Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2007 – (October 1, 2006 to Sept 30, 2007)

Survey Title: SDJV PR96: Pacific Black Scoter Breeding Survey

Principal Investigators:
Robert Stehn, Robert Platte, and Paul Anderson
U.S. Fish and Wildlife Service, Migratory Bird Management, 1011 E. Tudor Rd., Anchorage, AK 99503

Partners:
Fred Broerman
Yukon Delta National Wildlife Refuge, 807 Chief Eddie Hoffman Road, P.O. Box 346; MS 535, Bethel, AK 99559
Tina Moran
Selawik National Wildlife Refuge, 160 2nd Avenue, P.O. Box 270, Kotzebue, AK 99752
Kristine Sowl and Ken Richardson
Izembek National Wildlife Refuge, PO Box 127, MS 515, Cold Bay, AK 99571

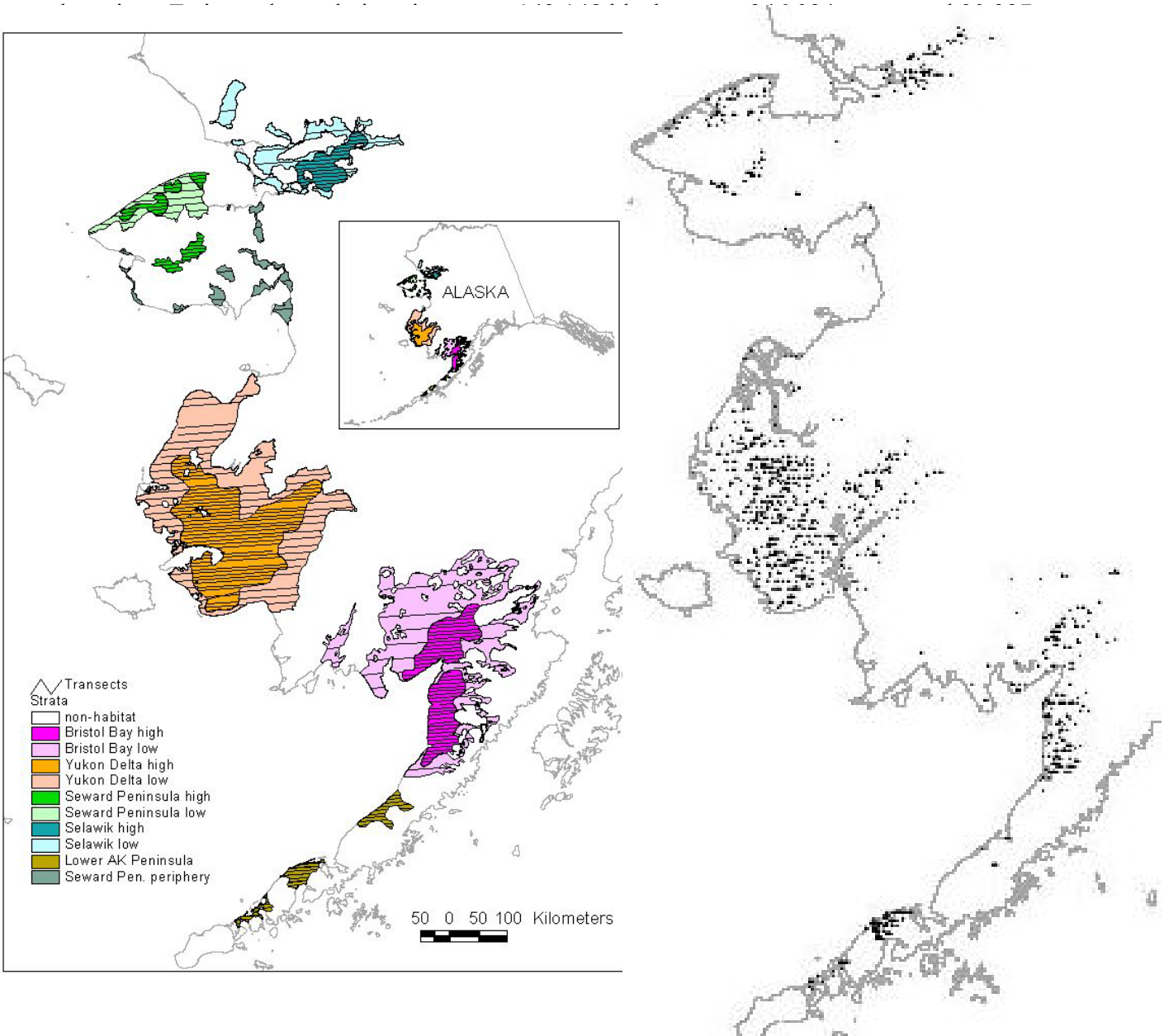
Project Description: We designed a comprehensive aerial survey for monitoring the breeding population of Black Scoter (*Melanitta nigra*). Based on analysis of intensive systematic surveys flown at various times and locations between 1989 and 1997, we delineated 10 strata for systematic sampling using geographic and high vs. low density regions. We sampled 154,475 km^2 of western Alaska tundra wetlands that contain about 95% of the known breeding population of black scoters. Timing of the survey was appropriate for later-nesting species, 3 weeks after the standard North American Waterfowl Breeding Pair survey. Using fixed-wing aircraft and standard waterfowl aerial survey protocol, a left-seat pilot observer and a rear-seat observer recorded all scoters (*M. nigra, M. perspicillata, M. fusca*), scaup (*Aythya marila, A. affinis*), and long-tailed ducks (*Clangula hyemalis*) seen on 200m wide transects.

Objectives: Annual aerial indices with correction for visibility rate provide unbiased estimation of breeding population size, determination of population trend, and identification of important scoter habitat. The survey precision should allow for meaningful results at a regional scale within a 5-year period relevant for management. The survey was funded from 2004 to 2006 as part of SDJV Project #38, Black Scoter Integrated Study, and it continues to complement goals of that project as data on population delineation, seasonal movement, and estimated harvest are compiled.

Preliminary Results: We have now completed the fourth year of survey observations with the same pilot and observers. The surveys covered about 28,000 linear km flown on 36 days between 12 and 25 of June, 2004-07. The aerial index averaged 86,562 black scoters with an average standard error of 11,419 (CV=0.132) based on observations from front- and rear-seat observers in 4 years. Another 3,688 were white-winged or surf scoters. The aerial indices indicated 137,407 scaup (SE = 19,889, CV = 0.145) and 12,923 long-tailed ducks (SE = 3,961, CV = 0.307).

For each year, observer, and region, we estimated the average detection rate by independent front- and rear-seat observations on the left side of the aircraft on approximately every fourth transect. We matched observations based on time (location), species, group size, behavior, and distance from the aircraft. The 4-year average detection rate across all years and regions was 56% and 67% for black scoter for the front- and rear-seat observers, respectively. Front- and rear-seat average detection rates were 55% and 60% for scaup, and 9% and 18% for long-tailed duck. This compares with 86%, 52%, and 54% for these species based on the ratio of observations from fixed-wing aircraft compared to a helicopter while flying Yukon Delta transects, 1989-1991. These standard breeding pair survey ratio-estimated detection rates (Smith 1995) for tundra habitats assumed that the observer in the helicopter detected 100% of the birds.

The aerial index divided by estimated detection rate gave an estimate of the actual population. For scoter and scaup, we estimated specific detection rates for each observer, region, and year to calculate the appropriate stratified population estimates. Even after combining all regions and years, the small number of long-tailed ducks (only 2 matched of 31 total observations) resulted in an imprecise and probably biased estimate of average



trends. Comparing the historic survey observations from 1989-1997 to the recent aerial indices show reduced populations for scoter, scaup, and long-tailed ducks, now at 66%, 70%, and 37% of their previous indices, respectively. With approximately a 13-year period between the average survey dates, and assuming constant growth rates, these ratios reflect

Figure 1. Transects flown combining 4 years of aerial survey sampling in 10 strata for monitoring the Black Scoter population. The locations of all scoters seen are indicated by points on the map to the right.

average annual rates of decline at -3.2%, -2.7%, and -7.4%. For each species, the apparent declines were very similar among the Bristol Bay, Yukon Delta, and the Seward Peninsula-Selawik regions.

Confounded with these possible changes in population size as shown by decreased aerial indices are the 2-3 week later survey timing, generally earlier seasonal chronology, observer experience, and perhaps other unrecognized differences. The paucity of long-tailed duck observations and their very low detection rates may be related to the later and inappropriate timing of the recent survey. Visibility is reduced during mid- to late-incubation for this species because females are incubating eggs and males may have departed. Although the recent survey is timed appropriately for nesting scoter and scaup, perhaps the historic surveys were too early and included more transient, non-breeding birds. Survey data from 1988-2007 on 12,832 km^2 of the coastal Yukon Delta (8% of total area and also sampled by the black scoter survey) shows scoter, scaup, and long-tailed duck aerial indices increasing at 1.7%, 1.7%, and 1.5% per year for these three species (Platte and Stehn 2007).

The adjustment of the historic aerial index data by the fixed-wing to helicopter ratio for detection rate, and adjustment of the recent survey data by front- and rear-seat mark-resight detection rates, may or may not help to resolve differences. For scoters, the standard tundra detection rate (86%) used with the 1989-97 survey data resulted in a smaller historic estimate of population size. If accurate, the recent population estimates averaged 93% of the earlier survey and indicated near stable population size at -0.6% annual change. For scaup, the detection rate estimated by the two methods were almost the same, therefore the aerial indices and estimated populations showed the same trend of about -3% per year. For long-tailed ducks, the recent data indicated a very low (probably biased) detection rate that should not be trusted. If used, the recent long-tailed duck population became 137% of the historic population indicting +2.5% annual change. Assumptions on the accuracy of the historic and the recent detection rate estimates made a large difference.

Project Status: The survey data obtained satisfied the desired objectives of monitoring the size, distribution, and trend of the black scoter nesting population. We have demonstrated that precise and unbiased estimates of visibility detection rates can be obtained, however these depend on collecting enough representative and independent front- and rear-seat observations, correctly identifying the matched observations, and meeting the assumptions of the simple mark-resight statistical model. Detection rates have differed, but not greatly, among years, regions, and observers. The process of determining detection rate remains difficult.

With completion of the first four-year rotation of transects lines, we plan to re-examine the stratified design. The scattered transects sampling the interior portion of the Seward Peninsula and the Alaska Peninsula are inefficient to fly. Rather than sampling ¼ of the transects each year, we flew these areas by covering all transects in a single year, and then we used the data obtained for those years not flown. The efficiency of coverage in low-density habitat can be further improved. In addition, sampling a smaller total area, for instance covering 80% of the population range rather than 95%, may be adequate. We plan to modify the design to better allocate sampling effort in the future.

Project Funding Sources (US$).

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (agency or organization)
5983					
	5500				USFWS MBM Alaska
	3600				Selawik NWR
	7000				Yukon Delta NWR
	3500				Izembek NWR

Total Expenditures by Category (SDJV plus all partner contributions; US$).

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding (include only if this was a major element of study)					
Surveys (include only if this was a major element of study)	**25,583**				
Research					