Oryx

Long-term forest protection pays off: the spread of threatened bracket fungus in Estonian forest set-asides

By Kadri Runnel & Asko Lõhmus, 19th September 2019

In forest conservation we too often seem to lose large intact landscapes and biodiverse forests to timber industries or land development before effective conservation action can take place. When ecologists then try to protect old-growth stands, striving to create large, well-connected habitat networks, they often find that the most sensitive species remain in only a few, isolated forest patches. Even once protected, we do not know whether and when these largely degraded habitats could enable remnant primaeval-forest species to recover across their range and spread out from their refugia along these networks. Most parts of Europe that have a long history of intensive land-use are currently faced with this situation.

Fruit bodies of *Amylocystis lapponica*. Photo: Urmas Ojango

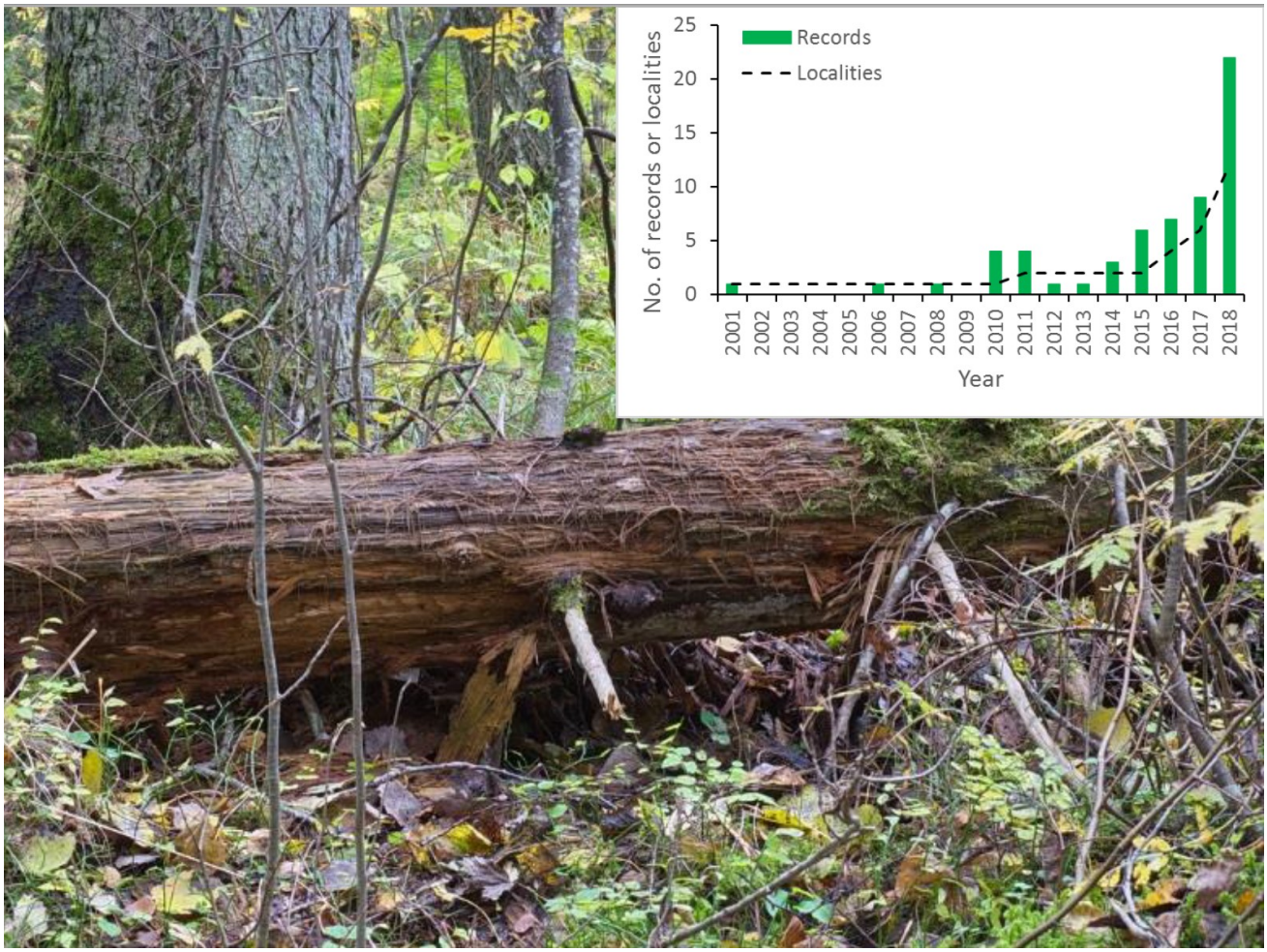
Our small group of conservation mycologists has now provided a preliminary answer to this

complex issue based on long-term monitoring of a threatened bracket fungus, *Amylocystis lapponica*, in Estonia.

Amylocystis lapponica is a saprotrophic fungus that grows on large fallen conifer trunks and is threatened across Europe. In the last 30 years its fruit bodies have been recorded in eight European countries, mostly in the boreal zone. To the south it is only present in a few refugia in the best-preserved Central European primaeval forests.

When in good shape, *A. lapponica* fruit bodies are easy to detect. Photo: Urmas Ojango

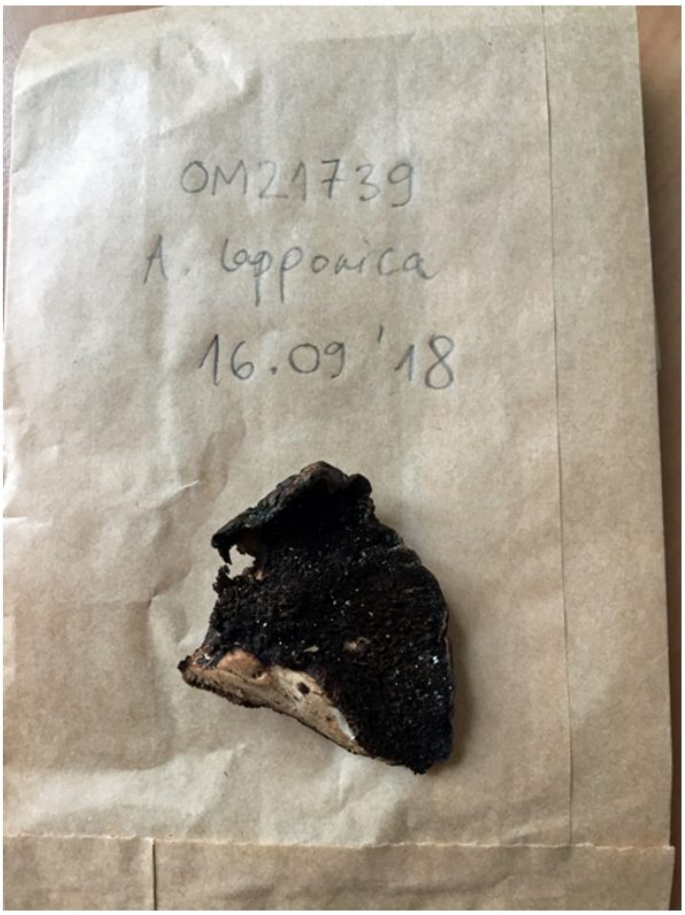
In Estonia this species was known for 40 years from a few records in a single old-growth stand and was categorized as Critically Endangered. Throughout this period there have been increasing efforts to protect forests from human intervention. The area of strict forest reserves in Estonia rose from a single stand in 1924 (the locality of the fungus) to 3% of all forests in the early 1990s and to 13% in 2019.



Typical habitat of *A. lapponica*: a rotten spruce trunk in an old-growth forest. The graph shows the species records and number of localities during the 21st century. Photo: Urmas Ojango

We finally received some good news in 2011, when *A. lapponica* was discovered in a nature reserve in north-east Estonia, c. 100 km from the first locality. In 2017 two new subpopulations were found in central and southern Estonia. By 2018 the number of known subpopulations had expanded to nine, in 12 separate localities.

How can we be sure that the species was not already present in the newly discovered localities? *Amylocystis lapponica* is a fungus detectable mostly from its annual fruiting bodies, and fungi such as this can easily skip a few years of fruit-body production. What we had, however, were impressive survey histories of most of the new localities. Before the first record, these areas had been surveyed several times by local or visiting professional or amateur mycologists. These people are unlikely to walk through a forest without noticing and reporting this iconic species. Furthermore, *A. lapponica* is also well-known to the local conservation community as it is strictly protected nationally. In fact, the national Conservation Act makes it obligatory to report all records of the species to conservation authorities. Thus, we are confident that the population has expanded.



Left: A mycologist (Dr. Kadri Runnel) documenting *A. lapponica* record. Photo: Vladimir Kunca. Right: Identifying old, out of shape or dried *A. lapponica* fruit-bodies requires high mycological skills. This fruit-body was found and identified by Dr. Otto Miettinen, a Finnish mycologist visiting Estonia. Photo: Kadri Runnel

But why did the population expand and what does this mean for forest conservation? We found that all the new localities were in the best preserved old-growth stands, where no interventions had taken place over the last 50 years, although some forest use was likely in the more distant past. However, what exactly improved in these forests during this time remains clear. Thus we do not know whether those conditions could be purposefully restored in a shorter time period.

We are also unsure about the origin of the source populations for the new localities. Perhaps the last Estonian refugium played a contributing role, but the spores could have also originated from elsewhere. Nevertheless, it seems to be worth establishing forest reserve networks even in fragmented and impoverished landscapes, and then to wait. Patience beyond the time-frame of a single human generation may eventually pay off in forest conservation.

The article Recovery of the Critically Endangered bracket fungus *Amylocystis lapponica* in the Estonian network of strictly protected forests is available in *Oryx—The International Journal of Conservation*.

Kadri Runnel & Asko Lõhmus

Kadri Runnel is currently a post-doc at the Swedish University of Life Sciences. Her studies concentrate on the ecology and conservation of wood inhabiting fungi and their habitats.

Asko Lõhmus is a research professor at the University of Tartu and has a wide range of research interests in conservation biology, sustainable forest management and wildlife–habitat relationships.