Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2012 – (October 1, 2011 to Sept 30, 2012)

Project Title: SDJV Project #82. James Bay Molting Black Scoter Survey

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Partners (*anyone else providing some kind of support)*:
Environment Canada / Canadian Wildlife Service, Ontario Ministry of Natural Resources, US Fish and Wildlife Service

Project Description (*issue being addressed, location, general methodology)*:
The primary target species for this survey is the eastern population of Black Scoter (*Melanitta americana*); specifically, the population of molting birds occurring along the Ontario and Québec coastlines of James Bay and Hudson Bay. Black Scoters form major summer molting concentrations offshore along the James and Hudson Bay coast, most notably along the western James Bay coast of Ontario where as much as two thirds of the adult male component of the Atlantic Black Scoter population may gather. Given the stability of these flocks during the flightless period, this situation provides an ideal opportunity for monitoring the abundance and distribution of this population. This survey also can assist with developing population size estimates needed for conservation planning and determining more localized areas within James or Hudson Bay that may be important for birds so present and future threats can be identified and mitigated.

Surveys of molting flocks of Black Scoter have been undertaken in 1977 and 1991, and during an SDJV-sponsored study of survey methodology development in 2006 and 2009 (Ross 1983, Ross and Abraham 2006, Ross et al. 2009). Previous SDJV-sponsored

developmental work consisted of two components. The first was a reconnaissance survey of eastern Hudson and James Bay to determine the extent of molting concentration there in order to more accurately spatial limits of the operational survey. This involved a single offshore aerial survey with two observers from Umiujaq, Quebec to Moosonee, Ontario, including the Belcher Islands (Cotter 2009). The second part included further developmental work surveying the molting flocks along the western James Bay coast.
Results of that work have helped to develop standardized protocols (such as survey window dates (late Jul – early Aug), altitude, time of day and tide conditions, and equipment), but recent technological advancements in equipment and understanding of Black Scoter ecology via satellite telemetry indicated the need for further refinement of survey. As a result, we undertook additional developmental work in 2012 to evaluate benefits of using higher quality camera equipment (e.g., species, sex, age determination and improved resolution for computer-assisted counts) and feasibility of automated counting of digital photos as we work towards an operational survey. Data from this survey will help inform conservation of Black Scoter and other sea ducks by providing data needed to determine and monitor population trends and spatial distributions of birds in James Bay and Hudson Bay (previously determined to be an important molting area for this species).

During summer 2012, we conducted a photographic, aerial survey of molting flocks of scoters (primarily Black Scoters) found offshore along the Ontario (currently) shoreline in James Bay. The survey was flown during late July (24 – 28 July) during a time when birds have congregated for molt. We used an amphibious, high-winged aircraft (Quest Kodiak - USFWS) to conduct the survey. A zig-zag search pattern was flown (altitude: 800 – 1000 ft, distance offshore: ~ 0.5 – 10 km) around high tide when wind and visibility were conducive for surveying. When a flock of birds was located, the aircraft was positioned to improve light conditions for photography, altitude reduced to ~ 500 ft asl and the aircraft flown alongside/past the flock at a distance of ~ 500 ft. A digital SLR camera (Canon EOS 5D Mark II) with image stabilized , telescopic zoom lens (70 – 200mm) was used by an observer in the right, rear passenger seat to take multiple, sequential images of flocks while an observer in the front right passenger seat estimated flock size and species into a digital voice recorder. A GPS was used to keep a track log (time and location at 2 second intervals) of the aircraft during each survey. A second GPS was interfaced directly with the digital SLR so when a picture was taken the specific time and location of the aircraft was recorded as metadata associated each digital photograph. After surveys were completed each day photographs were downloaded from the camera, best picture or series of pictures for larger flocks determined and retained for further processing.

After the annual survey was completed, we created an electronic database that contained the digital file name and all associated metadata (including date, time, latitude, longitude, etc) for each photograph along with additional fields that accommodated species-sex-age specific counts (when possible) and comments on photo quality and reliability of species identification. Upon returning from the field, we reviewed the photos and determined which were of sufficient quality where species/age/sex could be determined and counted. We also delineated a subset of photos of varying quality and flock sizes that were manually counted and used to validate automated counts of digital images. All photos will be processed using ImageJ© software to determine if that program can reduce data processing time associated with hand-counting individuals from digital photographs.

Objectives *(should identify how the project addresses SDJV priorities*):
The primary objective is to develop survey methodology, including extent of coverage, so as to undertake a yearly count of molting Black Scoters in Hudson and James Bay suitable as an index to monitor trend of the Atlantic population of this species. Secondary objectives include validating that: 1) scoter species and sexes can be determined using high quality digital photographic equipment 2) digital imaging software can be used successfully to reduce time required to count individual ducks on photographs.

Preliminary Results *(include maps, photos, figures/tables as appropriate):*
Aerial surveys were flown using an amphibious Quest Kodiak aircraft offshore along the Ontario coastline of James Bay during four consecutive days between 24 and 28 July 2012. The survey crew consisted of a USFWS Pilot Biologist (S. Earsom) and two CWS Waterfowl Biologists who photographed (S. Meyer) and located and estimated (S. Badzinski) flocks. Over the four survey days, approximately 550 various-sized flocks of molting scoters were observed and photographed (e.g, Plate 1, 2, 3), which initially resulted in >3,000 photographs which eventually were reduced to a final set of 962. The final set of photographs was processed and individuals counted from digital images by a CWS Biologist between 20 August and 24 September 2012, which translated into 21 work days or 168 person hours. The final set of photographs was sent to the OMNR during late September 2012 to determine if computer software (ImageJ©) can be used to automate count and increase efficiency.

During the 2012 survey, a total of 128,808 scoters were counted from digital images (Table 1). Black Scoters were the predominate species observed and accounted for about 98% of the scoters that were able to be identified to species. Both Surf Scoters and White-winged Scoters were observed, but each only accounted for about 1% of scoters that were able to be identified to species. Reliable species and sex/age determinations were possible from many of the high quality photographs of molting flocks. For example, we were able to count about 3,600 brown plumaged Black Scoters from photographs (Table 1). After adjusting counts of unidentified scoters by species-specific proportions, a total of 125,369 Black Scoters, 1,613 Surf Scoters and 1,826 White-winged Scoters likely were observed during the 2012 survey (Table 2).

Black Scoter flocks, as in previous surveys, were locally abundant offshore (<10 km) along the Ontario coastline in three major areas of James Bay: 1) southern James Bay (Mouth of Moose River – Nomansland Point: ~100 km); 2) southeastern and northeastern shoreline of Akimiski Island, ~100 km; 3) northern James Bay (Ekwan Point – Hook Point; ~200 km) (Figure 1). Both northern and southern James Bay survey sectors had about 47,000 scoters each during the 2012 survey. However, survey coverage of northern James Bay was not complete because the final survey day was shortened due to severe weather when we were about 20 km north of Lake River or 70 km away from the end of the survey sector at Cape Henrietta Maria. Numbers in southern and northern James Bay were similar to the 2 most recent surveys conducted in 2006 and 2009 (Table 3). The northeastern and southern shores of Akimiski Island again had significant numbers of Black Scoters in 2012; the 31,000 birds counted in 2012 was similar to 2006 values but was nearly 10,000 birds higher than 2009 values (Table 3).

Project Status ***(e.g., did you accomplish objectives, encounter any obstacles, what are your plans for the future?)***

Overall, we were able to accomplish some of our objectives set out in 2012. We were able purchase a higher quality camera and image-stabilized telephoto lens and use it during survey to increase the clarity of photos and allow for easier species, sex/age identification. The higher resolution photos also should be better for testing the computer software for automated counting. This aspect of the project is not yet completed, but will be underway shortly and results are anticipated before late November 2012. We also were able to get complete coverage/counts of most of the western James Bay survey area (e.g., southern James Bay and Akimiski Island), which are directly comparable to previous surveys where complete coverage of those areas had been attained. However, similar to 2009, we were not able to survey the entire Northern James Bay sector primarily due to weather and lack of funds for a return trip to survey the area. In the future, we would like to fly a reconnaissance survey of the Hudson Bay coastline of Ontario (and also possibly eastern James Bay) to determine numbers of Black Scoters, as well as other scoter species, molting in that area. Recent satellite telemetry data suggests these areas are being used by molting birds and, especially for the Ontario coastline, there is no previous information regarding abundance and distribution for that area (see Table 3). Note that eastern Hudson Bay and eastern James Bay coastlines (Umiujaq, Quebec to Ontario border, including the Belcher Islands; Cotter 2009) were surveyed in 2009, but few birds were observed in those areas (see Table 3). We also were able to determine that if the survey becomes operational we likely would be able to make arrangements to purchase fuel in Attawapiskat, Ontario. Being able to do this would reduce ferry time and provide another base of operations to maximize time spent surveying the Northern James Bay sector which is often difficult to complete due to unfavorable weather conditions (e.g., fog).

Literature Cited:

Cotter, R. 2009. Sea Duck Joint Venture Annual Project Summary for Endorsed Projects FY 2009 – (October 1, 2008 to Sept 30, 2009). Project Title: 2009 Black Scoter Survey of southern Hudson Bay and James Bay, Quebec.

Ross, R.K., K.F. Abraham, R. Brook, and R. Cotter. Sea Duck Joint Venture Annual Project Summary for Endorsed Projects FY 2009 – (October 1, 2008 to Sept 30, 2009). Project Title: Feasibility Assessment of Monitoring the Eastern Black Scoter Population through Aerial Surveys of Moulting Flocks in James Bay.

Ross, R. K. and K. F. Abraham. 2006. Sea Duck Joint Venture Annual Project Summary for Endorsed Projects FY 2006 – (October 1, 2005 to September 30, 2006) Project Title: James Bay Black Scoter Survey.

Ross, R. K. 1983. An estimate of the Black Scoter, *Melanitta nigra*, population moulting in James and Hudson bays. Canadian Field-Naturalist 97:147-150.

Project Funding Sources (US$). Complete only if funded by SDJV in FY12; this is used to document: 1) how SDJV-appropriated funds are matched, and 2) how much partner resources are going into sea duck work. You may Include approximate dollar value of in-kind contributions in costs. Add rows as needed for additional partners.

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (name of agency or organization)
18,500					USFWS (contract USFWS aircraft & pilot)
			8,000		CWS (salary for obs. & analysis), travel & equipment)
				4,250	OMNR (accommodation, salary for analysis)

Total Expenditures by Category (SDJV plus all partner contributions; US$). Complete only if project was funded by SDJV in FY12; total dollar amounts should match those in previous table.

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)		30,750			
Research					

Table 1. Number of scoters counted from photographs taken during aerial surveys conducted offshore of the James Bay coastline of Ontario between 23 and 28 July 2012.

Species	Male / Black	Female / Brown	Unknown	Total
Black Scoter	93,531	3,672	7,969	105,172
Surf Scoter	1,345	8		1,353
White-winged Scoter	1,100	2	430	1,532
Unidentified Scoter			20,751	20,751

Table 2. Estimated total numbers of Black Scoter, Surf Scoter and White-winged Scoters counted during aerial surveys conducted offshore of the James Bay coastline of Ontario between 23 and 28 July 2012.

Species	Species Total	Unidentified (est.)	Total (adjusted)
Black Scoter	105,172	20,197	125,369
Surf Scoter	1,353	260	1,613
White-winged Scoter	1,100	294	1,826

Table 3. Summary results of all surveys of molting Black Scoters in western James Bay.

Survey sector	1977	1991	2006	2009	2012
Northern James Bay	42,600	37,640	46,570	40,110*	46,870*
Akimiski Island	NS	NS	33,080	21,820	31,393
southern shore	NS	NS	(15,980)	(18,220)	(22,567)
north/eastern shore	NS	NS	(17,100)	(3,600)	(8,826)
Southern James Bay	2,400	16,320	9,810	44,670	47,106
Eastern James Bay	NS	NS	NS	1,605	NS
Eastern Hudson Bay	NS	NS	NS	930	NS
Belcher Islands	NS	NS	NS	1,796	NS
Western Hudson Bay	NS	NS	NS	NS	NS

a incomplete count
b NS = No survey conducted

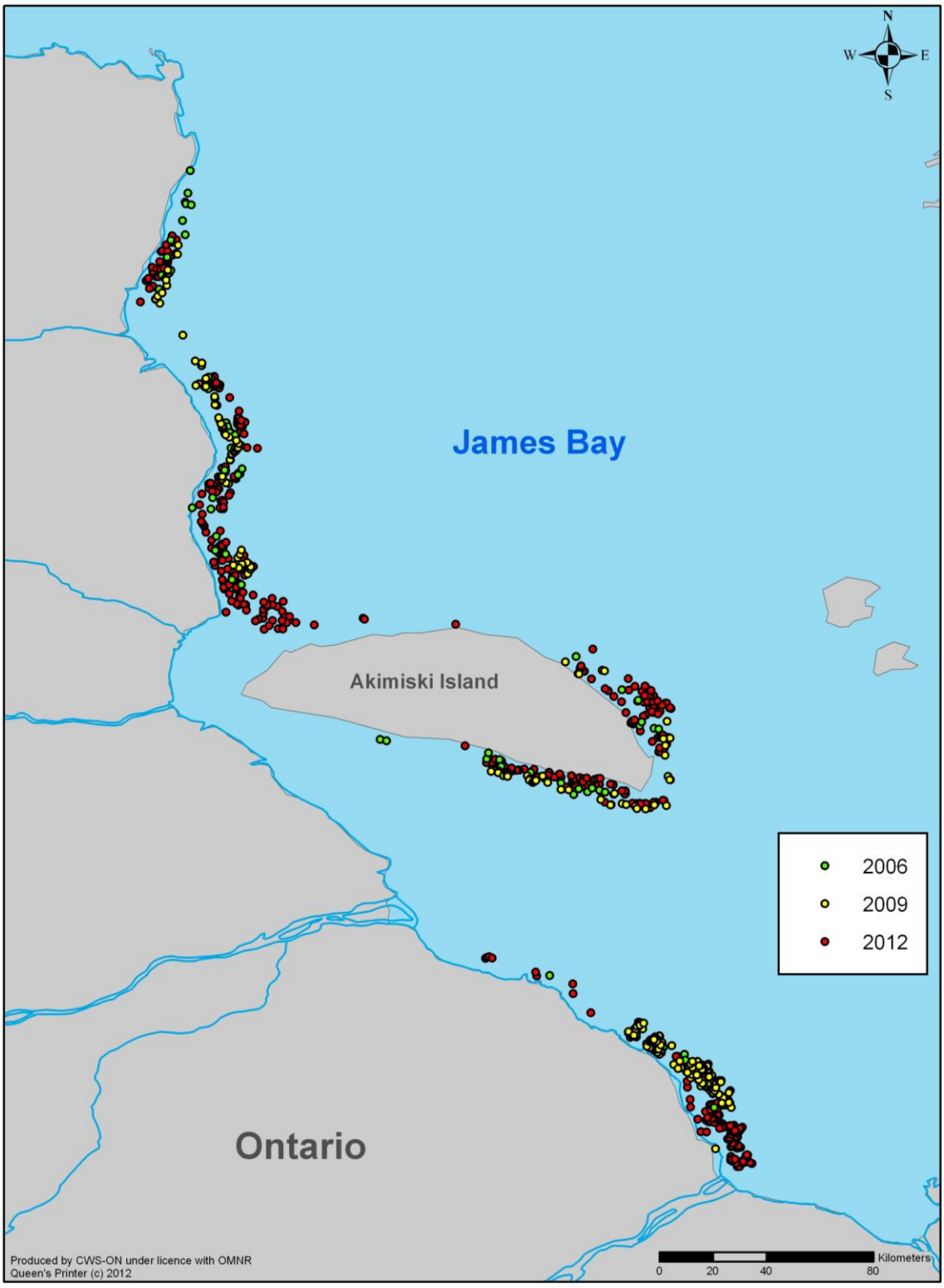

Figure 1. Distribution of molting scoter flocks observed during surveys conducted at western James Bay during late July 2006, 2009 and 2012.

Plate 1. Photograph of a flock of Black Scoters taken at northern James Bay during 28 July 2012.

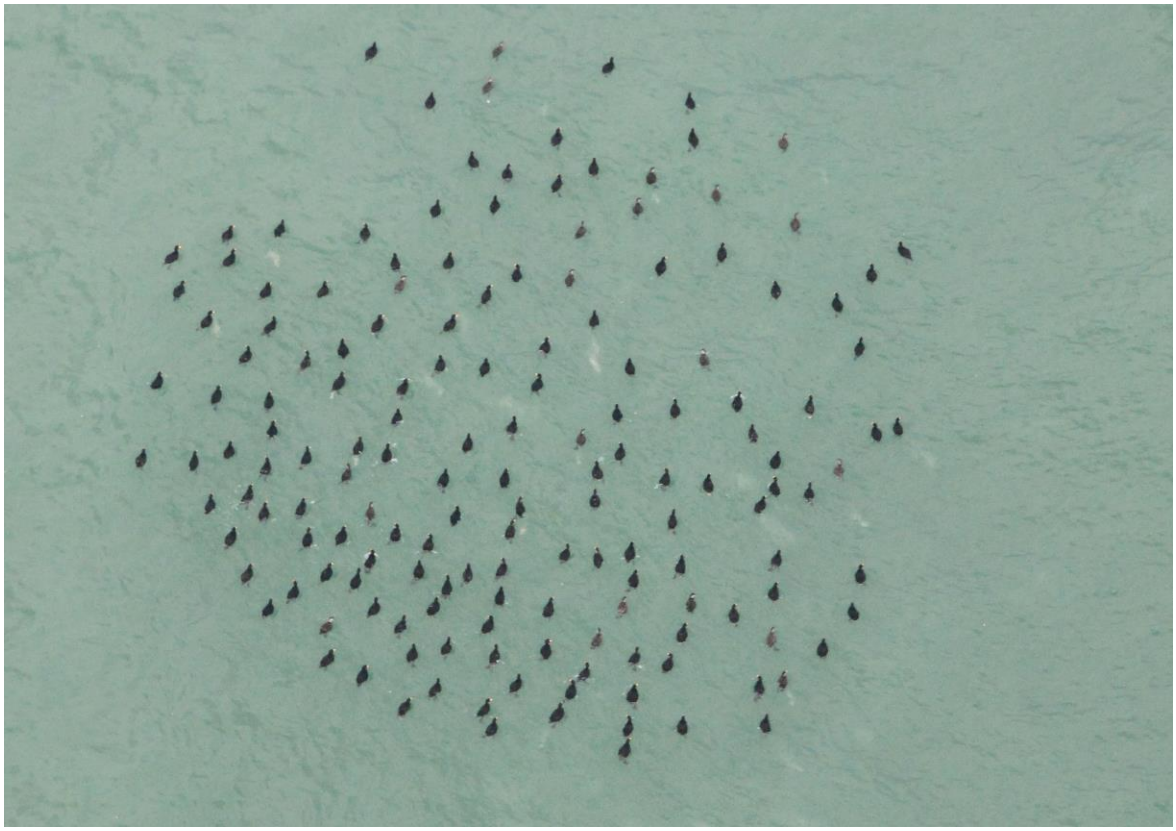

Plate 2. Photograph of a flock of Surf Scoters and Black Scoters taken at northern James Bay during 28 July 2012.

Plate 3. Photograph of a flock of White-winged Scoters taken at northern James Bay during 27 July 2012.