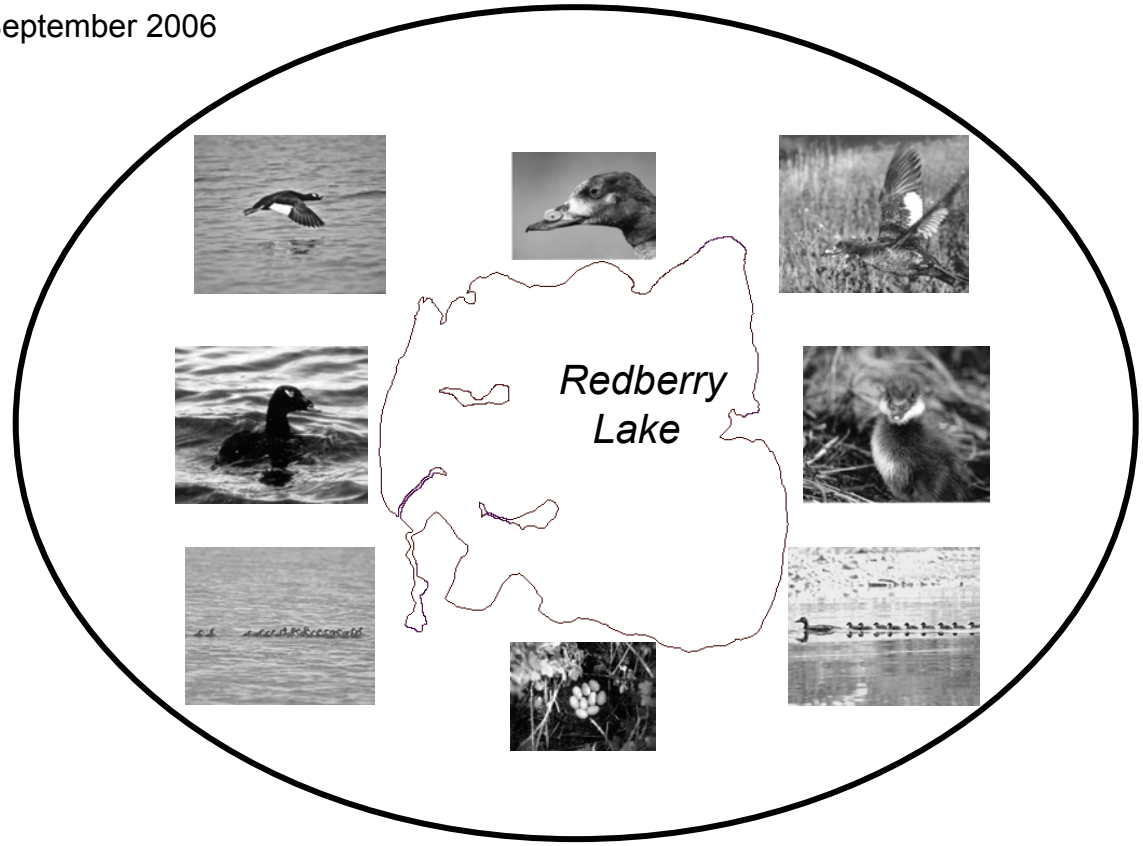
Breeding Biology and Population Dynamics of White-winged Scoters (*Melanitta fusca*) at Redberry Lake, Saskatchewan

Progress Report

September 2006



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Supporting Organizations

- Ducks Unlimited Canada
- Environment Canada
- Institute for Wetlands and Waterfowl Research
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Publications

●Traylor, J. J., R. T. Alisauskas, and F. P. Kehoe. Brood amalgamation in white-winged scoters (*Melanitta fusca*): strategy, epiphenomenon, or combination? Behavioral Ecology and Sociobiology: *In prep.*

●Pelayo, J. T., K. R. Mehl, J. J. Traylor, W. L. Reed, and T. A. Arnold. Colored nape-markers for offspring of precocial waterbirds. Journal of Field Ornithology: *In review*.

●Traylor, J. J. and R. T. Alisauskas. 2006. Effects of intrinsic and extrinsic factors on survival of white-winged scoter (*Melanitta fusca deglandi*) ducklings. Auk 123: 67-81.

●Alisauskas, R. T., J. J. Traylor, C. J. Swoboda, and F. P. Kehoe. 2004. Components of population growth rate for white-winged scoters in Saskatchewan. Animal Biodiversity and Conservation 27.1: 451-460.

●Traylor, J. J., R. T. Alisauskas, and F. P. Kehoe. 2004. Multistate modeling of brood amalgamation in white-winged scoters. Animal Biodiversity and Conservation 27.1: 369-370.

●Traylor, J. J., R. T. Alisauskas, and F. P. Kehoe. 2004. Nesting ecology of white-winged scoters (*Melanitta fusca deglandi*) at Redberry Lake, Saskatchewan. Auk 121: 950-962.

Theses

●Swoboda, C. J. *In prep*. Population delineation of white-winged scoters at Redberry Lake, SK. M. Sc. Thesis, University of Saskatchewan, Saskatoon.

●Wood, C. N. 2004. Competition between ants (*Hymenoptera: Formicidae*) and nesting white-winged scoters (Melanitta fusca): Is scoter nest success and placement influenced by ants at Redberry Lake, Saskatchewan? B. Sc. Honors thesis, University of Regina, Saskatchewan.

●Traylor, J. J. 2003. Nesting and duckling ecology of white-winged scoters (*Melanitta fusca*) at Redberry Lake, SK. M.Sc. Thesis, University of Saskatchewan, Saskatoon.

The results presented in this progress report are preliminary and interpretation is subject to change as more data are collected. Most of this data will be incorporated into theses and publications when analyses are complete.

Introduction

In the last twenty years, declining population trends of white-winged scoters (*Melanitta fusca*) in North America have raised conservation concerns. Black scoters (*M. nigra*), surf scoters (*M. perspicillata*), and white-winged scoters are counted in aggregate during aerial surveys each spring in North America. Breeding ranges of the three species also show much overlap. Because of considerable sympatry, it is not possible to examine species-specific population trends over their entire range. Nevertheless, population surveys indicate a declining trend in abundance for this genus at the continental level (Kehoe et al. 1994, Alisauskas et al. 2004). North American scoter populations appear to have declined by ~ 65% since the 1950s with > 50% of the decline occurring over the last twenty years (Trost 1998 in Alisauskas et al. 2004). Data from the breeding waterfowl survey for the southern survey strata represents primarily white-winged scoters based on scoter breeding ranges (e.g., white-winged scoter are the only species to breed in the prairie biome of western Canada). Data from these strata suggest that white-winged scoters (hereafter scoter) have declined in Southern Saskatchewan and have become locally extinct in Southern Manitoba and Alberta. Historically, the prairie biome was an important breeding area. Currently, the southern edge of their breeding range is north of the prairies, in the aspen parkland and declines are occurring there also. Breeding pair counts in the aspen parkland on Redberry Lake, Saskatchewan, have declined by about 45% in the last 20 years alone, while counts at Jessie Lake, Alberta, declined from 57 pairs to none in the same amount of time (Brown and Brown 1981, Alisauskas and Kehoe unpubl. data., D. Duncan, Environment Canada, pers. comm.) suggesting that northward retraction of the breeding range is continuing. Scoters may soon disappear as breeding birds in the parkland ecoregion of western Canada with breeding areas relegated to the boreal forest, where population surveys also indicate declines. There has been a 75% reduction in scoter population size since the 1950s in the boreal forest region of Alberta, British Columbia, and the Northwest Territories (Trost 1998).

Population decline could result from declines in any component(s) of the life cycle (e.g., adult survival, nesting success, or offspring survival). Therefore, all vital rates require estimation for a complete understanding of the relative contributions of separate life cycle components to population change. High annual adult survival rate (~0.77), low duckling survival (~0.01), depressed age ratios among harvested birds (series of age ratios < 0.6 juveniles: adult, 1962-1992), and delayed sexual maturity of offspring suggest population declines may have resulted from low recruitment of ducklings into the breeding population (Brown and Brown 1981, Brown and Fredrickson 1989, Alisauskas et al. 2004, Traylor and Alisauskas 2006). Thus, low productivity (i.e., duckling survival, and juvenile and subadult survival) could be important in the population dynamics of this species. Possible reasons for declines in scoter productivity include: high reliance on zebra mussels (*Dreissena polymorpha*) with high contaminant loads, possibly leading to depressed likelihood of nesting by scoters (Di Guilo and Scanlon 1984), anthropogenic disturbance and habitat loss on breeding grounds (Brown and Brown 1981, Turner et al. 1987, and Mikola et al. 1994), increased gull (*Larus spp*.) populations (gulls are major predators of nests and ducklings)

(Kehoe 1989) and increased harvest rates (Kehoe et al. 1994), all of which may result in decreased breeding probability, nesting success, and/or duckling survival. Clearly, a better understanding of factors that influence population dynamics are required to conserve effectively this little-studied species (Brown and Fredrickson 1997).

The purpose of this report is to briefly summarize up-to-date findings from research on breeding biology of white-winged scoters at Redberry Lake, Saskatchewan, including the 2006 breeding season These data, together with that collected since 2000, will facilitate assessment of the interplay of pertinent factors and reproductive parameters on population dynamics of scoters at Redberry Lake.

Specific information described here includes:

1. pair counts
2. number of nests located
3. nesting chronology
4. clutch size
5. nest success
6. number of females captured
7. number of ducklings captured

Methods

Study Area

Fieldwork was conducted on Redberry Lake, Saskatchewan from late May to early August 2006. Redberry Lake is a 4500 ha federal bird sanctuary and Biosphere Reserve, supporting the largest known local breeding population of scoters in North America (P. Kehoe unpubl. data, Fig. 1).

Pair Counts

Weather permitting, pair counts of the entire lake were performed twice weekly from late May to mid-July. Birds were counted from a boat and from points on land and were classified as pair, lone male, lone female, group (three to five birds), and flock (more than five birds; Brown and Fredrickson 1989).

Nest Searching

Three islands (i.e., Gull, Pelican, and Old Tern Islands) were each systematically searched twice on foot between 0700 and 2200 hours. We did not nest search New Tern Island to avoid disturbing the American white pelican (*Pelecanus erythrorhynchos*) colony. Clutch size (i.e., the number of eggs deposited) was only recorded for nests that made it to incubation. Nest initiation dates were estimated by subtracting stage of embryonic development obtained by candling

eggs (Weller 1956) and clutch size multiplied by laying interval (1 egg every 1.5 days, Brown and Brown 1981) from the date that the nest was found. Nests were visited every 7-10 days to determine fate (successful, abandoned, depredated, or unknown) and were considered to be successful if at least one egg hatched as indicated by the presence of egg membranes (Klett et al. 1996) or ducklings.

Capture and Marking of Females and Ducklings

Nests were visited just before or during hatch; bills of hatching ducklings that protruded from pipped eggs were coded with indelible ink for individual identification of ducklings and were marked with plasticine-filled leg bands (Blums et al. 1999) after they had completely emerged from eggs. Ducklings were then returned to nests from which they were initially removed and covered with nesting material. At or near hatch, incubating female scoters were captured by hand on the nest or with a hand-held net as they flushed from the nest. Females were weighed with a Pesola scale (±10 g), measured (culmen, head length, and tarsal length; ±0.1 mm), and marked with a standard United States Fish and Wildlife Service leg band and a uniquely colored nasal-marker (Lokemoen and Sharp 1985).

Results

In 2006, 279 pairs of white-winged scoters were counted representing a ~33% decrease in population size since the mid-1980's (Fig. 2) when the average number of pairs counted was 420. The sex ratio (M: F) has remained similar to historical estimates (~60:40). This local population was in serious decline until ~2001, but may be slowly increasing in recent years (Fig. 2, Alisauskas et al. 2004).

Three islands were searched from June to August. A total of 106 nests were found on islands and monitored for survival; of these, 40 nests hatched. This sample size of nests was an increase from 2005 but remained low probably because of nest loss from an active coyote den on Gull Island. In previous years there have been between 33 and 100 nests found on Gull Island; only 20 nests were located this year.

In 2006, mean nest initiation date was 14 June (Julian date 165) and mean hatch date was 26 July (Julian date 207). Most scoters initiated nests in the 2nd and 3rd weeks of June; mean nest initiation dates were similar among years at Redberry Lake (Fig. 4). Mean clutch size in 2006 was 9.1 (95% CL: 8.5 to 9.6) and was comparable to the long-term average of 9.0 (Fig. 5). Nest success (apparent nest success) was 38%, a decline from the long-term average of 47% (Fig. 6), and is likely due to increased nest predation from coyotes.

A total of 52 females were captured in 2006; 30 of these were recaptures. The numbers of recaptured hens since 2001 have ranged annually from 18 to 58 individuals, while first-time captures since 2000 have ranged from 26 to 57

individuals (Fig. 7). There have been 2096 ducklings marked since 2000; 2006 was the second consecutive year recruited ducklings were detected in this population. Of the eight females recaptured as breeders in 2006, two were hatched in 2000 and six in 2003. A total of nine recruited ducklings have been detected since 2000. In 2006, 149 ducklings were marked with plasticine legbands (Fig. 8). This small sample was likely due to the small number of successful nests and low egg hatchability (i.e., number of eggs that hatch in successful nests). Egg hatchability was ~52% in 2006 representing the lowest value recorded since the inception of the study (Fig 9).

Application of Results

The results of the study serve three main purposes: 1) to further the knowledge base on the breeding biology and population dynamics of white-winged scoters, 2) for comparison with on-going studies in the boreal forest regions of Alaska and Canada, and 3) to generate a population model to aid in the development of sound harvest management strategies for this species.

Additionally, it is hoped that findings help to guide decisions about local predator management (specifically red fox, ring-billed gull and California gull) to enhance production not only of scoters and other waterfowl, but also shorebirds, terns and phalaropes at Redberry Lake Migratory Bird Sanctuary. It is suspected that intense gull predation of ducklings is the major cause of low scoter recruitment, and also seems to be responsible for large-scale alteration of breeding waterbird community at this Migratory Bird Sanctuary over the last 2-3 decades. In this regard, a sanctuary-wide survey as done by Kerbes et al. (1985) should be repeated to measure these changes.

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Fig. 1. Redberry Lake federal bird sanctuary and Biosphere Reserve, Saskatchewan. Shaded areas indicate islands searched for nests.

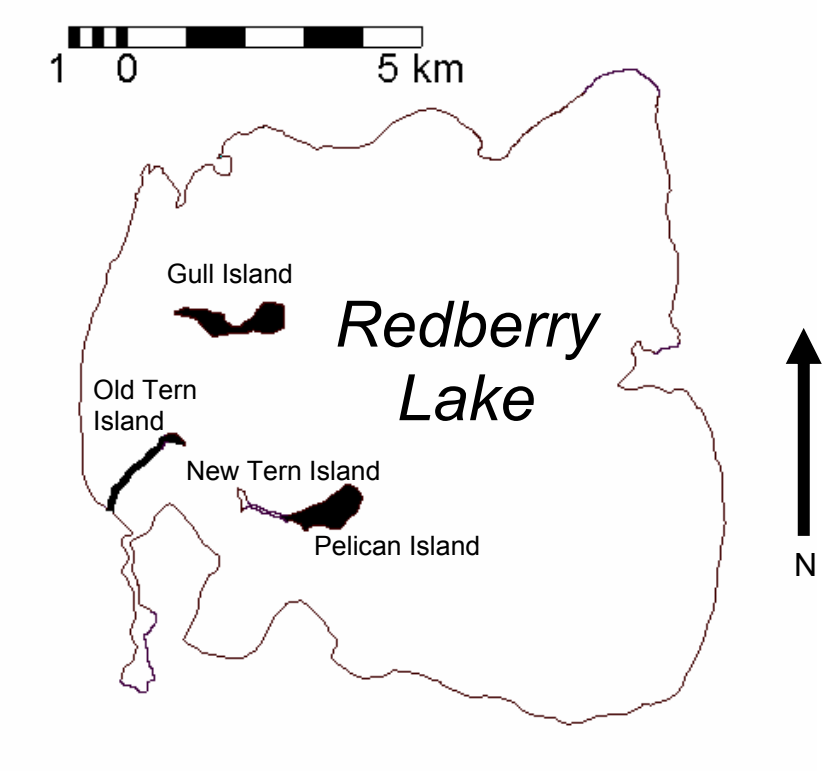

Fig. 2. Number of white-winged scoter pairs counted at Redberry Lake, SK from 1977 to 1980 (Brown 1981), 1984 to 1985 (Kehoe, unpubl. data), 1998 to 2006 (Alisaukas and Kehoe, unpubl. data).

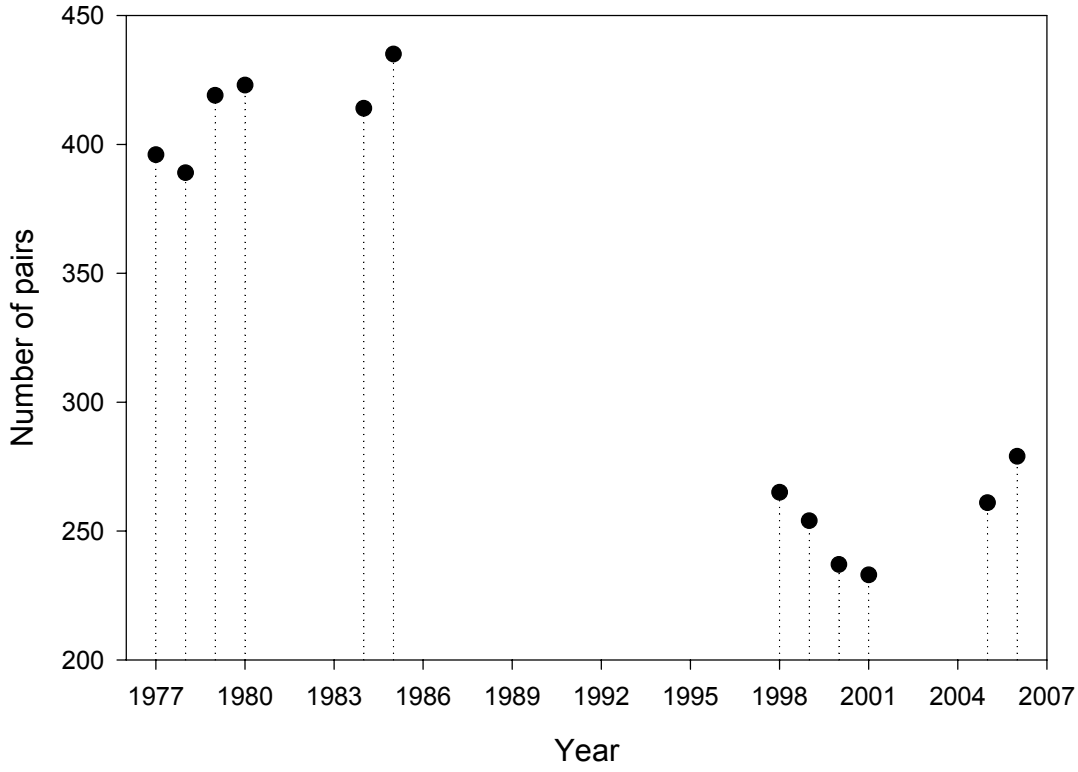

Fig. 3. Number of white-winged scoter nests found per year from 2000 to 2006 at Redberry Lake, SK.

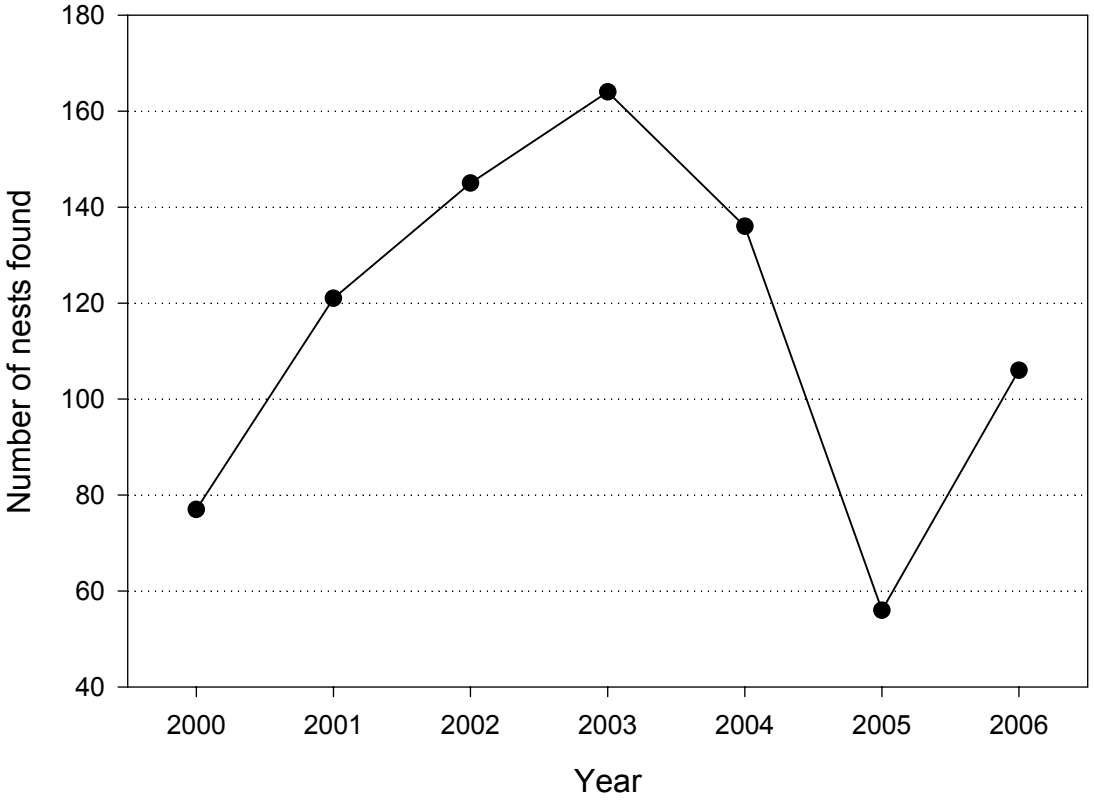

Fig. 4. Mean nest initiation date for white-winged scoter nests at Redberry Lake, SK from 2000 to 2006. Julian date 161 is equivalent to June 10.

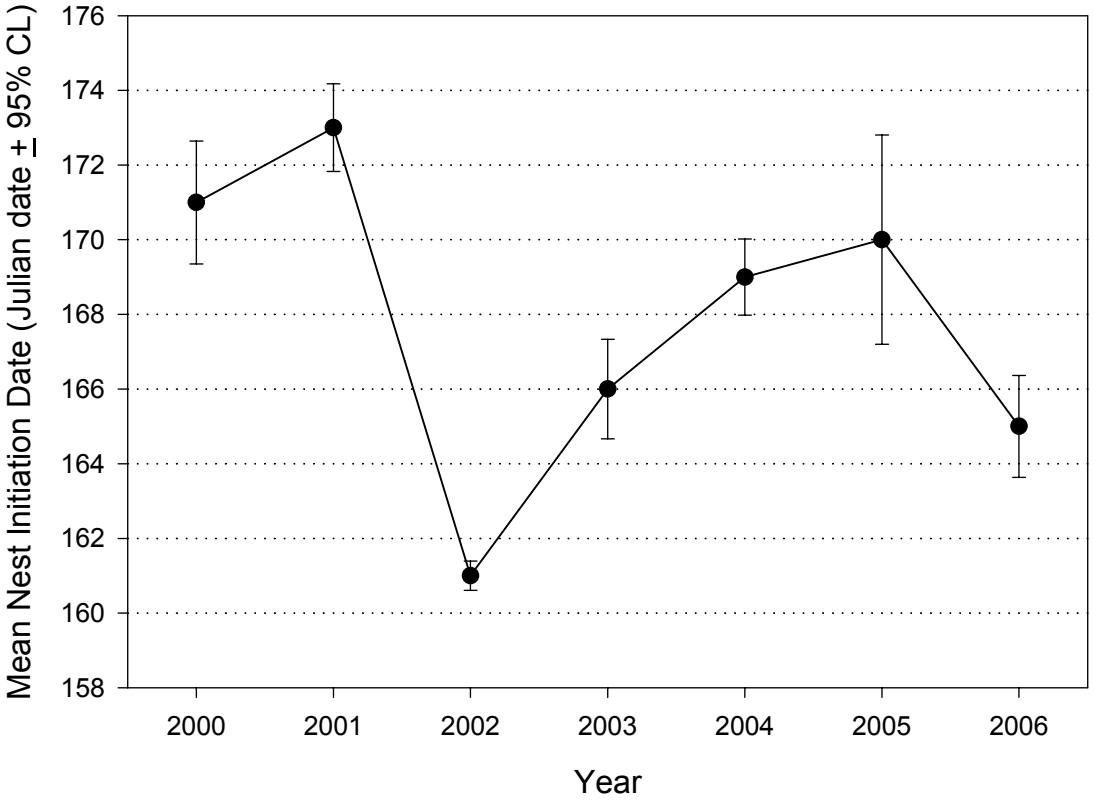

Fig. 5. Mean clutch size for white-winged scoters nesting at Redberry Lake, SK from 2000 to 2006.

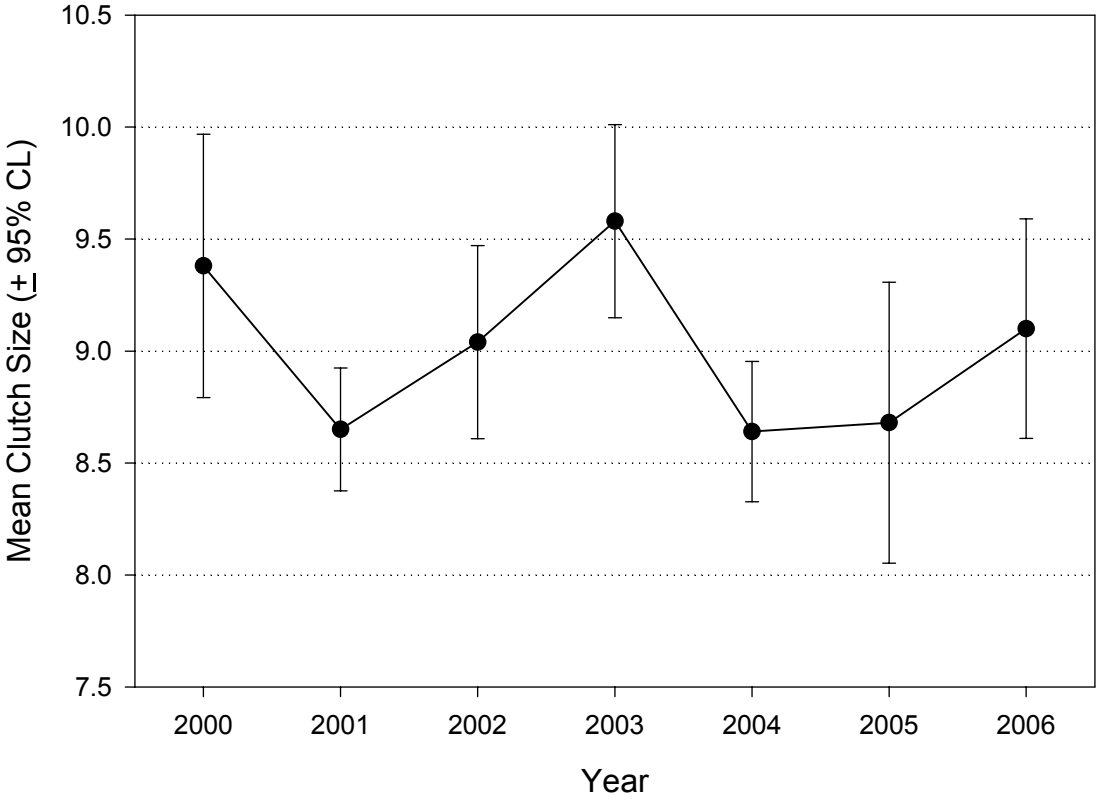

Fig. 6. Nest success (% successful) for white-winged scoters nesting at Redberry Lake, SK from 2000 to 2006.

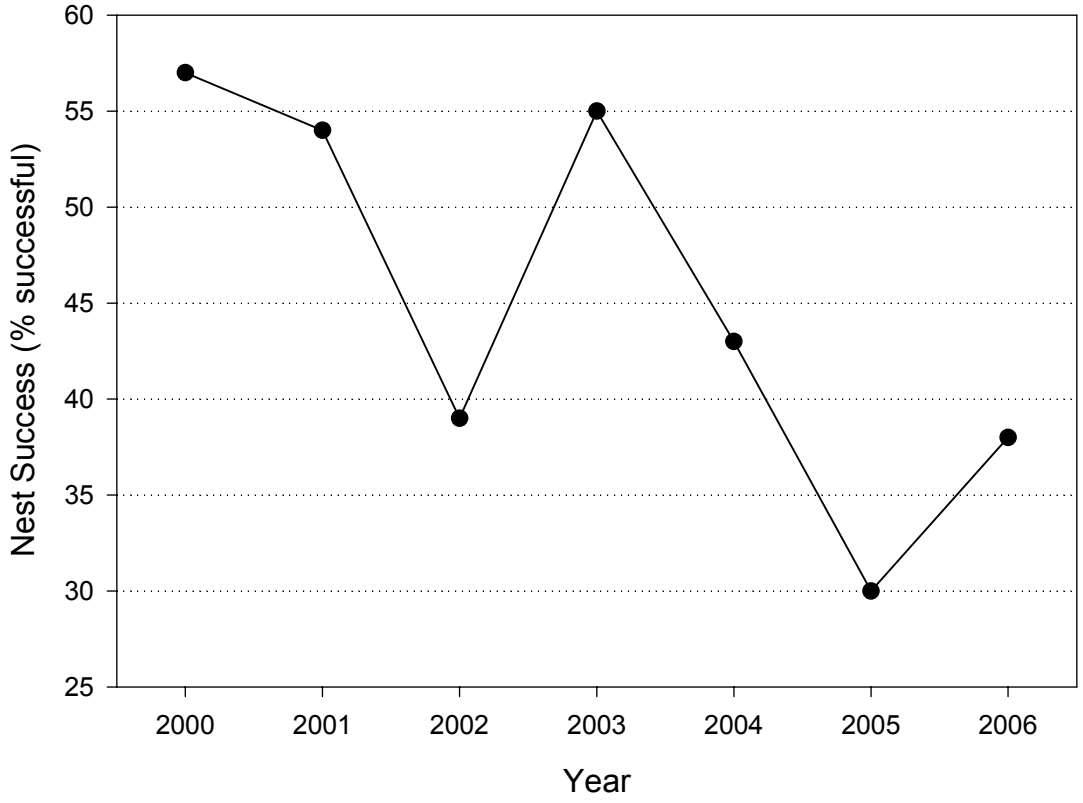

Fig. 7. Number of female white-winged scoter first time captures, recaptures, and total captured at Redberry Lake, SK from 2000 to 2006.

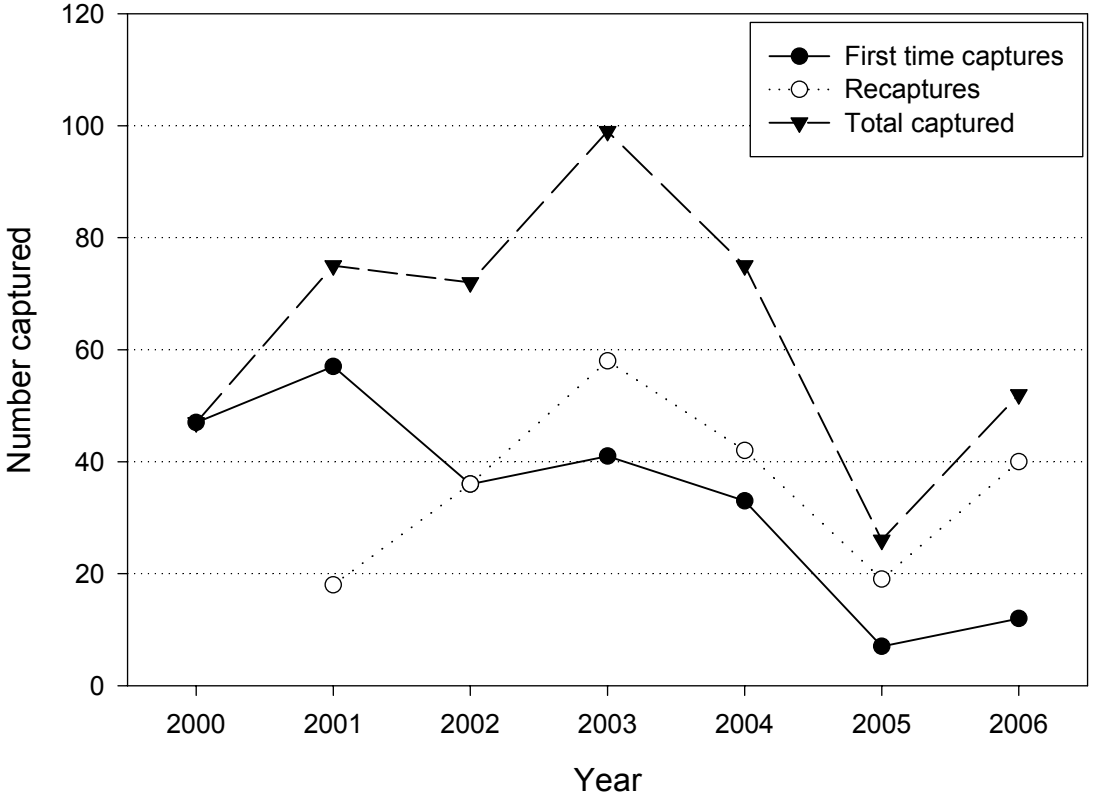

Fig. 8. Number of white-winged scoter ducklings captured and marked from 2000 to 2006 at Redberry Lake, SK.

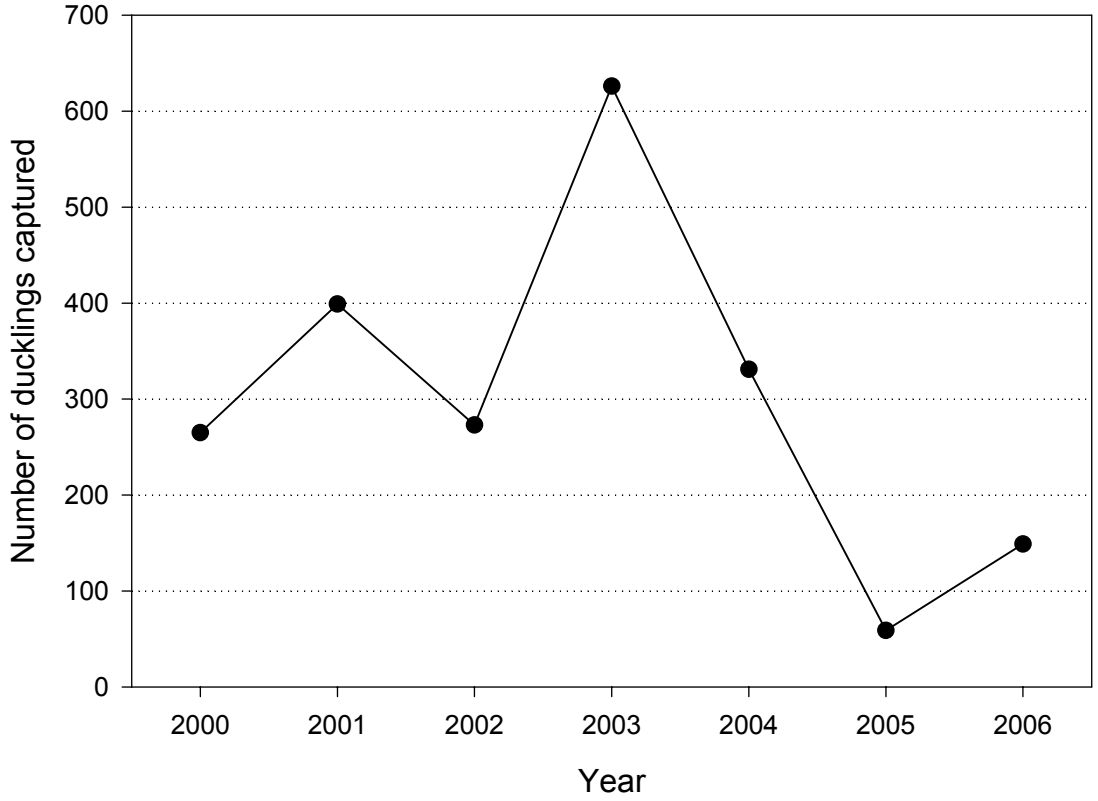

Fig 9. Mean egg hatchability (% of eggs hatching in a successful nest) for white-winged scoters at Redberry Lake, SK from 2000 to 2006.