National scale prioritization and spatial planning
–
Finnish case for cost-effective ecosystem restoration and management

Santtu Kareksela

METZO III -project

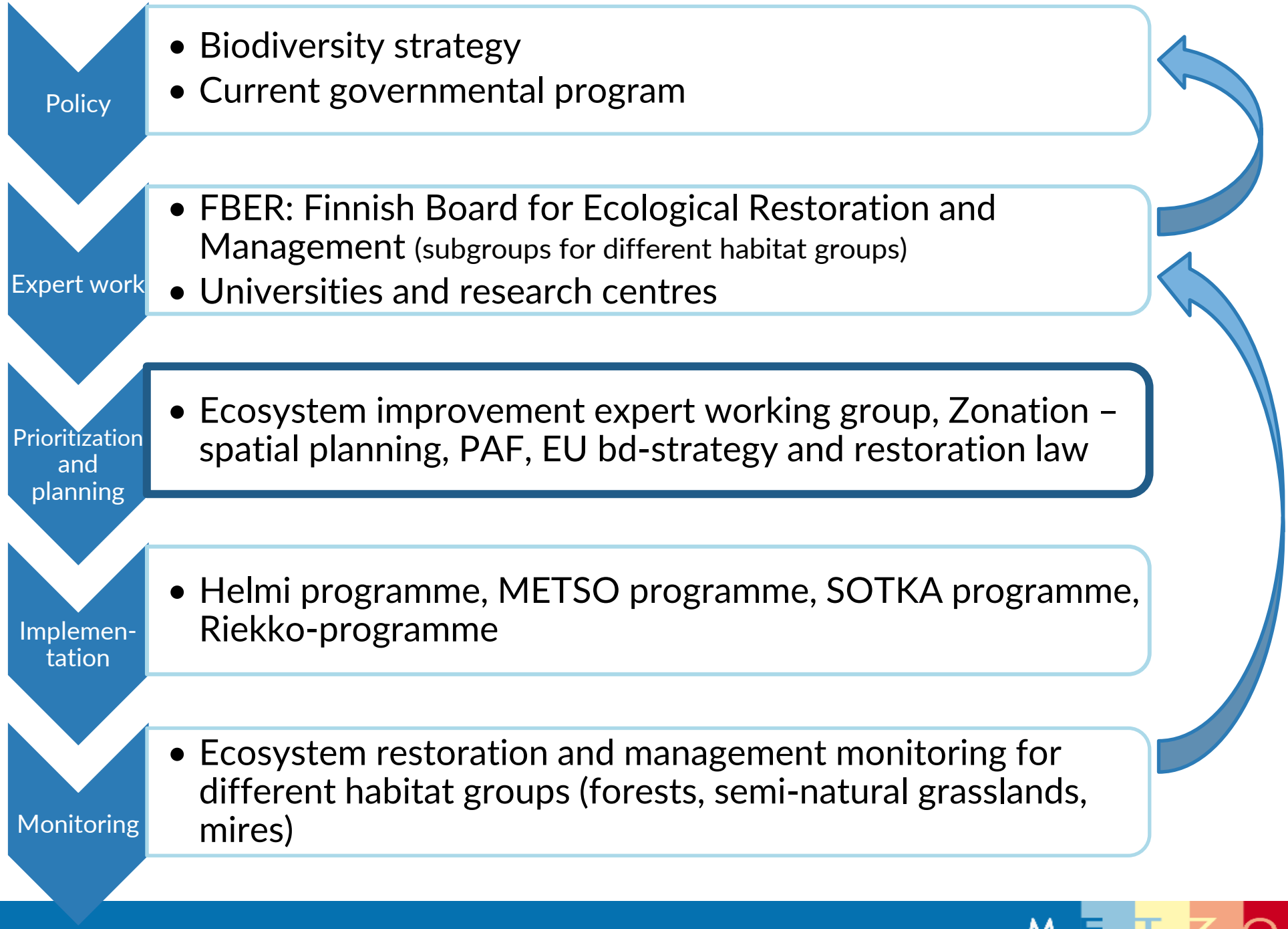
Metsähallitus, Parks & Wildlife Finland

Siggen seminar 2022: Nature restoration and the role protected areas

31 March 2022

METSÄHALLITUS

Finnish restoration policy



Defining and setting priorities in time and space

Why do we need systematic analyses?

ILLUSTRATIONS BY DANIEL MAJOR

Buried by bad decisions

Our brains are hard-wired to make poor choices about harm prevention in today's world. But we can fight it, says **Daniel Gilbert**.

The London Association for the Prevention of Premature Burial was founded in 1896 to prevent "premature burial generally, and especially amongst the members"[1]. Because nineteenth-century physicians couldn't always distinguish the nearly dead from the really most sincerely dead, premature burial was a problem. But not a big problem. The odds of being buried alive in 1896 were, like the odds of being buried alive today, very close to zero. Nonetheless, the good citizens of England formed action committees, wrote editorials and promoted legislation that ultimately led to expensive safeguards against "the horrible doom of being buried alive"[1]. Most of those safeguards — such as the costly requirement that bodies spend time in 'attractive waiting mortuaries' before being buried — are still with us today. The frequency with which modern cadavers use this waiting period to demonstrate that they've been misdiagnosed is approximately never.

Premature burial isn't a big problem, but the way we deal with big problems is. When an aeroplane's fuselage rips open mid-flight, or an offshore oil rig explodes, or a nuclear power plant is crippled by a tsunami, we immediately ask what could have been done differently, blame those who didn't do it, then allocate funds and pass legislation to make sure it gets done that way the next time. At first blush, this seems sensible. After all, no one is in favour of aviation accidents, reactor meltdowns or oil spills; so when these things happen, why not do everything we can to make sure they don't happen again?

The answer is that because resources are finite, every sensible thing we do is another sensible thing we don't. Alas, research shows that when human beings make decisions, they tend to focus on what they are getting and forget about what we are forgoing. For example, people are more likely to buy an item when they are asked to choose

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Can decision-making be taught?
go.nature.com/ykpugo

Conservation Biology

Conservation Practice and Policy

Six Common Mistakes in Conservation Priority Setting

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Abstract: *A vast number of prioritization schemes h decisions about the allocation of finite resources. H setting priorities in conservation frequently includes to be more rigorous and scientific in the way prior on well-established principles of decision science, we priorities for conservation: not acknowledging conse defined problem; not prioritizing actions; arbitrarine of failure. We explain these mistakes and offer a pat mistakes in future prioritizations.*

Keywords: Conservation Action Planning, conserv operations research, prioritization

Seis Errores Comunes en la Definición de Prioridades d

Resumen: *Se ha desarrollado un vasto número d servación navegue entre decisiones difíciles en cua la aplicación de métodos cuantitativos para la defin incluye errores que pueden socavar la intención de su en que se establecen las prioridades y se asignan los de la ciencia de la decisión, resaltamos seis errores c*

Conservation Biology

Contributed Papers

Use of Inverse Spatial Conservation Prioritization to Avoid Biological Diversity Loss Outside Protected Areas

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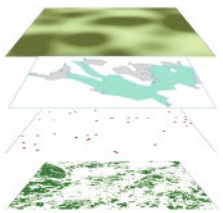
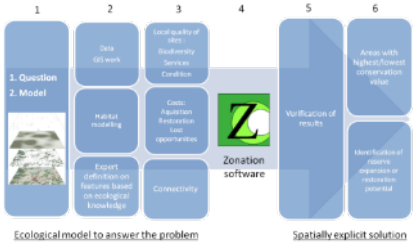
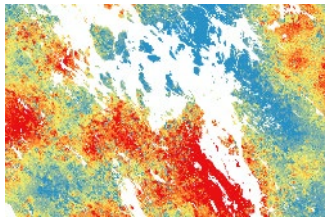
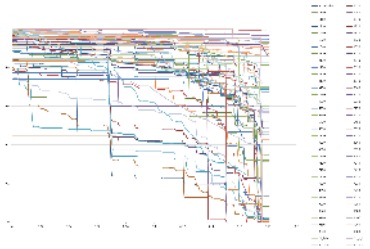
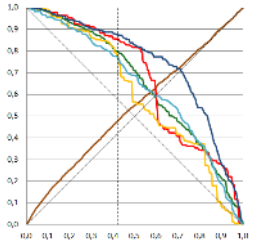








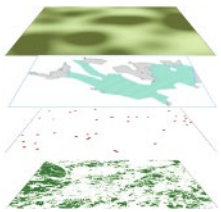


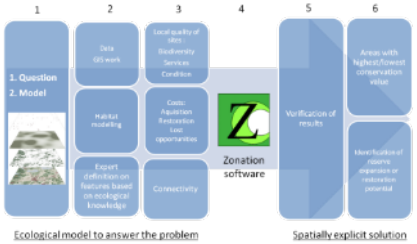
Why do we need systematic analyses?

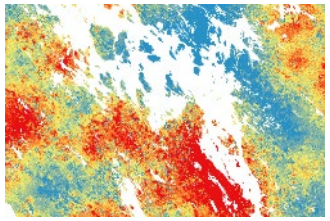
To avoid harmful opportunism in decision-making

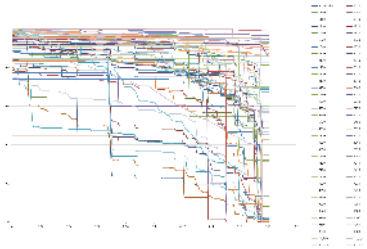
To find the balance!

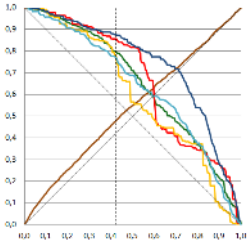
To define and recognize opportunities



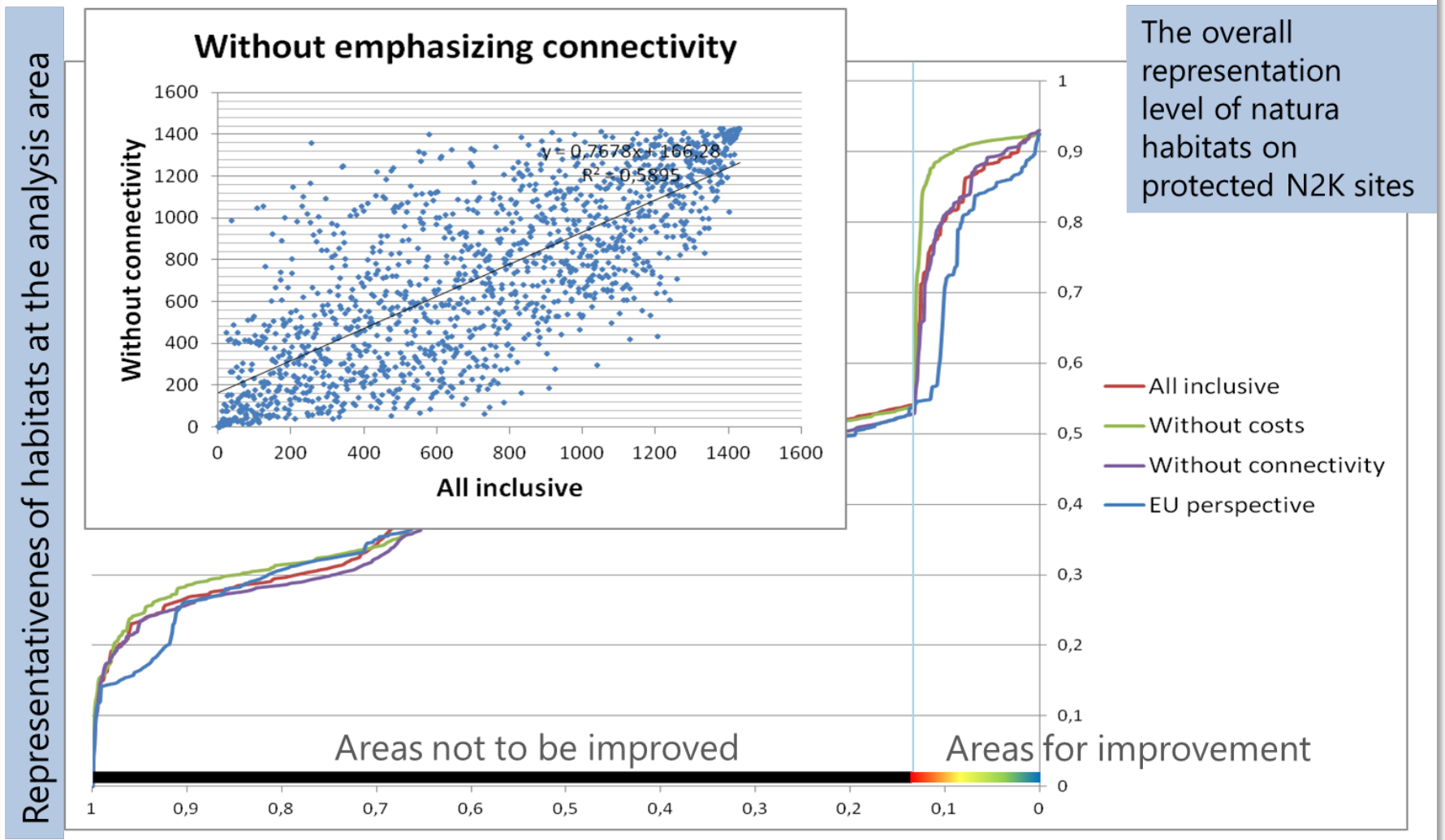








Graphical analysis of the performance
COMPARING TRADE-OFFS

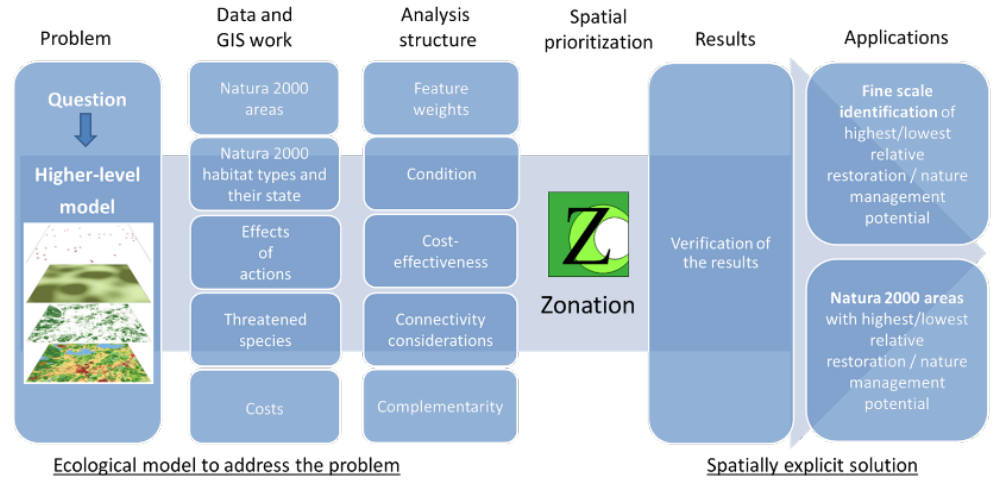


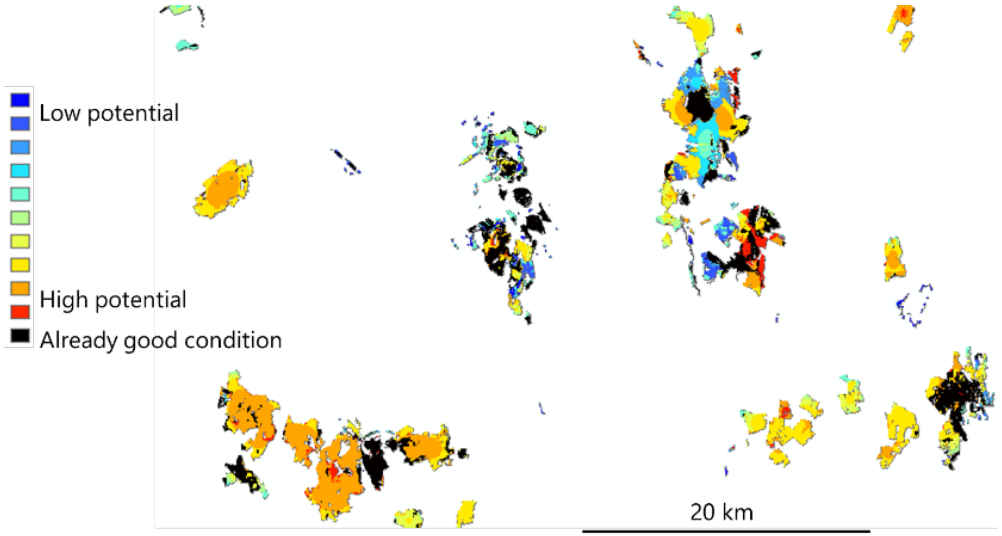
Total area included in the analysis = protected N2K areas in Finland

National scale restoration prioritization in Finland

Finnish restoration prioritization project
Resource allocation for how to most cost-efficiently reach the 15% restoration target

Spatial prioritization of N2000 network in Finland
for restoration and management:
Which areas to restore and manage to cost-effectively improve ecological representativeness of our PA network





Finnish restoration prioritization project

Resource allocation for how to most cost-efficiently reach the 15% restoration target

100 habitat experts

Working in ecosystem groups

Systematically defining:

- current state of ecosystems
- degraded ecosystem elements
- how to best reverse the degradation (cost-efficient methods) for each ecosystem type

Calculating resource allocation scenarios within ecosystem groups and across all ecosystems

Framework for assessing and reversing ecosystem degradation – Report of the Finnish restoration prioritization working group https://julkaisut.valtioneuvosto.fi/handle/10024/74862

Spatial prioritization of Natura 2000 areas for restoration and management potential

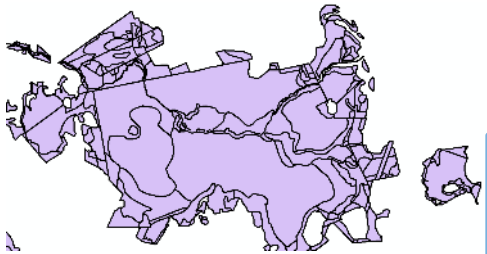
Main elements from databases and Finnish Restoration Prioritization -project

Current methods

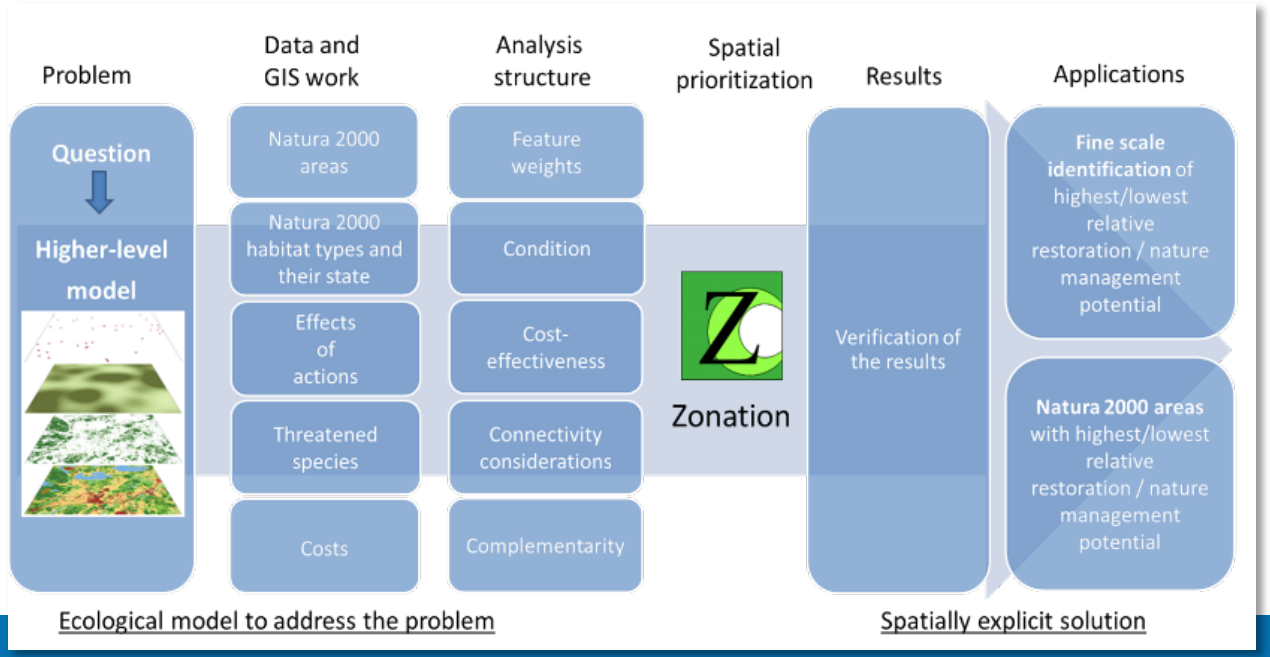
Effects of the methods

Costs of the methods

Fine scale geographic information for
67 N-habitat types + **threatened species**
+ current state for each habitat patch
from the **Parks & Wildlife habitat database**

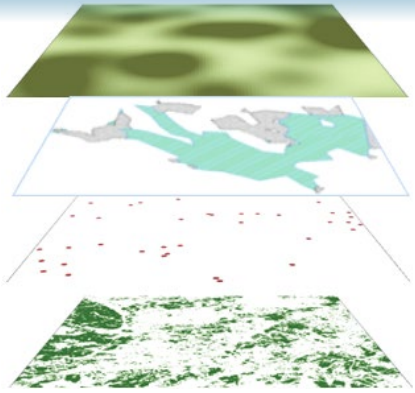


How good they will be
How much they are improved



https://www.syke.fi/en-US/Research__Development/Nature/Specialist_work/Zonation_in_Finland/Zonation_projects_and_research

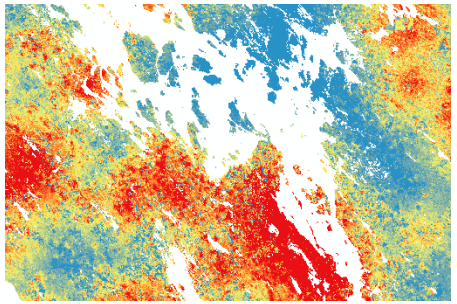
Zonation

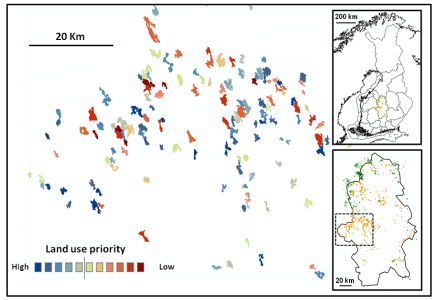


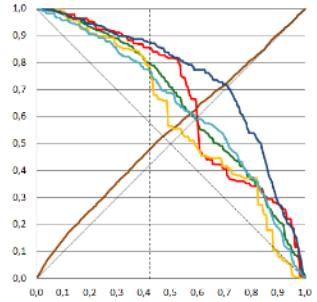
Ranks areas (pixels to any size planning units) according to their conservation value, based on:

- Aims to maximize ecological value of the solution (set of areas) considering simultaneously data for multiple habitats and species
- Complementarity (identifying what is missing or poorly represented)
- Connectivity, Condition, Cost-effectiveness

Produces data for trade-off evaluation (how the solution changes / area / costs)







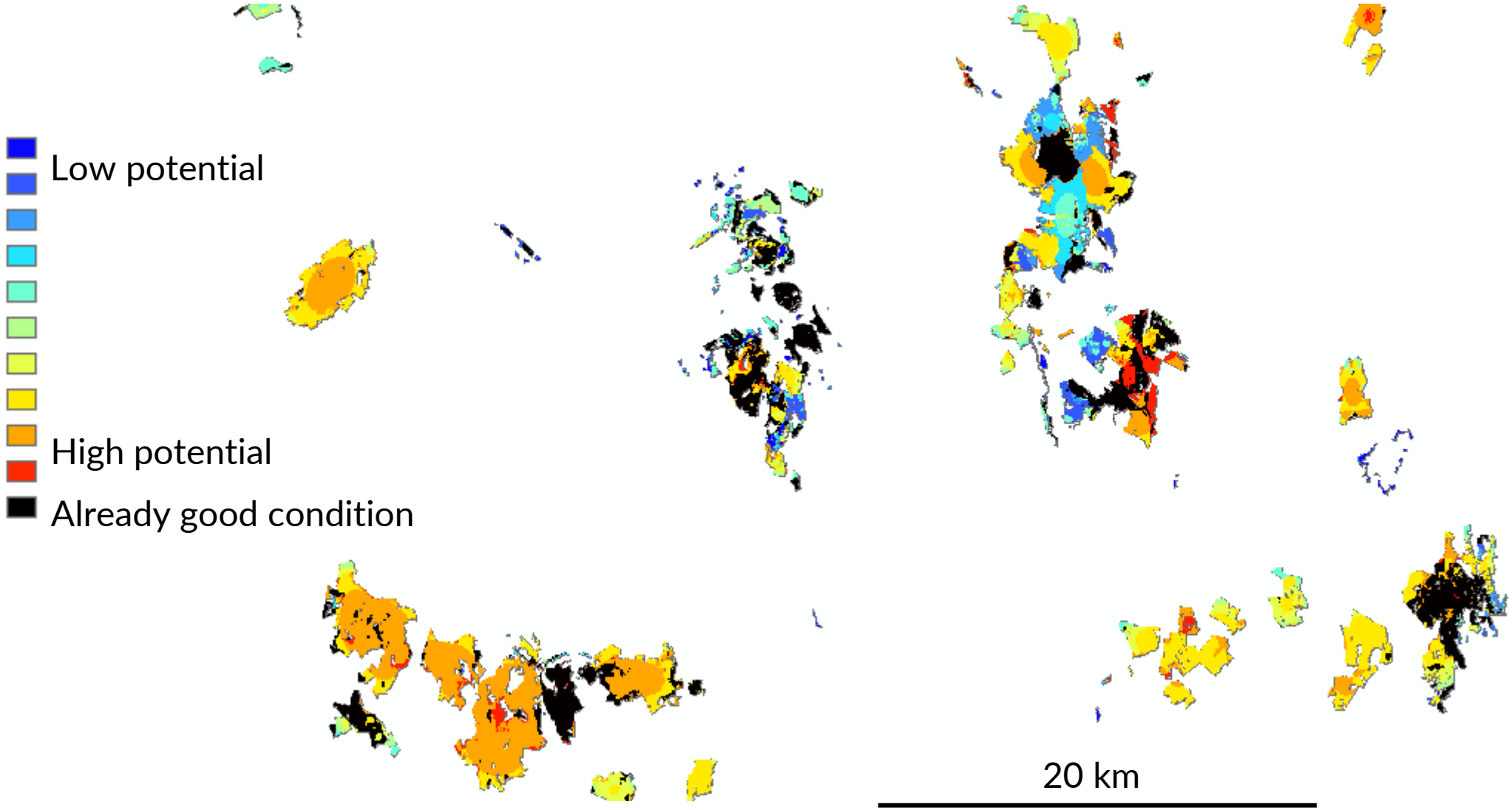
Kareksela et al. 2013 *Conservation Biology*

Comparison of trade-offs
Avoiding opportunism

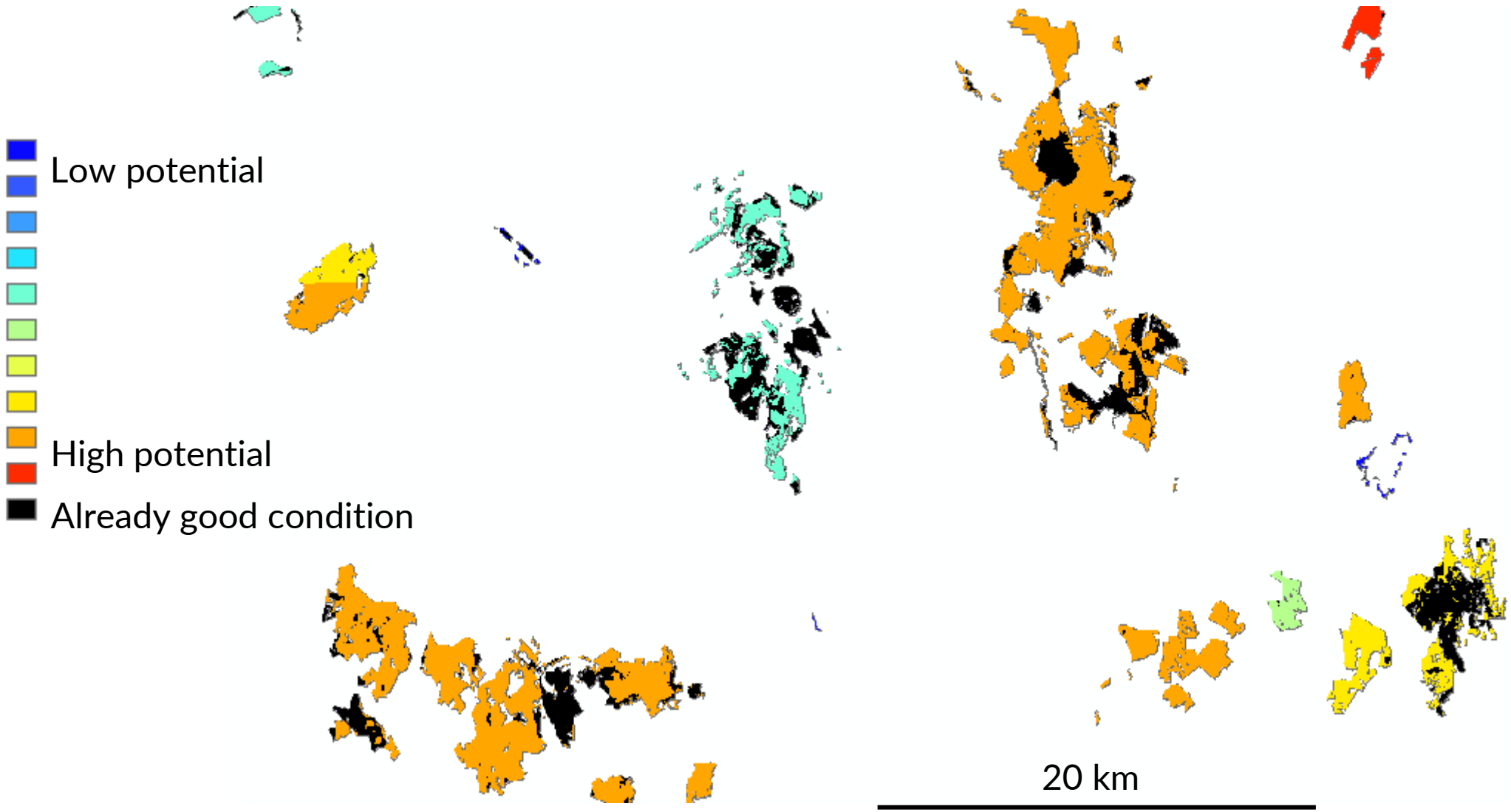
Finnish restoration prioritization project

- 15% target is beyond our (current) resources
- Fixing habitat group specific targets leads to cost-inefficient solution
  - Expensive (continuously managed) habitats consume most of the resources
- Relationship of cost-efficiency and cost-effectiveness still a bit unclear in this process!

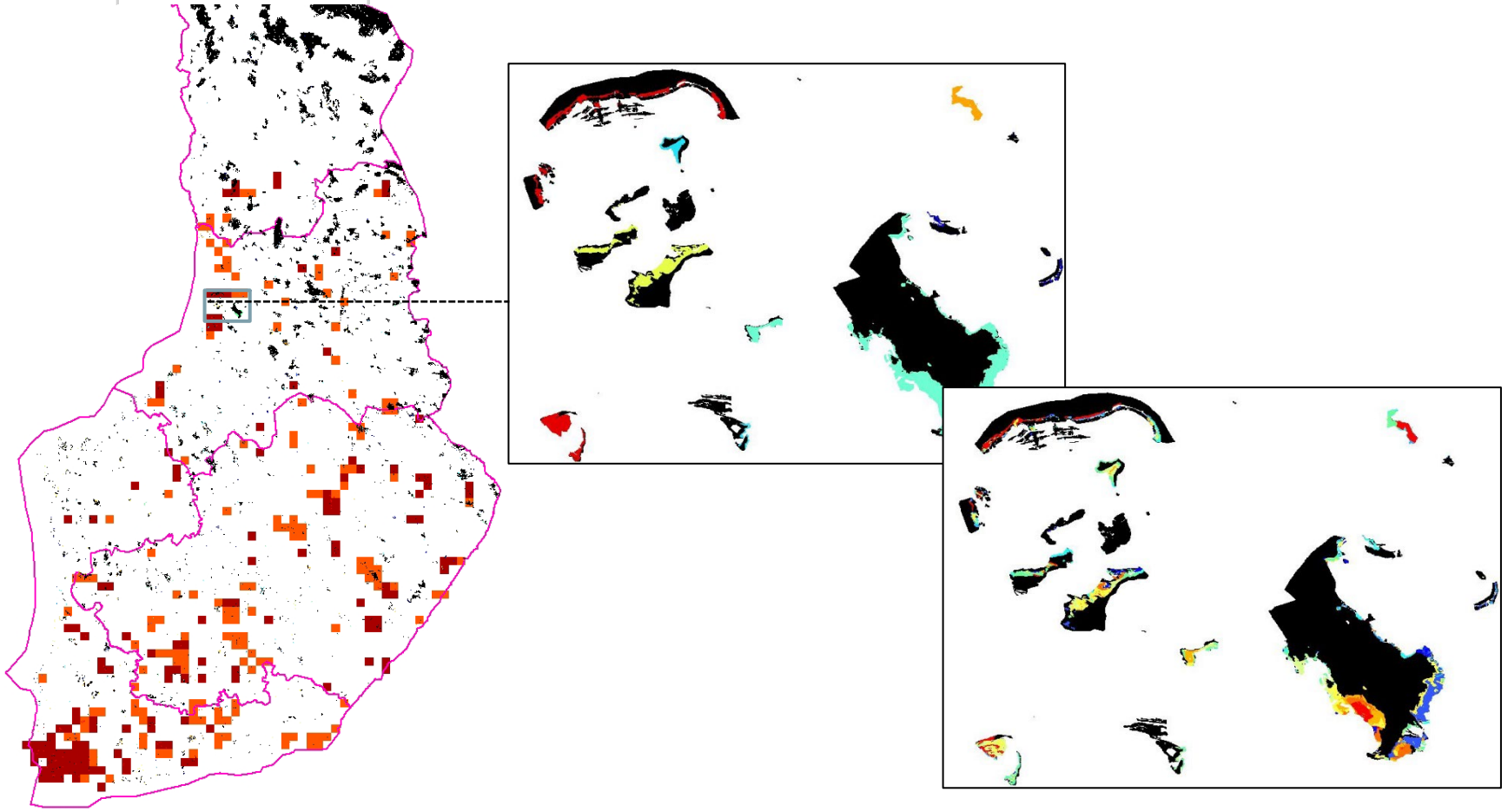
Spatial prioritization – showing more detailed priorities



Spatial prioritization – showing more detailed priorities and also priorities between N2K sites



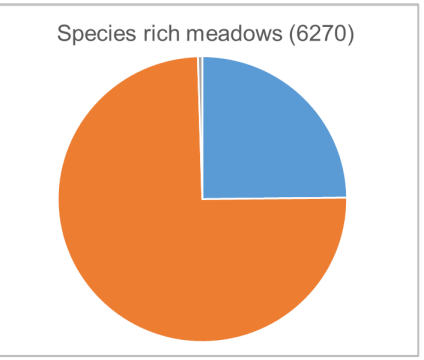
	Most cost effective 20%	Herb rich and broad leaved forests	Cultural biotopes	Bogs, mires, and fens	Coastal biotopes	Sun-lit esker forests
Region	Restored/managed hectares (ha)	Repeated management (ha)	Continuous management (ha)	Restored (ha)	Continuous management (ha)	Repeated management (ha)
Järvi-Suomi	7743,25	3449,75	838,25	3353,5	0	408,25
Pohjanmaa-Kainuu	3089,75	350,25	1825,25	686,25	840,75	24,75
Lappi	562,75	20,75	281,5	174,25	0	0
Rannikko	7818,25	2567	2797,25	1014,5	2138,5	556,5
SUM	**19214**	**6387,75**	**5742,25**	**5228,5**	**2979,25**	**989,5**

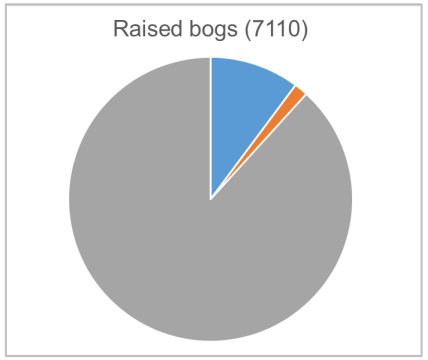


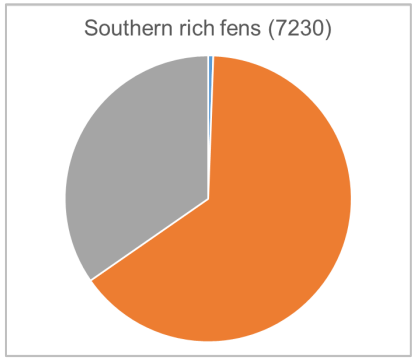
Good condition or not realistic

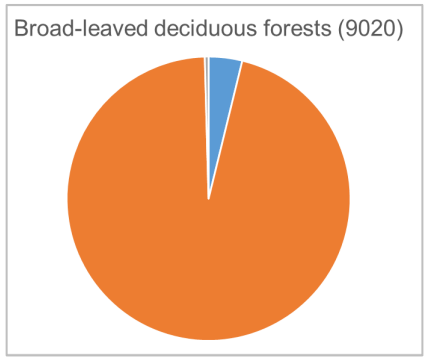
Potential and will be improved (best 20% solution)

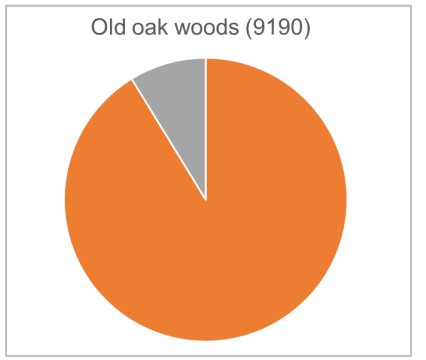
Potential but not treated if “only” best 20% is done

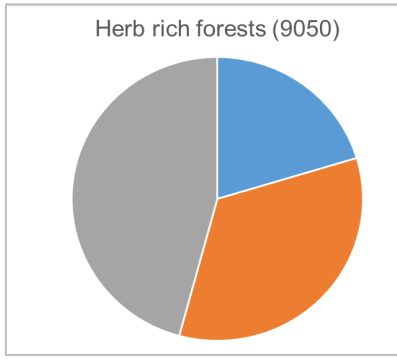






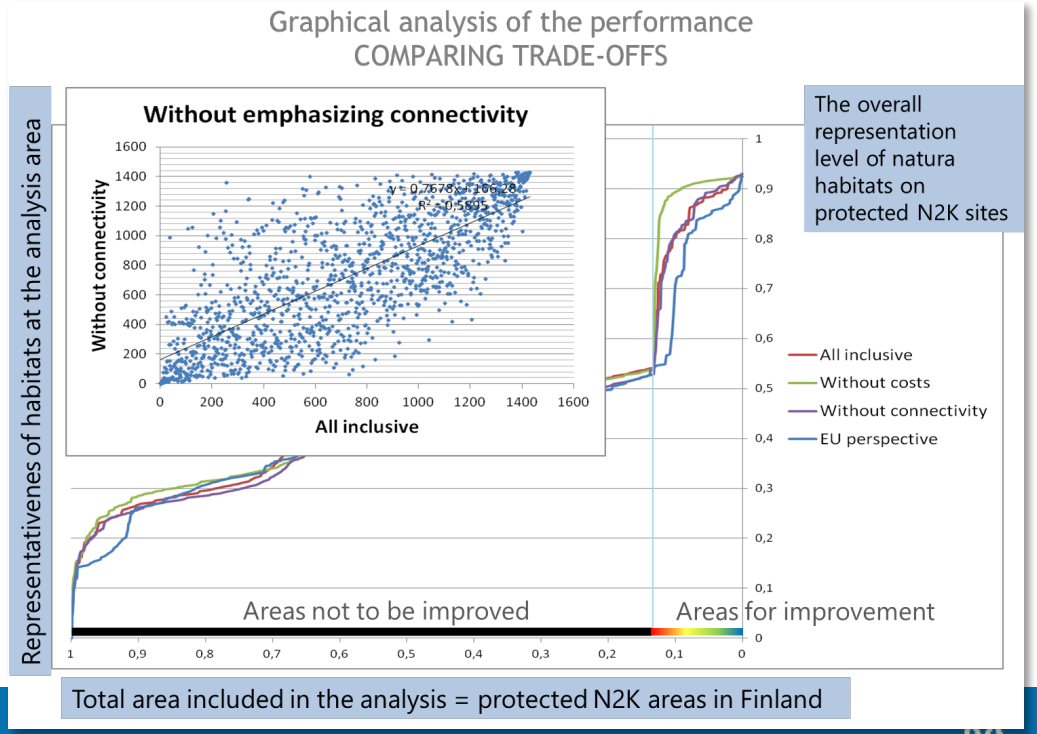


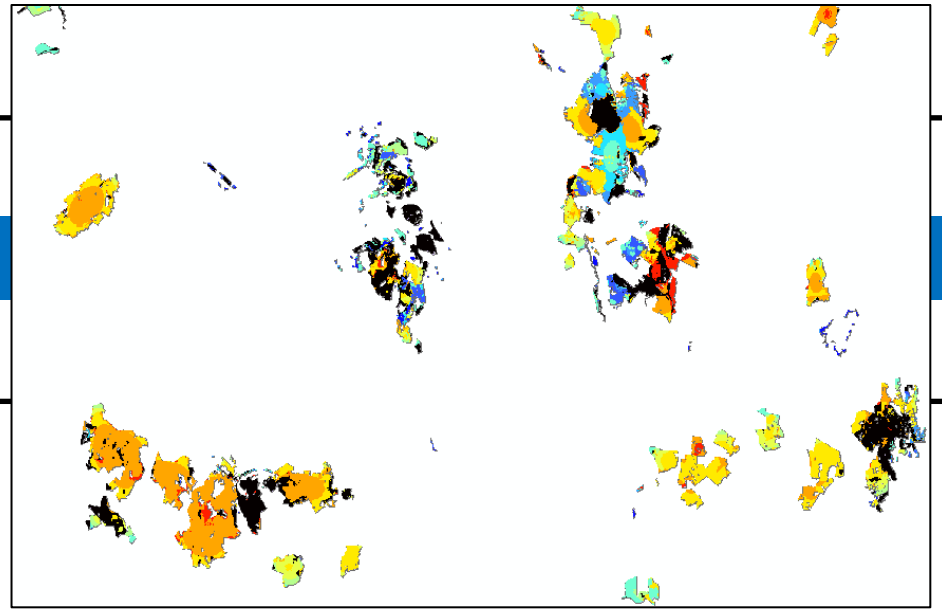


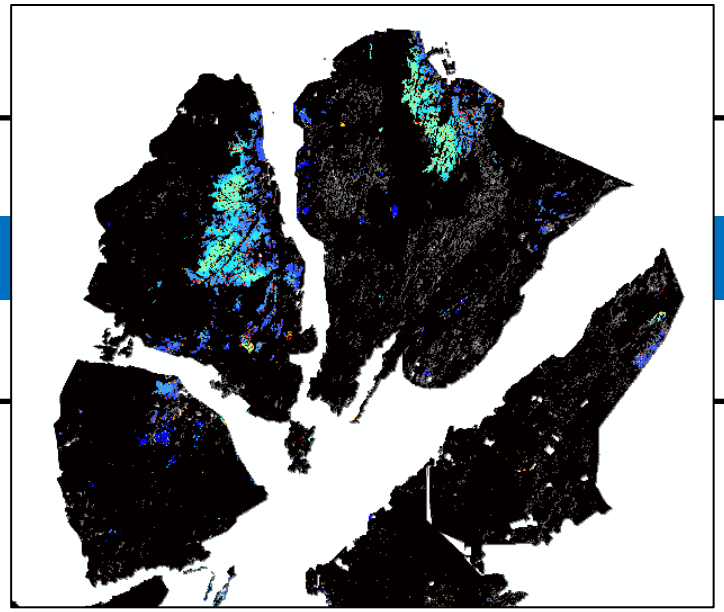


Comparing how habitat representations differ with different analysis perspectives

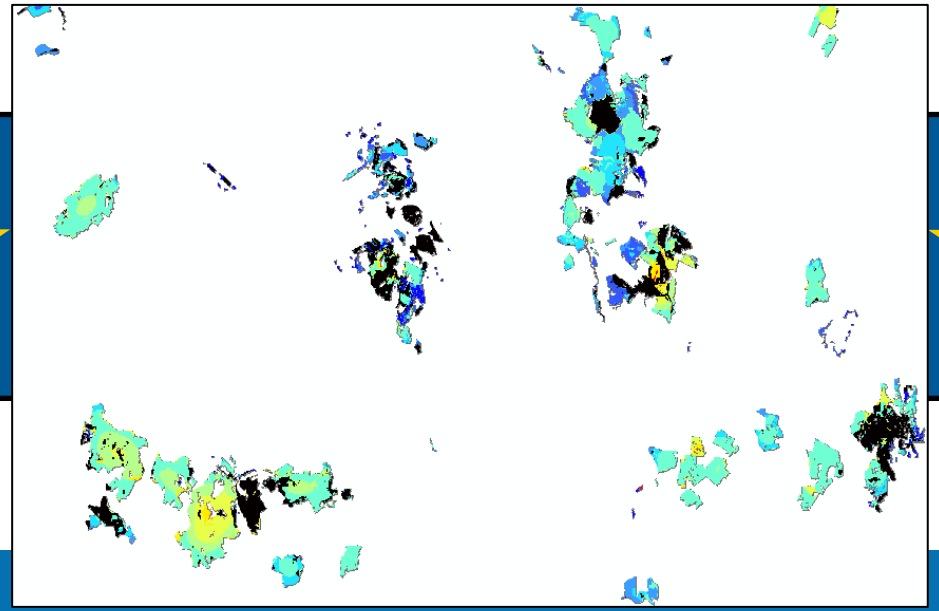
How the solution changes if we change: connectivity? costs? species? habitat rarity/representation in the boreal region or EU27?

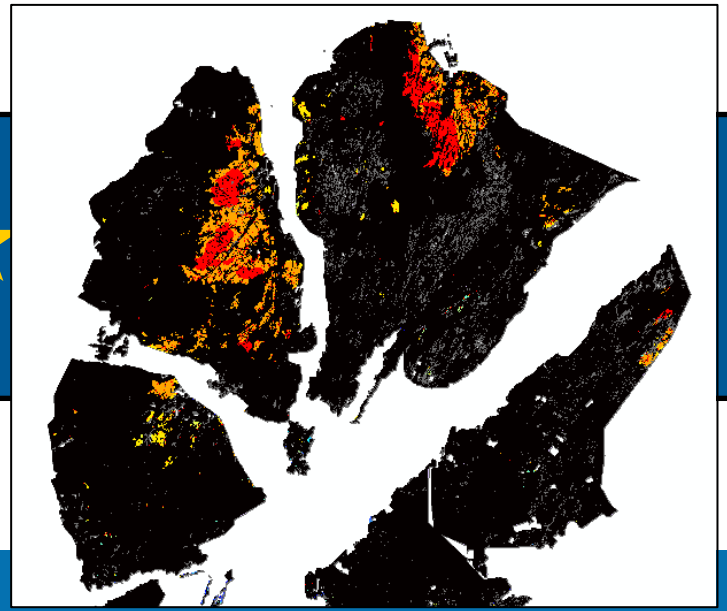






Priorities when using national scale abundances of habitats and when each habitat is weighed according to how big proportion of that habitat's EU27 area is in the analysis area (habitat weight: area in protected areas in Finland / area in EU27).





EU restoration law from the Finnish perspective

30% means 1,2 M ha

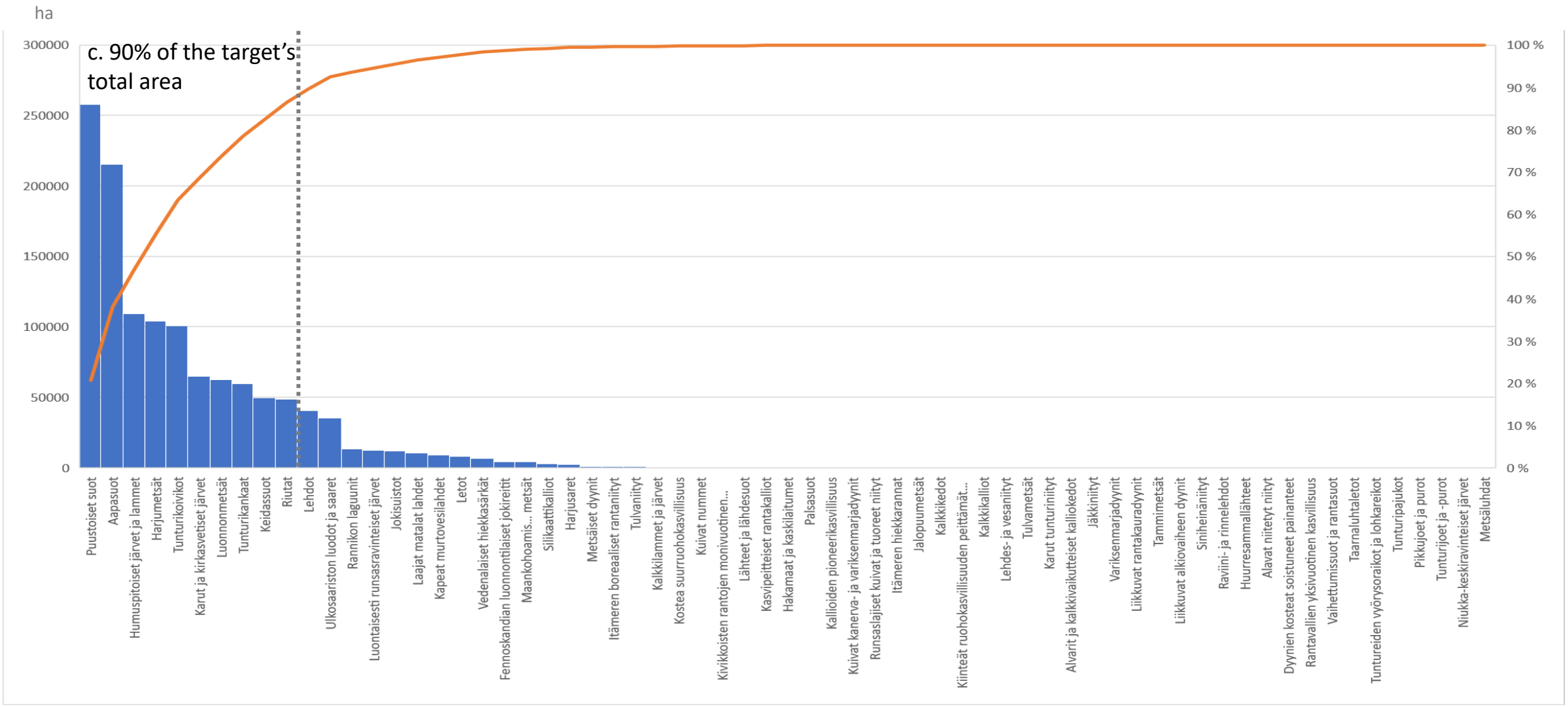
If 30% for all N-habitats the cost is c. 5 000 – 12 000 M€

Prioritization according to cost-effectiveness significantly reduces costs and increases effectiveness (e.g. maximizing relative increase to the area in good condition)

Flexibility should be allowed to allocate resources between habitats!

Possible benefits of co-prioritizing and allocation of habitat specific responsibilities between MS should be investigated!

30 % area of not good condition for each N-habitat in Finland – Largest habitats define the needs to meet the restoration target



10 habitats with most to restore compile c. 90% of the huge 30% target, 1,2M ha –
30 % target for the other 55 habitats can be reached with a more realistic target of 120 000 ha/ by 2030

Differences of models and solutions
-
Prioritizing according to cost-effectiveness makes a difference

30% restoration of degraded area **for all N-habitats** (with degraded area), **no priorities**

Habitat group	30 % Restoration area / ha	30 % Cost / Milj. €
Coastal habitats	141 000	2 500–10 000!
Freswater habitats	192 000	1000
Grasslands, heath & scrub	2 500	6
Bogs, mires & fens	532 000	500
Fells	160 000	160
Rocky habitats	3 200	5
Forests	212 000	600
Total	1 242 700	4 800–12 300

Prioritization according to cost-effectiveness: 43 habitats restored ->100 %, 14 habitats no restoration

(almost) Same total restoration area with 1/3 costs!!

3-times average increase to N-habitats!!
43 -> 100% and 14 -> 0% against
57 -> 30%)

Habitat group	Restoration area (ha) following habitat specific cost-effectiveness	Cost / Milj €
Coastal habitats	136 000 (141 000)	180 (2 500–10 000)
Freswater habitats	43 000 (192 000)	215 (1000)
Grasslands, heath & scrub	8300 (2500)	21 (6)
Bogs, mires & fens	194 000 (532 200)	192 (500)
Fells	335 000 (160 000)	335 (160)
Rocky habitats	600 (3200)	1,1 (5)
Forests	485 000 (212 000)	731 (600)
Total	1 202 000 (1 242 700)	1 770 (4 800–12 300)

How is this prioritization working (in addition to data problems..)?

National level priorities and cooperation enabling cost-effectiveness

Finnish restoration prioritization showing efficiency pitfalls

Spatial analysis providing a complementary solution at national scale by cost-effectively filling in biodiversity gaps (through restoration and management in this case)

Ensuring connectedness in the landscape

Effective allocation of resources to meet the mutually agreed targets

"Strict" implementation is still a challenge while *ad hoc* opportunities arise

Regional planning in Parks & Wildlife Finland

Priority Action Framework (PAF), national pledge for EU BD-strategy, EU restoration law

Even more holistic solutions?

Our ability to achieve larger scale effects like mitigating climate change or e.g. regional ESS consideration like flood control still needs more careful analyses..

Thank you!

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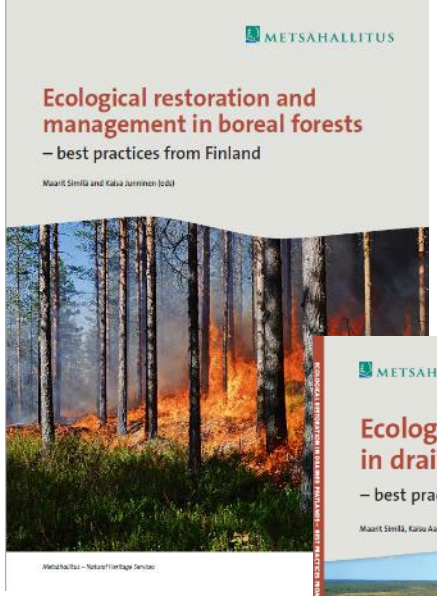
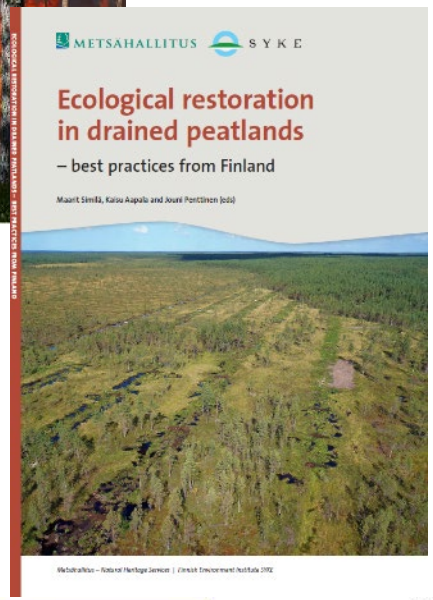
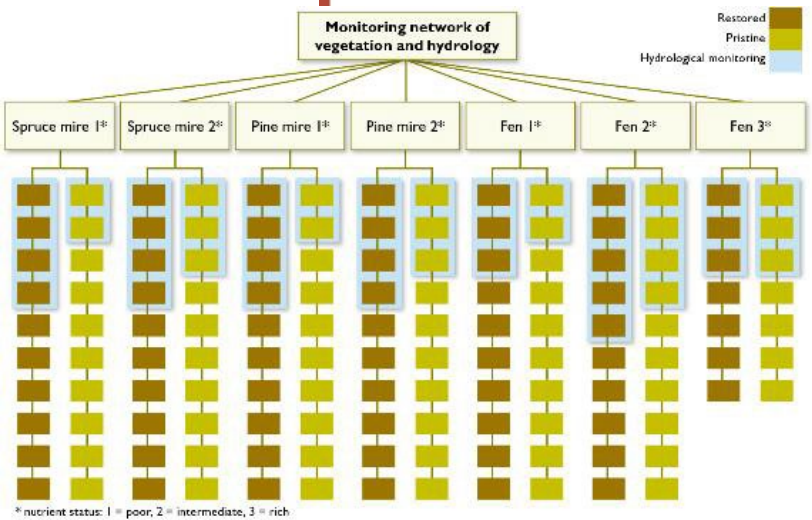
Zonation analysis:
https://www.syke.fi/en-US/Research__Development/Nature/Specialist_work/Zonation_in_Finland/Zonation_projects_and_research

Finnish Restoration Prioritization –project:
https://julkaisut.valtioneuvosto.fi/handle/10024/74862







The Finnish Board on Ecological restoration and management (FBER) – a key instrument for successful and long-term (since 2004) development of restoration in Finland

- **National cooperation body**: Steering group with three habitat expert groups (forests, peatlands, semi-natural grasslands)
- **Key national restoration experts** from main research and operative institutes and authorities, including MoE and MoAF, are involved
- **Adaptive management and the evaluation of the impacts** of restoration require both experimental scientific research and long-term monitoring on a scale of decades. FBER has actively produced and planned:
  - Handbooks for the ecological restoration of forests and drained peatlands
  - Monitoring guidebooks
  - A national network of long-term monitoring of restored peatlands and forests

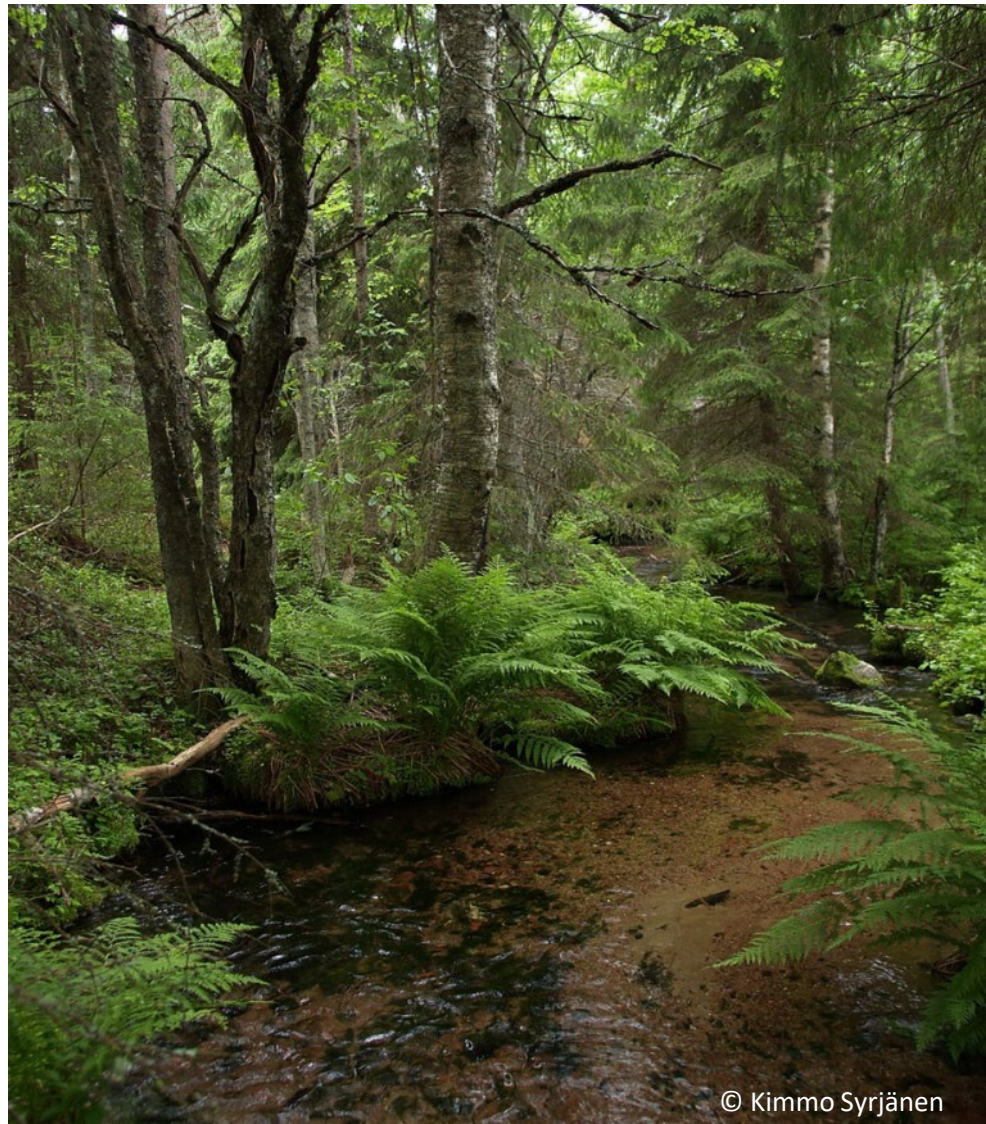
FBER's expertise is used in a broad range of research and development projects as well as policy processes concerning restoration, and it collaborates with large range of national and international stakeholders (including SERE and ReNO)

METSO - The Forest Biodiversity Programme for southern Finland 2008 –2025

A success story of nature conservation and management in Finland

https://metsonpolku.fi/en-US/News

- **Voluntary-based** conservation and management programme based on a government resolution
- **Engage all participants** - active collaboration between forest and environmental authorities (MoAF,MoE) and organizations, private forest owners, forest companies, NGOs and other stakeholders
- **Ambitious targets** - 96 000 ha permanently protected forests and 82 000 ha of fixed-term (10 years) environmental forestry subsidy agreements and nature management by 2025
  - So far appr. 5 000 ha nature management
  - Compensation for permanent protection is tax-free
- **Criteria** - voluntary-based programme but site selection according to jointly approved ecological criteria
- **Active communication** - scientific research + nature management and restoration development projects + regional partnerships → mainstreaming forest biodiversity, engaging all participants
- **Resources** - government funding, appr. 30 million euros per year



Helmi-programme, 2020 ->

National scale program for improving ecosystems and species in and outside protected areas

Connecting administration, experts, planners, land-owners…

Targets for 2020-2023:

- Protect 20 000 ha of mires
- Restore 12 000 ha of mires
- Restore and manage15 000 ha of seminatural grasslands
- Restore and manage 80 sites of SPA-bird wetlands
- Manage 600 wooded sites
- Restore 200 freshwater and coastal habitat sites

ALSO: Riekko-programme and SOTKA-programme

- Restoring and managing wetlands and mires and whole watersheds to improve declined bird and fish populations and sustain related ecosystem services