Nordmann's Greenshank and Redshank Breeding Ecology Study in the Bay of Schast'e, Sea of Okhotsk, Russia

project report

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Introduction

The research team that took part in fieldwork in Schaste Bay consisted of the following individuals: Vladimir Pronkevich, Vladimir Roslyakov (Institute of Water and Ecology Problems, Far Eastern Branch, Russian Academy of Sciences, Khabarovsk), Konstantin Maslovskii (Federal Center of Biodiversity of East Asia, Vladivostok), Philipp Maleko (University of Florida, Florida Cooperative Fish and Wildlife Research Unit), Aleksey Kalchenko, and Boris Tutin (Nikovaevsk-on-Amur). The analysis of lichen species found in the Nordmann's Greenshank's nest was conducted by Irina and Boris Skirins (The Geography Institute, Vladivostok) definition of plants - Doctor of Biological Sciences Maria Kryukova (Institute of Water and Ecology Problems, Far Eastern Branch of the Russian Academy of Sciences).
The purpose of the project: To study the endangered Nordmann's Greenshanks (*Tringa guttifer)* and Common Redshanks (*Tringa tetanus)* breeding ecology in Schaste Bay, South-western Sea of Okhotsk, Russia, with the hopes of learning more about the biology of an endangered species on the brink of extinction.
Timeline:
May 15th: departed via automobile from Khabarovsk to Nikolaevsk-on-Amur;
May 16th: arrived to Nikolaevsk-on-Amur;
May 17th: arrived to Schast'e Bay (Iska River entry, village Vlasyevo). Established a temporary field camp at the Iska River entry and conducted avian surveys from the Iska River entry to the mouth of Zimnik River. It was necessary to establish the temporary camp in order to wait for high tide, which would allow us to reach the main basecamp located near the Zimnik River mouth by boat.
May 21st: transported the research team and field equipment to the main base camp by a motorized rubber-inflatable boat;
May 21st- July 28: conducted field work at the Western part of the Schaste Bay;
July 2-7th: examined the south-west bank of the Schast'e Bay using two motorboats;
July 28th: transported the research team and field equipment to Vlasyevo village and the city of Nikolaevsk-on-Amur;
July 29-30: departed from Nikolaevsk-on-Amur to Khabarovsk.
Materials and methods
The winter of 2018-2019 was relatively snowless and not too windy; therefore, by the time we started our fieldwork, a significant area of the study site was already free from snow cover. Small patches of snow blown in by the wind were preserved on the border of the coastal meadow and the forest line. By the beginning of field work, the western part of Schast'e Bay was freed from ice cover, as well (fig.1).
During the field work, the weather was relatively warm with little rainfall. In the second half of July, the height of the grass in the areas of the coastal meadow adjacent to the forest reached 1.5 meters tall (fig. 2-3).
Our research activities started in 2018. We chose a section of the West coast of Schaste Bay (the South-west Sea of Okhotsk) near the mouth of the Zimnik River as a model site for the study of the nesting biology of two types of sandpipers: the Common Redshank and Nordmann's Greenshank. This site is relatively accessible for field work, as it is located 40 km away from the city of Nikolaevsk-on-Amur, and only a short 20 minute boat ride from the village of Vlaseyvo.
In 2018, some biology features of the two species were revealed, such as the phenology of certain life-history parameters; and several possible methods for catching birds was also developed. Common Redshanks, a widespread sandpiper throughout Eurasia were chosen as a model species for testing research methods to study the biology of endangered Nordmann's Greenshank.
In 2018, we tagged 8 Common Redshanks with light-level geolocators. In 2019, out of the 8 tagged birds, we successfully retrieved geolocators from 6 individuals. At present, information

on the migratory routes; wintering, staging, and stopover locations recorded by the geolocators is being transcribed.
The search for Common Redshank nests was conducted by combing suspected suitable nesting areas. We successfully found 23 nests of Common Redshanks in the control area between the mouths of Zimnick River and Serebrenyi River; and 7 more Common Redshank nests were found in the coastal meadow adjacent to Chernaya River, Avri River and Komel River in the south-west part of Schast'e Bay. The most significant discovery of 2019 was the inhabited nest of a Nordmann's Greenshank on June 17, 2019. Before that, only 5 nest of the species have ever been found by a single researcher, Vitaly Nechaev, in Northern Sakhalin Island, 1976. No other nests of this bird have ever discovered throughout the whole history of ornithological research, until our research efforts in Schast'e Bay, 2019.
The bird nests we found were described according to generally accepted methods.
In addition, temperature loggers (i-Button) were used to study the species incubation regime. Currently, the process of transcribing data from the temperature loggers is still ongoing. Common Redshanks were caught mostly on the nests via automatic and semiautomatic traps. Altogether, we caught 17 adult Common Redshanks. The birds were tagged with metal bands, yellow and red engraved-flags, and two individual colored plastic bands.
Our multiple attempts to capture adult birds on the tidal mudflats during the spring migration period and during the nesting period were unsuccessful. When the birds were near their chicks, we were able to capture them with mist-nets (placing peeping chicks under the nets), and also with the aid of semiautomatic bow-nets, placed on top of elevated tables (fig. 4-5).

All birds were examined and measured. Feather samples were taken from all captured adult birds and blood samples were taken from several birds for genetic analysis. Nordmann's Greenshank adults were caught only near their chicks when the birds left their vast moss swamps and headed to the coastal meadows for improved foraging conditions in July. Altogether we caught 7 adult species of Nordmann's Greenshank and 8 downy chicks. Adult birds were tagged with metal bands, red engraved-flags, and two individual color bands.
To observe the nesting biology of Common Redshanks an attempt to use photo traps was made, but due to the high rate of nest abandonment and depredation from ravenous Large-billed Crows, we had to abandon this idea.
This report uses photographs by V. Pronkevich, K. Maskovsky and P.Maleko.

Fig. 1. Thawing of ice on the surface of the Sea of Okhotsk (June 2, 2019).

Fig. 2. Mouth of Zimnik River.

Fig. 3. Base camp near the mouth of Zimnik River

Fig. 4. Elevated bow-net table to catch Nordmann's Greenshanks and Common Redshanks.

Fig. 5. In the process of placing a mistnet to catch Nordmann's Greenshanks with downy chicks as decoys.

First arrival dates of studied species

The arrival of the first Common Redshank (*Tringa totanus)* occurred before our arrival to Schaste Bay. Information from local hunters reveals that the first Common Redshank arrived to the Western part of the bay between the 10th and 15th of May.

The first Nordmann's Greenshanks (Tringa guttifer) arriving to the breeding grounds were detected by us on the 22nd of May at the mouth of the Serebryanyy River.

The start of breeding and mating vocalizations

The first breeding behaviors of Common Redshanks were noted on the 24th of May. The mating call of the birds were produced immediately upon arrival to the mating grounds. In previous years mating calls of this species were recorded on migratory sites along inland sites.

Mating calls of male Nordmann's Greenshanks *(Tringa guttifer)* were also heard upon their immediate arrival to the breeding grounds in Schaste Bay. The first mating of the Greenshanks were observed on the 25th of May. The mating event of one pair lasted between 5 to 7 seconds. The same day we noted the first undulating mating flights of a lone male, as well as a group of three males. Throughout the whole season, the greenshanks were most active in their mating calls on the 27th of May. The first mating of another common shorebird in Schaste Bay- the Black-tailed Godwit (*Limosa limosa)* - was noted on the 24th of May.

On June 11 our research team conducted a survey throughout the entire day of mating calls produced by the Nordmann's Greenshanks throughout the study site. This day was overcast with morning temperature at +8º C, and a maximal temperature of +15ºC for the rest of the day. Sunrise was at 2:45 am. The first mating call was noted at 4:48am. Maximal activity occurred between the hours of 5 and 6 am (21% of all mating calls heard that day). From 10 to 11 am the overcast weather cleared. Perhaps due to this weather change a surge in mating calls of

Nordmann's Greenshanks occurred between the hours of 11am and 1pm (28.75% of mating calls were heard during this time period) (table 1). During the night, no mating calls were heard.
The study site occurred between the mouths of two rivers: Serebrenyy River to the North and Zimnick River to the South (approximately 2 kilometers apart). 97.5% of all mating calls heard throughout the day came from the area between our base-camp in the middle and the mouth of the Serebrenyy River. The last in 2019 voice of the male of Nordmann's Greenshanks was noted by us on July 25.

Table 1

Mating call activity of male Nordmann's Greenshanks (amount of mating calls per hour) on different areas of the study site. 11 June, 2019.

Period of Surveys (hours)	Area 1- mouth of Zimnick River	Area 2- mouth of Zimnick River to base camp	Area 3- base camp to the mouth of Serebrenyy River	Total	Percent of Total (%)
4–5	—	—	3	3	3,75
5–6	1	—	16	17	21,25
6–7	—	—	1	1	1,25
7–8	—	—	1	1	1,25
8–9	—	1	6	7	8,75
9–10	—	—	4	4	5,0
10–11	—	—	9	9	11,25
11–12	—	—	12	12	15,0
12–13	—	—	11	11	13,75
13–14	—	—	—	—	—
14–15	—	—	8	8	10,0
15–16	—	—	3	3	3,75
16–17	—	—	1	1	1,25
17–18	—	—	—	—	—
18–19	—	—	3	3	3,75
After 19:00 no mating calls were heard					
Total:	1	1	78	80	100,0

The distribution of Common Redshank nests in the control plot

In the control plot over the entire period of field work, 23 nests of the Common Redshank were found (fig. 6, table 9-12). Of these, 22 nests were found in a coastal meadow and 1 nest in a moss swamp. In addition, 7 Common Redshank nests were found in the southwestern part of the bay (Fig. 8). Under nests, birds occupy elevated areas. More often nests were arranged on small bumps. In the control plot of the meadow, 60% of the nests were tied to a micro elevation of the relief, on which there were numerous traces of the movement of tracked all-terrain vehicles.

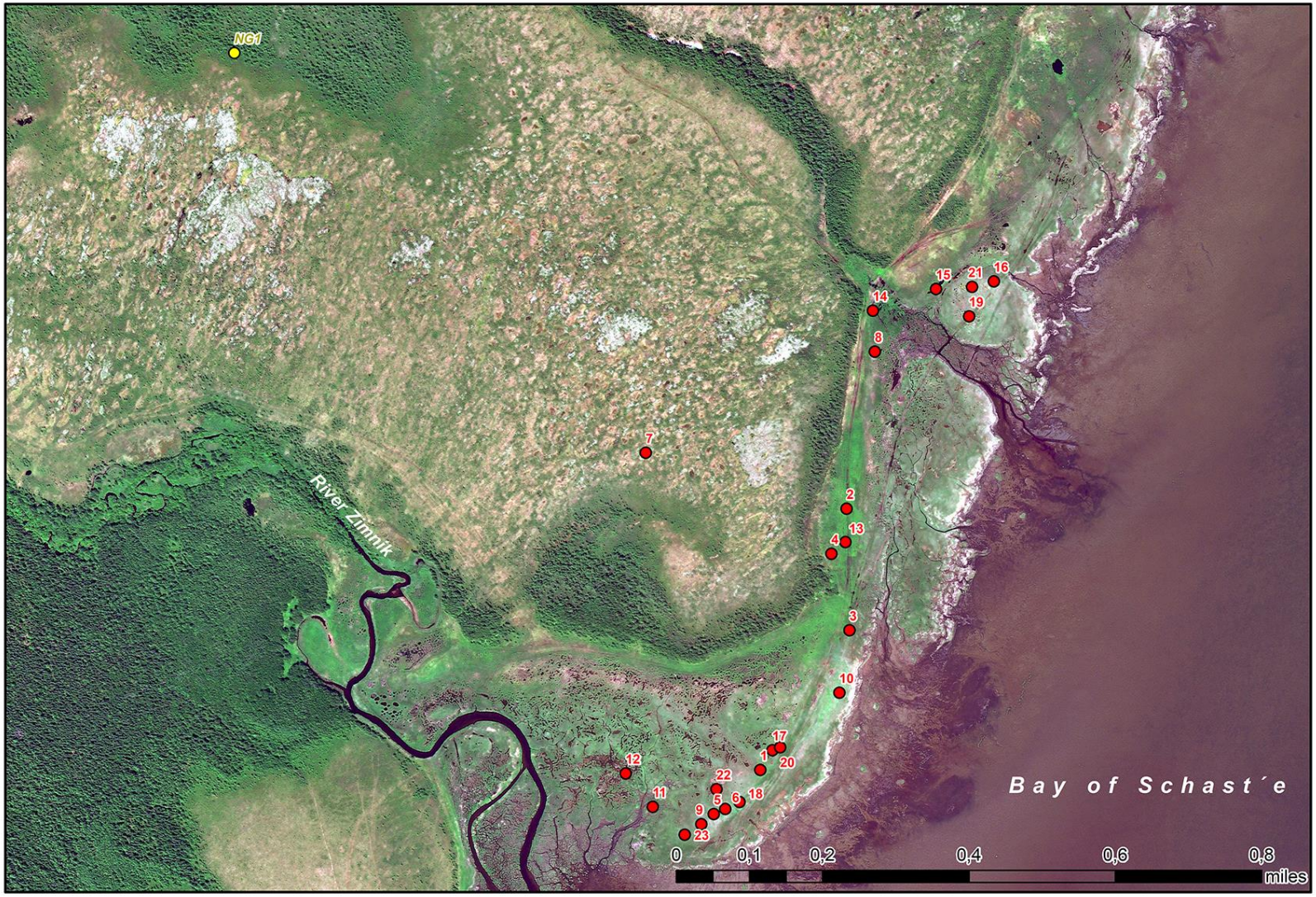

Fig. 6. Location of Common Redshank nests (red dots) and Nordmann's Greenshanks (yellow dot) at the control site near the mouth of the Zimnik River in 2019 (the numbers indicate the serial number of the nest).

The influence of predatory animals on the success of breeding of the studied species

Large-billed Crow (Corvus macrorhynchos) does the most harm to the nests of the studied species. Of the 23 nests of the Common Redshank whose history was able to trace 13 nests were devastated by predators (fig. 7). The only nest of Nordmann's Greenshanks that we managed to find was also devastated by a Large-billed Crow.

In 2019, the abundance of Large-billed Crow was 2–3 times higher than in 2018. The reasons for this phenomenon are unknown to us. In 2019, the list of predatory animals that we identified in 2018 was replenished with another species - Wolf Wolf (Canis lupus). In early July, at the control site, we noted a brood of these animals, consisting of 4–5 individuals.

On July 27, 2019, on the border of the coastal meadow and the tidal zone, we found feathers from a dead bird, probably a chick of Nordmann's Greenshank. We suggest that the chick was preyed by a swamp owl, recorded in this area.

Fig. 7. Common Redshank destroyed eggs.

The number of Nordmann's Greenshanks in various sections of the western coast of the Schast'e Bay in 2019

The numbers of Nordmann's Greenshanks in selected sections near the base camp are shown in the table 2.

Table 2

The number of Nordmann's Greenshanks in various sections of the western coast of the Schast'e Bay in 2019 (in pairs, males and individuals)

Plot	24.05	25.05	26.05	27.05	29.05	31.05	6.06	01.06	02.06	07.06	08.06	9.06	10.06	2-4.07	21.07	22.07	23.07	26.07
Zimnick River to base camp	?	?	5	5	1♂	2♂ 2 pairs	?	?	?	?	2♂	1 pair 1♂	1♂	?	1	1	?	—
Base camp to the mouth of Serebrenyy River	?	3 pairs	?	2♂	3♂	4 pairs	4 pairs	?	?	4 pairs	1♂	2♂	1♂	18-56	1	2	?	1
Mouth R. Vonuchii	?	?	?	?	?	?	?	1 pairs	1 pairs	?	?	?	?	?	?	?	?	?
Base camp — foundation of the spit Petrovskaya	9♂	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?

Note:

? - means no accounting;

— - means no birds were observed.

2019 Surveys of Nordmann's Greenshank (*Tringa guttifer)* brooding areas along the shoreline of Schast'e Bay

From the 2nd to the 5th of July 2019, with the help of two motorized boats, we surveyed the South-western shoreline of Schaste Bay from the mouth of the River Iska to the inland areas of Kospakh, with the goal of detecting brooding Nordmann's Greenshanks (fig. 8-11). During the survey period the weather was clear and sunny, but with very strong sustained winds. Before this date, surveys of sections of the area were surveyed during the beginning of July 1993, and between late June and early July 2009. This area was surveyed in early April of 2019 by snowmobile, with the intention of finding hunting cabins to lodge in during the summer surveys (Pronkevich et al., 2011). The area South of Kommel River has never been surveyed during summer.

During this survey the brooding areas of Nordmann's Greenshanks were identified on coastal meadows connected to the mouths of several rivers: Black River, Avri River, and Komel River.

Mouth of Avri River: On the 2nd of July, approximately 0.7 kilometers north of the river, a lone Nordmann's Greenshank was observed feeding on the tidal mudflat. On the same day near the mouth of the river another lone individual was foraging in the tidal mudflat. Neither birds displayed any behaviors typical of birds near chicks, such as alarm calling. Nevertheless, we hypothesize these two individuals could represent two mating pairs located in the region.

Chernay River: On the coastal meadow just West of Black River, another lone Nordmann's Greenshank was detected on the evening of the 2nd of July. On the morning of the 3rd, a flying greenshank was observed, producing a mating call as he flew over a larch forest on the right side of the river. By these observations we determined that in this section of Schaste Bay two pair of greenshanks inhabit the area.

Area of coastal meadow adjacent to the mouth of Komel River: On the 4th of July, a large portion of this section was surveyed for the first time during the summertime. 11 adult Nordmann's Greenshanks were recorded along the mudflat and coastal meadow throughout this survey. Of these 11 birds, 6 individuals held together in pairs, while 5 were not observed to belong to a pair. We hypothesize that all birds observed in this area could have represented 8 breeding or brooding pairs. All birds displayed behaviors typical of brooding individuals near their respective chicks. In 1993, only a small section of the River Kommel was surveyed, with no recorded alarming greenshanks; thus, we believe this is a newly described area of breeding Nordmann's Greenshanks.

West of the mouth of Komel River, we recorded 10 individual adult greenshanks. Of these 10, 6 birds were in pairs and 4 birds were single. We hypothesize that in this section of Schaste Bay 7 pairs of greenshanks are possible.

Fig. 8. The schamatic of surveys by boat and by foot of potential brooding areas of Nordmann's Greenshanks in Schast'e Bay during 2019. Location of Common Redshank nests found in the southwest coast Schast'e Bay in 2019 (numbers indicate the number of the nest).

Fig. 9. Chernaya River near the mouth.

Fig. 10. A coastal meadow near the mouth of Avri River.

Fig. 11. Mouth of Komel River during low tide.

Beginning of the migration of Nordmann's Greenshanks towards wintering

On July 8–9, 1993, in the Bay of Schast'e, on a section of a coastal meadow between the mouths of the Komel and Iska Rivers (35 km), we took into account 278 individuals of the Nordmann's Greenshanks, among which approximately 40 birds showed concern - were local, the remaining 238 individuals were kept in groups and, probably were passing (Pronkevich, 2008). In the first ten days of July 2018, up to 7 migrating individuals (except local birds) were not disturbed at the mouth of the Serebryany R. in the territory of the area under our control. In the period from July 2 to July 4, 2019, 18 to 56 migrating Nordmann's Greenshanks were noted at the mouth of this river. Probably, migratory birds appearing on the coast early are represented by immature birds that have lost their clutches or broods.

Description of Nordmann's Greenshanks nest

The residential nest of Nordmann's Greenshank was discovered on June 17, 2019 in a fragment of a larch forest measuring 1.35 x 0.53 km in the interfluve of Zimnik and Serebryany at a distance of 1.8 km from the sea shore (fig. 12-19). When a nest was found, the bird sat tightly on the eggs. She closely let people in and did not fly off during a multiple walk around the tree. On June 27, at the next inspection of the nest, it turned out to be abandoned. No eggs were found in the nest. The nest was probably ravaged by a crow. The nest of Nordmann's Greenshank was located on the southeastern side of Larix cajanderi larch with a diameter at the height of a person's chest 130 cm. Tree height 14 m. The tree is located in a sparse shrub larch forest 13 m from its southern edge, which passes into a bush-moss swamp (N 53.480700 ° E 140.894100 °). 100 m south of the tree from the nest there is a swamp with reindeer moss lichens. The first dry branches on a tree are located at a height of 1 m from the surface of the earth. The crown of the tree has a non-symmetrical shape - in the lower tier there are more branches on the south side, in the upper tier - they evenly depart from the trunk.

Trees are not closed, neighboring trees are at a distance of 2, 5, 5, 3 m from a tree with a nest. Their diameter is 5–22 cm. Betula middendorffii, Duschekia fruticosa up to 5 m high are spread in the canopy. In the shrub layer, prevails Ledum decumbens, L. palustre, the projective cover of which reaches 80-90%. Salix caprea, Vaccinium uliginosum, Myrica tomentosa, and rarely Pinus pumila are singly observed. The grass-shrub layer is represented by a rare Calamagrostis langsdorffii, Carex pallida, C. lapponica, Rubus chamaemorus.

The nest was located on a dry branch at a distance of 83 cm from the trunk. The diameter of the branch at its base is 3.2 cm. From above, the nest is covered by a "paw" formed by a living branch. The height of the nest from the surface of the earth is 370 cm. The length of the branch on which the Nordmann's Greenshank nest is located is 250 cm. Its width is 180 cm. The distance from the branch on which the nest is located to the higher branch is 40 cm.

The nest has a loose structure and is visible when viewed from below. The height of the nest is 4 cm, the diameter is 23 x 23 cm, the diameter of the tray is 13 x 12 cm, and the height of the side is 3 cm.

Below the nest of 100 cm is a dead branch. The basis for the nest is a dry branch with a fork and a "panicle" of small dry branches. Such a thick whisk is a natural formation. A relatively large branch, which is also the base of the nest, was introduced (or dropped) to the fork. This branch is woven into the structure of the nest. On the "panicle" that also forms the basis of the nest, even before the nest was formed, a certain number of lichens grew. The next layer is made up of small branches of larch brought by a bird or fallen from the upper tiers of a tree, on which lichens have also grown. These branches are woven into the general structure of the nest and partially woven by a bird, partially fused together by lichens of the genus Bryoria (Bryoria fuscescens). The process of such accretion (Bryoria forms special attachment organs - hapters) requires a long time, much more than two weeks. Most of the lichens of the genus Evernia (Evernia mesomorpha) were introduced to the nest, because, judging by the photo, it is not found near the

nest, or it is distributed in very small numbers. On the underside of the nest there is Bryoria fuscescens dead who died. It is unknown whether it was introduced from the outside or was there earlier, but died after the construction of the nest.
List of lichens found in the nest:
1. *Bryoria fuscescens* (Fr.) Brodo et D. Hauksw.;
2. *Melanohalea olivacea* (L.) O. Blanko, A. Crespo et Al;
3. *Lecanora symmicta* (Ach.) Ach.;
4. *Evernia mesomorpha* Nyl.;
5. *Hypogymnia sachalinensis* Tchaban. & Mc.

In the post-nest period of 2019, the nest was removed from a tree and taken for research.

Description of the nest *Lanius cristatus*, Brown Shrike

On the above tree, 465 cm above the surface of the earth, another nest was found, presumably belonging to Lanius cristatus, Brown Shrike (fig. 20-21). The non-residential nest is located near the trunk on two living branches. The diameter of the tree at the nest is 17 cm. The height of the nest is 7 cm. The diameter of the nest is 22 x 15 cm, the diameter of the tray is 13 x 11 cm, the height of the nest is 3.5–4.0 cm. Lichens and needles are found in small numbers in the nest tray, Pinus pumila. The main building material for the nest was dry branches of larch (Larix cajanderi). The nest tray is lined with sedge (Carex sp.), Needles of larch (Larix cajanderi) and cedar dwarf pine (Pinus pumila). In addition, inflorescences of vaginal cotton grass (Criophorum vaginatum) were present in the tray. The nest in the structure and composition of building material is very different from the nest of Nordmann's Greenshank.
In the post-nest period of 2019, the nest was removed from a tree and taken for research.

Fig. 12. A fragment of the larch forest in which the nest of Nordmann’s Greenshank was found.

Fig. 13. A fragment of the larch forest in which the nest of Nordmann’s Greenshank was found.

Fig. 14. Moss swamp.

Fig. 15. Lumpy swamp.

Fig. 16. Nest of Nordmann’s Greenshank.

Fig. 17. Clutch of Nordmann’s Greenshank.

Fig. 18. The Nordmann’s Greenshank on the nest.

Fig. 19. Nordmann’s Greenshanks nest.

Fig. 20. Brown Shrikes nest.

Fig. 21. Brown Shrikes nest.

Tagging Nordmann's Greenshank and Common Redshank

A total of 7 Nordmann's Greenshank adults and 8 downy chicks were captured (fig. 22-26, table 3-8.). Adult birds were marked with a metal ring, a red engraved plastic flag and two individual plastic rings. Downy chicks were marked with a metal ring and a red plastic ring. The date and place of capture of adult Nordmann's Greenshank, the scheme of their color marking, dimensional characteristics and the amount of material collected from captured Nordmann's Greenshank are presented in tables 3-5.

Nordmann's Greenshank adults were caught only near the chicks during the period when the birds left the vast moss swamps on the coastal meadows for growing chicks (July). Our numerous attempts to catch adult birds during the spring migration period and in the nesting period in the tidal zone were unsuccessful. Near the chicks, birds were caught using spider webs, planting worrying chicks under them, and with the help of semi-automatic beams mounted on artificial tables set up in the places of the chicks. Chicks were tracked with binoculars and caught manually.

Altogether, we caught 17 adult Common Redshanks. The birds were tagged with metal bands, yellow and red engraved-flags, and two individual colored plastic bands.

Fig. 22. Tagging scheme for adult Nordmann's Greenshank.

Fig. 23. Trapped chicks Nordmann's Greenshank.

Fig. 24. Nordmann's Greenshank down chick.

Рис. 25. Common Redshank down chick.

Рис. 26. Common Redshank down chick.

Table 3

Date and place of capture of adult Nordmann's Greenshank, scheme of their color marking

NOGR ID	Date Captured	Time Captured	North Coordinates	East Coordinates	Metal Band Number	Banding Combination	Red Flag Engraved Code
NOGR1A	July 6	2030	53.47837	140.92349	IS001651	RFE/M:R,DG/-	P1
NOGR1B	July 6	2110	53.47837	140.92349	IS001652	RFE/M:LB,O/-	P2
NOGR2	July 7	1115	53.46761	140.90781	HS012315	RFE/-:LB,R/M	X1
NOGR3	July 10	1845	53.47533	140.92061	HS012322	RFE/-:LB,Y/M	V1
NOGR4	July11	1908	53.47285	140.91873	HS012323	RFE/-:LB,DG/M	P3
NOGR5	July 16	1645	53.46464	140.90880	HS012326	RFE/-:Y,O/M	X2
NOGR6	July 22	1826	53.47122	140.91772	HS012331	RFE/-:Y,R/M	V2

Table 4

Dimensional characteristics of captured Nordmann's Greenshank

NOGR ID	Weight(g)	Culmen (mm)	Nares-to-tip (mm)	Total Head (mm)	Tarsus from Bone	Tarsus from Webbing	Wing unflattened	Wing Flatteded
NOGR1A	144.3	51.2	39.7	89.0	46.3	42.2	174	175.5
NOGR1B	148.5	54.7	42.3	91.3	47.0	44.1	178	182
NOGR2	132	52.4	40.0	86.3	43.4	N/A	175	N/A
NOGR3	151.6	54.6	42.9	91.9	46.4	42.7	180	182
NOGR4	133.0	52.1	39.3	87.2	45.8	43.6	172	175
NOGR5	128.8	49.3	37.9	84.5	45.0	41.7	168	170
NOGR6	142.5	49.3	39.1	84.3	45.0	42.7	170	172

Table5

Dimensional characteristics and volume of material collected from captured Nordmann's Greenshank

NOGR ID	Tail from feather base	Tail from Uropygial Gland	Feathers Collected?	Blood Collected?	Chicks Banded?
NOGR1A	63	68.1	Yes	No	Yes
NOGR1B	55	71.6	Yes	No	Yes
NOGR2	65	66.3	Yes	Yes	Yes
NOGR3	64	71.5	Yes	No	No
NOGR4	63	67.0	Yes	No	No
NOGR5	65	76.9	Yes	Yes	No
NOGR6	60	71.6	Yes	Yes	No

Table 6

Date and place of capture of adult Common Redshank, the scheme of their color marking and some dimensional characteristics

Nest ID	Date Captured	Time Captured	Metal Band Number	Banding Combination	Red Flag Engraved Code	Weight(g)	Culmen (mm)
CORE001	June 21	1333	HS012303	YF,RFE/-:O,DG/M	AE	117.8	41.2
CORE001	June 26	1815	HS012305	YF,RFE/-:R,O/M	AK	116.2	39.1
CORE003	June 21	1010	HS012302	YF,RFE/-:O,Y/M	AC	113.5	40.1
CORE006	June 26	1640	HS012304	YF,RFE/-:O,DG/M	AH	117.3	39.8
CORE008	June 16	1151	HS012301	YF,RFE/-:O,LB/M	AA	131.2	40.1
CORE010	June 28	1200	HS012306	YF,RFE/-:R,LB/M	AJ	118.6	40.1
CORE010	July 9	1932	HS012321	YF,RFE/-:Y,LB/M	AN	110.5	39.2
CORE013	July 4	815	HS012311	YF,RFE/-:R,Y/M	AL	107.0	40.2
CORE016	July 17	2030	HS012327	YF,RFE/-:DG,R/M	AU	117.5	39.4
CORE017	July 12	1940	HS012323	YF,RFE/-:DG,O/M	AT	113.3	40.3
CORE018	July 24	1935	HS012341	YF,RFE/-:Y,DB/M	KJ	112.6	41.1
CORE019	July 23	1645	HS012332	YF,RFE/-:DB,LB/M	KE	107.3	40.6
CORE020	July 12	1940	HS012324	YF,RFE/-:Y,DG/M	AR	113.3	41.0
CORE022	July 18	1858	HS012328	YF,RFE/-:DG,LB/M	AY	116.5	39.5
CORE022	July 22	1230	HS012329	YF,RFE/-:DG,Y/M	KA	120.8	41.8
CORE023	July 22	1340	HS012330	YF,RFE/-:O,DG/M	KC	124.5	40.3
BNTCORE	July 24	1618	HS012335	YF,RFE/-:DB,Y/M	KH	94.7	39.5

Table 7

Dimensional characteristics of captured adult Common Redshank

Nest ID	Nares-to-tip (mm)	Total Head (mm)	Tarsus from Bone	Tarsus from Webbing	Wing unflattened	Wing Flatteded	Tail from feather base
CORE001	32.5	73.9	47.4	44.4	152	153	60
CORE001	31.2	71.6	44.4	41.9	148	151	56
CORE003	31.100	72.5	46.8	45.2	148	151	57
CORE006	31.50	71.6	44.7	42.5	145	147	56
CORE008	31.70	73.2	48.5	45.5	153	155.5	60
CORE010	30.70	72.7	45.7	43.4	150	151.5	57
CORE010	31.4	72.1	46.1	43.3	148.5	150	62
CORE013	32.2	74.0	49.3	43.6	160	162	55
CORE016	31.6	71.3	45.1	42.8	151	153.5	59
CORE017	32.9	72.8	47.7	44.4	148	150	58
CORE018	32.7	73.1	45.5	42.6	152	153.5	60
CORE019	32.2	71.9	43.8	41.0	145	148	56
CORE020	31.0	72.2	47.9	45.9	154	157	53
CORE022	31.4	71.7	47.1	45.6	151	153	58
CORE022	32.4	72.9	45.6	43.2	152	154	58
CORE023	31.70	71.5	44.4	41.8	144	145.5	58
BNTCORE	32.5	71.3	45.3	42.4	146	147.5	57

Table 8

Dimensional characteristics and volume of material collected from captured Common Redshank

Nest ID	Tail from Uropygial Gland	Feathers Collected?	Blood Collected?	Chicks Banded on Nest?
CORE001	62.5	Yes	No	Yes
CORE001	58.6	Yes	No	Yes
CORE003	60.6	Yes	No	No
CORE006	57.6	Yes	No	No
CORE008	63.6	Yes	No	No
CORE010	64	Yes	No	Yes
CORE010	63.2	Yes	Yes	Yes
CORE013	59	Yes	No	No
CORE016	62.1	Yes	Yes	No
CORE017	62.2	Yes	No	No
CORE018	63.9	Yes	Yes	Yes
CORE019	66.4	Yes	No	No
CORE020	60	Yes	No	No
CORE022	61	Yes	No	No
CORE022	65.4	Yes	Yes	No
CORE023	58.7	Yes	Yes	Yes
BNTCORE	60.8	Yes	No	No Nest

Table 9

Characteristics of Common Redshank and Nordmann's Greenshank nests

Nest ID	Date Nest Found	Coordiantes North	Coordinates East	Nest Depth (cm)	Vegetation Height (cm)	Nest Diameter (cm)	Inserted TL?
CORE001	June 08	53.46654	140.91156	N/A	N/A	10x10	Yes
CORE002	June 08	53.47170	140.91441	N/A	N/A	N/A	Yes
CORE003	June 10	53.46930	140.91451	9	19	9x10	Yes
CORE004	June 11	53.47081	140.91391	9	16	9x10	Yes
CORE005	June 12	53.46567	140.91002	6	19.50	9.00x8.5	Yes
CORE006	June 12	53.46577	140.91040	7	17	12x9	Yes
CORE007	June 12	53.47280	140.90775	4	13.50	13x10	No
CORE008	June 12	53.47480	140.91534	8.500	16.50	8.5x10.5	Yes
CORE009	June 18	53.46547	140.90961	3.500	14	9x10	Yes
CORE010	June 21	53.46807	140.91418	N/A	N/A	N/A	Yes
CORE011	June 29	53.46581	140.90800	4.500	19.50	10x9	Yes
CORE012	June 29	53.46647	140.90710	2.500	20	11x10	Yes
CORE013	June 30	53.47104	140.91437	7.00	14	8.5x11	Yes
CORE014	July 1	53.47561	140.91527	3.00	20	7x8	Yes
CORE015	July 1	53.47604	140.91736	4.500	18	9x10	Yes
CORE016	July 2	53.47619	140.91928	4	11	10x11	Yes
CORE017	July 4	53.46693	140.91196	7	17	11x8	Yes
CORE018	July 4	53.46591	140.91087	4.500	11	10x9	Yes
CORE019	July 5	53.47550	140.91846	4	14	10x11	Yes
CORE020	July 10	53.46699	140.91222	5	16	12x11.5	Yes
CORE021	July 10	53.47608	140.91856	3.500	15	10.5x10	Yes
CORE022	July 12	53.46616	140.91011	3	20	11x10	Yes
CORE023	July 18	53.46526	140.90906	0.5	N/A	8.5x8	No
NOGR01	June 17	53.48068	140.89410	3.500	4.500	17x17	Yes

Table 10

Characteristics of Common Redshank and Nordmann's Greenshank nests

Nest ID	Fate	Maximum # of Eggs	Egg 1 Width	Egg 1 Length	Egg 1 Weight (g)	Float Angle	Below Surface?	Egg 2 Width	Egg 2 Length
CORE001	Hatched	4	30.80	45.6	N/A	15	Yes	31.70	46.0
CORE002	Depredated	4	30.00	44.1	N/A	15	Yes	31.00	43.80
CORE003	Depredated	4	30.60	45.4	21.50	15	Yes	30.70	45.9
CORE004	Depredated	4	29.60	43.3	19.50	15	Yes	30.00	43.20
CORE005	Depredated	4	29.100	41.2	17.60	N/A	N/A	29.70	42.40
CORE006	Depredated	4	30.00	44.3	19.70	N/A	N/A	30.50	43.40
CORE007	Depredated	4	29.40	44.1	19.20	35	Yes	30.30	43.1
CORE008	Abandoned	4	30.30	45.0	20.30	20	Yes	30.40	45.0
CORE009	Depredated	4	31.20	43.70	20.0	89	Yes	31.50	43.1
CORE010	Hatched	4	30.90	42.50	20.20	15	Yes	31.40	43.3
CORE011	Depredated	4	30.20	46.3	20.70	20	Yes	29.90	44.7
CORE012	Depredated	4	29.80	44.8	19.60	20	Yes	29.00	44.6
CORE013	Depredated and Abandoned	3	29.20	43.40	17.90	80	No-3mm	29.90	44.9
CORE014	Depredated and Abandoned	4	31.100	45.4	N/A	15	Yes	30.70	45.3
CORE015	Depredated	4	30.30	43.6	20.00	20	Yes	30.500	44.3
CORE016	Hatched	4	31.00	42.4	20.30	N/A	N/A	30.30	42.4
CORE017	Abandoned	3	30.90	41.9	20.00	15	Yes	30.50	42.6
CORE018	Hatched and Abandoned	3	29.90	42.5	18.20	35	Yes	31.80	43.9
CORE019	Abandoned	4	29.80	45.1	19.40	15	Yes	29.80	43.50
CORE020	Active	4	29.80	43.9	19.50	15	Yes	28.60	43.7
CORE021	Depredated	3	29.20	41.3	17.40	20	Yes	29.00	43.50
CORE022	Abandoned	3	29.70	43.6	19.50	35	Yes	30.70	44.3
CORE023	Hatched	4	31.100	43.6	18.40	80	No-4mm	31.100	42.5
NOGR01	Depredated	4	34.90	49.0	29.70	45	Yes	34.30	49.40

Table 11

Characteristics of Common Redshank and Nordmann's Greenshank nests

Nest ID	Egg 2 Width	Egg 2 Length	Egg 2 Weight	Float Angle	Below Surface ?	Egg 3 Width	Egg 3 Length	Egg 3 Weight	Float Angle	Below Surface ?	Egg 4 Width	Egg 4 Length	Egg 4 Weight	Float Angle	Below Surface ?
CORE001	31.70	46.0	N/A	15	Yes	31.30	46.0	N/A	15	Yes	30.50	45.5	N/A	N/A	N/A
CORE002	31.00	43.80	N/A	15	Yes	31.20	44.5	N/A	15	Yes	30.60	45.2	N/A	N/A	N/A
CORE003	30.70	45.9	21.50	15	Yes	30.40	45.2	21.0	15	yes	30.100	45.3	20.50	N/A	N/A
CORE004	30.00	43.20	19.60	15	Yes	30.00	42.2	19.40	15	Yes	30.100	43.0	19.90	N/A	N/A
CORE005	29.70	42.40	18.50	N/A	N/A	29.80	41.4	17.90	N/A	N/A	29.80	40.8	18.30	N/A	N/A
CORE006	30.50	43.40	20.40	N/A	N/A	30.100	45.2	21.20	N/A	N/A	30.60	43.40	20.40	N/A	N/A
CORE007	30.30	43.1	19.40	30	Yes	30.40	41.9	19.20	35	Yes	30.100	41.9	19.0	35	Yes
CORE008	30.40	45.0	21.00	35	Yes	30.20	45.0	21.00	30	Yes	30.50	43.4	20.80	35	Yes
CORE009	31.50	43.1	19.50	89	Yes	31.80	44.0	20.50	89	Yes	31.30	43.60	20.100	80	Yes
CORE010	31.40	43.3	21.50	15	Yes	30.100	43.2	20.30	N/A	N/A	31.40	42.70	21.20	N/A	N/A
CORE011	29.90	44.7	19.70	20	Yes	29.70	43.6	19.40	20	Yes	N/A	N/A	N/A	N/A	N/A
CORE012	29.00	44.6	18.50	15	Yes	29.100	44.6	18.90	15	Yes	28.60	42.2	17.30	N/A	N/A
CORE013	29.90	44.9	18.60	80	No-3mm	29.30	43.9	N/A	85	No-2mm	N/A	N/A	N/A	N/A	N/A
CORE014	30.70	45.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CORE015	30.500	44.3	20.20	20	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CORE016	30.30	42.4	19.50	N/A	N/A	30.30	43.3	19.40	N/A	N/A	30.100	43.5	19.90	N/A	N/A
CORE017	30.50	42.6	20.50	15	Yes	30.80	41.9	19.70	15	Yes	N/A	N/A	N/A	N/A	N/A
CORE018	31.80	43.9	21.50	40	Yes	31.80	43.7	21.50	45	Yes	N/A	N/A	N/A	N/A	N/A
CORE019	29.80	43.50	18.20	15	Yes	29.00	44.80	18.40	20	Yes	30.00	44.1	19.60	N/A	N/A
CORE020	28.60	43.7	18.40	15	Yes	30.00	44.0	19.30	15	Yes	N/A	N/A	N/A	N/A	N/A
CORE021	29.00	43.50	17.70	20	Yes	29.60	42.9	18.100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CORE022	30.70	44.3	21.00	30	Yes	30.60	44.0	20.30	45	Yes	N/A	N/A	N/A	N/A	N/A
CORE023	31.100	42.5	18.30	85	No-3mm	31.50	43.3	18.60	85	No-3mm	N/A	N/A	N/A	N/A	N/A
NOGR01	34.30	49.40	29.20	45	Yes	34.60	48.6	29.50	35	Yes	33.40	49.6	27.50	35	Yes

Table 12

Characteristics of Common Redshank nests and clutches found on the southwestern coast of Bay of Schast'e from July 2 to 5, 2019

Data	Coordiantes North	Coordinates East	Egg Weight (gr)	Egg sizes	Nest Diameter (cm)	Nest height (cm)	Nest Depth (cm)
June 2	53.40399	141.02417	18,7 18,0 17,11 17,0	45,4x20,0 44,0x29,7 43.0x29,2 42,2x29,6	9,5x10,0	16,5	5,0
June 2	53.40236	141.04247	18,6 18,2 19,1 18,5	44.9x29.3 44.3x29,4 44.3x29,8 44,0x29,3	9,5x10,0	11,0	4,0
June 3	53.39460	141.09821	18,7 17,4 19,5 18,5	43,5x29,6 40,8x29,6 43,4x30,0 42,6x29,5	10,0x10,0	12,0	3,0
June 3	53.39193	141.09643	19,9 20,2 20,6	42,9x20,5 43,6x30,3 44,2x30,7	10,5x11,0	16,0	6,0
June 3	53.38932	141.09409	16,8 20,1 19,3 19,3	41,5x30,4 45,7x29,9 44,6x29,4 43.5x30,1	11,0x10,0	16,0	5,5
June 3	53.38038	141.08870	18,2 18,0 17,7 17,4	41,0x29,7 40,7x29,6 41,6x29,7 41,7x29,6	11,0x10,0	14,5	5.0
June 4	53.31507	141.19325	20,5 20,8 21,0 20,8	43,9x30,5 43,8x30,9 44,9x30,4 44,0x30,6	9,0x10,0	25,0	3,0

Start of Nordmann's Greenshank and Common Redshank flights

The first flying chick of Nordmann's Greenshank in 2019 was recorded by us on July 24. This happened on the section between our base and the mouth of the Zimnik Rever. The bird sat on the border of a short coastal meadow and tidal zone. When a person approached the bird, it silently took off and flew to the tidal zone 30 meters from the meadow. A flying chick on the chest has no spots on the chest. The head has a gray color and chicks feathers are present on it. Beak and wings are much shorter than in adult birds.
The next case of a meeting with a flying chick of Nordmann's Greenshank (possibly the same thing) occurred on July 25 on the coast from our base to the Serebryany River.
On the same day, two flying chicks of Nordmann's Greenshank were met north of Serebryanyy River. All the chicks of the Nordmann's Greenshank met were unlabeled. At this time, we did not see their parents near the chicks.

We were not able to meet Common Redshank flying chicks. This was probably due to the death of chicks from predators.

Fig. 27. Nordmann's Greenshank chick who can fly.

Prospects for further research

In 2019, we managed to find only one Nordmann's Greenshank nest. The process of finding nests is associated with high labor costs. The nest found was located 1.8 km from the seashore. Probably other nests are also located several kilometers from the sea. We think that the search for nests should be carried out using miniature satellite transmitters. This will significantly increase work efficiency. But, considering that Nordmann's Greenshank is an extremely rare species, it is necessary in subsequent years to catch the birds again to remove the transmitters.

In addition, there remains an unresolved question of how to monitor Nordmann's Greenshank nests. The nest we found in 2019 was devastated by a large-billed crow. It is highly likely that new nests found by researchers will also be ravaged by predators. We think that the solution to this problem is impossible without the use of modern technology for observation. Probably, these should be video tracking devices - miniature remote video cameras. Otherwise, we risk harming the nests of Nordmann's Greenshank. Researchers should not approach the nests of this bird during the nesting period.

The following publications were made on the topic of research:

In a scientific journal:

Pronkevich V.V. New data on rare birds of Khabarovsk Kray // Bulletin of the Northeast Scientific Center of the Far Eastern Branch of the Russian Academy of Sciences. № 2, 2019. 89–98 p.

Newspaper publications:

1. Platoshkina N.S. These travelers know no bounds // Newspaper TOЗ 9.10.2019, P. 3.
2. Trutnev S. Nordmann's Greenshank, live! // Newspaper Amursky Liman № 38, 18.09.2019. 13 p.
3. Weintraub K. A Rare Greenshank is Spotted in Russia // Newspaper The New York Times, 31.08.2019. (http://www.nytimes.com/2019/08/31/science/rare-bird-nordmann-greenchank-russia.html).

TV report:

Reporting on the television channel "Russia - 1" (http://vestidv.ru/news/19/10/09/28264).