Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2005 – (October 1, 2004 to Sept 30, 2005)

Project Title (SDJV Project #38): **Assessment of the Pacific Black Scoter Population: Population Size, Distribution, and Links among Populations: An Integrated Approach**
YEAR 2 of a 3 YEAR STUDY.

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Project Description: Numbers of Pacific black scoters appear to have declined greatly, although survey data are imprecise and hinder detailed analyses of population trend. Little is known about the biology of black scoters, including delineation of subpopulations and links among annual cycle stages. This study integrates three elements (population surveys, satellite telemetry, and genetics) into a multi-pronged approach to determine population status and trends and provide the information necessary to make scientifically sound management decisions. These elements are complementary and benefit from being conducted simultaneously.

Objectives:

a. Provide precise annual estimates of the size of the Pacific breeding population that will serve as a long-term monitoring tool.
b. Estimate observer detection rates.
c. Identify breeding, molting and wintering locations used by black scoters across the annual cycle.
d. Use mtDNA sequence data to infer levels of site fidelity by testing for genetic differentiation among breeding and among wintering areas.
e. Assess timing of movements in relation to population surveys and subsistence harvest.

Preliminary Results*:*

Population Surveys Data from 2005 survey are still being analyzed. However, the 2004 survey produced a visibility-corrected total population estimate of 93,071 (SE=14,662, CV=15.8%) scoters. This was within the desired range of precision for this survey. The 2004 index was approximately half the estimate obtained during surveys conducted 1989-97. In 2005, nearly all designed transects were flown using an amphibious Cessna 206 with the exception of several lines near Izembek NWR, where a super cub was used. To estimate detection rates, the rear seat observer sat behind the left-seat pilot on roughly every 3rd transect flown. These independent double-counts were used to estimate observation detection rates by matching observations of the same species, group size, and recorded locations. In 2004, average detection rate of scoters was 0.754; data are still being analyzed for 2005.

Satellite Telemetry

Current status of Black Scoter satellite transmitter deployments:

Location	2003-2004	2005	2006	2007*
	Numbers of transmitters deployed ((total) Ad Female/Ad Male/ Subadult Female) that survived for > 2 months			
Winter/staging				
Kodiak NWR, AK	(8) 2/4/0	(7) 3/3/1		
Nelson Lagoon, AK	(23) 0/22/1			
Strait of Georgia, BC	(5) 4/0/0	(10) 5/5/0		
Dutch Harbor, AK ?				
Breeding				
Togiak NWR, Alaska				
Selawik NWR, AK				
Yukon Delta NWR, AK		(10) 3/0/7		

Cumulatively, 60 black scoters have been marked and have survived to provide excellent data on migration routes, timing of migration, and location of staging and molting areas. Survival of radio-tagged black scoters has been excellent. Figures 1 and 2 summarize movement patterns for all birds. Links to partner maps depicting movements of individual birds from each marking location can be found at www.seaduckjv.org/ststoc.html.

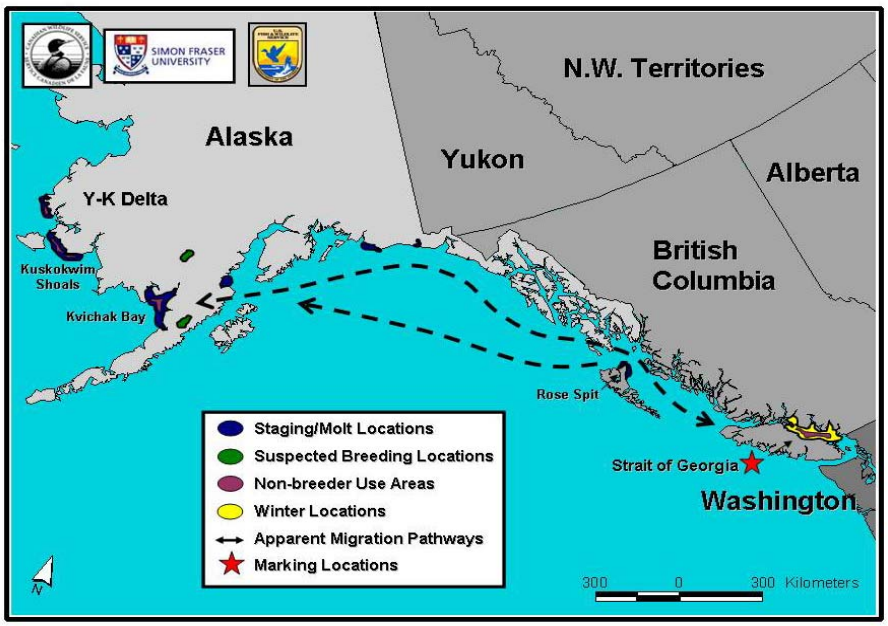

Figure 1. Annual movement patterns of black scoters marked with satellite transmitters in British Columbia.

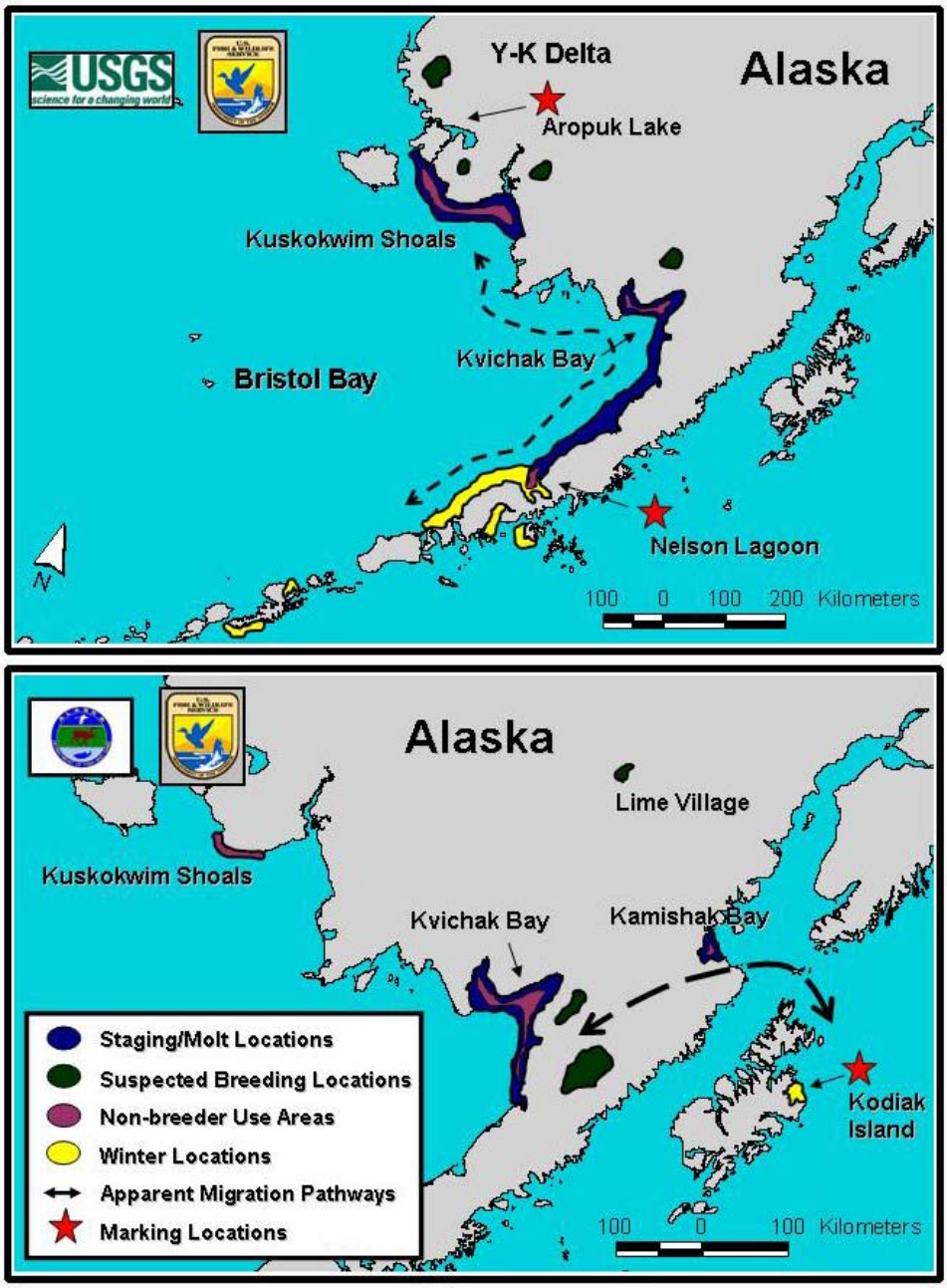

Figure 2. Annual movement patterns of black scoters marked with satellite transmitters in Alaska.

In Alaska, Black Scoters are known to breed primarily in three major areas: Bristol Bay Lowlands, Yukon-Kuskokwim Delta, and Seward Peninsula. Individuals marked in this study migrated exclusively to the Yukon-Kuskokwim Delta and Bristol Bay Lowlands. Not a single bird has gone north to Seward Peninsula / Selawik areas suggesting that that population may be independent from the other breeding populations in western Alaska.

Cross-seasonal movements of individuals were varied; appearing to follow coastlines, overland routes or more direct offshore pathways. Birds favored near-shore waters of Bristol Bay and the Kuskokwim Shoals throughout the breeding and molting periods. Specifically, Kvichak Bay was utilized by individuals from each marking location from spring through autumn; suggesting that this is a critical area for non-breeding, staging and molting Pacific Black Scoters.

Telemetry Results by Marking Site

Strait of Georgia, BC, Canada: CWS and Simon Fraser University implanted 10 black scoters (5 females, 5 males) in February 2005. British Columbia is near the southern extent of the wintering range of Black Scoters along the Pacific coast of North America. As such, capture and marking of black scoters from this area and deployment of satellite transmitters (PTTs) allows for population delineation and potential differentiation of subpopulations from different wintering areas.

Over two winters of marking, researchers from the Canadian Wildlife Service and Simon Fraser University have deployed 15 PTTs on Black Scoters wintering in British Columbia. In December 2003, they marked 5 adult females with PTTs, 4 of which generated useful data. In February 2005, they marked 10 adult Black Scoters, 5 of each sex. Of these 2005 markings, 8 (4 of each sex) have produced excellent data through spring migration and the breeding period.

A number of patterns emerge from a review of the data to date from Black Scoters marked in British Columbia. First, within-season winter site fidelity seems high; locations after marking but prior to migration indicated that individuals remained closely associated with the areas in which they were captured. Also, between-year fidelity to wintering sites is apparently high, based on the 4 females captured in December 2003; all 4 of these birds returned to the Strait of Georgia in fall 2004. Presumably, we will gain more insights into this phenomenon based on fall and winter locations of the birds we marked in February 2005.

Another key finding is the importance of the Rose Spit area off the NE corner of Haida Gwaii (Queen Charlotte Islands) as a staging area in both spring and fall. Nearly all of the Black Scoters marked in British Columbia stopped in this area during spring migration, for up to 4l weeks. Also, during fall migration in 2004, 2 of the 4 female Black Scoters staged at the Rose Spit area for at least 2 months, from late October to early January. Of note, this area is being considered for energy development, including oil and gas exploration and a large wind turbine farm.

Other important spring-staging areas included Kamishak Bay in southern Cook Inlet, Alaska and Kvichak Bay, Alaska, both of which were also important areas for Black Scoters marked on other wintering areas. To date, all birds marked in British Columbia have spent the breeding seasons in the Bristol lowlands or Yukon-Kuskokwim Delta areas; none have migrated to the Seward Peninsula, which is thought to be an important breeding area.

Kodiak Island, Alaska:

Alaska Department of Fish and Game captured seven black scoters (4 Adult females, 3 Adult males) in Kalsin and Women's Bay, Kodiak, Alaska from 1–11 March 2005, augmenting a sample of eight scoters (4 females and 4 males) marked in 2004. All birds were surgically implanted with 40g satellite transmitters. All seven from 2005 survived. Birds departed Kodiak between 6 April and 1 May. All birds used Kvichak Bay (in Bristol Bay) for a staging area at some point in the spring or summer. All 4 females went to nesting areas, 3 on the Yukon-Kuskokwim Delta and one on the Alaska Peninsula. Arrival dates ranged from 20-26 May and departure dates ranged from 24-28 July (dates unadjusted for duty cycles and represent latest possible arrival and earliest possible departure). Following nesting all females moved to coastal waters: Kuskokwim Shoals (1), Kuskokwim Bay (2), and Kvichak Bay (1). The 3 males remained on the coast. One male spent from 15 May to present (30 August) on the Kuskokwim Shoals off the Yukon-Kuskokwim Delta; another male spent from 20 April to 27 June on the Alaska Peninsula before moving to Kvichak Bay and then the Kuskokwim Shoals. A third male spent from 10 April to 11 August in Kvichak Bay. The last transmission we

received from the latter bird was on 11 August. The bird was still alive and the transmitter had not been performing consistently. Currently 6 PTT's are still transmitting data and the seventh PTT is currently dormant but not definitively dead. As of 30 August we have received 2316 locations.

Nelson Lagoon, Alaska: In April 2003, researchers from USGS/Alaska Science Center implanted 17 individuals (16 males and 1 female) with satellite transmitters. Two birds likely died and one transmitter failed (no signal) within two weeks of capture. Two transmitters failed in December 2003 and January 2004 and one bird likely died in December 2003. All other transmitters failed in April or May 2004. All individuals remained in Alaska and migrated within a narrow range between the Yukon-Kuskokwim Delta and near-Aleutian Islands. Eight individuals (7 males and the single female) moved inland to 2 major breeding areas, the Yukon-Kuskokwim Delta and Bristol Bay Lowlands, Alaska, and remained for a period (males: 10-30 days; female: >50 days) suggestive of breeding activity. Mean arrival date of males to breeding locations was May 18. Suspected non-breeding individuals remained in coastal near-shore waters of the Kuskokwim Shoals, Kuskokwim Bay or Kvichak Bay, Alaska, throughout the breeding period. Birds likely molted along the Kuskokwim Shoals, Kvichak Bay or Nelson Lagoon, Alaska. Birds wintered in near-shore waters along the Alaska Peninsula and near-Aleutian Islands.

Six adult males were implanted, out of the intended 15 transmitters, in April 2004 by researchers from the USGS/Alaska Science Center. Because of difficulties capturing females, transmitters were deployed only in males following the proposed sex ratio of 2:1, to complement the effort in 2003. Five individuals departed Nelson Lagoon in late-May and moved to near-shore waters along southwestern coastal Alaska. One male remained in Nelson Lagoon from April to present. We suspect that all individuals were non-breeding, as they resided in near-shore waters of the Kuskokwim Shoals, Kvichak Bay, or Nelson Lagoon, Alaska, throughout the breeding and molting periods. Two of the five individuals returned to and are currently in Nelson Lagoon, Alaska.

Yukon-Kuskokwim Delta, Alaska: Researchers from the USGS/Alaska Science Center implanted three adult females and seven juvenile (<1-yr old)) females with satellite transmitters at Aropuk Lake in early June 2005. Aropuk Lake is a shallow freshwater lake complex approximately 50 miles inland from the Bering Sea coast. Because of difficulties capturing adult females, five transmitters were not deployed and will be used in 2006. Adults departed Aropuk Lake during the last week of July, remaining in the area for an average duration of 59 days. Subsequent movements were to marine waters of the Kuskokwim Shoals for the present molting period. Two juveniles departed Aropuk immediately following surgery and moved to freshwater locations elsewhere on the Y-K Delta. In late July, these birds re-located to near-shore waters of the Y-K Delta in either Jack Smith Bay or Hazen Bay and have remained to present. Five juveniles remained at Aropuk Lake until mid to late-July before moving to the Kuskokwim Shoals or Kvichak Bay for the current molting period. These areas, specifically the Kuskokwim Shoals and Kvichak Bay, appear critical to molting and staging Black Scoters.

Genetics

Tissue samples were collected from all marked birds, plus others that were captured and released, and are currently stored at the USGS Molecular Ecology Laboratory in Alaska. Mitochondrial DNA primers are currently being developed (SDJV project# 40). Genetic analyses will be done after completion of this study and acquisition of samples from all study areas.

Project Status: We accomplished the objective of obtaining a precise population estimate for the survey area in 2004. The 2005 survey was more complete and we expect similar precision. No changes to the survey design are planned at this time. We will continue double sampling to obtain observer specific detection rates.

We plan to continue implanting black scoters this summer on the Yukon-Kuskokwim Delta. We also plan to mark birds during winter at Dutch Harbor in the Aleutian Islands to get a better handle on breeding areas for black scoters that winter in the Aleutians. We have been unable to identify any promising capture sites at Togiak or Selawik areas and will continue reconnaissance at those areas before attempting to capture birds there, hopefully in 2007.

Adult female black scoters have proved difficult to catch at all sites and at all seasons, despite numerous attempts by experienced trappers. This is unfortunate, since adult females offer the best opportunities to identify breeding areas. In future markings, we will be using a new battery in PTTs that allow tracking for at least 2 years, thereby enabling marking of subadult females. In other words, we can mark birds as young as first-year, and if they survive, track their movements for up to two years until they attain breeding age (presumably at 3 years). Only female birds will be marked from now on, as we feel the marking of males has yielded sufficient information on timing of migration, which was needed to properly schedule the aerial breeding survey.

As a result of this study, we are developing methods for aging both male and female black scoters. In general, first-year birds are readily distinguished by body plumage, whereas second-year and older birds are distinguished using a combination of bill coloration and patterns, bill shape, and possibly wing plumage. Confirmation of age classes has been done by measuring bursal depth.

One of the original objectives in the proposal was to tap traditional knowledge about black scoter biology and harvest. Although we may continue to obtain information toward this objective opportunistically, the objective has been formally dropped due to significant political, bureaucratic, and financial obstacles. Local communities are kept abreast of this study through contacts with Refuge Information Technicians and distribution of a “Black Scoter Studies in Alaska” fact sheet. One local village prepared but then withdrew a Tribal Grants proposal to examine questions about the black scoter harvest. We hope to work with the communities to encourage submission of this proposal again in 2006.

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)
61,101					
	5000				USFWS Bristol Bay / Kodiak EcoTeam
	40,600				USGS
	57,920				Alaska National Wildlife Refuges (USFWS)
	13,500				USFWS Migratory Bird Management - Alaska
	2300				National Park Service
				6500	Simon Fraser University
			15700		Canadian Wildlife Service
		10,300			Alaska Dept Fish&Game

Total Expenditures by Category (US$)

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys	**38,500**				
Research	**181,421**				
Communication					
Coordination					