

The threatened and near-threatened birds of northern Ussuriland, south-east Russia, and the role of the Bikin River basin in their conservation

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Summary

Fieldwork on the distribution, habitat preferences and status of birds was conducted in the Bikin River basin, northern Ussuriland, south-east Russia, during May–July 1992, 1993, 1995, 1996 and 1997. The results of this survey combined with data collected during 1960–1990, show the area to be of high conservation priority and one of the most important for the conservation of Blakiston's Fish Owl *Ketupa blakistoni*, Chinese Merganser *Mergus squamatus*, Mandarin Duck *Aix galericulata* and Hooded Crane *Grus monacha*. This paper reports on all of the 13 threatened and near-threatened breeding species of northern Ussuriland, with special emphasis on their occurrence and status in the Bikin area. Three more species, included in the Red Data Book of Russia, are also briefly discussed. Maps show the distribution of the breeding sites of the species discussed. The establishment of a nature reserve in the lower Bikin area is suggested as the only way to conserve the virgin Manchurian-type habitats (wetlands and forests), and all 10 species of special conservation concern. Monitoring of the local populations of Blakiston's Fish Owl, Chinese Merganser and Mandarin Duck in the middle Bikin is required.

Introduction

No other geographical region of Russia has as rich a biodiversity as Ussuriland which includes the territory of Primorski Administrative Region and the most southern part of Khabarovsk Administrative Region. However, many animal species have become rare or uncommon as a result of habitat destruction (forest fires, logging, agriculture, etc.) which has been widespread in the Ussuri River valley and in the southern part of the Primorski Region. The largest refugia of virgin Manchurian-type forests are preserved only in the middle part of the Bikin River and in the valley of the Samarga River. Old-growth spruce-fir forests still cover a large area in the central Sikhote-Alin Range (all of the upper Bikin and Bikin-Khor-Samarga watersheds), but these are also now under threat. Fairly intact wetlands (swamps, shallow lakes, marshes) still exist in the lower Bikin and Khor river basins.

Many of the species of birds of special conservation concern in the Ussuri-Sikhote-Alin Bioregion (Ussuriland) still breed in the Bikin basin. The Bikin River, together with its four largest upper tributaries (the rivers Klyuchevaya, Svetlovodnaya, Zeva and Kilou), rises in the central Sikhote-Alin Range and

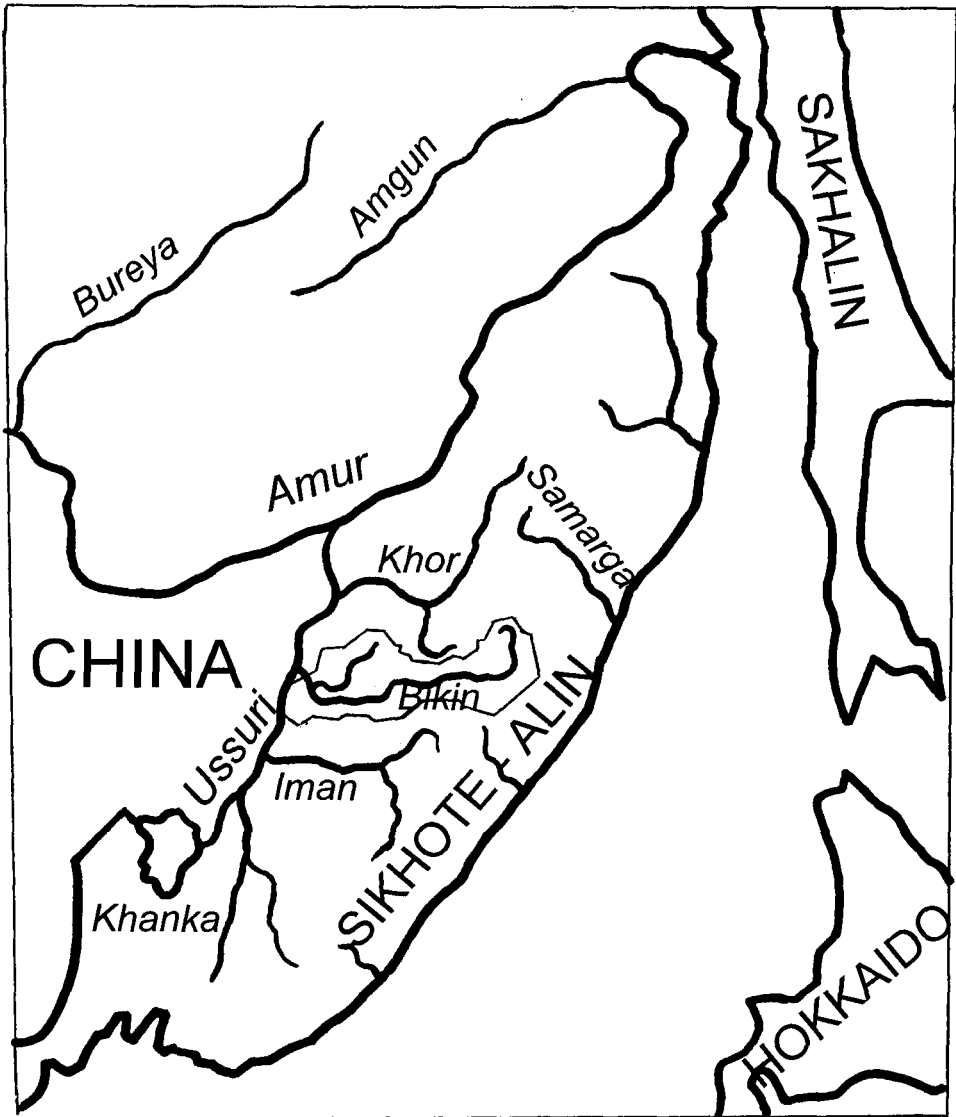


Figure 1. Amurland and Ussuriland, south-eastern Russia.

flows westward for over 250 km to the Ussuri River (Figure 1). The Bikin basin is rather wide in both its lower and upper reaches but is quite narrow in its long middle portion, being squeezed by the latitudinally extended ridges of the Sikhote-Alin Range. These ridges separate the Bikin from the rivers Bol'shaya Ussurka (Iman) to the south and Khor to the north. The overall length of its main course is 560 km, while the catchment area is 22 300 km².

The Bikin basin is characterized by a great variety of landscapes and habitats, resulting from a broken relief and from its particular geographical location, producing a complex interaction of Manchurian and east Siberian floristic compon-

ents. The relatively good state of nature preservation allows the area to serve as a source for many endangered and uncommon Ussuriland birds and mammals. A total of 13 species of birds listed as globally threatened or near-threatened by Collar *et al.* (1994) is known from this region, while six more species have been included in the Red Data Book of Russia (Krivenko 1983) and nine more are considered to be rare in the Far East region (Nechaev and Shibaev 1989). Because the middle and upper parts of the Bikin basin (and especially areas remote from the river) are difficult of access, little research on the biodiversity and conservation needs have been undertaken until recently. Lack of accessibility may explain why large areas of virgin forest, deserving the highest conservation priority, have been somewhat neglected by Russian conservationists. The other reason is the difficulty of reconciling formal and often strict conservation rules with the way of life of the indigenous people (Udege and Nanai), who live by hunting, trapping and fishing in the middle and upper Bikin.

Information on the birds of the Bikin River basin presented here is based mainly on the surveys of the Bikin Initiative Research Group (1990–1996), particularly under the Bird Biodiversity Project (1995–1997) supported by the National Geographic Society. In addition, data accumulated by one of the authors (Y.B.S.) during numerous visits to the lower and middle Bikin in 1970–1996, and from other occasional visits have been incorporated into this study. General information on the breeding ranges is provided by Collar *et al.* (1994), Potapov and Flint (1987), Nechaev and Shibaev (1989), Stepanyan (1990) and Nechaev (1969, 1991).

Protected area system

All the natural reserves in Ussuriland are located in its most southern part and connected with small isolated blocks of virgin forest. One new reserve, although still too small, was established several years ago at Lake Khanka. The only relatively large protected area is the Sikhote-Alinskii Zapovednik (Reserve), located mostly in the mountainous and coastal lands of south-east Ussuriland (the southern part of the central Sikhote-Alin Range). No reserves exist in northern Ussuriland where, in the largest remaining virgin forests, recent logging concessions have been granted. Several local logging companies continue to harvest forests in the lower/middle Bikin in territory traditionally used by indigenous people, which, extending from the village of Krasnyi Yar upriver to the village of Okhotnichiy (Ulunga), has a special status in forestry management. The Joint Russian–South Korean venture Svetloe, a successor of the South Korean company Hyundai, continues to harvest the old-growth spruce–fir forests on the mountainous plateau of the Bikin watershed (central Sikhote-Alin).

The deforestation of this latter area is now close to a critical point which will result in marked changes to the hydrology of the Bikin River, followed by an inevitable successive destruction of the Manchurian-type riparian forests with their unique wildlife. Even the selectively logged Sikhote-Alin forests are strongly susceptible to forest fires, which usually spread over vast areas. Both Hyundai and Svetloe, as well as smaller local companies, have repeatedly tried to obtain consents from district and regional administrations for the harvesting of primary forests in the upper Bikin country, namely in the upper reaches of

the Zeva and Kilou rivers. These attempts have been resisted by the Udege-Nanai society (Obschina) of Krasnyi Yar, supported by Greenpeace and other international organizations. Obschina tries to control the situation but, as far as we know, no strict prohibition has been established. All the agreements exist only on paper and ecological monitoring in the Bikin area is not yet possible. As we documented on video in 1996 forest harvesting by Svetloe is brutal, observing none of the elementary forestry principles. The upper Bikin area, along with the entire central Sikhote-Alin, has been proposed for the World Heritage List (Bocharnikov 1996), but unfortunately there has been no progress. Currently a Malaysian company is likely to get permission to start harvesting virgin forests along the Samarga River.

The intact wetlands of the lower Bikin country, with six globally threatened and 10 further species rare in Russia, are also without any kind of formal protection. As they are located close to populated areas, drainage may start at any time, prompted by mining and other interests. At the moment increased human disturbance in these sites is the most important threat for rare breeding birds.

Ornithological exploration of the Bikin River basin

Many interior parts of northern Ussuriland have never been surveyed, even at a basic level. In Bikin, only inhabited and relatively accessible territories in the lower/middle reaches (around the villages of Verkhniĭ Pereval, Olon and Krasnyi Yar) and along the river valley itself have received short visits by various researchers over the years. The first reliable data collected by local naturalist B. K. Shibnev, were partly incorporated into the only review of the birds of Ussuriland (Vorob'yov 1954). In the 1960s and early 1970s there were studies of some species in Bikin (Pukinsky 1973, 1978, Pukinsky and Nikanorov 1974). Many valuable data were collected at that time but have never been published, except for some notes made in photograph albums of Bikin wildlife (Pukinsky 1975, 1984) and some notes on Bikin waders (Shibnev 1973). Data collected in the 1930s to 1950s in the lower-middle Iman (B. Ussurka) (Spangenberg 1965) can be compared, as both rivers (Bikin and Iman) share a similar flora and fauna.

More recently data on the current status of Mandarin Duck *Aix galericulata* and Chinese Merganser *Mergus squamata* in the Bikin valley have been summarized (Shibnev 1976, 1985) and the first nests of Red-crowned (Japanese or Manchurian) Crane *Grus japonensis* in the lower Bikin swamps have been recorded (Shibnev 1982). During the past 20 years several counts of Chinese Merganser have been made in parts of the Bikin, and some lower Bikin swamps have been surveyed by a joint Japanese-Soviet team (Bocharnikov 1990, Bocharnikov and Shibnev 1994, Fudjimaki *et al.* 1989, 1990). The Bikin Initiative Research Group has published preliminary results of the first ornithological survey of the upper Bikin basin and its mountainous watersheds (Koblik and Mikhailov 1995, Mikhailov *et al.* 1997a,b, Koblik *et al.* 1997).

Climate, geography and vegetation

The continental climate, with warm and damp summers, rather warm autumns and cold moderately snowy winters is characteristic of the entire Bikin country,

while the influence of the summer monsoon is quite appreciable in June–August in the lower and middle parts of the river. The Bikin is ice-covered (except for the scattered but abundant small rapids) during four months from mid-November to mid-April and spring floods following ice melt last 10–15 days. However, the highest water levels usually result from summer rainfall.

The valley of the lower Bikin and a large lowland watershed between the Bikin and Alchan (Bikin's major lower tributary) can be considered as a part of the vast Ussuri River valley. Extensive agricultural and urbanized areas only occur in the extreme lower Bikin, particularly along its left bank. Much of the land consists of open swamps with *Sphagnum*-grassy bogs, high-grass meadows and shallow lakes. These wild open habitats alternate with "islands" of oaks, poplars and birch and are encircled by hilly country with Manchurian-type oak and secondary broadleaved forests. The long middle Bikin is mainly hill country, grading into mountains, covered with a complex primary Korean Pine–broadleaved forest, replaced by dark spruce–fir stands above 800 m. Old-growth Yeddo-white bark spruce forests, with some thin larch stands, occupy the hilly and mountainous upper Bikin country, being replaced by Alpine (dwarf cedar-pine and stone-mossy tundra) associations only in the highest parts, above 1200–1300 m. The *Sphagnum* swamps with depressed larches (so-called marrs) are sparse throughout the middle and upper Bikin taiga.

The primary riparian broadleaved forests (with mature elms, poplars, willows and many other trees and bushes) form a gallery along the Bikin course, from the village of Verkhni Pereval to Okhotnichiy (Ulunga) and, in separate sections, extend far into the upper Bikin stretches. The Bikin flows in numerous channels separated by islets with willow, alder and complex riparian forest. Numerous former riverbeds with slow-flowing or still water are scattered throughout the gallery forests.

Fieldwork

The ornithological survey of the Bikin Basin was conducted by the Bikin Initiative Research Group in May–July 1992–1993 and May–July 1995–1997. In addition, Y.B.S. surveyed several swampy areas in the lower Bikin country in 1989–1990 as a member of the joint Japan-Soviet group. Many individual stretches of the lower and middle Bikin were regularly visited by him in the 1970s to the 1990s. Y.B.S. also carried out a census of wildfowl and Blakiston's Fish-owl in April 1996 in 50-km stretches of the Bikin main course between Verkhni Pereval and Krasnyi Yar.

Birds were surveyed through a combination of line transect surveys, point-counts and general observations, supplemented by mist-netting and overall early morning recording of bird vocal activity. Surveys included various landscapes and habitats with special attention paid to swamps (marrs). Counts of the wildfowl and raptors were carried out repeatedly in May–July 1992–1996 by motorboat along the Bikin and Zeva main courses. There was also intensive photo-documentation with video-recordings made in 1996 and 1997.

The major study areas, with times of survey, are described below (Figure 2).

(1–5) The lower Bikin (Figure 3); swampy flatlands with patches of tall grass, small lakes and wooded stands (oak, birch, poplar, larch) and complex riparian

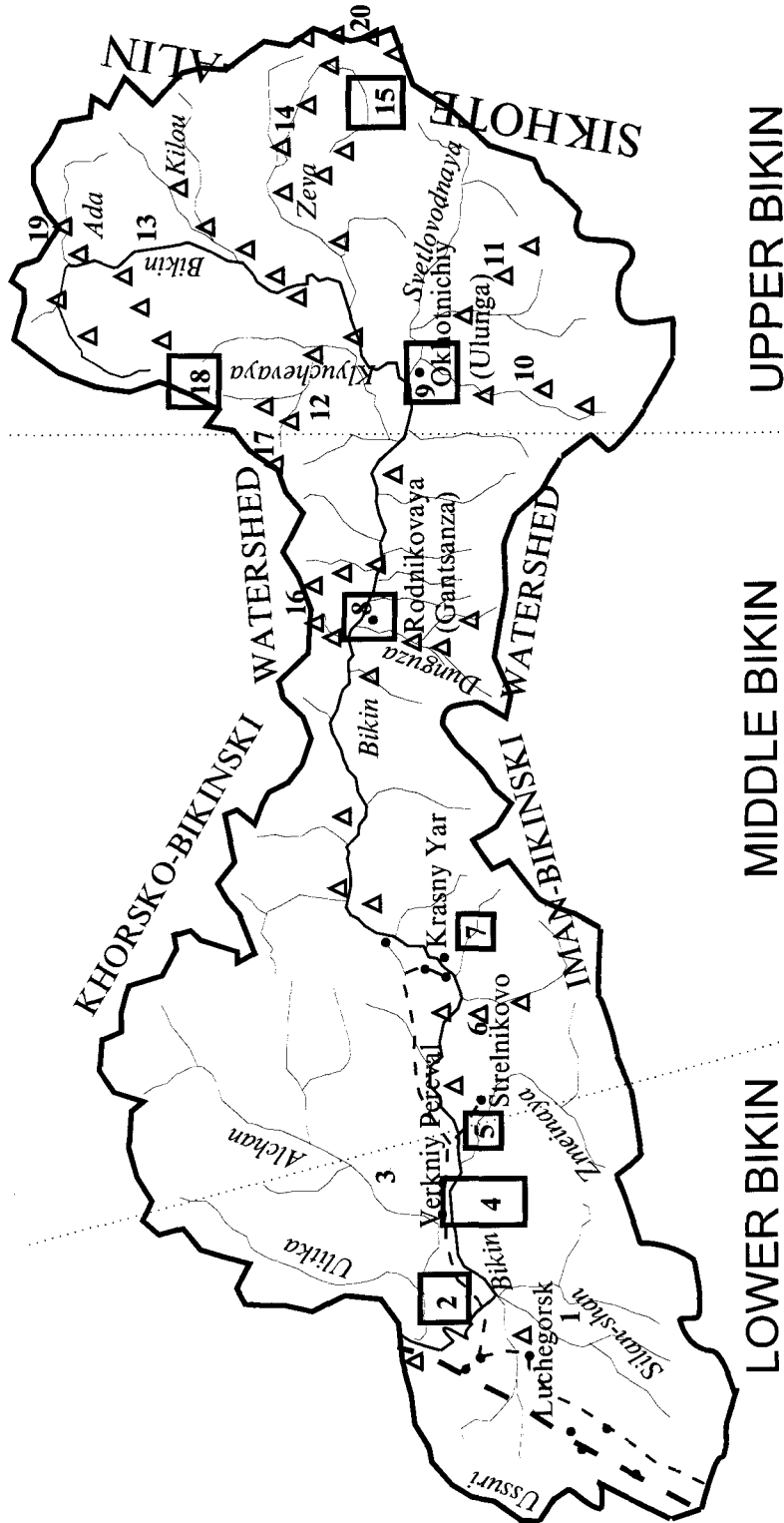


Figure 2. Sites for birds and study areas in the Bikin River Basin, Pozharski District, Primorski Administrative Region. Designations: small circles, villages; squares, fixed study areas; triangles, routes and short-term visits (see text).



Figure 3. The lower Bikin country: Bikin-Alchanskaya Marr (Photograph by Y.B.S.).

broadleaved forests: (1) Silanshanskaya Marr, (2) Bikin-Alchanskaya Marr (= Alchanskaya Marr in Gluschenko *et al.* 1997), (3) Middle-Alchanskaya Marr, (4) Kushnarikhskaya Marr, (5) Zmeinaya Marr. April–July 1980–1990, May–July 1997.

(6–8) The middle Bikin (Figure 4); virgin gallery broadleaved (complex) and hilly mixed Korean Pine–broadleaved forests. In sites 6 and 7 also selectively logged hilly mixed forests. (6) The hills along the River Situkhe and (7) the area of the villages Krasnyi Yar–Soboliny; May–July, various years during 1970–1996. (8) The area of the meteorological station Rodnikovaya (both sides of Bikin, the rivers Dunguza and Sangeli, site Nyolo); detailed survey in May–June 1992–1993.

(9–14) The upper Bikin country (Figure 5); mainly hilly virgin spruce–fir forests (sites 11, 12, 13), old-growth spruce–birch forests (sites 10, 14); pyrogenic birch–larch and larch forests (sites 9, 14); June–July 1993 and May–July 1995, 1996. (9) The area of the village Ulunga; (10) the River Malaya Svetlovodnaya (Chinga); (11) the area between the Rivers B. Svetlovodnaya (Biomo) and Pescherka (Fugou); (12) the basin of the River Klyuchevaya (Bochelaza); (13) the extreme upper Bikin country; (14) the canyon of the River Zeva.

(15–20) The central Sikhote-Alin Range, including Khorsko-Bikinskii watershed (16–18). (15) The swampy plateau in the extreme upper Zeva (900–1000 m), *Sphagnum* marrs and spruce–fir forests, 6–31 May 1996; (16) Mt Sangeli, 28 May–7 June 1993; (17) Mt Arsen'eva, 28–30 June 1995; (18) Mt Sukhopadnaya, 2–12 July 1996; (19) Mt Mokhovaya, 4–6 June 1995; (20) Mts Kuznetsova, Tsar-sopka, Sinepalnaya, late May–June 1996. In sites 16–20, mountainous spruce–fir and stone birch forests and Alpine habitats.



Figure 4. The middle Bikin country (Photograph by Y.B.S.).

Results

Five globally threatened and eight near-threatened species are known from the Bikin River basin (classification according to Collar *et al.* 1994). Six more species breeding in the area are regionally threatened and included in the *Red Data Book of Russia* (Krivenko 1983). Three of them, though not rare in Bikin, are also included in the survey. All the rare species of the region are non-passerines. In the following accounts the conservation status of each species name is given as Threatened, or Near-threatened.

Schrenck's Bittern *Ixobrychus eurhythmus* Near-threatened

Breeding range South-eastern China north to the Ussuri-Amur river system, Japan (Honshu northward) and Sakhalin. Monotypic. In south-east Russia known from the most southern parts north to the Khanka Lake and through all the Ussuri and Amur valleys westwards to the river Argun (south-east Transbaykalia) and north-east to Lake Evoron.

Bikin area: most of the records are from the lower Bikin, where this species appears to be still common in flooded tussocky patches with tall grass in the Bikin-Alchanskaya Marr and along the rivers Bolshoi and Malyi Silan, Kushnari-kha and Zmeinaya. In 1997 the song was recorded twice at the end of May on the rivers Kushnari-kha and Zmeinaya with five sight records of flushed birds during June.



Figure 5. The upper Bikin country (Photograph by Y.B.S.).

Status and threats Although not yet treated in Russia as rare (Nechaev and Shibaev 1989), no data are available on the overall population density. Reported to be rare in Sakhalin (Nechaev 1991) but still locally common at Khanka Lake (Y.B.S. unpublished) and in Khasan (K.E.M. 1990 unpublished). It was locally abundant in the middle of the century in the Ussuri valley lowlands (lower Iman; Spangenberg 1965), but obviously declined later as a result of the reduction of wetlands in the Ussuri-Amur river system. In the lower Bikin one bird was flushed per km in preferred habitats. The local threat is further draining of the Ussuri wetlands but the main cause of decline seems to lie outside Russia.

Oriental White Stork *Ciconia boyciana* Threatened

Breeding range After extinction of the Japanese and Korean populations in 1971, confined to eastern Manchuria and lowlands in the Amur-Ussuri river system (Coulter 1995). Population much fragmented. Monotypic.

Bikin area: in the lower Bikin Oriental White Storks breed in marrs with scattered wood stands and small lakes (Figure 6). In the 1970s four or five pairs bred

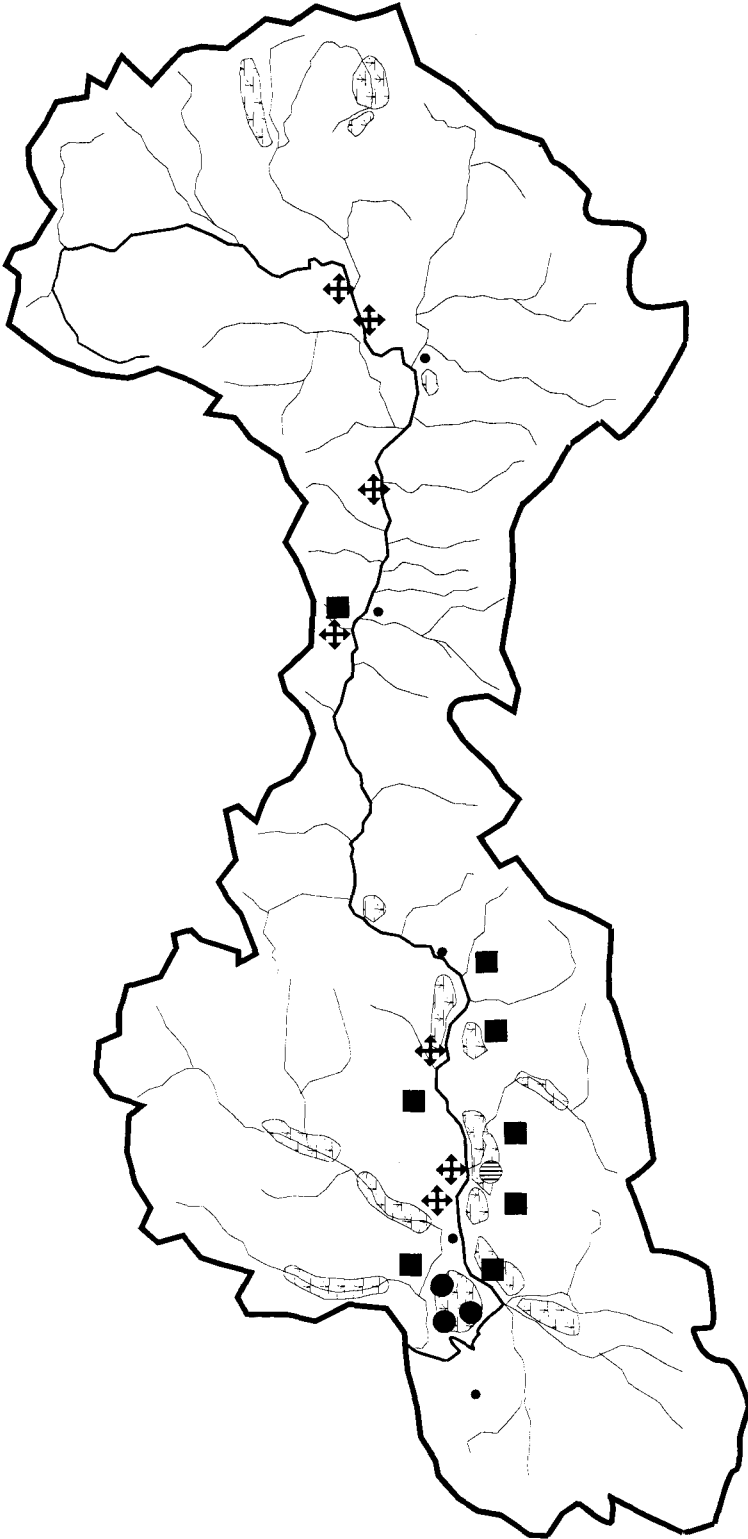


Figure 6. Oriental White Stork *Ciconia boyciana* and Black Stork *Ciconia nigra*. Oriental White Stork: known nesting sites before 1980 (striped circle) and before 1997 (dark circles). Black stork: nesting sites before 1980 (dark squares) and the sight records of birds in May–July 1993–1996 (crosses). The marked areas are the marrs.

in the Bikin-Alchanskaya Marr and two pairs in the Zmeinaya Marr (one pair was monitored for 10 years). In 1990 four breeding pairs and one old nest were found within 22 500 ha surveyed in the Bikin-Alchanskaya Marr (Fudjimaki *et al.* 1990), and in 1996 only one occupied nest was known to local hunters. The nest was destroyed by wind in winter 1996–1997. In spring 1997 for the first time no storks were known to breed in the lower Bikin country. However, one and later three birds wandered widely over the area during May–June. All the known nests were located on the top or in the middle part of dead larches, near the edge of stands. Brood size is three or four but sometimes only one survives (Y.B.S. 1980s unpublished data, Fudjimaki *et al.* 1990). In the Zmeinaya Marr a pair of storks regularly nested in a colony of Grey Herons *Ardea cinerea* (10–12 pairs) and had used three nests during 10 years (Y.B.S. pers. obs.).

Status and threats Due to a severe decline in the population during the second half of the century the species is listed as endangered (Collar *et al.* 1994). The total number was estimated at less than 1000 in 1990, most of these birds breeding in Russia and wintering in central China (Coulter 1995). Sixty-one pairs were thought to nest in the Primorski region at the beginning of the 1980s, including 38 pairs along the Ussuri valley (Krivenko 1983). Judging from the situation in Bikin, this number may have declined considerably during the past five years. The conversion of wetlands to agriculture, pesticides, human disturbance, loss of nest-trees due to strong winds and poaching of transient birds are considered to be general threats (Coulter 1995). In the lower Bikin the storks mainly suffer from disturbance by fishermen in May–June and, in April, from deer poachers, especially local militia using military vehicles. Some birds have certainly been intentionally killed by deer poachers. Regularly, both intentional and accidental burning of grass in spring results in serious depletions of invertebrates and amphibians thus posing another direct threat. In particular, the Bikin-Alchanskaya Marr, which supported up to 10 pairs of storks in previous years, burns each year. We believe that only strict protection will ensure the survival of this species in the Ussuri River valley.

Mandarin Duck *Aix galericulata* Near-threatened

Breeding range North-east China, Ussuriland and Amurland, Japan (mostly Hokkaido), Sakhalin, Kunashir. Monotypic. In south-east Russia formerly throughout the middle and lower Amur Basin and entire Ussuriland, but now vanished from the deforested basin of Lake Khanka and the valley of Ussuri River, being restricted in the Ussuri system mainly to its major tributaries (the rivers Khor, Bikin and Iman).

Bikin area: in the Bikin, Mandarin Ducks are partial to dense broadleaved riparian forests, where they breed mostly by former river channels now closed to boats, with still or slow-flowing water, cluttered with bushes, logs, etc. The nest-trees can be up to 0.5 km away from the river. The birds avoid open riverbanks and also those with dark spruce–fir forests. We consider the species still to be common in the lower and middle Bikin up to K. Yar, including its larger lower tributaries, the rivers Alchan, Ulitka, Kushnarikha and Zmeinaya; less common

from K. Yar to Okhotnichiy and rare from Okhotnichiy up to the River Kilou. In 1995–1996 there were a few sight records of adults above Kilou but it was not recorded in the fast-flowing tributaries of the middle and upper Bikin, including the largest ones such as the Klyuchevaya and Zeva. Between 9 and 16 April 1996, before the nesting season, 67 birds were counted per 50 km on surveys along the side of the river between V. Pereval and K. Yar and 55 and 29 birds respectively during two boat counts on 20–22 and 23 April.

Status and threats The total world population is estimated at about 6000 pairs, with some 600 pairs in Russia (Madge and Burn 1988). Considered to be a rare nesting species in southern and central Sakhalin and presumably in Kunashir (Nechaev 1969, 1991). After strong declines of populations throughout the range in the 1960s and 1970s (Shibnev and Gluschenko 1981), Mandarins are only locally common in the south of the Primorski Region, mainly in nature reserves (Nechaev and Shibaev 1989). In the middle Bikin the density was one pair per 2–3 km in the early 1970s but half of that 10 years later (Shibnev 1985). At the beginning of the 1980s the total number was estimated at 350–400 pairs in Bikin (Shibnev 1985) and, for comparison, about 300 pairs in the entire Amur region (Nechaev and Shibaev 1989). Judging from the 1996 early spring count, the total number of Bikin birds is about the same as in the 1980s. Luckily, local hunters only kill Mandarins occasionally as the bird's Red Book status is well known. No problem exists with the nesting trees since logging is still strictly forbidden in the riparian forests. Although the population is not increasing, in many respects the situation with the Mandarin Duck is far better than that of other rare wildfowl which suffer greatly from poachers. Predation of ducklings by American mink *Mustela vison* may be another potential threat.

Chinese Merganser *Mergus squamatus* Threatened

Breeding range North-east Heilongjiang and Kirin in China, possibly North Korea, the lower Amur Basin and Ussuriland in Russia. Monotypic. In south-east Russia most of the population is concentrated on the western slopes of the Sikhote-Alin Range, in the middle parts of the rivers Khor, Bikin and Iman (Shibnev 1985). Also breeds in the middle-lower Amur Basin, between the rivers Zeya and Amgun (reported from 12 sites), and in lesser numbers by smaller rivers along the coast of the Japanese Sea (Nechaev and Shibaev 1989, Bocharnikov 1990).

Bikin area (Figure 7): this obligate tree-hole nester which requires old, thick trees of elm and poplar and fish-rich waters, breeds mainly in the middle part of the Bikin, fringed with rich Manchurian-type forests, from V. Pereval up to Okhotnichiy. It is far rarer in the non-populated Bikin upper reaches, where Goosander *Mergus merganser* is more usual and is increasing in numbers, but it becomes commoner in the middle Bikin reaches. Surprisingly, neither broods nor adults were recorded in the middle Bikin tributaries, fast-flowing through the hilly coniferous and mixed taiga. Only one brood was recorded on the River Klyuchevaya at the end of June 1995. During boat counts on 20–23 April 1996, immediately after their spring arrival, only 10 and 13 Chinese Mergansers were recorded for a stretch of 50 km of the Bikin between V. Pereval and K. Yar

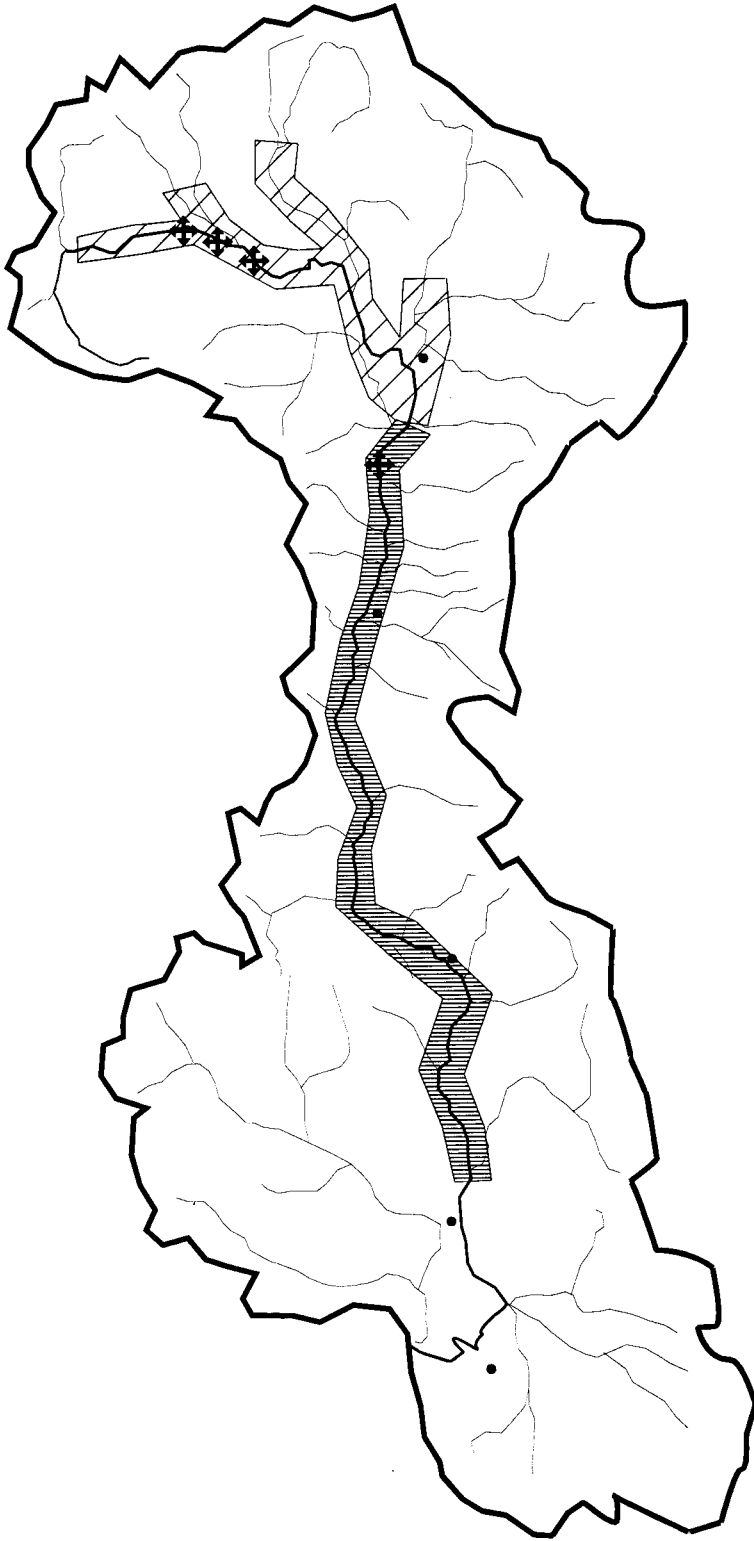


Figure 7. Chinese Merganser *Mergus squamatus*. The general (vertical stripes) and supplementary (oblique stripes) ranges of breeding and sight records of the groups of males in June–July (crosses).

(though 10–14 mergansers were not identified to species level and 16 and 12 birds identified as Goosander). Many males moult in the upper Bikin, where groups were recorded by V. Aramiliev in early June 1989 (Bocharnikov and Shibnev 1994) and at the end of May to the beginning of June 1995 (our data).

Status and threats Vulnerable (Collar *et al.* 1994). The total number has decreased over the past two decades by 10 to 20 times and is assessed in Russia at about 900–1000 pairs, with a ratio of ten to one between Primorski and Khabarovsk Administrative regions respectively (Nechaev and Shibaev 1989, Bocharnikov 1990). The Bikin and Iman are considered to be the main strongholds for this species. In Bikin, the total number was estimated as 120–150 pairs in the early 1980s (Shibnev 1985) and later as 150–200 pairs (Bocharnikov 1990; Bocharnikov and Shibnev 1994); 140 breeding pairs have recently been estimated for the Iman (Surmach and Zaykin 1994), but no hard data are available for the Khor. Judging from the 1996 early spring count, the total number has halved since the 1980s. We also assume that, in many previous counts of upper Bikin stretches, the more common Goosander broods were confused with those of Chinese Merganser, resulting in an overestimation of total numbers. Birds are regularly killed, especially in spring, from motor boats by local people, including Udege hunters, for fun rather than for the pot. In addition there has been increased pressure from fishermen over the past three years together with competition for food from summer flocks (numbering up to 100) of Great Cormorant *Phalacrocrax carbo* and double the previous number of Goosanders. We believe that only immediate action, especially the establishment of strict conservation measures for particular Bikin stretches, will enable this species to survive.

White-tailed Eagle *Haliaeetus albicilla* Near-threatened

Breeding range The entire Palearctic except for western Europe and southern Central Asia (race *albicilla*); south-western Greenland. In south-east Russia inhabits all Amurland, northern Ussuriland, Sakhalin and Kuril islands; along the seashore up to the south of the Primorski Region.

Bikin area: One or two pairs apparently breed in the lower Bikin with regular sightings of adults and once of a young bird during the past three years. In total, there have been about 10 sightings of immatures and adults in May–July 1995–1996 in the upper Bikin reaches above Okhotnichiy, but no nests have been found. At the same latitude, but by the shore of the Sea of Japan, one nest with a large fledgling was found on 12 June 1996. According to reliable reports (A. A. Danevich, July 1997), the White-tailed Eagle is now more common in summer in the uninhabited lowest Bikin and middle Ussuri stretches.

Status and threats The regional population is mainly declining. The lower Amur basin (about 200 nesting pairs), the Sakhalin (100 pairs) and the Kamchatka (80 pairs) are considered to be the main strongholds in the far east of Russia; in Ussuriland it is relatively common along the seashore, where one pair breeds per 10 km (Nechaev and Shibaev 1989). We consider that a few pairs nest in the lower Bikin with presumably more along the main Ussuri River, which has never

been surveyed during the second half of this century. The number of Ussurian birds is possibly increasing, as, after a long absence, birds have again started to breed at Lake Khanka (Y. Gluschenko, pers. comm., May 1997). Direct threats include human disturbance at nesting sites and the killing of birds by local people who still consider large raptors as competitors for fish. The reduction of previously large fish stocks and in particular the recent disappearance of migrating salmon in the Ussuri River system may restrict the number of breeding eagles.

Spotted Eagle *Aquila clanga* Threatened

Breeding range Formerly the entire zone of deciduous and mixed forests from eastern Europe to north-east China, middle Amurland and Ussuriland. Monotypic. In south-east Russia this species is restricted to open woody areas in the valley of middle-lower Amur and along the Ussuri; also breeds in the south of the Primorski Region (Nechaev and Shibaev 1989).

Bikin area: in previous decades several pairs regularly nested in the large marrs and grassy lowlands with scattered woods in the lower Bikin country. A nest with adults was found by Y.B.S. in the Bikin-Alchanskaya Marr in 1990, where a pair of birds was repeatedly sighted in June 1997. Other data include rare sight records in May–June of soaring birds each year during 1992–1996 in the lower-middle Bikin range, from V. Pereval up to Rodnikovaya, and once from the upper Zeva reaches (the Sikhote-Alin plateau) in May 1996.

Status and threats Vulnerable (Collar *et al.* 1994). Considered not to be rare in the middle of the century along the Ussuri River (Vorob'yov 1954), in particular in the lower Iman (Spangenberg 1965). Now a rare species with unknown numbers of breeding pairs; locally common only in the Zeysko-Bureyskay plateau in the middle Amur basin (Nechaev and Shibaev 1989). There are no recent reports of breeding pairs from the south of Primorski Region (only singles recorded for last decade in winter and early spring by Y.B.S. in Kedrovaya Pad State Nature Reserve). We estimate only one or two pairs currently breed in the Bikin-Alchan watershed.

Siberian Grouse *Falcipennis falcipennis* Near-threatened

Breeding range Extreme eastern Siberia in the range between Aldan River and the Sea of Okhotsk, northern part of the Amur Basin and the Sikhote-Alin Range south to the uppermost reaches of the River Armu (the northern upper tributary of the Iman); northern parts of the Sakhalin. Monotypic.

Bikin area: confined to the upper Bikin country eastward from the line connecting the rivers M. Svetlovodnaya and Klyuchevaya. Pukinsky and Nikanorov (1974) reported nesting birds from the lower parts of the Klyuchevaya. We have at least 20 records of single birds, both males and females, in June–July 1995 and May–June 1996 at different sites throughout the upper Bikin country: in the rivers Klyuchevaya, Pravyi Bikin, Ada, the middle and upper Zeva, and Mt Kuznetsova (central Sikhote-Alin). Local hunters find grouse in winter in the same sites and

also from areas of the upper Svetlovodnaya (Ulunga) and middle-upper Kilou. Mainly inhabits dark Yeddo Spruce–White-bark Fir primary forests both on the plateaux and tops of the hills, up to the timber line at 1300 m; several of our records refer to larch stands.

Status and threats The total number is unknown; considered to be rare in many parts of the range (Potapov and Flint 1987). Data on local density are sparse because of its secretive way of life and the difficulty of estimating abundance for larger areas. According to our data and hunters' reports the species is likely still to be fairly common in the upper Bikin. Siberian Grouse are not hunted in this unpopulated area and its continued presence in the Sikhote-Alin Range depends on the survival of the old-growth spruce–fir forests.

Red-crowned Crane *Grus japonensis* Threatened

Breeding range Formerly northern Manchuria, Lake Khanka and the valleys of Ussuri and middle Amur, but true range is much fragmented. An isolated population breeds in Hokkaido. Monotypic. In the middle Amur known from four or five main areas between the rivers Zeya and Urmi; in Khanka Lake nests in southern and north-eastern parts, and in the Ussuri valley reported from the lowermost reaches of the Khor and Bikin (Potapov and Flint 1987). A few birds breed irregularly on Kunashir Island (Nechaev and Shibaev 1989).

Bikin area (Figure 8): in May 1981 two or three nesting pairs (one nest found, Figure 9) were recorded in the Bikin-Alchanskaya Marr (Shibnev 1982). In July 1990 a group of three Red-crowned Cranes was observed by Y.B.S. in the same area. In spite of an intensive survey of this marr by the field team in May–June 1997 no Red-crowned Cranes were found and no recent hunters' reports are available, so we believe that this species has left this part of the Ussuri valley.

Status and threats Vulnerable (Collar *et al.* 1994). The population in Russia was estimated at the end of the 1980s as 150–200 (Potapov and Flint 1987) or even 300–350 (Nechaev and Shibaev 1989), including 30–45 nesting pairs (the former source). The huge Bikin-Alchanskaya Marr is a true potential breeding area for this species but the increase in human disturbance and the early spring grass burning now prevent it nesting there. Strict protection laws are required.

Hooded Crane *Grus monacha* Near-threatened

Breeding range Northern Manchuria (found nesting in Heilongjiang since 1991), middle to lower Amur Basin southward to the Bikin basin. Two isolated breeding areas are known from the western and southern Sokha-Yakutia. Suggested for central Sakhalin (Nechaev 1991). Monotypic. In south-east Russia a single nesting record is known from the middle Amur (with many summer sightings) and more from the lower Amur (Evoron-Chukchagirskaya Basin, Amgun River), but most breeding records are from the Bikin (Potapov and Flint 1987, Nechaev and Shibaev 1989). Some birds were reported from the river Marevka, a tributary of the lower Iman (Ozaki 1995).

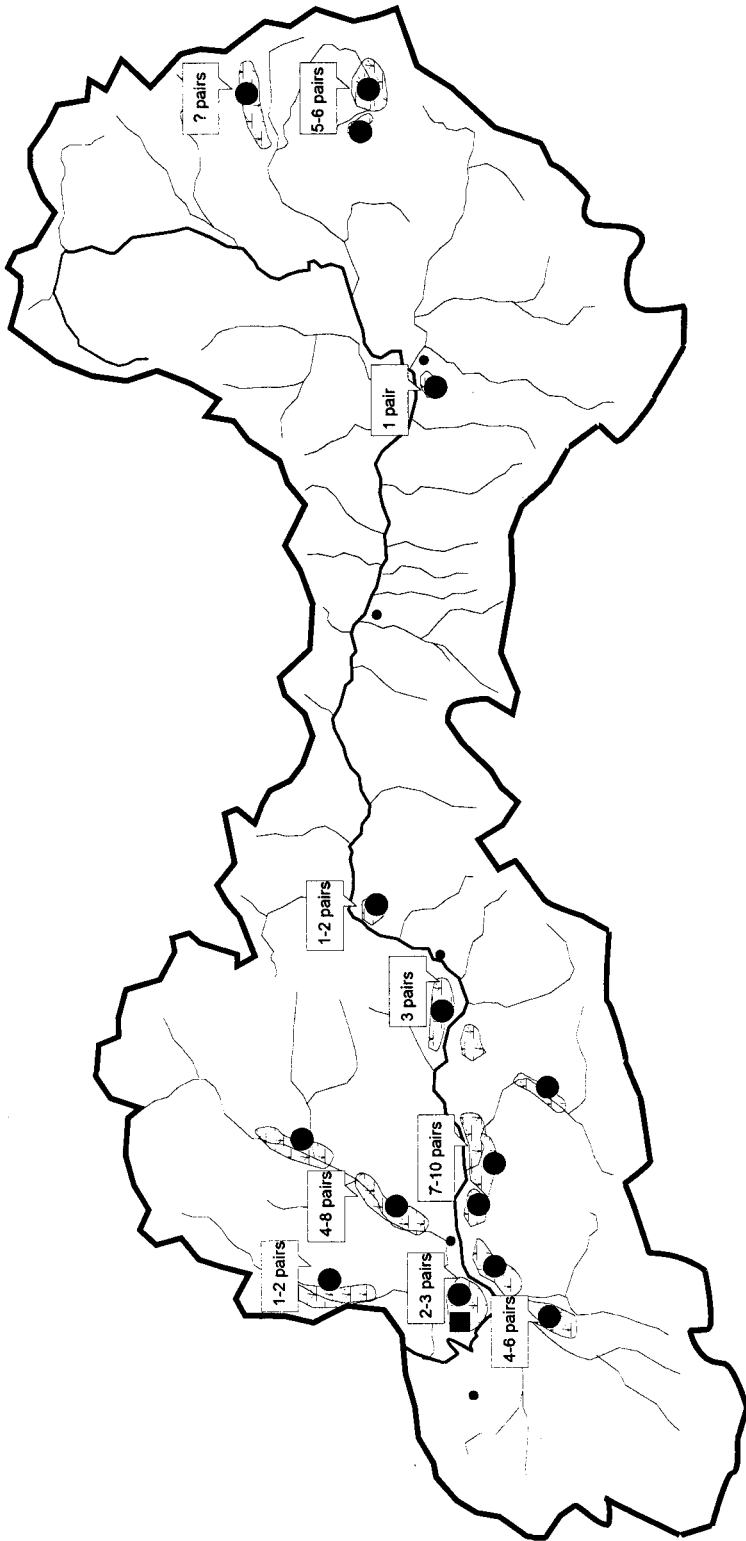


Figure 8. Red-crowned Crane *Grus japonensis* and Hooded Crane *Grus monacha*. Red-crowned Crane: known nesting site in 1987–1990 (black circles). Hooded Crane: known nesting sites in 1980–1997 (black squares). The marked areas are the marris.



Figure 9. A nesting pair of Red-crowned Cranes *Grus japonensis* in the Bikin-Alchanskaya Marr. (Photograph by Y.B.S.).

Bikin area: (Figures 8 and 10). In contrast to other Asian cranes, this species breeds in small to large sphagnum-ledum boggy swamps (marrs) with scattered depressed larches and surrounded by dense forest or secondary woodland. Breeding records are from at least 10 sites, from the lower Bikin upwards to the central Sikhote-Alin plateau (Pukinsky and Il'insky 1977, Pukinski *et al.* 1982, Fudjimaki *et al.* 1989, Mikhailov *et al.* 1997a). Our observations provided breeding data as follows: the Middle Alchanskaya Marr (4–8 pairs) and the marrs along the river Ulitka (one or two pairs); Silanshanskaya Marr (4–6 pairs); Kushnarikhskaya Marr (one to two pairs) and Zmeinaya Marrs (6–8 pairs) (all in the lower Bikin country); Olonskaya Marr (3–5 pairs) and Sobolinskaya Marr (one or two pairs) in the middle Bikin and the marrs in the most upper reaches of the rivers Zeva and Kilow (5–10 pairs). No breeding birds were found in the Bikin-Alchanskaya Marr, but single wandering pairs of Hooded Crane were observed here in May 1992 and June 1997.

Status and threats The total world population on the wintering grounds is estimated as 11 800 birds (Collar *et al.* 1994). The Bikin population was 40–50 pairs in the 1970s, including about 30 nesting pairs (Pukinsky *et al.* 1982), which was considered to be one of the largest in south-east Russia (Potapov and Flint 1987). These numbers still occur and the most valuable marrs, with the highest density of this species, are Kushnarikhskaya and Zmeinaya marrs, Middle-Alchanskaya Marr and those in the Zeva-Kilow upper reaches. Some pairs certainly breed by



Figure 10. Hooded Crane near the nest at the edge of marr. (Photograph by Y.B.S.).

the Iman and Khor but actual numbers are unknown. Hooded Cranes are still safe in many sheltered Bikin marrs but disturbance by fishermen and loggers has greatly increased in the past three years, especially in the Bikin-Alchanskaya Marr (currently deserted by the cranes) and Kushnarikhskaya-Zmeinaya marrs (a highly valuable area). The establishment of strict protection control for these areas is believed to be essential for the welfare of this species.

Band-bellied Crake *Porzana paykullii* Near-threatened

Breeding range North-eastern China, northern part of North Korea, the wet lowlands of the Ussuriland and middle Amur in Russia. Monotypic.

Bikin area: this species was common in earlier decades in damp grassy patches along the smaller rivers and lakes in the lower Bikin country, in particular in the Bikin-Alchanskaya Marr, Silanshanskaya Marr and Kushnarikhskaya-Zmeinaya Marrs. In June 1997 we recorded, by calls, only single birds in each of these sites.

Status and threats No data on population density in the Russian far east and at least until the 1990s it was not treated here as a rare species (Potapov and Flint 1987, Nechaev and Shibaev 1989). In sites where the species was formerly locally common 10 singing males per 1 square kilometre could be expected (the lower Iman, Spangenberg 1965). Similar densities were estimated in June 1990 in the Khasan area (K.E.M. unpublished data). Based on our records, we can only surmise a current decline in the Ussuri River system, but cannot pinpoint specific threats.

Long-billed Plover *Charadrius placidus* Near-threatened

Breeding range Eastern and north-eastern China, Japan and the Amur-Ussuri river system; the range much fragmented. Monotypic. In south-east Russia considered to breed in the middle Amur between the rivers Bureya and Ussuri, along the Ussuri (no particular sites specified), in the Bikin and by some small rivers along the southern part of the Primorski Region (Vorob'yov 1954, Nechaev and Shibaev 1989). Never reported from the Iman and Khor.

Bikin area: as in the other sites of Ussuriland, this plover breeds in the Bikin in isolated pairs and only on large and high pebble beaches in the middle parts of the river, avoiding pure sand, large stones and low beaches. In May 1992–1996 a few adult birds, one to three each year, were recorded in the middle Bikin. Almost all sightings occurred in the 20 km range between the mouths of the Takhalo and Amba (about 20–30 km up from K. Yar), and only once in the range of 5–10 km above K. Yar. On 14 July 1992 a young bird, still unable to fly, was observed below the mouth of the Takhalo. There were no records of this species in May–June of 1970–1996 below K. Yar, where Little Ringed Plover *Charadrius dubius* is common, and also upwards from the Amba, although the preferred habitats occur along the Bikin bed up to the River Kilou. There was a single record of a clearly non-breeding bird in July 1997 not far from V.Pereval.

Status and threats The total number is unknown but it seems to be always rare in the region, with a low nesting density (one pair per 10–20 km, Nechaev and Shibaev 1989) even in favoured sites. Long-billed Plovers have not been observed during the past 10 years in several small rivers to the south of the Primorski Region, referred to in the literature (Y.B.S. pers. obs.). The real situation in the Ussuri is unknown as this river has not been surveyed for many decades. In some cases this species has been confused with Little Ringed Plover. Although no serious threats are known in the breeding sites, the apparently high level of nesting fidelity and strict preference for particular pebble beaches is likely to make this species highly vulnerable to local habitat destruction. The main threats lie beyond the study area, presumably on the migration routes and in the winter quarters.

Far-Eastern Curlew *Numenius madagaskariensis* Near-threatened

Breeding range Eastern Siberia, Kamchatka, extreme north-eastern Mongolia and eastern Manchuria, Amurland and Ussuriland, possibly northern Sakhalin. The range is much fragmented. Monotypic. In Ussuriland it is mainly confined to the southern parts (near the coastal flats in the Posiet bay, Khasan area, Khanka basin) and to the lower reaches of Iman, Bikin and Khor. In Amurland it is known from Zeysko-Byreyskaya and Evoron-Chukchagirskaya basins (Nechaev and Shibaev 1989).

Bikin area (Figure 11): in Bikin it nests in small and loose groups (2–6 pairs) on open grassy–*Sphagnum* patches among the marrs. The main breeding sites are all in the lower Bikin country. There are 8–10 pairs in the Bikin-Alchanskaya Marr, two to three pairs in the Kushnarikhskaya Marr and 8–12 pairs in the Zmeinaya Marr. Undoubtedly some pairs also breed in the Silanshanskaya and Middle-Alchanskaya marrs, which have been poorly surveyed.

Status and threats The total number and breeding density in Ussuriland and Amurland is virtually unknown. This species has clearly declined since 1980, with no more than 30–40 pairs breeding nowadays in the lower Bikin. Major causes of its decline in the Ussuri valley include the loss of large swampy areas to agriculture and the long-term practice of setting grass fires in early spring (Vorob'yov 1954, Nechaev and Shibaev 1989), especially in the Bikin-Alchanskaya Marr. The species may suffer heavy hunting pressure on its migration routes and in its winter quarters.

Blakiston's Fish Owl *Ketupa blakistoni* Threatened

Breeding range Amurland and Ussuriland, eastern Heilongjiang and presumably the northern part of North Korea (race *doerriesi*); Sakhalin, Hokkaido, and southern Kuril Islands (race *blakistoni*). The continental race is also considered to breed throughout coastal Siberia, along the Sea of Okhotsk northward to Magadan and in western Kamchatka (Pukinsky 1993), but there are virtually no nesting records from the latter territories (E. R. Potapov, pers. comm. 1997). In the Amur basin it is mainly reported from lower reaches by the rivers Urmi, Kur, Gorin, Khun-

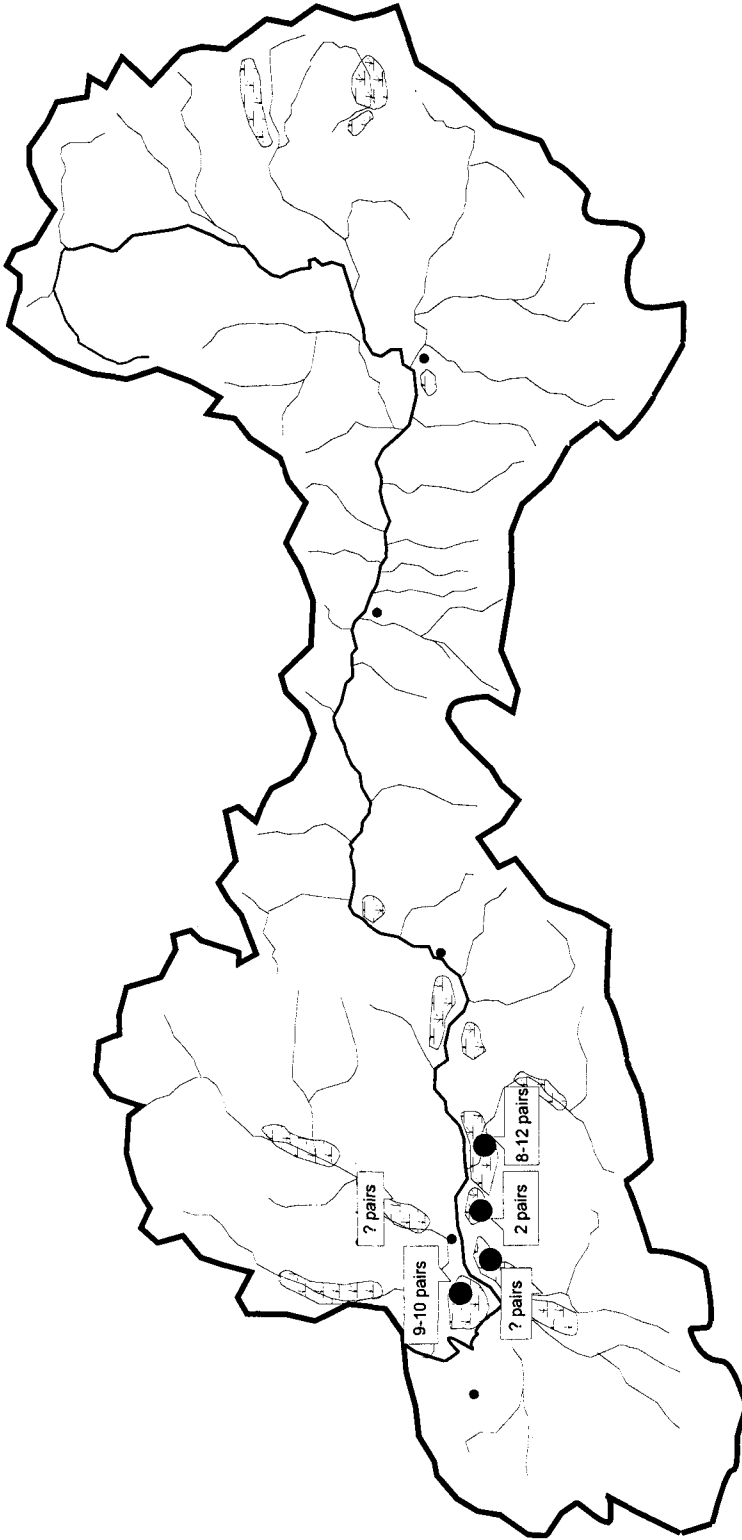


Figure 11. Far-eastern Curlew *Numenius madagaskariensis*. Distribution of nesting settlements in 1997. The marked areas are the marrs.

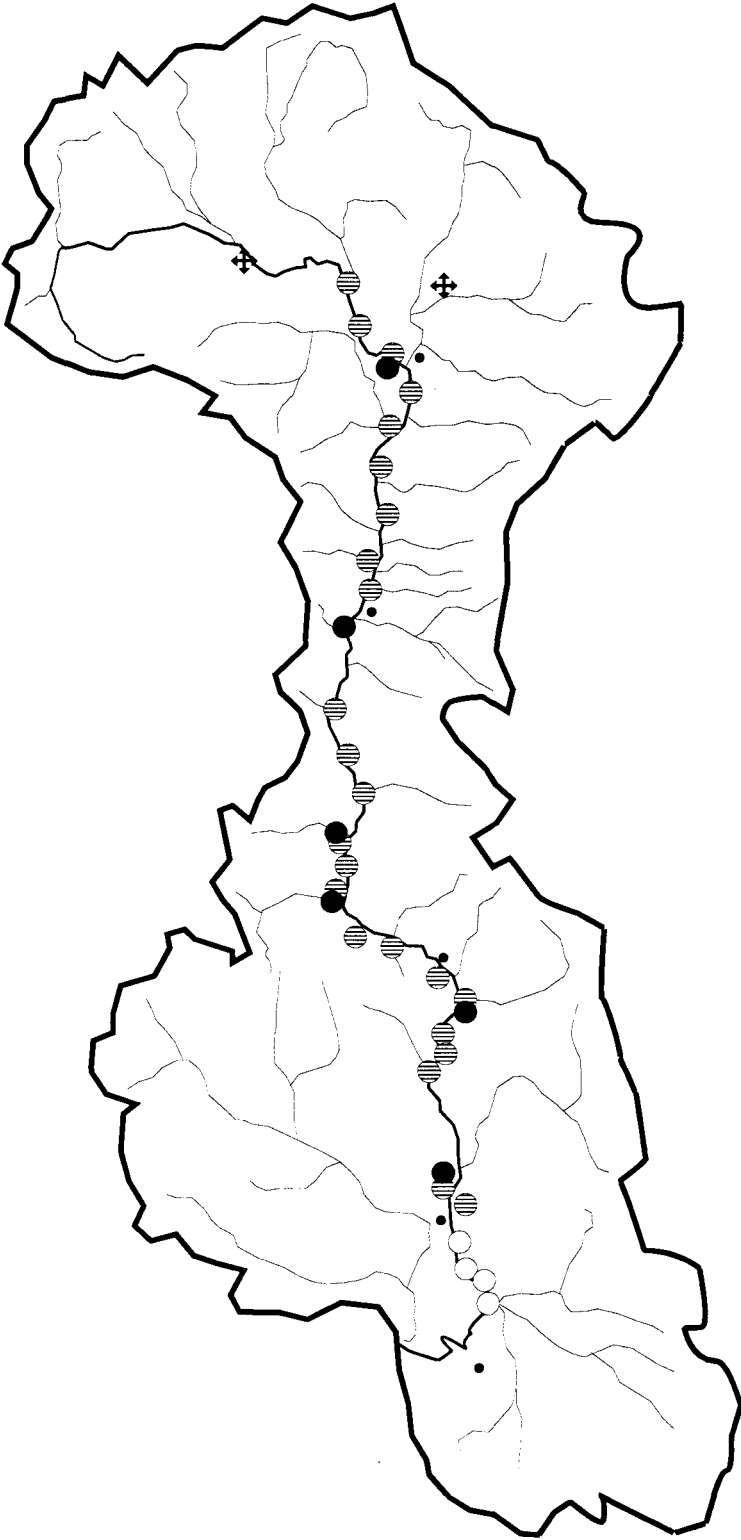


Figure 12. Blakiston's Fish Owl *Ketupa blakistoni*. Actual nesting sites before 1970 (only for the lower Bikin; open circles), before 1980 (striped circles) and in 1993–1996 (dark circles). The crosses are acoustic records of separate birds in 1993 and 1995.



Figure 13. Young Blakiston's Fish Owl near the nesting site. (Photograph by Y.B.S.).

gari and Amgun (one report from the middle Amur); in Ussuriland is known from the rivers Iman, Khor, Bikin and Alchan (Pukinsky 1993). It is assumed to breed by some rivers along the coast of the Sea of Japan (Nechaev and Shibaev 1989).

Bikin area: (Figures 12 and 13). A resident species, everywhere dependent on densely forested, rather large rivers, rich in fish and with available nest sites in old, thick trees with large hollows. It prefers secluded sites, with shallow, slow-flowing river branches alternating with small peaceful backwaters, chiefly near the mouths of smaller tributaries (Spangenberg 1965, Pukinsky 1993, our data). It requires the presence of unfrozen shallows with running water in winter. The fish owl breeds only in the strip of gallery broad-leaved forests, nowadays from about 10 km above V. Pereval to the mouth of Zeva River (Shibnev and Gluschenko 1981), where breeding pairs were registered in different years at 25–30 sites. Formerly, nests were known at the mouths of the rivers Chantofu, Olonka, Danguza, Metokheza and Zeva (Pukinsky 1993). In 1992–1996 we recorded owls by ear from the following sites at the mouths of rivers B. Muziza (May 1992), Svetlovodnaya (Ulunga, June–July 1993, 1995 and 1996), B. Svetlovodnaya (Biomo, June 1993) and mostly from Danguza-Nyelo-Sangeli sites (June 1992 and May–June 1993, the vicinity of Rodnikovaya). In this last site at least three booming birds could be heard within a radius of 2 km. On Y.B.S.'s early April count in 1996 only one booming duet was recorded per 50 km between K. Yar and V. Pereval. Three more pairs, according to local hunters, bred at the mouths of the rivers B. Muziza, Takhalo and Amba. A check of the former site

in May 1997 proved negative and no new information was available from Udege hunters in K. Yar in 1997. Nor were there any records from the upper Bikin and the rivers Klyuchevaya and Zeva in May–July 1995–1996 (Mikhailov *et al.* 1997a). Once, on 12 June 1996, the call of the fish owl was recorded by us in the sea coast forested area of the river Kamenka.

Status and threats Endangered, the total population is estimated at 300–400 pairs (Collar *et al.* 1994). In the 1980s 45–52 birds lived in Hokkaido (Brazil 1985) and 18–20 pairs bred on Kunashir Island (Dykhan and Kisleiko 1988). Only a few recent records are available from Sakhalin (Nechaev 1991). Over recent decades the species has decreased 4–5 times in Ussuriland, becoming very rare in Iman (Pukinsky 1993), where it was common in the middle of the century (Spangenberg 1965). The Bikin is considered to be a main stronghold of the fish owl in Northern Asia (Pukinsky 1993) but even here numbers have recently decreased to a critical level. We estimate the total number of pairs in Bikin now at no more than 15, against 26 breeding pairs and some 70 birds overall in 1975–1976 according to Pukinsky (1993). The fish owl is most threatened in winter, with persecution by trappers who think they spoil the fur of trapped animals. Some birds are occasionally caught and die in mink traps and, in addition, the Udege always considered the owl as an acceptable food. Another threat is a reduction in the birds' winter prey over the past three years due to intensive, year-round net-fishing. We believe that the only way to rescue this species (and the subspecies) in Ussuriland is the establishment of strict protected status for particular Bikin stretches.

Regionally rare (included in *Red-Data Book of Russia*) species

Black Stork *Ciconia nigra* (Figure 7)

Formerly distributed throughout Amurland and Ussuriland, but the recent population is much declined and the total number is unknown (Nechaev and Shibaev 1989). In the late 1970s in the Bikin-Alchanskaya Marr 4 or 5 pairs were thought to nest (Pukinsky *et al.* 1982) and nests were known to Y.B.S. and B. Shibnev in the forested areas behind Kushnarikhskaya Marr, Zmeinaya Marr and along the lower Alchan. In April 1996 only two birds, presumably from different pairs, were recorded in 50 km between V. Pereval and K. Yar where 4–6 pairs nested in the 1970s and in May–June 1997 four birds were observed at quite different sites on the lower Bikin. Above K. Yar one bird was sighted in May 1993 in the Rodnikovaya area by the River Sangeli (the old nest was found nearby). Apart from these, we have several sight records of feeding birds in May–July 1992, 1993 and 1996 from V. Pereval up the Bikin to the river Zeva. No Black Storks were observed in the large wild taiga area of the upper Bikin in 1995 or 1996. We estimate that only five or six pairs of Black Stork now breed in the Bikin. Killing of birds (often merely for fun) when they feed along river margins and disturbance in the lower Bikin seem to be main causes of the decline during the 1980s and 1990s.

Osprey *Pandion haliaetus*

Previously common throughout Amurland and northern Ussuriland, including the sea coast (Vorob'yov 1954), but now considered to be rare (Nechaev and Shibaev 1989). In Bikin the number has decreased 1.5 times compared with the 1970s, and most pairs have disappeared from a range between V. Pereval and K. Yar. The last pair that bred in the area of V. Pereval, in the Kushnarikhskaya Marr, left in 1995. Ospreys are still relatively common in the middle and upper Bikin, from 30 km above K. Yar up to the river Kilou, with up to 12 sight records per 150 km during the motor boat count and three occasional nest records each year. Occupied nests are now known at the mouths of the rivers Kailu (three), Dunguza (one), Zeva (one) and Kilou (one). In the mid-1980s, the total number was estimated by Y.B.S. for the lower and middle Bikin (up to the Zeva) as 13–16 pairs (Nechaev and Shibaev 1989). It is more likely 9–11 now but three or four more pairs breed in the upper Bikin, from the Zeva up to the Ada. The main threat is persecution by local hunters who consider Ospreys as competitors for fish and, in the past three years, a major decline in fish stocks due to intensive netting. In addition nests are destroyed by wind since they are always built on the top of high, usually dead trees.

Grey-faced Buzzard *Butastur indicus*

The breeding range is confined to the north-east of China, the Korean Peninsula, the Japanese Islands (except Hokkaido), southern Ussuriland and the Ussuri River valley north to the middle Amur, westward to the river Bureya. In the 1970s it was quite common in the lower and middle Bikin, in particular around and below V. Pereval area (Pukinsky 1984, Y.B.S. unpublished data). Recently it has declined dramatically over the whole range in Russia (Nechaev and Shibaev 1989) and became rare in the middle Bikin. Surprisingly, the 1997 survey suggested that this buzzard was locally quite common in the lower Bikin, in particular along the Alchan edge of the Bikin-Alchanskaya Marr (six or seven recorded sites with birds in May–June). The total number is difficult to evaluate because of the secretiveness of birds near nest sites. This behaviour may protect them from hunters during the breeding season but the killing of migrant and wintering birds is considered to be the main cause of decline in Russia (Nechaev and Shibaev 1989).

Conclusions

The Bikin River basin is undoubtedly the largest remaining unspoilt area for Ussuriland wildlife in the Russian far east. It is a main stronghold in northern Asia for four globally rare bird species: Blakiston's Fish Owl, Mandarin Duck, Chinese Merganser and Hooded Crane. The catchment also holds rare species such as the Amur Tiger *Panthera tigris altaica* and the region should be given a much higher conservation priority both within Russia and in eastern Asia. The globally threatened and near-threatened species of birds breeding in the Bikin can be subdivided into three general groups: (i) those directly depending on the conifer forests of the upper Bikin, (ii) those living in broadleaved riparian forests

(middle part of the Bikin) and (iii) those mainly depending on the swamps of the lower Bikin.

The first category comprises only the Siberian Grouse, whose survival depends wholly on the fate of the primary spruce–fir forests, many of which have been the subject of recent logging concessions both in Khabarovsk and the Primorski Administrative Regions. In fact, the future harvesting of old-growth forests in the central Sikhote-Alin plateau will inevitably have far more serious consequences as these forests regulate the hydrological profile of the Bikin River. The swamps within these forested areas, for example those in the upper reaches of the Zeva River, should be treated as Important Bird Areas. Apart from Siberian Grouse they support high numbers of Black-billed Capercaillie *Tetrao parvirostris* and Hooded Crane. The inclusion of these areas in the Sikhote-Alinskii State Nature Reserve, which lacks these three species within its present boundaries, is essential. The entire central Sikhote-Alin Range should be included in the World Heritage List (Bocharnikov 1996) in recognition of its international importance in conserving biodiversity.

The second group of species comprises Chinese Merganser, Blakiston's Fish Owl, Mandarin Duck, Long-billed Plover, Osprey and Black Stork. Strict preservation is not possible in the middle Bikin above Krasnyi Yar, as this is considered to be the territory of the indigenous Udege and Nanai peoples who follow a traditional way of life. For the same reason logging is forbidden in the virgin forests of the middle Bikin so anti-poaching controls could be an effective conservation measure. However, we believe that this would no longer be sufficient to ensure the survival of Blakiston's Fish Owl and Chinese Merganser. Special projects are required to map all the breeding pairs of Blakiston's Fish Owl and census the entire population of Chinese Merganser in early spring and early autumn. Future monitoring programmes for these populations should be developed and financially supported. Educational efforts, including making a film of the fish owl as a symbol of the virgin Ussurian taiga, are essential to change the attitude of local people to this endangered species.

Five species of special conservation concern, namely Schrenk's Bittern, Oriental White Stork, Band-bellied Crane, Japanese Crane and Far-Eastern Curlew are associated with marshes of the lower Bikin basin, as is much of the Bikin population of Hooded Crane. We can add to this list Black Stork, Grey-faced Buzzard, Spotted Eagle and some other rare birds of the far east of Russia (Oriental Honey Buzzard *Pernis ptilorhynchus*, Pied Harrier *Circus melanoleucos*, Black Grouse *Tetrao tetrax ussuriensis*, Yellow-legged Button Quail *Turnix tanki*, Brown Hawk Owl *Ninox scutulata*, Collared Scops Owl *Otus bakkamoena*, Eastern Broad-billed Roller *Eurystomus orientalis*, Asiatic Paradise Flycatcher *Terpsiphone paradisi incei*, Grey-headed Pygmy Woodpecker *Dendrocopus canicapilus* (Nechaev and Shibaev 1989)). All of these species breed by swamps, on wooded hillsides and in gallery forests of the lower Bikin. In addition, the wetlands and grasslands of the lower Bikin are the feeding grounds for many wildfowl and waders on spring migration. The lower Bikin is generally more populated than the middle and upper Bikin, but because of the large swamps, human settlements are very localized, ensuring that the majority of these swamps (Bikin-Alchanskaya Marr, Middle-Alchanskaya Marr, Kushnarikhskaya Marr and Zmeinaya Marr) and their surrounding wooded hills and forests are of no interest to loggers and industrialists.

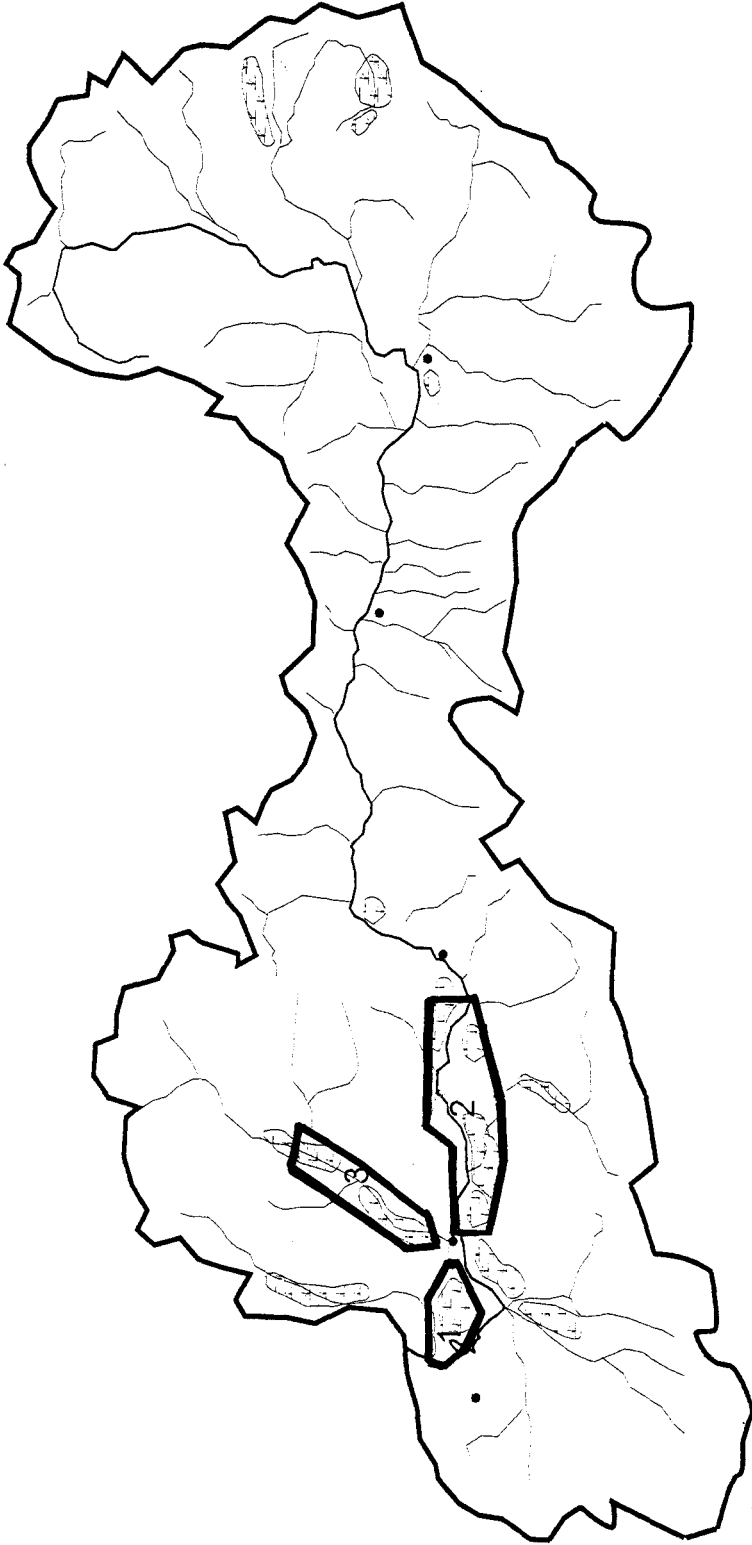


Figure 14. The three areas proposed for the zapovednik (nature reserve) or national park in the lower-middle Bikin country (Gluschenko *et al.* 1997): 1, Bikin-Alchanskaya Marr; 2, Kushnarikhskaya and Zmeinaya Marrs and the Bikin stretches from Verknii Pereval towards Krasnyi Yar; and 3, Middle-Alchanskaya Marr.

The main threat here for the cranes, storks and raptors is disturbance by fishermen and hunters. This is the site (Figure 14) where a national park is proposed (Gluschenko *et al.* 1997), preserving typical Ussurian wetlands and Manchurian-type forest habitats with six breeding globally threatened and near-threatened species and 14 more rare species of the Russian Far East. In particular, 16–24 pairs of Hooded Crane breed here, and with strict protection the Oriental White Stork and Japanese Crane may resume nesting in the Bikin-Alchanskaya Marr. The strip of Bikin channels between V. Pereval and K. Yar with its virgin gallery forests and breeding Blakiston's Fish Owls (currently 3–5 pairs), Chinese Mergansers (10–15 pairs) and Mandarin Duck (many pairs) should also to be included in this reserve.

The establishment of a nature reserve or national park with its centre in the village of Verknii Pereval will not only preserve the unique wildlife in the lower Bikin, but will also enable the monitoring of populations of Blakiston's Fish Owl, Chinese Merganser and Mandarin Duck over the whole middle and upper Bikin. Wetlands International, WWF and BirdLife International as well as other international and Russian conservation organizations must work to save this area, the largest refugium of the unique Ussurian wildlife in the far east of Russia.

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References

- Bocharnikov, V. N. (1990) Current status of the Chinese Merganser *Mergus squamatus* in Russia. *Bull. Inst. Orn. Kyung Hee University* 3: 23–27.
- Bocharnikov, V. N. (1996) The Sikhote-Alin Nature Complex as an object of the World Heritage List. *Vestnik of Far East Branch of Russian Academy of Sciences* 5: 43–53 [in Russian].
- Bocharnikov, V. N. and Shibnev, Y. B. (1994) The Scaly-sided Merganser *Mergus squamatus* in the Bikin River Basin, Far East Russia. Pp. 3–10 in B. Hughes and J. Hunter, eds. *The Scaly-sided Merganser Mergus squamatus in Russia and China*. Slimbridge, Glos.: The Threatened Waterfowl Research Group (Special Publ. 1).
- Brazil, M. (1985) Owl of the setting sun. *BBC Wildlife* 3(3): 110–115.
- Collar, N. J., Crosby, M. J. and Stattersfield, A. J. (1994) *Birds to watch 2: the world list of threatened birds*. Cambridge, U. K.: BirdLife International (BirdLife Conserv. Series 4).
- Coulter, M. C. (1995) Ecology and status of the Oriental White Stork. Pp. 86–87 in C. H. Halvorson, J. T. Harris and S. M. Smirenski, eds. *Cranes and storks of the Amur River*.

- Proceedings of the International Workshop 'Khabarovsk-Poyarkovo-Khabarovsk, July 3–12 1992'. Moscow: Arts Literature Publishers.
- Dykhan, M. V. and Kisleiko, A. A. (1988) The number and distribution of *Ketupa blakistoni* on Kunashir Island in the nesting period. Pp. 29–32 in *Rare birds of the Far East and their protection*. Vladivostok: Far East Science Center, Academy of Science of the USSR [in Russian].
- Fudjimaki, Y., Shin-ichi, H., Kiyooki, O., Osamu, Y., Fusahiro, N., Khrabryi, V. M., Starikov, Y. B. and Shibnev, Y. B. (1989) Breeding status of the Hooded Crane *Grus monacha* along the Bikin River in the Far East of the USSR. *Strix* 8: 199–217 [in Japanese with English summary].
- Fudjimaki, Y., Tsuyoshi, F., Osamu, Y., Motoichir, Y., Khrabryi, V. M., Shibnev, Y. B. and Sokolov, A. B. (1990) Breeding ecology of the Oriental White Stork *Ciconia ciconia boyciana* in the Bikin-Alchan Marr in the Far East of the USSR. *Strix* 9: 139–157 [in Japanese with English summary].
- Gluschenko, Y. N., Shibnev, Y. B. and Bocharnikov, V. N. (1997) Wetlands in the basin of river Bikin that are of special concern to conservation. Pp. 42–48 in *Birds of the wetlands of the southern Russian Far East and their protection*. Vladivostok: DalNauka [in Russian].
- Koblik, E. A. and Mikhailov, K. E. (1995) On the birds of upper belts of the mountains of Khorsko-Bikinsky watershed (middle Sikhote-Alin). *Bull. Moscow Soc. Nat., Biol. I Ser.* 99(6): 47–54 [in Russian with English summary].
- Koblik, E. A., Mikhailov, K. E. and Shibnev, Y. B. (1997) On the birds of the river valleys of the eastern slopes of the Sikhote-Alin Range. *Russ. J. Orn., Express Issue* 21: 10–14 [in Russian].
- Krivenko, V. G. (1983) *Red Data Book of Russia: Krasnaya Kniga RSFSR*. Moscow: Rossel'khozizdat [in Russian].
- Madge, S. and Burn, H. (1988) *Wildfowl*. London: Christopher Helm.
- Mikhailov, K. E., Koblik, E. A. and Shibnev, Y. B. (1997a) Rare and sporadic birds of Russia in the upper basin of the River Bikin (the northern part of Primorsky Region). *Russ. J. Orn., Express Issue* 7: 3–7 [in Russian].
- Mikhailov, K. E., Koblik, E. A. and Shibnev, Y. B. (1997b) On the avifauna of the mountain landscapes of the Central Sikhote-Alin Range. *Russ. J. Orn., Express Issue* 8: 3–7 [in Russian].
- Nechaev, V. A. (1969) *Birds of the southern Kuril Islands*. Leningrad: 'Nauka' [in Russian].
- Nechaev, V. A. (1991) *Birds of Sakhalin Island*. Vladivostok: Far East Branch, USSR Academy of Sciences [in Russian].
- Nechaev, V. A. and Shibaev, Y. V. (eds.) (1989) Birds. In *Rare vertebrates of the Soviet Far East and their protection*. Leningrad: 'Nauka' [in Russian].
- Ozaki, K. (1995) Color banding studies of Hooded and White-naped Cranes in Japan and East Asia. Pp. 141–143 in C. H. Halvorson, J. T. Harris and S. M. Smirenski, eds. *Cranes and storks of the Amur River*. Proceedings of the International Workshop 'Khabarovsk-Poyarkovo-Khabarovsk, July 3–12 1992'. Moscow: Arts Literature Publishers.
- Potapov, R. L. and Flint, V. E. (eds.) (1987) *The birds of Russia and contiguous regions: Galliformes, Gruiformes*. Moscow: 'Nauka' [in Russian].
- Pukinsky, Y. B. (1973) On the ecology of *Ketupa blakistoni* in the basin of the River Bikin. *Bull. Moscow Soc. Nat., Biol. Ser.* 78(1): 40–46 [in Russian with English summary].
- Pukinsky, Y. B. (1975) *Along the taiga river Bikin*. Moscow: 'Mysl' [in Russian].
- Pukinsky, Y. B. (1978) About rare and poorly known species of the basin of the River Bikin. *Priroda* 1: 56–76 [in Russian].
- Pukinsky, Y. B. (1984). *Birds of the Ussuriland taiga: travelling along the river Bikin*. Khabarovsk: Knizhnoe izdatel'stvo [in Russian].
- Pukinsky, Y. B. (1993) The Fish Owl. Pp. 290–302 in S. G. Priklonski, ed. *The birds of Russia and contiguous regions: Pterocliiformes, Columbiformes, Cuculiformes, Strigiformes*. Moscow: 'Nauka', [in Russian].

- Pukinsky, Y. B. and Il'insky, I. V. (1977) On the biology and behavior of *Grus monachus* during the nesting period (Primorsky Krai, basin of the River Bikin). *Bull. Moscow Soc. Nat., Biol. Ser.* 82(1): 5–17 [in Russian with English summary].
- Pukinsky, Y. B. and Nikanorov A. (1974). The Siberian Grouse. *Okhota and Okhotnichie khozyaystvo* 7: 42–43 [in Russian].
- Pukinsky, Y. B., Ilyinsky, I. V. and Shibnev, Y. B. (1982) The number and distribution of Hooded Crane in the Bikin River Basin. Pp. 44–49 in *Cranes of East Asia*. Vladivostok: Far East Science Center, Academy of Science of the USSR [in Russian].
- Shibnev, B. K. (1973) The waders of the Basin of the River Bikin. *Fauna and ecology of waders*. Moscow: Moscow University Press 2: 83–86 [in Russian].
- Shibnev, Y. B. (1976) Brief notes about Chinese Merganser in the Bikin River. *Rare, endangered and poorly known species of the USSR* 13: 73–74 [in Russian].
- Shibnev, Y. B. (1982) The Japanese Crane nests in the River Bikin (Primorski Territory). Pp. 98–99 in *Cranes of East Asia*. Vladivostok: Far East Science Center, Academy of Science of the USSR [in Russian].
- Shibnev, Y. B. (1985) The current status of *Aix galericulata* and *Mergus squamatus* on Bikin River. Pp. 95–99 in *Rare and endangered birds of the Far East*. Vladivostok: Far East Science Center, Academy of Science of the USSR [in Russian].
- Shibnev, Y. B. and Gluschenko, Y. V. (1981) Rare birds of the Primorsky region, needed in special conservation. Pp. 58–60 in *Rare and disappearing animals of the Far East of the USSR*. Vladivostok: USSR Academy of Sciences. [in Russian].
- Spangenberg, E. P. (1965) The birds in the Basin of River Iman. *Proc. Zool. Mus. Moscow State Univ.* 9: 98–202 [in Russian].
- Stepanyan, L. S. (1990) *Conspectus of the ornithological fauna of the USSR*. Moscow: 'Nauka' [in Russian].
- Surmach, S. G. and Zaykin, D. V. (1994) The Scaly-sided Merganser *Mergus squamatus* (Gould) in the Iman Basin, Far East Russia. Pp. 11–17 in B. Hughes and J. Hunter, eds. *The Scaly-sided Merganser Mergus squamatus in Russia and China*. Slimbridge Glos.: The Threatened Waterfowl Research Group (Special Publ. 1).
- Vorob'yov, K. A. (1954) *Birds of the Ussuriland*. Moscow: 'Nauka' [in Russian].

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