



Crop Wild Relatives

An Inventory in the Abisko–
Torneträsk Area 2022

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Introduction

Inventory of crop wild relatives (CWR), wild populations/species that are closely related to a crop, is a part of the project *Nordic PGR Conservation*. The project is designed for promoting the conservation of these genetic resources in the Nordic countries and facilitating their use in future research and plant breeding efforts.

The Abisko-Torneträsk area was selected as a representative area in the Swedish mountains with a well-known flora, easy to reach and with good facilities. Within the area, three main areas were selected for detailed study. The selection of sites was made with the aim to include as many species as possible from the Nordic CWR priority list (Fitzgerald et al, 2021). For more details on the selection, see the chapters below regarding each area.

The following areas were inventoried in 2022 (and date of inventory): south of Kopparåsen (Loktacohkka's northern slope) (2022-07-12), eastern side of Gearggevaggi (2022-07-13), Gohpasjohka, west side (Björkliden) (2022-07-14) and Boarrasacohkka (2022-08-04). It was also done an inventory of the site with *Elymus mutabilis* in Abisko national park (2022-07-15).

Main focus was put on the northern species of *Elymus* as they are genetically close to wheat (*Triticum*), their distribution is restricted to the Fennoscandian mountains or/and north of Fennoscandia and all the other species on the inventory list are more common and evenly distributed in the investigated area.

The selected areas are between 1.5 ha (Abisko) and 175 ha (Gearggevaggi) and are for the most part homogenous and easy to perform species inventory at. The main part of the area of each object was investigated for the target species. Data on location, distribution and size of the population was collected, as well as other relevant information, such as threats and management needs. Observations of all species from the priority list was recoded, invasive alien species (Strand et al, 2018) was search for, but no one was found, red listed species (SLU Artdatabanken, 2020) occurred in some of the areas, but was not included in the investigation as flora guardians was performing counting on those species at the same time and reported separately.

The result from the inventory is published digitally on Artportalen.se (Swedish Species Gateway) and uploaded on GBIF (Global Biodiversity Information Facility).

Objectives

The main objectives for the inventory 2021 was:

1. To provide background information for recommendations on future management of the selected areas and to promote the conservation of crop wild relatives.
2. Test methods for selection of sites and methods for inventory.
3. Identify populations suitable for *in situ* conservation.

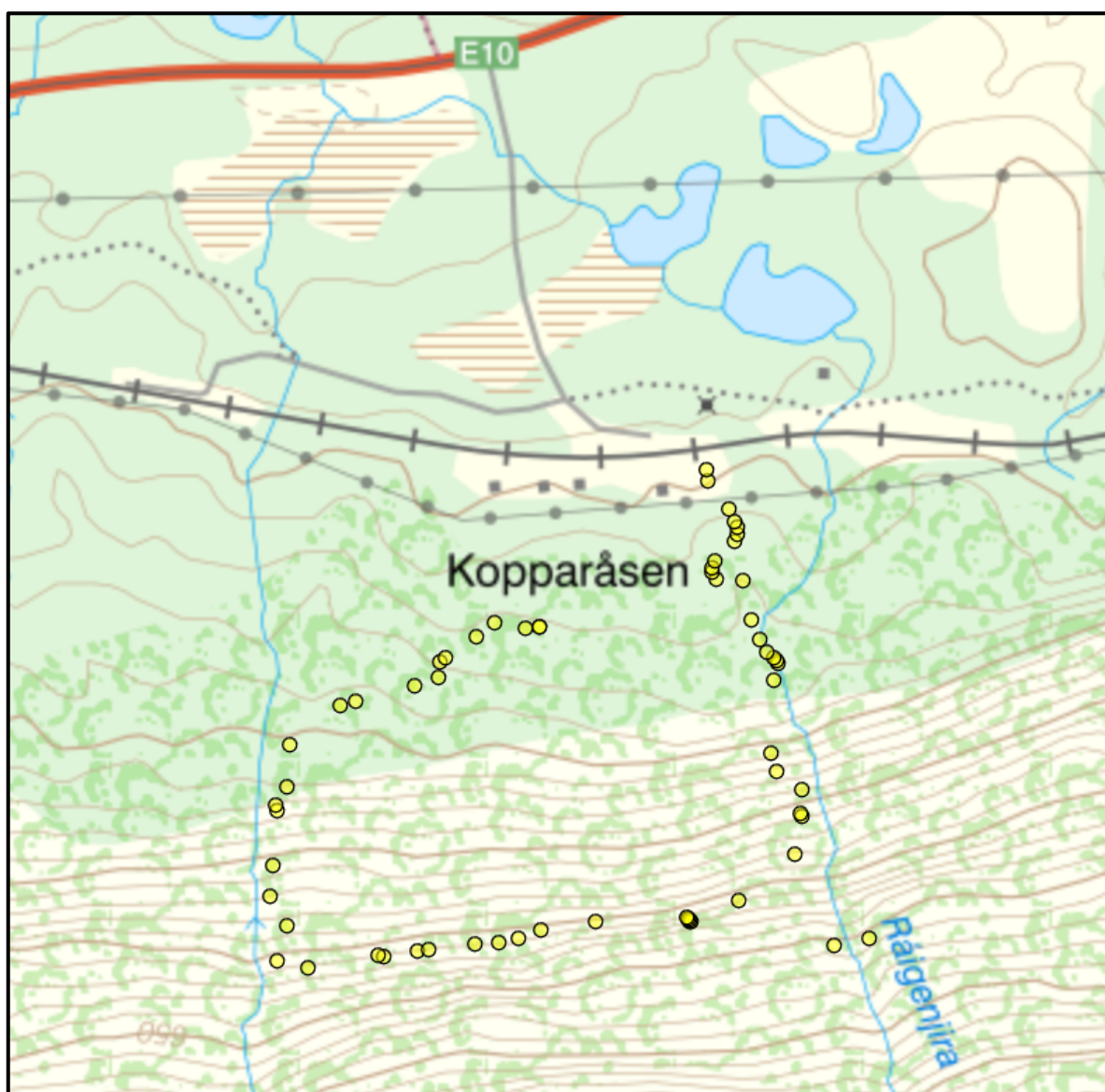


Map 1. Areas included in the inventory (yellow circles). Artportalen.se

Kopparåsen (Loktacoikkas northern slope) – inventory area 150 ha

South of former railway station Kopparåsen is a north facing rather steep slope of the mountain Loktacoikka. It is a humid calcareous, species rich area. Just south of the railway there is a narrow strip of tall herb mountain birch forest (this year heavily affected by moths). The birch forest is intermixed by sloping rich fens. South of the birch forest, there are a steep slope with calcareous heaths and grasslands, with some willow thickets. In several areas overstrained by, water most of the summer season. The investigated area is 1 km in east-west direction and 750 m from south to north.

The site was selected because of the known populations of *Elymus kronokensis* and *E. mutabilis*



Map 2. Kopparåsen (Loktacoikkas northern slope). Yellow dots are reported observations of crop wild relatives during the inventory (Artportalen.se).



Fig 1. Loktacoikkas northern slope.



Fig 2. Site with *Elymus kronokensis*.



Fig 3. *Elymus kronokensis*.



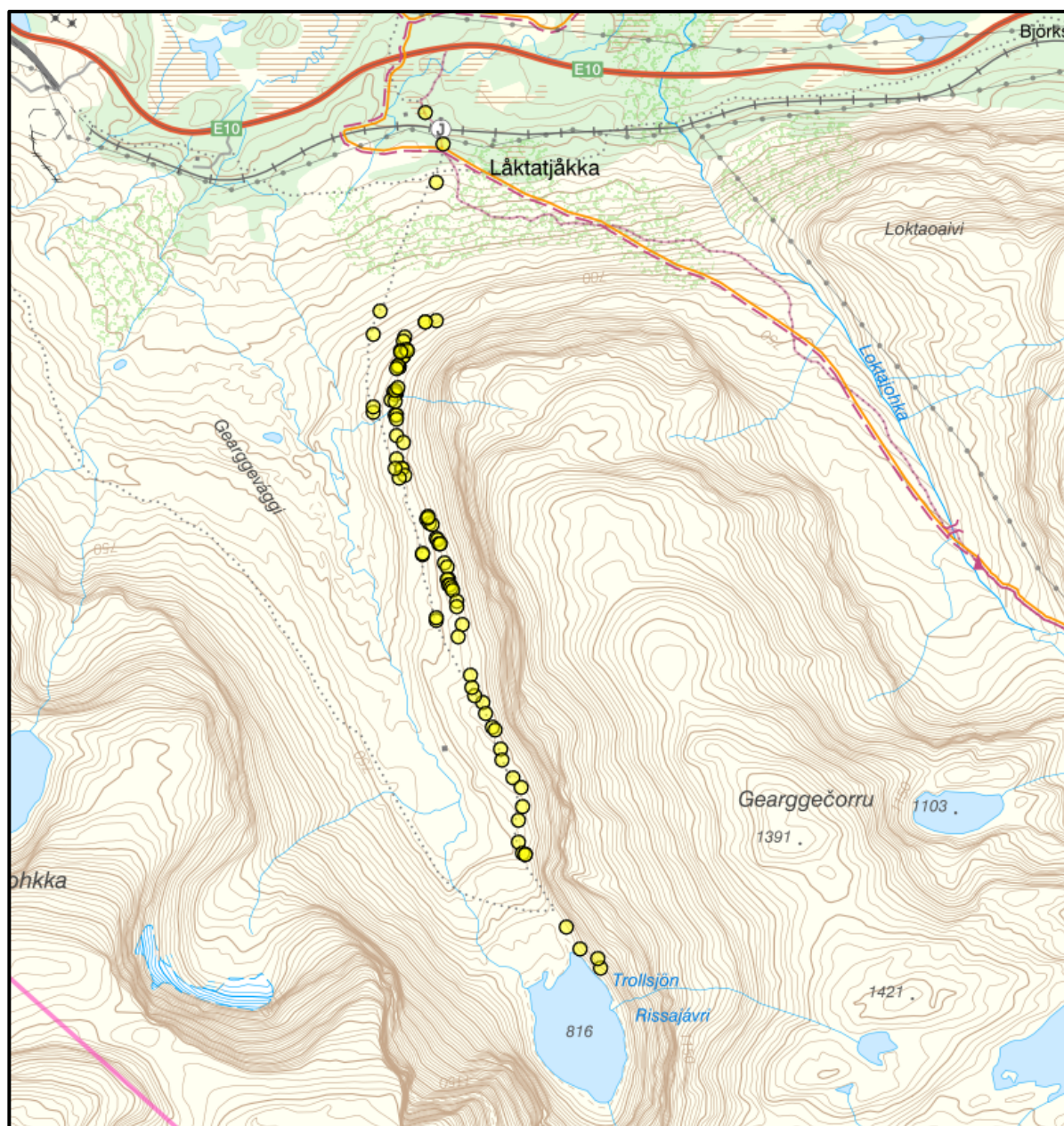
Fig 4. *Vaccinium vitis-idea* in flower.

Table 1. Taxa of observed crop wild relatives at Kopparåsen (Loktacohkkas northern slope). Population frequency: C=common, F=Frequent, S=Scattered, R=Rare.

Taxon	Number of observations	Population frequency
<i>Angelica archangelica</i>	12	F
<i>Elymus caninus</i>	4	S
<i>Elymus kronokensis</i>	2	R
<i>Elymus mutabilis</i>	3	S
<i>Festuca rubra subsp. arctica</i>	7	F
<i>Phleum alpinum</i>	4	S
<i>Poa alpina</i>	7	F
<i>Poa pratensis subsp. alpigena</i>	5	F
<i>Rubus chamaemorus</i>	1	R
<i>Rubus saxatilis</i>	5	F
<i>Vaccinium myrtillus</i>	4	F
<i>Vaccinium uliginosum</i>	4	F
<i>Vaccinium vitis-idaea</i>	2	R

Gearggevaggi – 175 ha

The investigated area is a 3.5 km long strip along the eastern side of Gearggevaggi, from just above the tree line in the north to Rissajavri in the south. From east to west, the distance is about 500 m. The area is mixed heath and grassland, and some parts are calcareous and others are siliceous. The site was selected because it is the richest known site for *Elymus kronokensis* in the Abisko area. It is also known for big populations of many other target species as *Phleum alpinum*, *Angelica archangelica*, *Poa* and *Festuca*.



Map 3. Gearggevaggi. Yellow dots are reported observations of crop wild relatives during the inventory (Artportalen.se).



Fig 5. Gearggevaggi from south.



Fig 6. Gearggevaggi from north.



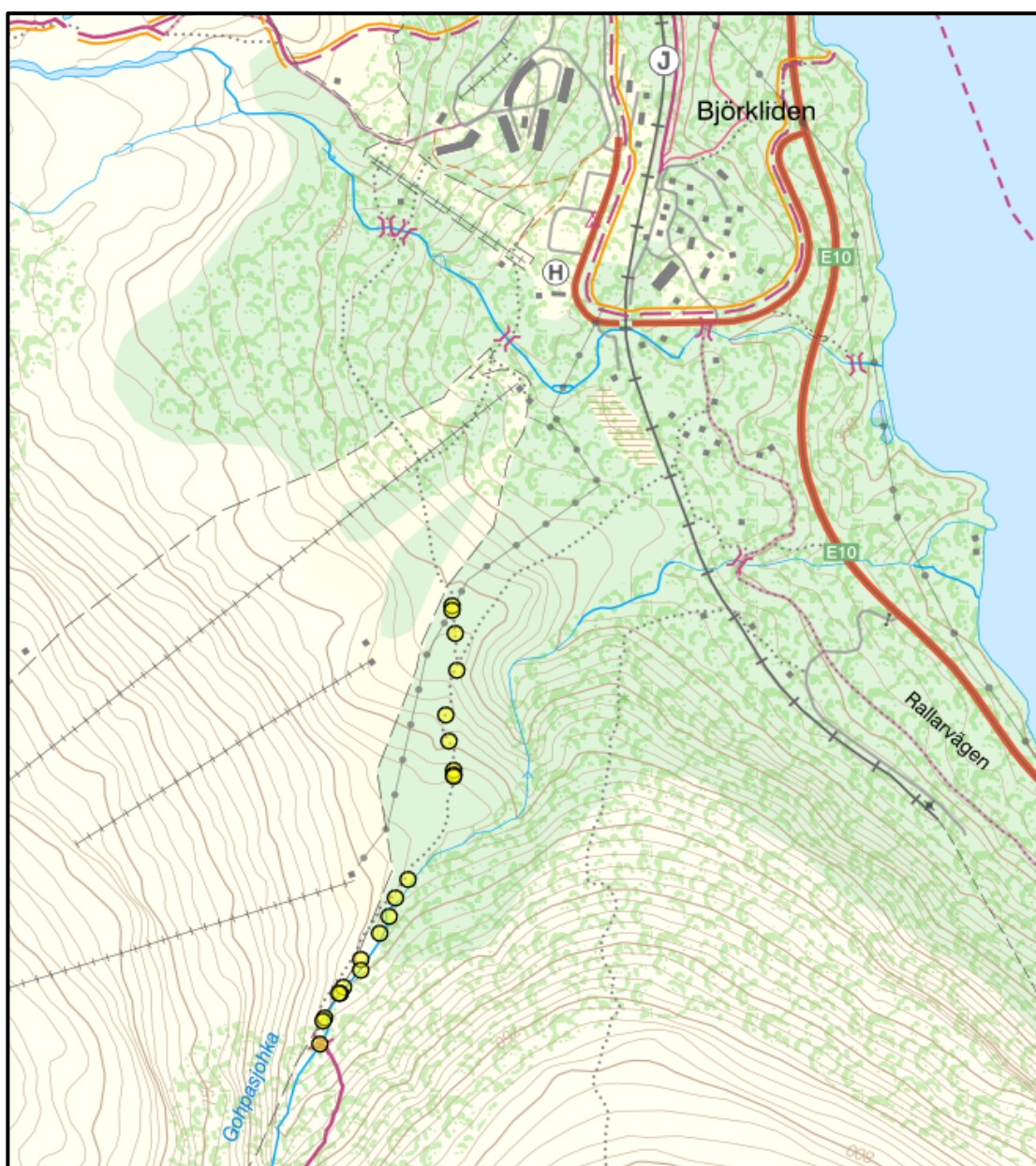
Fig 7. *Elymus kronokensis* in Gearggevaggi.

Table 2. Taxa of observed crop wild relatives at Gearggevaggi. Population amount: C=common, F=Frequent, S=Scattered, R=Rare.

Taxon	No of reports	Population frequency
<i>Angelica archangelica</i>	10	S
<i>Elymus caninus</i>	1	F
<i>Elymus kronokensis</i>	5	F
<i>Elymus</i> sp.	24	F
<i>Festuca rubra</i> subsp. <i>arctica</i>	3	R
<i>Phleum alpinum</i>	13	F
<i>Poa alpina</i>	7	S
<i>Poa pratensis</i> subsp. <i>alpigena</i>	2	R
<i>Rubus chamaemorus</i>	1	F
<i>Vaccinium myrtillus</i>	7	S
<i>Vaccinium uliginosum</i>	5	S
<i>Vaccinium vitis-idaea</i>	7	C

Gohpasjohka, west side (Björkliden) 15 ha

The site was selected for the occurrence of *Elymus mutabilis*. It is a narrow strip along the west side of Gohpasjohka and along the track from Björkliden to Njulla. The inventory was done along the track, between the brook and the steep mountainside. The site is situated in the uppermost part of the mountain birch forest and in the northern (lower) parts on esker-like sandy ridges. The area is 1.5 km along the track and 50 m wide on each side of the track. *Elymus mutabilis* was the main target but all other CWR listed species was noted but not evaluated in detail. In 2022, the *Elymus* population was rich in culms and seems to be in excellent health. When it was revisited in September 2023, the population was not that well. Much fewer culms and few seeds in each.



Map 4. Along Gohpasjohka. Yellow dots and areas are reported observations of crop wild relatives during the inventory (Artportalen.se).



Fig 8. *Elymus mutabilis* site from north.



Fig 9. Gohpasjohka with Björkliden in the



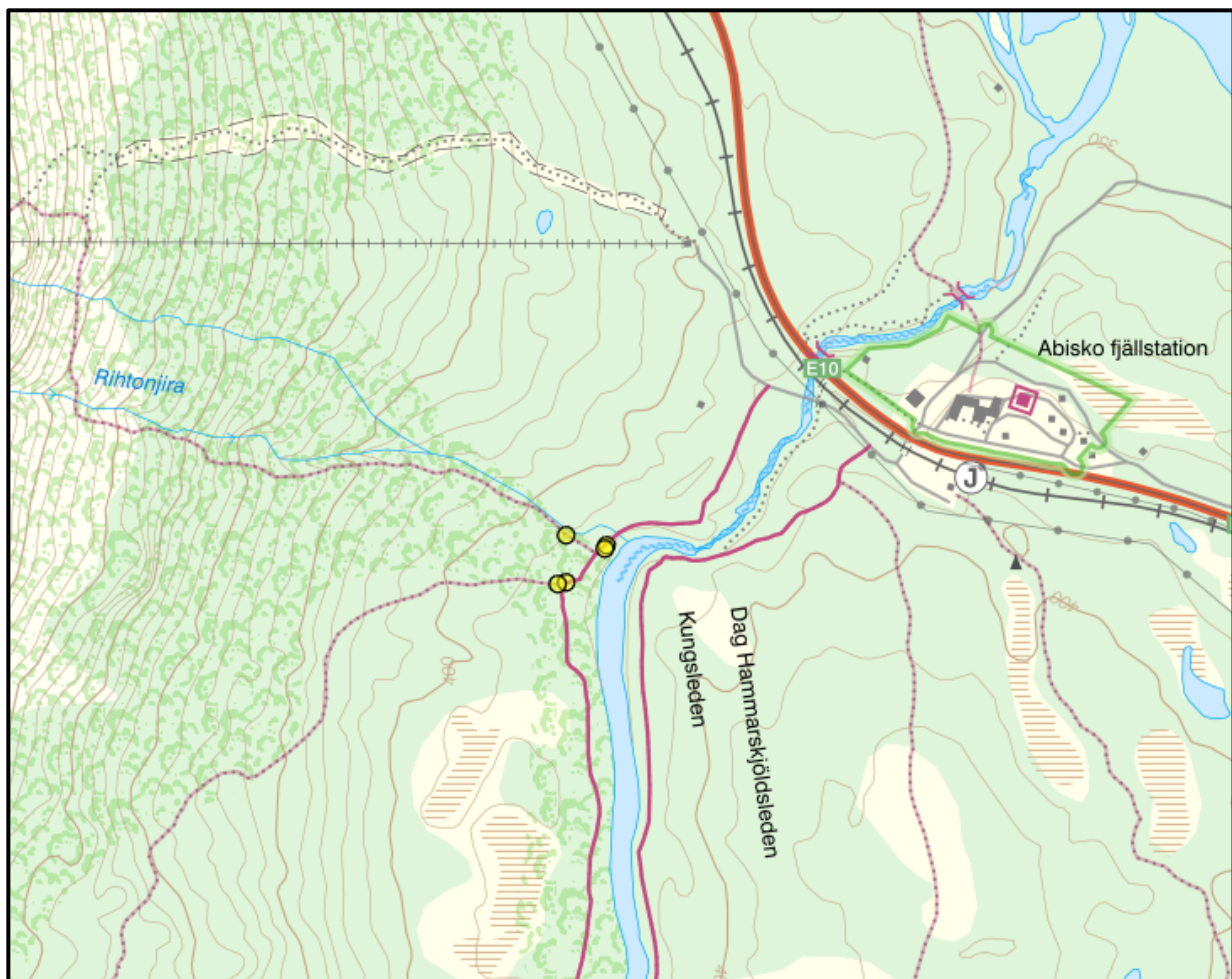
Fig 10. *Elymus mutabilis*.

Table 3. Taxa of observed crop wild relatives along Gohpasjohka. Population amount: C=common, F=Frequent, S=Scattered, R=Rare.

Taxon	No or reports	Population frequency
<i>Elymus mutabilis</i>	5	F
<i>Phleum alpinum</i>	5	R
<i>Poa alpina</i>	2	C
<i>Rubus chamaemorus</i>	1	F
<i>Rubus saxatilis</i>	3	
<i>Vaccinium myrtillus</i>	2	
<i>Vaccinium uliginosum</i>	1	
<i>Vaccinium vitis-idaea</i>	3	C

Abisko National park – 1.5 ha

This site in the national park was visited only because of the occurrence of *Elymus mutabilis*. Only the population of *E. mutabilis* was measured and *E. caninus* was noted.



Map 5. *Elymus mutabilis* site in Abisko national park. Yellow dots are reported observations of crop wild relatives during the inventory (Artportalen.se)



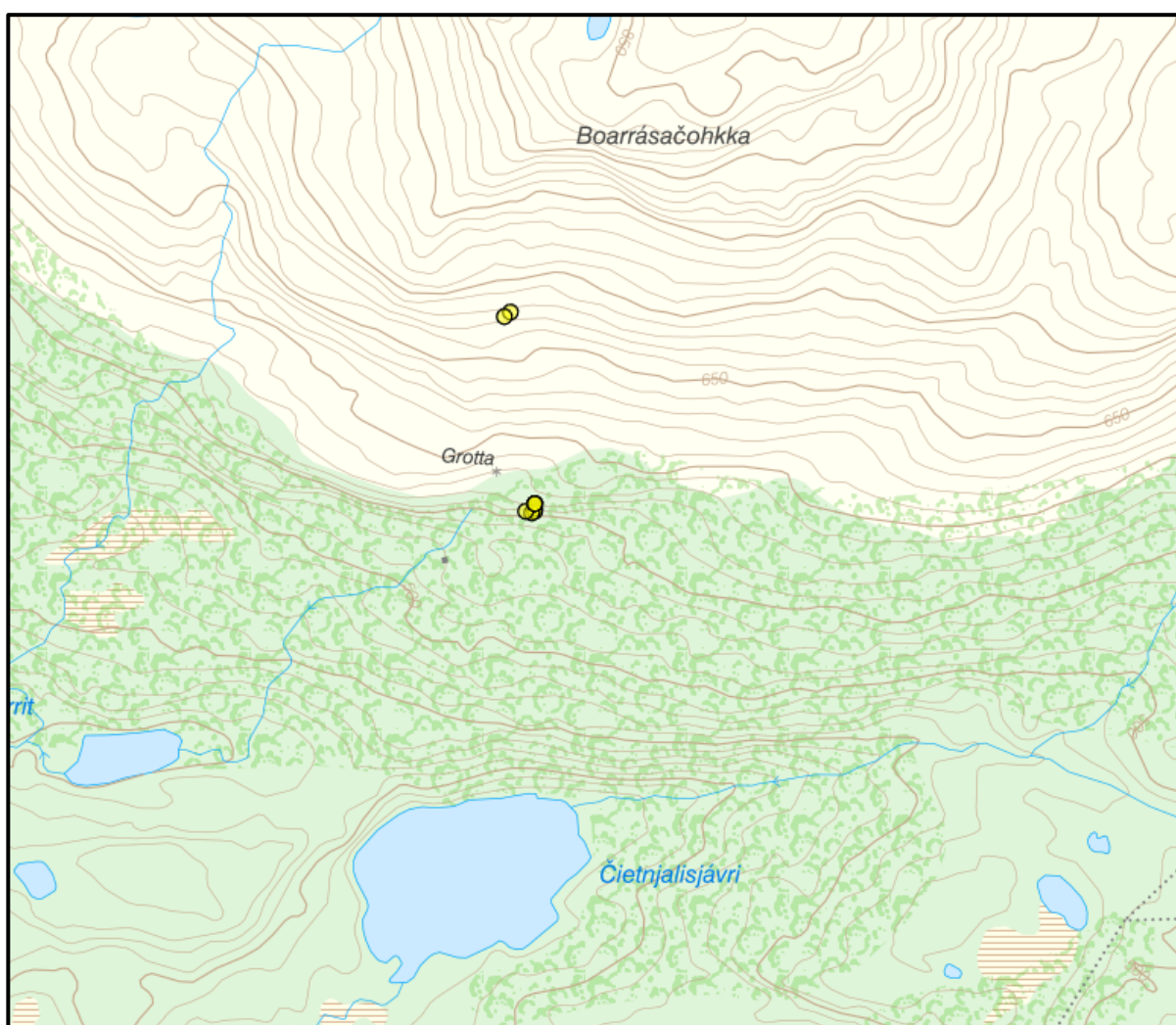
Fig 11. *Elymus mutabilis* in Abisko national park.

Table 4. Taxa of observed crop wild relatives in Abisko national park. Population amount: C=common, F=Frequent, S=Scattered, R=Rare.

Taxon	No of reports	Population frequency
<i>Elymus caninus</i>	1	S
<i>Elymus mutabilis</i>	4	F

Boarrasacohkka, north side of Torne träsk 15 ha

The site was selected for the occurrence of *Elymus kronokensis* and because of habitats that differ a lot from the other inventory sites, as it is an extremely rich site, dolomite and other kinds of limestone and south facing cliffs and slopes, with many rare and southern species. Two smaller areas were included in the inventory as parts of the area is hard and dangerous to approach, as it is steep, full of smaller caves and sinkholes, and we have only a limited time for the inventory because of boat transport back to Abisko. The southern area was in the dolomite cliff area focusing on the area with *Fragaria vesca*, a since long isolated population. The northern area was above the treeline, on the species rich grassland, with focus on the area with *Elymus kronokensis*. The species composition was very different from the other areas visited, as shown by the absence of *Angelica*, *Phleum* and *Festuca* and very few *Poa*.



Map 6. Boarrasacohkka. Yellow dots are reported observations of crop wild relatives during the inventory (Artportalen.se).



Fig 12. *Fragaria vesca* at Boarrasacohkka.



Fig 13. Boarrasacohkka, *Fragaria vesca* site.



Fig 14. Boarrasacohkka, *Elymus kronokensis* site.

Tabell 5. Taxa of observed crop wild relatives at Boarrasacohkka. Population amount: C=common, F=Frequent, S=Scattered, R=Rare.

Taxon	No of reports	Population frequency
<i>Elymus caninus</i>	1	R
<i>Elymus kronokensis</i>	1	S
<i>Fragaria vesca</i>	1	F
<i>Poa alpina</i>	2	S
<i>Rubus saxatilis</i>	1	R
<i>Vaccinium myrtillus</i>	1	F
<i>Vaccinium uliginosum</i>	1	F
<i>Vaccinium vitis-idaea</i>	3	S

Results and recommendations

The fieldwork was done at two different weeks during 2022; the main inventory was done in mid-July, which this year was probably optimal for the work. Early summer had been warm with rather much precipitation and the snow had melted away early. Three weeks later in first half of August was planned for seed and DNA-sample collection, and some complementary inventory, mainly on the site Boarrasacohkka on the north side of Torne träsk. During the weeks between mid-July and early August, the weather had been very cold and rainy so the vegetation had not developed at all, so the seed collection failed, but the DNA-samples collection and the complementary inventory was successful. A revisit in September 2023 did solve the seed collection failure. That revisit in both Gohpasjohka and Gearggevaggi in 2023, gave some impression on how the vegetation could look different between years. The year 2023 had a late spring and the snow had disappeared late in June, and then July was warm and very dry and no rain until beginning of August. In Gearggevaggi, the sites with *Elymus* were much more fertile than the year before and the population of *Phleum alpinum* was much bigger, at the same time, the *Elymus mutabilis* population along Gohpasjohka looks much smaller and weaker compared with the year before.

The selection of sites was rather representative of the diversity in the Abisko/Torne träsk area in the sense of including most of the crop wild relatives in the area. However, the area is big and including many habitats that was not included, especially on higher levels. The most important target species was covered to a large extent and most of the relevant species known from the area were captured during the inventory.

The methods used for the inventory in the selected areas was revisiting sites that had records in Artportalen and the online Virtual Herbarium. In addition to this, all the area was extensively covered by free search and all part of the selected area was visited and crop wild

relatives was noted. This with exception for Boarrasacohkka, as mentioned above as the areas for inventory at that site had to be limited because of the terrain and limitation of time for the visit on Northern side of Torne träsk.

The result from the inventory will be suitable for future work on crop wild relatives in the area. There are no obvious management needs on any of the areas, other than that the reindeer grazing should continue at the same level as present. If the tourist paths and facilities should expand, care has to be taken to consider the target species. However, as climate change is already affecting the vegetation, the need for regular monitoring on the target species is important.

According to *in situ* conservation of populations of target species, Gearggevaggi is very suitable as a site, as several of the species (*Elymus kronokensis*, *Angelica archangelica* and *Phleum alpinum*) occur in large populations. In addition, *Poa alpina*, *Poa pratensis* subsp. *alpigena* and *Festuca rubra* subsp. *arctica* are scattered at the site. All three sites with *Elymus mutabilis* is also suitable for *in situ* conservation (S of Kopparåsen, Gohpasjohka and Abisko national park). All these sites are easy to reach and monitoring and possible future management is easy to conduct.

South of Kopparåsen (Loktacohkka's northern slope)

In total, 13 crop wild relatives were identified in this area. The birch forest was heavily affected by the moth outbreak and many birches were dying. These outbreaks are normal in the area, so that will probably not affect crop wild relatives such as *Elymus mutabilis*, which will probably react in a positive way when the birches are dying and there will be lots of nutrients. The population of *Elymus kronokensis* is small and need regular monitoring so if something is changing in an unfavourable direction, measures can be in place soon. The site is not protected.

Gearggevaggi

In total 12 crop wild relatives were registered from this rather big area. The area is situated about 50-100 meters above the tree line, so it will take some time before the birch forest invades the area. The tourists are just using the path to Rissajavri, so the impact from them is very small. However, it is important to start a monitoring program, so negative changes are observed in time, so measures could be implemented. The most important species in the area is the *Elymus kronokensis* and the *Elymus* that probably is a stabilised hybrid between *Elymus kronokensis* and one of the other *Elymus* in the area. The site is protected as Natura 2000 area. The crop wild relative species is not protected as species but their habitat is protected.

Gohpasjohka, west side (Björkliden)

Eight crop wild relatives were found in the area, but the investigated area was small, and the focus was on *Elymus mutabilis*. It is important that this population is monitored, so the difference between years is recorded and can be followed more in detail. The site is

situated along a heavily used path, but that will probably not have negative effects on the species, as long as the path will not become wider or more exploited. The site is not protected but located just outside a Natura 2000 area.

Boarrasacohkka

In all eight crop wild relatives were registered in the area, but there could be more as only a small area was investigated. This area is today changing rapidly because of the climate. Therefore, it is important to monitor the change. It is an area that only has few visitors, so it is very little disturbance from humans, and the sign from earlier activities is vanishing more and more. The site is protected as Natura 2000 area. The crop wild relative species is not protected as species but their habitat is protected.

Abisko national park

The only crop wild species that was recorded in this was two *Elymus* species. The forecast for the population of *Elymus mutabilis* is that it will decline in the short-term as the birch forest will become denser, but after the next moth outbreak, it will increase, as there will be more light and nutrients. It is important that it will be a monitoring program for the site, so effects on climate change and more could be followed. The site is situated in the national park and is protected by the national park regulations.

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