

MBM

Memorandum

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Date: 15 July 2011

Subject: 2011 Preliminary Results for Dusky Canada Geese on the Copper River Delta, Alaska

INTRODUCTION AND METHODS

The Copper River Delta (CRD) dusky Canada geese survey was conducted on 16-17 May 2011 by the Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Anchorage, Alaska. The 2011 aerial survey was comparable in timing to other years and weather and visibility were good. As in 2010, William Larned was pilot/left seat observer and William Eldridge was right seat observer.

Standard U.S. Department of Interior survey techniques were used as in previous CRD surveys (USFWS and CWS 1967). A Cessna 206 on amphibious floats was used to fly east-west transect lines (Fig. 1) at an altitude of approximately 45 m and airspeed of 150 km/hr. Pilot and right-seat observer counted target species to a distance of 200 m from the plane. Observations were recorded directly into a laptop computer connected to the airplane Global Positioning System through a survey program (John Hodges, USFWS, Migratory Bird Management) and each observation received a coordinate location. The same flight lines have been used since 1997 (Fig. 1). Three strata (Fig. 1) were used for population estimates: West Delta, East Delta, and Egg Island. Transects are separated on these strata at intervals of 0.93 km (0.5 nautical mile) intervals, 1.85 km (1.0 nautical mile) intervals 0.78 km (0.42 nautical mile) respectively. All species of geese, trumpeter swans, swan nests, moose, bears and coyotes that were observed were counted during the survey. Population indices for dusky Canada geese, trumpeter swans, and swan nests are presented in this report.

Dusky Canada Geese

Population Indices

The population indices (Tables 1, 2) are defined as follows:

$$\begin{aligned}\text{Indicated Total Birds} &= 2 \times (\text{singles} + \text{pairs}) + \text{birds in flocks} \\ \text{Indicated Breeding Birds} &= 2 \times (\text{singles} + \text{pairs})\end{aligned}$$

These indices are based on the assumption that a single goose observed represents a pair, with the unseen mate on a nest, so single observations are doubled to account for the pair. Geese seen on nests were not counted.

Analysis was performed by a VisualBasic program (John Hodges, USFWS, Migratory Bird Management). Average densities of each aerial index were calculated from all transects within each of the 3 strata. A ratio was used to calculate the average density and variance (Caughley 1977). Average density was multiplied by total stratum area to calculate the population index for each of the three strata which were summed for the total index. We assumed that all flight lines were flown as designed. Bird locations determined from the voice/GPS location were assigned to the nearest transect.

Conversion of population indices to an estimated population

The Dusky Canada Goose Management Plan (Pacific Flyway Council 2008) presents methodology to convert the aerial survey population indices, plus estimates from a Middleton Island boat survey (Petrula et al. 2010), to a population estimate that should better represent the actual population number, minus current year production. Three components are used to estimate the population: 1) CRD indicated breeding birds index from the May survey 2) CRD flocked bird estimate from the May survey, and 3) Middleton Island adult birds from a late June boat survey. The results from the July production survey conducted by the Alaska Department of Fish and Game are not included in this estimate. The following steps and correction factors (which will change annually with additional data) were used in determining the annual population estimates for 2011 and previous years:

CRD Breeding Bird Component

- 1) The indicated breeding birds index from the May survey is changed to an aerial breeding pair index (= 0.5 aerial pairs per indicated breeding birds aerial index).
- 2) The ground nest density per aerial pair density (3.39 nests per aerial pair) is used to calculate total number of nesting pairs to correct for pairs not seen on the May aerial survey (Hodges and Eldridge 2007). This value is determined and updated by analyses of random ground plot nest searches, which are conducted every three years by the U.S Forest Service.
- 3) The nest detection rate (0.832 nests detected per actual nest) corrects for nests undetected on ground plots (Youkey 1998).
- 4) The average renesting rate (1.2 nests per pair) corrects for the number of extra nests counted on ground plots due to renesting (Fondell et al. 2006).
- 5) birds per pair (= 2 birds per nest)

The conversion factor is determined by multiplying the above values as follows:

$$0.5 * 3.39 * (1 / 0.832) * (1 / 1.2) * 2 = \mathbf{3.3954}$$

The resulting factor is multiplied by the aerial indicated breeding bird index (Table 2) to determine the breeding bird component of the total CRD dusky Canada goose population estimate.

CRD Flocked Bird Component

The number of birds in flocks is expanded by stratum and summed for the entire delta (Table 1). We assume that 100% of flocked birds (3 or more birds together) are observed.

Middleton Island Adult Bird Component

The number of adult geese observed on Middleton Island during late June ground surveys was added as a third population component (Pacific Flyway Council 2008). For those years without Middleton Island surveys, the number of adult geese as seen in the most recent prior year with data was used. The Middleton Island survey conducted in late June 2010 recorded 1,249 adult geese (Petruła 2010). No Middleton Island survey was planned for 2011 so the 2010 count of 1,249 adult geese was used for 2011.

The total dusky Canada goose population estimate = CRD breeding bird component + CRD flocked bird component + Middleton Island adult bird component.

Trumpeter Swan

Population Indices

We assume that 100% of swans and swan nests are seen on transects. Unlike geese, we count swans on nests as single birds or as a pair if another single bird is seen close to one on a nest. The population indices for swans are as follows:

$$\begin{aligned} \text{Total Birds} &= (2 \times \text{pairs}) + \text{single birds} + \text{birds in flocks} \\ \text{Singles and Pairs} &= (2 \times \text{pairs}) + \text{single birds} \\ \text{Swan Nests} &= \text{number of active swan nests} \end{aligned}$$

The same population analysis program described above for dusky Canada geese was used to calculate the population indices for trumpeter swans (Table 2).

RESULTS AND DISCUSSION

Dusky Canada Geese

The three components of the dusky Canada goose estimate, the population estimate, and 3-year running average for all years are presented in Table 1 and Fig 2. The indicated breeding bird and indicated total bird indices were the highest recorded since 2002 (Table 1) and increased dramatically from the recent low of 2009. Number of flocked birds also increased considerably over 2010 (Table 1). These increases could be in part due to three consecutive years of high production on CRD (Petrula 2010). While the 2011 data certainly do not reverse the long-term negative population trend (Fig. 2) perhaps it is appropriate to look at the last 3 years as indication of a recent positive trend. More years of data will be required to confirm if this represents a valid reversal and trend.

The Flyway Management Plan specifies a population management goal for dusky Canada geese between 10,000 to 20,000 birds. When the three-year running population average is below 10,000 birds, which has been the case since 2009, implementation of management procedures (Action Level 2) is required. These procedures, in conjunction with good production for the last three years, may have contributed to the higher 2011 population estimate. One more year of good numbers from the CRD aerial components of the population estimate should bring the 3-year population average above the 10,000 bird mark.

While the West Delta produces the highest number of dusky observations, densities have varied and shifted within those strata over years. A report analyzing aerial observation densities and changes over time is forthcoming from the Division of Migratory Birds, Anchorage.

Trumpeter Swans

The three population indices for trumpeter swans are presented in Table 2 and Fig. 3. The data for swans are variable but the trend for swan singles and pairs from 1986-2011 showed a significant increase ($p=.005$). Indices for total swans and swan nests also showed increasing trends but not significant (Fig. 3). We do not have an explanation for the high variability of the swan data but it appears that these data could be used to track long term changes in swan singles and pairs. Because the Chugach National Forest swan spring breeding and fall productivity surveys have been canceled, and because index trends from this survey are similar to those surveys (Groves et al. 2009), swan results from the spring Copper River dusky survey may provide an alternative partial measure of the regional trumpeter swan breeding population.

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Year	Indicated total birds index	SE	Indicated breeding birds index	SE	3.3954 * CRD breeding birds index	CRD birds in flocks	CRD Breeding and Flocked	Middleton Island adults	Total estimated Dusky population	3-year running average
1986	5469	356	4811	389	16335	658	16993	80	17073	
1987	5408	504	4294	409	14580	1114	15694	84	15778	
1988	5296	364	4412	325	14981	884	15865	90	15955	16269
1989	6582	565	4463	369	15154	2119	17273	75	17348	16360
1990	5442	669	4482	457	15218	960	16178	93	16271	16525
1991	3773	437	2861	356	9714	912	10626	249	10875	14831
1992	6648	835	4472	284	15184	2176	17360	473	17833	14993
1993	6334	495	4096	265	13908	2238	16146	473	16619	15109
1994	5810	432	4226	253	14349	1584	15933	473	16406	16953
1995	3685	323	3357	250	11398	328	11726	473	12199	15075
1996	3509	267	2936	190	9969	573	10542	1456	11998	13534
1997	4208	271	3379	176	11473	829	12302	1168	13470	12556
1998	4814	350	3571	203	12125	1243	13368	1168	14536	13335
1999	3068	224	2599	174	8825	469	9294	1168	10462	12823
2000	3009	184	2477	128	8410	532	8942	1309	10251	11750
2001	3157	202	2788	181	9466	369	9835	1309	11144	10619
2002	3836	294	2966	173	10071	870	10941	1416	12357	11251
2003	3083	222	2215	129	7521	868	8389	1416	9805	11102
2004	3198	235	2712	190	9208	486	9694	1499	11193	11118
2005	5050	614	3986	418	13534	1064	14598	1499	16097	12365
2006	3412	326	3006	301	10207	406	10613	1453	12066	13119
2007	2848	188	2456	157	8339	392	8731	1453	10184	12782
2008	2512	192	2222	167	7545	290	7835	1317	9152	10467
2009	1768	165	1513	103	5137	255	5392	1317	6709	8682
2010	2714	193	2324	131	7891	390	8281	1249	9530	8464
2011	3736	326	2845	202	9660	891	10551	1249	11800	9346

Table 1. Aerial Population Indices and Converted Population Estimates for Dusky Canada Geese, 1986-2011.

Year	Swan Singles and Pairs		Total Swans		Nests
1986	435		467		95
1987	191		199		32
1988	342		667		85
1989	360		425		75
1990	245		381		65
1991	342		361		66
1992	222		353		47
1993	245		382		43
1994	300		372		45
1995	424		457		41
1996	399		475		68
1997	230		248		65
1998	508		588		96
1999	410		435		79
2000	447		592		65
2001	499		576		96
2002	592		756		107
2003	519		671		129
2004	416		549		57
2005	469		670		75
2006	788		888		147
2007	403		412		65
2009	337		346		89
2010	448		463		77
2011	449		511		74

Table 2. Population Indices for Trumpeter Swan Singles and Pairs (singles + 2 x pairs), Total Swans (singles + 2 x pairs + flocked birds), and Nests (active swan nests).

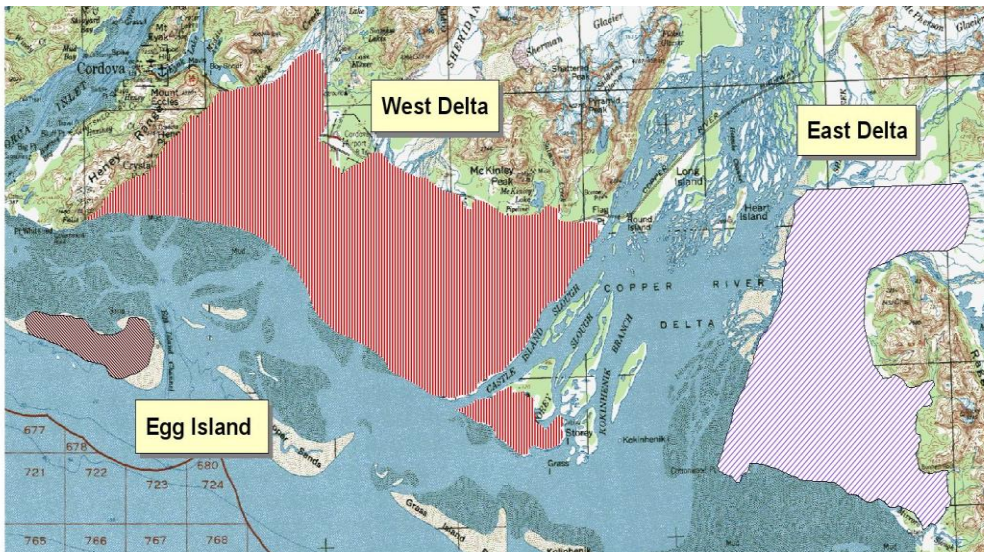


Figure 1. Flight lines and Stratification for the Copper River Delta aerial survey.

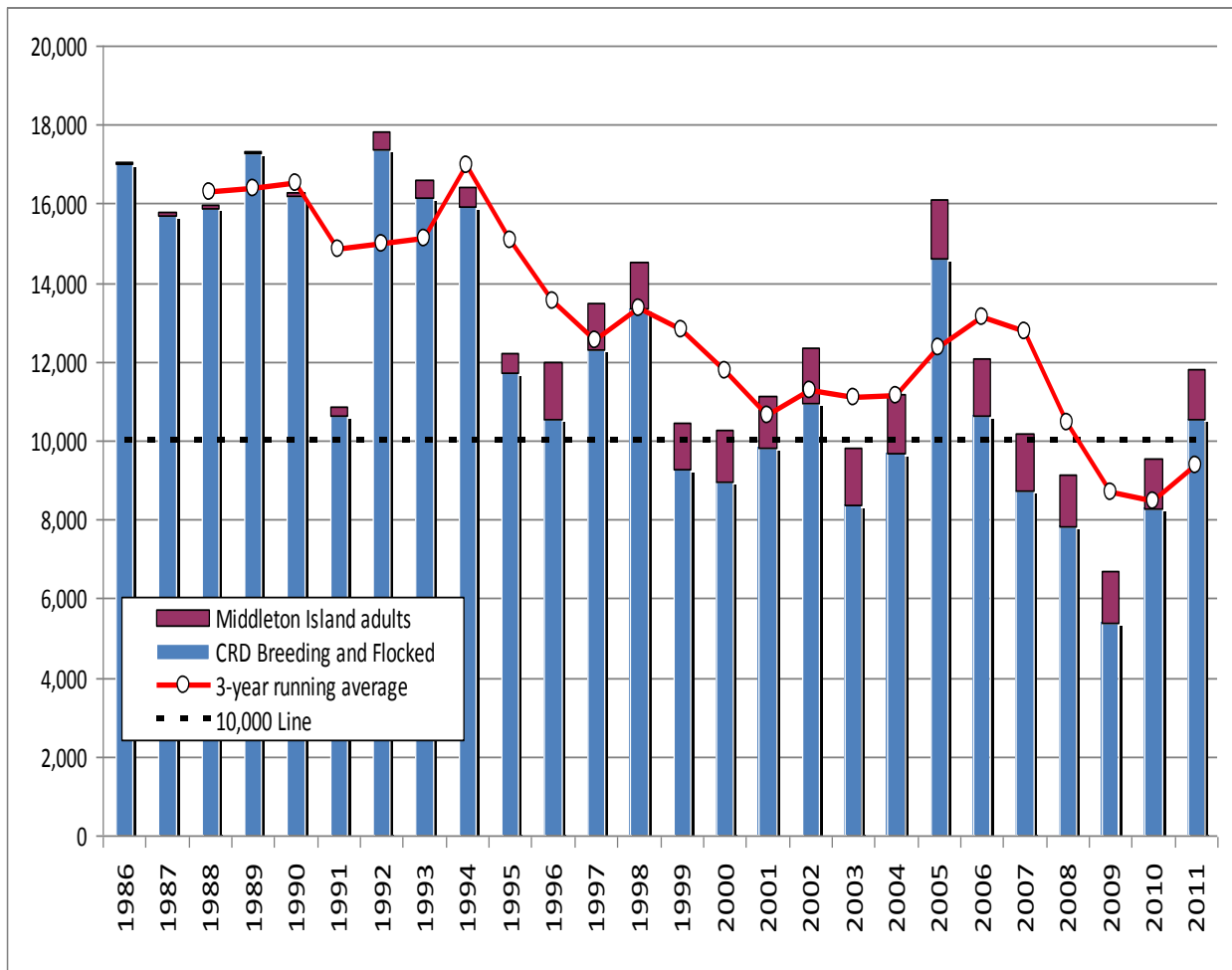


Figure 2. Population Index conversion for the aerial survey of Dusky Canada Geese with Middleton Island adult bird estimate and 3-year running average, 1986-2011.

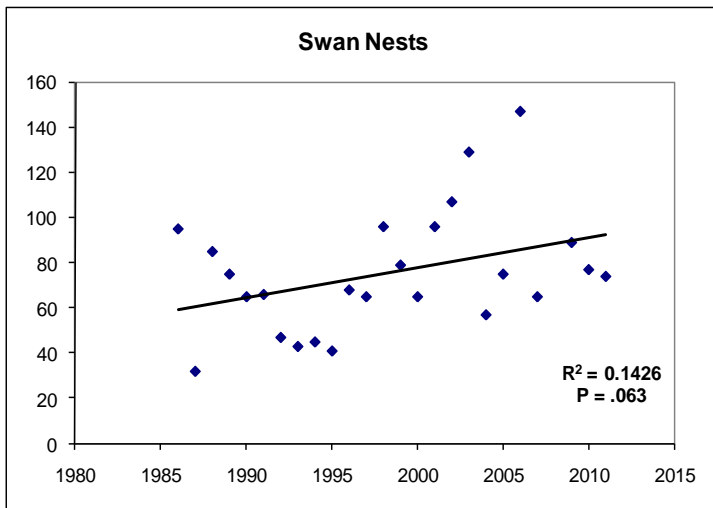
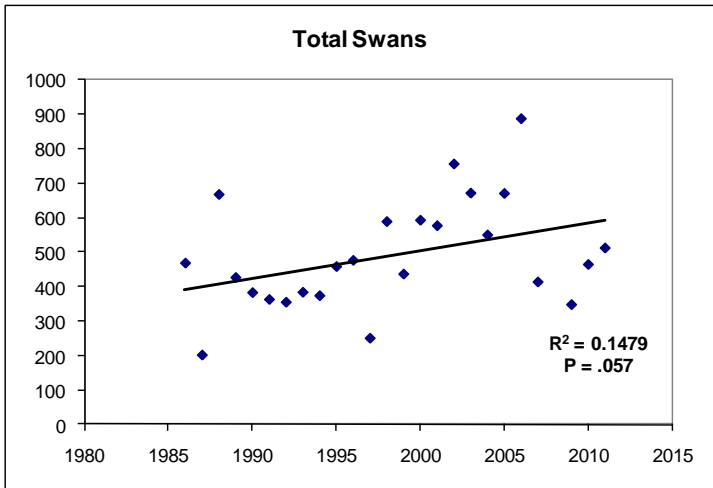
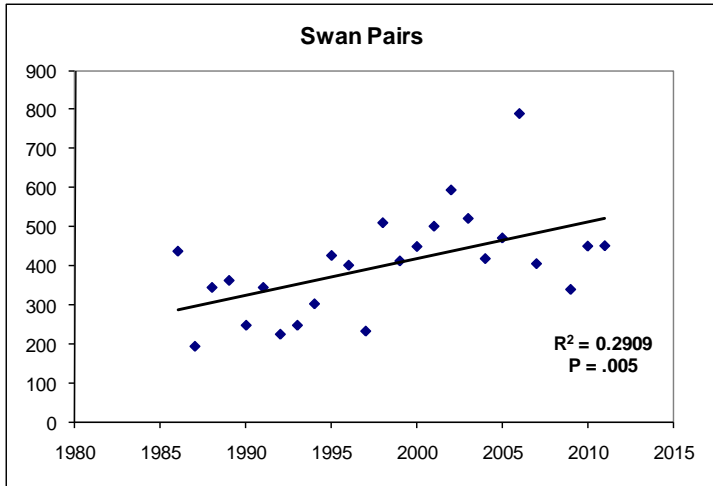


Figure 3. Population Indices for Trumpeter Swan Pairs, Total Birds, and Nests.