% change, '84-'05 avg.	46.5	17.9	-1.3	4.4	57.9	18.8	20.2	15.0	-14.4

¹ Population estimates preceding 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 2005.

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 2006¹.

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		1	3	4	9
TEXAS								
Rita Blanca Res.							1	1
Cactus								0
TOTAL	1	1	1	2	1	3	9	18

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

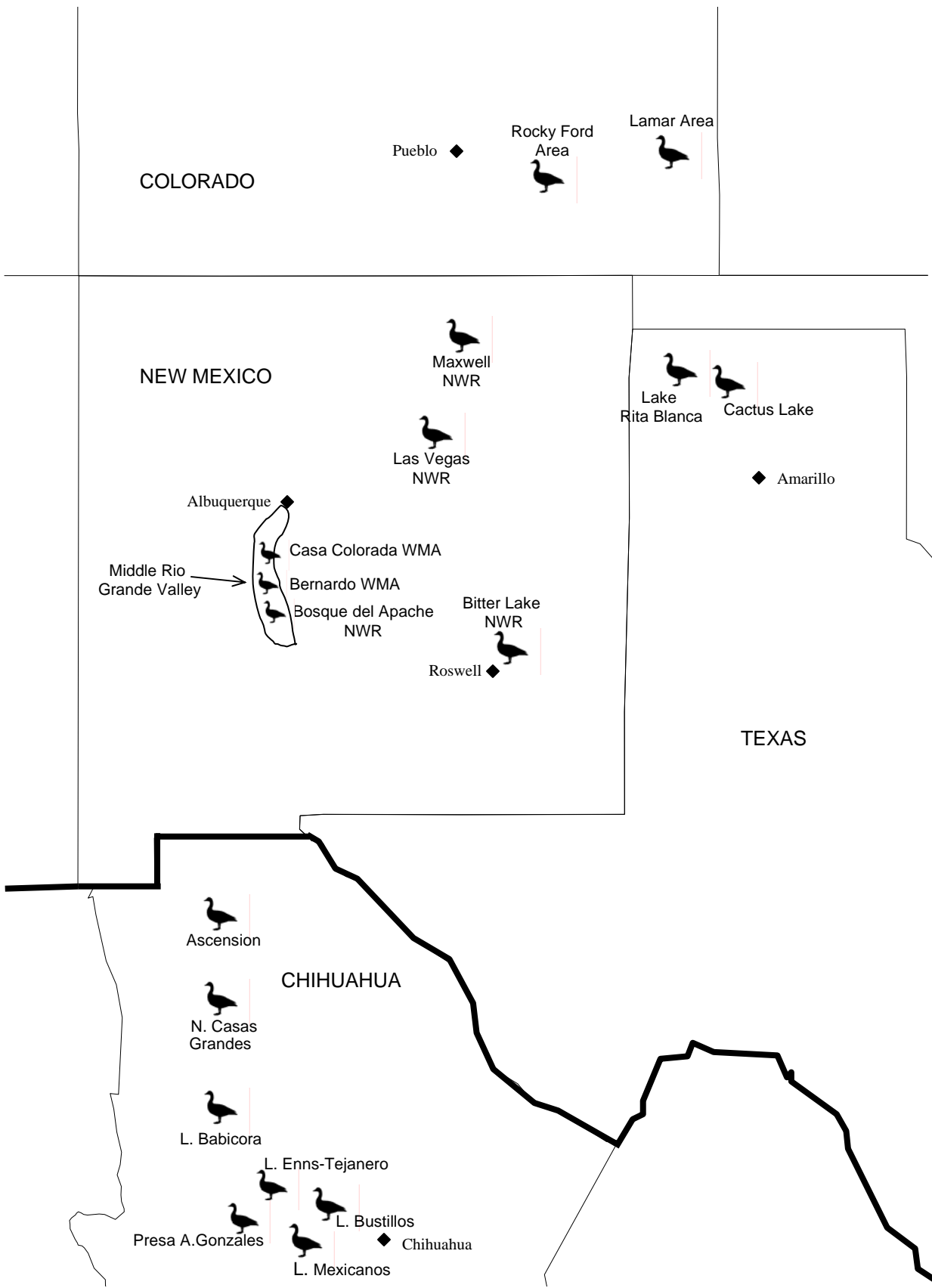


Fig. 1. Locations surveyed in the Western Central Flyway to assess species composition and productivity of lesser snow and Ross's geese, fall and winter, 2006-2007.

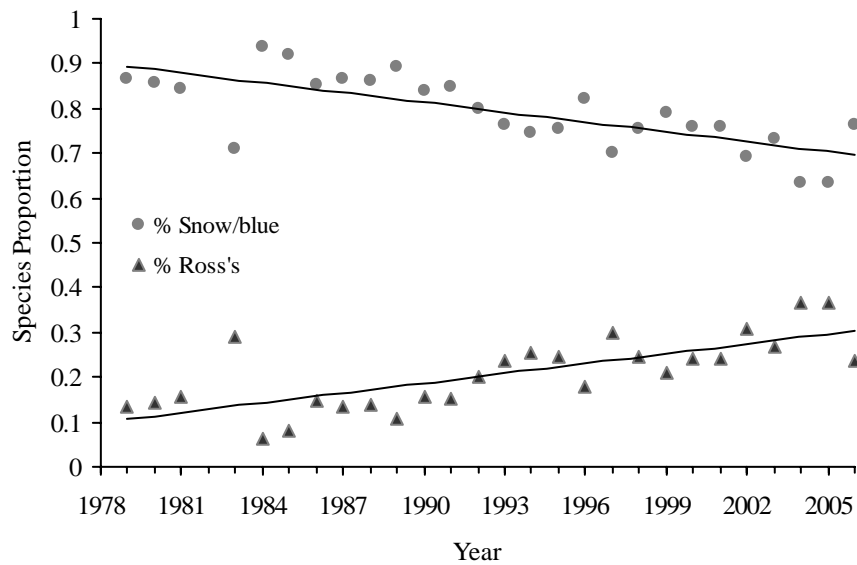


Fig. 2. Proportion of adult snow and Ross's geese in the Western Central Flyway Population, Winters 1979 – 2006. Data for 1982 were unavailable.

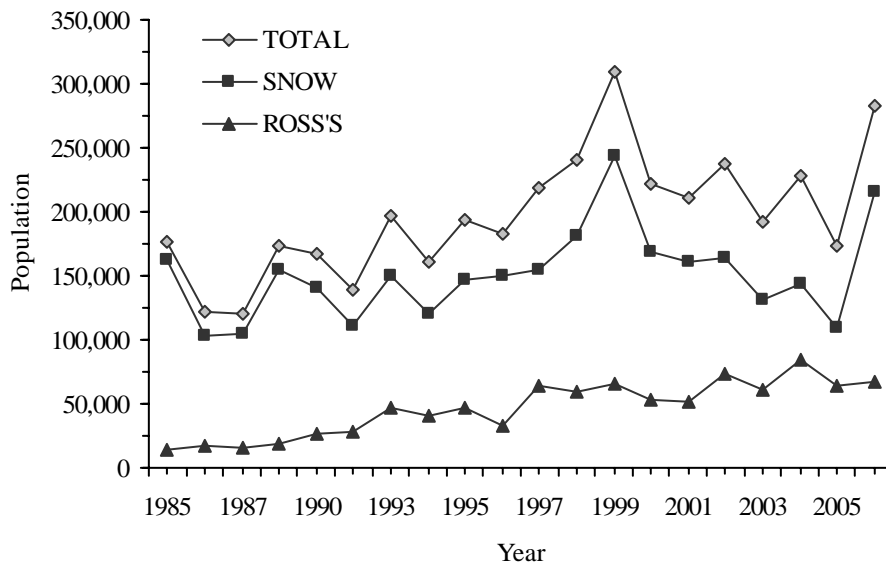


Fig. 3. Population estimates of Western Central Flyway light geese during winters 1985 – 2006. Incomplete survey years, 1988 and 1991, were excluded. Population estimates for each species were calculated using species compositions weighted for the Flyway based on each year (see Table 2).

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**SNOW AND ROSS'S GEESE SURVEYS IN THE MIDDLE RIO GRANDE VALLEY,
NEW MEXICO, AND IN CHIHUAHUA, MEXICO, WINTER 2006-07**

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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 2006-07. In New Mexico, geese peaked at 61,317 in early December, +34.6% above the 22-year mean. In Chihuahua, 61,900 geese were recorded at 7 areas during 11-19 January and numbers were -19.7% below the mean. An estimated $\approx 114,100$ light geese were at survey sites in the Rio Grande Valley, New Mexico and at 7 areas in Chihuahua in mid January 2007. Samples of geese (New Mexico-11,759, Chihuahua-7,891) were classified by species, color morph and age. Species composition of adults in New Mexico was 74.1% snow geese and 25.9% Ross's geese; 1.97% of adult snow geese were blue morph. In Chihuahua, 81.1% of adults were snow geese and 18.9% were Ross's geese; 1.05% of adult snow geese were blue morph. The percentages of immature snow geese were 19.8% in New Mexico and 25.0% in Chihuahua, and were -1.5% below and +23.2% above the 22-year means, respectively. The mean number of immatures per family was 2.18 in New Mexico and 2.04 in Chihuahua. Ross's geese averaged 15.0% and 18.6% immatures in New Mexico and Chihuahua; recruitment was +2.7% and +6.9% above average, respectively. Two 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 Wangel Island, Russia and eastern Arctic colonies on Baffin and Southampton Islands, LaPerouse Bay and Cape Henrietta Maria also have been recorded. The senior 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 2006 included the Bosque del Apache NWR (Bosque Refuge) and the State Waterfowl Management Area at Bernardo (Ladd S. Gordon SWMA). 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 21-23 December 2006 and in Chihuahua from 11-19 January 2007.

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. Aaron Drew and 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 Aaron Drew and Allen Nicholson for assisting with field surveys in Chihuahua and 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 due to above normal late summer-fall precipitation. Corn production at the Bosque Refuge was below normal due to initial problems with planting procedures and fields had to be replanted (A. Drew, pers. comm.). Refuge corn production, however, was improved over 2005-06. New Mexico Game and Fish Wildlife Management Areas (Bernardo, Belen, Casa Colorada) reported average corn yields (T. Mitchusson and D. Wilson, pers. comm.).

In Chihuahua, wetland water levels were the highest in 15 years (winter 1991-92). Above average summer and fall precipitation greatly improved wetland water levels and levels were further enhanced by a number of major winter storms. Smaller depressional wetlands were full and abundant in many areas especially in the Cuauhtemoc and Babicora-Madera valleys, and near A. Gonzales Reservoir in the Guerrero region; flooded roads and fields were also common at N. Casas Grandes and Ascension.

Survey conditions in Chihuahua were difficult due to windy conditions and much precipitation. Continuous rain showers during the last half of the survey prevented access to some locations because they lacked paved or gravel roads. Many areas became impassable due to flooded fields and muddy and flooded dirt roads restricting surveys to locations near the few paved highways. Areas where it was impossible to leave paved or gravel roads due to excessive precipitation included 1) Babicora-Madera valleys, 2) A. Gonzales Reservoir area, 3) N. Casas Grandes, and 4) Ascension. In the Babicora-Madera valleys, rain, fog and low heavy cloud cover minimized viewing wetlands. Light geese were not observed at Laguna Babicora, although we found 4,700 near Laguna Golondrinas in the adjacent Madera Valley. Light geese were not found at A. Gonzales Reservoir, although 2,400 were located nearby in a temporary flooded depressional wetland along a paved highway. A resident near the reservoir stated that large numbers of geese had departed 2 days prior to our arrival to the east toward the Cuauhtemoc Valley. At N. Casa Grandes light geese did not return to the two large wetlands east of the city. Instead, we observed some 6,000 in fields along the paved highway north of the city. Due to the abundance of water and numerous shallow depressional wetlands many geese did not return to traditional water bodies during midday hours and, instead, remained scattered over the landscape. Consequently, count data are minimal for most areas. The largest goose concentration was at Laguna Colorada (18,000) near Ascension.

Northern pintail was the most abundant and widely distributed duck species observed, especially in the Cuauhtemoc Valley where many thousands were scattered on the numerous shallow wetlands; an estimated 17,000 were at the small Laguna Enns on 14 January. White-fronted geese also were widely dispersed; the largest concentration, 3,500, was at Laguna Tejanero. One small Canada goose was observed during the survey associated with snow and Ross's geese at Laguna Bustillos.

Laguna Tejanero is threatened by drainage. A partially constructed drainage ditch was present on 12 and 14 January leading to a nearby major drain in an arroyo. This important small, shallow wetland receives very high use by wintering geese and other water birds, but is farmed during drought years. On 14 January, an estimated 13,500 light geese, 3,500 white-fronted geese, and >8,000 pintail were present. A photo of this wetland also appeared in Drewien et al. (2003:426). This wetland is privately owned by two Mennonite families and hunting is not allowed. Efforts to preserve this important wetland should be undertaken 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 61,317 light geese was recorded in the Middle Rio Grande Valley during the 1st week of December (Tables 1 and 2). The peak population estimate was +34.6% above the 22-year mean (45,552). A population of 49,800 was present in the Rio Grande Valley during the 3rd week of the December when this survey was conducted and 52,171 during the mid January survey period in Chihuahua (Table 2).

A total of 11,759 light geese was classified by species and age (Table 2). Classification of 9,572 adults yielded 74.1% snow geese and 25.9% Ross's geese (Table 2). The proportion of Ross's geese in 2006 was 27.6% above the 20-year mean ($x=20.3\%$). Of 7,092 adult snow geese classified, 1.97% ($n=140$) were blue morph (Table 2). During 22 winters, the percent blue morph averaged 1.7%, ($sd=0.19$) and has remained relatively constant (range, 1.5-2.1%). One adult blue morph Ross's goose was observed at Bernardo.

Chihuahua: A total of 61,900 light geese was recorded at 7 survey units or -19.7% below the 22-year mean (77,101) (Tables 1 and 2). The population estimates for several areas (Babicora-Madera valleys, A. Gonzales Reservoir, N. Casas Grandes) are minimal because most of these areas were inaccessible due to inclement weather.

We classified 7,891 light geese by species and age. Classification of 6,010 adults revealed that 81.1% were snow geese and 18.9% were Ross's geese (Table 2). The percentage of Ross's geese is probably grossly underestimated due to the inability to access goose flocks due to inclement weather at Ascension and N. Casas Grandes where larger numbers of Ross's geese normally winter. One blue morph Ross's goose was observed near Laguna Golondrinas.

Classification of 4,877 adult snow geese showed that 1.05% ($n=51$) were blue morph (Table 2). 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. Presence of the blue morph during January 2007 varied by location with lows of 0.61% at Laguna Tascate to a high of 1.64% at Laguna Golondrinas (Table 2). The lower proportion of blue morph in winter 2006 compared to recent years resulted from the lack of access to goose flocks at the northern sites of Ascension and N. Casas Grandes where higher proportions of the blue morph are normally found.

Recruitment Estimates

Snow Geese: Samples totaling 8,840 snow geese (includes blue morph) in New Mexico contained 19.8% immatures (Table 2) and was -1.5% below the 22-year mean (20.1%). The percent immatures for the small sample of blue morphs ($n=200$) was 30.0%. The mean number of immatures/family was 2.18 (Table 3). In Chihuahua, samples totaling 6,499 snow geese (includes blue morph) contained 25.0% immatures (Table 2) or +23.2% above the 22-year mean (20.3%). The percent immatures in a small sample of blue morphs ($n=72$) was 29.2%. The mean number of immatures/family was 2.04 (Table 3).

Ross's Geese: The percent immatures in a sample of 2,919 Ross's geese in New Mexico was 15.0% (Table 2), or +2.7% above the 20-year (1986-05) mean (14.6%). In Chihuahua, immatures averaged 18.6% in Ross's geese and varied by location from 15.7% at Laguna de los Mexicanos to 20.9% at Laguna Golondrinas (Table 2). The 18.6% immatures was +6.9% above the 20-year mean (17.4%). 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 75 neckbanded geese (51-snow, 24-Ross's) including 42 in New Mexico and 33 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 on Baffin Island (1-Bernardo, NM) and LaPerouse Bay (1-Laguna Tejanero, Chih) (K. Meeres, CWS, pers. comm.); a third red collar was unidentified. Four 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).

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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 1984-2006.

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

^{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 2006-07.

Location	Pop.	Adult	Snow/Blue geese		Total	Adult	Ross's geese		Total geese
	Est.	snow/blue	Immature <u>1/</u>	(%)		Immature (%)	Total		
NEW MEXICO									
Rio Grande Valley	61,317 <u>2/</u> (49,240) <u>3/</u>	6,952/140	1688/60	(19.8)	8,840	2,480	439 (15.0)	2,919	11,759
CHIHUAHUA									
Ascension	18,000								
N. Casas Grandes	6,000	245/ 2	91/ 0	(26.9)	338	160	39 (19.6)	199	537
L. Babicora-Madera Valley	4,700	480/ 8	180/ 8	(27.8)	676	128	28 (18.0)	156	832
L. Tascate	2,600	326/ 2	137/ 0	(29.5)	465	7	0 (0.0)	7	472
L. Tejanero	13,500	1,642/ 16	467/ 3	(22.1)	2,128	34	8 (19.1)	42	2,170
L. Enns	600	223/ 3	85/ 0	(27.3)	311	0	0 (0.0)	0	311
L. Bustillos	9,300	900/ 10	278/ 5	(23.7)	1,193	387	85 (18.0)	472	1,665
L. Mexicanos	4,800	555/ 5	220/ 3	(28.5)	783	140	26 (15.7)	166	949
A. Gonzales Res.	2,400	455/ 5	143/ 2	(24.0)	605	277	73 (20.9)	350	955
Total/X	61,900	4,826/51	1,601/21	(25.0)	6,499	1,133	259 (18.6)	1,392	7,891

1/ % immatures include blue morph.

2/ Peak count in Valley, 1st week Dec 2006, (T. Mitchusson, pers. comm.).

3/ Estimated number of light geese in Rio Grande Valley, New Mexico in mid Jan 2007 during Mexico survey.

Table 3. Family sizes of lesser snow geese in the Middle Rio Grande Valley, New Mexico, and in Chihuahua, Mexico, winter 2006-07.

Location	Immatures/family						Total families	Mean immatures per family
	1	2	3	4	5	6		
NEW MEXICO								
Rio Grande Valley	95	169	84	28	7	1	384	2.18
CHIHUAHUA								
Ascension								
N. Casas Grandes	6	9	3	2			20	2.05
L. Babicora-Madera Valley	20	22	13	3	1		59	2.03
L. Tascate	5	16	4	1			26	2.04
L. Tejanero	28	42	28	2	1		101	2.07
L. Enns	8	8	3	1			20	1.85
L. Bustillos	13	22	11	5	1		52	2.21
L. Mexicanos	13	23	5	2			43	1.91
A. Gonzales Res.	12	18	9	1			40	1.98
Total Families (Mex)	105	160	76	17	3		361	2.04

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 2006-07.

Location	Snow geese				Ross's geese		Total	
	Yellow	Black	Red	Green	Blue	Yellow		White
<u>NEW MEXICO</u>								
Bosque NWR	11	6		2	6	8	1	34
Bernardo	2	3	1		2			8
Subtotal	13	9	1	2	8	8	1	42
<u>CHIHUAHUA</u>								
Ascension								
N. Casas Grandes					1			1
L. Babicora-Madera Valley								
L. Tascate		1						1
L. Tejanero	9	9	2	2	2			24
L. Enns								
L. Bustillos	1				1	2	1	5
L. Mexicanos		2						2
A. Gonzales Res.								
Subtotal	10	12	2	2	4	2	1	33
TOTAL	23	21	3	4	12	10	2	75

TITLE:

Pacific Flyway Goose and Swan Productivity Surveys - 2006

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)

COOPERATORS:

Canadian Wildlife Service(CWS)

U.S. Fish and Wildlife Service(USFWS)

Division of Migratory Bird Management(DMBM)

Klamath Basin NWR

Red Rock Lakes NWR

Sacramento NWR

Delevan NWR

Colusa NWR

Sutter NWR

Butte Sink (CA/Pvt./FWS)

Oregon Department of Fish & Wildlife(ODFW)

Utah State Division of Wildlife Resources

Wrangel Island Preserve

REPORTED BY:

Elizabeth Huggins, Flyway Biologist, USFWS/Division of Migratory Bird Management

ABSTRACT:

Productivity surveys for most species and populations were conducted in 2006 and appear in the tables of this report along with a short narrative in the Results section. Productivity survey results from the portion of the Ross's goose population that winters in the northern highlands of Mexico, appear in the Western Central Flyway Report.

METHODS:

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 2006.

RESULTS:

Lesser Snow Goose:

Western Arctic: No report

Mixed flocks: Table 1.

J. Isola, M. Carpenter and M. Wolder collected data at Sacramento, Colusa and Delevan NWR for 10 days from October 26, 2006 to December 1, 2006 with a result of 27.8% juvenile lesser snow geese (n= 15,064 adults and 5,802 juveniles).

Wrangel Island: Table 2 and 3.

V. Baranyuk collected data on Wrangel Island in 2006. The total spring population was 132.5 thousand, with 23.9% young. This was 12.8% higher than last years count. The breeding population of 93.2 thousand was -2.7% lower and the percentage of successful nests(87.7%) was 6.6% higher than last year.

Sean Boyd, CWS, reports on data collected for the Fraser/ Skagit deltas winter 2005-06. Total lesser snow geese observed was 83,148 with 21.2% young. Last years count was 80,040 total lesser snow geese with 39% young. This is a -46% decrease in production from last year and a 5.2% increase in production from the 1975 to 2005 long term mean.

Lesser Snow Goose data collected by Rod King in the Skagit Valley from Dec 14-17, 2006 consisted of 19.3% juveniles (n= 1513 adults and 361 young) with an average brood size of 2.5 from 147 broods.

Ross' Goose: Table 4.

Productivity appraisals for Central Flyway wintering Ross's geese in the northern highlands of Mexico continue to be conducted by Dr. Rod Drewien and are reported in the Western Central Flyway White Goose Productivity Survey Report.

M. Carpenter collected data at Sacramento and Colusa NWR for 3 days from November 2 to 30, 2006. A sample of 2705 total birds revealed 25.4% juvenile Ross's geese (N=2018 adults and 687 juveniles). This was a -13% decrease from last year (29.2%).

Greater White-fronted Goose: Table 5.

M. Carpenter, J. Isola and M. Wolder collected data at Colusa, Sacramento, Sutter, and

Butte Sink NWR for 7 days from October 11 to November 21, 2006 with a result of 27.7% juvenile Pacific greater white-fronted geese(n=5970 adults and 2289 juveniles).

E. Huggins collected data at the Klamath Basin NWR complex for 3 days from September 21 to October 4, 2005 (pre-hunting season) with a result of 24.7% juvenile greater white-fronted geese (N=757 adults and 248 juveniles). Three attempts were made to collect age ratio data during hunting season from October 13 to November 9, 2006 with no success due to flighty birds.

The combined production from Colusa, Sacramento and the Klamath Basin was 27.4%. This is a -15.2% decrease from last year (32.3%).

Tule Greater White-fronted Goose: Table 6.

M. Carpenter, M. Wolder , and J. Isola collected data at Sacramento, Delevan and Colusa NWR for 10 days from October 11 to December 19, 2006 with a result of 30.5% juvenile Tule greater white-fronted geese(n= 1953 adult and 857 juvenile geese).

Marty St. Louis and others collected data in the Summer Lake wildlife area for 3 observation periods in September 2006 with a result of 31.4% juvenile Tule greater white-fronted geese(n=560 adults and 256 juvenile geese).

Combined production for the Sacramento complex and Summer Lake wildlife area is 22.5%. This is a decrease of -4.0% from last year (23.4%).

Tundra Swan: Table 7 & 8.

Tom Aldrich reports on data collected in Utah with a result of 11.5% juvenile Tundra Swans (n= 23,142 adults and 3,004 juveniles) with 1.9 young/family.

Marty St. Louis collected data in the Summer Lake Wildlife Area for 12 days from October 25, 2006 to January 24, 2007 with a result of 14.77% juvenile Tundra Swans (n= 5695 adults and 987 juveniles) with 1.8 young/family.

Surveys conducted by Rod King on tundra swans in the Sacramento Valley during December 28 - 29, 2006, revealed a productivity rate of 2.4 % juveniles +/- 0.126 % S.E. (n = 14,930 total birds consisting of 14,563 adults and 367 juveniles) which was the lowest rate recorded in 6 years and was significantly lower than 15.6% recorded in 2005. 216 broods were observed from an average family size of 1.7 (+/- 0.85 S.E.) and was identical to the brood size average of 2005.

Tundra Swans data collected December 14-17, 2006 by Rod King in the Skagit Valley consisted of 12 young observed for a productivity rate of 8.9%. Brood size averaged 1.5 from a total of 8 broods.

Combined production for the Utah, Summer Lake and Sacramento areas was 9.1%. 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 2006. This report was formerly the Tristate Trumpeter Swan Survey Report (1967-1991) and is 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.

This years report was compiled by Jim Dubovsky Assistant Migratory Bird Coordinator. Observers from the Fall 2006 RMP survey counted 507 total swans in the U.S. Breeding segment of this population, a count slightly lower than last year(510) but the second highest count since 1992. Numbers of white birds (416) increased 6% but the number of signets(91) was 16% lower compared to counts in 2005.

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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																					
1962	483						4008	1673	29.5								6428	1665	20.6	1.8	20.6	
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								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			23.0											31.0		
1985	550				40.0	2.3																
1986	522				2.6				5.0												5.0	
1987	525				37.0															22.0	22.0	
1988	441				42.0															35.0	35.0	
1989	464				19.3,28	2.1														24.0	24.0	
1990	709																1382	620	31.0		31.0	
1991	690																2372	610	7.8		7.8	
1992	639																			18.0	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																	15064	5802	27.8		27.8	
Mean	513		8640	7360	27	2	5686	2059	28		2911	963	27		4608	892	18	4308	1184	24	2	25
% change from mean	7377																	250	390	16		10
% change from 2005	4270																	130	65	-21		-23

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, 1948-2006.

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
(1975- 05) LTA	1,749.5	77.2	0.24	35,207 (48-05)	20.1 (48-05)	1,736	47.7
% Change 2006 vs. LTA.				136%	5.5%	67.6%	38.2%
2006 v s . 05				4%	-46%	- 31.2%	- 6.1%

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	

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
Mean	222.7	3537.3	1904.3	35.2	2.3	8892	1481	23.5	2.1	2333	789	26.5	2.1	21.7
% change from mean						-80.5	-83.3	4.9		155.9	190.2	4.7		26.2
% change from 2005						-22.6	-49.49	-26.0		208.4	154.6	-12.6		-15.2

*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 Lake, 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
Mean	861.25	235.75	25.18	468.33	144.67	24.4	495.67	133.33	24.0		657.85	262.3	24.99	2.0	24.7
% change from mean				19.6	77.0	28.5					196.9	226.8	16.8		-9.0
%change from 200 5				12.4	146.2	81.5					84.9	130.4	16.9		-4.0

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
Mean	65.6	1455	299.1	19.2	2.4	15004.1	4441.5	30.7	2.4	5036.2	810.3	15.0	1.9	7406.6	1540	17.7	2.0	20.3
%change from mean						54.2	-32.4	-62.5	-19.8	13.1	21.8	-1.3	-4.7	96.6	-76.2	-86.4	-13.5	-55.1
% change from 2005						283.3	-12.0	-68.1	-8.2	272.5	229.0	-9.8	0.0	65.5	-77.4	-84.6	0.0	-62.9

*Population indices are from Pacific Flyway Data Book (Trost, 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	JUVENILES	% YOUNG
1963	1,397	527	27.4%	99	218	2.20	1,595	745	31.8%
1964	1,193	171	12.5%	372	717	1.93	1,937	888	31.4%
1965	883	541	38.0%	141	362	2.57	1,165	903	43.7%
1966	4,326	2,002	31.6%	626	1,464	2.33	5,578	3,466	38.3%
1967	4,753	3,975	45.5%	595	1,722	2.89	5,943	5,697	48.9%
1968	10,597	6,679	38.7%	933	2,609	2.80	12,463	9,288	42.7%
1969	19,527	15,414	44.1%	637	2,031	3.19	20,801	17,445	45.6%
1970	28,478	6,907	19.5%	500	1,181	2.36	29,478	8,088	21.5%
1971	5,465	1,422	20.6%	516	1,165	2.26	6,497	2,587	28.5%
1972	5,102	1,193	19.0%	440	967	2.20	5,982	2,160	26.5%
1973	3,696	2,105	36.3%	670	1,549	2.31	5,036	3,654	42.0%
1974	9,610	1,733	15.3%	577	1,333	2.31	10,764	3,066	22.2%
1975	2,443	163	6.3%	218	539	2.47	2,879	702	19.6%
1976	1,457	171	10.5%	245	640	2.61	1,947	811	29.4%
1977	2,960	123	4.0%	459	1,091	2.38	3,878	1,214	23.8%
1978	3,848	342	8.2%	596	1,343	2.25	5,040	1,685	25.1%
1979	7,210	2,198	23.4%	960	2,456	2.56	9,130	4,654	33.8%
1980	7,868	3,116	28.4%	687	1,594	2.32	9,242	4,710	33.8%
1981	11,636	3,917	25.2%	1,246	2,635	2.11	14,128	6,552	31.7%
1982	4,173	1,305	23.8%	271	600	2.21	4,715	1,905	28.8%
1983	12,456	6,373	33.8%	774	2,229	2.88	14,004	8,602	38.1%
1984	1,298	639	33.0%	65	159	2.45	1,428	798	35.8%
1985	670	276	29.2%	77	173	2.25	824	449	35.3%
1986	754	513	40.5%	195	464	2.38	1,144	977	46.1%
1987	402	224	35.8%	68	175	2.57	538	399	42.6%
1988	1,364	762	35.8%	235	556	2.37	1,834	1,318	41.8%
1989	1,263	696	35.5%	144	352	2.44	1,551	1,048	40.3%
1990	3,548	1,708	32.5%	351	902	2.57	4,250	2,610	38.0%
1991	2,286	1,176	34.0%	232	594	2.56	2,750	1,770	39.2%
1992	3,102	920	22.9%	209	476	2.28	3,520	1,396	28.4%
1993	1,809	630	25.8%	180	449	2.49	2,169	1,079	33.2%
1993 Aerial Photography	2,380	598	20.1%	143	381	2.66	2,666	979	26.9%
1994	3,434	1,346	28.2%	262	633	2.42	3,958	1,979	33.3%
1995	5,655	2,178	27.8%	783	1,777	2.27	7,221	3,955	35.4%
1996	7,317	2,434	25.0%	588	1,125	1.91	8,493	3,559	29.5%
1997	108,626	22,934	17.4%	855	2,034	2.38	110,336	24,968	18.5%
1998	87,629	13,033	12.9%	501	1,099	2.19	88,631	14,132	13.8%
1999	67,388	10,481	13.5%	603	1,333	2.21	68,594	11,814	14.7%
2000	47,752	3,371	6.6%	173	324	1.87	48,098	3,695	7.1%
2001	26,836	2,012	7.0%	80	162	2.03	26,996	2,174	7.5%
2002	43,301	8,115	15.8%	884	1,827	2.07	45,069	9,942	18.1%
2003	18,103	5,485	23.3%	207	533	2.57	18,517	6,018	24.5%
2004	13,072	6,000	31.5%	38	109	2.87	13,148	6,109	31.7%
2005	5,198	2,544	32.9%	420	868	2.07	6,038	3,412	36.1%
2005 Aerial Photography	11,115	1,493	11.8%	530	988	1.86	11,115	1,493	11.8%
2006	21,660	1,594	6.9%	741	1410	1.90	23,142	3,004	11.5%
2006 Aerial Photography	10,042	989	9.0%	559	986	1.76	10,042	989	9.0%
2007									

Table only includes Oct-Jan classification

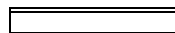
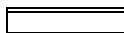


Table 9. Historical records for the Rocky Mountain Population of Trumpeter Swans, 1967 to Present.*

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	

*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 – 2006

SPECIES SURVEYED:

Pacific Brant (*Branta bernicla nigricans*)

Trumpeter Swan (*Cygnus buccinator*)

Emperor Goose (*Chen canagica*)

Dusky Canada Goose (*Branta canadensis occidentalis*)

CONTRIBUTORS:

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 Koyukuk/Nowitna National Wildlife Refuge Complex

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 Migratory Bird Management, Juneau

U.S Forest Service (USFS)

 Cordova Ranger District

 Yakutat Ranger District

Alaska Department of Fish and Game

 Division of Wildlife Conservation, Statewide Waterfowl Program

Comox Valley Naturalists Society – British Columbia

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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 2006 and early 2007 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 2006.

The following productivity measures were estimated for 2006:

Species	Type of Year	Productivity Estimate	% Change From 2005	% Change From Mean
Pacific Brant	Below Average			
Fall % Juv.		20.3%	-39%	-10%
Fall Juv./Fam.		2.63	-9%	+0%
Winter % Juv.		7.3%	-53%	-41%
Trumpeter Swan	Average			
Late Summer Brood Size		3.1	+0%	-3%
Late Summer % Juv.		28.0%	+3%	+10%
Late Summer % Prs. w/ Brd		39.4%	+16%	+23%
Winter % Juv.		15.8%	-24%	-16%
Winter Juv./Fam.		2.24	-5%	-3%
Emperor Goose	Above Average			
Fall % Juv.				
From ground counts		38.0%	+33%	+63%
From aerial photos		35.2%	+90%	+92%
Fall Juv./Fam.		2.26	-19%	-19%
Cackling Cackling Goose	No Report			
Dusky Canada Goose	Above Average			
Late Summer % Juv.		23.1%	+96%	+22%

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 2006), 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 20.3% juveniles were estimated from a sample of 33,482 brant during ground surveys conducted at Izembek Lagoon, Alaska in September and October. She also estimated a mean of 2.63 juveniles per family group from a sample of 222 families. The proportion of juveniles was 39% below the 2005 estimate and 10% below the 43-year mean. The mean family group size was 9% below the 2005 estimate and equal to the 40-year mean.

Winter Productivity: Table 2.

Russ Canniff collected data from Birch and Oak bays in Puget Sound, WA in March 2007. He estimated 7.3% juveniles from a sample of 455 brant. Unlike in Padilla and Samish Bays, where in prior years Canniff recorded mostly gray-bellied brant from the high arctic population, all of the brant he observed in Birch and Oak bays in March were black brant.

This year's winter productivity estimate of 7.3% was 53% below the 2005 estimate and 41% below the 22-year mean.

Summary: Pacific brant experienced below-average production in 2006.

Trumpeter Swan:

Late-Summer Productivity: Tables 3 and 4.

Late-summer productivity surveys were conducted in Alaska between 6 July and 29 August by Koyukuk/Nowitna NWR, USFS Yakutat Ranger District, 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. Forty three 1:63,360-scale topographic maps were surveyed in 2006. Combining the results from all areas yielded a mean brood size of 3.1 (n=396 broods), 28.0% juveniles in the population (n=4,447 total swans), and 39.4% pairs with a brood (n=981 pairs) (Table 3). The mean brood size was the same as in 2005 and was 3% below the 30-year mean (Table 4). The proportion of juveniles was 3% higher than in 2005 and 10% above the mean. The percentage of pairs with a brood was 16% higher than in 2005 and 23% above the mean.

Winter Productivity: Table 5.

On Vancouver Island, British Columbia, Graeme Fowler reported the results of swan surveys conducted from November 2006 through February 2007 by the Comox Valley Naturalists Society. The mean percent juvenile was 19.2% (n = 1,053) in November, 17.8% (n = 1,591) in December, 18.2% (n = 1,671) in January, and 15.4% (n = 1,929) 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 2007. He found that 16.1% were juveniles from a sample of 3,525 swans. He also collected data on family group size from November 2006 through February 2007 and found a mean of 2.24 juveniles per family group from a sample of 117 families.

Data from all winter survey areas combined resulted in an estimate of 15.8% juveniles from a sample of 5,454 swans. This was 24% below the 2005 estimate and 16% below the 29-year mean. The mean family group size was 2.24 from a sample of 117 families. This was 5% below the 2005 estimate and 3% below the 24-year mean.

Summary: Trumpeter swans experienced average production but below-average winter survival of juveniles in 2006.

Emperor Goose: Tables 6 and 7.

Kristine Sowl reported that 38.0% juveniles were estimated from a sample of 5,422 emperor geese during ground surveys conducted at Izembek NWR, Alaska in September and October (Table 6). She also estimated a mean of 2.26 juveniles per family group from a sample of 476 families. The proportion of juveniles was 33% higher than in 2005 and 63% above the 39-year mean. The mean family group size was 19% lower than in 2005 and 19% below the 39-year mean.

Chris Dau 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 35.2% juveniles for the 2006 fall population, 90% higher than 2005 and 92% above the 21-year mean (Table 7).

Summary: Emperor geese experienced above-average production in 2006.

Cackling Cackling Goose: No Report.

Dusky Canada Goose: Table 8.

Mike Petrula 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 11 July. Of a total count of 6,216 geese, 23.1% were identified as juveniles. The proportion of juveniles was 96% above the 2005 estimate and 22% above the 35-year mean.

Petrula and his colleagues also conducted a ground survey on Middleton Island in the Gulf of Alaska on 22-24 June (Petrula et al. 2006). The survey has been done periodically to determine the status of this island group of dusky Canada geese, which breeds in an environment free of mammalian predators and generally experiences higher productivity than its mainland counterparts. Of an estimated total 2,317 geese, 37% were goslings. This compared to 34%, 40%, 48%, 37%, and 37% in 1996, 1997, 2000, 2002, and 2004, respectively.

Summary: Dusky Canada geese experienced above-average production in 2006.

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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, 1963-2006.^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
Mean ^b			22.6			2.64
% Change from:						
2005			-39%			-9%
Mean			-10%			0%

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

^b Mean excludes 2006.

Table 2. Historical winter productivity records for brant in the Pacific Flyway, 1983-2006.

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
Mean ^f			N/A			14.9			11.2			7.9			10.1	12.4
% Change from:																
2005			N/A			N/A			N/A			N/A			N/A	-53%
Mean			N/A			N/A			N/A			N/A			N/A	-41%

^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 Mean excludes 2006.

Table 3. Results of late-summer 2006 productivity surveys for trumpeter swans in Alaska.^a

Area	Number of 1:63,360 Maps Surveyed	Date(s) 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	8/14-8/29	398	29	152	579	213	792	77	2.8	26.9	38.7
Minto Flats	6	8/3-8/5	924	93	513	1530	746	2276	230	3.2	32.8	49.1
Copper River Delta	11	8/5-8/8	544	59	337	940	216	1156	68	3.2	18.7	22.8
Yakutat Forelands	10	8/29	38	6	9	53	27	80	9	3.0	33.8	47.4
Southeast Alaska	10	7/6-7/10	58	1	40	99	44	143	12	3.7	30.8	41.4
Total	43		1962	188	1051	3201	1246	4447	396	3.1	28.0	39.4

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

Table 4. Historical late-summer productivity records for trumpeter swans in Alaska, 1968-2006^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	
Mean ^b									3.2	25.4	32.0	
% Change from:												
2005										0%	3%	16%
Mean										-3%	10%	23%

^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 2006.

Table 5. Historical winter productivity records for trumpeter swans in the Pacific Flyway, 1977-2006.

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
Mean ^e			22.1		2.36			17.6			18.6		2.31	18.7
% Change from:														
2005			N/A		N/A			-27%			-25%		-5%	-24%
Mean			N/A		N/A			-12%			-13%		-3%	-16%

^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 2006.

Table 6. Historical fall productivity records (from ground counts) for emperor geese at Izembek Lagoon, AK, 1966-2006.^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
Mean ^c			23.4			2.80
% Change from:						
2005			33%			-19%
Mean			63%			-19%

^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 2006.

Table 7. Historical fall productivity records (from aerial photos) for emperor geese on the Alaska Peninsula, 1985-2006.^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
Mean ^c			18.3
% Change from:			
2005			90%
Mean			92%

^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 2005.

Table 8. Historical productivity data for dusky Canada geese on the Copper River Delta, AK, from July aerial surveys, 1971-2006.^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	6216
Mean ^b	19.0	
% Change from:		
2005	96%	
Mean	22%	

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

^b Mean excludes 2006.