National Inventories of Landscapes in Sweden

The National Inventories of Landscapes in Sweden (NILS) is an environmental monitoring program. Monitoring biophysical conditions and changes in deciduous forests, grasslands, alpine habitats and seashores for reporting within the EU's Species and Habitats Directive.

NILS a general framework of several specialized inventories

NILS Grassland inventory – A National inventory of all types of grasslands, but with an extra emphasis in grasslands with high nature values (i.e. grasslands included in appendix 1 in the EU Species- and Habitat directive). Started 2020.

NILS Deciduous forests inventory – A National inventory of deciduous forests complementing the data from the Swedish National Forest Inventory. Focusing on e.g. Broad leaf forests, Alluvial forests, Deciduous swamp woods and old deciduous forests in the western taiga, i.e. deciduous forests included in appendix 1 in the EU Species- and Habitat directive). Started 2020.

NILS Alpine inventory – A National inventory of habitats in the Swedish alpine area, with a focus on nature types with high nature values (i.e. habitats in the alpine area included in appendix 1 in the EU Species- and Habitat directive). Using the new design since 2021.

THUF Sea shore inventory– A National inventory of habitats along the Swedish seashore, with a focus on habitats included in appendix 1 in the EU Species- and Habitat directive. Using the new design since 2021.

Method

Hierarchical samples

The new design is a general framework were both common and less common habitats could be monitored. We use a small subset of the sample to survey common habitats, and larger subsets of the sample to survey less common habitats.

Two-phase inventory

Further, since some of the habitats are rare, the new design of the inventories relies on a two-phase sampling design (Figure 1) where, in the first phase, a sample of tracts was chosen using random balanced sampling from a sample frame. Every plot in the tract were inventoried and classified using aerial photos or classified with the aid of models. Then, in the second phase, the classes were used to select a sample of plots to field inventory within each tract. The finesse of this second phase was that we could use remote sensing information to exclude plots from an expensive field inventory when we know beforehand that they do not contain anything relating to the objectives of the monitoring program.

A. Selection of tracts

Sampling frame covering Sweden.

- PSU 3
- PSU 4
- PSU 5
- PSU 6

Schematic illustration of the tracts within different PSU

B. Inventory in aerial photos

Every plot in the tract were inventoried and classified using aerial photos. The classes were combined to "sample classes" which were later used to select plots which should be inventoried in the field.

Classes within the grasslandsinventory 2022

- ○ Alvar
- ● Siliceous rock with pioneer vegetation
- ○ Sandy ground
- ● Grazing/mowing with continuity
- ● Grazing/mowing without continuity
- ● Trädklädd betesmark
- ● Annan gräsmark
- ● Ej aktuell

Schematic illustration of classfied sample plots within a tract

C. Sample plots selected for field inventory

A maximum of 8 plots per tract were inventoried within the grasslands inventory.

Schematic illustration of plots selected for field inventory within a tract

Tracts within the 2021 inventory

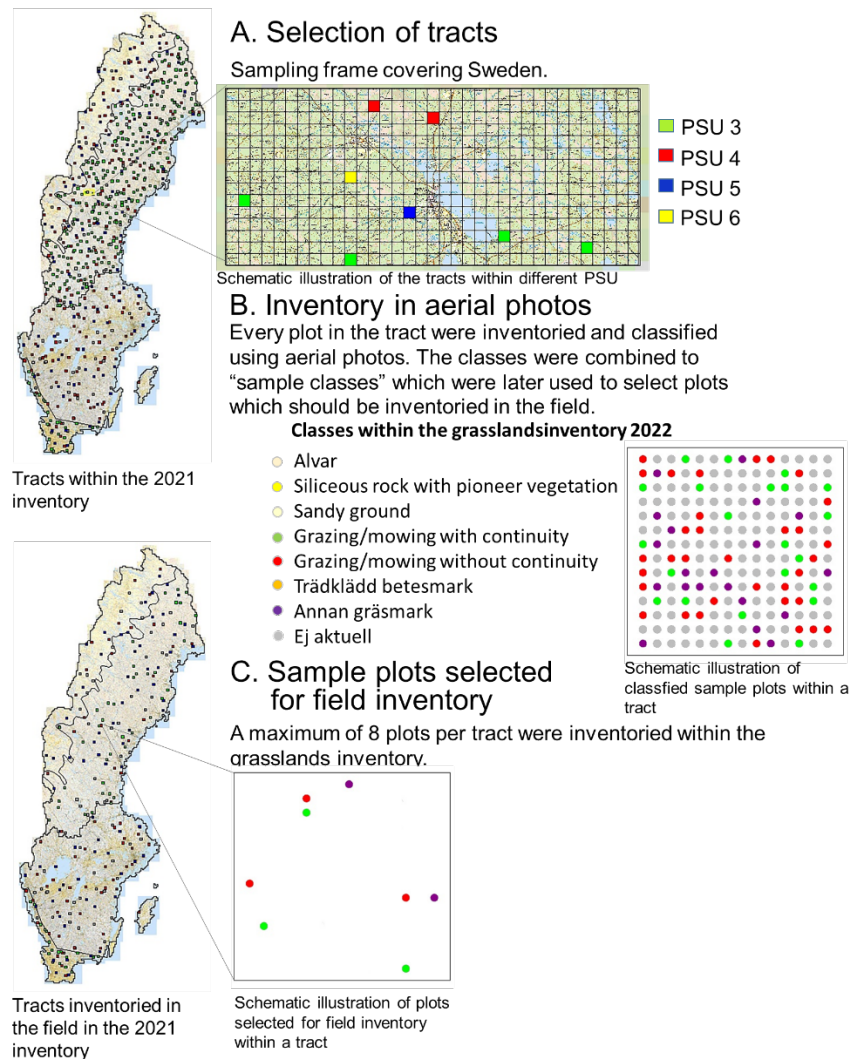Tracts inventoried in the field in the 2021 inventory

Figure 1. A schematic illustration of how tracts and sample plots were selected within the grassland inventory. First, tracts were randomly selected with balanced sampling (A) from the sampling frame. Each sampling plot within the chosen tracts was inventoried and classified using aerial images (B). Further, the classes recorded in the aerial image inventory were combined to "selection classes". Among the sample plots that according to the inventory could be grassland a random selection of plots were conducted (C) that will be inventoried in the field (maximum 8 plots per tract could be selected). Sample plots and sometimes a whole tract lacking grassland were not inventoried in the field. The same procedure was used in the inventory of deciduous forests and was done simultaneously with the grassland inventory, although with other classes. Observe that the sparsest sample, PSU 6, was a subsample of the more densely sample PSU 5, which is a subsample of PSU 4 etc.