Project Update: February 2017

We started working on our project in September 2016, but the report also contains information on our expeditions in summer 2016.

One of the main goals at the beginning of the project is to compile all our previous data on vascular plant diversity of the area investigated. Another aim is to find new rich fens in Kostroma Oblast which would be similar to ones we revealed before.

1) Expeditions

During summer 2016 we made four short expeditions in the west part of the Kostroma Oblast (the Kostroma river basin) of middle Russia (**Fig. 1**). Transportation costs were partially paid by the Kostroma branch of the Russian Geographical Society.

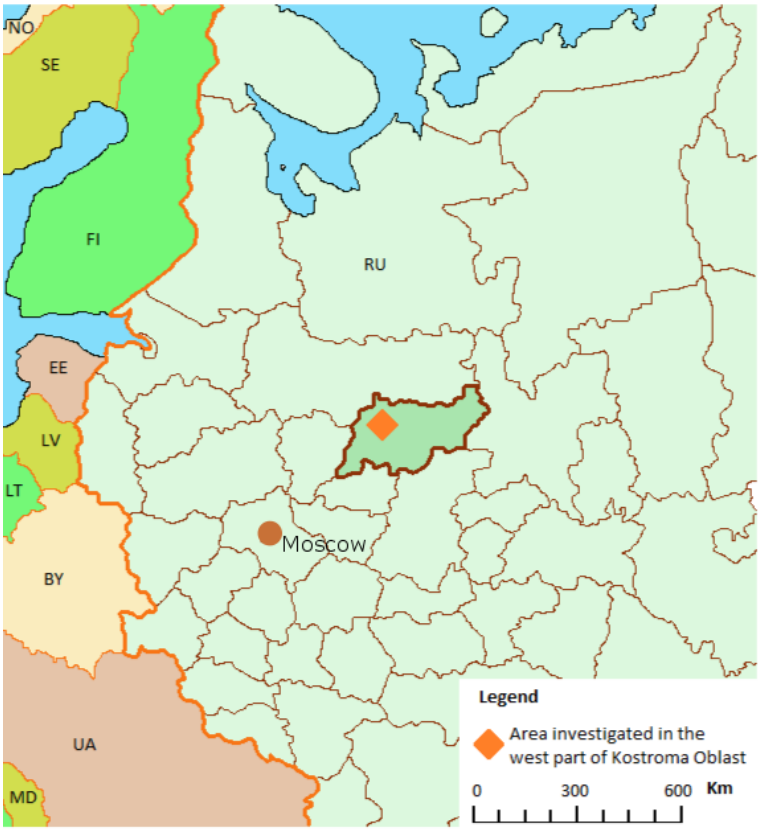

Figure 1. Location of the area investigated in the Middle Russia.

Our main goal was to make exploratory trips and to conduct floristic investigations. We explore three minerotrophic mire ecosystems located in Soligalich, Chuhloma, Galich and Susanino districts (**Fig. 2**).

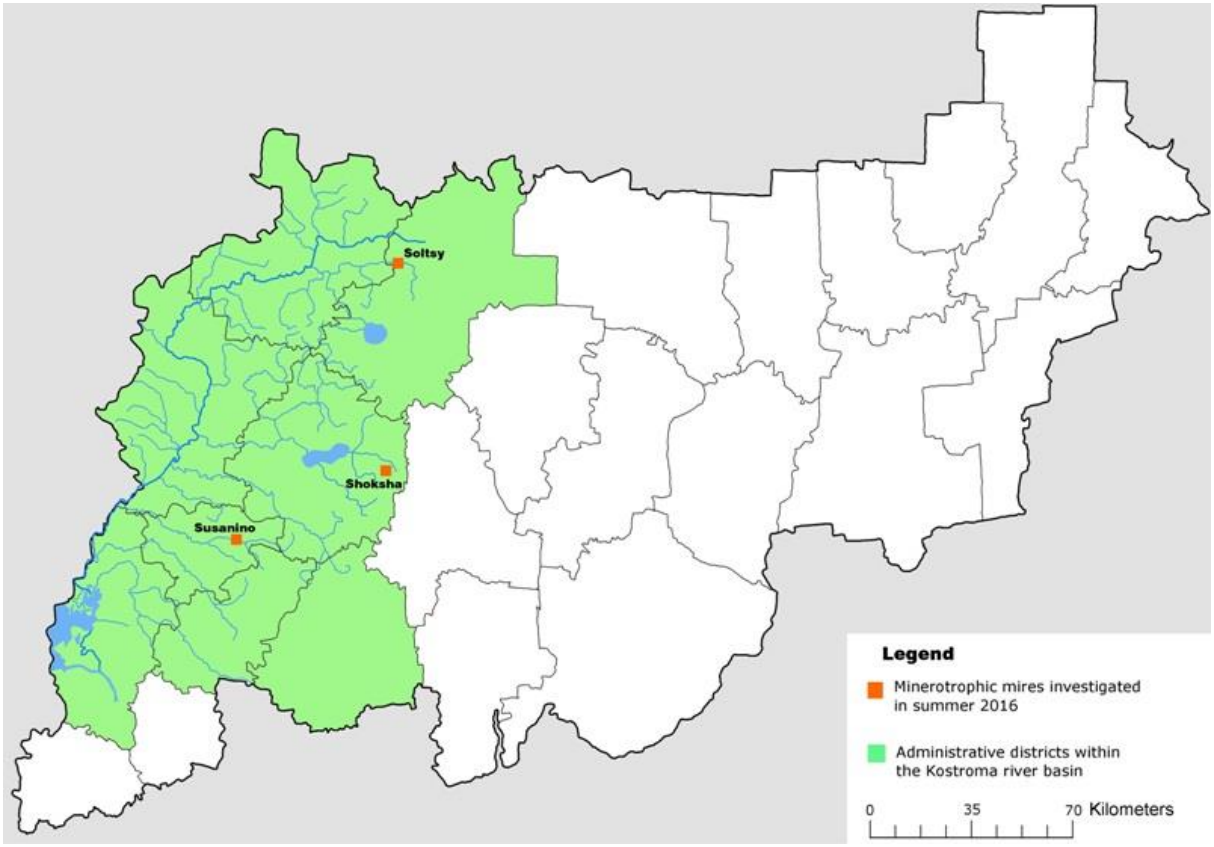

Figure 2. Location of the three mires investigated in the west part of the Kostroma Oblast.

Soltsy mire

Soltsy mire is the main object within the project. We visited this mire from 30th June – 3rd July 2016 and made four routes to continue our floristic investigation (**Fig. 3**). The expedition team also included zoologists from Nature Museum of Kostroma Oblast. During this trip some new and rare vascular plant species were found in less disturbed mire and wet forest ecosystems which prove the uniqueness of this nature complex. *Carex capillaris* and *Carex bergrothii* are species of grass-moss habitats in rich fens, *Geranium robertianum* is species of alder (*Alnus glutinosa*) wet forests and *Cystopteris montana* is species of spruce (*Picea fennica*) wet forests. *Carex bergrothii* and *Cystopteris montana* are new species for the flora of middle Russia.

The total number of vascular plant species is estimated as 265. 36 species are protected at regional level and two species, *Cypripedium calceolus* and *Ophrys insectifera*, at national level. More than 50 of the new localities of rare and protected species were revealed. All the data on floristic records are georeferenced by GPS and kept in an MS Excel database, so at the end of the project we will be able to make maps of objective distribution of rare species. Map at **Fig. 4** (made in ArcGis) shows the distribution of rare plant species and a picture of our field routes as well.

Figure 3. 30th June 2016. Expedition to the Soltsy mire (Chuhloma and Soligalich districts). At the Vocha river bank. Artyom Leostrin (first from left) – botanist, leader of the project, Anna Efimova – botanist, Nikita Efimov – young ornithologist, Anatoly Antsiferov – zoologist.

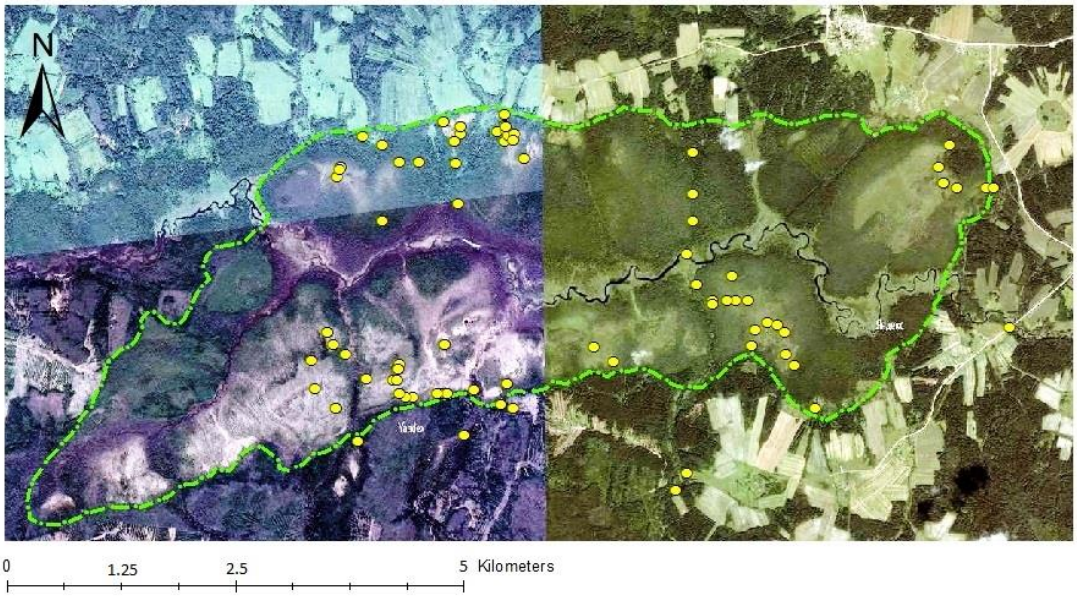

Figure 4. Localities of rare and protected species in the Soltsy mire up to summer 2016.

We substantially specify the distribution of *Cypripedium calceolus* and *Ophrys insectifera* within the Soltsy mire. It turned out that both species distributed through the whole mire complex but their abundance in certain localities is low (especially for *Ophrys insectifera*).

The distribution of fly orchid in middle Russia is needed to reevaluate because of their highly rarity and losses of the most of previously known localities. The geographical range of the species in Eastern Europe has big disjunctions and its sparse localities are dispersed very separately in some regions. So, the populations of *Ophrys insectifera* in Kostroma Oblast appear to be the biggest in middle Russia.

Special attention was paid to the water bodies system in the south part of Soltsy mire where highest concentration of rare species was revealed (**Fig. 5**). Variegated mosaic of plant communities is presented here and the species of raised bogs, rich fens and wet meadows are living in immediate proximity. Such features of vegetation are not typical for the mires of middle Russia.

Figure 5. Southern part of Soltsy mire. Spring fen with *Scirpus tabernaemontani* in grass layer. The water bodies are habitats for *Chara* species.

Shoksha mire

One-day trip to Shoksha mire (Galich district) brings some unexpected discoveries. We visited a southeastern part (about 2 km^2) of the mire that remains unaffected after melioration and peat extraction in the 1970s (**Fig. 6, 7**).

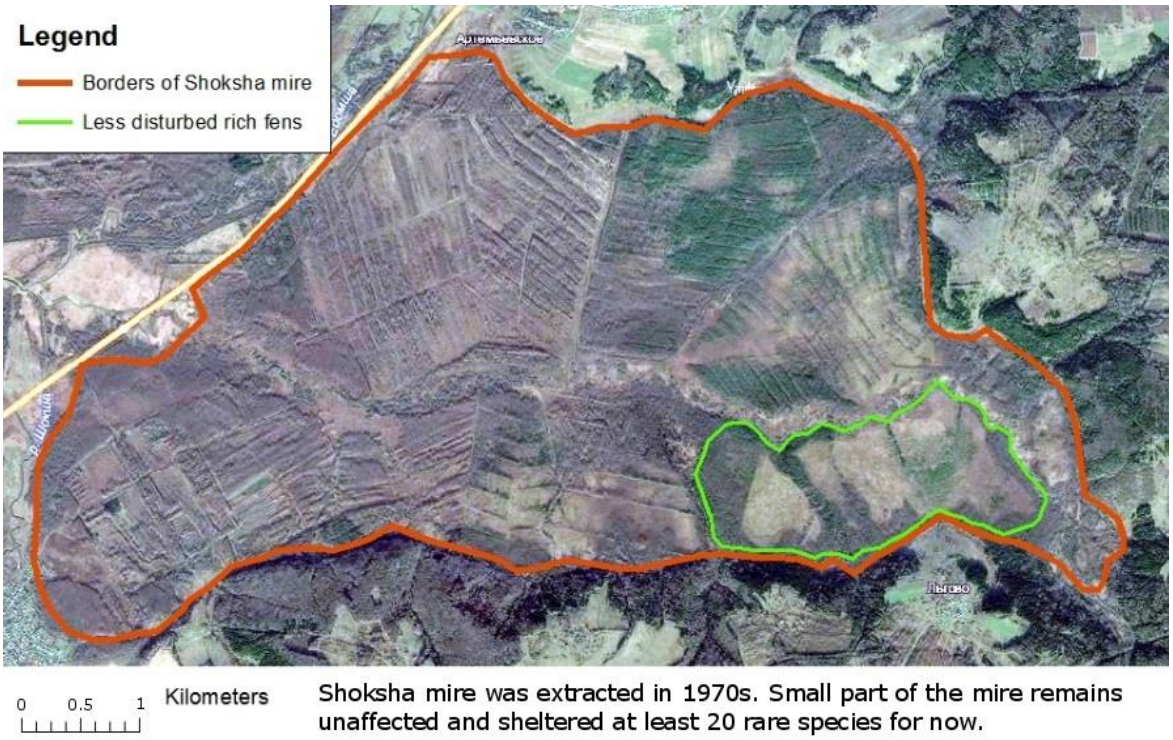

Figure 6. Satellite image of Shoksha mire (Galich district). One of the biggest mires in Kostroma Oblast.

Figure 7. The depression occupied by Shoksha mire – ancient fluvioglacial valley.

It contains rich fens communities which are very similar to previously known in Susanino and Soltsy mires (**Fig. 8**). There are at least 20 rare and protected species inhabit fens and wet forest communities including two nationally protected species (*Liparis loeselii* and *Ophrys insectifera*) and other orchids (**Fig. 9, 10**). This territory has regional level of protection already but as zoological reservation only. We will propose for the complex protection of the Shoksha mire in future due to its high plant species diversity even after melioration. Shoksha

mire is the second locality in Kostroma Oblast (after Susanino mire) where *Liparis loeselii* was found.

Figure 8. Birch open woodland mire site. *Eriophorum latifolium* is dominant of grass layer.

Figure 9. *Liparis loeselii*

Figure 10. *Herminium monorchis*

Two expeditions were made to the Susanino mire. This territory is protected already but has no exhausting data on vascular flora. So we decide to investigate this mire to replenish our revision. Almost 300 vascular plant species were found at this territory in fen and wet forest communities (20 species is rare in Kostroma Oblast).

2) Participating in a conference

The tentative results of our investigations in the Soltsy mire were reported at the "VIII meeting in memoriam of Ekaterina Alexeevna Galkina" taking place in the Komarov Botanical Institute (Saint Petersburg) from 2nd-3rd February 2017 (organised by Mire branch of Russian Botanical Society). Members of our project team (Artyom Leostrin and Olga Galanina) have participated at the conference. Thus the information on rich fens which are unique for middle Russia was presented to the Russian Society of Mire Scientists (**Fig. 11**). The proceedings of the conference available at the following link (http://www.binran.ru/files/publications/Proceedings/Proceedings_Mire/VIII_Galkinskii_Chteniya_Proceedings.pdf).

Figure 11. 2nd February. Participants of the "VIII meeting in memoriam of Ekaterina Alexeevna Galkina"

3) Popular science

We prepare a short text about Soltsy mire on the popular science website dedicating to water resources of Russia. The text is available at the following link (http://water-rf.ru/Водные_объекты/3424/Сольцы)