Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2009 – (Oct 1, 2008 to Sept 30, 2009)

Survey Title: SDJV PR96: Pacific Black Scoter Breeding Survey

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Project Description: We conducted a sixth year of aerial survey observations to monitor Alaska's breeding population of Black Scoters. A left-seat pilot observer (PDA) with a rear-seat observer (SS, TLM) flew in a Cessna 206 aircraft on amphibious floats and recorded all Black, White-winged, and Surf scoters (*Melanitta nigra, M. perspicillata, M. fusca*), Greater or Lesser scaup (*Aythya marila, A. affinis*), and Long-tailed Ducks (*Clangula hyemalis*) within 200m on each side of the aircraft using standard aerial survey protocol. Approximately every fourth transect was flown with the rear-seat observer and the pilot both viewing the left side collecting independent double-counts to estimate detection rate. The timing of the survey was about 3 weeks after the standard North American Waterfowl Breeding Pair and Habitat survey and appropriate for late-nesting diving duck species. The systematic transect design was based on previous extensive surveys flown throughout Alaskan wetlands in various years from 1989 to 1997. From 2004 to 2007, we flew systematic transects sampling 154,645 km^2 of tundra wetlands divided into 12 strata of high and low scoter density in various geographic regions. Using these results, we then redesigned the survey to be more practical and effective by excluding some areas of low density and increasing sampling where variance was high. In 2008 and 2009, transects were flown to sample 113,732 km^2 of wetlands in 6 strata covering 74% of the original area and 84% of the 2004-07 average scoter population. Other regions, such as the small area of high-density black scoter nesting habitat near Nelson and Izembek Lagoons on the Alaska Peninsula, will be surveyed periodically.

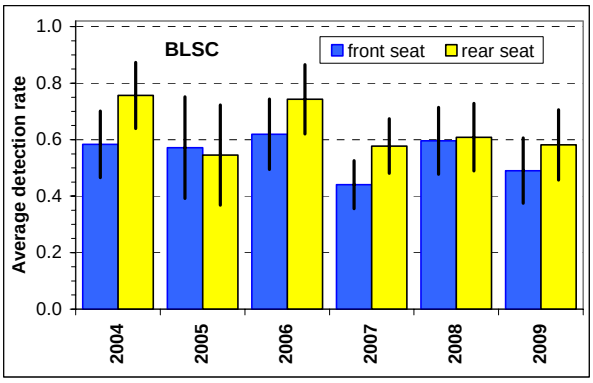
Objectives: Annual aerial survey indices of Black Scoter populations in their nesting habitat, with correction for possible variation in detection rate, provide sufficient data to estimate the breeding population size, determine population trend, and identify important scoter habitat. The survey precision should provide meaningful results for managers within a 5-year period. The survey from 2004 to 2006 was part of SDJV Project #38 Black Scoter Integrated Study and it continues to complement goals of that project as more data on population delineation, seasonal movement, and estimated harvest are compiled.

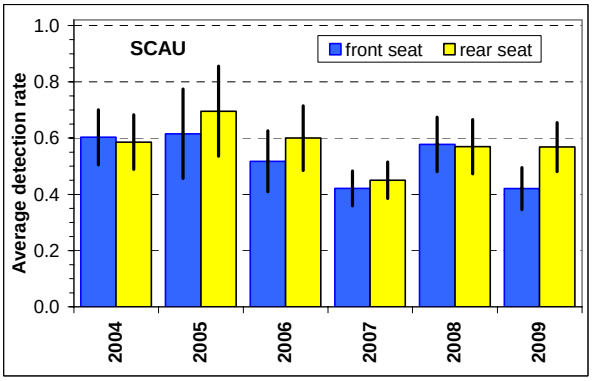
Preliminary Results: The 2009 aerial survey observations tallied 607 sighting locations of Black Scoter, 4 Surf Scoter, 919 Scaup, and 40 Long-tailed Ducks in an observed area of 1,350 km^2 on 78 transect sections. The combined observer data indicated a total population index of 92,365 Black scoter (standard error = 8,603, CV=9.3%) and a total observed bird index of 117,399 Scaup (se = 9,435, CV=8.0%) in 2009. We reanalyzed data from previous years to estimate the population indices from the same area and stratification (Table 1). The 2009 population indices were larger and the sampling errors were smaller.

Table 1. Aerial indices of Black scoter, Scaup and Long-tailed ducks on western Alaska tundra wetlands.

Year	Scoter species	Black Scoter	Scaup	Long-tailed Duck	Tundra Swan	Jaeger species
1989-1997	121,158		147,026	27,503	78,453	3,752
2004	67,563	65,418	99,932	10,026		
2005	61,393	60,821	107,345	9,658		
2006	77,901	76,034	116,076	12,645		
2007	83,620	81,506	113,562	9,852		
2008	62,606	62,048	88,284		75,498	1,427
2009	92,772	92,366	117,399	5,639		

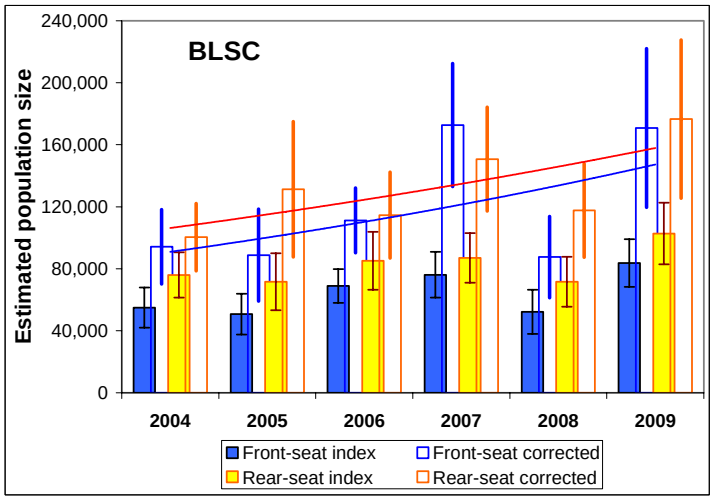
The increasing trend of the 2004-2009 Black Scoter aerial index data (combined observers, no adjustment for detection) indicated an average annual population growth rate of 1.054 (90% confidence interval = 0.994-1.119). The estimated precision of the scoter survey showed a coefficient of variation of 10.6% based on the average estimate of sampling error from the last 6 years. Using an approximate formula for power to detect trends (Gerrodette 1987), a constant annual population change of -3.41% (50% decline in 20 years), if it should occur, would be detected as significant with 9 years of data. The recent average annual growth of the Scaup aerial index was 0.981 (90% c.i. = 0.920-1.046) with a CV of 11.7%.

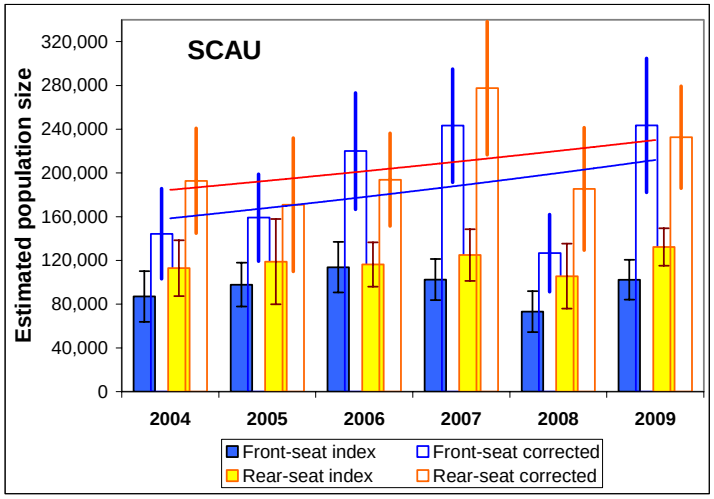




From the independent front- and rear-seat observations, we matched observations based on time (location), species, group size, and notes recorded on behavior and distance from the aircraft. The 6-year average detection rates were 55% and 64% for black scoter and 53% and 58% for Scaup, for the front- and rear-seat observers, respectively. This compared with detection rates of 86% (VCF = 1.15) for scoters and 52% (VCF = 1.933) for scaup based on the ratio of counts from helicopter to fixed-wing aircraft recorded on the Yukon Delta, 1989-1991 (Smith 1995).

Detection rate varied to some degree with all factors examined such as species, year, group size, seat, observer, and region (Fig. 1), although some of these differences were not as expected. For example, during the last two years the first-year observers in the rear seat did not have lower detection rates, whereas on the more northern transects the most experienced and unchanged front and back seat observers indicated lower detection rates. In spite of these complications, because the double count data were collected systematically representing all days, regions, conditions, group sizes, and observers, the combined data should result in a relatively unbiased estimate of the average detection rate, provided that heterogeneity of detections among observations was not extreme.





We used the aerial population index divided by detection rate calculated from each combination of species, observer seat, and year to estimate the actual population size (Fig. 2). The 6-year average population index of 73,379 Black Scoters was corrected to an average population estimate of 126,370 indicated total birds. The 6-year average population index of 107,262 Scaup increased to an estimated population of 199,130 total birds. Population trends did not differ significantly in either slope or fit whether calculated from indices or the corrected population estimates. There was a tendency during 2004-09 for the Black Scoter aerial indices to increase (annual growth rate GR = 1.055) and estimated detection rates to decrease (GR = 0.967), and therefore the corrected population growth rate was larger (GR = 1.091). For both scoter and scaup, relatively high population indices occurred in 2007 and 2009. With the data available so far, the variability of the corrected population estimates, measured by the coefficient of variation among years, was larger than the uncorrected aerial indices.

P**roject Status:** The survey data obtained has met the objectives of monitoring the size, distribution, and trend of the black scoter nesting population. We have produced estimates of average detection rate by matching observations made by independent front- and rear-seat observers yet improved methods for analysis of these mark-resight data are still needed.