



Joint Environmental Management of the River Tana

WP 4 BIODIVERSITY

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Introduction

At the River Tana, ice and floods as well as the transport of sediments displaced by them create unique habitats: extensive shifting sands, sand beaches and shingle shores as well as low freshwater meadows. The restless and ever-changing riparian zone provides a refuge and a competition-free habitat for many species that are rare elsewhere in Finland and Norway. Some of the species are only found in the River Tana Valley.

One of objectives of the River Tana Interreg project is to increase awareness about the nature values of the River Tana. Cooperation meetings between the Norwegian and Finnish authorities resulted in an agreement on the species for which further information or possible field inventories were required. The aim was also to identify those habitats that are important for the preservation of the species composition. This report provides a summary of the studies of the project's biodiversity section and the measures taken in the work package.

Work on the biodiversity theme took place at several meetings between the authorities. In these, the project partners specified the species and habitat types to be examined in more detail and exchanged information about the countries' information systems and threat status classifications concerning species and habitat types. Memorandums were produced on the meetings.

The field work took place in July–August between 23 July and 2 August and 20 and 30 August 2018. During this period, inventories of plant species were conducted on seven days. Work on the other days comprised inventories of traditional landscapes, advice to residents on their management and restoration of a model site. The plant species inventories mapped out new potential occurrence sites and examined known occurrences on both sides of the river as well as collected information about other threatened species on the Finnish side (Backman 2019, Lipponen 2020). In addition, an inventory of the *Pelochrista guentheri* moth in the River Tana Valley (Albus Luontopalvelut 2018) and a survey of seminatural grasslands and wooded pastures in the municipality of Deatnu (Tana) (Arnesen & Sletten 2018) were commissioned as outsourced services.

Geospatial datasets

A website (www.naturbase.no) maintained by the Norwegian Environmental Agency provides access to species and habitat type location data and, where necessary, the data can be ordered as geospatial data.

Finland currently has several information systems in use and, as regards species, the environmental administration's geospatial data system will still undergo changes during 2020. Data in the environmental administration's information system is not yet publicly accessible. As the Norwegian datasets are easy to download and a similar system is also being developed in Finland (although specific species and habitat type data will not be publicly available in the future, either), it was regarded as important in the project to exchange information about the use of national information systems and about how to access species and habitat type data from the other side of

the border. The project ended up creating a shared geospatial dataset on the species and habitat types examined in more detail, which can be utilised as background material in contexts such as land use plans. The dataset will be delivered with this project report to municipalities and regional authorities. Land use planning should, however, be based on the most up-to-date data, which can be found in the national systems of Finland and Norway.

Once the Finnish environmental administration's species data has been transferred to the species information system (laji.fi) maintained by the Finnish Biodiversity Information Facility, any follow-on projects should develop the direct utilisation of datasets via interfaces to enable access to the most up-to-date data.

How to access geospatial data

The Norwegian <https://kartkatalog.miljodirektoratet.no/> pages can be used to select and download data on species and habitat types easily onto your computer.

Most of the species information on the biodiversity information portal of the Finnish Biodiversity Information Facility is publicly available and can be downloaded at www.laji.fi. Requests for information about seminatural grasslands and wooded pastures and, for the time being, also about threatened species should be submitted to Lapland Centre for Economic Development, Transport and the Environment (kirjaamo.lappi@ely-keskus.fi), but following the transfer to the new information system, information requests will be passed on to the Finnish Biodiversity Information Facility.

Species surveys

The River Tana appears to be not only a border river between Finland and Norway but also to form a natural dispersal barrier for species. The plant species selected for more detailed examination were the wheatgrass *Elymus fibrosus* and the meadow-rue *Thalictrum kemense*. It was agreed that an eye would be kept on the Tartarian catchfly (*Silene tatarica*) in the field work as the species is relatively common by the large rivers of Central Lapland and found in Norway by the River Buolbmátjohka. The survey also covered a large number of other plant species that are threatened only on one side of the River Tana. In most cases, the differences in the threat status of plant species were found to be due to the natural dispersal barrier. Among plant species, many eastern species hardly occur at all on the western or northern side of the River Tana. There are also examples to the contrary, including the European white hellebore (*Veratrum album*), which is quite abundant in the municipality of Deatnu (Tana), with abundant occurrences even found on sites including roadsides. On the other hand, the species is Critically Endangered (CR) in Finland. At the same time there are, for example among insects, several species that are threatened on both sides of the river and that are either broadly dispersed but low in number or that are strictly adapted to an environment like the River Tana Valley or even exclusively adapted to the River Tana environment. The insect species chosen for closer examination were the *Pelochrista guentheri* moth, whose habitat is limited to the River Tana Valley, and the dune tiger beetle (*Cicindela maritima*), which is low in number in both countries. The habitat type examinations were limited to

traditional landscapes as these feature habitat types that are threatened in Finland as well as Norway.

Elymus fibrosus wheatgrass

The wheatgrass *Elymus fibrosus* is a wind-pollinated species that is relatively easily dispersed to new sites. Its distribution area ranges from areas in Russia east of the Yenisei River and west of Lake Baikal all the way to Northern Europe. In Finland, the most abundant occurrences of the species have been found by the River Kemijoki, but it also occurs on other sandy shores of northern rivers, such as those of the Avviljohka (Ivalojoki), Oulankajoki and Ovnnesjohka (Ounasjoki) rivers. According to the Finnish environmental administration's information database (Hertta), the northernmost occurrences found in Finland are by the River Anarjohka, but scientific collections also contain samples from the shores of the River Tana (Finnish Biodiversity Information Facility 2020). There are a total of 12 known occurrences of *E. fibrosus* in the River Tana Valley and by the River Anarjohka, of which 5 in Finland and 7 in Norway (Figure 2). The River Tana Valley occurrences are the only ones in Norway. In addition, there is one observation from a site by the River Suoidnejohka around 30 km west of the River Tana. *E. fibrosus* grows on stone and sand river shores, in sandy freshwater meadows and in places also on road shoulders.

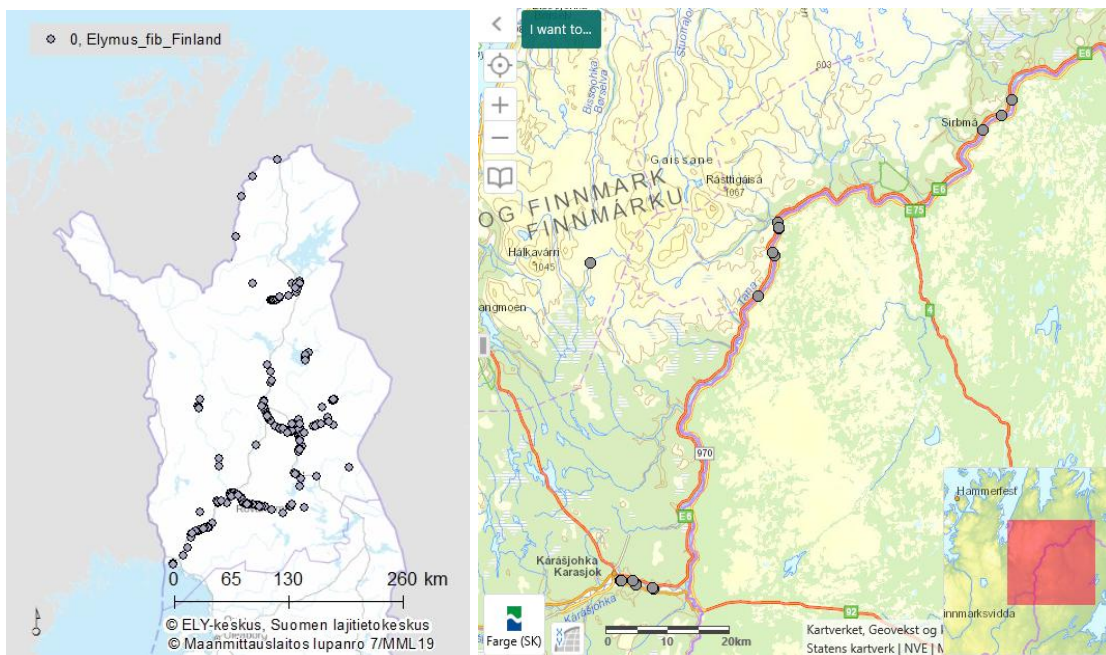


Figure 1. Finnish and Norwegian observations of the wheatgrass *Elymus fibrosus* (Finnish environmental administration's information database (Hertta) 9 December 2019, Finnish Biodiversity Information Facility 2020 and Norwegian Environmental Agency's Naturbase map service 3 February 2020).

On the basis of examinations of aerial photos, the field inventories focused on habitats that appeared suitable for *E. fibrosus* and were located in the vicinity of its known occurrence sites. A total of 6 new occurrences of *E. fibrosus* were found, of which 3 on the Finnish and 3 on the Norwegian side. The species does not appear to be particularly abundant, mainly occurring in single spaced out tufts even on representative sites. In addition, some of the occurrences were located in areas that are clearly becoming overgrown. The species appears to thrive in areas that

already features somewhat developed vegetation but with open sand still remaining, too. The species stays on a site for quite a long period of time, disappearing gradually as the site grows over. The Dalvadas occurrences found in summer 2018 were located in riparian *Salix* spp. thickets on the open shore side. The species is obviously difficult to spot in the dense thickets. The species is adapted to the changing environment maintained by the flooding and ice erosion of the northern rivers. The continuum of the preservation of open sites and the emergence of new ones is important for the preservation of *E. fibrosus*.

The shores of the River Tana have plenty of potential habitats for *E. fibrosus*. If the river's natural flood dynamics and ice erosion are preserved, habitats suitable for the species will be preserved and new ones also created. It is likely that the overgrowth of sites where the species grows has been accelerated also by the discontinuation of cattle grazing and the reduced mowing of the shores, even though the species is not perceived as an actual traditional landscape species. An abundance of other wheatgrasses such as *E. caninus* and *E. mutabilis* were also found in the field surveys. Some of the plants were also clearly hybrids of the above-mentioned species. *E. fibrosus* cannot be regarded as abundant at the River Tana, but it is likely to occur infrequently here and there in sandy freshwater meadows and in places also in upper sections of sand shores and on stone shores. At least on the Finnish side, the area between Ochejohka (Utsjoki) and Nuorgam would appear to have fewer habitats that look suitable for the species but, on the other hand, the efforts to detect the species focused more specifically only on the area between the River Veahčajohka and Välimaa. On the Norwegian side, the species has been found in upper sections of sand shores. The new occurrences observed and old observation sites inventoried in summer 2018 were examined in more detail specifically for each area in the plant species report (Lipponen 2020), and individual sites are presented here as examples.



Figure 2. Observations of *Elymus fibrosus* according to threatened species databases (Finnish environmental administration's information database (Hertta) 9 December 2019, Finnish Biodiversity Information Facility 2020, Norwegian Environmental Agency's Naturbase database 9 December 2019) and the species observed in fieldwork carried out in 2018.

Seitala

In Seitala, the wheatgrass *Elymus fibrosus* was found in three locations. On the Finnish side, the species grew on the sandy riverbank on the sheltered side. The individuals grew on exposed sand, but there were also batches of the harebell (*Campanula rotundifolia*) and alpine milkvetch (*Astragalus alpinus*) as well as Breckland wild thyme (*Thymus serpyllum* subsp. *tananensis*) growing nearby. A total of 4 fertile and 3 sterile tufts were found on the site, and 1 more tuft was detected slightly further to the north. On the Norwegian side, the species was found in two locations on the highest point of the sandy and exposed river bank, totalling 23 fertile individuals. Other vegetation was scant. Accompanying species included the wheatgrasses *E. caninus* and *E. mutabilis*, the red fescue (*Festuca rubra*), the alpine milkvetch (*Astragalus alpinus*) and smallweeds (*Calamagrostis* spp.).

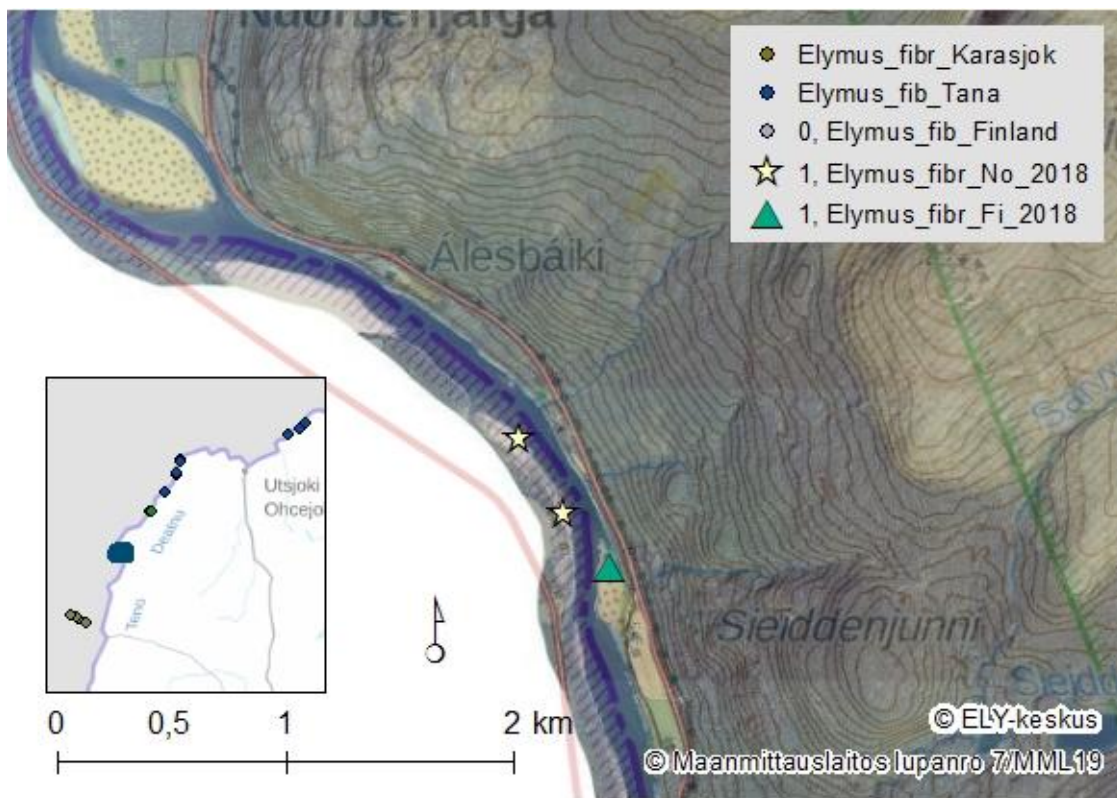


Figure 3. Occurrences in Seitala. The 2018 observations are indicated by the green triangle and the yellow stars.



Figure 4. Typical appearance of the wheatgrass *Elymus fibrosus* growing on an exposed site. The leaves are bright green and the flower spikes are nodding. The occurrence was photographed in Seitala.

Ruovttot and Leavvajohka

There are several known sites where the wheatgrass *Elymus fibrosus* has been observed in the area south of the River Leavvajohka on the Norwegian side (Figure 5). The occurrences of *E. fibrosus* observed in summer 2018 are indicated on the map by a star. The northernmost known Leavvajohka occurrence could not be found, but a few tufts were found slightly further towards the south by the river on a site that was in part already becoming overgrown. The more southern Leavvajohka sites where *E. fibrosus* grows featured individual tufts of the species on a steep and in parts rocky river bank. The Ruovttot occurrence of *E. fibrosus* in a low freshwater meadow was the largest one found in summer 2018. Tens of individuals of the species were found scattered around the meadow, but this occurrence cannot be regarded as very abundant, either. Ruovttot is also likely to be a representative site as regards insect species, as it features a mosaic-like transition from the multiple-species freshwater meadow to exposed patches of sand.

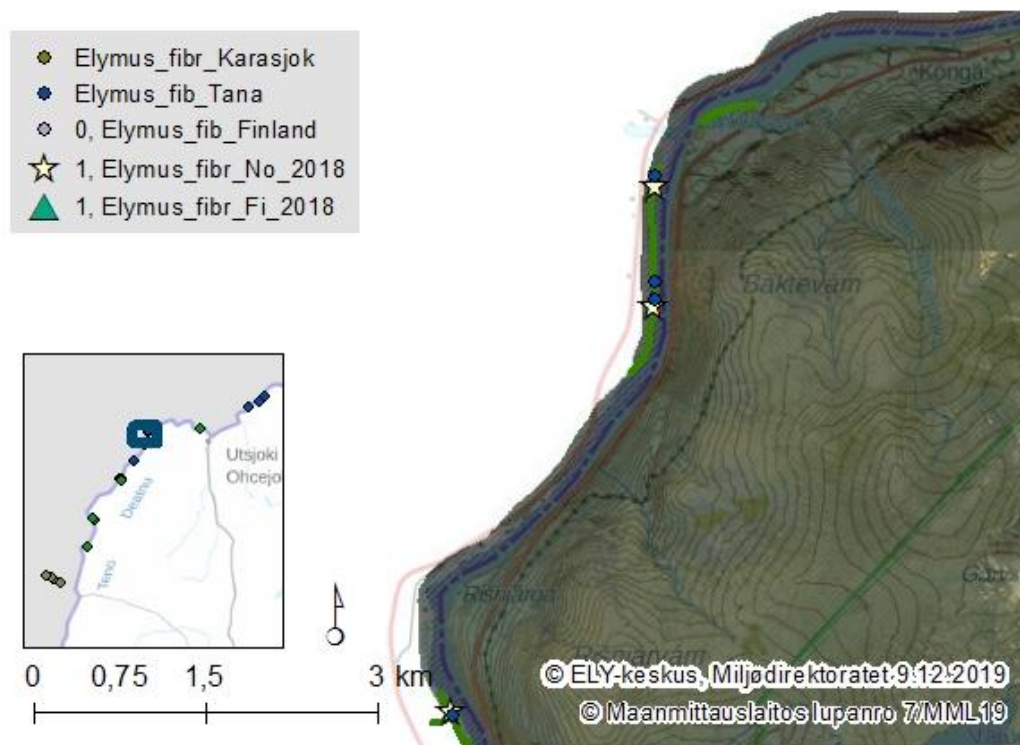


Figure 5. The Norwegian occurrences examined comprised the Ruovttot and Tanadalen: ved Tana/Deatnu litt ovenfor samløpet med Leavvajohka occurrences shown on the map.



Figure 6. The wheatgrass *Elymus fibrosus* growing in a mosaic pattern formed by other vegetation and sand. This site is also likely to be a potential occurrence site for Lepidoptera.

Collection data of the Finnish Biodiversity Information Facility also contains an observation from the Norwegian side that is not included in the Norwegian Environmental Agency's geospatial datasets (Figure 9). The occurrence was not verified on the basis of a site visit.

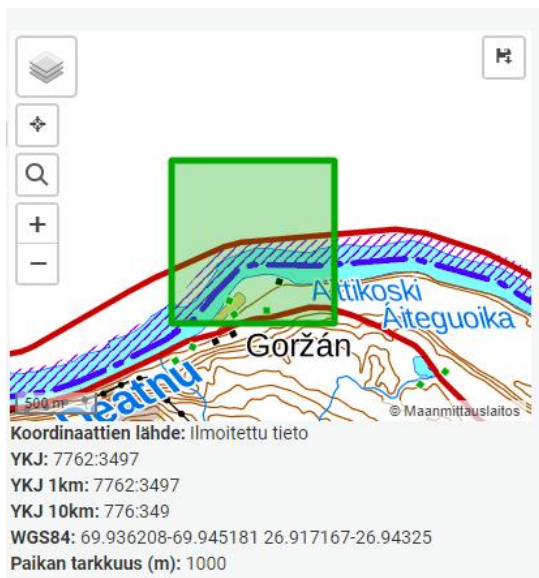
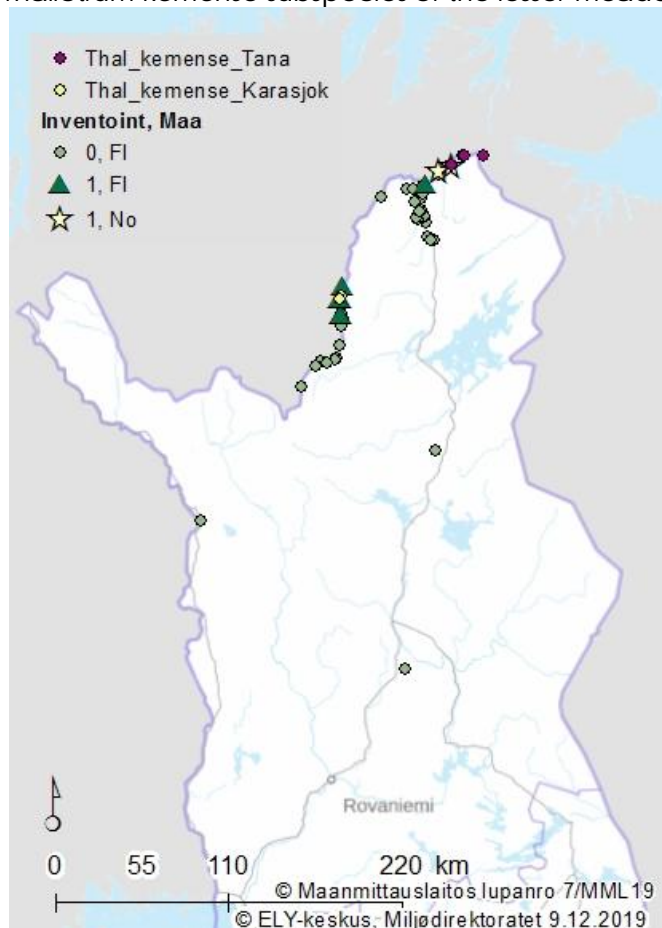


Figure 7. The Goržán occurrence of the wheatgrass *Elymus fibrosus* was located north of the river on the Norwegian side, grid point 1 km accuracy (Finnish Biodiversity Information Facility 2020).

Lesser meadow-rue (*Thalictrum minus* subsp. *elatum*, syn. *Thalictrum kemense*)

Thalictrum kemense subspecies of the lesser meadow-rue is a protected species in Finland and its



current IUCN Red List status is Least Concern (LC), but it was classified as Near Threatened (NT) in the previous threat status assessments. In Norway, the *Thalictrum kemense* subspecies is classified as Vulnerable (VU).

T. kemense is widely distributed in the east, with the furthest observations having been made in China and Mongolia. In the west, its distribution is limited to separate occurrences in the River Tana and River Ochejohka Valleys (Norwegian Environmental Agency 2020, Finnish Biodiversity Information Facility 2020b). In Southern Finland, several occurrences of the species have been found in gardens. The species favours herb-rich forests, flooded forests and cultural environments. In Ochejohka (Utsjoki), the species has in inventories of traditional landscapes been found on several old residential sites, and it is likely that some of these occurrences were translocated by humans (Kalpio & Bergman 1999).

Figure 8. Occurrences of the *T. kemense* subspecies of the lesser meadow-rue in Finland and Norway.

In the field inventories, the species was searched for not only during plant species inventories but also in conjunction with traditional landscape inventories. In summer 2018, a total of 8 occurrences were found, with 6 of these entirely new ones. Of these, 2 occurrences were on the Norwegian side. The species would appear to thrive to some extent in environments with regular disturbances as the best occurrences were located either in riparian herb-rich forests reached by floods or in open or semi-open seminatural grasslands and wooded pastures. The Pystyoja occurrences were located in an old cattle pasture that had already overgrown into a dense thicket of young birches (*Betula* spp.) and willows (*Salix* spp.). It is likely that the forests around the old meadow to the west of Bálggatbákti also used to be more open in the past. In flood-shaped environments, the preservation of the natural flood cycle helps to preserve occurrences, but in seminatural environments the plants may be suppressed due to overgrowth. A few examples of the findings from summer 2018 are given below.



Figure 9. Occurrences of the *Thalictrum minus* subsp. *elatum*/ *T. kemense* subspecies of the lesser meadow-rue in the River Tana and River Anarjohka Valleys.

Bálggatbákti

There are two occurrences of the *Thalictrum minus* subsp. *elatum* or *T. kemense* subspecies of the lesser meadow-rue by the River Anarjohka north of Bálggatbákti to the east and north of a meadow now longer in use. On the western side, the subspecies grows by and on a path leading into the meadow. On the eastern side, the occurrence is located in the forest by the meadow, which is small in area. Accompanying plants found include the wheatgrass *Elymus caninus* and the wood cranesbill (*Geranium sylvaticum*).

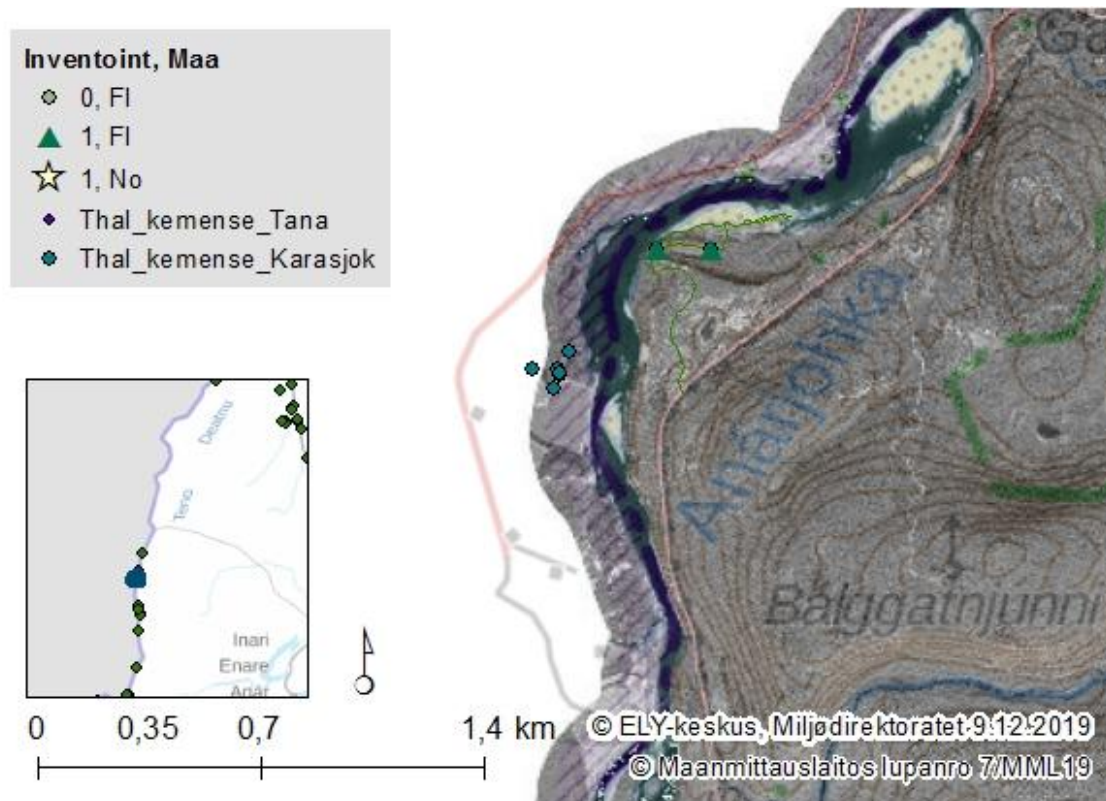


Figure 10. Separate occurrences of the *Thalictrum kemense* were found north of Bálggatbákti at the eastern and western end of a small meadow. The meadow is located under a very steep dorsal ridge in the river valley. An abundant occurrence of the *T. kemense* is located on the Norwegian side around 500 m to the southwest.



Figure 11. The overgrowth of the growing site of the *Thalictrum kemense* can be seen in the photograph taken from the ridge on the southern side. The peripheral parts of the meadow are overgrown and the species appears to only thrive in the semi-open zone around the meadow.

Badje-Guoldná



The valuable traditional landscape site of Badje-Guoldná has two occurrences of the *Thalictrum kemense* as well as many other valuable species. The occurrences are located on a bank at the fringe of meadows. The occurrence is not very abundant as there are only a few groups formed by the species in total. The Badje-Guoldná traditional landscape has been classified in an inventory as a regionally valuable landscape. Like the Badje-Guoldná site, Jorggastat on the Norwegian side also used to be a summer settlement. People would move to Badje-Guoldná for the summer from Aslakkala, located around 2 km downstream. Accompanying species include the longleaf speedwell (*Veronica longifolia*) and the small meadow-rue (*Thalictrum simplex* subsp. *boreale*).

Figure 12. Photo by Marjut Kokko

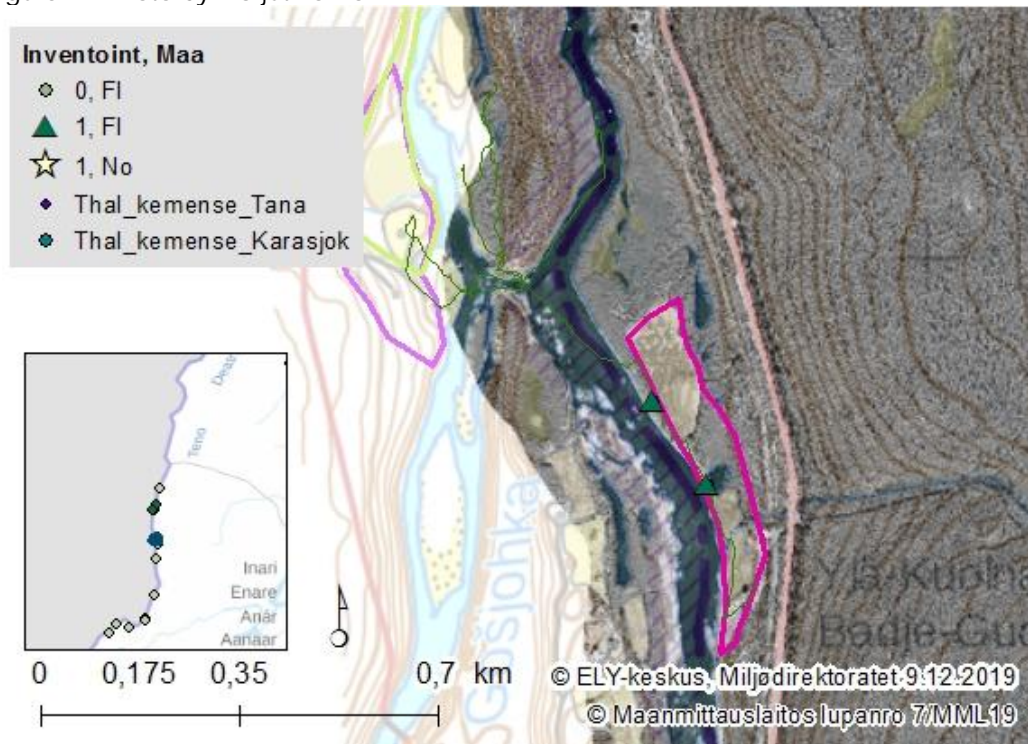


Figure 13. The occurrences of the *T. kemense* in Badje-Guoldná are located on the valuable managed traditional landscape site of Badje-Guoldná (outlined in pink). On the Norwegian side, the same entity contains the valuable seminatural grassland site and cultural environment of Jorggastat (outlined in pale purple and green).

Bajit-bievrá

On the Norwegian side, there are several semi-open freshwater meadows where grazing still takes place at least occasionally or where grazing only ended a few years ago and the meadows have not yet overgrown. The old riverside pasture of Bajit-bievrá is a good example of such a site with a diverse species composition. The *Thalictrum kemense* was found growing sparsely among junipers (*Juniperus communis*), in a total of around five groups. Accompanying species included the tufted hairgrass (*Deschampsia cespitosa*), goldenrod (*Solidago virgaurea*), meadow buttercup (*Ranunculus acris* ssp. *borealis*), lady's mantles (*Alchemilla* spp.) and wood cranesbill (*Geranium sylvaticum*).

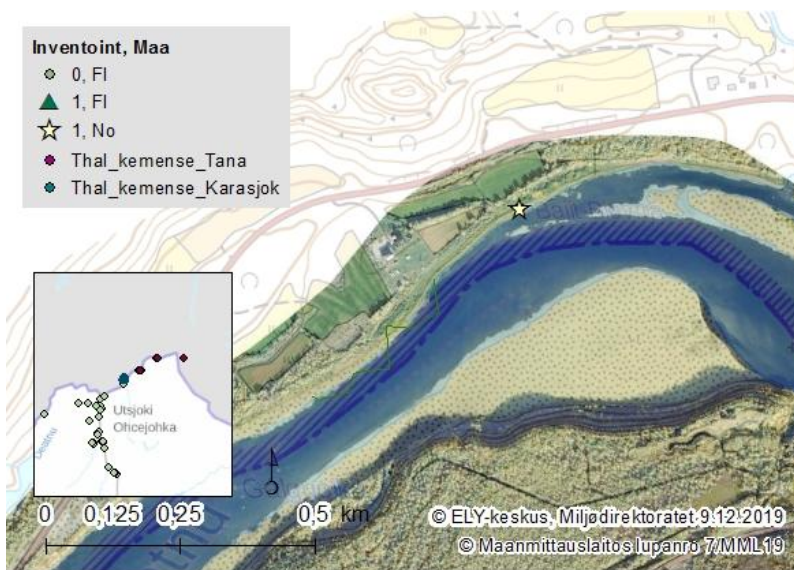


Figure 14. Signs of grazing can be seen on the shores of Bajit-bievrá. The current management status of the site is not known.

Pajukoste, NE



The most viable occurrence of the *Thalictrum kemense* in the summer 2018 inventories was found on the Norwegian side, north of the river across from the valuable Vålímáa traditional landscape. The riparian forest occasionally grazed by cattle has relatively high levels of light, and tens of individuals of the subspecies grew here and there in the forest. The size of the occurrence extended tens of metres towards the west from the observation point. Accompanying species included the wood stitchwort (*Stellaria nemorum*), globeflower (*Trollius europaeus*), longleaf speedwell (*Veronica*

longifolia), goldenrod (*Solidago virgaurea*) and wood cranesbill (*Geranium sylvaticum*).

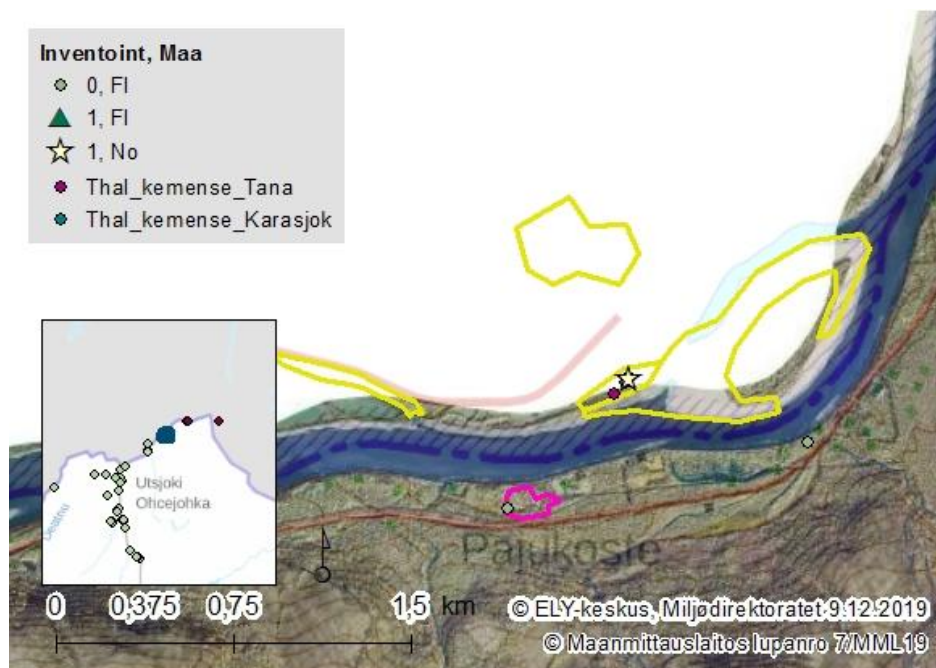


Figure 15. The occurrence of the *T. kemense* is representative and extensive, and cattle have at least occasional access to the riparian forest, too. The area outlined in yellow indicates the valuable habitat types on the Norwegian side, and the valuable Vålímáa traditional landscape side on the Finnish side is outlined in pink.

Tartarian catchfly (*Silene tatarica*)

The distribution area of the Tartarian catchfly (*Silene tatarica*) focuses on Eastern Europe. In Norway, the species is found only by the River Buolbmátjohka, a tributary of the River Tana flowing from Lake Pulmanki. However, the species has not been found by the river flowing into the southern part of Lake Pulmanki despite vegetation surveys carried out in the area. The location at the River Buolbmátjohka is thus a relict. The species was not found in the summer 2018 field inventories. Habitats of the species are maintained by grazing and mowing. After all, *Silene tatarica* was originally a steppe species whose current sites by northern rivers are merely a historical remnant. The species is dispersed through seeds. New habitats for it have also been found by sunlit road shoulders (Hämet-Ahti et al. 1998, Finnish Biodiversity Information Facility d, Figure 16). The IUCN Red List category of the species is Near Threatened (NT) in Finland and Vulnerable (VU) in Norway.

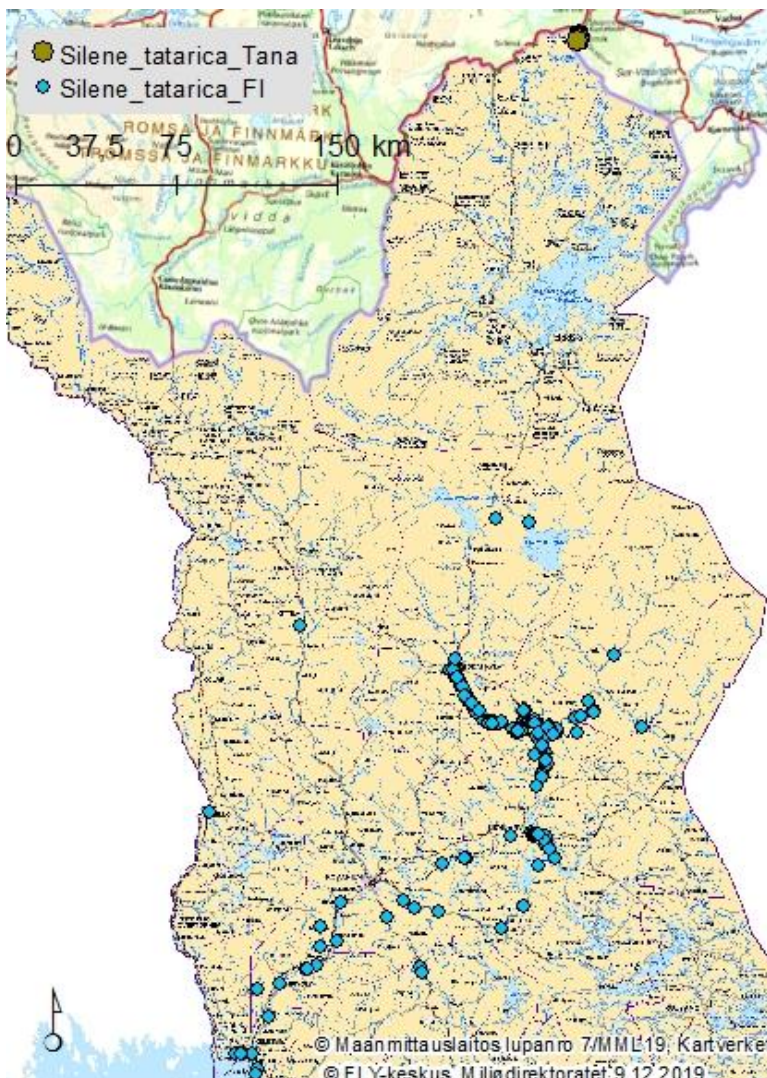


Figure 16. The Tartarian catchfly (*Silene tatarica*) appears to have separate occurrences in Finland and Norway.

Pelochrista guentheri moth

The *Pelochrista guentheri* moth is classified as Endangered (EN) in Finland and Norway. In addition, the species is under strict protection in Finland (under section 47 of the Nature Conservation Act). The range of the species is limited to the River Tana Valley in Finland and in Norway also covers areas by the River Karasjohka. The species is also extremely rare internationally as, in addition to the River Tana catchment area, only the specimens of the type series from East Karelia are known. The species probably also can be found by rivers running into the Arctic Ocean east of Finland (Karsholt & van Nieukerken 2013). On the other hand, there are no known occurrences of the species in areas such as the River Oulankajoki basin in the Koillismaa subregion of northeastern Finland, even though sandy riparian areas are typical there. *P. guentheri* occurs in open and semi-open sands and shingle shores featuring the goldenrod (*Solidago virgaurea*, Figure 17), on which the larvae are likely to feed. In line with the mode of life of other species in the genus, the larvae are likely to live inside the stem at the base or root neck of the food plant, so observation cannot take place without damaging the larvae. Therefore observation only covers adults. The adult stage lasts around three weeks from late June to mid-July. (Albus Luontopalvelut 2018)



Figure 17. A potential habitat for the *Pelochrista guentheri* moth and many other Lepidoptera. A site like this featuring species including the goldenrod (*Solidago virgaurea*), mountain everlasting (*Antennaria dioica*), alpine milkvetch (*Astragalus alpinus*), alpine catchfly (*Viscaria alpina*) and Breckland wild thyme (*Thymus serpyllum* subsp. *tanaensis*) is bound to be a habitat for a number of noteworthy species. Photo by Albus Luontopalvelut Oy (2018).

Habitats of the *Pelochrista guentheri* moth are also valuable for other Lepidoptera species. Species occurring by the River Tana on same sites as the goldenrod (*Solidago virgaurea*) include the mountain everlasting (*Antennaria dioica*), alpine catchfly (*Viscaria alpina*) and alpine milkvetch (*Astragalus alpinus*), all of which also have their respective dependent Lepidoptera species such as *Gnorimoschema strelicellum* (EN) – *Antennaria dioica*; *Eupithecia fennoscandica* (EN) – *Viscaria alpina*; *Coleophora svenssoni* (EN) – *Astragalus alpinus*. In addition to these, there are species whose ecology, such as their food plant, is not yet known specifically.

Albus Luontopalvelut Oy conducted an inventory of the *Pelochrista guentheri* in the River Tana Valley in 2018. The inventory also recorded observations of other Lepidoptera species that are under special protection or noteworthy on other grounds. The observations were made by three persons in early July on 22 sites (17 in Finland and 5 in Norway) in the riparian zone of the River Tana (Anarjohka). In Finland, the inventory covered an area ranging from south of Gáregasnjárga (Karigasniemi) to Nuorgam, and in Norway areas close to Gáregasnjárga village. The field observation combining active observation and hand netting took place in the evening and at night. The observation period was divided in accordance with the size and structural diversity of the sites. Depending on site quality and previous observation history, 1–3 visits were made to each site. *P. guentheri* was observed on 5 sites in Finland and 1 in Norway (Dorvoguokkasavu) (Figure 18, Figure 19). The sites found on the Norwegian side were not as high in quality as the sites assessed as being the best on the basis of the structure of the environment on the Finnish side, especially south of Gáregasnjárga (Karigasniemi). Many of the sandy shores of the River Tana on the Norwegian side between Gáregasnjárga and Ochejohka (Utsjoki) represent either extensive, almost vegetation-free “sand deserts” or are strongly impacted by the river. The latter means strong or frequent erosion events that change the structure of the riparian zone towards conditions unfavourable to *P. guentheri* or prevent the establishment of plant species.



Figure 18. Occurrences of the *Pelochrista guentheri* moth in Norway and Finland. The figure also shows the 2018 observations.

In Finland, three separate occurrences of *P. guentheri* were found in the southernmost observation grid cell, the data on which had previously been imprecise. The southernmost one of these (Doarrovasgárggu) is smallish in area but high in quality in terms of structure and vegetation. The Pystyoja site is likely to be the most important current site of the species as regards quality and the state of the local population. On the other hand, there may not even be another site that is

extremely diverse and as extensive as Vitnjalasnjavvi in Finland. In addition, one new *P. guentheri* population was found north of Gáregasnjárga (Karigasniemi).

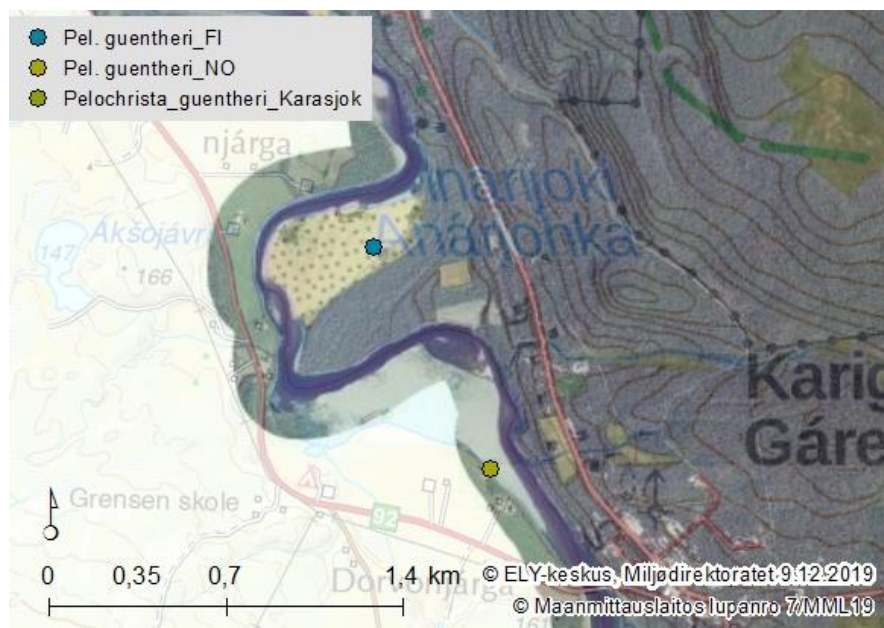


Figure 19. In the summer 2018 inventories, one *Pelochrista guentheri* moth individual was found on the Dorvoguokkasavu site, but the southern parts of the area may provide a potential site for the species.

In Sieidal, excellent habitat occurred to a limited extent only on a mowed compartment not reached by regular floods. Among the known Finnish occurrence sites of *P. guentheri*, the species was found on one site (Hehkkenjavvi). On the basis of the quality of the environment and the observation history of the species, among other known occurrence areas, Roavvenjárga and Allasuolu are the most likely to remain inhabited. The state of the *P. guentheri* population remained unclear as regards the Gáregassuolu site. Despite intensive observation efforts and the habitat being suitable for the species, no individuals were observed. Among the previously known (1990s) observation sites, the Roavesavu local population is likely to have been lost. There were hardly any habitats suitable for *P. guentheri* in the area. Among the known occurrence sites, Rássája, Áitejohka and Báđos were not covered by the inventory. In addition, one of the sites where the species has been found in the 2000s was not included in the field inventory. The site is located in a 100 km² grid cell through which the River Veahčajohka runs, but the location could not be specified further in this inventory.

At the regional level, occurrences of *P. guentheri* are viable in an area covering the southern and northern side of Gáregasnjárga (Karigasniemi) where the density of qualitatively appropriate habitats is at its highest. The species was abundant only on the Pystyoja site, where the habitat structure is fully compliant with the understanding of a habitat characteristic of the species: there should be a relatively abundant occurrence of the goldenrod (*Solidago virgaurea*) in a disturbance-prone semi-open sandy site, a shingle site with low grain size or a combination of these. Corresponding numbers of individuals have previously only been observed on the Hehkkenjavvi occurrence, which appears to have declined. Overgrowth was found to have advanced on the site, but a more likely explanation to the decline is local fluctuation in population dynamics or phenological differences resulting from annual structural variation between the habitats. High-quality sites where multiple individuals were found (Doarrovasgárggu and Vitnjalasnjavvi) have viable local populations. Low observation numbers based on habitat scarcity (Sieidal and

Dorvoguokkasavu] may imply reduced viability of local populations. Populations of which there are observations from recent years and in whose habitats no essential changes have been observed (Gáregassuolu, Roavvenjarga and Allasuolu) must still be interpreted as extant. The observation locations are presented in more detail in Appendix 1. (Albus Luontopalvelut 2018)

Dune tiger beetle (*Cicindela maritima*)

The dune tiger beetle (*Cicindela maritima*) lives in sunlit environments, with its habitats limited to the immediate vicinity of riparian sands. The species hunts during the day and is at its most active around midday. The beetles spend their resting period in depressions dug by them in wet riparian sand. When in pursuit of prey, they have been found to cover distances of more than 100 m per hour, which is quite a long distance for a small beetle. (Irmmler 2010) There are observations of the species from Northern Europe, Central and Western Europe but also from Russia (Irmmler 2010, Finnish Biodiversity Information Facility 2020 e)

In Finland, *Cicindela maritima* is found in various parts of the country on seashores as well as sand lake and river shores. There is only one observation of the species in the Finnish environmental administration information database as regards the River Tana area, but it is likely that there have been very few searches for the species as there are plenty of observations from the Norwegian side from sand shores of the River Tana as well as the River Karasjohka. *C. maritima* is classified as Vulnerable (VU) in Finland and Endangered (EN) in Norway, where it is even classified as a prioritized specimen (a special protection regime). The species is regarded as low in number although its distribution area is extensive. No separate field inventory was carried out at the River Tana in this project, but data on existing observations was collected into the shared database from both sides of the border (Figure 20).

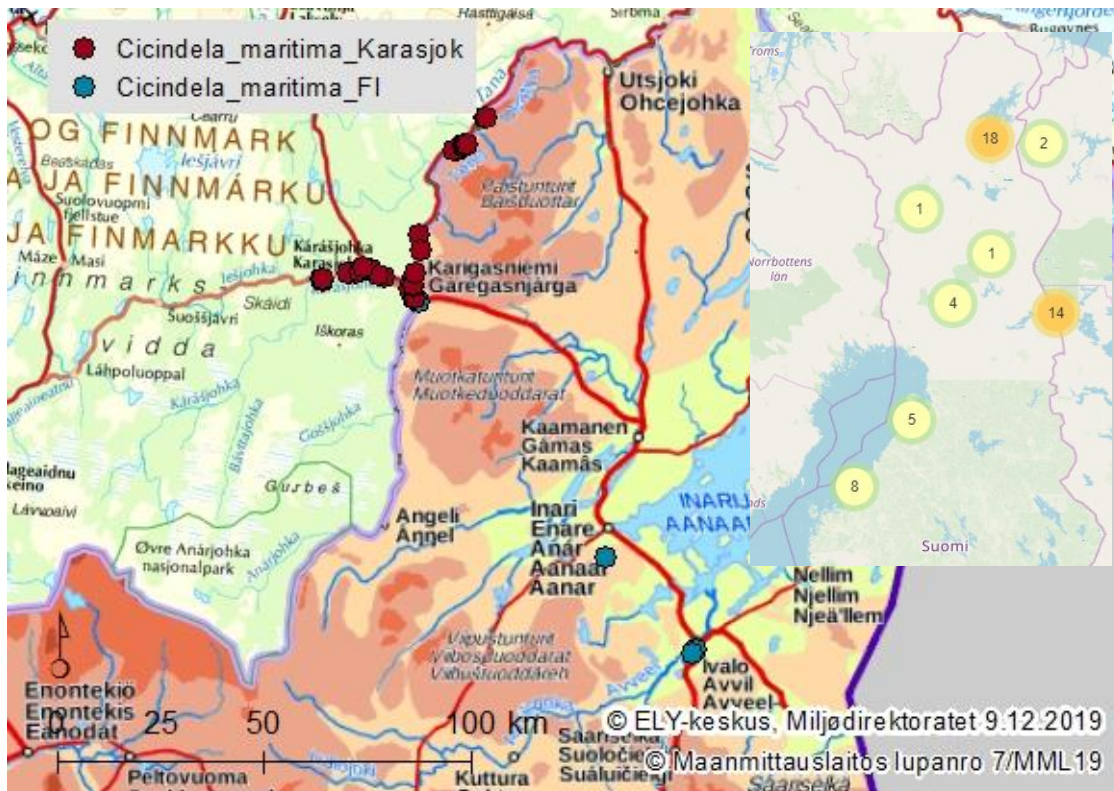


Figure 20. Occurrences of the dune tiger beetle (*Cicindela maritima*) in the River Tana Valley and in Finland. (Finnish Biodiversity Information Facility, occurrence locations of *Cicindela maritima*)

Seminatural grasslands and wooded pastures in River Tana Valley

Existing data on known traditional landscape sites have been compiled in a report on the traditional landscapes of Ochejohka (Utsjoki) (Backman 2019). The report also covers representative sites by the River Anarjohka. The report (in Finnish) can be found online at: [https://ely-keskus.fi/->Lappi->Projektit ja hankkeet -> Tenojoen Interreg -hanke](https://ely-keskus.fi/->Lappi->Projektit%20ja%20hankkeet->Tenojoen%20Interreg%20-hanke). Ochejohka has a total of around 40 seminatural grassland and wooded pasture sites, of which around 15 are covered by regular management measures. In Finland, all seminatural grasslands and wooded pastures are threatened habitat types, but only coastal meadows and juniper meadows are protected habitat types under the Nature Conservation Act (section 29 of the Act).

In Norway, meadows are defined as a selected nature type. This means that there is a specific law and specific regulations to look after this habitat type and its values. This does not mean that meadows are protected, but authorities at all levels have to consider how they can take care of the values when they receive applications for building activities. All known meadows are included in the Norwegian database at naturbase.no. In addition to meadows with distinct biological values, some areas with biological, ecological and cultural-historical values are included in naturbase.no as 'valuable cultural landscapes'. There are 5 such landscapes in Deatnu (Tana) municipality and 7 in Kárášjohka (Karasjok) municipality (Figure 21).

It was found in cooperation between the authorities that there are slight differences between the classifications of traditional landscapes. In Norway, the focus is on herb-dominated meadows whereas in Finland more barren graminoid meadows are also regarded as valuable sites. There are also slight differences in management recommendations (Figures 22 and 23). An inventory conducted in Norway (Arnesen & Sletten 2018) found new kinds of culturally influenced graminoid-dominated meadows that had been established by applying extra soil and using seaweed for fertilisation. The habitat type is not recognised by the Norwegian habitat type classification system (Nature Types in Norway, NiN). Although no threatened species were found in the inventories, meadows (fields) are classified as valuable habitat types in themselves, as these types of remnants of old farming culture in themselves are rare and valuable.



Figure 21. Occurrences of seminatural grasslands and wooded pastures in Finland and Norway. In Finland, data on traditional landscapes also covers sites that are valuable in terms of cultural-historical value. The map shows the sites recorded in geospatial datasets.

In Finland, the River Tana Interreg project has enabled data collected in various projects to be supplemented and recorded and the provision of information about the management of traditional landscapes in Ochejohka (Utsjoki). Data on the sites is based not only on field visits but also on information received from landowners and on site descriptions of the previous traditional landscape inventory (Kalpio & Bergman 1999). Any existing inventory data from the previous round of traditional landscape inventories was verified and data was updated concerning changes. The project participated in the communal work gathering organised in collaboration by the Ochejohka (Utsjoki) parish, the Ochejohka municipality, the Centre for Economic Development, Transport and the Environment, and Metsähallitus, the agency governing the use of state-owned land, on the naturally valuable Pappila site in Ochejohka. In addition, visits were made during the summer to provide advice relating to the management of seminatural grasslands and wooded pastures and

to funding applications. The results of the survey visits, management recommendations and information about funding were sent to landowners and to Ochejohka municipality.

In Norway, traditional landscape inventories took place in Deatnu (Tana) municipality and focused on sites at the end of the Tanafjord that had not previously been covered by inventories (Arnesen & Sletten 2018).



Figure 22. A tall-herb meadow in Smalfjordsletten. The dominant species are the globeflower (*Trollius europaeus*), the *Allium schoenoprasum* subsp. *sibiricum* subspecies of the chives, and the alpine bistort (*Bistorta vivipara*). The site is classified as highly important ('svært viktig') in Norway and managed annually by mowing carried out by the landowner.



Figure 23. The graminoid-dominated Vålmaa site is classified as a regionally valuable site. Similarities and differences between habitat type inventories were compared during joint field visits. The Vålmaa site is managed by Metsähallitus, the agency governing the use of state-owned land in Finland, and has been both mowed and grazed. Pictured on the site are Mia Vuomajoki (Metsähallitus) and Lars Smeland (Deatnu (Tana) municipality).

Management recommendations for seminatural grasslands - benefits for species too

The management of seminatural grasslands and wooded pastures affects the preservation of several species that have become rare. All of the threatened species by the River Tana in Finland and Norway alike benefit to some degree from the management of seminatural grasslands and wooded pastures and may find habitats from other seminatural sites, too. The wheatgrass *Elymus fibrosus* and the *Pelochrista guentheri* moth were found close to a mowed river shore in Seitälä. The *Thalictrum kemense* subspecies of the lesser meadow-rue was observed on several traditional landscape sites, and on pastures no longer used the survival of the species was threatened by overgrowing in a few observation locations.

The general management principles for seminatural grasslands in Finland are grazing, mowing and controlled burning, while in Norway mowing is used and, case-specifically, mowing followed by grazing may be used in meadows. In Finland, grazing is often the only option for the management of extensive areas and sites where mowing is in practice impossible due to the site being very rocky, uneven or steep. Grazing pressure (number of animals per hectare) must be appropriate in relation to site production rate. In natural pastures, there is annual variation in the amount of food plants and additional feeding is not recommended due to eutrophication. As food runs out, animals should be moved to another pasture section.

Mowing is suitable as a management method for sites that are small in area, sites with particularly valuable species, sites that have an even and hard ground and are therefore suitable for machine mowing, and sites that are difficult to access and visit to check on the grazing animals on a daily basis. The purpose of mowing and the removal of mowed material is to increase the openness and light exposure of the site and to reduce soil nutrient content. Mowing reduces the viability of tall vegetation benefitting from eutrophication, which benefits several low meadow species and increases insect diversity in the meadow.

Mowing usually takes place once in each growing season, and the most suitable time for mowing is in late summer after the flowering and seed maturation of meadow plants. The mowed material is collected and removed in a few days from mowing, allowing time for mature seeds to disperse. The best disposal method for the mowed material is to use it as winter feed for cattle. Burning or depositing plant waste on the managed site is not recommended due to its eutrophying impact. Mowing is recommended to be primarily conducted using a mowing tool with a cutting blade such as a scythe, scythe mower or a tractor-pulled mower such as a dual-blade one (Figure 24).



Figure 24. Scythe mowers are used on many northern sites and are the recommended mowing tool for seminatural grasslands in Norway. In Finland, seminatural grasslands may be mowed using a tractor or an all-terrain vehicle and mower combination. Photos by Marjut Kokko and Merja Lipponen.

In Ochejohka (Utsjoki), sites have remained open and free from trees even in cases where some time has passed since management measures. In many cases, mowing every few years is enough to preserve the diversity of vegetation and to prevent scrub colonisation and appearance of tree plantlets. A small section of the vegetation should also be left unmowed every year. Tools suitable for the removal of problem species such as the stinging nettle (*Urtica dioica*) include mowers with a crushing blade, such as brush cutters, string trimmers or lawn mowers.

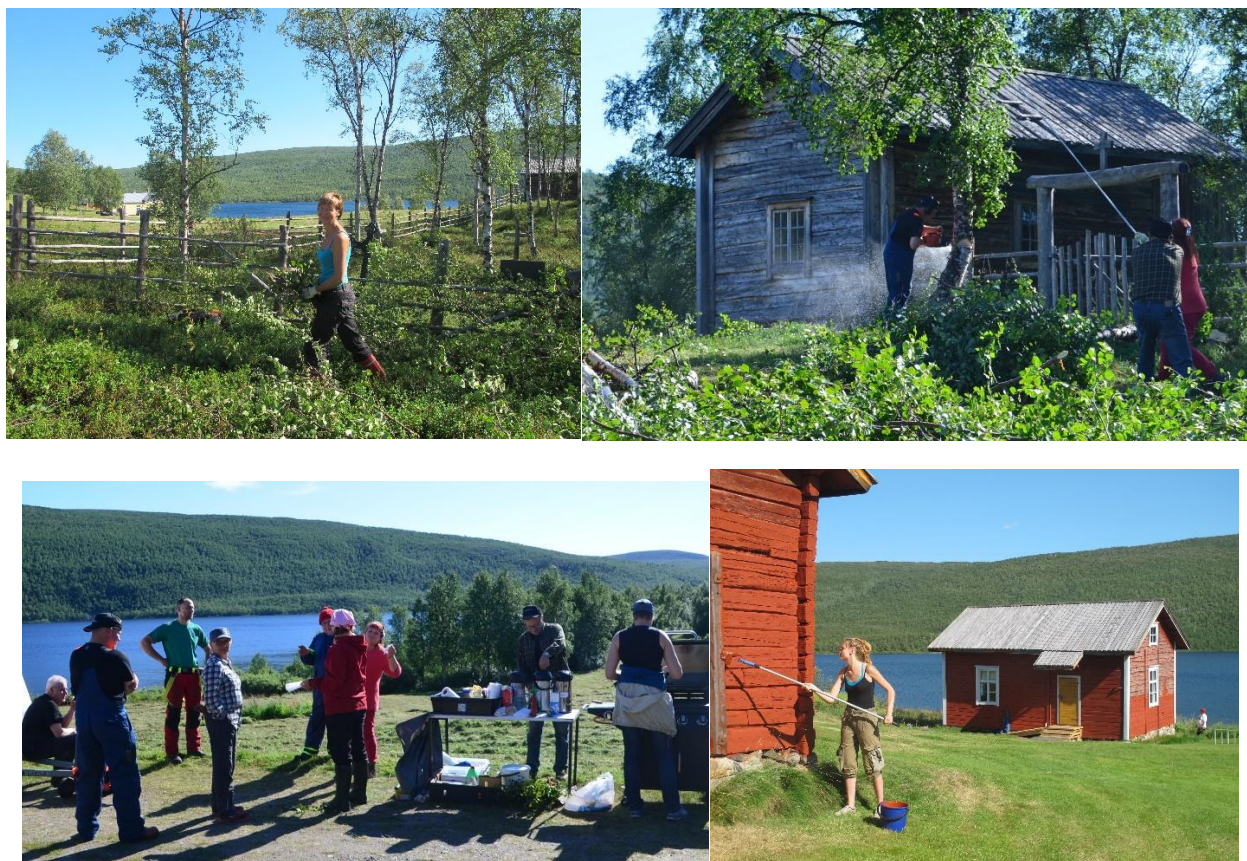


Figure 25. Rehabilitation of seminatural grasslands, depending on the site, comprise several different work phases, including looking after built cultural heritage. Photographs of communal work gatherings to rehabilitate the Pappila meadow in Ohcejohka (Utsjoki) by Marjut Kokko and Merja Lipponen.

The rate of meadow overgrowth has fortunately been slow in areas as far up north as Ochejohka (Utsjoki), but at times brush cutters and chain saws are also needed in rehabilitation work when trees and scrubs have started to cover open areas (Figure 25). Scrub colonisation rate is high on riverside sites in particular. Willows (*Salix* spp.) are quick to resprout, so clearing should, where possible, be carried out in a way that enables sprouts to be subsequently mowed down by machine. At times controlled burning is also used in meadow rehabilitation if a species such as the tufted hairgrass (*Deschampsia cespitosa*) has gained ground. The impact can be intensified by sowing seeds of local meadow species in the burnt area. Sheep are also efficient at removing tufts if they graze in the area during the summers following controlled burning.

The methods employed in Norway are mainly the same as in Finland, but mowing and possibly mowing followed by grazing is favoured in Norway, whereas in Finland grazing may also be the only management method.

More information about management methods can be found at the following links:

The website of the Cultural Landscapes Association, Finland:

<http://perinnemaisemat.fi/>

Information in Swedish about meadow management in the national guide for management of cultural landscapes (1999):

<https://www.miljodirektoratet.no/globalassets/publikasjoner/dirnat2/attachment/649/sider-fra-skjotselsboka-kap-12.pdf>

Guide in Norwegian for restoration, management and harvesting of meadows (2018):

https://www.fylkesmannen.no/globalassets/fm-rogaland/dokument-fmro/landbruk/skjema-og-malar/2019-slaattemark_veiledningshefte_nibio_rapport.pdf

Funding for traditional landscape site management

Funding in Finland:

Environmental agreements in agriculture and support for non-productive investments

Support from the Rural Development Programme for Mainland Finland 2014–2020 has been available for the management of landscapes as well as seminatural grasslands and wooded pastures. Provided under agreements on farmland biodiversity and landscape management, support has been available to farmers, registered associations and private landowners through environmental agreements on the management of agricultural habitats concluded for five years. Financial support has been granted for the management of seminatural grasslands and wooded pastures, edge zones, groves and natural pastures. The amount of support is determined on the basis of the size of the area, and payments are made annually. The compensation amounts to EUR 450 per hectare or EUR 600 per hectare if the site is classified as valuable in a traditional landscape inventory or otherwise by the Centre for Economic Development, Transport and the Environment. Applications are submitted to the Centre for Economic Development, Transport and the Environment and the application period is annually in the spring, provided that there are sufficient appropriations available.

During the Rural Development Programme for Mainland Finland 2014–2020 funding period, compensation has been available for initial clearing and fencing of seminatural grasslands and wooded pastures. The amount of compensation is determined on the basis of costs. The maximum amount has been EUR 1,862 per hectare (for sites under 3 ha), EUR 1,108 per hectare (for sites exceeding 3 ha but under 10 ha) and EUR 754 per hectare (for sites exceeding 10 ha). The compensation amounts and conditions for the coming funding period will be known at the start of the programme period in 2021 at the earliest. Applications are submitted to the Centre for Economic Development, Transport and the Environment and the application period is in the spring each year, provided that there are sufficient appropriations available.

The next programme period is being planned and specific information on how the period will turn out as regards funding for seminatural grasslands and wooded pastures is yet to be received. Further details will be received during winter 2020. More information is available from Centres for Economic Development, Transport and the Environment.

In addition, the Helmi habitats programme of the Ministry of the Environment provides opportunities for joint planning with landowners regarding suitable management measures for the most valuable seminatural grassland and wooded pasture sites. The programme also enables the rehabilitation of the most valuable seminatural grassland and wooded pasture sites with central government support.

Buildings are also essential components of traditional landscapes. Building stock that survived World War II has high cultural-historical value, and buildings and structures from the 1800s relating to fishing, reindeer husbandry and agriculture represent the oldest buildings in Ochejohka (Utsjoki). Those most valuable in terms of building history are traditional small log buildings and storehouses. The building stock is characterised by the use of logs, which may have been floated from great distances away, and of peat and birch bark, as well as the placement of buildings by the most important transport route of that time – the river. More recent building stock is also valuable, and support is available case-specifically for buildings from the post-war reconstruction period, too.

Funding in Norway

Harvesting meadows:

In Norway it is possible to get funding for the following work on meadows:

- planning of restoration and management;
- restoration;
- harvesting, fencing and other types of management.

The aim of this funding is to take care of this nature type and related biodiversity. Altogether 500–600 meadows in Norway are managed on governmental funding. In the municipalities of Deatnu (Tana) and Kárášjohka (Karasjok), there is only one site receiving funding at the moment. The regional authority (Fylkesmannen) is in charge of this funding.

Cultural landscapes:

There is also another funding mechanism for environmental measures in agriculture (abbreviated SMIL). The aim is to enhance biological and cultural heritage values in agricultural areas and reduce pollution from agriculture. The municipality is in charge of this funding.

Discussion and recommendations for follow-on projects

In all contexts, safeguarding the preservation of species means preserving their habitats and ensuring the functioning of ecosystems. This is emphasised at the River Tana where the river provides a dynamic environment undergoing constant change. Species have adapted to this disturbance created by ice and floods, and their occurrence varies when local conditions change. All the species examined in this project are dependent on regular disturbances. It is of paramount importance to safeguard the preservation of this dynamic river ecosystem at the River Tana in the future, too.

For example, the habitats of the *Pelochrista guentheri* moth will probably only be preserved for a few decades, which means the creation of new habitats is vital for the regional viability of the species. In the small scale, the utilisation of sandy areas is most likely to facilitate the prolongation of the life cycle of the habitats of the species by maintaining the disturbance dynamics characteristic of the habitats preferred by the goldenrod (*Solidago virgaurea*). Rivershore grazing used to support these disturbance dynamics, and reasonable grazing pressure would appear to be advantageous for *P. guentheri* populations for the reason alone that it helps prevent the overgrowth of habitats. The mowing of freshwater meadows and thickets involves a lower risk than grazing, although mowing is probably also less effective as it does not have a direct impact on the ground layer. (Albus Luontopalvelut 2018). Monitoring of the natural dynamics of the habitats of *P. guentheri* and the population and metapopulation dynamics of the species should take place at a sufficiently early stage to identify any threats. (Albus Luontopalvelut 2018)

Land use planning should therefore take into account not only individual occurrences of species but also the continuum of habitats that is required by species adapted to the disturbance dynamics of the river environment. In addition, different species use parts of the same sand shore that are at different succession stages, with a section of the shore suitable for one as a habitat not being suitable for another. In practice, this means careful planning in riparian areas. The flooding of a river in its natural state restricts land use for construction, but changes in human activities due to reasons such as tourism growth may also have impacts on the succession stages of sand shores. On the other hand, measures such as scrub clearing for landscape management reasons also support the preservation of the species values of the area.

Any follow-on project could encourage people to rehabilitate and manage traditional landscapes and cultural environments on both sides of the river. Funding methods are available in Finland and Norway, and the authorities are also committed to preserving traditional landscapes. The problem in the future may be to find suitable people to carry out the management work when the population is ageing. The transfer of knowhow to the next generations would also be important. All traditional landscapes are threatened and will only be preserved through active management. Any follow-on project should focus on considering new alternatives to management forms and plan and implement management measures to be employed in practice on both sides of the river.

Shared geospatial data generated by this project can be utilised as background material in planning as regards the species examined in the project. The best way to access up-to-date data

is, however, via constantly updated national information systems, and utilising interface data is recommended in any follow-on projects. The changing climate is likely to change the timing of river flood peaks and the duration and time of flood periods, and this will also play a role as regards the River Tana ecosystem and the habitats of species in the future. For example, Arctic or southern alien species spreading to the area due to climate change should be taken jointly into account in border regions, and joint efforts should be made to identify measures to manage and control them. In the future, cooperation between states in border regions in the context of species inventories, threat status assessments, protection and management will help to save resources as well as to identify the species that are the rarest and most in need of help and to focus species protection work on them.

Appendices

Appendix 1. Summer 2018 plant observations in Norway and location-specific species observations of the *Pelochrista guentheri* inventory from Finland and Norway.

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Appendix 1. Pelochrista quenheri in Tana River Valley in 2018 (According to Albus Luontopalvelut Oy 2018)
Rare species found in study sites and the assessment of sites and population of Pel. Quentheri in 2018

Study site [hours/site]	Species	Exx	IUCN (2010, FI)	Specially protected (Finnish Nature consevation Act § 47)	The assessment of the local population of Pelochrista quentheri	Known/new site	The assessment of the site
4.1.1 Gáregassuolu [7 h 45 min]	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU		?	Known	known habitat (from 1970), still good habitat, observation recommended Observation recommended
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)				
	kurjenhernekoisa (<i>Polopeustis altensis</i>)		LC				
	pistenunnakoi (<i>Aproaerema anthyllidella</i>)		LC				
4.1.2 Hehkenjavvi [6 h 15 min]	somerikkopeilikääriäinen (<i>Pelochrista quentheri</i>)	1	EN	Yes	Regressive?	Known	Observation recommended known habitat, overgrowing
	kurjenhernepussikoi (<i>Coleophora svenssoni</i>)	2	EN	Yes			
	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU				
	piiskuhietakoi (<i>Gnorimoschema valesiellum</i>)		VU				
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)				
4.1.3 Julláguoika [3 h 30 min]	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU		No observations		small, good quality site
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)				
4.1.4 Roavvenjárga [13 h]	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU		sparse	Known	known habitat, quality ok, not outstanding probably a local population (of Pel. Quen.)
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)				
4.1.5 Doarrovasgárggu [2 h 30 min]	somerikkopeilikääriäinen (<i>Pelochrista quentheri</i>)	4	EN	Yes	vital	New	good quality site on grounds of vegetation and structure
	tunturipikkumittari (<i>Eupithecia fennoscandica</i>)	3	EN	Yes			
	pohjannauhamittari (<i>Perizoma minoratum</i>)						
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)						
4.1.6 Vitnjalasnjavvi [5 h]	somerikkopeilikääriäinen (<i>Pelochrista quentheri</i>)	4	EN	Yes	vital	New	extremely diverse and large site further survey recommended
	suomenpeilikääriäinen (<i>Eucosma suomiana</i>)	2	VU				
	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU				
	piiskuhietakoi (<i>Gnorimoschema valesiellum</i>)		VU				
	käpäläsulkanen (<i>Platyptilia tesseradactyla</i>)		NT				
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)				
	käpäläkirjokoisa (<i>Pyrausta porphyralis</i>)		LC (NT)				
	pistenunnakoi (<i>Aproaerema anthyllidella</i>)		LC				
4.1.7 Roavesavu [3 h]						Known	Known habitat (from 1990) Local population probably extinct There is only little suitable habitat left
4.1.8 Erkkesavu [2 h]	tesmahitukoi (<i>Elachista diderichsiella</i>)		LC		No observations		no suitable, no suitable vegetation
4.1.9 Áhgujohgárggu [2 h 45 min]	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)		No observations		Possible habitat for Pel. Quent. Further survey recommended
4.1.10 Áhguoigárggu [2 h 45 min]	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU		No observations		Possible habitat for Pel. Quent. Further survey recommended
	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)				
	käpäläkirjokoisa (<i>Pyrausta porphyralis</i>)		LC (NT)				
4.1.11 Sieidal [1 h 30 min]	somerikkopeilikääriäinen (<i>Pelochrista quentheri</i>)	2	EN	Yes	Sparse	New	On the grounds of habitat, the local population is small Observation is recommended
	pohjannauhamittari (<i>Perizoma minoratum</i>)		VU				
4.1.12 Njirrannuorri [2 h]					No observations		poor quality, overgrown
4.1.13 Allasuolu [3 h 30 min]	pohjankiiltokääriäinen (<i>Grapholita aureolana</i>)		LC (NT)		?	Known	knwon site (from 2017), quality still good, probably a local population (of Pel. Quen.) Observation is recommended
	tesmahitukoi (<i>Elachista diderichsiella</i>)		LC				
4.1.14 Nuvvosjohnjálbmi [2 h 15 min]					No observations		poor quality, overgrowing rocky
4.1.15 Boratbovccis	pohjannauhamittari		VU		No observations		Good vegetation for Pel. Quent.

[3 h]	<i>(Perizoma minoratum)</i>					rocky and therefore probably not suitable habitat
	pohjankiiltokääriäinen <i>(Grapholita aureolana)</i>	LC (NT)				
	kurjenhernekoisa <i>(Polopeustis altensis)</i>	LC				
4.1.16 Siedgasuolu [15 h]				No observations		rocky, sparse vegetation further survey recommended
4.1.17 Pystyoja [2 h 15 min]	somerikkopeilikääriäinen <i>(Pelochrista guentheri)</i>	40 EN	Yes	vital	New	On the grounds of the quality of habitat and abundance of individuals, the most significant
	pohjannauhamittari <i>(Perizoma minoratum)</i>	VU				site of Pel. Quent. in Finland
	piiskuhietakoi <i>(Gnarimoschema valesiellum)</i>	VU				
4.2.1 Guohppenjavvi [2 h 30 min]	pohjannauhamittari <i>(Perizoma minoratum)</i>	VU		No observations		small, good quality site
	pohjankiiltokääriäinen <i>(Grapholita aureolana)</i>	LC (NT)				
	kurjenhernekoisa <i>(Polopeustis altensis)</i>	LC				
	pohjanlasiipi <i>(Synanthedon polaris)</i>	LC				
	hietikkohitukoi <i>(Elachista baltica)</i>	LC				
	lapinkätkökääriäinen <i>(Aethes deuschiana)</i>	LC				
4.2.2 Bahásguoika [45 min]	pohjankiiltokääriäinen <i>(Grapholita aureolana)</i>	LC (NT)		No observations		poor quality, little suitable habitat, erodable
4.2.3 Julláguoika [1 h 30 min]	tunturipikkumittari <i>(Eupithecia fennoscandica)</i>	1 EN	Yes	No observations		On the grounds of habitat probable habitat for Pel. Quent.
	pohjannauhamittari <i>(Perizoma minoratum)</i>	VU				further surveys recommended
	ruijannokiperhonen <i>(Erebia medusa)</i>	NT				
	kangaskääriäinen <i>(Argyroplote concretana)</i>	NT				
	käpäläkirkkoisa <i>(Pyrausta porphyralis)</i>	LC (NT)				
	pohjankiiltokääriäinen <i>(Grapholita aureolana)</i>	LC (NT)				
4.2.4 Ráidevágga [2 h 15 min]				No observations		Poor quality, vegetation sparse Habitat may vary due to human effect
4.2.5 Dorvoguikkasavu [1 h 30 min]	somerikkopeilikääriäinen <i>(Pelochrista guentheri)</i>	1 EN	Yes	vital/regressive?	Known	One of the few occurrence sites of Pel. Quent. In Norway, large habitat The habitat of Pel. Quentheri is restricted to the south of the site On grounds of the abundance of <i>Solidago virgaurea</i> ,
	pohjannauhamittari <i>(Perizoma minoratum)</i>	VU				the local population is vital
	pohjankiiltokääriäinen <i>(Grapholita aureolana)</i>	LC (NT)				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Liite 1.														
2	Red list's species in Norway in 2018														
3	Coordinates in EUREFFINTM35														
4	Shape *	OBJECTID	latin_name	Nimi_suome	Abundance	Habitat	Status_in_Norway	Status_in_Finland	Accompanied species	Date	Mapper	NB	Abundance_	X_koordina	Y_koordina
5	Point	30	Elymus fibrosus	siperianvehnä	13	Sandy shore	VU	EN	Cerastium alpinum, Astrogalus alpinus	1.8.2018	Lipponen M	Seitala, on sandy River Bank. 13 fert tussocks.		7726805	459345
6	Point	31	Elymus fibrosus	siperianvehnä	12	Sandy shore	VU	EN	Calamagrostis, Astrogalus alpinus, Elymus mutabilis, Elymus caninus	1.8.2018	Lipponen M	Seitala, on the sandy river Bank. fert tussocks.		7727133	459143
7	Point	47	Thalictrum minus	keminpikkuängelmä	0	Deciduous	LC	VU	Stellaria nemorum, Trollius europaeus, Ver. longifolia, Ger. sylvaticum	29.8.2018	Lipponen M	NE from Pajukoste, intertidal deciduous forest along of The River Tana. Dozens of fertile	abundant	7768666	519245
8	Point	48	Thalictrum minus	keminpikkuängelmä	20	Old pasture	LC	VU	des. cespitosa, Sol. virgaurea, alchemilla sp. Geranium sylvaticum, Ranunculus acris ssp. borealis	29.8.2018	Lipponen M	Bajit-bievvrä, On the river bank of Tana. Between betulas and juniperus		7764910	511862
9	Point	52	Thalictrum simplex	pohjanhoikkaängelmä	0	Meadow	LC	VU	Lactuca sibirica, veronica longifolia, Elymus caninus, Galium boreale	28.8.2018	Lipponen M	Mohkkejä Narrow shore meadow	dozens	7673236	449415
10	Point	53	Elymus fibrosus	siperianvehniö	0	sandy shore	VU	EN		29.7.2018	Lipponen M	Ruovttot, Galbmajársavu, known	dozens	7753991	477379
11	Point	54	Elymus fibrosus	siperianvehniö	0	sandy shore	VU	EN		29.7.2018	Lipponen M	Leavvajohka, known		7757526	479147
12	Point	55	Elymus fibrosus	siperianvehniö	0	sandy shore	VU	EN		29.7.2018	Lipponen M	Leavvajohka, few tussocks on the bank of River Tana. There is some overgrowing (low willows	few tussocks	7758567	479150