

Fauna and population of passerine birds in the lower reaches of the Bolshaya Rechka River (Altai Territory, Bolsherechensky Reserve)

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The aim of the work is to supplement the current data on the fauna and population of passerine birds on the Nature Reserve "Bolsherechensky", located in the Altai Territory in the lower reaches of the Bolshaya Rechka River. The territory of the preserve is typical for the Verkhneobskiy forest area. One of the primary duties of the Nature Reserve is to protect the habitats of rare and endangered bird species. However, the modern avifauna in the reserve, despite several previous reports, remains underestimated and not sufficiently studied. Our work has been carried out over the spring and summer of 2012, 2013, 2017 and 2021. The number of species was estimated based on their density obtained during the survey, and a point scale was used to describe the species. We concluded that the summer (breeding) passerine bird populations of the Nature Reserve "Bolsherechensky" consist of 12 families and 35 species, while the presence of 15 rare bird species was registered in the Reserve. Our results will enrich the data bank on the fauna and the population of passerine birds of the lower reaches of the Bolshaya Rechka River in the Nature Reserve "Bolsherechensky", which can be used to improve biodiversity conservation measures.

Acta Biologica Sibirica 9: 71-84 (2023)

<http://journal.asu.ru>

<https://doi.org/10.5281/zenodo.7680150>

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Academic editor: R. Yakovlev | Received 22 January 2023 | Accepted 2 February 2023 | Published 19 February 2023

<http://zoobank.org/18591425-A65C-43D3-8F8E-12DA6066195E>

Citation: Vazhov SV, Matsyura AV, Vazhov VM (2023) Fauna and population of passerine birds in the lower reaches of the Bolshaya Rechka River (Altai Territory, Bolsherechensky Reserve). Acta Biologica Sibirica 9: 71-84. <https://doi.org/10.5281/zenodo.7680150>

Keywords

passerines, population, number, Altai Territory, Verkhneobsk forest area, Bolsherechensky sanctuary.

Introduction

The deepening economic development of the Verkhneobsk forest massif in the Altai Territory is accompanied by the transformation of natural landscapes (Vazhov 2015), which changes the natural habitats (Demidovich et al. 2021) and causes an immediate response, which can serve as clear indicators of ecosystem health (Kovaleva et al. 2021). Moreover, wildlife sanctuaries, which perform the functions of wildlife protection, contribute to the stability of the population and the number of birds; this makes it necessary to study them (Povarintsev et al. 2016). However, the modern avifauna of some PAs of Altai Krai, such as the State Nature Reserve of regional importance "Bolsherechensky" (52°46'30"N, 84°13'43"E, Fig. 1), located in the Verkhneobsky boron, remain virtually unstudied. There are only sporadic publications that indicate sightings of birds in this reserve without indicating the precise locations of these sightings, the number of nesting sites, or any estimation of numbers (Chupin, Petrov 2005; Zakaznik 2009). Data from our 2012 and 2013 counts on Falconiformes and Strigiformes populations in this area have also been partially published (Vazhov 2015).

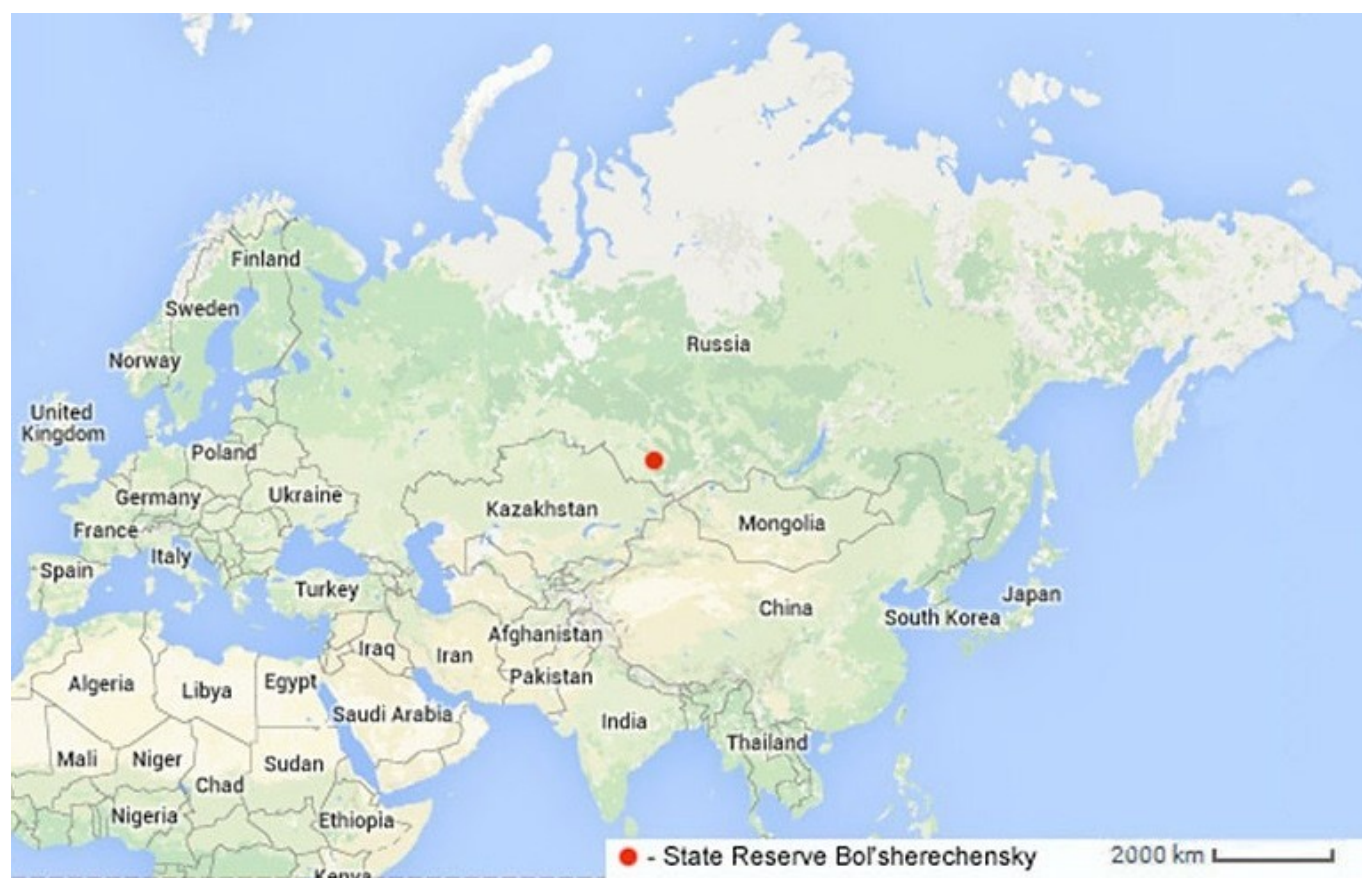


Figure 1. Bolsherechensky Nature Reserve (Bolsherechensky zakaznik, 2023).

Land processing, food base, and geographical characteristics (Vazhov et al. 2022.) largely determine the population, distribution, abundance, and adaptive abilities of birds (Matsyura, Zimaroeva 2016). Intraspecific competition is of great importance in the choice of nesting habitats (Vazhov 2013).

Therefore, the study of the fauna and bird population in the "Bolsherechensky" Reserve is relevant. Our work aimed at supplementing the current data on the fauna and population of passerine birds in "Bolsherechensky" within the borders of the Bolshaya Rechka River valley. Research objectives were to summarize the own and literature data on the summer bird population, to study the

territorial locations and the composition of the species, and to determine the number of each species.

The State Nature Reserve (of regional significance) "Bolsherechensky" is situated in the Troitsky region of Altai territory and occupies an area of $33.6 \text{ ha} \cdot 10^3$. Its main objectives include the preservation of avifauna in natural habitats within the Verkhneobsk forest area. The dominant habitats are pine and mixed forests, bushes, open forests with vast glades, and water and water-related lands with wooded banks of streams and reservoirs (Zakaznik 2009).

Materials and methods

The work was carried out in the spring-summer periods during four years in the Bol'sheherechensky sanctuary in the borders of the Bolshaya Rechka River valley. In 2012, we made fragmentary observations on road and hiking routes from April 24 to July 17, during which we surveyed the neighborhoods of Varlamenskoe, Teleutskoe, and Sredneabrashkino lakes, as well as villages Listvyanka and Chausovo (Vazhov 2015). In 2013, we rafted along the Bolshaya Rechka River in 03.09-09.09 from the village of Zagainovo to Listvyanka; the length of the route was 59 km. The total surveyed area was about 17.7 km^2 . In 2017, another rafting trip along Bolshaya Rechka was conducted from May 27 to June 01 from the village of Zagainovo in the village of Chausovo, the length of the route was 80 km. The total survey area was approximately 24 km^2 . In 2021, we also rafted along the Bolshaya Rechka River from July 15-20 along the 2013 route (Fig. 2): from Zagainovo village to Listvyanka village, the total length was 59.3 km and the survey area was approximately 18 km^2 .

The standard route count with unlimited field of view was used for bird counting (Bibby et al. 1998; Field, Gregory 1999; Karyakin 2004; Ravkin, Livanov 2005). To calculate the density for each species, the average detection range was determined from a set of records (Nichols et al. 2000; Rosenstock et al. 2002). We follow Bibby et al. (1990) to estimate the species abundance. Radial visits to the camps were made to count birds in the river valley. We considered the breeding territories where we found the nests or adult birds in pairs, unbroken clutches, or molting adult males during the breeding season. When a nesting site was detected, its geographic coordinates were recorded using a personal satellite navigator and entered into the electronic database of the ArcView GIS software with further desktop processing of the spatial data. The bird names and their taxonomic categories are presented according to field guides (Stepanyan 1990; Ryabitsev 2001; Koblik, Redkin, 2006; Ryabitsev 2014a, 2014b).



Figure 2. Expedition group on the route. 15 July 2021. Photo by S.V. Vazhov.

Result

We summarized passerine population data for the lower Bolshaya Rechka River in the Bolsherechensky Reserve, including 15 rare from 35 species registered (The Red Data Book 2001, 2006, 2009; see Table 1).

No	Species	Abundance	
		Average density, ind/km2	Quantity, individuals
1	Red-backed shrike (<i>Lanius collurio</i> (Linnaeus, 1758))	0.04	2-4
2	European magpie (<i>Garrulus glandarius</i> (Linnaeus, 1758))	0.08	5-6
3	Common grasshopper warbler (<i>Locustella naevia</i> (Boddaert, 1783))	0.03	2-4
4	Blyth's reed warbler (<i>Acrocephalus dumetorum</i> (Blyth, 1849))	0.08	4-6
5	Booted warbler (<i>Hippolais caligata</i> (M.N.K. Lichtenstein, 1823))	0.02	No data
6	Willow warbler (<i>Phylloscopus trochilus</i> (Linnaeus, 1758))	0.03	1-2
7	European pied flycatcher (<i>Ficedula hypoleuca</i> (Pallas, 1764))	0.03	No data

8	African stonechat (<i>Saxicola torquata</i> (Linnaeus, 1766)	0.08	3-5
9	Redwing (<i>Turdus iliacus</i> (Linnaeus, 1766)	0.03	No data
10	Song thrush (<i>Turdus philomelos</i> (Brehm, 1831)	0.06	3-4
11	Marsh tit (<i>Parus palustris</i> (Linnaeus, 1758)	0.08	2-5
12	Eurasian tree sparrow (<i>Passer montanus</i> (Linnaeus, 1758)	0.03	No data
13	European greenfinch (<i>Chloris chloris</i> (Linnaeus, 1758)	0.08	3-5
14	Common redpoll (<i>Acanthis flammea</i> (Linnaeus, 1758)	0.08	3-5
15	Hawfinch (<i>Coccothraustes coccothraustes</i> (Linnaeus, 1758)	0.06	No data

Table 1. Density and abundance of rare passerine species registered in the Bolsheherechensky Reserve

Passeriformes

Hirundinidae

1. Bank Swallow (*Riparia riparia* Linnaeus, 1758). Two colonies of shorebirds were found on 17-18 July 2021 on the bluffs of the Bolshaya Rechka River. The density was 11.1 ind/km². The average density for all years was 3.4 ind/km². We registered 61-200 birds.

Motacillidae

2. Yellow Wagtail (*Motacilla flava* Linnaeus, 1758). Four individuals were seen on 16 July 2021 and two more individuals on 19 July. Density was 0.33 ind/km². The average density in all years was 0.17 ind/km². We registered 6-10 individuals.

3. Gray Wagtail (*Motacilla cinerea* Tunstall, 1771). Rare species. Adult birds with broods were recorded in 5 plots on 17-18 July, and 3 birds were seen on 19 July. The density was 0.85 ind/km². The average density in all years was 0.42 ind/km². We registered 15-25 individuals.

4. White Wagtail (*Motacilla alba* Linnaeus, 1758). Common species. A white wagtail was seen in large numbers in 2017; in 2021 we found 3 individuals with broods on 18 July and also observed a wagtail with a brood on 19 July. The average density in all years was 2.71 ind/km². Based on these data, we can assume that at least 48 individuals live in the valley of the Bolshoi River within the reserve.

5. Masked Wagtail (*Motacilla personata* Gould, 1861). Rare species. An individual was seen on June 01, 2017. Density was 0.06 ind/km². Wagtails were observed daily from 16 to 19 July 2021. The density was 0.23 ind/km². The average density for all years was 0.14 ind/km². We registered 2-5 birds.

Laniidae

6. Common Shrike (*Lanius collurio* Linnaeus, 1758). Very rare species. We recorded a pair of birds on the right bank of the Bolshaya Rechka River during an overnight stay on 19-20 July 2021. The density was 0.11 ind/km². The average density for all years was 0.04 ind/km². We registered 2-4 individuals.

Oriolidae

7. Golden Oriole (*Oriolus oriolus* Linnaeus, 1758). One of the rarest species. The oriole was identified by voice on 28 and 29, 2017. The density was 0.11 ind/km². The bird was sighted daily by voice from July 16-20, 2021 in numbers ranging from 1 to 10 individuals. The density was 1.64 ind/km². The average density for all years was 0.87 ind/km². We registered 30-60 birds.

Corvidae

8. Eurasian Jay (*Garrulus glandarius* Linnaeus, 1758). Very rare species. Several individuals were seen on 19 July 2021 at the place of overnight stay. The density was 0.28 ind/km². The average density for all years was 0.08 ind/km². We registered 5-6 individuals.

9. European Magpie (*Pica pica* Linnaeus, 1758). Rare species. On 28 May 2017, 3 individuals were observed along the route and 2 nesting sites were found. Magpies were known to nest in Listvyanka village, where we registered 7 nesting sites on 31 May this year, and on 01 June we found a magpie nest in Chauzovo village (Fig. 3). Density was 1.02 ind/km²; a bird was seen on 19 July 2021 on a route to a nesting site. The density was 0.11 ind/km². The average density for all years was 0.57 ind/km². We registered 24-34 birds.

10. Hooded crow (*Corvus cornix* Linnaeus, 1758). Common species. Up to nine individuals were counted on the route daily in 28-31 May and 01 June 2017. We established 28 nesting sites, and on 01 June near the village of Chauzovo, we observed a stiff and prolonged conflict of a pair of crows with a pair of kites. The density was 3.16 ind/km². Hooded Crows were common in the valley of the Bolshaya Rechka River on 16-20 July. One to three individuals were seen daily and 6 nesting sites and a nest on a pine tree were found. The density was 1.13 ind/km². The average density in all years was 2.14 ind/km². The abundance ranged from 21 to 76 individuals.

11. Raven (*Corvus corax* Linnaeus, 1758). Rare species. In 2017, only one pair was seen on the route on 28 May and we found 1 nesting site. The density was 0.11 ind/km². In 2021 a pair of Ravens was observed at the rookery site from 15 to 16 July, and one individual was also seen on 18 July. The density was 0.17 ind/km². The average density for all years was 0.14 ind/km². We registered 3-4 individuals.



Figure 3. Fledged chick of *Pica pica*. Photo by S.V. Vazhov.

Sylviidae

12. Common Grasshopper Warbler (*Locustella naevia* Boddaert, 1783). A very rare species. Observed during an overnight stopover on the left bank of the Bolshaya Rechka River in the direction of Listvyanka village on 19-20 July 2021. Listvyanka. The density was 0.06 ind/km². The average density for all years was 0.03 ind/km². The numbers could not be estimated using these data; probably 1-2 pairs nested in the study area.

13. Blyth's Reed Warbler (*Acrocephalus dumetorum* Blyth, 1849). A very rare species. Three individuals were seen during an overnight trip on 19-20 July 2021 along the left bank of Bolshaya Rechka in the direction of Listvyanka village. The density was 0.17 ind/km². The average density for all years was 0.08 ind/km². We registered 2-3 nesting pairs.

14. Booted Warbler (*Hippolais caligata* M.N.K. Lichtenstein, 1823). Very rare species. Observed on 19-20 July 2021 during an overnight stop on the left bank in the direction of Listvyanka village. Listvyanka. The density was 0.05 ind/km². The average density for all years was 0.02 ind/km². The numbers could not be estimated using these data.

15. Lesser Whitethroat (*Sylvia curruca* Linnaeus, 1758). Rare species. In 2021, Arctic Ground Squirrels were recorded on 15-16 July, counted on 17 and 18 July on the route of the study plot, and seen on the right bank of the Bolshaya Rechka River on 19-20 July. The density was 0.23 ind/km². The average density for all years was 0.11 ind/km². We registered 4-7 individuals.

16. Willow Warbler (*Phylloscopus trochilus* Linnaeus, 1758). Very rare species. Warblers were recorded during an overnight stop on the left bank in the direction of Listvyanka village on 19-20 July 2021. The density was 0.06 ind/km². The average density for all years was 0.03 sturgeon/km². We registered 1-2 individuals.

17. Common Chiffchaff (*Phylloscopus collybita* Vieillot, 1817). Rare species. Two to five individuals were heard singing daily on the route from 16-20 July 2021. The density was 1.07 ind/km². The average density for all years was 0.54 ind/km². We registered 19-32 birds.

Muscicapidae

18. European Pied Flycatcher (*Ficedula hypoleuca* Pallas, 1764). A very rare species. On 29 May 2017, one individual was observed. The density was 0.06 ind/km². The average density for all years was 0.03 ind/km². It is not possible to estimate the number based on such data.

19. African Stonechat (*Saxicola torquata* Linnaeus, 1766). A very rare species. Three individuals were seen during an overnight stop on the left bank of the river on 19-20 July 2021 in the direction of Listvyanka village. The density was 0.17 ind/km². The average density for all years was 0.08 ind/km². We registered 3-5 individuals.

20. Thrush Nightingale (*Luscinia luscinia* Linnaeus, 1758). Rare species. On 30 May 2017, one individual was identified by voice on the route and three more singing birds were heard at the overnight site on 31 May. The density was 0.23 ind/km². The average density for all years was 0.11 ind/km². We registered 6-7 individuals.

Turdidae

21. Fieldfare (*Turdus pilaris* Linnaeus, 1758). Rare species. Two individuals were observed on 19 July and three more individuals during an overnight stay on the right bank of the Bolshaya Rechka River on 19-20 July. At the same time we also counted Mountain Ash Buntings on the left shore in the direction of Listvyanka. The density was 0.34 ind/km². The average density for all years was 0.17 ind/km². We registered 6-10 individuals.

22. Redwing (*Turdus iliacus* Linnaeus, 1766). Very rare species. The Redwing was recorded on a radial route on 19 July 2021 near Listvyanka village. The density was 0.06 ind/km². The average density for all years was 0.03 ind/km². We were unable to estimate the numbers using these data.

23. Song Thrush (*Turdus philomelos* Brehm, 1831). A very rare species. A song thrush nest was found in 2012 (Fig. 4). The birds were identified by voice on 29 May 2017 at the overnight site and on the route. The density was 0.11 ind/km². The average density for all years was 0.06 ind/km². We registered 3-4 individuals.

Aegithalidae

24. Long-Tailed Tit (*Aegithalos caudatus* Linnaeus, 1758). Rare species. We recorded one bird on 18 July and 20-20 July during overnight and in the morning on the left bank in the direction of Listvyanka village. During the night and morning on the left bank of the river towards Listvyanka. Density was 1.47 ind/km². The average density in all years was 0.73 ind/km². We registered 26-44 individuals.



Figure 4. The nest of *Turdus philomelos*. Photo by S.V. Vazhov.

Paridae

25. Marsh Tit (*Parus palustris* Linnaeus, 1758). Very rare species. We only encountered it once: on May 29, 2017, during an overnight stay. The density was 0.21 ind/km². The average density for all years was 0.08 ind/km². We registered 2-5 individuals.

26. Willow Tit (*Parus montanus* Baldenstein, 1827). Common species. Flocks of 10-20 puffins were seen daily on the route from 16-19 July in 2021. The density was 3.33 ind/km². The average density

for all years was 1.01 ind/km². The abundance ranged from 18-60 individuals.

27. Great Tit (*Parus major* Linnaeus, 1758). One of the most common species. In 2012 we found a nest of tits (Fig. 5). In 2017, several individuals were observed on 29 May at an overnight site. The density was 0.62 ind/km². In 2021, daily from 16-20 July, tits were widely represented along the route by single individuals and flocks of 10-20 birds. The density was 4.17 ind/km². The mean density in all years was 1.51 ind/km². We registered 15-90 birds.



Figure 5. *Parus major* on the nest. Photo by S.V. Vazhov.

Passeridae

28. Eurasian Tree Sparrow (*Passer montanus* Linnaeus, 1758). Very rare species, was observed as a solitary bird on 15 and 18 July 2021. The density was 0.11 ind/m². The mean density for all years was 0.03 ind/km². The numbers could not be estimated using these data.

Fringillidae

29. Common Chaffinch (*Fringilla coelebs* Linnaeus, 1758). Rare species. In 2017, several finches were counted at an overnight roost on 29 May. The density was 0.62 ind/km². In 2021, it was observed sporadically during overnight stays on 16 to 17 July and during the day on 17 July. The density was 1.67 ind/km². The average density for all years was 0.75 ind/km². We registered 15-30

individuals.

30. European Greenfinch (*Chloris chloris* Linnaeus, 1758). Very rare species. It was counted on 19 and 20 July 2021 on the route and during an overnight stay. The density was 0.17 ind/km². The average density for all years was 0.08 ind/km². We registered 3-5 individuals.

31. Goldfinch (*Carduelis carduelis* Linnaeus, 1758). Rare species . One or two birds were observed on the survey route on 17, 19 and 20 July 2021. The density was 0.23 ind/km² . The average density for all years was 0.11 ind/km². We registered 4-7 individuals.

32. Common Redpoll (*Acanthis flammea* Linnaeus, 1758). A very rare species. One and two individuals were observed on the route on 17 and 18 July 2021, respectively. The density was 0.17 ind/km². The average density in all years was 0.08 ind/km². We registered 3-5 individuals.

33. Common Rosefinch (*Carpodacus erythrinus* Pallas, 1770). Rare species. Spotted on 29 May 2017, density was 0.04 ind/km². In 2021, rosefinches were identified by voice: one individual at the rookery site on 17 July, two individuals along the route on 18 July, and another individual at the rookery site on 19 July. The density in 2021 was 0.28 ind/km². The average density for all years was 0.17 ind/km². We registered five individuals.

34. Red Crossbill (*Loxia curvirostra* Linnaeus, 1758). Common species. It was widely represented in flocks of 10-20 birds daily from 17-20 July on the route and at the resting places in 2021. The density in 2021 was 2.26 ind/km². The average density for all years was 1.13 ind/km². We registered 41-67 birds .

35. Hawfinch (*Coccothraustes coccothraustes* Linnaeus, 1758). Very rare species. We recorded two sightings of one specimen each on 19 and 20 July 2021. The density was 0.11 ind/k² in 2021. The average density for all years was 0.06 ind/km². However, the abundance could not be estimated using these data.

Conclusions

The summer population (nesting) of Passerine birds in the "Bolsherechenskii" reserve in the valley of the Bolshaya Rechka River consists of 35 species belonging to 12 families. The reserve includes 15 rare bird species. A brief review of rare passerines suggested expanding various ornithological research in the Verkhneobskoye forest to improve biodiversity protection measures.

Acknowledgements

The authors thank A.V. Gribkov and L.V. Pozhidaeva for their financial and technical help in organizing field studies. The authors are also grateful for the efforts of the individual expedition participants, R.F. Bakhtin, Ph. Bakhtin, V.N. Kozil, student N.A. Kolotov and high school student A. Bepalov. V. Vazhov and S. Vazhov were partially supported in 2012 by the Global Green Grants Fund grant, Project "Let us save the raptors of the Upperobian bog!", and in 2017 by Lash-Rasha LLC.

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