

Supplementary report on project 15010-1

Status of populations of rare plant species on the Kunashir Island

It is clear that detailed knowledge of species range and state of their populations is necessary for vulnerability estimation and effective protection of biodiversity. However in some cases there is no information even for rare and endangered species and it makes an effective protection of these species more complicated. Usually such “mysterious” species have a limited habitat range in regions hard to reach where detailed studies are very difficult because of lack of resources. The Kuril Islands located on the South-Eastern border of Russia can be a good example of this situation. Complex geological history, connections with different parts of a continent and some other factors determine a uniqueness and richness of a Kuril flora. Flora of the Northern Kurils formed under the influence of Beringian center of florogenesis and has much in common with flora of Kamchatka. Flora of Southern Kurils formed with the participation of the Japanese center of florogenesis thus it is unique for a wide territory of Russia. Many plant species rare in Russia are known only from the Southern Kurils which are the northern edge of these species range. However as mentioned in recently published Red Book of Russia detailed actual status information about populations of several species of higher plants from the Southern Kurils is absent and a search for new populations is required. Many of those species can be found in Russia only on the Kunashir Island which has the richest flora from all the Kuril Islands.

Actual status and locating information about populations of rare plant species on the Kunashir is very important because these peripheral populations situated on the edge of species range main part of which usually lie in Korea and Japan are extremely vulnerable and exposed to elimination. On the other hand peripheral populations often differ from central populations genetically so they represent a source of genetic diversity and even a potential for origin of new species. Both of these considerations allow to suppose populations of such species from the Kunashir Isl. especially important for protection.

Below we describe status of the populations of rare plants species on the island Kunashir that we have inspected.

Hydrocotyle ramiflora

This small herbaceous plant from the Apiaceae (also known as Umbelliferae) family can be recognized from the rounded shiny leaves and capitate inflorescences. The northern edge of the species range lies in Russia. In addition to the Kunashir Island this rare species is found on the Iturup Island (also Southern Kurils) and... in the Krasnodar Region. Outside the borders of Russia *Hydrocotyle* has a wide range in Eastern Asia.

It is believed that this species grows near thermal springs and is vulnerable to shift of their regimen in particular to turning them into pools. Our observations allowed to correct this information. First, it is turned out despite *Hydrocotyle* forms a dense growth near the Alyokhin Springs (N 43°54'57.01", E 145°31'16.63", growth of 10 m² in square on the right bank of the stream), it is also plenty in damp places far from springs. For instance, we found new population of the species on a damp deserted road near the mouth of the Filatova River (N 44°10'58.93", E 146°01'29.82", growth of 20 m² in square, plants had lots of flowers and fruits). At the same time *Hydrocotyle* does not grow near other thermal springs what was confirmed during our field work. Second, *Hydrocotyle* is, fortunately, more resistant to

external influences than it was previously thought. So the species forms a continuous carpet near the spring on the territory of the Alekhino frontier post (N 43°55'01.18", E 145°31'34.59") despite the spring is turned into pool and often used by people. On the outskirts of the Goryachy Plyazh village we found spacious growth of *Hydrocotyle* at the site of ruined greenhouses (N 43°59'54.78", E 145°48'04.83", total square is about 150 m²) despite cows intensively pasture on that meadow.

Our observations allow to disprove an information about “scanty and irregular” fruiting of *Hydrocotyle* stated in Red Book of Russia. Quite the reverse, numerous plants in populations we examined had flowers or fruits.

Bothrocaryum controversum

This rare species in Russia grows only on the Kunashir Island where the north-eastern edge of its range is situated. Main part of the range is in China, Korea and Japan. This rather tall slender tree with grey bark is easily recognized by specific for Cornaceae family entire leaves with arcuate venation. Leaf arrangement is alternate, leaves crowded together at the top of the branches. Trees we found had a plenty of fruits.

In addition to the environmental route to the cape Stolbchaty *Bothrocaryum* can be seen in the middle reaches of the Valentina Stream (we found two trees: N 43°58'52.68", E 145°40'03.06"; N 43°59'03.01", E 145°39'39.00") and along the road leading to the cottages near the Tretyakovo frontier post (we found twelve trees per 1.5 km of the road: N 43°58'24.15", E 145°40'11.33"; N 43°58'27.26", E 145°40'05.68"; N 43°58'31.56", E 145°39'55.62"; N 43°58'32.41", E 145°39'53.87"; N 43°58'33.52", E 145°39'51.11"; N 43°58'33.70", E 145°39'50.07"; N 43°58'33.96", E 145°39'43.91"; N 43°58'36.80", E 145°39'25.59"; N 43°58'37.49", E 145°39'24.89"; N 43°58'42.29", E 145°39'20.64"; N 43°58'43.14", E 145°39'20.37"; N 43°58'45.92", E 145°39'18.63").

Daphniphyllum humile

A decreasing in its number species grows in Russia only on the Southern Kurils (the north of the Kunashir Island and the south of the Iturup Island) where lies the northern border of its range. Outside the borders of Russia it can be found Korea and Japan. This low evergreen shrub can be seen from afar by a gleam of its alternate entire leathery leaves.

In the north of Kunashir we found *Daphniphyllum* in the undergrowth of fir forests in valleys of rivers Severyanka (N 44°19'53.17", E 146°01'37.81", a thicket of about 10×20 m on the steep bank of the stream) and the Zolotaya (N 44°21'44.49", E 146°01'32.73", a few plants without flowers or fruits in a lower part of a steep slope; N 44°21'44.10", E 146°01'40.12", a thicket of fruiting plants no less than 200 m² in square) where it quite often forms continuous thickets. Both locations are not mentioned in the Red Book of Russia. Exploration works (trenching of prospecting pits) in the upper reaches of the stream Moristy are now aborted and therefore no more threat the population of *Daphniphyllum* (N 44°22'34.27", E 146°02'20.17", a dense thicket no less than 400 m²) as it was stated in the Red Book. The population on the edge of prospecting pits we examined was in excellent condition, many plants were abundant in fruits, the species intensively reproduced itself even in continuous thickets of a bamboo.

Rhododendron tschonoskii

This rare species can be found in Russia only in the southern part of the Kunashir Island where the north-eastern edge of its range is situated. The species is also spread in the Northern Japan and in the south of Korea. This small deciduous shrub with white flowers can be identified on a densely branched crown with rust-hairy leaflets and young shoots and on white flowers.

This *Rhododendron* can be the most easily found in caldera of the Golovnin Volcano where it usually grows on placers and slopes near thickets of dwarf Siberian pine. The population of *Rhododendron* we found on the rocky upper part of the eastern slope of the Central dome (N 43°51'55.80", E 145°30'08.45") was presented by numerous growing one by one shrubs with abundant fruits and solitary flowers (5 August 2014) which had a low height due to the habitat was open for winds.

Schizophragma hydrangeoides

An endangered species in Russia can be found only on the Kunashir Island where the north-eastern edge of its range lies. Outside Russia *Schizophragma* grows in Japan and on the south of Korea. This woody vine is easily recognized by large round-heart-shaped leaves with serrated edges and large white inflorescences. *Schizophragma* differs from *Hydrangea petiolata*, a vine it is like, in only one petaliform sepal of marginal sterile flowers (sterile flowers of *Hydrangea* have four such sepals).

Schizophragma can be easily seen in the northern part of the island where large specimens of abundant fruiting are often found in valleys of Severyanka (N 44°20'23.14", E 146°00'31.83"; N 44°20'17.73", E 146°00'52.34"), Zolotaya (N 44°21'02.60", E 146°00'21.75") and Zalivnaya (N 44°25'26.56", E 146°03'37.33") rivers and in the environs of the cape Dokuchaeva (N 44°30'28.11", E 146°09'51.77"; N 44°30'16.98", E 146°09'24.22") in fir and mixed coniferous-broadleaf forests.

Magnolia hypoleuca (Magnolia obovata)

This endangered species in Russia is found only on the Kunashir Island where the northern edge of its range is. Outside the borders of Russia magnolia is spread in China and Japan.

It is possible to stumble across a magnolia in non-flowering condition only by chance, because usually these trees with large leaves grow singly in forests quite difficult to access among dense thickets of bamboo whereas flowering plants are visible from afar due to their large white flowers. You can easily get acquainted with this species not only on the environmental route to the cape Stolbchaty, but also in the picturesque valley of the Valentina Stream, where magnolia occurs relatively frequently (N 43°58'49.52", E 145°40'05.45"; N 43°58'58.19", E 145°39'51.02", tree had one fruit but was wrenched off; N 43°59'03.09", E 145°39'34.37") and a large tree with several trunks growing right next to the abandoned thermal spring close to cottages near the Tretyakovo frontier post (N 43°59'06.15", E 145°39'21.49", tree had six fruits). Also numerous trees grow on the edges of the road to cottages: N 43°58'15.56", E 145°40'01.17"; N 43°58'17.03", E 145°40'04.30"; N 43°58'17.21", E 145°40'06.97"; N 43°58'17.23", E 145°40'11.28"; N 43°58'18.70", E 145°40'13.04"; N 43°58'20.87", E 145°40'14.93"; N 43°58'22.37", E 145°40'14.79"; N 43°58'23.70", E 145°40'13.38"; N 43°58'26.40", E 145°40'09.00", tree had fruits; N 43°58'26.68", E 145°40'08.21"; N 43°58'26.99", E 145°40'07.36"; N 43°58'30.95", E

145°39'55.70"; N 43°58'33.70", E 145°39'50.07"; N 43°58'35.02", E 145°39'31.65"; N 43°58'38.25", E 145°39'24.02"; N 43°58'46.96", E 145°39'18.19".

In addition to mentioned locations we found magnolias in different parts of the island: in the environs of the cape Alyokhina (N 43°55'20.50", E 145°32'33.40"; N 43°54'24.35", E 145°31'53.14"), in the environs of the cape Ivanovsky (N 43°50'23.66", E 145°24'39.43"; N 43°50'30.04", E 145°25'24.50"; N 43°49'17.92", E 145°25'23.94"), near the former village Paltusovo (N 43°43'42.39", E 145°26'06.95"), in the mouth of the Zalivnaya River (N 44°25'28.76", E 146°03'39.32") and in the environs of the cape Dokuchaeva (N 44°30'18.17", E 146°09'23.06"). The last location is the most northern point where *Magnolia hypoleuca* was ever found.

Due to adverse weather conditions insects do not pollinate most of magnolia flowers, so trees with set fruits are rare. We saw one tree with several fruits in the mouth of the Zalivnaya River and a few scanty fruiting trees in the valley of the Valentina Stream one of which, unfortunately, was recently wrenched off perhaps by a typhoon sprung up on the island a week before. Owing to weak seed reproduction magnolias on Kunashir renew mainly vegetatively i.e. new shoots grow from existing trunks. This may be a reason why the species is represented on the island by single trees but not by groves.

Outside the reserve magnolias may suffer from the human activity. We saw a young tree with broken top near the Alekhino frontier post (N 43°55'07.47", E 145°31'50.69").

Amitostigma kinoshitae

This rare species which is an endemic of the Kurils and Japan grows in Russia only on southern part of the Kunashir Island where the northern edge of its range lies. Outside Russia *Amitostigma* is found on the Japanese islands of Hokkaido and Honshu. This small orchid can be identified by few linear cauline leaves and whitish-pink flowers with three-lobed lip and very short spur.

Amitostigma can be seen on the south-eastern shore of the lake Goryachee (N 43°51'53.59", E 145°31'03.51", about 100 plants; N 43°51'49.10", E 145°30'51.58", about 10 plants) and on the north-eastern shore of the lake Glukhoe (N 43°54'25.94", E 145°38'11.77", 5 plants), where it occurs in sedge-moss bogs. Populations are in good condition, plenty of flowers and fruits.

Tilia maximowicziana

An endangered species is known in Russia only from few localities in the south of the Kunashir Island where the northern edge of the species range is. Outside the borders of Russia it is recorded for the Hokkaido and Honshu islands. This tree has a typical for limes appearance.

Tilia maximowicziana is extremely difficult to find because it usually grows in the form of single trees in remote mixed forests with thickets of bamboo. We managed to find only one tree in the environs of the cape Ivanovsky (N 43°50'35.22", E 145°25'26.75"). That specimen had several trunks but we did not observe any fruit or root shoot.

The list of used literature

Barkalov V.Yu. Flora of the Kuril Islands. — Vladivostok: Dal'nauka, 2009. — 468 pp.

The Red Book of the Russian Federation (plants and fungi) / R.V. Kamelin et al. — Moscow.: KMK Scientific Press, 2008. — 885 pp.

Keys for the vascular plants of Sakhalin and the Kurile Islands / D.P. Vorobiev et al. — Leningrad: Nauka, 1974. — 372 pp.

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New species of aquatic plants, found on the Kunashir Island

During our expedition on the Kunashir Island (Southern Kurils, Sakhalin Region) in July–August 2014 we found six new species of aquatic higher plants for the island's checklist and also rare or new for the Kurils in general. Three of them are found on the territory of the Kurilsky State Reserve for the first time (Barkalov, Yeremenko, 2003) and the fourth is included in the Red Book of the Sakhalin Region (Taran, 2005). Vouchers are deposited in IBIW excepting the voucher of *Isoëtes asiatica* which is deposited in MW. First and last names of the collectors are abbreviated: P.A. Volkova – PV, Yu.O. Kopylov-Guskov – KG, D.A. Zakharchenko – DZ.

Lemna japonica Landolt: N 44° 20.727', E 146° 01.138', 1.5 km to the north-east from the Rudnoe village, a small pool on a ridge, 18. 08. 2014, col. PV, KG, det. A. Bobrov. – On the Kurils this species was earlier found only on the Iturup Island which is neighbouring the Kunashir Island (Vorobiev, 1956). Also it was found in the southern part of the Sakhalin Island (Tzvelev, 1996b). The species grows in the protected area of the Tyatya forestry of the Kurilsky State Nature Reserve.

Isoëtes asiatica (Makino) Makino: N 44° 03.236', E 145° 49.489', 2.5 km to the north-north-east from the Yuzhno-Kurilsk town, southern shore of the lake Serebryanoe, in water on stony soil, 22. 08. 2014, col., det. PV, KG. – On the Kurils the species was earlier found on the Iturup Island which is neighbouring the Kunashir Island, on the northern islands Shumshu, Paramushir, Onkotan (Barkalov, 2009) and on the Sakhalin Island (Taran, 2005). The species is included in the Red Book of the Sakhalin Region as a vulnerable species (Taran, 2005).

Myriophyllum sibiricum Kom.: N 44° 03.236', E 145° 49.489', 2.5 km to the north-north-east from the Yuzhno-Kurilsk town, the lake Serebryanoe, in water on stony soil, 22. 08. 2014, col. PV, KG, det. A. Bobrov. – On the Kurils the species was earlier found only on the northern island Paramushir (Barkalov, 2009), also found in the southern part of the Sakhalin Island (Tzvelev, 1995).

Sparganium emersum Rehm.: N 44° 20.727', E 146° 01.138', 1.5 km to the north-east from the Rudnoe village, a small pool on a ridge, 18. 08. 2014, col. PV, KG, det. A. Bobrov. – This species was not earlier found on the Kurils, the nearest known locations are the northern part of Sakhalin, Kamchatka and Japan (Tzvelev, 1996a). It grows in the protected area of the Tyatya forestry of the Kurilsky State Nature Reserve.

Sparganium × *engleranum* Asch. et Graebn. (*S. angustifolium* Michx. × *S. emersum*): N 44° 03.117', E 145° 49.729', 2.5 km to the north from the Yuzhno-Kurilsk town, the lake Serebryanoe, in water on silty soil, 22. 08. 2014, col. PV, KG, det. A. Bobrov. – Parental species *S. angustifolium* on the Kurils is found only on the Paramushir Island and also in the northern part of the Sakhalin Island (Tzvelev, 1996a). This hybrid grows on Kamchatka (Grebnyuk, 2012), it is rather usual in northern Europe and can be found in the north-west of North America (Cook, Nicholls, 1986).

Utricularia macrorhiza Le Conte: N 43° 54.380', E 145° 38.204', northern end of the lake Glukhoe (near the former village of Sernovodsk), in a channel, 06.08.2014, col. PV, KG, DZ, det. A. Bobrov. – Earlier on the Kurils the species was found only on the northern island Shumshu (Barkalov, 2009) also it was recently found in the northern part of the Sakhalin

Island (Barkalov, Taran, 2004). This species grows in the protected area of the Alekhino forestry of the Kurilsky State Nature Reserve.

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