# An attempt in Sweden to standardise indicators between sites, for comparability

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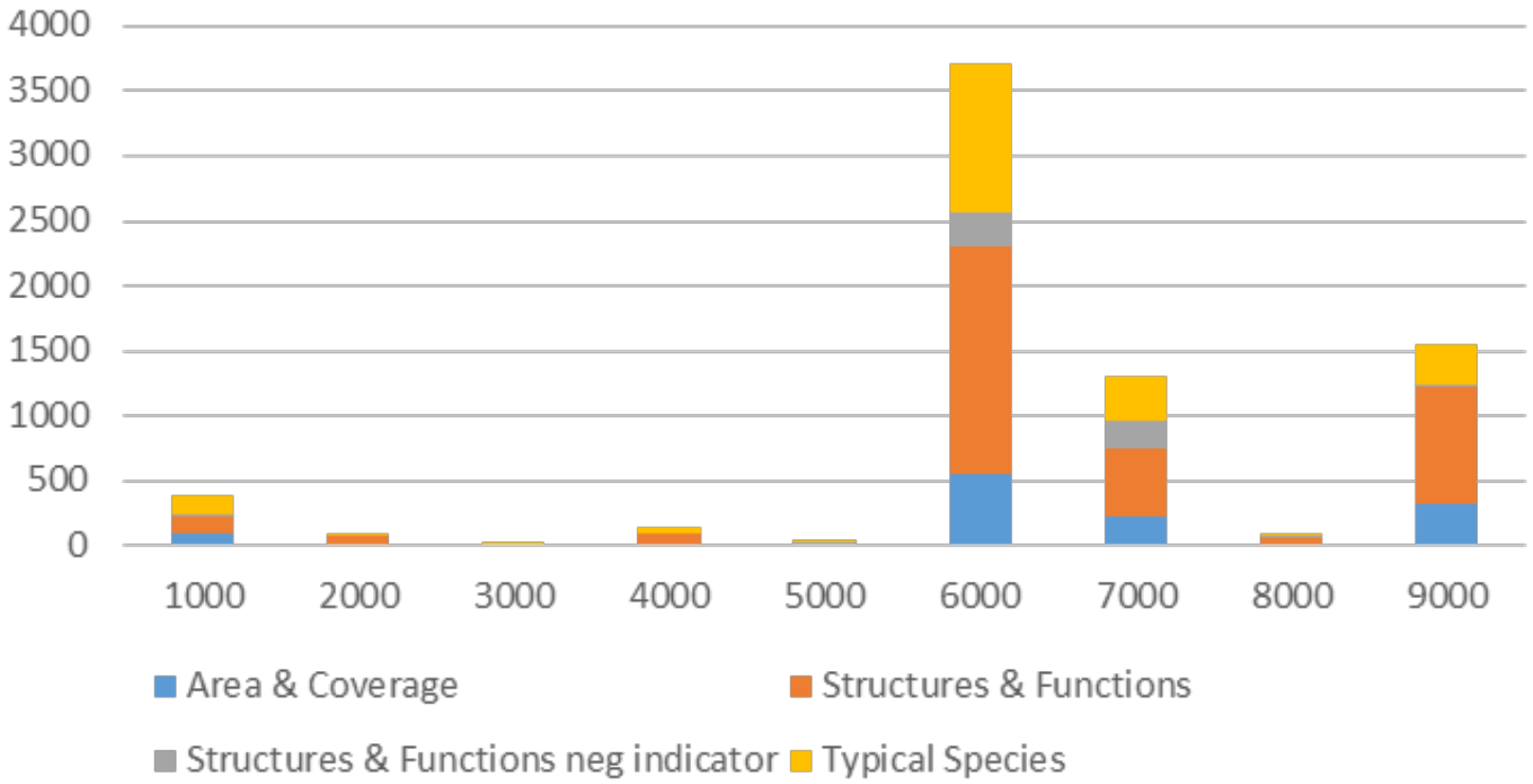
# National recommendations since 2008-2010 *for monitoring of protected areas*

- Recommendations since 2010, in Swedish only (1400 pages)
  http://www.naturvardsverket.se/Stod-i-miljoarbetet/Vagledningar/Miljoovervakning/Uppfoljning-i-skyddade-omraden/Manualer-for-uppfoljning-i-skyddade-omraden/
- A national system (Swedish EPA), used by our 21 County Administrative Boards
- National databases
- Obligatory / non-obligatory
- Natura 2000 habitats and species, and some national

# Funding and decision-making

- Around 16 million Euro in Sweden for management of habitats in 2016 (10 million Euro to grasslands)
  (Details, in Swedish only, see p27 in: http://www.naturvardsverket.se/978-91-620-6758-8 )
- Around 1 million Euro for monitoring of protected areas in 2016 – for habitats, species, visitors, installations…
- Each County Administrative Board (CAB) decides on targets, indicators & methods for their protected areas
- Each CAB supposed to use national databases and follow recommendations, but implementation varies.
- Thus: incomplete data, so far

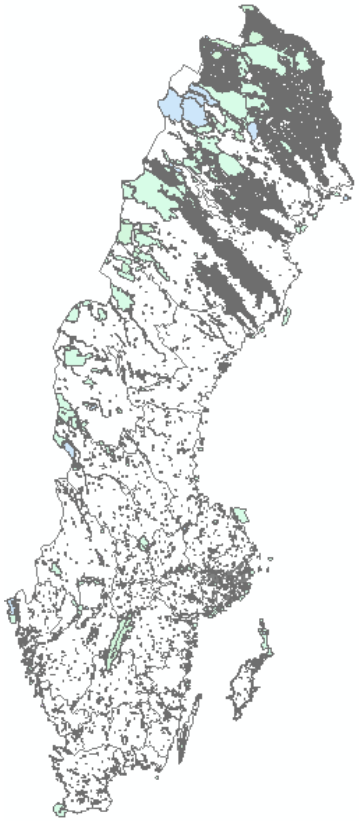
# Used indicators nationally per habitat group (number of management areas*)



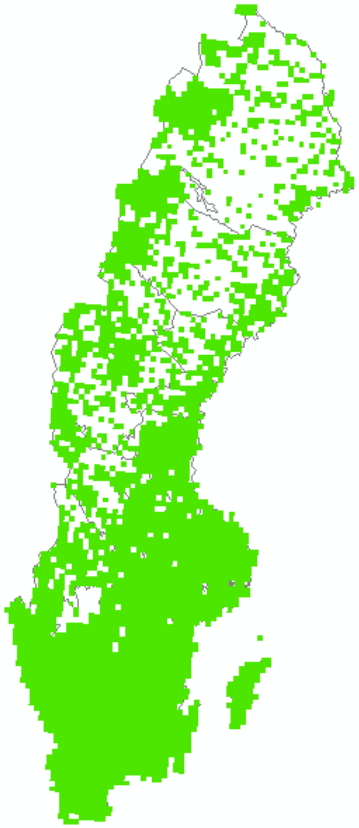

*** A protected area can have several management areas per habitat**
**Please note: this is not the proportion of monitored area per habitat group**

# Distribution of habitats (10x10 km grids)
# Total area vs Natura 2000 sites

**Protected areas**

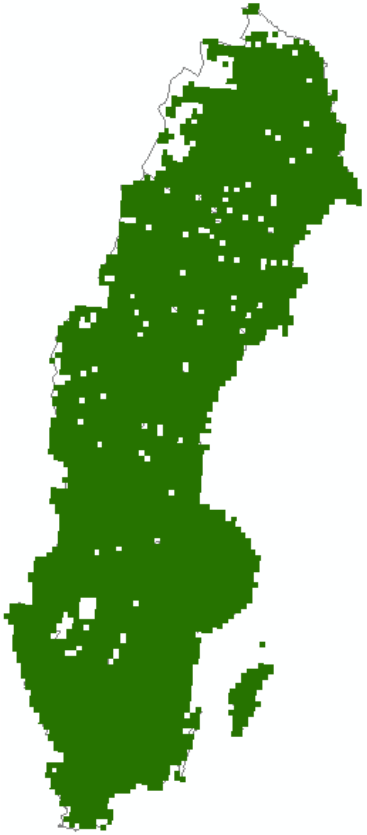


**Grasslands (6000-)**
**8 100 km2/**
**2 800 km2**



**Wetlands (7000-)**
**40 500 km2/**
**6 500 km2**

**Forests (9000-)**
**58 900 km2/**
**20 400 km2**



# Used indicators for structures and functions, nationally

| Group of indicator | Times used |
|---|---|
| Bush cover | 682 |
| Vegetation height | 678 |
| Tree cover | 662 |
| Overgrowth of bushes and small trees | 305 |
| Ditches | 225 |
| Dead wood | 197 |
| Negative indicator species | 166 |
| Threatened tree species | 132 |
| Removal of tree or dead wood | 132 |
| Cover of white or brown mosses | 123 |
| Vegetation | 67 |
| Tree or bush cover | 27 |

58 specific indicators belong to 26 groups

For all habitat groups, cover and height were used most frequently

| | |
|---|---|
| Macrophytes | 23 |
| Rejuventation of trees | 22 |
| Natural surrounding environment | 18 |
| Sand or exposed substrates | 16 |
| Foreign species | 9 |
| Source for pollen and nectar | 7 |
| Fire | 6 |
| Water quality | 4 |
| Fish species | 3 |
| Hydromorphological structures | 2 |
| Benthic algae | 1 |
| Foreign tree species | 1 |
| Humic soil layer | 1 |
| Hydrology | 1 |
| Leaf liter | 1 |
| | 3511 |

# Most frequently used indicators for structure and functions per habitat group

| Indicator | 6000 | 7000 | 9000 | sum of all habitats | % |
|---|---|---|---|---|---|
| Bush coverage (maximum) | 336 | 24 | 26 | 431 | 12% |
| Vegetation height (interval) | 364 | 25 | 29 | 450 | 13% |
| Tree cover (maximum) | 352 | 18 | 4 | 403 | 11% |
| Bush coverage (interval) | 136 | 0 | 56 | 235 | 7% |
| Vegetation height (maximum) | 173 | 0 | 14 | 228 | 6% |
| Overgrowth of bushes and small trees | 135 | 0 | 21 | 161 | 5% |
| Tree cover (interval) | 99 | 17 | 79 | 216 | 6% |
| Ditches (Intact hydrology) | 0 | 209 | 0 | 209 | 6% |
| Cover of white or brown mosses (e.g., Scorpidium) | 0 | 120 | 0 | 120 | 3% |
| Negative indicator species | 0 | 43 | 0 | 43 | 1% |
| Dead wood (volume) | 0 | 0 | 197 | 197 | 6% |
| Negative indicator species | 0 | 0 | 162 | 162 | 5% |
| Removal of tree or dead wood | 0 | 0 | 71 | 72 | 2% |
| Removal of tree or dead wood | 0 | 0 | 58 | 60 | 2% |
| .... | ... | ... | ... | ... | ... |
| All 58 indicators | 1759 | 527 | 907 | 3511 | 100% |

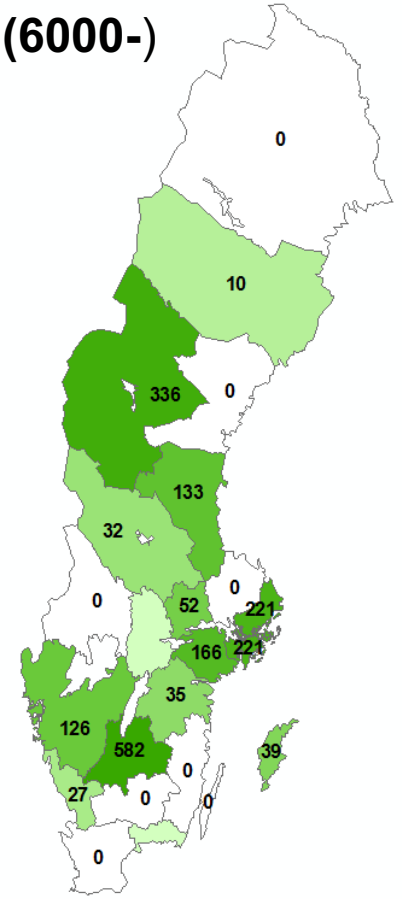
# Most frequently used indicators for structure and functions per habitat group

14 indicators, out of 58 registered, accounts for 85 percent of all registrations

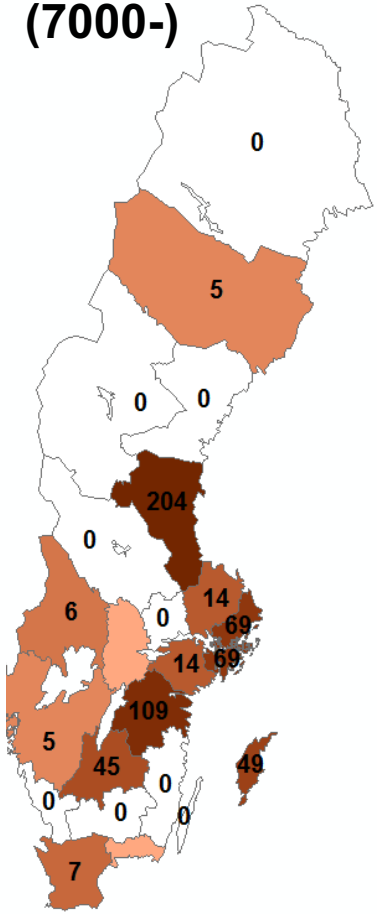
Several indicators are used more than once, and used as a combination with maximum, minimum or an interval (e.g., Bush coverage)

# Structures and functions, number of monitored targets per county

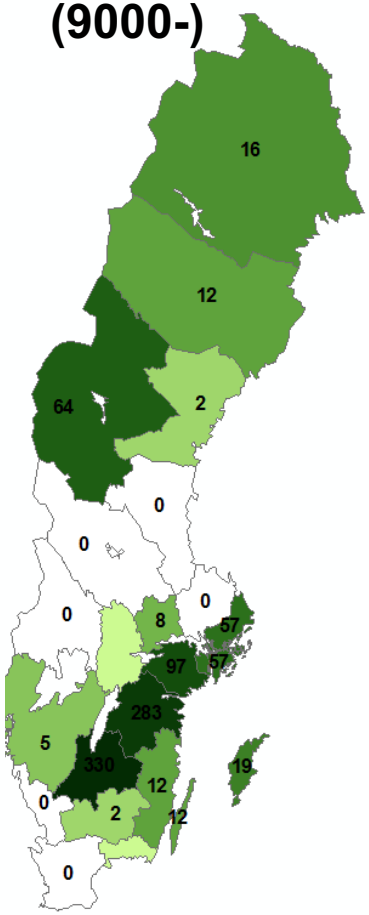
**Grasslands (6000-)**




**Wetlands (7000-)**




**Forests (9000-)**



# Typical species, number of monitored targets nationally

**Ground-living vascular plants, mosses and lichens 1440**

**Mosses, liverworts, lichens and funghi – as epiphytes or on dead wood ..... 293**

**Birds ..... 126**

**Butterflies ..... 98**

**Dung beetles ..... 60**

**Fishes ..... 14**

**Digging Hymenoptera ..... 8**

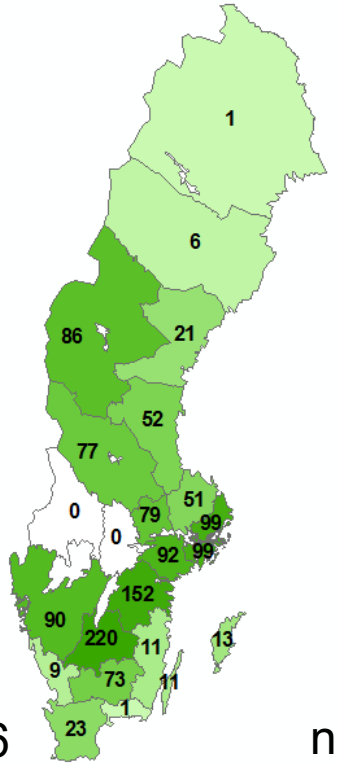
**Macrophytes in water ..... 2**

**Others ..... 5**

**Total number .....2047**

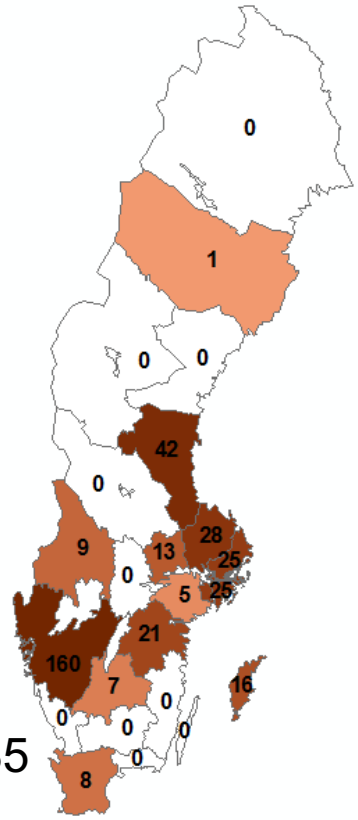
# Typical species, number of monitored targets nationally

6000 Grasslands



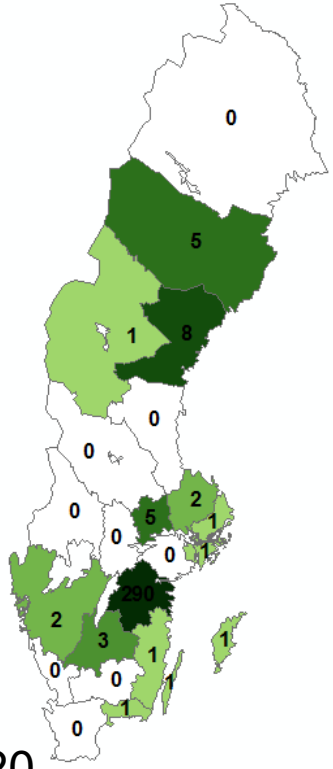

n = 1156
(56%)

7000 Wetlands




n = 335
(16%)

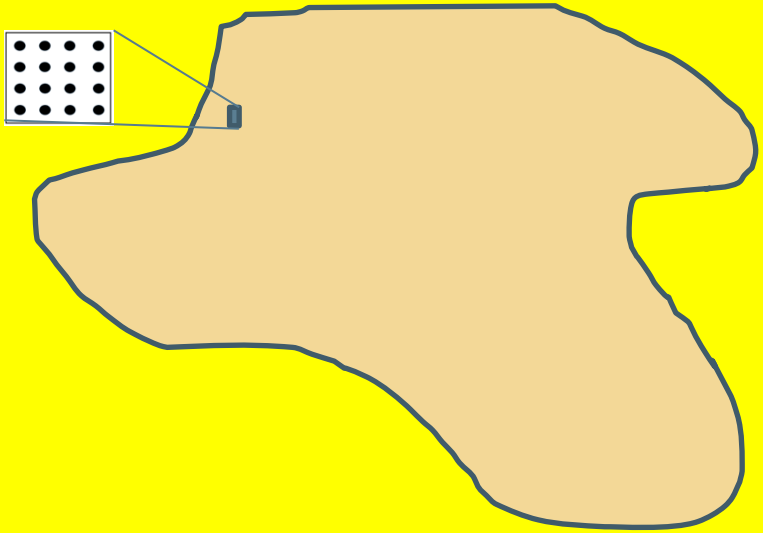
9000 Forests




n = 320
(16%)

# Examples of monitored targets – how well the habitat is surveilled

| Habitat Group | Area and coverage<br>Monitored (km2) | Typical species<br>vascular plants, mosses and lichens | epiphytes |
|---|---|---|---|
| 6000- | 40 | 0,68% | |
| 7000- | 118 | 0,02% | |
| 9000- | 108 | 0,02% | 0,02% |



Assuming that the monitoring within the site is representative for the whole site

% of total *national* area

# Conclusions?

- Out of 58 possible indicators, a handful are very dominant
- National system, but County implementation differ widely
- …making comparisons and reporting difficult.
- So far, very few examples where data have been used to change management.
- Further analysis and possible improvements will be performed during 2017