Swiss Federal Institute of Technology Zurich (ETH)

SYSSELMESTEREN PÅ SVALBARD

Att.: Lena Valentina Sophia Bakker

Our date:	*Our reference*	*Your date:*
25.05.2022	22/01757-3	04.04.2022

Reply to research application – soil development - Isfjorden, Festningen, Barentsburg, Kongsfjorden, Forlandet - 2022 - Swiss Federal Institute of Technology Zurich - RiS-ID 11961 A2

We refer to research application dated 04.04.2022 regarding fieldwork on soil development in Isfjorden, Forlandet, Kongsfjorden, Festningen, Barentsburg in the period 30.06.-12.08.2022.

Fieldwork description

During the planned 2022 field campaign, we aim to collect plant, soil and microbial data and samples for laboratory analyses and growth experiments. Most of the fieldwork is planned within Management area 10. However, to understand current and future developments in Svalbard, we also need to include locations within national parks at Alkhornet (Nordre Isfjorden National Park) and at Templet (Sassen-Bünsow Land National Park). These locations are chosen as they each represent bird cliffs with very different landforms and geologies. We also plan sites at Festningen geotope protection area, a unique area to study soil development across geochemically distinct bedrock from which soils form. To complete our climatic and geological gradient, we would also like to sample soils and leaves of Silene acaulis in Forlandet National Park and Nordre Isfjorden national park. All sampling will be performed in a way to minimise disturbance of flora, wildlife and natural environments. We will follow site specific guidelines where available. Our project does not include any red listed plant species. At each site at Isfjorden we would like to sample the following data:

1) Soil

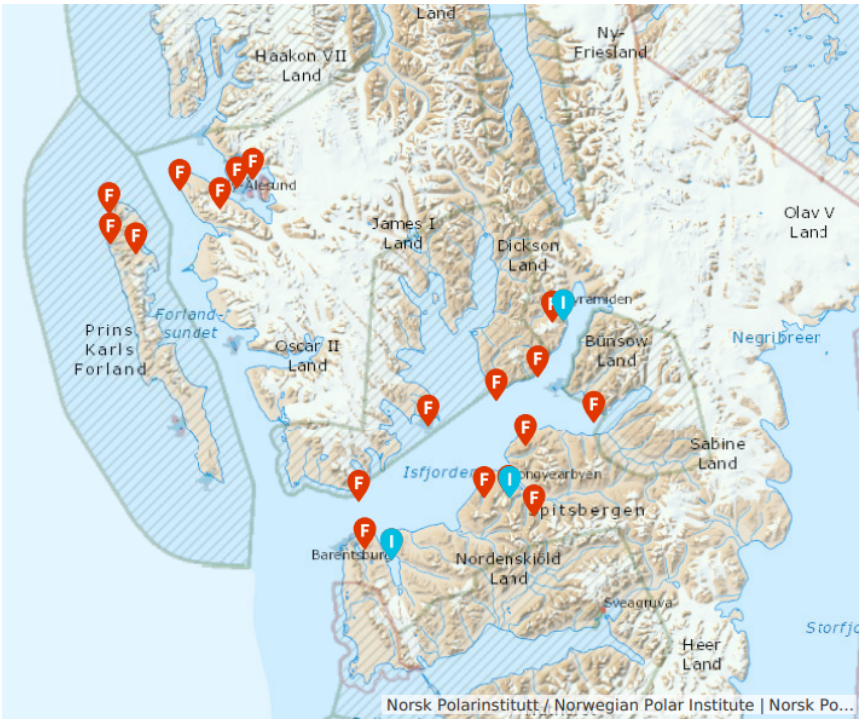
- conduct soil sampling using a small soil corer (ø 5 cm, with a maximum depth of 30 cm) to minimize the environmental impact of our sampling. At each site, we plan to sample 20 soil cores distributed within a 25x25 m area (four replicates) to evaluate soil characteristics, soil development stage, soil below ground biomass and for microbial DNA analysis. On a 50x50 cm area (15 replicates) we would like to sample 5 additional soil cores for key soil characteristics, for microbial DNA analysis and a microbial N fixation assay.

2) Vegetation

- conduct non-invasive vegetation surveys and sample plant litter from the plots to measure carbon and nitrogen content.

Postal address	Visiting address	Phone	E-mail
Postboks 633 9171 LONGYEARBYEN	Vei 309-6 9170 LONGYEARBYEN	79 02 43 00	firmapost@sysselmesteren.no www.sysselmesteren.no

- collect leaf samples for the measurement of Specific Leaf Area and nitrogen content of the species mentioned below:
**Common tundra species: Saxifraga oppositifolia, S. cespitosa, Cerastium arcticum, Silene acaulis, Luzula nivalis, Carex misandra*
**Common bird cliff species: Oxyria digyna, Cochlearia officinalis, Cerastium arcticum, Saxifraga cernua*
**Common species on disturbed soils: Achillea millefolium, Alchemilla subcrenata, Barbarea vulgaris, Deschampsia cespitosa, Festuca rubra, Poa pratensis and Trifolium repens*
- collect seeds, when available, from 20 individuals per population for the species above to test the genetic basis of phenotypic differences in a common garden experiment.
- collect aboveground biomass from 20 plots within squares of 20x20 cm. We will not sample on plots with occurring red listed plant species.
- collect leaf samples of Silene acaulis from 30 individuals from 20 populations (sites) along geological and climatic gradients for an investigation of its genetic architecture of soil and climatic adaptation. This is planned to be carried out at all sites where we do vegetation surveys around Isfjorden and Kongsfjorden. We would also take two soil samples per site with a small soil corer (⌀ 5 cm) for soil characterisation.
- collect and document plant species for identification and reference (to be curated and deposited in the Arctic herbarium of TRH, the NTNU University Museum).



Fieldwork location Longyearbyen, Pyramiden, Barentsburg:
We would like to install temperature loggers for one year close to the settlements of Pyramiden, Longyearbyen and Barentsburg to gain a complete understanding of the annual temperature flux in the investigated natural and disturbed soil systems. The precise locations will be defined during the fieldwork. Temperature loggers ("HOBO MX2202",Onset Computer Corporation, size: 3.35 x 5.64 x 1.8 cm) will be buried ca. 5cm below the soil surface and localized with a high precision GPS. All sites will be revisited again in the summer 2023 to retrieve temperature loggers.

Bjørndalen bird cliff, Longyearbyen and Adventdalen tundra:
In addition to the fieldwork described in the general project description we would like to:
- Collect 74 L of topsoil for a growth experiment in Zurich. The soil will be collected in a dispersed fashion using the small soil corer (ø 5 cm) to minimise the disturbance of the landscape. This amounts to a maximum of 160 cores retrieved and a disturbed surface area of a maximum of 3.2 m2 dispersed over a minimum of 100 m2.
- Depending on occurrence and growth status, collect ca. 1000 seeds (or alternatively in case of lack of seeds max. 100 ramets) from the representative target species mentioned in the project description. This is to supplement a manipulation experiment in Zurich to dissect the feedbacks between plants and soil.
- Collect seeds of 500 mother plants from one big population of Silene acaulis near Bjørndalen to study the evolutionary potential of traits adaptive to environmental variation.

Tempelet bird cliff:
As described in the general description

Mimerdalen tundra
Festningen tundra
Alkhornet bird cliff

Ny-Ålesund, Kvadehuken, Fuglehuken, Horneflya, Richardlaguna, Blomstrandhalvøya, Feiringhallet, Bohemanneset:
We would like to sample soils and leaves of Silene acaulis.

Deltaneset tundra, Kapp Thordsen tundra, Skansbukta bird cliff:
This site is planned as reserve sites for our natural tundra and geological gradient work. Field work as mentioned in the project description will only conducted in case the suggested primary sites cannot be visited for unforeseen reasons. However, we would like to sample soils and leaves of Silene acaulis in any case.

<u>Drone</u>
We would like carry out UAV (unmanned aerial vehicle) based soil and vegetation monitoring for pattern analysis. We are using multi-rotor copter UAVs equipped with a multi spectral and standard RGB camera. The multi-spectral camera will be mounted on a 2.8 kg (incl. batteries 4 kg) UAV with a diagonal wing span of 80 cm (incl. propellers 120 cm). The RGB UAV is a consumer grade DJI Mavic 2 pro (0.9 kg incl. batteries; wing span of 32 cm incl. propellers).

Installations

Installations

We will be erecting (an) installation(s) within Longyerbyen planning area
We will be erecting (an) installation(s) within Barentsburg, Coles bay or Pyramiden planning area

From	To	Coordinates	Name
05 Jul 2022	12 Aug 2023	E 514454.96875, N 8683145 N 02 51.075' E 072 33.534'	HOBO Logger (buried) Longyearbyen

Type	Dimensions in centimeters	Contact person
Temperature Sensor	L:6 W:4 H:3	Lena Valentina Sophia Bakker lena.bakker@erdw.ethz.ch

Uploaded files

Screenshot 2022-03-31 at 15.35.17.png

From	To	Coordinates	Name
22 Jul 2022	14 Aug 2023	E 529377.375, N 8732037 N 02 56.751' E 072 42.268'	HOBO Logger (buried) Pyramiden

Type	Dimensions in centimeters	Contact person
Temperature Sensor	L:6 W:4 H:3	Lena Valentina Sophia Bakker lena.bakker@erdw.ethz.ch

Uploaded files

Screenshot 2022-03-31 at 15.35.17.png

From	To	Coordinates	Name
28 Jul 2022	16 Aug 2023	E 481832.1875, N 8665904 N 02 39.96' E 072 30.726'	HOBO Logger (buried) Barentsburg

Type	Dimensions in centimeters	Contact person
Temperature Sensor	L:6 W:4 H:3	Lena Valentina Sophia Bakker lena.bakker@erdw.ethz.ch

Regulations

Regulations on the national parks Sør-Spitsbergen, Forlandet and Nordvest-Spitsbergen, on the nature reserves Nordaust-Svalbard and Søraust-Svalbard, and on the nature reserves for birds on Svalbard.

Section 3. Purpose of the national parks

The purpose of protecting the areas is to maintain large, continuous and largely undisturbed areas of natural environment on land and in the sea with intact habitats, ecosystems, species, natural ecological processes, landscapes, cultural heritage and cultural environments. The areas are to be maintained as reference areas for research purposes and for opportunities to experience Svalbard's natural and cultural heritage.

Forlandet national park is particularly intended to safeguard:

• an island with a characteristic mountain range with jagged (alpine) mountains and a wide coastal plain
• well-developed rock glaciers and frozen ground formations
• several localities of varying sizes with cliff-nesting seabird colonies and a core area for the world's most northerly population of common seal (harbour seal)
• important structures and sites and cultural environments with traces of earlier whaling activities, overwintering hunters and trappers and prospecting for minerals.

Section 6. Protection against development and disturbance
The areas above are protected against all forms of development, including the construction of buildings and installations of all types, mining, oil exploration and production, extraction of deposits and other activities that involve physical disturbance of the terrain or disturbance of the natural environment.

Section 9. Protection of the flora
Plants and fossils shall not be removed, and are protected against all types of damage or disturbance not caused by normal access or passage.

Regulations on the protection of Festningen geotopvernområde on Svalbard FOR-2003-09-26-1190
Section 3. Purpose
The purpose of the conservation is to preserve an area with valuable geological and Quaternary geological deposits, including:
- The fortress profile, one of Svalbard's most famous and complete geological reference profiles localities with elevated soil temperature and karst phenomena - deposits of fossil footprints from ancient lizards the area as an area of special scientific value.

2. Plants, animals and fossils
2.1 Plants and animals are regulated by Chapter IV of the Svalbard Environmental Protection Act and section 4 of the Svalbard Act with associated decisions.

Section 6 Permissions
In addition to measures as mentioned in the first paragraph, the administrative authority may dispense with the protection provisions in section 4, when scientific or special reasons otherwise warrant it.

Regulations on protection of Nordre Isfjorden national park FOR-2003-09-26-1187
Section 3. Purpose
The purpose of the conservation is to preserve a large, cohesive and essentially untouched Arctic coastal and fjord landscape with intact habitats, ecosystems, species, natural ecological processes, landscapes and cultural monuments as an area for research and experience of Svalbard's natural and cultural heritage, including especially safe:
- large areas with continuous, lush and species-rich vegetation with elements of vulnerable plant species areas with thick peat deposits
- extensive beach plains with large wetlands, and shallow sea areas; biotopes that are important nesting, feeding and myth areas for birds - rich bird life (waders, geese, marine ducks and seabirds)
- well-developed and interesting Quaternary geological formations and deposits - valuable cultural monuments
- the characteristic and well-known rock formations Skansen and Alkhornet

1. Landscape and natural environment
1.1 No activities must be initiated that could damage the geological deposits, such as construction of buildings, facilities, including tank farms, and fixed installations, provision of barracks and the like, laying of cables and cables, extraction, filling, relocation and storage of mass, leveling, construction of roads, quays, landing sites, etc., scraping of the seabed or the earth's surface, drainage and other forms of drying, drilling, blasting or the like and extraction of minerals, oil and fossils.

2. Plants, animals and fossils
2.1 Plants and animals are regulated by Chapter IV of the Svalbard Environmental Protection Act and section 4 of the Svalbard Act with associated decisions.

Section 6 Permissions
In addition to measures as mentioned in the first paragraph, the administrative authority may dispense with the protection provisions in section 4, when scientific or special reasons otherwise warrant it.

Act of 15 June 2001 No.79 Relating to the Protection of the Environment in Svalbard
iii. Flora
Section 28 (what protection of the flora involves)
No person may damage or remove flora.
Damage resulting from lawful access and passage or approved activities is excepted from the provision of the first paragraph.

Section 29 (collection for scientific or private use)
The collection of fungi and seaweed for private use is permitted. The collection of flora for research or teaching purposes is permitted where this does not make significant inroads into the local populations of the flora involved.

Section 37 (exemptions)
Even if permission may not be granted for a particular undertaking under this chapter, the Governor may grant exemptions from the provisions of this chapter for scientific purposes or when other special reasons so indicate

Section 57 (requirement for permits outside land-use planning areas and within land-use planning areas where there is no approved land-use plan)
A permit is required from Svalbard's environmental protection authorities for the following undertakings outside land-use planning areas and within land-use planning areas where there is no approved land-use plan:
1. physical alteration of the terrain

The Governor's considerations
Fieldwork locations (cf. map above) at Forlandet lies in Forlandet national park and the regulations relating to the national parks Sør-Spitsbergen, Forlandet and Nordvest-Spitsbergen, on the nature reserves Nordaust-Svalbard and Søraust-Svalbard, and on the nature reserves for birds on Svalbard comes to an act. For locations in Nordre Isfjorden national park, regulations relating to protection of Nordre Isfjorden For locations outside national parks, the Svalbard Environmental Protection Act comes to an act.

According to section 11 d in the regulations relating to Forlandet national park, section 4 in the regulations relating to Nordre Isfjorden national park, section 6 in the regulations relating to Festningen geotopvernområde and section 37 in the Svalbard Environmental Protection Act, the Governor may grant permission for scientific purposes. This does not necessarily mean that permission is given. Generally, fieldwork should be carried out outside protected areas. In this particular case, the Governor must consider if the activity is in conflict with the purpose of

Forlandet and Nordre Isfjorden national parks, Festningen geotopvernområde and the Svalbard Environmental Protection Act.

The fieldwork that includes soil sampling and flora collection at 17 locations is considered to need a permission, cf. the regulations.
The soil sampling includes 20 soil cores distributed within a 25x25m area (four replicates) and on a 50x50cm area, 15 replicates, 5 additional soil cores.
The vegetation sampling involves sample of plant litter, leaf samples from common tundra species, seed collection (20 individuals per population) and biomass from 20 plots within squares of 20x20cm. Additional, leaf samples of *Silene acaulis* from 30 individuals from 20 sites.
In addition, the fieldwork also include collection of 74 L of topsoil, maximum 160 cores retrieved, collection of 1000 seeds from representative target species and 500 mother plants from one big population of *Silene acaulis* near Bjørndalen.

Silene acaulis is listed as LC (viable) in the Norwegian Red List for Species 2021 – Svalbard. The Governor considers that the collection will not have negative impact on the distribution of the species. Regarding the vegetation and soil sampling, the Governor considers that permission can be given, but the sampling must be spread to reduce terrain alterations and species on the Red List must not be collected.

Installations
Installations applied for include temperature loggers (3.35 x 5.64 x 1.8 cm, buried 5cm below the soil surface*)* in Barentsburg, Pyramiden and Longyearbyen. The Governor of Svalbard consider the installations as reversible and temporary and that does not require special permission according to the regulations relating to the Act of 15 June 2001 No. 79 Relating to the Protection of the Environment in Svalbard (the Svalbard Environmental Protection Act). It is important that the installations are secured properly for humans, marine traffic and wildlife and removed by the end of the fieldwork period.

Drone
Drone will be used to document the fieldwork. Use of drone does not need special permission. Please be aware of section 5 and 30 in the Svalbard Environmental Protection Act due to use of UAV and that it is forbidden to disturb wildlife.

The purpose of the activity is scientific. By following the conditions set to the permission, the Governor consider the fieldwork applied for is not in conflict with the purpose of the national parks, Festningen geotopvernområde or Svalbard Environmental Protection Act and will not affect the conservation values.

The Governor's decision
The Governor of Svalbard grants Swiss Federal Institute of Technology Zurich att. Lena Valentina Sophia Bakker permission to conduct fieldwork at specified locations in the period 30.06.-12.08.2022 as described in the application.

The permission is given under the provisions of the Regulations relating to the national parks Sør-Spitsbergen, Forlandet and Nordvest-Spitsbergen and relating to the nature reserves Nordaust-Svalbard and Søraust-Svalbard and the nature reserves for birds section 11 d, regulations relating to

protection of Nordre Isfjorden national park section 4, regulations relating to protection of Festningen geotopvernområde section 6 and the Svalbard Environmental Protection Act section 37.

The Governor's permission is granted on the following conditions:

- Permissions are only valid for the people included in the project.
- Sampling of soil, seed and vegetation must be reduced to a minimum of what is necessary. Species on the Norwegian Red List for species 2021 – Svalbard category NT, VU, EN, CR.
- All equipment and all waste items are to be removed and brought back. Garbage shall not be burned, except clean untreated wood.
- This permit must be brought along during the fieldwork.
- The project shall submit a yearly report from the fieldwork in the RiS database by 01.11.2022 with information on what, where and dimension of sampling.

The fieldwork that involves temperature loggers and sampling in Longyearbyen may need a notification to Longyearbyen lokalstyre, the plan responsible.
The fieldwork in Ny-Ålesund may need a permission from Kings Bay, the plan responsible and landowner.
The fieldwork that involves temperature loggers and sampling in Pyramiden and Barentsburg may need a notification to Trust Artikugol, the plan responsible.

Please notice that your planned fieldwork outside Management Area 10 requires notification to the Governor according to the regulation FOR-1991-10-18-671 on travel in Svalbard (the Tourism Regulation). The notification form is available here: Notification of travel plans for individual travellers; residents, visitors and researchers.

Duty of care
The Governor calls attention to the duty of care in the Svalbard Environmental Protection Act section 5 first sentence, «Any person who is staying in or operates an undertaking in Svalbard shall show due consideration and exercise the caution required to avoid unnecessary damage or disturbance to the natural environment or cultural heritage. » The Governor requests particular attention regarding wildlife

Right to complain
According to Norwegian law you are entitled to complain about the present decision. Written complaints must be submitted within three weeks of receiving this letter. The complaint must be submitted to the Governor

Regards

Kristin Heggelund
Head of Environment Protection

Ingvild Øyjordet
Adviser Nature Management

This document is approved and expedited electronically without signature

Copy
Longyearbyen lokalstyre
Kings Bay AS
Miljødirektoratet