Chapter 2:

SPECIES DESCRIPTION AND BIOLOGY

Ray T. Alisauskas, Canadian Wildlife Service

Ross's geese (*Chen rossii*) share the genus with lesser snow geese (*Chen caerulsecens caerulescens*), and greater snow geese (*Chen caerulescens atlantica*). They are closely related to snow geese (Avise et al. 1992), and occasionally hybridize with them (Trauger et al. 1971, Alisauskas et al. 1998a). In this report, they are collectively referred to as light geese. Before recent expansion in range and numbers of all 3 groups (see below), winter populations of Ross's geese were found largely in the western United States and, during breeding, Ross's geese were largely confined to Canada's central Arctic (Bellrose 1976). Ross's geese were and still are associated with lesser snow geese during their annual cycle. Members of this genus are highly gregarious, but Ross's geese frequently occur with lesser snow geese in large flocks of up to several hundred thousand birds. Co-occurrence of Ross's geese and greater snow geese in eastern North America is rare.

Ross's geese are the smallest bodied of the three groups of light geese, with white plumage and black tips on primary wing feathers, a trait shared with snow geese. Lesser snow geese show variation in plumage color giving rise to white phase and blue phase individuals; there is an east-west cline in plumage color ratios of lesser snow geese with blue phase most common in the east and white phase most common in the west. "Blue" plumage exists within both Ross's and greater snow geese, but is very rare (McLandress 1983). Downy Ross's goose goslings show a polymorphism (white vs. yellow) not evident after 3-4 weeks, and the genetic basis for this is unknown (Cooke and Ryder 1971). Relative to snow geese, Ross's geese are not only smaller, but are also different in body proportions. The neck is shorter in relation to its body, and the bill is shorter relative to head size. Ross's geese lack the "grin patch" and large lamellae (i.e., tooth-like serrations) along edges of upper and lower mandibles (i.e., jaws) that are characteristic of snow geese. Ross's geese can have various-sized caruncles, or wart-like structures, along the base of the bill (McLandress and McLandress 1979), a feature absent in both lesser and greater snow geese. Juvenile plumage tends to be slate gray in Ross's geese, but intensity and extent on the body is less than in snow geese and not as obvious in the field nor in the hand. Ross's geese have different vocalizations (Ryder and Alisauskas 1995) and a more rapid wing beat than lesser snow geese, however discriminating between the two species, particularly when they are flying, is still difficult without experience.

Weights of Ross's geese (Ryder and Alisauskas 1995) and lesser snow geese (Ankney 1982) are highly variable during the annual cycle because both can store large amounts of fat (Ankney and MacInnes 1978, Bon 1996). Nevertheless, adult Ross's goose females (1,826 ± 160 g, n = 75) weigh less than adult snow goose females (2,706 ± 270 g, n = 99) upon arrival at the Karrak Lake breeding colony (R. T. Alisauskas,

Canadian Wildlife Service, unpublished data). Age of first reproduction and breeding probability by adult Ross's geese are the subject of current research, and may differ from respective rates observed in snow geese. Despite differences in egg and body size, the incubation period in both Ross's geese and snow geese ranges from about 21 to 23 days. Craig (2000) suggested that Ross's goose embryos attain a higher level of functional maturity in the egg than do snow geese, thereby hatching in a more developed state (Slattery and Alisauskas 1995). Ross's geese tend to disperse farther from nesting areas than do snow geese during brood rearing (Slattery 1994). Ross's geese appear to possess greater adaptations for dispersal to brood-rearing areas, e.g., greater functional maturity of hatchlings, compared to lesser snow geese (Slattery and Alisauskas 1995). Differences in dispersal distances may be related to differences in food preference between species, and may be consistent with interspecific differences in bill morphology. Alisauskas (1998) suggested there were differences in the habitats occupied on the midcontinent wintering grounds by Ross's and lesser snow geese, due in part to differences in bill morphology and possible diet preferences. Ross's geese appear to avoid coastal marshes (Harpole et al. 1994), but currently are increasing in numbers on inland agricultural habitats in the midcontinent (Alisauskas 1998).

Clutch size at Karrak Lake for Ross's geese (3.31 ± 0.01, n = 5,182) was lower than for snow geese (3.55 ± 0.02, n = 4,770) from 1991 to 2000. Over the same period, nest success was similar, 84.5% and 81.3%, respectively. In some years, snow geese at Karrak Lake show a substantial decline in nest success not exhibited by Ross's geese. Ross's goose eggs are smaller than those of lesser snow geese, and it is possible to discriminate between nests of the two species by egg size (Alisauskas et al. 1998a).

Most Ross's geese in the Queen Maud Gulf Bird Sanctuary share nesting colonies with snow geese. Despite this, there seem to be few extra-pair fertilizations (Dunn et al. 1999). Previously, Ross's geese tended to select islands in shallow lakes for nesting colonies, but more recently they are found nesting in greater numbers on mainland areas (Alisauskas and Boyd 1994), possibly a consequence of increasing numbers of snow geese whose presence may improve chances of successful nesting by Ross's geese. For example, Bantle (1998) showed that attack rates by Ross's geese on foraging arctic foxes increased in relation to increasing density of snow geese.

Peak spring migration by snow geese in western Saskatchewan occurs before 1 May, whereas it is after 1 May by Ross's geese, which may be found in high numbers there as late as 15 or 20 May. At Karrak Lake, Ross's geese also have a somewhat different migration chronology, arriving and nesting 3 or more days later than snow geese (Alisauskas 2001). Dzubin (1965) reported that Ross's geese begin to arrive in southern Saskatchewan by the first week of September, with the greatest influx in late September; departures were largely completed by mid-October. Ross's geese now may remain until the end of October, mixing and departing with large numbers of snow geese. Changes in fall migration chronology remain to be quantified.

Whereas midcontinent lesser snow geese breed in high numbers over large areas of Canada's eastern and central Arctic (Cooke et al. 2000), most Ross's geese apparently

are still largely confined to Canada's central Arctic in and near the Queen Maud Gulf Bird Sanctuary. Most light geese there nest in 5 or 6 colonies, the largest of which is at Karrak Lake (Kerbes 1994, Alisauskas et al. 1998b). However, the number of new colonies is growing (Alisauskas and Boyd 1994) and it is unlikely that all existing colonies with Ross's geese are known. The 2000 population estimate at Karrak Lake was 395,000 ± 106,000 (95%CL) Ross's geese, and 264,000 ± 42,000 snow geese (Alisauskas 2001). Ongoing research at Karrak Lake leading to estimation of various vital rates (survival, fecundity, age of first reproduction, breeding propensity, immigration, and emigration) will improve population modeling of Ross's geese.

Little is known about habitat use and requirements of Ross's geese during spring migration through boreal regions from Prairie Canada to Arctic nesting areas, and from brood-rearing areas to Prairie Canada in late summer and autumn. Greater detail about Ross's goose biology is provided by Ryder and Alisauskas (1995).

LITERATURE CITED

Alisauskas, R. T. 1998. Winter range expansion and relationships between landscape and morphometrics of midcontinent Lesser Snow Geese. Auk 115:851-862.

Alisauskas, R. T. 2001. Nutritional ecology and population biology of Ross's Geese. Progress report, January, 2001. Canadian Wildlife Service, Saskatoon, Saskatchewan.

Alisauskas, R. T., and H. Boyd. 1994. Previously unrecorded colonies of Ross' and Snow geese in the Queen Maud Gulf Bird Sanctuary. Arctic 47:69-73.

Alisauskas, R. T., S. M. Slattery, J. P. Ryder, M. L Gloutney, A. D. Afton, R. H. Kerbes, and M. R McLandress. 1998a. Discrimination of Ross' and Lesser Snow Goose eggs. Journal of Field Ornithology 69:647-653

Alisauskas, R. T., S. M. Slattery, D. K. Kellett, D. Stern, and K. Warner. 1998b. Spatial and temporal dynamics of Ross's and snow goose colonies in Queen Maud Gulf Bird Sanctuary, 1966-1998: Progress report on numbers of geese and colonies, September 1998, Canadian Wildlife Service, Saskatoon, Saskatchewan.

Ankney, C. D. 1982. Annual cycle of body weight in lesser snow geese. Wildlife Society Bulletin 10:60-64.

Ankney, C. D., and C. D. MacInnes. 1978. Nutrient reserves and the reproductive performance of female Lesser Snow Geese. Auk 95:459-471.

Avise, J. C., R. T. Alisauskas, W. S. Nelson, and C. D. Ankney. 1992. Matriarchal population genetics structure in an avian species with female natal philopatry. Evolution:1084-1096.

Bantle, J. L. 1998. Arctic fox predation on Ross's and Lesser Snow Geese. Thesis, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan.

Bellrose, F. C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Pennsylvania.

Bon, R. L. 1998. Spring nutritional ecology of migrating and breeding Ross' Geese. Thesis, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan.

Cooke, F., and J. P Ryder. 1971. The genetics of polymorphism in the Ross' goose (Anser rossii). Evolution 25:483-490.

Cooke, F., C. M. Francis, E. G. Cooch, and R. T. Alisauskas. 2000. Impact of hunting on population growth of mid-continent Lesser Snow Geese *in* H. Boyd, editor. Population modelling and management of Snow Geese. Canadian Wildlife Service Occasional Paper No. 102.

Craig, L. M. 2000. Comparative incubation ecology of Ross's and Lesser Snow Geese at Karrak Lake, Nunavut. Thesis, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan.

Dunn, P. O., A. D. Afton, M. L. Gloutney, and R. T. Alisauskas. 1999. Forced copulation results in few extrapair fertilizations in Ross's and lesser snow geese. Animal Behaviour 57:1071-1081.

Dzubin, A. 1965. A study of migrating Ross' Geese in western Saskatchewan. Condor 67:511-534.

Harpole, D. N., D. E. Gawlick, and R. D. Slack. 1994. Differential winter distribution of Ross' Geese and Snow Geese in Texas. Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies 48:14-21.

Kerbes, R. H. 1994. Colonies and numbers of Ross' Geese and Lesser Snow Geese in the Queen Maud Gulf Migratory Bird Sanctuary. Canadian Wildlife Service Occasional Paper No. 81.

McLandress, M. R. 1983. Winning with warts? A threat posture suggests a function for caruncles in Ross' geese. Wildfowl 34:5-9.

McLandress, M. R., and I. McLandress. 1979. Blue-phase Ross' geese and other blue-phase geese in western North America. Auk 96:544-550.

Ryder, J. P., and R. T. Alisauskas. 1995. Ross' Goose (*Chen rossii*). Number 162 *in* A. Poole and F. Gill, editors. The Birds of North America. The Academy of Natural

Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Slattery, S. M. 1994. Neonate reserves, growth and survival of Ross' and Lesser Snow Goose goslings. Thesis, University of Saskatchewan, Saskatoon, Saskatchewan.

Slattery, S. M., and R. T. Alisauskas. 1995. Egg characteristics and body reserves of neonate Ross' and Lesser Snow Geese. Condor 97:970-984.

Trauger, D. L., A. Dzubin, and J. P. Ryder. 1971. White geese intermediate between Ross' Geese and Lesser Snow Geese. Auk 88:856-875.