

FRESHWATER PEARL MUSSEL IN KAMENNAYA RIVER - EXPEDITION TO KOSTAMUKSHA NATURE RESERVE, NW RUSSIA

P. Oulasvirta

Alleco Ltd Mekaanikonkatu 3, 00880 Helsinki, Finland
panu.oulasvirta.alleco.fi

The objective of our expedition was to find out whether the freshwater pearl mussel (*Margaritifera margaritifera*) exists in the Kamennaya River, Kostamuksha Strict Nature Reserve, NW Russia. There were some earlier observations about the species in the Kamennaya River made by the staff of the Nature Reserve (Kashevarov & Nikitin, 1998). Our aim was to verify these findings and confirm that the mussel species in the river really is *Margaritifera margaritifera*. Also, we wanted to get a picture of the state of the mussel population. Our expedition was a preliminary study for further, more thorough investigations.

The expedition took place on 20–23.7.2009 and was accompanied by Jari Heikkilä (Friendship Park, Finland), Boris Kasherov (Kostamuksha Nature Reserve, Russia) and the author (Alleco Ltd, Finland), who was responsible for searching for and identifying the mussels. The expedition headquarters was a Nature Reserve's wilderness hut, which is situated by the Kamennaya River, ca. 10 km downstream from Lake Kiitehenjarvi. Searching for the mussels was carried out in three locations: in a river pool in front of the hut, and in one location upstream and one downstream of the hut (see Fig. 1).

FRESHWATER PEARL MUSSEL

The freshwater pearl mussel (*Margaritifera margaritifera*) is the longest living species in Europe's fauna, and can attain an age of at least 150 years. The species exists only in rivers and can be recognized by its kidney shaped shell and gold or dark brown colour. The fully grown freshwater pearl mussel is 10–15 cm long, the maximum being 16–17 cm.

Because of its complex and vulnerable life cycle, the freshwater pearl mussel is considered a top indicator of a healthy river ecosystem. A vital population with stable recruitment of young mussels always indicates clean water and good salmon or trout populations. On the other hand, if a population consists only of adult mussels, it indicates that negative changes have taken place in the environment.

An abundant and vital freshwater pearl mussel population does not only indicate clean water; it also produces it. An adult mussel filters around 50 litres of water per day through its body at the same time as it purifies the water. Indeed, dense mussel populations play an important role in maintaining the health of the ecosystem. By purifying the water, they benefit the spawning success of many fish species, including their host fish, salmon and brown trout. Such species, which maintain the diversity of the ecosystem and create habitats for other species, are known as key species of the ecosystem. If these key species are destroyed, the function of the whole ecosystem suffers.

The freshwater pearl mussel is protected at both national and international levels. In Finland, it has been protected by the Nature Conservation Act since 1955. In Russia, it is a red-listed species as well. The freshwater pearl mussel is also listed in Annex II of the European Union Habitats Directive as a species whose habitat must be protected for its survival.

METHODS

Searching for the mussels was done by diving. Depending of the depth of the location, either skin (snorkel) diving or SCUBA diving (diving with an aqualung) was used. Locations 1a and 3 were examined by skin diving and locations 1b and 2 with SCUBA. Location 3 was surveyed by two divers (Boris Kasherov and the author) doing parallel transects.

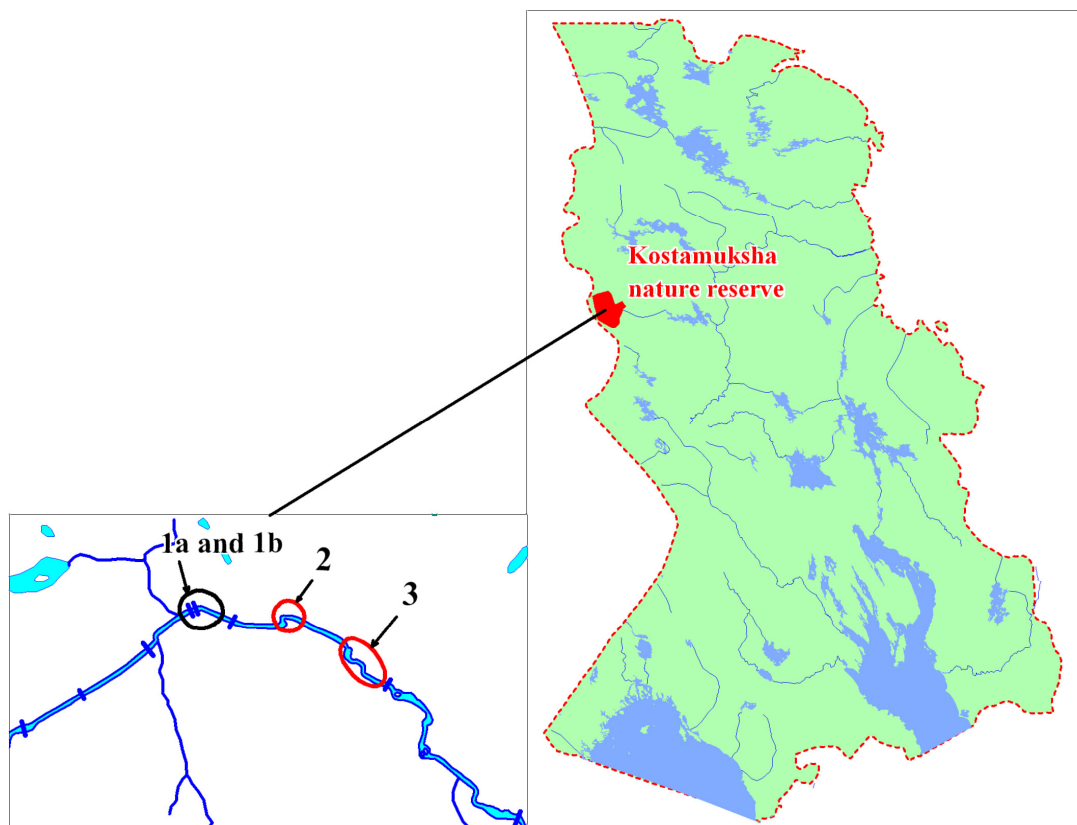


Fig. 1. Kostamuksha nature reserve and investigated locations (1a, 1b, 2 and 3). Freshwater pearl mussels were found from sites 2 and 3 (red circles)

RESULTS

Freshwater pearl mussels were found at locations 2 and 3. Location 1b in the upstream was a very deep site (max 7 m) just downstream of a powerful rapid. No mussels were observed there. Neither were the mussels found from location 1a, which was the upper part of the same rapid.

A majority of the mussels were found just opposite the hut in the river pool (location 2). The mussels were mainly located immediately downstream of the rapid in an area where the current became weaker and where the depth was around 4 metres (Fig. 2). The bottom substrate was mainly sand with few bigger stones here and there. I counted well over one hundred mussels in the ca. 100 m² area. The highest densities were 5-10 mussels per square metre. The smallest mussels found were ca. 5 cm long, which indicates that the population is breeding. However, to confirm this, and to estimate the rate of the recruitment, we need to carry out more detailed studies. This time the limited amount of air in the diving cylinder prevented any longer search for juvenile mussels. Besides this area, individual mussels were observed also in some other parts of the river pool.

Location 3 downstream from the river pool was ca. 1 km long. The river habitat there was mainly strong current with small rapids in some places. Altogether 13 freshwater pearl mussels were found. All the observed specimens were adult mussels.



Fig. 2. The river pool in front of the Nature Reserve's wilderness hut (location 2). The red circle indicates the area where more than one hundred mussels were observed.

Photo by *Jari Heikkilä*



Fig. 3. Location 3 downstream from the river pool at location 2. Thirteen mussels were detected in the 1-km long river stretch

Photo by *Jari Heikkilä*



Fig. 4. Location 1b is a deep river pool downstream of a strong rapid. The bottom in this area is rocky, and the maximum depth is ca. 7 metres. No mussels were detected
Photo by *Jari Heikkilä*



Fig. 5. Location 1a just upstream of the rapid in Fig. 4. Boris Kashevarov standing on the stone and Panu Oulasvirta skin diving in the water. No mussels were detected
Photo by *Jari Heikkilä*

CONCLUSIONS

Our expedition proved that the Kamennaya River is a *Margaritifera* river. It is also obvious the mussel population in the river is breeding. However, due to limited time for our field work the rate of the recruitment and the vitality of the population could not be estimated during this expedition. Although well over one hundred mussels were found we still cannot say for sure that the population in the Kamennaya River is remarkable. Considering the fact that investigations were carried out only in three areas, it is, however, quite likely. Most probably, the main habitats of the mussels are elsewhere in the river. Further studies will give us more information on that. According to the previous observations made by the staff of the nature reserve mussels exist also a couple of kilometres downstream from the sites we surveyed.

A majority of the mussels observed were in an area where the depth was ca. 4 metres. Such a significant depth is not very common a habitat for the freshwater pearl mussel. Although even deeper findings are known, freshwater pearl mussel is normally found in much shallower water. Moreover, a river pool is not a very common surrounding for the freshwater pearl mussel, which always requires flowing water. This was the case also this time, because the mussels were in the area just downstream of the rapid, where the current was still notable. In fact, the water in the whole river pool at location 2 was constantly moving, thus providing a suitable habitat for the freshwater pearl mussel in the area which resembles a small lake rather than a river.

According to my earlier observations on freshwater pearl mussel populations I would have expected to find more mussels from location 3, where both the depth and current conditions were typical for *Margaritifera* rivers. However, only a couple of specimens were found. Our surveys showed, however, that the distribution of the mussels continues downstream from the river pool. We can expect to find more mussels further downstream.

At locations 1a and b, upstream from the river pool, the bottom consisted mainly of big boulders. Especially at location 1b beneath the rapid the boulders were really big, several metres in diameter. Thus, it is theoretically possible that there are still mussels between and under the boulders, which were invisible to the diver. The same uncertainty applies also to location 1a, upstream of the rapid, where the bottom was also stony.

Thus, since no mussels were found from locations 1a and 1, it is still uncertain whether the distribution of the freshwater pearl mussel continues to the upper reaches of the Kamennaya River. This is also a matter to be investigated in further studies.

References

- Kashevarov B.N. & Nikitin V.O. 1998: Notes on the freshwater pearl mussel (*Margaritifera margaritifera*) in the Kostamuksha Nature Reserve. Memoranda Soc. Fauna Flora Fennica 74: 41–44 p.