Chapter 3:

DISTRIBUTION AND ABUNDANCE

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DISTRIBUTION

Approximately 90-95% of all Ross's geese breed in the Queen Maud Gulf region of the central Canadian Arctic (Kerbes 1994). Small numbers of Ross's geese also breed on Banks Island in the western Arctic, along western and southern Hudson Bay, and Southampton and Baffin Islands in the eastern Arctic. Prior to the 1960s, Ross's geese nested primarily in the central Arctic region and most birds migrated to wintering areas in California. This species has dramatically expanded its range eastward in recent decades (Ryder and Alisauskas 1995; Fig. 1). Examination of the distribution of Ross's goose harvest among Flyways illustrates the range expansion. Ross's geese did not occur in the Central Flyway harvest survey until 1974, and did not occur in the Mississippi Flyway harvest survey until 1982. The first occurrence of Ross's geese in the Atlantic Flyway harvest was in 1996 (Sharp and Moser 2000). A large proportion of Ross's geese winter

Fig. 1. Primary geographic range of the Ross's goose.

in the Central Valley of California (Ryder and Alisauskas 1995). Smaller numbers of Ross's geese winter in New Mexico, Texas, Mexico, Louisiana, and Arkansas. Changes in the distribution of harvest and recoveries of banded birds further illustrates the range expansion from the 1950s to the 1990s (Moser and Duncan, this report).

Ross's geese in the Mid-continent Population (MCP) of light geese. These Ross's geese migrate primarily through North Dakota, South Dakota, Nebraska, Kansas, Iowa, and Missouri, and winter in Arkansas, Louisiana, Mississippi, and eastern, central, and southern Texas. Field studies conducted in Texas during winter indicate that Ross's geese comprise approximately 5.7% of light geese (lesser snow and Ross's geese combined) found in the MCP range (Texas Parks and Wildlife Department, unpublished data). Ground-based observations of light goose flocks wintering in Louisiana during 2001 indicated that Ross's geese comprised 2.3% of all light geese in sampled areas, and up to 19% of individual flocks (Helm 2001).

Ross's geese in the Western Central Flyway Population (WCFP) of light geese. These Ross's geese winter in southern Colorado, northwestern Texas, New Mexico, and the Northern Highlands of Mexico (Hines et al. 1999). Intensive surveys of WCFP light geese are conducted at major migration and wintering areas in Colorado, New Mexico, Texas, and Chihuahua, Mexico each year during the months of November, December, and January. Light goose population estimates of major roost sites within the survey area are obtained from aerial and ground surveys. Information collected from light goose flocks include estimates of flock size, species composition, color phase ratio, immature:adult age ratio, and family size. Proportions of snow and Ross's geese are calculated from adult geese only. During 2000/01, Ross's geese comprised approximately 24% of WCFP light geese (Thorpe 2001; Fig. 2).

Ross's geese in the Pacific Flyway. Ross's geese in the Pacific Flyway migrate primarily to the Central Valley of California. Grinnell and Miller (1944) reported Ross's geese in both the Sacramento Valley and the northern portion of the San Joaquin Valley. Bellrose (1976) indicated that the majority of Ross's geese wintered in the lower San Joaquin Valley of California. More recently, McLandress (1979) documented that a larger segment of the Ross's goose population wintered in the Sacramento Valley than in the San Joaquin Valley. The percentage of Ross's geese banded in the central Arctic that are recovered by hunters in the Pacific Flyway has declined from nearly 100% in the 1950s and 1960s, to 60% during 1990-98, although the number of Ross's geese harvested in the Pacific Flyway is still increasing.

ABUNDANCE

In the early 20th century, Ross's geese were considered to be the rarest goose species that visited the U.S. (Bent 1925). Although the location of the species' breeding colonies were unknown, the principal wintering grounds were limited to the central valleys of California. No population estimates were made in the early 20th century,

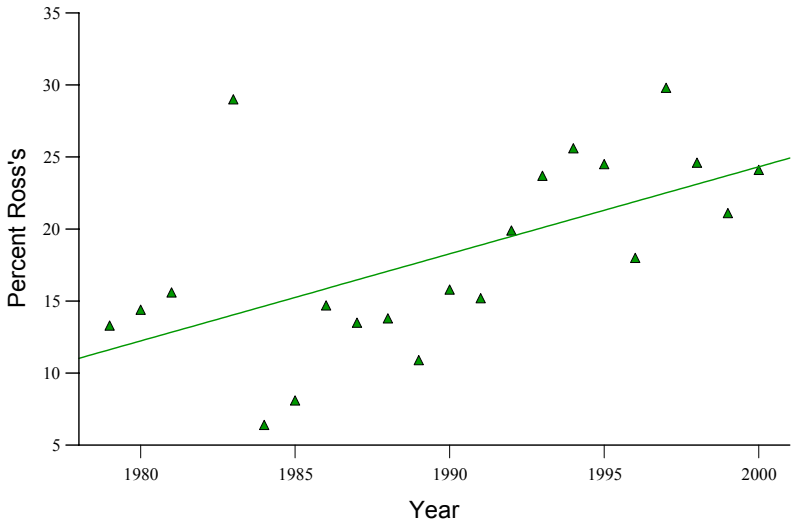

Fig. 2. Proportion of Ross's geese in the Western Central Flyway Population of light geese during winter, 1979-2001 (Thorpe 2001). Data for 1982 were not available.

although Bent (1925) cited a report of a flock of "several thousand individuals" on the Missouri River in Montana in April 1885. Photographic surveys of Ross's geese on breeding colonies began in 1966. Although not complete counts, annual winter indices of light geese in the midcontinent region are available beginning in 1970.

Breeding Ground Population Estimates

Long-term estimates of the spring population of Ross's geese are obtained from periodic photographic inventories of breeding colonies conducted since 1966 (Kerbes 1994). The number of Ross's geese in the central Arctic, as determined from photo surveys, has increased from 34,000 birds in 1966, to 567,000 birds in 1998 (Table 2). An additional 52,000 Ross's geese were estimated in the eastern Arctic (Table 2). Including an additional 30% to account for non-breeders (Kerbes et al. 1999), the total spring population on known colony sites in the central and eastern Arctic likely was near 805,000 birds in 1998. Assuming an annual growth rate of 9.0% (U.S. Fish and Wildlife Service 2001, Alisauskas and Rockwell, this report), the total spring population will be 1.04 million in 2001, and nearly 2.3 million by 2010.

Aerial and ground sampling in the central Arctic in 1998 at the Queen Maud Gulf Bird Sanctuary (Alisauskas et al. 1998) and other locations (Caswell et al. 1997, CWS unpublished data) suggests the number of Ross's geese in the Canadian Arctic in 1998 may have exceeded 1,000,000 breeding and non-breeding geese at various colonies, higher than estimated from the most recent photo-inventory.

Table 2. Photo-inventory estimates of breeding Ross's geese in the central and eastern Arctic, 1966-98 (Kerbes 1994, Canadian Wildlife Service unpublished data, Caswell et al. 1997).

Year	Central Arctic	Eastern Arctic	Total
1966	34,000		34,000
1976	77,300		77,300
1982	90,800		90,800
1988	188,000		
1990		2,000	190,000[a]
1998	567,000	52,000	619,100

[a] 1988 and 1990 pooled.

Annual Winter Indices

Winter waterfowl surveys are conducted each year throughout all lower 48 States in the U.S. These surveys began in some areas as early as 1935 but consistent annual coverage began in 1955. Biologists did not begin separate inventories of MCP and WCFP geese until the winter of 1969/70. By maintaining similar survey methods from year to year, the winter index is useful for monitoring trends of various populations. Because winter indices are available every year for most light goose populations (versus periodically for Arctic breeding colony estimates), the winter index is utilized to annually monitor population trends and aid in making management decisions.

Because not all areas in each State are surveyed, the winter surveys do not provide complete population estimates for light geese. Instead, the survey provides an index to the winter population of geese, which should not be confused with the size of the breeding population. Furthermore, population growth rates derived from breeding and wintering areas are not directly comparable because birds from a particular breeding area may winter in several geographic regions. Past photographic inventories of eastern Arctic lesser snow goose nesting colonies suggested that winter indices averaged about half of the actual spring population estimate (Kerbes 1975). Boyd et al. (1982) used a correction factor of 1.6 to apply to winter indices to estimate the approximate breeding population size of lesser snow geese in spring. It is likely that similar correction factors are valid for Ross's geese.

Ross's geese in the Mid-continent Population (MCP) of light geese. The winter index of MCP light geese (lesser snow and Ross's geese combined) increased from approximately 777,000 birds in 1970, to approximately 2.6 million birds in 2000. Assuming that Ross's geese comprise 4% of the MCP winter index (mean of Texas and Louisiana field studies cited earlier), the winter index included approximately 106,000 Ross's geese. During 1970-2000, the MCP light goose winter index increased 3.3% per year. The rate of increase has risen to 4.2% per year in the past 10 years.

Ross's geese in the Western Central Flyway Population (WCFP) of light geese. WCFP light geese that occur in the U.S. are surveyed every winter in Central Flyway States. A more comprehensive winter survey of WCFP light geese is obtained every 3 years when light geese are also surveyed in Mexico. The winter index of WCFP light geese has increased from approximately 42,000 birds in 1970 to approximately 256,000 birds in 2000. During 1970-2000, the WCFP winter index increased 6.2% per year. Assuming Ross's geese comprise 24% of the WCFP winter index (Thorpe 2001), the index would include approximately 61,400 Ross's geese.

Ross's geese in the Pacific Flyway. Long-term annual winter indices are not available for Ross's geese in the Pacific Flyway. Annual winter surveys from 1956 to 1978, when Ross's geese were thought to winter exclusively in the San Joaquin Valley, indicated an increase in Ross's geese in California from 13,100 to 31,200. In 1977, McLandress (1979) estimated the post-hunting-season population in the Central Valley to be 106,000. Species composition surveys conducted in the Central Valley during the winters of 1988/89 and 1989/90 resulted in Ross's goose estimates of 214,700 and 168,400, respectively (Silveira 1989, 1990). The survey was repeated in 1992, resulting in an index of 221,300 birds (Mensik and Silveira 1993). Efforts to repeat the survey in California since then have been hampered by a wider distribution of roosting geese due to winter flooding of rice fields and observer access difficulties due to wet winters. The survey was completed in December of 2000 and resulted in an estimate of 256,000 Ross's geese (Feldheim, in preparation).

The continental population goal for Ross's geese in the North American Waterfowl Management Plan (NAWMP)(U.S. Department of the Interior 1998) is 100,000 breeding birds. The Pacific Flyway Council (1992) adopted a continental Ross's goose population goal of 100,000 breeding or 150,000 wintering birds. Therefore, the 1998 photo-survey estimate of 619,000 breeding Ross's geese in the central and eastern Arctic (combined) is more than 600% higher than the NAWMP and Pacific Flyway Council goals.

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