Sea Duck Joint Venture

Annual Project Summary for Endorsed Projects

FY 2005 – (October 1, 2004 to Sept 30, 2005)

SDJV PROJECT #49: DEMOGRAPHY AND MOULT ECOLOGY OF SURF SCOTERS IN EASTERN NORTH AMERICA

Multi-year funding, year one of three.

2005 September 27

Principal Investigators:

Scott Gilliland, Canadian Wildlife Service, Mount Pearl, NL, A1N 4T3,
(709) 772-2013, Scott.gililand@ec.gc.ca
Keith McAloney, Canadian Wildlife Service, Sackville, NB, E4L 1G6,
(506) 634-5013**,** Keith.mcaloney@ec.gc.ca
Rodger Titman, Dept. Natural Resources, McGill University, PQ, H9X 3V9,
(514)398-7933, titman@nrs.mcgill.ca
Eric Reed, Canadian Wildlife Service, Gatineau, PQ, K1A 0H3,
(819) 953-0294, Eric.reed@ec.gc.ca
Jean-Pierre Savard, Canadian Wildlife Service, Ste. Foy, PQ, G1V 4H5,
(418) 648-3500, Jean-Pierre.Savard@ec.gc.ca
Neil Burgess, Canadian Wildlife Service, Mount Pearl, NL, A1N 4T3,
(709) 772-4143, Neil.Burgess@ec.gc.ca
Sabir Bin Muzaffar, Atlantic Canada Ecology Research Network, Department of Biology, Memorial University of Newfoundland, St. John's, NL, A1B 3X9
(709) 737-3239, v35sbm@mun.ca
Mark O'Conner, Dept. Natural Resources, McGill University, PQ, H9X 3V9,
(514) 398-7933, moconn12@po-box.mcgill.ca

Partners:
Gus Dicker, Sikumiut Environmental Management Ltd., Nain, NL, A0P 1L0,
gus.dicker@sikumiut.ca
Les Hulett, INCO Ltd. 145 King St. West, Suite 1500, Toronto ON, M5H 4B7,
lhulett@inco.com

Project Description:

This study has two components that will provide information on Surf Scoter demography and molting ecology. Estimates of demographic parameters are required for understanding population dynamics and may be important for identifying factors related to scoters declines. To our knowledge, there is no estimate of survival for Surf Scoters. In addition, molting and migration constitute major energy expenditures in migratory birds (King 1974). For Surf Scoters

little is known about annual variation in molt chronology, about the resources that make sites attractive to molting birds or about their behavior, food, habitat requirements or energetic requirements during molt. Follows are preliminary results from the pilot study that was endorsed by the SDJV in 2004 and funded by the SDJV in 2005.

Objectives:

The project has two major components. The first is a traditional banding program where we will attempt to measure vital rates of male surf scoters, and their affiliations between the molting area and harvest areas. Provided we are able to recapture a sufficient number of marked individuals over the course of the study, it would be possible to improve survival estimates and measure site fidelity by using mark-recapture models that combine information from live recaptures and band recoveries (Barker 1997). It would also be possible to estimate recruitment and population growth rate from the mark-recapture data, providing an independent assessment of population trajectory to the aerial surveys currently in place (Pradel 1996, Nichols et al. 2000). The second is to study molting ecology (chronology, behaviour and habitat use) of Surf Scoters. Specific objectives for this component of the project are as follows:

1) to measure direct and indirect band recovery rates for scoters,
2) to refine and develop new capture techniques for molting scoters,
3) to band up to 1000 in 2005, with a goal to double banding effort for 2006,
4) to develop methods for aging molting male Surf Scoters,
5) to develop annual indices for species, age, sex composition and recruitment,
6) to evaluate use of isotopes analyses of juvenile feathers to identify affiliations between molting and breeding areas,
7) to evaluate mark-recapture or mark-resighting techniques for estimating survival,
8) to screen a sample of birds for heavy metal and organic contaminants and parasites,
9) to determine differences in molt chronology of subadult, adult females and to document annual variability in chronology,
10) to compile time-activity budgets throughout the molting period and to estimate the energetic costs of molting activity,
11) to monitor behavioral effects of disturbance on molting scoters,
12) to document habitat use during the molting period,
13) to determine differences in geographic ranges occupied during feather replacement from stable isotope signals in feathers of males, females and subadults,

Preliminary Results:

Our primary study area is in the vicinity of Nain. Here, concentrations of molting scoters occur around the archipelagos of Black, Nukasusutok and Iglosiatik Islands (Fig 1.). The areas around Nukasusutok and House Harbour Islands were the site of the intensive banding program and the Black Islands area for the moult ecology study.

Captures and Band Recoveries--. From 8 to 17 August 2004 and from 21 July to 22 August 2005, we caught 657 and 671 molting sea ducks, respectively (Table 1). All birds were banded except for 36 males that were collected (see below). Male Surf Scoters comprised about 95% of all captures. We observed three plumages classes for male Surf Scoters: 1) complete development of adult plumage and bill ornaments, opaque white eye iris, and crimson legs, 2) incomplete development of adult plumage and bill ornaments, milky white iris, tawny legs, and presences of juvenile breast feathers, and 3) same as 2, but no juvenile breast feathers. We suspect that plumage class 1 were ASY birds, and classes 2 and 3 were SY birds; however we used the more conservative age class AHY for plumage types 1 and 3. The was a significant difference in the age composition between years (Chi-square = 17.9, df=1, $p \leq 0.0001$) with about 10% and 4% of captures being second-year males in 2004 and 2005, respectively (Table 2). The difference in age composition may reflect annual variability in recruitment rate and suggests that there maybe significant annual variability in productivity and or over-winter survival of immature males.

Eight band recoveries of Surf Scoters had been reported to the banding office up to 30 June 2005. This provides our first estimate of the direct recovery rate (1.3%) for Surf Scoters. Two recoveries were reported from the north shore of the Gulf of St. Lawrence, one in CT, three in MD, and two in NC (Fig. 2). In 2005, we recaptured four of 631 Surf Scoters that were banded in 2004.

Collections--. We collected 36 Surf Scoters in 2005. The collection was distributed evenly across observed range of ninth primary length. Blood smears were collected form about 25 birds. The collection is currently frozen and we are making arrangements for processing them. All birds will be aged by presence of a bursa. Tissue samples will be collected and analyzed for contaminant loadings, and some tissues will be archived for future studies of genetics or stable isotopes. All birds will be examined for parasite loadings and analyzed for nutrient content.

Molt Chronology--. We used development of the ninth primary as a measure of the progression of wing molt. With variability in timing of captures accounted for between years, there was no difference in molt chronology between 2004 and 2005 (ANCOVA, p=0.60, n=640), and ninth primary in the population increased about 3.0±0.1 SE mm per day (ANCOVA, $p \geq 0.0001$, n=640) between 20 July and 22 August.

Birds gained an average 0.20±0.09g (±SE) of body mass per 1.0 mm increase in ninth primary length (ANCOVA, p=0.02, n=545; Fig.1), and averaged 27 g heavier in 2004 than 2005 (ANCOVA, p=0.001, n=545; Fig. 3).

Behavior--. We surgically implanted 20 subcutaneous radio-transmitters in male Surf Scoters and fitted 12 others with nasal markers. We used Holohil PD-2, 3.8 g VHF transmitters (Holohil Systems, Carp, ON). From 26 July to 17 August 2005, we attempted to monitor the patterns of bird movement by following birds fitted with radio transmitters. We used a Wildlife Materials Inc. TRX-1000S PLL synthesized tracking receiver with a frequency range of 172-173 MHz in combination with a directional Yagi antenna. Birds were monitored from vantage points used during behavioral observations. Scanning of each frequency (±1KHz) occurred whenever flocks were within the signal range of radio transmitters (~7 km^2 around the bird). Each frequency was tested for approximately 10s as the Yagi was slowly waved across the flock. We attempted to receive signals from a total of 30 flocks (~ 4250 birds total) for roughly 5 hours of total scanning. This component of the study was not successful because we only re-located only five marked birds between 26 July an 17 August.

Observations of Surf Scoter activities were distributed throughout the molting period (early, middle and late periods of molt). We attempted to evenly distribute observation time during three periods of the day: morning (5:00-10:30), mid-day (10:31-16:00) and evening (16:01-21:30). Birds were skittish and responded to our presence from more than a kilometre away. As such, behavioral observations had to be carried out from locations that were hidden from the birds.

Bird activity was monitored using instantaneous scan-sampling (Altmann 1974) of the entire flock, and this for as long as the flock remained visible from the observation point. Scanning intervals were varied depending on the number of birds present in the flock (0–19 = 30s; 20-49 = 2 min; >50 = 5 min). Activities were assigned to one of six different categories: feeding, locomotion, maintenance, resting, alert and social (Adams et al. 2000). An additional category (inter-bird distance) was also assessed for most flocks. In addition, a stopwatch was used to measure length of dives during diving bouts of some flocks. A total of approximately 10.5 hours of behavioral observations were collected over the period spanning 29 July to 22 August 2005. We conducted 21 observation periods ranging from 5 min to 2h 15min, with an average observation period of about 50 min. Flocks observed during these periods ranged from 6 to approximately 300 birds (mean=66 birds).

Although data has yet to be analyzed, it appears that birds spent a large portion of their time performing locomotory and maintenance activities. Also, in contrast to what was initially suspected, we found that birds were often involved in feeding bouts. Average dive time of foraging birds was 49.8s±6.3SD (n=38).

Communications:

Our project is centered in the community of Nain, Labrador. The project has a high visibility in town and we have been making efforts to inform residents about the study. These have included interviews on the community radio and a public presentation. We have planned further presentations to the Board of the Labrador Inuit Association and to local high school students this winter. During the capture effort this year we had an opportunity have a local TV crew film our operation. The crew obtained about 4.5 hrs of footage during the banding effort. This should result in a half hour show that will be aired on the Aboriginal Peoples Network during the winter of 2006.

Project Status:

We maintained a similar banding effort in 2005 as in 2004, but only with increased capture effort. The only feasible way to increase the number of birds banded maybe to establish a second banding crew at a new site. Our initial estimates direct recovery and recapture rates are low. The recapture probabilities should improve each year as the number of marked birds in the population increases each year.

We are currently preparing contracts to process the tissue collections and evaluate the parasite loadings for the sample of birds in the collection. Samples will be sent to the NWRC lab in early 2006 to evaluate contaminants loadings.

The level of information collected on the behavioral component of the study was disappointing. We are re-evaluating the telemetry equipment used, and we will likely change the study site in 2006. The failure to successfully locate radio-marked birds maybe due to several factors: 1) local geography made reception of signals difficult as many high rocky islands blocked signals, 2) birds may have moved out of the study area, thus putting them beyond the effective range of the transmitters (one nasal marked bird was re-sighted 50 km from the capture site; GD pers. obs.), 3) there may have been a faulty component in receiver/antenna assembly, and 4) logistics traveling 10-20 km each days by boat to the field site and weather conditions limited the number of opportunities to search for birds. We are currently consulting with Lotec to determine if there was a failure in the receiver/antenna assembly, and re-evaluating if the transmitters used had adequate signal strength to detect the birds over required distances. We are considering using more powerful transmitters and plan to move the study site. The new site has few adjacent islands that may interfere with signals and that will allow observers to remain at the site for several days. Changing the study site will also eliminate the need to travel and land the study site daily, thus increasing the number of opportunities for tracking. Similarly, time devoted to behavioral observations was limited by weather conditions and logistics. Moving the study area

will limit the need to travel by boat to the study site and will increase the opportunities to conduct observations. However, this will require establishment of a semi-permanent field camp because the area maybe frequented black bears.

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Project Funding Sources:

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)
24,980					
			56,300		NSTP[1]
				21,000	INCO mining

1 Northern Scientific Training Program

Total Expenditures:

Activity	Breeding	Molting	Migration	Wintering	Total
Banding		60,500			60,500
Surveys					
Research		41,780			41,780
Communication					
Coordination					

Table 1. Number of waterfowl caught in molt drives, Nain, Labrador, 2004 and 2005.

		Species[1]			
Year	Sex	COEI	SUSC	WWSC	BLSC
2004	Female	1	37	2	0
2004	Male	3	595	19	0
2005	Female	1	40	0	1
2005	Male	6	622	1	0
Total		11	1294	22	1

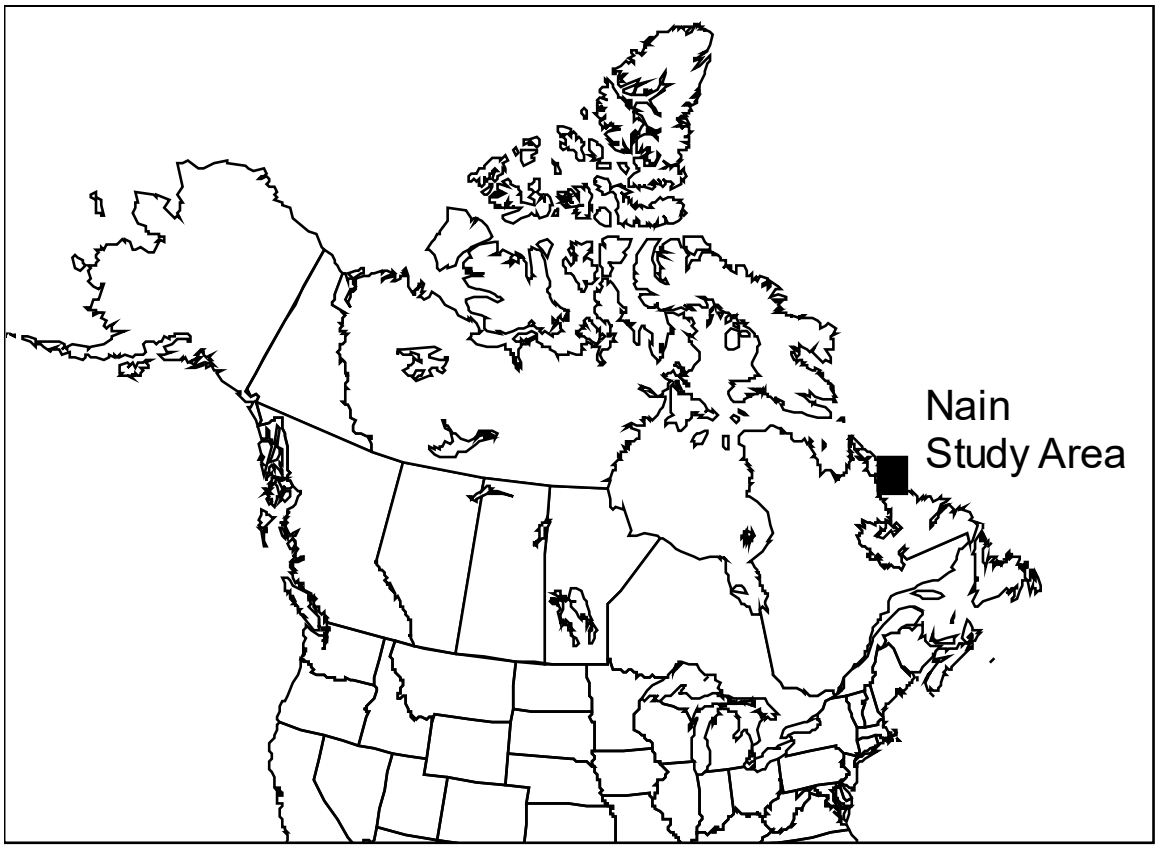
1. COEI = Common Eider; SUSC = Surf Scoter; WWSC = White-wing Scoter; BLSC = Black Scoter.

Table 2. Age composition of male Surf Scoters caught in moult drives, Nain, Labrador, 2004 and 2005.

	Year	
Age[1]	2004 (n=595)	2005 (n=622)
AHY	90	96
SY	10	4

1. AHY= after hatch year, SY= Second year.

a).



b).

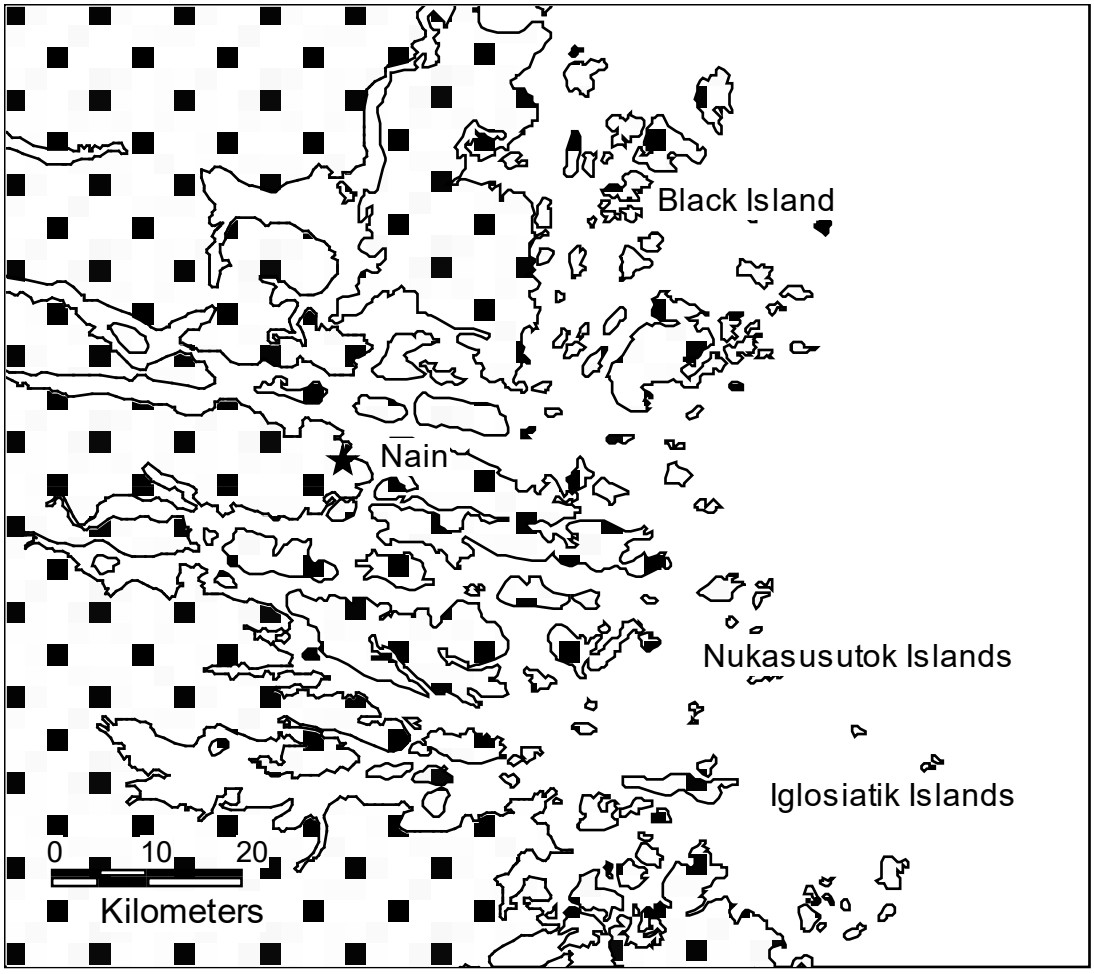


Fig. 1. Maps showing the general location of the study area (a) and specific location of the study

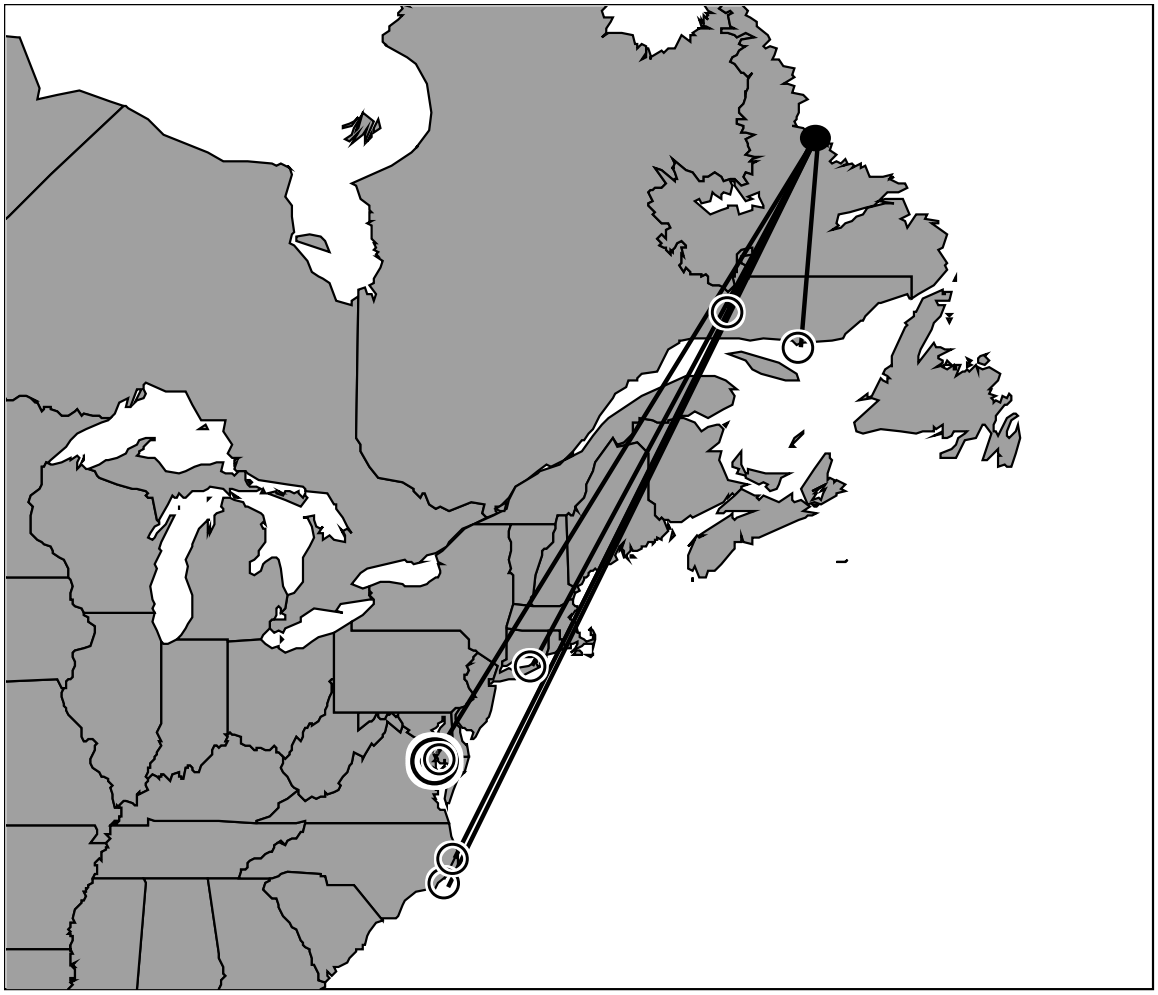


Figure 2. Location of band recoveries for Surf Scoters banded near Nain Labrador, 2005.

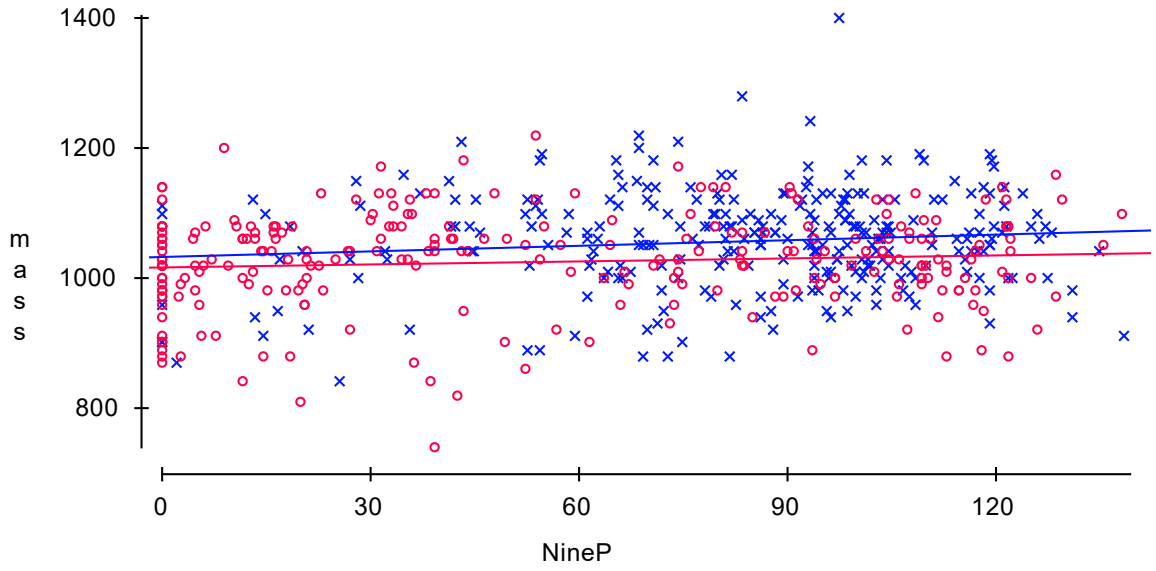


Figure 3. Body mass (g) vs. ninth primary length (mm) of male surf scoters in 2004 and 2005. Blue Xs represent 2004 and red circles 2005.