



# Digitally mapping values in the forest



# Digitally mapping values in the forest (DVIS)

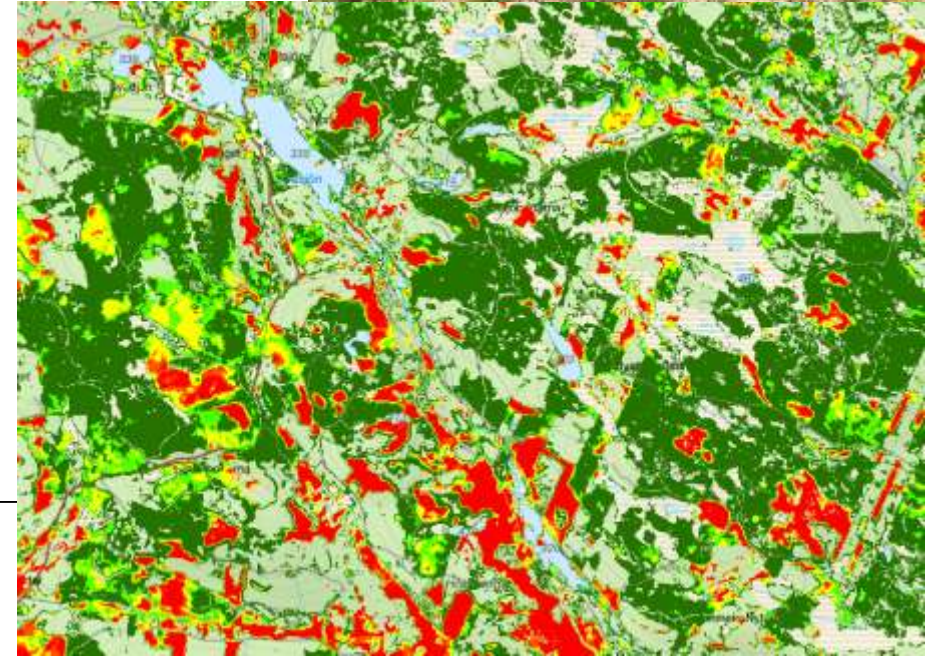
- The Swedish Government has tasked the Swedish Forest Agency and the Swedish Environmental Protection Agency with developing spatially explicit data products on **nature** and **cultural heritage** values in forested landscapes, as a complement to field-based inventories.
  - The project was initiated in autumn 2022 and is scheduled for final reporting no later than 30 June 2027.
- Identify areas of high cultural value such as hunting pit systems and charcoal hearth.
- Identify forests with low or high conservation value.
- Indicate areas with Annex 1 habitat types in the Species and habitat directive

 Low values  
 High values

charcoal hearth



hunting pit





# Indicative mapping of forest habitats and high nature values



9110 – 9130 Luzulo-Fagetum beech forests, Asperulo-Fagetum beech forests



9180 – Tilio-Acerion forests of slopes, screes and ravines



91E0 Alluvial forests



91F0 Riparian mixed forests along the great rivers



9160 – 9190 Sub-Atlantic and medio-European oak or oak hornbeam forests, Old acidophilous oak woods with Quercus robur on sandy plains

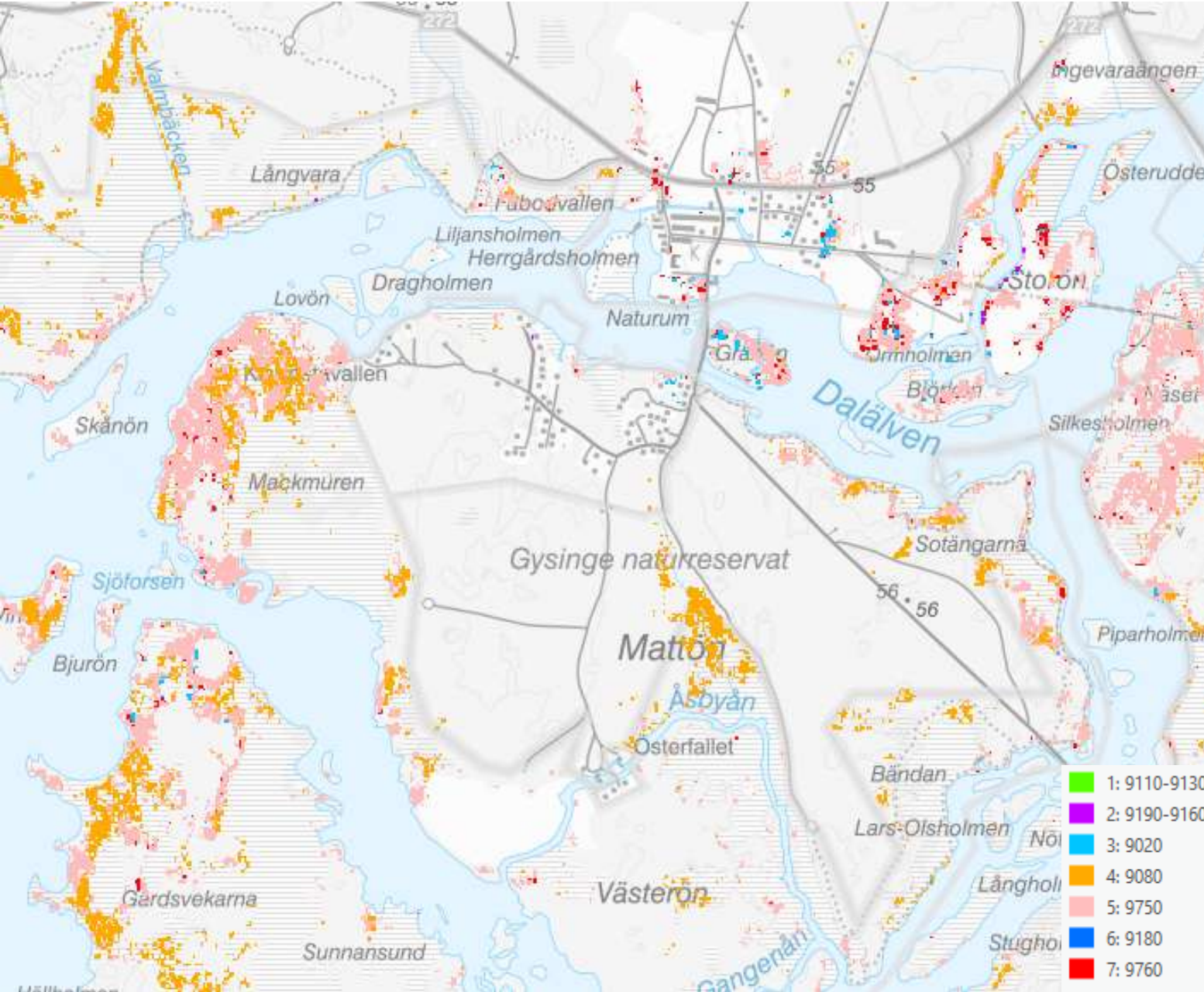


9020 – Fennoscandian hemiboreal natural old broad-leaved deciduous forests rich in epiphytes.



9080 – Fennoscandian deciduous swamp woods





Aim:

Investigate if it is possible to map and distinguish habitat types using a machine learning model, and is the information useful?

Expected result:

An indication (remote sensing-based), 0–100, of the presence of the target natural habitat types.

# Mapped Annex 1 habitats:

9110 – 9130 Luzulo-Fagetum beech forests and Asperulo-Fagetum beech forests

9160 – 9190 Sub-Atlantic and medio-European oak or oak hornbeam forests, Old acidophilous oak woods with *Quercus robur* on sandy plains

9180 – Tilio-Acerion forests of slopes, screes and ravines

9020 – Fennoscandian hemiboreal natural old broad-leaved deciduous forests (*Quercus*, *Tilia*, *Acer*, *Fraxinus* or *Ulmus*) rich in epiphytes

91E0 – Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

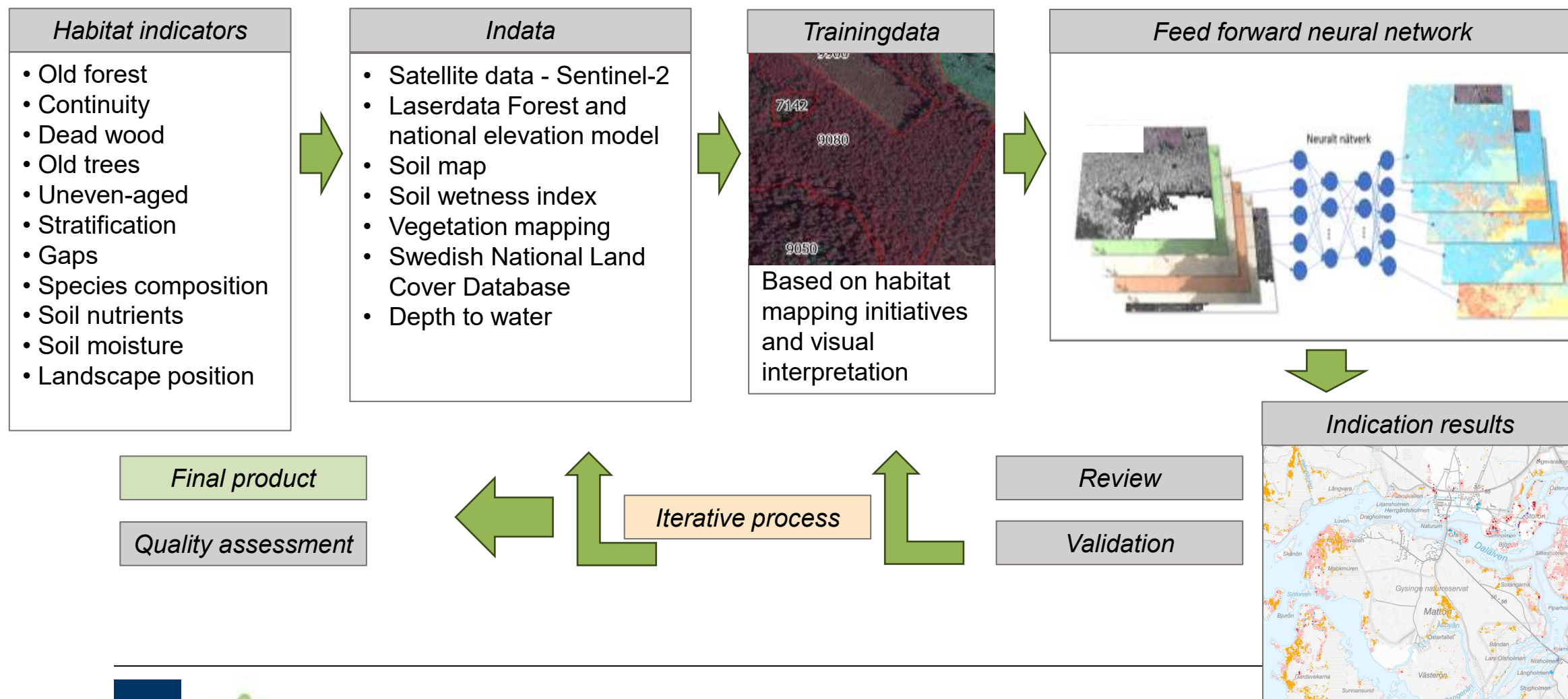
91F0 – Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*)

9080 – Fennoscandian deciduous swamp woods



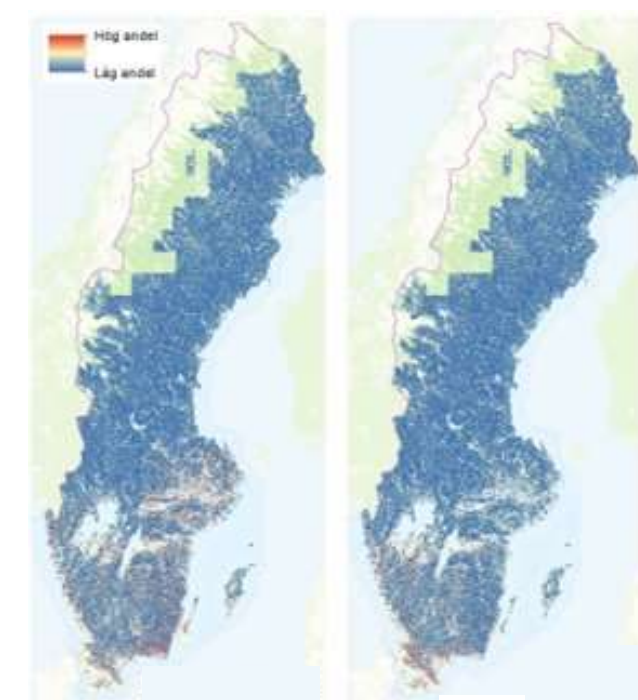
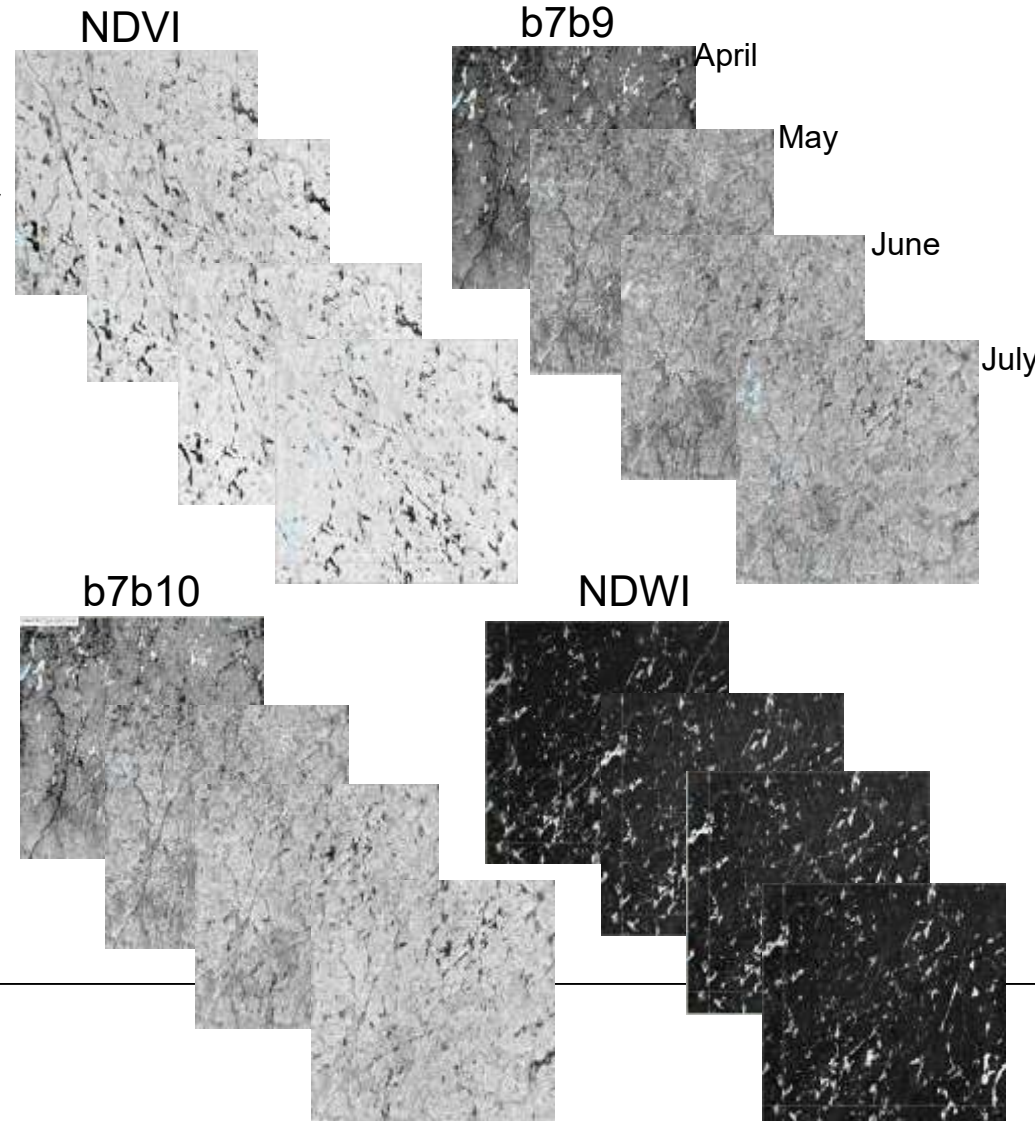


# Indicators, input data and method



# Indata preparation

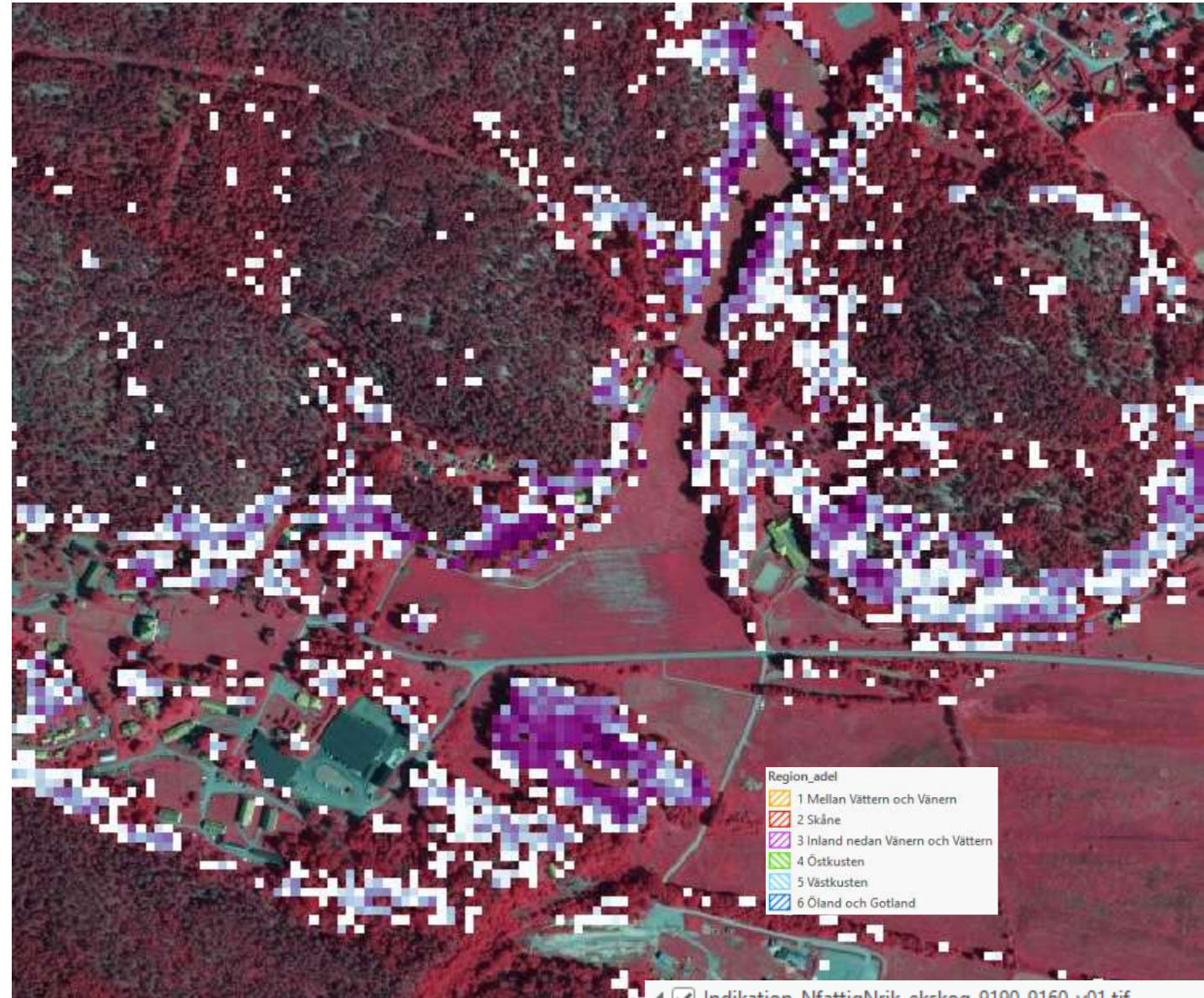
- Sentinel 2 data – calculated index over time 2018-2025 and over seasons April → May
- Thematic classes from Swedish National Land Cover Database.
- Laserdata preparation
- Trainingdata





# Results

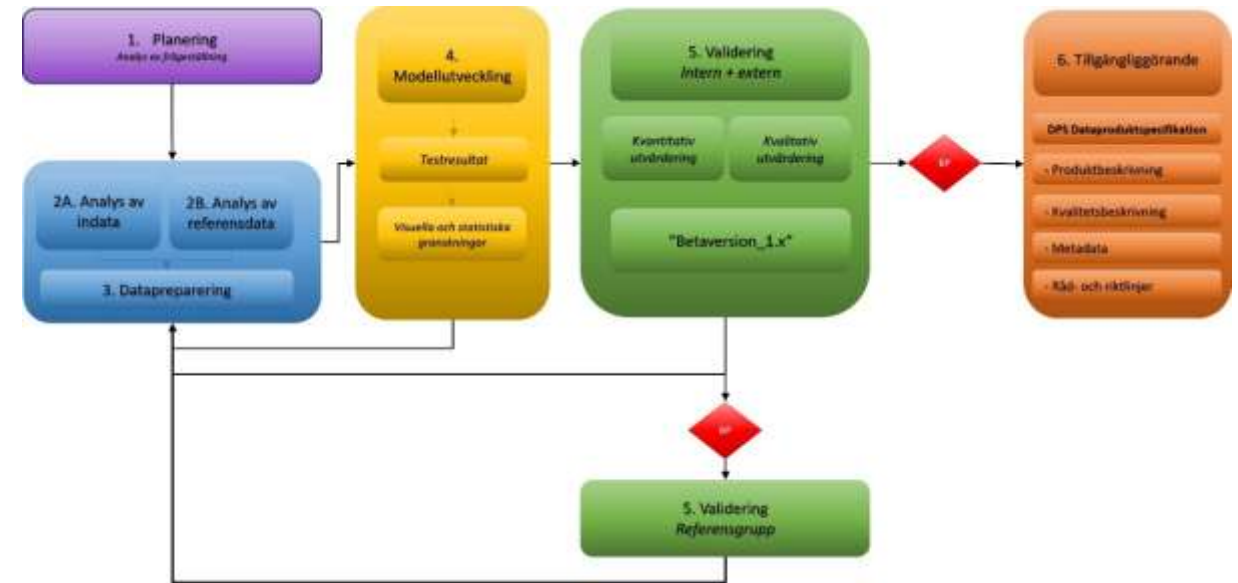
- 5 layers of indication:
    - 9110-9130, beech
    - 9160-9190, oak
    - 9180-9020, Broadleaf forest / Deciduous forest
    - 9080, deciduous swampwoods
    - 91F0-91E0, riparian and alluvial forests
  - Aggregated indications
  - Strongest indicated habitat
  - Symbology files
- Not all habitat indicators are visible in remote sensing products.
- Mixing among habitats do occur
- Relevant for identify previously unknown areas of habitats.





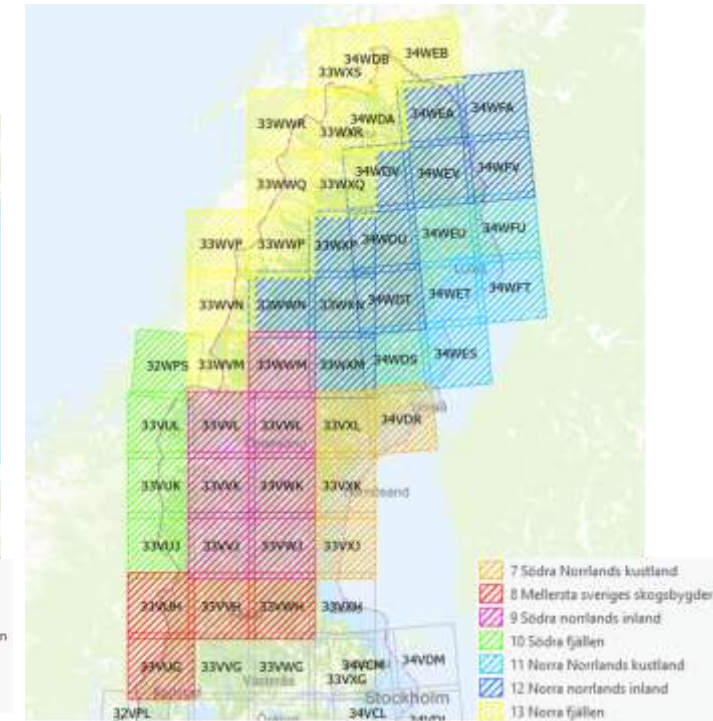
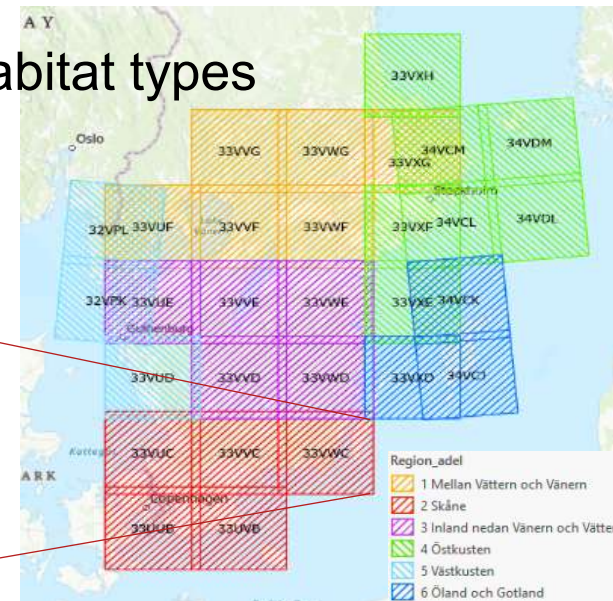
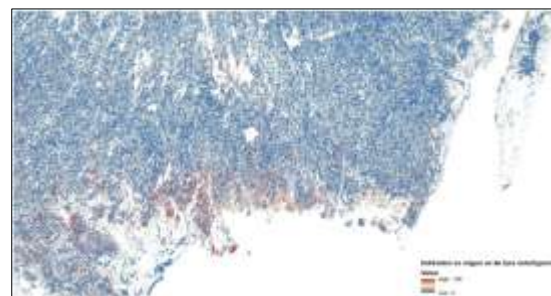
# Quality assessment and validation

1. Iterative process
  - Lock and feel
  - Statistical analysis
  - Training signatures /counter signatures
2. Validation process via reference group
3. Validation process via field campaign
4. Finalized product



# Systematic approach - gradual rollout

- Initial model development and indata testing in test area south of Sweden.
- Gradual roll out within Broadleaf forest / Deciduous forest – 7 habitat types.
- Gradual roll out northern Sweden – 2 habitat types



2023

2024

2025

2026>



# Next step:

1. In field validation
2. Evaluation additional datasets
3. Evaluating performance of combination model
4. Additional habitats and DVIS
5. Roll out northern Sweden





# Questions?



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