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Status of the Scaly-sided Merganser *Mergus squamatus* in the Far East of Russia

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The Scaly-sided Merganser is listed in the Red Data Books of the IUCN, USSR, RSFSR (Republic of Russia) and South Korea with an estimated world population of only 1200 pairs. The main breeding range of the species is in the Khabarovsk and Primorye regions of the Soviet Far East and in north-eastern China. Birds winter mainly in southeast China. Scaly-sided Mergansers have also occurred in Japan, North Korea, South Korea, Vietnam, Taiwan, Burma, Tibet and Thailand. The species is known to be under threat on both the breeding and wintering grounds.

In February 1991, The Wildfowl & Wetlands Trust (WWT), the International Wildfowl and Wetlands Research Bureau (IWRB) and the Pacific Institute of Geography, Far East Branch, USSR Academy of Sciences, initiated a cooperative study of endangered waterfowl in the Far East of Russia. As part of this research, a breeding survey of the Scaly-sided Merganser was carried out on the Bikin River in the Primorye region of the Russian Far East.

Scaly-sided Mergansers arrive on the Bikin River at the end of March and, by the time the ice on the upper sections of the river begins to move, the birds are already dispersed over the breeding sites (Shibnev 1985). Females usually begin incubation in the first weeks of May and broods hatch in early June. Most ducklings fledge in the last ten days of August. Scaly-sided Mergansers leave the Bikin between mid-September and mid-October. It is still not clear where the majority of males spend the moulting period, although Bocharnikov (1990) suggested that they fly to the upper reaches of the rivers, while Shibnev (1985) stated that they remain on the breeding grounds. Others have suggested that they fly to moulting sites elsewhere.

Study Site and Methods

The Bikin River, a tributary of the Ussuri River, flows westwards from the west slopes of the Sikhote-Alin Mountains (Fig. 1). The river runs for approximately 620 km from its source, 120 km upriver from the village of Ulunga, to the Ussuri and the study area extended for roughly 335 km along the middle reaches (from approximately 46°45'N, 135°15'E to 46°30'N, 137°20'E).

The vegetation of the middle reaches of the river is mixed coniferous/broad-leaved forest characterised by white-barked elm *Ulmus propinqua*, korean pine *Pinus koraiensis* and maximovitch poplar *Populus maximoviczii*. There is a higher proportion of conifers and small-leaved deciduous trees on the upper reaches with dominant species changing to birch *Betula*, koyama spruce *Picea koraiensis* and siberian larch *Larix sibirica*. Most of the riverbank is covered with dense undergrowth under primary forest and there is little human habitation save for the villages at Krasny Yar and Ulunga. The region has a maritime climate with cold dry winters and warm wet summers. The river is frozen from October until March and winter temperatures regularly reach as low as -25°C.

There were two periods of fieldwork, from 24 June to 7 July and 27 July to 16 August 1991. In the first study period, surveys were conducted mainly on the middle reaches of the Bikin River where the river consists of a network of waterways and islands and the main channels are up to 200 m wide. The second study period concentrated on the upper reaches where the river system is less complex and the main channels are only 50 m wide.

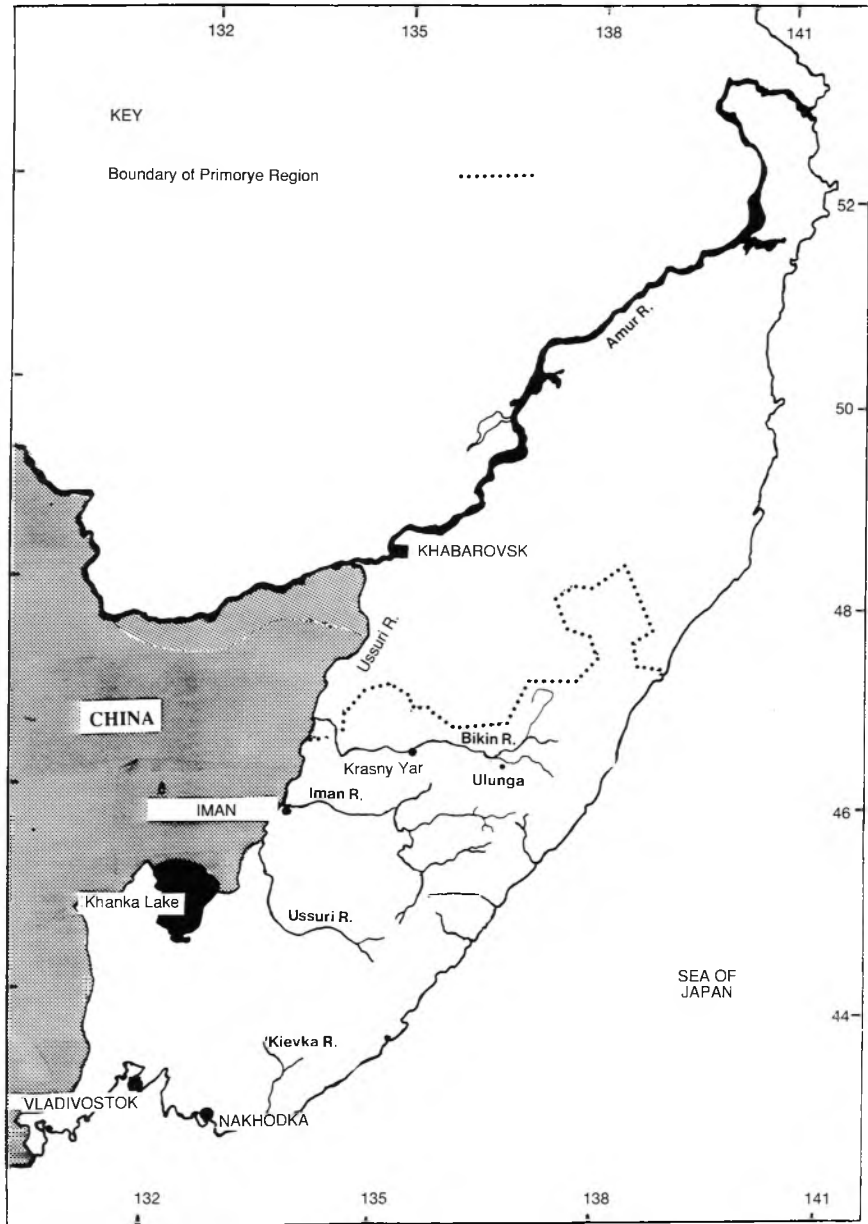


Figure 1. Map of the Far East of the USSR showing the approximate expedition route.

Surveys were conducted from 8 m river canoes powered by outboard motors. The boats were allowed to drift where possible to reduce disturbance and allow closer approach to the mergansers. Brood surveys were carried out mainly from 0600-1000 h and 1700-2100 h and birds were observed with the aid of 10 x 50 binoculars. Mergansers were first

identified as to species then, if broods were encountered, brood size and age to the nearest week, assuming an eight-week fledging period (Kolomiitsev pers. comm.), were recorded. All groups of flying Scaly-sided Mergansers which could be observed close enough to be aged included only juvenile birds, therefore I assumed that all of these birds

were fledged juveniles. Some distant parties may have been accompanied by females.

Identification

The identification of downy Scaly-sided Mergansers is not addressed as it was not possible to obtain adequate views of the intricate feather patterns. Madge and Burn (1988) should be consulted for a general description of the plumage of Scaly-sided Mergansers. In this account, comparisons are made only with Goosanders and not the structurally more similar Red-breasted Merganser *Mergus serrator* which does not occur on the rivers of the west slopes of the Sikhote-Alin Mountains.

Adult males in alternate plumage

This description was compiled from the examination of one museum skin because only brief field sightings of one adult male were obtained. The plumage of the male was essentially similar to that described in Madge and Burn (1988) with the following exceptions:-

1. The flanks were scaled with black, not dark grey.
2. The mantle was not black but whitish scaled with black and dark grey, similar to the rump.
3. The uppertail-coverts blended from whitish scaled black and dark grey to the same silvery-grey colour of the tail feathers.
4. The ventral region was mainly whitish with only the sides scaled blackish.

Adult females in alternate plumage

Of the plumage differences between adult female Scaly-sided Mergansers and Goosanders, the most obvious feature is the scaly flanks in the Scaly-sided Merganser, but this feature was surprisingly difficult to see from a moving boat. Given a fair view though, the scaly flanks should be visible and characteristic. The scaling was dark grey or black and much more extensive than the slight scaly patterning which may be found on the flanks of some female Goosanders. This suggests that females in summer do not lose the scaly flanks as suggested in Madge and Burn (1988).

Female Scaly-sided Mergansers have less white in the speculum than Goosanders. This is apparent as a thinner upper bar of white (smaller extent of white in greater coverts) and a thicker dark line through the upper speculum (more extensive dark tips to greater coverts). All female Scaly-sided Mergansers in flight possessed a complete dark line through the speculum whereas it was lacking to some extent in all but one female Goosander.

Female Goosanders have a richer russet head and generally paler grey mantle and lesser and median wing coverts than female Scaly-sided Mergansers. Female Goosanders also have a more noticeable white throat patch due to a more distinct outline of the patch and purer white feathers within.

Female Scaly-sided Mergansers can also be readily identified by their structural features and "jizz". Scaly-sided Mergansers are "longer-headed" than Goosanders - an image generated by the longer, thinner bill and less steep forehead of the Scaly-sided Merganser. Scaly-sided Mergansers are smaller, less bulky and less "powerful-looking" than Goosanders. The shape of the crest is also different. Goosanders have a shorter, more erect, double-pointed crest on the rear of the head while Scaly-sided Mergansers have a single longer, floppy crest. Another structural identification feature, which is surprisingly useful in the field (even in flying birds) if side views are obtained, is bill structure. Scaly-sided Mergansers have longer, thinner bills than Goosanders and the nail on the bill of Scaly-sided Mergansers is not visible. Goosanders have a noticeable downward-pointing nail on the bill. In the hand this feature is all the more apparent as the nail in Scaly-sided Mergansers is white and angled downwards at about 30° without projecting noticeably below the lower mandible. The number of serrations on the bill and the position of the nostrils are also diagnostic. Scaly-sided Mergansers have many more serrations on the upper mandible than Goosanders and the nostrils are located nearer the centre of the bill. The base of the bill is deeper and extends further into the feathering of the lores in the Goosander.

Juveniles

This description was compiled from observations of birds in the field and the exami-

nation of the skin of a seven week-old juvenile bird.

Fledged juveniles basically resemble females but have relatively darker heads and upperparts. The scaling on the flanks of juveniles is less extensive than in adult females and the chevrons on the flank feathers of juveniles are larger and a paler silvery-grey colour. At a distance this will give the impression of the sullied grey flanks described in Madge and Burn (1988). As in juvenile Goosanders, juvenile Scaly-sided Mergansers possess markings on the face which distinguish them from adults - eye-lids, a crescent below the eye and a line from the base of the bill to the eye. These face markings, combined with head colour, are also useful in separating juvenile Scaly-sided Mergansers from juvenile Goosanders. The markings in juvenile Goosanders are whitish and well defined against a dark russet-brown head. The markings in juvenile Scaly-sided Mergansers are less extensive and much less well defined due partly to the paler brown colour of the head and partly to the fact that the markings themselves are buffish-white, not whitish.

The same structural differences between female Scaly-sided Mergansers and Goosanders are also present in juvenile birds; however, they may well be less noticeable until birds are full grown. Differences in the plumage of the body and head are also similar though the juveniles of both species are relatively darker than adult females.

Results

An estimated total of 482 Scaly-sided Mer-

gansers (minimum 432) and 45 Goosanders was observed in approximately 3000 km of survey work (Table 1). The majority of these birds were downies/ unfledged juveniles or fledged juveniles. The total includes an estimated total of 66 broods (minimum 57) of Scaly-sided Mergansers and five broods of Goosanders.

Mean brood size of known-age unfledged broods accompanied by females in study period one was 8.5 ± 0.88 (mean ± 1 S.E.) for a mean estimated brood age of 3.9 ± 0.24 weeks. This figure includes three broods which may have been increased by brood amalgamation (brood sizes - 15, 16 and 23). Mean brood size in study period 2 had decreased to 4.2 ± 0.65 for a mean estimated brood age of 6.8 ± 0.26 weeks.

The age structure of the broods observed is shown in Figure 2. Brood ages refer to the time at which the broods were first observed. The histogram for the first study period shows two peaks of brood age - one at 3 to 4 weeks of age and the other at 8+ weeks. Brood densities on intensively surveyed sections of river varied between 1.84 and 3.60 per 10 km and were lowest on the upper stretches.

Females and broods showed a crepuscular activity pattern with birds proving difficult to locate between 1000 and 1600 h. During this time the broods either remained hidden in extensive riverside vegetation (mainly flooded areas of willows *Salix*) or used side channels of the river which were inaccessible to the river canoes used for the survey work.

Males did not remain to moult on the Bikin River; only one (paired) male was observed during the study.

Broods of Goosanders were located mainly in the upper stretches of the river.

Table 1. Number of mergansers observed on the Bikin River between 24 June and 16 August 1991.

Age/sex	Sightings	Scaly-sided Merganser		Goosander	
		Estimated total	Minimum	Sightings	Actual total
Brood female	60	48	46	12	5
Downy/unfledged juv.	395	338	325	65	39
Single female	5	2	2	1	1
Unsexed adult	6	6	6	0	0
Paired female	1	1	1	0	0
Paired male	1	1	1	0	0
Unidentified flying birds (a)	139	86	51	4	0
Total	607	482	432	82	45

a - The majority of birds in this category will be fledged juveniles, but a small number of adult birds may be included.

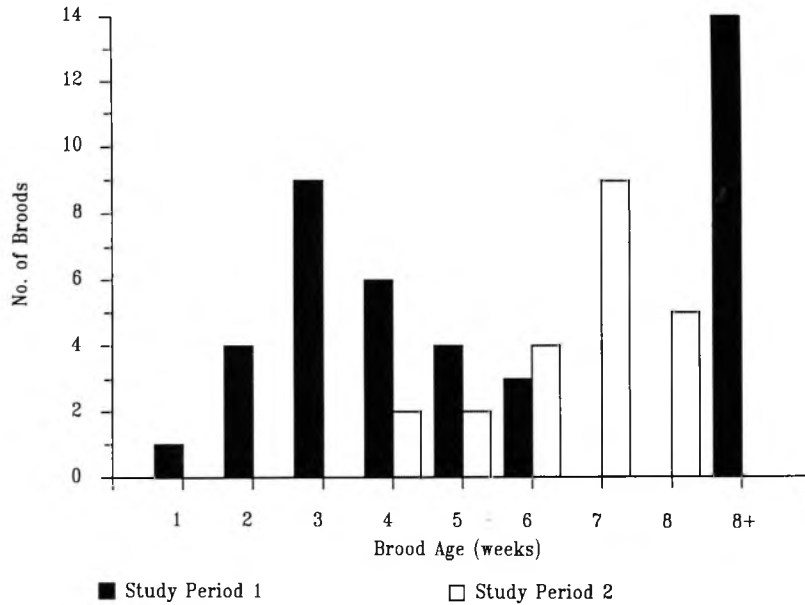


Figure 2. Age structure of Scaly-sided Merganser broods on the Bikin River during the two study periods in 1991.

No interactions between the two species were observed, but Scaly-sided Mergansers were noticeably more wary of boat traffic than Goosanders.

Discussion

Bocharnikov (1990) stated that Scaly-sided Mergansers were most common on the upper reaches of the Bikin River. Although the census techniques used in this study were far from complete, the results suggest that the mergansers were more common on the middle reaches. A census of mergansers on the upper sections of the Bikin River during spring 1991 showed that numbers were lower in 1991 than in previous years (Bocharnikov unpubl. data); however, the reasons for this are not clear. It is thought that heavy rainfall during the courtship and incubation periods may have caused a decrease in breeding success (see Kolomiitsev 1985). Other factors which may be important in explaining the higher brood density on the middle reaches of the river include the simple physical size of the river in these areas. Along its middle reaches the river is more extensive and comprised of a complex system of channels, whereas further upstream it becomes narrower and less complex. The

amount of suitable breeding habitat is also greater on the middle reaches.

Mean brood size in the second study period was half that during the first. This may be due to duckling mortality as a simple function of brood age or to factors operating at the second study site causing a higher duckling mortality or lower hatching success compared with that on the middle reaches. As the same birds were not censused in both study periods it is difficult to draw further conclusions. The mean brood size in the first study period may have been increased by three broods where amalgamation may have occurred. Brood amalgamation is common in Scaly-sided Mergansers; broods of up to 30 ducklings have been noted with one female (Grunovski pers. comm.) while groups of unaccompanied juveniles have reached 48 individuals (Bocharnikov 1990).

In the first study period there were two distinct peaks of brood ages which suggests a bimodal pattern of nesting behaviour. This resulted in two peaks of fledging activity - an early peak in the first week of July as well as the usual peak at the end of August (Shibnev 1985). Such a situation is often explained in terms of experienced breeding birds nesting earlier and this explanation would be applicable to Scaly-sided Mergansers which are known to re-

use suitable nest sites (Kolomiitsev pers. comm.).

The number of breeding pairs of Scaly-sided Mergansers on the Bikin River in the summer of 1991 appeared to be less than the estimate of 200 nesting pairs suggested by Bocharnikov (1990) and may be nearer the 120 to 150 pairs reported to have bred in 1980 and 1981 (Shibnev 1985). Brood density would also appear to be lower than the mean brood density of 3.3 pairs per 10 km for the Bikin River as a whole (Bocharnikov 1990) and perhaps even as low as the 1.3 to 1.7 broods per 10 km reported by Shibnev (1985). Brood densities on the Kievka River on the east slopes of the Sikhote-Alin Mountains fluctuate by similar magnitudes between years, from 0.4 to 3.8 pairs per 10 km stretch of river (Kolomiitsev 1985). In summary, brood densities of Scaly-sided Mergansers on the Bikin River in recent years have been less than four per 10 km of river. This contrasts with the situation in the 1950s when it was possible to see as many as 15 broods per 10 km stretch (Babenko and Kuznetsov 1986).

There was no evidence that males remained to moult on the upper stretches of the river as suggested by Bocharnikov (1990), but it was not possible to survey the upper 40 km of the river, so this possibility cannot be entirely discounted. However, it seems more likely that male birds undergo a moult migration as is the case with Goosanders (Madge & Burn 1988).

Present status and threats

Between 1975 and 1985, the number of mergansers breeding on the Bikin more than halved on the middle reaches of the river (Shibnev 1985). This was due not only to the effects of poaching and tree-felling but also to water pollution and the silting up of the shallow areas by industrial installations working on the upper reaches of the river. In the last five years the population level has stabilised somewhat, but remains endangered at 200 pairs or less (Bocharnikov 1990, this study).

Scaly-sided Mergansers are undoubtedly endangered on the breeding grounds in Primorye with a maximum population estimate of around 1000 pairs (Bocharnikov 1990). The major breeding site for Scaly-sided Mergansers, the Iman River, is sub-

ject to increased levels of disturbance and pollution. Logging is already widespread on the upper Iman, taking full advantage of the road system which extends up the Iman valley and over the Sikhote-Alin Mountains. The Iman River is now polluted mainly as a result of gold-mining activities on the upper reaches of the river.

The extensive logging activity, industrial development and population expansion in the Iman region can only be detrimental to the population of Scaly-sided Mergansers on the river. There is an additional serious threat to the remaining birds: preliminary work has begun for the construction of two dams on the middle reaches of the Iman. Such action would be devastating not only for the Scaly-sided Merganser but for the ecosystem as a whole.

The Bikin River probably represents the main breeding site for Scaly-sided Mergansers in the world, yet there are already plans for a joint Soviet-Korean logging contract to remove mature spruce trees from thousands of square kilometres on the upper reaches of the river near Ulunga. Original plans for this work have been delayed because of the adverse local reaction to the project; nevertheless preliminary work continues. If this work proceeds, then the only remaining stronghold of the Scaly-sided Merganser in the Primorye will be lost.

Logging is the major threat, but poaching and river disturbance also cause considerable losses every year. It is estimated that over 100 birds are shot on the Bikin River each year despite their status as a Red Data Book species (Bocharnikov unpubl. data). The majority of these birds are actually potential breeders returning to the Bikin in April and May. Given a population level on the Bikin of only 200 pairs, it is difficult to see how the species can tolerate this level of illegal hunting.

Disturbance from river traffic is an increasing threat to the Scaly-sided Merganser. Already there are only a few pairs breeding in suitable habitat in a 50-70 km stretch of river upstream from Krasny Yar because of the high level of disturbance from river traffic (Bocharnikov 1990). As the river canoe is by far the main mode of transport on the Bikin, this problem is likely to increase in the near future as the population of Krasny Yar and the nearby towns and villages continues to increase.

The introduced mink *Mustela vison* also

causes a low level of mortality to Scaly-sided Mergansers, though it is difficult to quantify the losses. The problems caused by mink are, however, minor compared to the major threats of logging, illegal hunting and disturbance from river traffic.

The Scaly-sided Merganser is actually the most common species of waterfowl breeding on the Bikin River, which suggests that its status in the Red Data Books of the RSFSR, USSR and IUCN must afford it some degree of protection. However, it is obvious that further protection is needed to secure the future of the remaining birds in the Primorye region. The establishment of a strict nature reserve in the Bikin River valley is of utmost importance, yet, despite proposals by Russian scientists, there has been no progress.

The poor economic situation in Russia

has resulted in great pressure to attract foreign currency. Unfortunately, economic development now continues regardless of the priorities of nature conservation and, should the proposed logging scheme continue on the Bikin River, the Scaly-sided Merganser may be destined for imminent extinction in this region. In the light of this, and considering the restricted world population of the Scaly-sided Merganser, a world action plan for the Scaly-sided Merganser is to be produced by The Wildfowl & Wetlands Trust during 1992-93. The recommendations of this action plan will include the formation of a nature reserve on the Bikin River and a proposal that the IUCN Classification of Scaly-sided Merganser be upgraded from "vulnerable" to "endangered".

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