

BREEDING ECOLOGY OF THE CHINESE MERGANSER IN THE CHANGBAI MOUNTAINS, CHINA

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Abstract.—Chinese Mergansers (*Mergus squamatus*) are summer residents in the Changbai Mountains, China. They arrive during March and stay until late September or early October. They are usually in pairs or small flocks. Most breeding sites were located along streams running through virgin forests, especially mixed conifer and broad-leaf forests. Nests were built in cavities of large diameter (\bar{x} = 57 cm) trees bordering streams and clutch size averaged 10 (range 8–12) eggs. Egg-laying began in early April and incubation lasted 35 d. Ducklings are described and behavior of juveniles leaving the nest was studied.

ECOLOGÍA REPRODUCTIVA DE *MERGUS SQUAMATUS*

Sinopsis.—La mergansa china (*Mergus squamatus*) es un residente de verano de las montañas Changbai, China. Las aves llegan en marzo y permanecen en la localidad hasta el final de septiembre o principios de octubre. Las mergansas suelen observarse en parejas o en pequeños grupos. La mayoría de los lugares en donde las aves se reprodujeron se encontraron a lo largo de arroyos que cruzaban el bosque virgen, particularmente de coníferos y bosques de hoja ancha. Las aves anidaron en cavidades de amplio diámetro (\bar{x} = 57 cm), de árboles al borde de los arroyos. El número promedio de huevos por camada fue de 10 (alcance 8–12). La puesta comenzó en abril y la incubación tomó 35 días. Se describen los patitos y la conducta de estos al dejar el nido.

The population of Chinese Merganser (*Mergus squamatus*) is 1200–1500 pairs in the world with 200–250 pairs breeding in China. They breed mainly in the Changbai Mountains (40–50 pairs; Zhao 1993), the Small Xinganling Mountains and areas in far-eastern Russia (900 pairs; Bocharnikov 1990). As a result of its restricted distribution and small population size, the Chinese Merganser is an endangered species and was listed in the Red Book of World Rare and Endangered Species published by IUCN and ICBM (King 1981). Kolommitsev (1985), Roslyakov (1985), Shibnev (1985), Bocharnikov (1990) and Zhao et al. (1979, 1993) estimated population size, described distribution and reported preliminary information on the ecology of Chinese Mergansers in far-eastern Russia and the Changbai Mountains of China. There is little information published about their reproductive biology, however. To ensure better protection and management of the Chinese Merganser, we obtained information about the reproductive biology of this rare and endangered bird. In this

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paper, we report preliminary results about its breeding ecology and behavior.

STUDY AREA AND METHODS

Our research was conducted during 1976–1978 and 1985–1991 in the virgin forests of Chanbaishan Natural Reserve (41°30′–42°50′N, 127°10′–128°50′E), Jilin Province, in northeastern China (Fig. 1). Summers are warm (average 22 C in July) and humid with frequent rain. Winters are cold (average –15 C in January), with substantial amounts of snow. Common trees are black pine (*Pinus koraiensis*), Daimyo oak (*Quercus dentata*), poplar (*Populus* spp.), Amur linden (*Tilia amurensis*), Manchurian ash (*Fraxinus mandshurica*), and mono maple (*Acer mono*). Many of the older trees have cavities suitable for nests of mergansers.

Several clear mountain streams and slow-moving rivers flow through the study area. Riverbeds are primarily rock and gravel. Fish, shrimp (*Palaemonetes* spp.), crayfish (*Cambaroides* spp.) and caddisflies (Phryganeidae) are abundant in the rivers and streams, providing the Chinese Merganser with an excellent food source (Zhao et al. 1985). Population density of the Chinese Merganser in the Changbai Mountains is relatively high, about 0.72 individuals/km river (Zhao, Z., unpubl. data), which provided good opportunities to study these birds.

We observed mergansers using binoculars and telescopes. Activities of the mergansers recorded were: formation of pairs, courtship, nesting, egg-laying, incubation and fledgling of the ducklings. To facilitate observations at the nest, we attached rungs to nest trees so we could climb the trees and inspect the nests. We also cut small replaceable sections from the boles at the back of the nest chambers. This section allowed us to measure eggs and observe the female and nest. Eggs were measured after the clutch was completed. Ducklings were captured by waiting under the nest-hole when they jumped to the ground. Ducklings were weighed using small, lever scales. We measured total body length, culmen length and length of one tarsus using both dividers and steel tape. Five adult birds were collected for food study.

As the population is small and nests in natural cavities of large trees inside virgin forests, it was difficult to locate a large sample of nests of the Chinese Merganser.

RESULTS

Social behavior.—Chinese Mergansers arrived in the Changbai Mountains in March. Early in the season, the mergansers occupy the larger lakes (>10,000 m²) or rivers near low hills. On arrival, they are usually found individually or in flocks of 3–5 birds. The mergansers form pairs in early to mid-April and then gradually move into tributary streams inside the forest. During most of the breeding season, Chinese Mergansers were observed as individuals or in pairs, but groups of 6–10 were observed in late August. Large flocks did not occur even during migration. The largest flock that we observed during the fall migration contained 16 birds. This

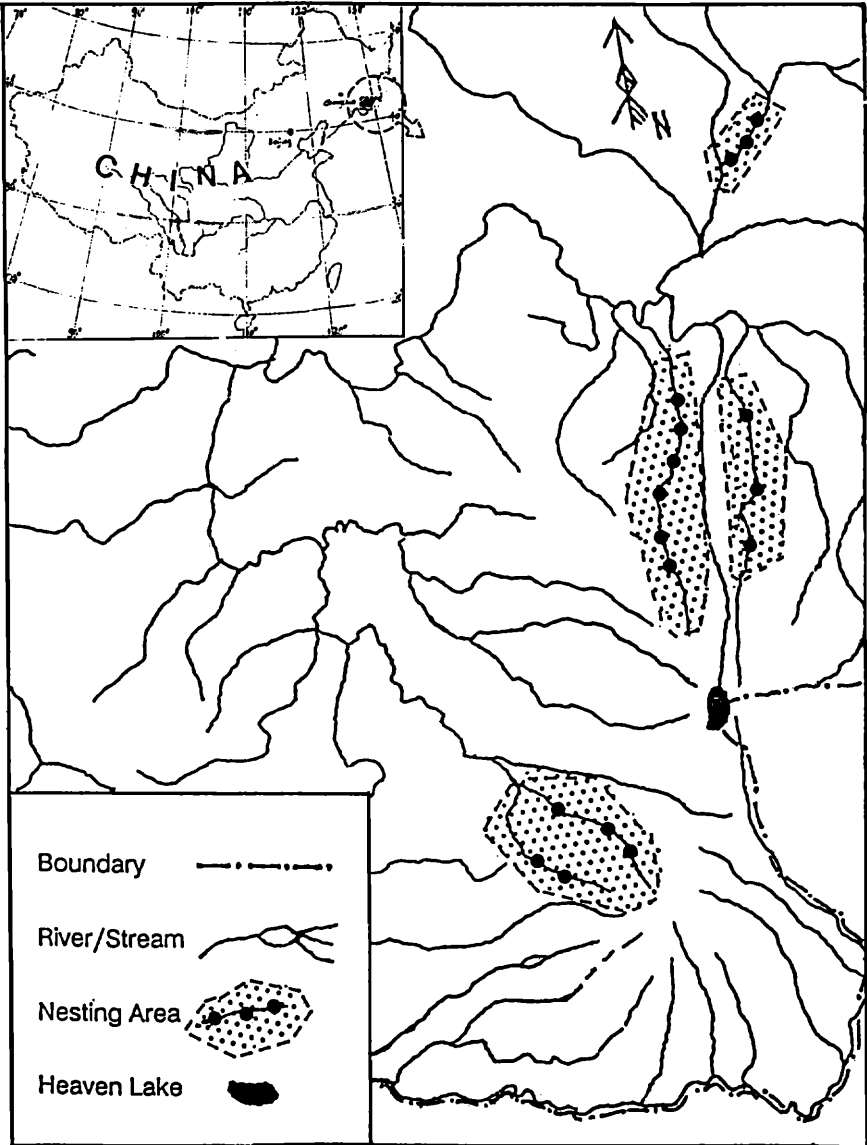


FIGURE 1. Nesting area of the Chinese Merganser in Changbaishan Natural Reserve, China.

flock was loosely distributed on the river and was comprised of young of the year.

Chinese Merganser feed on small fish, caddisflies, crayfish and other invertebrates (Zhao et al. 1985). Mergansers can remain underwater for

15–30 s. They feed throughout the day, beginning at dawn and ending at sunset.

Nesting biology.—Pairing takes place in late March to mid-April. Males often fight for females. After pair formation, pairs search for nest sites. Copulation occurs from early to late April. Chinese Mergansers nest in cavities of deciduous trees that are adjacent to stream banks. During our study, only seven nests were located and their eggs measured. One nest site was used by mergansers for three consecutive years. We were unable to monitor this nest longer because the nest tree was felled and the drake was killed by hunters. Of the seven nests that we found, five were in Popular (*Populus ussuriensis*) (one tree for three consecutive years), one was in Daimyo oak, and one in an Elm (*Ulmus* sp.). Mean height of nest holes was 8.2 m (range 4–11 m) and the mean diameter at breast height of the nest trees was 43 cm (range 30–60 cm). Shapes of the cavity entrances ranged from elliptical or long-elliptical to crevice-shaped. Mean dimensions (horizontal \times vertical) of the entry holes of the nest were 11 (range 9–12) \times 17 (range 11–20) cm. Nest chambers were 27 cm (range 20–30) in diameter and 58 cm (range 40–83) deep. Nests were lined with down and dry grass.

Chinese Mergansers lay only one clutch/year of 8–12 eggs. They usually lay one egg/day, except that they skip one day before laying the last egg. Eggs are white and oval. Mean length and width of 21 eggs were 63.3 (range 62.0–66.4) \times 45.9 (range 45.0–47.2) mm, respectively. Mean egg mass was 61.9 (range 59.5–63.0) g. Only the female incubates the clutch. Incubation lasts 35 d and hatching success (percentage of clutch that hatched) ranged from 85 to 100%. During incubation, the female stays on the nest all day, except for a mid-day recess of about 1 h to forage and rest. Eggs are covered with down when the female leaves the nest. Our observations at two nests indicate that the female rarely leaves the nest during the last 2–4 d of incubation, and stays in the nest all day during the last 1–2 d, ignoring disturbances outside the hole (e.g., loud voices, trucks, gunshots, knocking on the nest tree). Moreover, when we climbed to one of the nest entrances, the incubating female would not leave the nest. We caught one incubating female by hand, removed her from the nest and photographed her. Upon release, she returned to her nest and did not abandon it. One nest cavity from previous years was used by mergansers, perhaps because the previous nesting was successful. The beginning of egg-laying varied each year and was probably influenced by mean daily temperature. The warmer the weather, the earlier the mergansers began to lay.

Size and behavior of Ducklings.—We observed five broods; mean brood size at hatching was eight (range 6–12). Fledgling success was 100%. We weighed 20 ducklings from five broods at hatching. Ducklings weighed a mean of 40 g (range 36–43). Body length ranged from 148 to 160 mm (\bar{x} = 153 mm); culmen length ranged from 14.0 to 16.5 mm (\bar{x} = 15.5 mm); tarsus length ranged from 20.0 to 27.0 mm (\bar{x} = 24.0 mm); and tail length ranged from 21.0 and 23.0 mm (\bar{x} = 22.0 mm).

Ducklings are multi-colored. Their heads are brown-red and their backs are grey. There is a white spot on each shoulder and the rump. The neck and throat are yellow-white. The breast, flank, abdomen and wings are white. Ducklings have a light brown line extending from the bill to the rear of the head. Bills are dark brown with several white terminal specks. The feet and tarsi are slate-gray. Soon after hatching, the female and brood immediately leave the nesting area.

DISCUSSION

There are many similarities in the reproductive ecology of Chinese Mergansers, Red-breasted Mergansers (*Mergus serrator*), which we believe breed there because they were observed during the breeding season, and Goosander Mergansers (*M. merganser*) (a migrating bird). Nesting habitat, brood size and length of incubation period are similar for the three species. Red-breasted Mergansers, however, in the Changbai Mountains usually nest in rock crevices or in vegetation along river banks, as well as in bushes, grasses and reeds near water. We have never found them nesting in tree cavities. Goosander Mergansers, however, nest both in tree cavities and on land and usually are paired when they arrive on the breeding range (Dement'ev and Gladkov 1967). Chinese Mergansers form pairs after they arrive and nest only in tree cavities. There are no reported observations of Goosander Merganser ducklings leaving their nests, but some ornithologists believe that the female prods them towards the river using her bill (Dement'ev and Gladkov 1967). Our observations of the Chinese Merganser, however, indicate that the ducklings leave their nest on their own, encouraged by the calling of their parents.

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