



## PUBLISHER'S TRANSLATION INTO ENGLISH

**Nazarenko A.A. (2016)** First Evidence of Reed Parrotbill *Paradoxornis heudei polivanovi* Stepanyan, 1974 Dispersal from Khanka Region to Nearby Territories, with Comments on the Counterintuitive Role of Economic Activities on Biogeographic History of this Subspecies // *Far East. J. Orn.* 5: 32—41.

### SUMMARY

Multi-year monitoring (1958–1998) of avian fauna in a study area at the “Zhemchuzhny” Rice Farm near the city of Arseniev (Primorsky Territory) allowed for exact dating of the emergence (in 1984) and disappearance (in 1989) of an isolated settlement of reed parrotbill *Paradoxornis heudei*. Such short-time existence of this enclave is explained by its low ecological capacity: systematic burning of reeds, especially in autumn, and probably predation by Eurasian sparrowhawk in wintertime. This paper presents a chronology of all encounters with these birds and observations of their habits and behavior. A focus is made on their «loneliness syndrome» behavior caused by loss of a partner mate which is characterized by very intensive flying activities including flights far beyond typical habitats. It was shown that “the ecological corridor”, through which the birds of the Khanka population managed to reach the intermontane trough in the inner area of Sikhote-Alin Mt. Range was earlier inaccessible due ecological reasons, and for this population might have been the treeless strip along the railroad and highway some 40 km long.

*The referred figures and tables are in the original article in Russian, pp. 32—41*

The birds of Ussuriland have been studied for 140 years (Vorobiev, 1954; Gluschenko et al., 2010; Nazarenko, Surmach, 2016). The key scientific paradigm (objective) of the greater portion of this stage of studies was an inventory – identification and determination of the species diversity of regional avifauna. A final publication of V.A. Nechayev and T.V. Gamova (2009) showed that the inventory era has come to end and that time has come for a monitoring era – tracking the population status and their temporal and spatial dynamics (Nazarenko, Surmach, 2016). It should be noted that the key determinant of population status is man’s economic activities, so the response of the regional biodiversity to this factor reveals itself through species’ loss or appearance (Moore, 2016; Nazarenko, 2016). It turned out that reed parrotbill *Paradoxornis heudei* is a unique case in this collision.

A dramatic event in reed parrotbill’s biogeographic history was the circumstance that

economic importance of reed, previously a very important natural resource (fuel, thatching material, etc.) for traditional economies in the east of Asia, had dropped in the past century. As “reed harvest” was gathered in winter time, this meant crucial conditions for survival in wintering areas. As a result, only two very small isolated populations have remained in existence – nominative *heudei* in the lower reaches of Yangtze R. and *polivanovi* somewhere in the northeast of Asia. Being an anamorphic plant, reed is capable of actively spreading and effectively settling in bare soils and the latter type of soil is most common in developed agricultural areas – all this helped the birds to travel over the distance between Inner Mongolia and Khanka Lake. It is likely that the Khanka population pool was building up during several decades.

The sensational and still mysterious appearance of this species in the reedy and marshy banks of Khanka Lake was registered in 1968 (Polivanov et al., 1973). The Khanka population was already mentioned in the first edition of the Red Data Book of the USSR (Flint, 1978).

Due to energetic efforts taken by ornithologists in the following years, this probably growing

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population was investigated, its abundance was estimated at some 400 nesting pairs as of early 1980s, and its distribution was located as Khanka Lake and its southern neighborhood (Gluschenko, Shibnev, 1981; Nazarov, Kazykhanova, 1981).

Naturally enough, it could not cross anybody's mind at that time to search this species some where beyond the Khanka Lowland. Nonetheless, nesting birds were found during a routine survey of lakes among rice fields belonging to Zhemchuzhny Farm near Arseniev City in July 1984

### **STUDY AREA**

The locality where birds were found is remarkable in two respects. First, it is remarkable in ecological terms – this is a vast forestless lowland 25–30 km long and up to 10–15 km wide earlier called Srednedaubihinskaya Intermontane Trough (Atlas, 2008, Sheet 33). The lack of forest in this lowland, apart from remnants of riverside forests stretching along the stem of Daubihe (Arsenievka) River and its tributary Telianza (Sinogorka), may be a heritage of medieval civilizations. These “readymade” meadows were used as hayfields by residents of villages emerging on the periphery of this lowland during the time when Russians were settling in Ussuriland. One of these villages was Semenovka (nowadays this is Arseniev City). A typical picture of the past times was as follows: hundreds of hay stacks strewn all over the northern part of this area since mid-July; these stacks were moved out by tractor-drawn sleighs only after snow cover appeared.

Lakes with reed or bulrush growths on their banks are found primarily in the inner part of this lowland. The largest ones known as “Batiyev's Lakes”, including Bolshoye Kazennoye Lake where parrotbills were found, stretch for 6 km (Atlas, 2008, Sheet 33). Their mutual spatial position shows that they had emerged in the place of the ancient channel of a major river when it had noticeably more water than nowadays.

In late 1940s, rice fields occupied a maximum of one-fourth of this territory and were concentrated in its central-western part. During the next 30–40 years, they became dominating in spatial terms (Atlas, 2008, Sheet 33) and the ecological pattern of this territory has dramatically changed. Reed growths came into existence everywhere along numerous canals and in

wet wasteland. The most remote parts of these fields became accessible by road infrastructure.

Second, the area with rice fields and adjacent hayfields, pastures and riverside forests was used as a model area and its avian fauna has been monitored during more than 50 years which allowed for identification of obvious evidence of its dynamic both on population and species levels. The case of reed parrotbill is consistent with this picture.

### **MATERIALS AND METHODS**

The first stage of avian fauna identification studies in this lowland (1948–1958) ended in the graduation thesis “The Birds of the Floodplain in Middle Reaches of Daubihe River” defended at the Vertebrate Animals Zoology Chair of Tomsk University (Nazarenko, 1959). In the following years, work was continued with varying regularity: after 1980 – regularly and in the form of short, within 10 days, site visits in all seasons; in 1984–1998 (except winter months) – bicycle tour all over the territory. As “Tikhiy” Wildlife Refuge was organized in the study area in 1957 and the lakes, where reed parrotbill had been found, enjoy a special protected area status (Potapova et al., 2006), any bird capture for collection was out of the question.

### **DESCRIPTION OF ENCOUNTERS WITH REED PARROTBILL AND NOTES ON ITS BEHAVIOR**

**1984 Year.** Southwestern edge of Bolshoye Kazennoye Lake (BKL). Two birds were noticed flying with feed from the nearer shore to the farther shore in the middle of the day on July 11. In the morning of July 12, two fledglings were found in the same place: almost tailless, capable of fluttering only, very trustful but avoided being taken in hands. Their parents were anxious, allowed people to come close but their warning call (vzh, vzh, vzh...) sounded not loudly. It is notable that it was an open patch among growths and fledglings were keeping almost on the ground. An empty nest, very fresh by its appearance, was found in about 10–15 m from this place in dense reed growths. It has remained empty and was later picked for our collection. Another pair of birds was noticed at the other end of the lake at a distance of about 500 meters.

A brood of four fledglings with half-length tails was found on July 21 in the place where the second pair had been observed. Their wings were still short and very rounded. They were actively moving on reed stalks and fluttered with their wings begging for food. At first, they were accompanied by two adult birds and then by one only. Adults were feeding chicks with something they extracted from reed flower heads. They did this by their bills squeezing the reed flower head with their foot and sometimes were hanging on its end by their back downward. At this moment, the chick was sitting on the top of the bent stalk. When moving between stalks, adults fluttered rather than jumped, i.e. were continuously flapping their wings. Sometimes, feed was brought from far away. Modulated (trembling) whistles were heard from their direction from time to time.

**1985 Year.** On August 23, birds revealed their presence by modulated calls three times during 40 minutes on Cherny Berezy Lake, about 1 km from BKL, in dense wild rice and bulrush growths. We could not see them because there are no “high” roosting points in such growths on which these birds like to sit.

**1986 Year.** On January 1, birds were staying in dense reed growths near the road in approx. 4 km south of BKL. Some of them climbed up the stem to the flower head from time to time and stayed there for some time keeping silence or, less frequently, produced a modulated territorial call and then plunged into the growths. It was not possible to estimate the size of this group but we could see that birds can stay very close to each other. We could judge about their occupation by typical cracking sounds of reed stalk walls being destroyed or when the whole stalk was suddenly bent. The birds were continuously communicating with each other by soft calls. In general, this gregarious and feeding behavior had been already described in detail (Polivanova et al., 1980; Gluschenko, Shibnev, 1981).

The morning of August 2, southwestern side of BKL. Already approaching this place, we heard a typical territorial call – modulated warble. It was uttered by a brightly colored bird from the tops of dry last-year reed stalks. A low and short call of a different pattern was periodically heard from another place.

After a while, we saw the same bright colored bird carrying a building material (narrow fibers) in its bill when it was flying to the other shore of the lake (20 m) where it disappeared in a reed-grown patch with some last-year dry stalks. Then this bird returned to its previous place and started energetically moving in the growths periodically uttering a modulated warble and after a while again flew over to the other shore with a building material. It returned again, disappeared in the growths but almost immediately another adult bird, obviously less bright, flitted to the top of one of dry stalks. The male (bright one) flew over to it at once and then a brief demonstration of “male dominance” followed (Fig. 2). The birds immediately disappeared in the growths and possibly copulated there.

In the same place, we caught a glimpse of a fledgling with its tail half shorter than normal. Judging by trembling of reed stalks, the family was slowly moving around a small patch of growths sometimes uttering “soft” calls. After a while, the female with a flower head piece from last year’s reed plant flew over the lake and disappeared in the “nesting” patch of growths and the male flew over to the same place later but without any building material. After full silence followed for 5–6 minutes and the birds did not appear, we left this place. Nonetheless, walking 50–70 meters along the same lake, we again heard a modulated territorial call and saw a bright male. It remained unclear, whether it was the master of this new territory or the same male. During the same excursion, we registered a male by its territorial call and visually roughly in 1 km east of BKL on Cherny Berezy Lake.

**1987 Year.** May 13 and 15. According to a territorial call and visual observations, one male each was credibly staying on Cherny Berezy Lake and western edge of BKL. The weather was windy and difficult for observations. In addition, large patches of reed and bulrush growths on both lakes were burned over.

August 14–15. A brood was observed near the southwestern edge of BKL: two adult birds, one of which was periodically uttering a territorial call, and at least two almost grown-up juveniles. The birds rather energetically, but not simultaneously, were moving across thin reed growths and we did not manage to count the exact number of juvenile

birds. Interestingly enough, we did not find any birds in the same place 30 minutes earlier on August 15.

September 1, 2 and 4. In the course of a quick survey of rice fields on these dates, parrotbills were observed, occasionally by calls and visually, on Cherny Berezy Lake, in the central part of BKL and at the junction of BKL and Lesser KL – i.e. in the same places as in the summer season.

December 30 – January 3, 1988. No birds were found during a survey of rice fields and reed growths in the central-southern part of this area including neighborhoods of Pervoye Lake, Cherny Berezy Lake and “Airfield”. The weather was favorable – sunny and calm.

**1988 Year.** During a series of surveys (May 7–14; June 11–17; December 30 – January 1, 1989), no birds were found.

**1989 Year.** June 26, July 4. A pair of birds was registered by voice and de-visu on June 26 in a traditional location: at the southwestern end of BKL at its junction with Lesser KL. A small reed patch has survived here after fires. However, no birds were found here after half an hour of waiting on July 4. No birds were found either after one hour of waiting near the northeastern end of this lake where a small patch of last-year reed growths had also remained in existence.

August 3–5 and 26–27. One bird was registered by its territorial call on August 3 in the central part of BKL. No birds at all were registered on lake edges. On August 5, a solo male was encountered in non-typical location: in belt-like reed growths on ridges immediately in rice paddies roughly in 200 m away from Lesser KL. It was energetically moving and, when stopping at reed tops, consecutively uttered two vocal versions: a normal territorial call and the second one sounding as “phew, phew, phew...”

It is likely that the same bird was registered in the central part of BKL. It was energetically, in 200–300-meter-long spurts, alternately moving above the growths along the lake edge and rice field edge uttering a territorial call during short stopovers. It stopped near the southern extremity of

the lake, vocalized for some five minutes sitting in a high roosting point and then disappeared in thin reed growths on the rice paddy edge in the same place. Nobody answered it, and this individual was obviously in a state of behavioral discomfort. It was repeatedly observed in this place on August 27 and its behavior was the same: it was energetically flying around the territory including an open area above rice paddies and vocalized during stopovers. We would like to call this state/demonstration as a “loneliness syndrome”. This bird’s tail started molting: its central, the longest, flight feathers were missing.

An adult male was observed at the southern edge of BKL on August 26. It was uttering a warning call in reaction to my presence and, in addition, a territorial call. In the same location, we noticed at least one almost grown-up juvenile bird in reed growths. During one hour and a half on August 27, we first time ever worked on Bezymyannoye Lake with good reed growths. This place is some 4 km south of BKL. Adult birds were registered several times by their territorial calls in different places but at a far distance. It remained unclear how many birds were there. It is not unlikely that it was the same bird. This lake is much smaller than BKL.

**1990-1998 Years.** A quick survey of locations traditionally inhabited by reed parrotbill in this area performed in 1990 has yielded no results. This circumstance has caused much anxiety because monitoring results in 1988–1989 also showed that there were some problems with this colony. Unfortunately, monitoring activities performed in 1991–1998 when all lakes with reed and bulrush growths on their banks were repeatedly surveyed as were numerous “secondary” reed-grown areas and islets emerging everywhere among rice fields, particularly among abandoned fields. Therefore, it has to be recognized that this colony had ceased its existence on the premises of Zhemchuzhny Rice farm in the above said period <sup>(1)</sup>.

The colony described above was intrinsically vulnerable due to a low ecological capacity of its habitats (cf. Gluschenko, Shibnev, 1981) and other risks. The establishment of a local-level wildlife refuge

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1) Unfortunately, an isolated area with large and closely located lakes in 12 km downstream the valley of this area’s main river in vicinity of Yakovlevka Village remained unexplored. But this already lies beyond the boundaries of Zhemchuzhny Rice Farm and Tikhyy Wildlife Refuge

(1957) in this territory was dictated by the purposes of protection of water and wading birds and lotus growths. Reed parrotbill was included in the list of protected species only after 1984 (Gluschenko et al., 2005). Unfortunately, grass fires affecting reed growths were never closely controlled in this wildlife refuge. Autumnal fires resulting in shortage of feeding and sheltering conditions in the cold season were particularly critical for reed parrotbill, the more so that an additional limiting aspect is associated with this season. A particular group of birds is related in winter to reaped rice fields and reed growths: Pallas's reed bunting which spends winter here and such local species as blue tit and lesser spotted woodpecker. This feeding resource is exploited by Eurasian sparrowhawk and there are credible data that this woodpecker became its prey even in sufficiently dense reed growths (A.A. Nazarenko, unpublished data). This is another risk factor for reed parrotbill – rather large but not very “agile” bird.

### **SOME CONCLUSIONS**

1. Reed parrotbill belongs to a category of species rare for the temperate zone of the East Palearctic: its ecological niche is very specific both in environmental terms (reed growths) and by a territorial parameter – localized and isolated structure of these growths.

2. The spatial discreteness of this environment requires special adaptations to compensate specific features of this species' ecological niche. It turned out that such adaptation is available – it is an ability to fly swiftly and energetically for successful travel over areas with unsuitable ecological conditions. This is confirmed by observations of birds found in the state of “loneliness syndrome”.

3. The environment itself – reed populations – is surprisingly characterized by virtually similar adaptations. Reed is capable of energetically spreading through seed transfer by air flows (anemochory) including transfer over territories unsuitable for its existence. It is likely that, not being an effective competitor, this plant energetically settles in areas with bare soils and the latter type of soil is largely an inevitable consequence of man's economic activities.

4. The “ecological channel” through which this species had penetrated into Srednedaubihinskaya Intermontane Trough, territorially and ecologically

inaccessible in previous years, was a strip of forestless terrain along the railroad and highway stretching for some 40 km (Atlas, 2008, Maps 31 and 32).

The southern periphery of the Russian part of this species' geographic range as of 1980 was found westward, in the watershed of Ilistaya R., in a low and marshy area near Vassianovka Village (Gluschenko, Shibnev, 1981, Fig. 1, p. 57). On the eastern side, there is an “industrial desert” in the place of abandoned and partly flooded quarries of Rettikhovka Station and farther eastward but already in a narrow strip along the above mentioned roads up to Chernyshevka Village located near the western boundary of rice fields run by Zhemchuzhny Farm (Fig. 1). I have been to that area – there are small growths and patches of reed everywhere. It should be added that similar “industrial landscape islands” are not infrequent in Khanka Plain and their vegetation including reed growths has been studied fairly well (Osipov, Ivakina, 2016).

5. In conclusion, we would like to tell a few words about so late – only in 1968 – discovery of reed parrotbill near Khanka Lake (Polivanot et al., 1973). Indeed, this is a riddle because this species is not furtive, it has diverse vocalization, its main territorial call – a modulated warble – is loud and these birds often produce it openly sitting on a bent reed stalk. Strangely enough, neither first visitors to Khanka Lake (R. Maack in 1859 and N.M. Przhevalsky ten years later) nor large numbers of professional collectors and ornithologists at the end of the 19th century and in the first half of the 20th century had discovered this obviously exotic bird on reedy and marshy banks of Khanka Lake. We have to recognize that this species had not been present in Khanka Lake in those years as monitoring experiences for its small population near Arseniev City (this study) have shown that such populations are extremely unstable in time.

6. Still, we have managed to find possible reasons for this paradox. It is said in “The Birds of Korea” (Austin, 1948), the section on Pallas's reed bunting, that local residents widely used reed for fuel (other sources also mention such reed uses for thatch roofs, hedges, mats) and reed growths were almost completely mowed during December and January. And the above said buntings had virtually

no winter shelters. Given that household traditions in East Asia have deep ethnic roots, the Chinese also had a similar attitude to reed as an important natural resource – one can read about this, for instance, in V.K. Arseniev’s writings (Arseniev, 2007). We can assume that it was applicable especially to people who lived in a terrain with few forests near Khanka Lake (in Russia’s territory this had continued through mid-1930s). Curiously enough, all sources including Internet sources indicate that the “reed harvest” was gathered in winter and that reed continues being used for fuel in rural communities in the forestless valley of Yangtze River

7. Therefore, the reedy and marshy banks of Khanka Lake could not support any stable population of reed parrotbill after the winter reed-gathering campaign in those times. It is curious that in those years in South China, an area with no climatic winter, even nominative population of reed parrotbill (*heudei*) had a negligibly small geographic range in the extreme lower reaches of Yangtze River ((La Touche, 1925–1930, pp. 46–47).

Given this “ethnic factor”, the most likely “survival area” for reed parrotbill’s Far eastern population were locations in Inner and East Mongolia where reed growths are a natural ecological component of steppe lakes and deltas of rivers draining in such lakes (Fomin, Bold, 1991, p. 13 and p. 82). Furthermore, indigenous people with their numbers being by an order of magnitude smaller than in crop-growing China were engaged primarily in nomadic animal husbandry and lived in yurts.

8. It is curious that the population of those areas was described as an independent subspecies: *Paradoxornis heudei mongolicus* Stepanyan, 1979 (Dickinson, Christidis, 2014, p. 514). In the light of the above scenario, the relationship between this subspecies and *P.h.polivanovi* requires to be strictly verified including use of “molecular markers”. Biogeographic events, important for the population of *polivanovi* subspecies, have occurred during the last millennium – the epoch when the first states with mixed but largely crop-growing economies were emerging in the territory of modern Northeast China and southern areas of Primorsky Territory. These are Bohai kingdom and then so-called Golden Empire of Juchen, 7th–10th centuries A.D. (Kradin,

2005). An estimated population number is available for “late Bohai”: 3.8 million people (Kradin, 2005, p. 443). On the whole, this resulted in emergence of an agricultural landscape in the place of former vast woodland (Makohonienko et al., 2004; Jiang et al., 2008) which should have led to territorial expansion of reed populations. There is evidence that bare soils (sand erosion) had existed at that time (Makohonienko et al., 2004, p. 71). Thus, a potential “ecological bridge” came into existence for *polivanovi* population settling in the area between Inner Mongolia, “The Land of Lakes” in the watershed of middle Sungari and Khanka Lake. “The Land of Lakes” found in the inland area of Northeast China requires a special comment. This is a vast forestless and rather densely populated territory with its formal boundaries stretching 400 km from north to south and 200–250 km from east to west. There is a lot of large, medium and small lakes and just waterlogged areas scattered all over this territory (Military Map of Northeast China, scaled 1 to 2000000, Sheet B-VIII, 1975 Edition). There is Zhalong Nature Reserve located near Qiqihar in the north.

A well-known guide book (Cheng, 1987) shows only two *polivanovi* locations for this territory: “Heilongjiang Prov. (Qiqihar-Zhalong Reserve in the eastern suburb, ...)” and the second one northeast of Khanka Lake. As an absolutely identical map is provided in the previous edition of this guide book in Chinese language (Cheng, 1976), it is likely that this information had been obtained in earlier times. While the recent overview of the current state of this species’ expansion in China (Xiong, Lu, 2013) shows only two locations in the Land of Lakes close to each other and both located in nature reserves, it remains unclear what is going on in the rest part of this territory – where reed had been traditionally used for fuel.

Due to global technical progress, reed has largely lost its previous value as a raw material source during the last century and the time of population growth and spread has come for reed parrotbill. The only factor affecting these processes is reed burning-out (Polivanova et al., 1980; Gluschenko, Shibnev, 1981; Nazarov, Kazykhanova, 1981; this study). While the Khanka population pool was likely to have been “building up” during several decades, it can be expected that today, when a continuous “ecological

channel” from north to south exists in the Russian part of this species’ geographic range (Gluschenko, Shibnev, 1981; Nechayev, Gorchakov, 2001; Nazarov, 2004; Gluschenko et al., 2006; Gluschenko, Korobov, 2014; Sotnikov et al., 2016), these birds will in the nearest future start nesting on the north of Korean Peninsula. In East China, this expansion is proceeding at a very fast pace (Xiong, Lu, 2013).

This case demonstrates the surprising dialectic of relationships between human populations (= economic activities) and animal and plant populations in the context of time, space and ecology. Its outcome cannot to be predicted a priori.

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