

On the Biology of Amphibians of the Khankaiskii Nature Reserve, Primorye Region

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Accepted 24 April 1999

РЕЗЮМЕ: К биологии земноводных Ханкайского заповедника. И.В. Маслова. Сообщается о биотопах, размножении, развитии, активности и морфометрии сибирского углозуба (*Salamandrella keyserlingii*), монгольской жабы (*Bufo raddei*), дальневосточной жабы (*B. gargarizans*), дальневосточной квакши (*Hyla japonica*), сибирской лягушки (*Rana amurensis*) и чернопятнистой лягушки (*Rana nigromaculata*) в Ханкайском заповеднике.

ABSTRACT: Some data on the habitats, reproduction, development, activity and morphometrics of *Salamandrella keyserlingii*, *Bufo raddei*, *B. gargarizans*, *Hyla japonica*, *Rana amurensis* and *Rana nigromaculata* are presented.

INTRODUCTION

The study of amphibians of the Khankaiskii Nature Reserve, despite the large number of species, is only at an initial stage. The amphibians of Khanka Lake are contained in the collections made by Cherskii in 1908–1909, Volk in 1928, Linberg in 1928, Buldovskii in 1932 and Emelianov in 1940. Short-term researches were also conducted by Emelianov in 1940, Belova in 1973, Korotkov in 1974 in the mouth of the Spasovka River, on the east and south banks of Khanka and on the Sungacha River.

The Khankaiskii Nature Reserve was created in 1990. It is necessary to make an inventory and more detailed study of amphibians on protected lands. My research was done in the nature reserve and on separate plots within the territory of six areas around Khanka Lake and in the valley of the Sungacha River.

MATERIALS AND METHODS

In the field season of 1997 (from 13 to 20 May, 13 – 20 June and 20 – 28 August) I conducted observations on amphibians in three plots.

1. “River” – Spasskii area, east bank of Khanka Lake (environs of the cordon “Vostochnyi”). We studied 8 ponds (see the Supplement 1) of total area about 650 sq. m in a territory of 4 sq. m.

2. "Devil Swamp" (*Chertovo boloto*, in Russian) – Kirovskii area, the valley of Sungacha River (environs of settlement Pavlo-Phedorovka, abandoned rice fields, swamped lands around the frontier post at "Dalris"). I worked on 21 ponds (see Supplement 1) with a total area of 2080 sq. m.

3. "Pine" – Khankaiskii area, west bank of Khanka Lake (Prezhevskii Spit, Sosnovyi Island, environs of Novonikolaevka Settlement). Here studies were only conducted at the end of August, and so I caught amphibians which were already on the land. I used standard methods as described by Dabagyan and Sleptsova (1975), Dinesman and Kaletskaya (1952), Garanin and Darevsky (1987) and Sytina et al. (1987).

I caught and measured 119 specimens of the Asiatic Toad (*Bufo gargarizans*), 65 Mongolian Toads (*B. raddei*), 94 Japanese Tree Frogs (*Hyla japonica*), 184 Siberian Wood Frogs (*Rana amurensis*), 41 Dark-Spotted Frogs (*R. nigromaculata*), as well as 405 tadpoles of these species and 79 larvae of *S. keyserlingii*. After measurement I released all animals. The following abbreviations are used below: L – snout-vent length, mm; L.c – head length, mm; F – thigh length, mm; Mass, g. Mean values and standard errors are given in the tables below.

RESULTS

Salamandrella keyserlingii is a common species in all plots. I began research in the middle of May, so the spawning season was not observed, but I did conduct a census of late spawning these amphibians in the cordon "Vostochnyi". In permanent pond 2 (see Supplement 1) I counted more than 50 sets of clutches (in the majority of cases, these were solitary). The main mass of larvae had already hatched from their egg sacs. In the shallow temporary ponds 2, 4, 5, 6, 7 and 8 (see Supplement 1) I found 23 clutches at different development stages. In 16 clutches larvae were at late stages, in 6 at stages 17 – 20 (Sytina et al., 1987). One clutch was newly laid. The mean number of embryos in a single egg sac was 41.3 ± 1.18 (ranging from 20 to 66); in a single clutch 91.3 (ranging from 58 to 123). The majority of clutches were dessicated due to a lack of rain for a long time. From 46 egg sacs, dead eggs were observed in 25. The ratio of "living – dead" clutches was 1:2.6. I caught and measured 10 larvae at stages 34 – 35 of development (Table 1). These values are lower than those in adjacent areas in the Primorye Region (The Siberian Newt, 1996). It is quite possible that this connects with the fact that soils in the Khanka area are not optimal for this species. In the "Devil Swamp" plot, spawning time was also completed. I noted empty egg sacs in the temporary ponds 7, 11, 12, 13 and 19 in different habitats: rough meadow, mixed meadow and secondary broad-leaved forest (see Supplement 2). Heavy rains prevented me from catching any larvae. In the middle of June in the plot "River" I observed successful development of larvae in all temporary ponds, where they were previously noted in May. I measured 17 larvae at stages 37–38 and 29 larvae at stages 40–41 (Table 1).

Table 1. Total length, mm, of larval *Salamandrella keyserlingii* at different stages of development.

Sample sizes	Stages of development	Total length, mm	Date of catching
10	34 – 35	11.7 ± 0.32 (9.7 – 13.2)	14 May
17	37 – 38	18.0 ± 0.46 (16.7 – 21.6)	18 May
29	40 – 41	25.4 ± 0.51 (19.4 – 30.8)	18 May

Bufo gargarizans was only found in the plot “Devil Swamp”, where it was numerous. It occurs everywhere: on the hill slopes, in open wood (oak forest), on the borders of secondary broad-leaved forest, in mixed meadows, in dry meadows, in rough meadows and on the outskirts of bog land. On the road through the dry meadows to the foot hills with oak forest along 100 m of the route, I noted during at night time in May, 36 toads; in June 21 toads, in August 34 (with a notable prevalence of subadults). In June I examined the glade on the southeast slope of the hill and counted 17 yearlings per 25 sq. m. I presume that spawning time was in the last third of May, because in the middle of June tadpoles with hind limbs were seen in ponds 2, 20 and 21 (snout-vent length $8.9 + 0.13$ mm, from 7.1 to 10.1, $n=30$), but in second third of May clutches were absent in these ponds. The results of toad measurements are shown in Table 2. The data in Table 2 showed that in the forest area, yearlings were smaller than in open areas. In summary, they grew from 27.8 mm to 33.1 mm (on average) and attained a mass of between 2.1 to 3.3 g.

Bufo raddei is numerous on the plot “River” and common in the plot called “Pine”. The breeding season was from the middle of May to the middle of June. After breeding, adult toads did not retire more than 100 m from the bank of the Khanka Lake. In the cordon “Vostochnyi” the spawning area is in the reedbeds in the coastal zone of Khanka, where the depth was 0.15–0.20 m. Intensive courtship took place from 21.00 h to 02.00 h in May. In the coastal zone (area 50 sq.m) I caught during twilight 28 adult males and 4 females (Table 3) and found the first clutch of eggs. I discovered 8 leeches (*Glossiphonia complanata*) on the lower part of the body of 5 individual toads. I counted 3665 and 2800 eggs in two clutches. Most probably, the hatching of tadpoles occurred towards the end May, because I observed during the middle of June tadpoles with well developed hind limbs ($L = 13.9 \pm 0.22$, from 12.4 to 16.0, $n=20$). In June, toad recaptures were carried out on the sand bank of Khanka (which measured 300 m in length and 30-60 m width): between 22.00 h and 24.00 h I caught 32 adult and young individuals. Also at night time, I carried out a census of toads on the country road, which lies in 150 m from bank of Khanka. I observed 9 individual toads over 1000 m of the route. At the end of August I worked on Sosnovyi Island and caught four froglets in reed brushwoods in the central part of the island (Table 3).

Hyla japonica is widely distributed and has large populations. In the “River” plot, the first tree frogs calls were recorded between 8–10 May by foresters. When I worked on the cordon “Vostochnyi”, these animals began to call from 21.00 h. Maximum chorus levels were in the period from 22.00 h to 02.00 h. The majority of frogs gathered on pond 2, where males called in the water. I made night catches of tree

Table 2. Morphometric data on *Bufo gargarizans*.

	Month	May	June	August	
	Plot	"Devil swamp"	"Devil swamp" (hill)	"Devil swamp" (meadow)	"Devil swamp"
Males	L	55.8 ± 1.13 (53.0–57.9, n=5)	–	51.3 – 55.6, n=2	52.4 – 54.8, n=2
	L.c	22.1 ± 0.36 (20.7–23.2)	–	20.0 – 22.7	19.6 – 232.1
	F	22.9 ± 0.71 (20.5–25.4)	–	20.1 – 24.5	20.8 – 20.9
	Mass	18.7 ± 1.35 (14.8–23.2)	–	13.8 – 23.2	14.0 – 17.4
Females	L	47.8 – 57.2, n=3	–	–	–
	L.c	20.0 – 22.5	–	–	–
	F	19.2 – 24.3	–	–	–
	Mass	9.8 – 20.0	–	–	–
Subadults	L	38.1 ± 0.8 (32.7–45.0, n=20)	–	41.2 ± 1.11 (34.8–48.3, n=15)	48.6 – 48.6, n=2
	L.c	15.2 ± 0.33 (12.4–18.0)	–	16.9 ± 0.54 (12.2–22.1)	18.6 – 20.0
	F	15.4 ± 0.37 (12.7–18.8)	–	16.0 ± 0.58 (11.2–19.5)	17.9 – 19.3
	Mass	5.8 ± 0.4 (3.2–9.9)	–	7.3 ± 0.67 (3.4–11.8)	12.0 – 15.0
Yearlings	L	27.8 ± 1.14 (25.0–31.8, n=6)	27.6 ± 0.79 (23.2–35.6, n=16)	29.8 ± 0.7 (26.7–34.0, n=9)	33.1 ± 0.32 (32.3–34.3, n=5)
	L.c	10.7 ± 0.52 (8.8–12.9)	11.5 ± 0.33 (8.9–13.4)	12.3 ± 0.4 (10.1–14.7)	13.1 ± 0.28 (12.2–14.1)
	F	11.4 ± 0.4 (9.7–12.7)	10.9 ± 0.28 (9.5–13.8)	10.9 ± 0.28 (9.4–12.2)	11.7 ± 0.54 (9.7–13.1)
	Mass	2.1 ± 0.27 (1.5–3.3)	2.0 ± 0.16 (1.1–3.8)	2.6 ± 0.19 (2.0–3.8)	3.3 ± 0.18 (2.8–4.0)
Frogllets	L	–	–	–	20.8 ± 0.55 (13.8–28.3, n=34)
	L.c	–	–	–	8.3 ± 0.26 (5.3–12.0)
	F	–	–	–	8.1 ± 0.24 (5.2–11.6)
	Mass	–	–	–	0.9 ± 0.07 (0.3–2.1)

frogs for this measure. There I caught 20 males and 6 females, most amphibians were mating. One female laid 635 eggs in the nursery. In the "Devil Swamp" plot choruses were noted in a number of different habitats. In a night census I observed on pond 3 between 1 to 3 calling males persquare metre during the middle of May. I noted during the night-time on the road through dry meadow to the foot of the hill (with oak forest) 10 individuals along 100 m of the route. These probably went on to breeding ponds. In pond 11 (to the south of the frontier post "Dalris") I found large masses of eggs of these animal. Ten random samples of eggs, taken every 10 cubic cm, showed a high density: 95, 80, 102, 47, 75, 66, 136, 97, 21 and 150, on average 86.9. In the beginning of the summer my study showed changes in the sexual behavior of the tree frog. Chorusing began on the "River" plot at the later time of 22.30 h and was of a discrete

Table 3. Morphometric data on *Bufo raddei*.

	Month	May	June	August
	Plot	River	River	Pine
Males	L	49.8 ± 0.5 (44.2–54.7, n=24)	51.2 ± 0.76 (44.7–60.9, n=27)	–
	L.c	22.0 ± 0.31 (19.1–26.3)	21.5 ± 0.32 (17.9–23.8)	–
	F	18.2 ± 0.25 (16.0–20.8)	17.3 ± 0.37 (14.4–22.6)	–
	Mass	11.6 ± 0.43 (8.5–18.8)	13.7 ± 0.75 (8.6–23.2)	–
Females	L	47.4 ± 2.51 (40.1–52.9, n=4)	–	–
	L.c	19.6 ± 1.42 (17.4–22.5)	–	–
	F	16.8 ± 0.71 (15.3–19.0)	–	–
	Mass	10.3 ± 1.19 (7.2–13.2)	–	–
Subadults	L	–	38.9 ± 0.69 (36.4–41.2, n=5)	–
	L.c	–	17.0 ± 0.51 (15.2–18.6)	–
	F	–	14.7 ± 0.4 (13.1–15.6)	–
	Mass	–	6.1 ± 0.39 (4.8–7.5)	–
Juveniles	L	–	–	32.7 ± 0.87 (30.5–35.0, n=4)
	L.c	–	–	14.7 ± 0.56 (13.0–16.0)
	F	–	–	11.1 ± 0.39 (9.5–12.5)
	Mass	–	–	3.7 ± 0.24 (3.0–4.1)

nature. Males were sparse and did not call in the water, but on willow (*Salix*) trunks, above the water. No females were observed. Hatching of tadpoles had already begun. I caught 64 individuals in pond 8. The mean length of tadpoles was 6.5 mm ± 0.18 (4.2 – 8.7). At this time another situation existed in the “Devil Swamp” plot. At night time tree frogs called in all ponds: from large sand-pits to country ditches. I caught 25 males (Table 4). Tadpoles were found in 13 ponds out of 21. I collected 19 tadpoles from ponds 17, 18 and 19 (L = 5.7 ± 0.44, from 3.5 to 8.9).

Table 4. Morphometric data on *Hyla japonica*.

	Month	May		June	
	Plot	River	“Devil swamp”	River	“Devil swamp”
Males	L	38.0 ± 0.18 (36.4–40.0, n=20)	36.8 ± 0.43 (31.1–40.0, n=25)	38.1 ± 0.85 (35.4–47.1, n=12)	36.8 ± 0.28 (33.7–39.0, n=24)
	L.c	15.7 ± 0.19 (13.9–17.6)	14.3 ± 0.19 (12.1–15.8)	15.6 ± 0.33 (13.7–17.5)	15.7 ± 0.22 (12.9–17.8)
	F	18.2 ± 0.16 (17.1–19.9)	17.6 ± 0.83 (14.1–19.2)	17.5 ± 0.29 (16.0–19.8)	17.2 ± 0.26 (15.1–19.6)
	Mass	4.9 ± 0.09 (4.4–6.3)	4.2 ± 0.13 (2.6–5.6)	4.5 ± 0.34 (3.5–5.1)	5.1 ± 0.14 (4.0–6.5)
Females	L	40.4 ± 0.33 (39.9–43.0, n=6)	42.7 ± 0.89 (39.5–44.8, n=5)	–	–
	L.c	16.7 ± 0.29 (15.9–17.7)	16.5 ± 0.29 (15.6–17.6)	–	–
	F	19.2 ± 0.45 (17.7–21.4)	20.0 ± 0.44 (18.4–21.5)	–	–
	Mass	6.4 ± 0.5 (5.4–8.2)	7.4 ± 0.57 (4.9–8.4)	–	–

Table 5. Morphometric data on *Rana nigromaculata*.

	Month	June	August	
	Plot	River	Pine (pasture)	Pine (island)
Males	L	66.2 (62.0–71.6, n=4)	–	–
	L.c	27.7 (25.8–29.9)	–	–
	F	28.7 (26.6–31.1)	–	–
	Mass	28.9 (22.2–36.8)	–	–
Females	L	66.9 (56.9–85.6, n=3)	–	–
	L.c	27.5 (22.2–35.4)	–	–
	F	28.5 (22.7–36.1)	–	–
	Mass	31.7 (17.8–58.5)	–	–
Subadults	L	40.2 – 42.4, n=2	–	–
	L.c	16.4 – 18.5	–	–
	F	18.2 – 18.6	–	–
	Mass	6.1 – 7.8	–	–
Frogllets	L	–	34.4 ± 0.18 (27.6–39.1, n=16)	38.1 ± 1.81 (32.2–41.2, n=4)
	L.c	–	14.3 ± 0.47 (12.2– 15.6)	16.5 ± 0.41 (15.2–17.2)
	F	–	16.1 ± 0.41 (12.7– 18.6)	17.9 ± 0.64 (16.0–19.6)
	Mass	–	3.9 ± 0.28 (2.2–6.1)	5.6 ± 0.65 (3.6–7.2)

Rana nigromaculata is numerous in the “River” and “Pine” plots. In the middle of May I noted in the cordon “Vostochnyi” the calling of frogs in the littoral part of the bog, after sunset. Only one male was encountered on the land. In the middle of June I observed no juveniles or adult frogs in different habitats in the “River” plot. Frogs were caught in a channel (3 km north from the cordon “Vostochnyi”), on pond 2 in the water, in grass in the forest, and on the bank of an artificial pit with no vegetation. Data on measurements are given in Table 5. At the end of August the density of frogs was between 0.2 and 0.5 individuals per 1 sq. m. Frogllets were found on the wet meadow. I noted 1-5 young frogs along 10 m of the route. I also observed many frogllets on the pasture at a considerable distance from big ponds. They occurred on the banks of very small ditches. Such a distribution was found at Sosnovyi Island.

Rana amurensis was numerous at all plots and lives everywhere. In the “River” plot, reproduction of these frogs was noted even in the middle of May and swimming tadpoles were recorded in 6 out of 9 ponds. Adult frogs then left breeding ponds and went to feed on land. The “Devil Swamp” plot was positioned more to the north and reproducing frogs still occurred near separate ponds at this time, called (density 0.3 individual per 1 sq. m), but late clutches were found only 4 times (3 dead in pond 3 and 1 living at stage 27-28 in pond 11). I observed tadpoles here in 19 out of 21 ponds. The maximum density of tadpoles was in pond 6 (a storage pond). There, some aggregations were more than 1 cubic meter in size, with a density of between 1 and 20 tadpoles per 10 cubic cm. In middle of June I noted the end of metamorphosis of tadpoles and observed the first young frogs on land in the “River” and “Devil Swamp” plots. There are records of frogllets near pond 2 (cordon “Vostochnyi”). The density of metamorphic individuals in the “Devil Swamp” plot on the bank of pond 2 was about 2–3 frogllets per 10 sq. cm.

Table 6. Morphometric data on *Rana amurensis*.

	Month	August				
		May	June	"Devil swamp"	"Devil swamp"	Pine
	Plot	"Devil swamp"	River	"Devil swamp" (old rice field)	"Devil swamp" (meadow)	
Males	L	51.4 + 1.7 (44.5–61.3, n=10)	–	53.3, n=3	–	–
	L.c	16.8 ± 0.41 (14.9–19.0)	–	22.2	–	–
	F	25.0 ± 0.76 (21.2–28.6)	–	26.2	–	–
	Mass	10.0 ± 1.05 (6.6–18.0)	–	14.9	–	–
Females	L	53.2 (49.4 – 61.5, n=4)	51.5 – 54.1, n=2	–	–	–
	L.c	17.5 (16.2–19.7)	19.4 – 23.3	–	–	–
	F	24.2 (20.7–30.5)	23.8 – 23.5	–	–	–
	Mass	10.6 (6.9–19.2)	10.8 – 12.2	–	–	–
Subadults	L	40.8 ± 1.46 (34.4–48.6, n=9)	42.8 (41.3 – 46.2, n=3)	41.7 ± 0.42 (38.9–44.7, n=9)	–	43.0 ± 0.59 (40.5 – 6.4, n=11)
	L.c	13.6 ± 0.45 (11.7–16.0)	16.1 (14.3–18.6)	16.0 ± 0.45 (14.5–18.0)	–	16.1 ± 0.25 (14.5–17.6)
	F	19.6 ± 0.56 (16.6–21.8)	19.8 (18.6–22.0)	18.9 ± 0.57 (18.4–20.6)	–	20.4 ± 0.37 (18.6–22.6)
	Mass	4.9 ± 0.46 (3.4–8.1)	6.4 (5.5–7.1)	5.9 ± 0.26 (4.7–7.7)	–	6.5 ± 0.42 (4.4–8.7)
Juveniles	L	–	–	34.5 ± 0.76 (29.5–38.8, n=17)	29.6 ± 1.38 (21.6–37.0, n=17)	33.1 ± 0.84 (25.4–38.4, n=29)
	L.c	–	–	13.6 ± 0.31 (11.0–15.7)	12.3 ± 0.55 (8.3–14.9)	13.6 ± 0.6 (8.6–15.7)
	F	–	–	15.9 ± 0.33 (13.3–18.0)	12.8 ± 0.78 (8.5–16.6)	15.1 ± 0.44 (10.0–18.9)
	Mass	–	–	3.1 ± 0.19 (1.7–4.1)	2.3 ± 0.26 (1.0–3.9)	2.6 ± 0.18 (0.5–4.4)

Adult frogs occurred singly in different places, in grasslands, meadows, forests, as well as in the water (pond 2, "River" plot). In the end of August, I collected froglets and young-of-the-year in different habitats: abandoned rice fields, meadows near storage ponds, pasture on the west bank of Khanka. The results are given in Table 6.

DISCUSSION

My data showed that all species of amphibians which occurred in the Khankaiskii Nature Reserve are most abundant in the three plots: "River", "Pine" and "Devil Swamp". Two groups of amphibians can be identified according to their distribution. *Salamandrella keyserlingii*, *H. japonica* and *R. amurensis*, widely distributed, belong to the first group. *Bufo raddei*, *B. gargarizans* and *R. nigromaculata*, as locally numerous species, formed the second group. An interesting situation occurs in the habitat distribution in the cordon "Vostochnyi". On one hand, there are bogs and Khanka Lake; on the other hand, the

land is limited to a narrow strip between 0.4–0.5 km wide. I observed there an unusual, mosaic structure of habitat: alternating bog, wet meadow, broad-leaved forest, and sandy bank of Khanka with reedbeds. Dark-Spotted Frogs live on the border of the bog and of wet meadow. *Salamandrella keyserlingii*, *R. amurensis* and *Hyla japonica* are found in forest and partly on the meadow. *Bufo raddei* occurs near the bank of Khanka Lake. *Rana nigromaculata* lives in bogs. *Salamandrella keyserlingii* and *B. gargarizans* are found more frequently near hills. *Hyla japonica* and *R. amurensis* occur everywhere and are similar in their abundance.

ACKNOWLEDGMENTS

I am grateful to the Director of Khankaiskii Nature Reserve, Yu. P. Sushitskii and the foresters for their help in the field. S.L. Kuzmin assisted me in the preparation of this paper. The work was supported by the Russian Foundation for Basic Research, project no. 98-4-48254.

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SUPPLEMENT 1

Brief data on the ponds discussed in the text (the plot "River"):

1. Temporary roadside ditch in broad-leaved forest, 2.0 (length, m) – 0.5 (width, m) – 0.07 (depth, m).

2. Permanent pool. Flood brushwood of willows. 40.0 – 15.0 – 0.2-0.6.
3. Coastal sandy zone on bank of Khanka Lake with brushwood of reed. 25.0 – 25.0 – 0.2.
4. Temporary pool in broad-leaved forest. 1.5 – 0.7 – 0.05.
5. Temporary pool on wet meadow between the forest and the bog. 3.0 – 1.0 – 0.1.
6. Tree little pools on road rut in the forest. 0.5 – 0.1 – 0.05.
7. Temporary pool on wet meadow between the forest and the bog. 4.0 – 0.5 – 0.1.
8. Temporary pool on wet meadow between the forest and Khanka Lake. 50.0 – 1.0 – 0.2.
9. Border of the bog. 2.0 – 2.0 – 0.8.

SUPPLEMENT 2

Brief data on the ponds discussed in the text (the “Devil Swamp” plot):

1. The rests of sandpit on dry meadows near secondary broad-leaved forest on the hill (environs of Pavlo-Fedorovka Village). 20.0 – 20.0 – 2.0.
2. The rests of sandpit on dry meadows near secondary broad-leaved forest on the hill (environs of Pavlo-Fedorovka Village). 4.0 – 3.0 – 0.3.
3. The rests of sandpit on dry meadows near secondary broad-leaved forest on the hill (environs of Pavlo-Fedorovka Village). 4.0 – 3.0 – 0.2.
4. The rests of sandpit on dry meadows near secondary broad-leaved forest on the hill (environs of Pavlo-Fedorovka Village). 4.0 – 4.0 – 0.3.
5. Permanent pool with reed maces on the slope of the hill (environs of Pavlo-Fedorovka Village). 10.0 – 6.0 – 0.8.
6. Large pond with forest hills all round. 200.0 – 200.0 – 3.0.
7. Temporary roadside pool with reed on motley meadow near pastures (the road to frontier post “Dalris”). 70.0 – 7.0 – 0.3.
8. Temporary roadside pool with reeds between the “Devil Swamp” bog and the road in the valley of the Sungacha River (the road to the frontier post “Dalris”). 8.0 – 2.5 – 0.8.
9. Temporary roadside pool with reeds between the “Devil Swamp” bog and the road in the valley of the Sungacha River (the road to the frontier post “Dalris”). 20.0 – 5.0 – 0.8.
10. Permanent roadside pond with sedge in the valley the Sungacha River (environs of the frontier post “Dalris”). 6.0 – 6.0 – 1.2.
11. Temporary roadside ditch between brushwood of the bush and the bog in the valley of the Sungacha River (environs of the frontier post “Dalris”). 30.0 – 1.0 – 0.5.
12. Temporary pool on meadow bog with reeds and sedge by the foot of the hill (frontier post “Dalris”). 8.0 – 6.0 – 0.4.
13. Two overflowing ponds (due to heavy rainfall) and temporary pools on mixed meadow near the bushes and willows (the road to the frontier post “Dalris”). 6.0 – 5.0 – 0.2.
14. Abandoned swamped rice fields with reed maces. 100.0 – 4.0 – 1.0.
15. Abandoned swamped rice fields with reed maces. 6.0 – 4.0 – 1.5.
16. Temporary pool on swamped rice fields. 20.0 – 15.0 – 0.1.

17. Road ditch between the forest and the kitchen garden (environs of Pavlo-Fedorovka Village). 7.0 – 3.0 – 0.5.
18. Temporary pools with well grown reeds between the forest and kitchen garden (environs of Pavlo-Fedorovka Village). 2.0 – 2.0 – 0.3.
19. Road ditch between the forest and the kitchen garden (environs of Pavlo-Fedorovka Village). 5.0 – 2.0 – 0.6.
20. Fresh open-pit with precipitous banks (on west from Pavlo-Fedorovka Village). 15.0 – 10.0 – 2.0.
21. The sandpit by the foot of the hill (environs of frontier post “Dalris”). 20.0 – 10.0 – 1.5.