

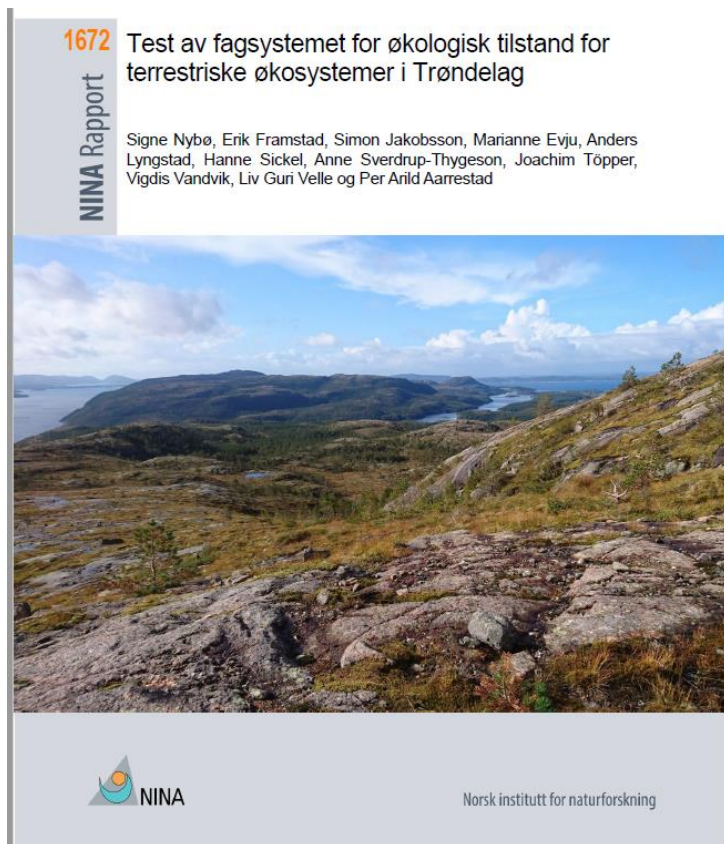
Testing the SEEA-EEA Ecosystem Condition framework

Breakout Group #8: Norway

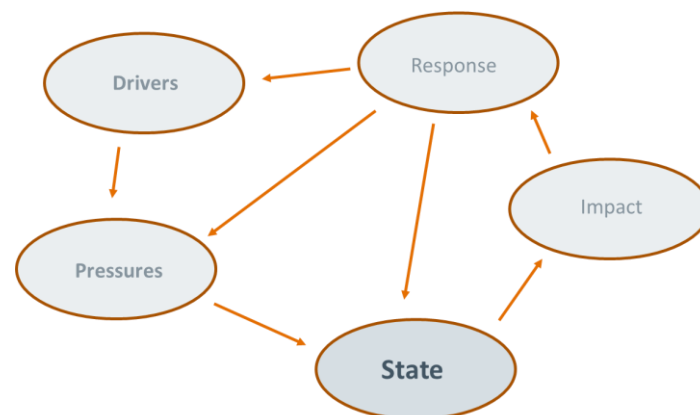
Moderators: Simon Jakobsson (Norwegian testing)
& Bálint Czucz

*Virtual Expert Forum on SEEA Experimental Ecosystem Accounting 2020
Session 1: Ecosystem extent and condition, 23-24 June 2020*

Background - Norwegian testing

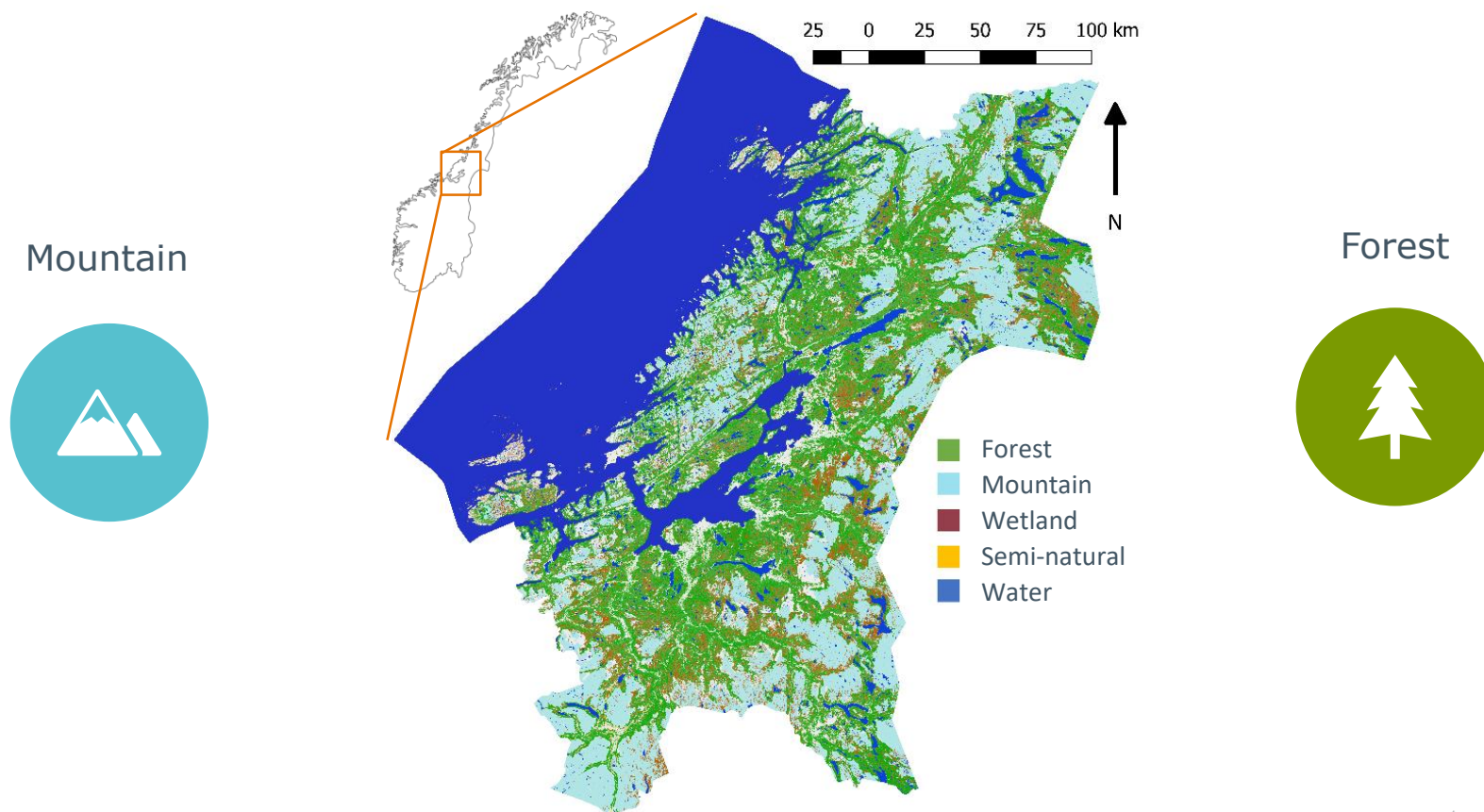


- Indicators based on already conducted pilot project (2018-2019)
- National scale implementation in 2020-2021
- Comparable indicator criteria



Nybø, S., Framstad, E., Jakobsson, S., Evju, M., Lyngstad, A., Sickel, H., Sverdrup-Thygeson, A., Töpper, J., Vandvik, V., Velle, L.G. & Aarrestad, P.A. 2019. Test of the system for assessing ecological condition for terrestrial ecosystems in Trøndelag. NINA Report 1672. Norwegian institute for Nature Research.

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Test of the system for assessing ecological condition for terrestrial ecosystems in Trøndelag. NINA Report 1672. Norwegian institute for Nature Research.

Stage 1: Reporting variables

Mountain



11 indicators

ECT groups	ECT classes
Abiotic ecosystem characteristics	1. Physical state characteristics (including soil structure, water availability)
	2. Chemical state characteristics (including soil nutrient levels, water quality, air pollutant concentrations)
Biotic ecosystem characteristics	3. Compositional state characteristics (including species-based indicators)
	4. Structural state characteristics (including vegetation, biomass, food chains)
	5. Functional state characteristics (including ecosystem processes, disturbance regimes)
Landscape level characteristics	6. Landscape and seascape characteristics (including landscape diversity, connectivity, fragmentation, embedded semi-natural elements in farmland)

Forest



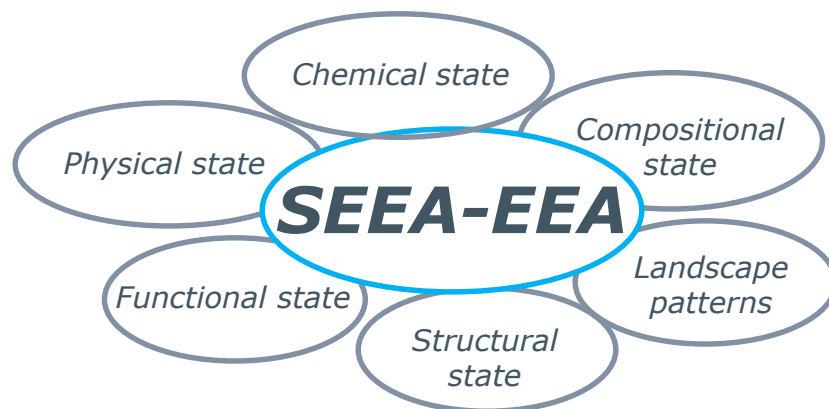
11 indicators

Stage 1: Reporting variables

Mountain



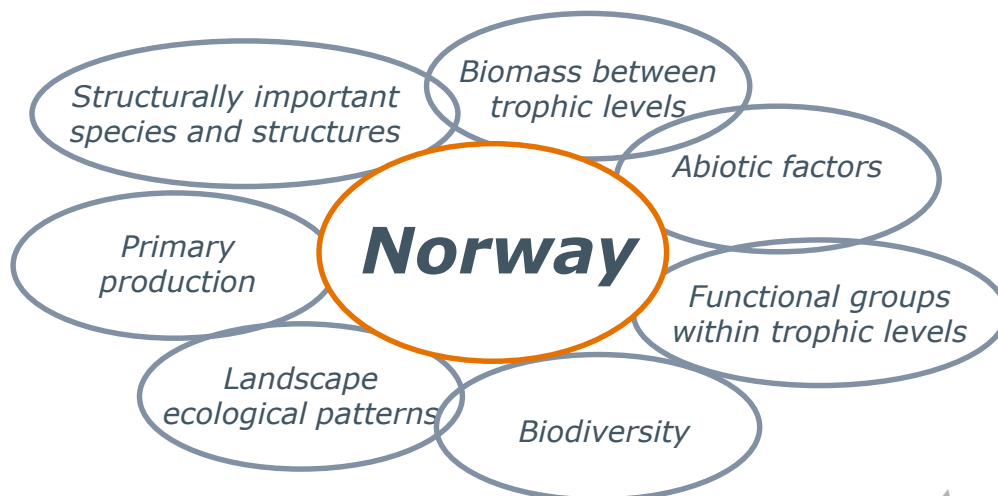
11 indicators



Forest



11 indicators



Stage 1: Reporting variables

STAGE 1

ECT Class	Descriptor	Unit	Variable value
			Year 1**
Ecosystem extent	<i>Extent</i>	<i>km²</i>	<i>16 600</i>
Physical state	-	-	-
Chemical state	Nitrogen deposition	kg N/ha/yr	3.74
	Indicator value of vegetation for nitrogen	Community index ¹	0.75
Compositional state	Predator populations	Individuals (Lynx eqv.)	162.25
	Deer populations****	Individuals (Moose eqv.)	82.86
	Deciduous tree species (cover; 3 species)	Volume m3/ha	3.04
	Bilberry coverage	% area coverage	8.59
	Area proportion without invasive species	% area coverage	99.98
Structural state	Dead wood total volume	Volume index ²	0.17
	Dead wood >30 cm volume	Volume index ²	0.15
Functional state	-	-	-
Landscape level characteristics	Area proportion old growth forest	% area coverage	20.57
	Area proportion >1 km from infrastructure	% area coverage	20.17



Stage 1: Reporting variables

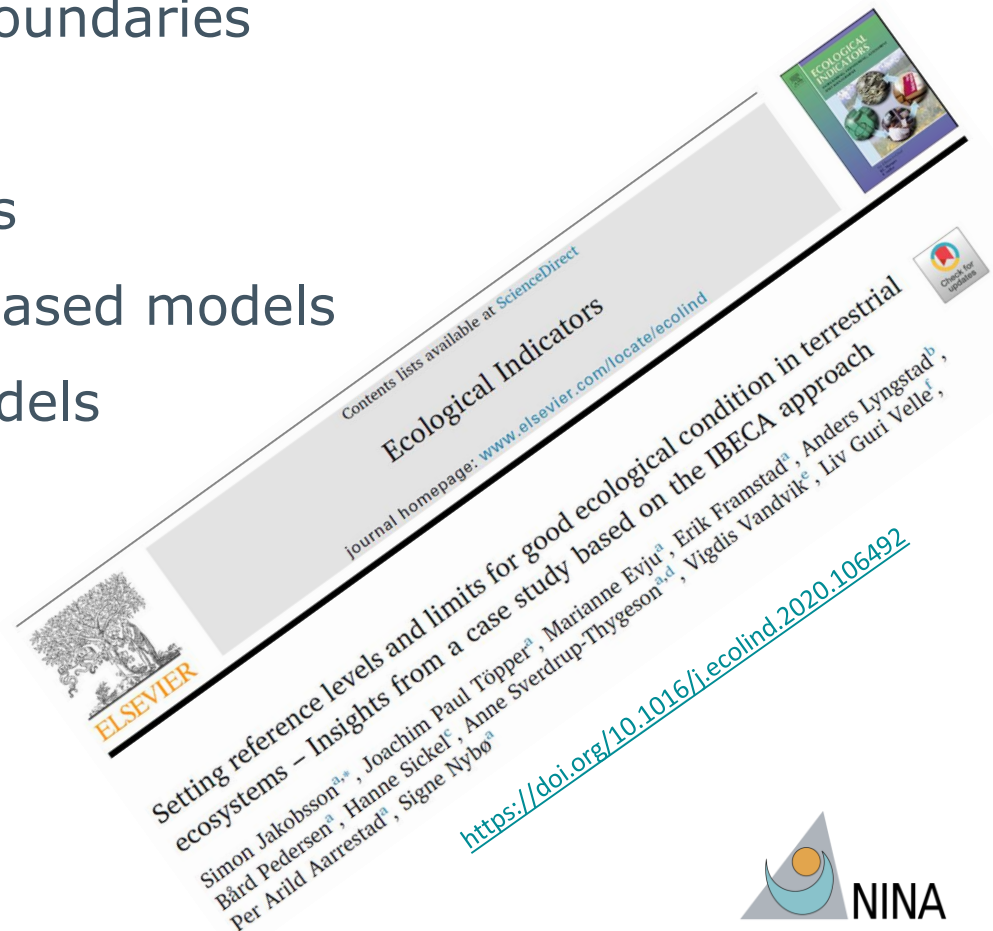
STAGE 1

ECT Class	Descriptor	Measurement unit	Variable values
			Year 1**
Ecosystem extent	<i>Extent</i>	<i>km²</i>	9 500
Physical state	-	-	-
Chemical state	Nitrogen deposition	kg N/ha/yr	2.75
	Indicator value of vegetation for light	Community index ¹	0.70
	Indicator value of vegetation for nitrogen	Community index ¹	0.74
	Indicator value of vegetation for pH	Community index ¹	0.55
Compositional state	Wild reindeer population	Individuals/km ²	0.59
	Willow ptarmigan population	Individuals	22.19
	Polar fox population	Individuals	77.25
	Wolverine population	Individuals	97.60
	Rodents populations	Population index ³	6.05
	Area proportion without invasive species	% area coverage	100.00
Structural state	-	-	-
Functional state	-	-	-
Landscape level characteristics	Area proportion >1 km from infrastructure	% area coverage	91.62



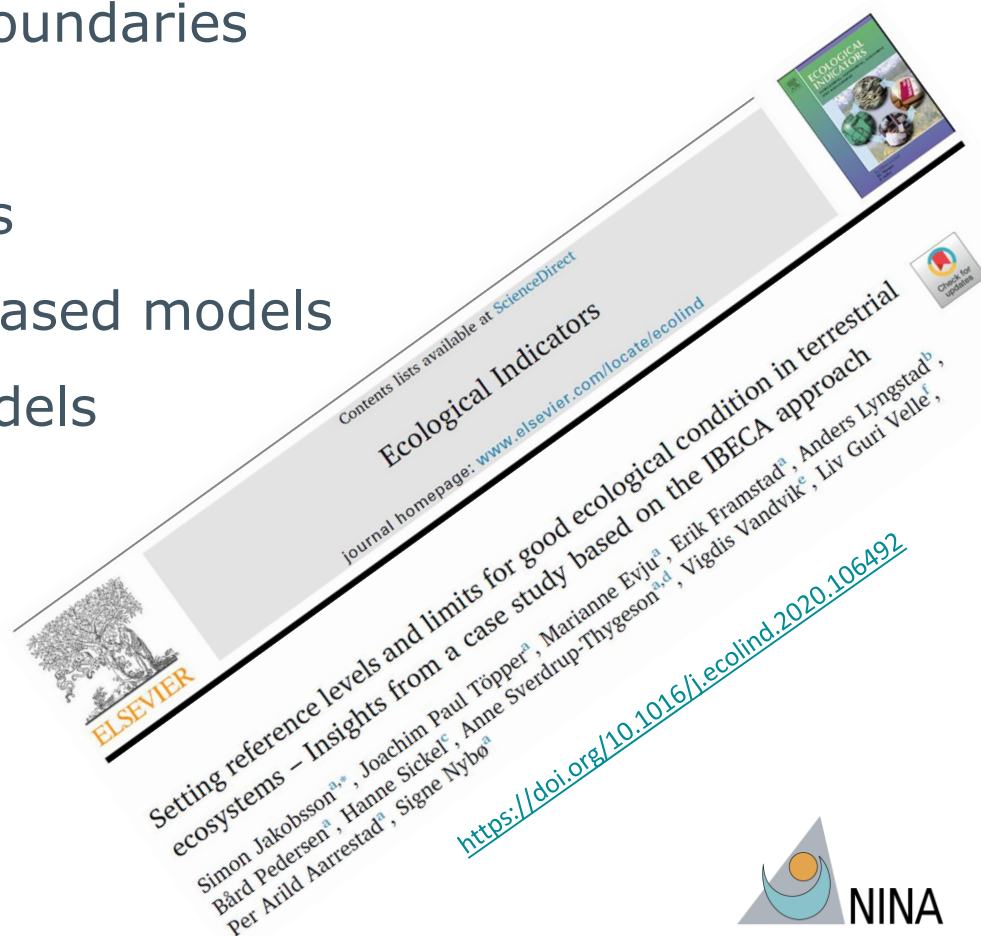
Stage 2: Reference levels

- Five main approaches to identify an 'intact nature' reference
 - ▶ Absolute biophysical boundaries
 - ▶ Reference areas
 - ▶ Reference communities
 - ▶ Ecosystem dynamics based models
 - ▶ Habitat availability models



Stage 2: Reference levels

- Five main approaches to identify an 'intact nature' reference
 - ▶ Absolute biophysical boundaries
 - ▶ Reference areas
 - ▶ Reference communities
 - ▶ Ecosystem dynamics based models
 - ▶ Habitat availability models
- Cf. Ch 5, Annex 5.5
 - ▶ ~~Target levels~~
 - ▶ ~~Baseline years~~



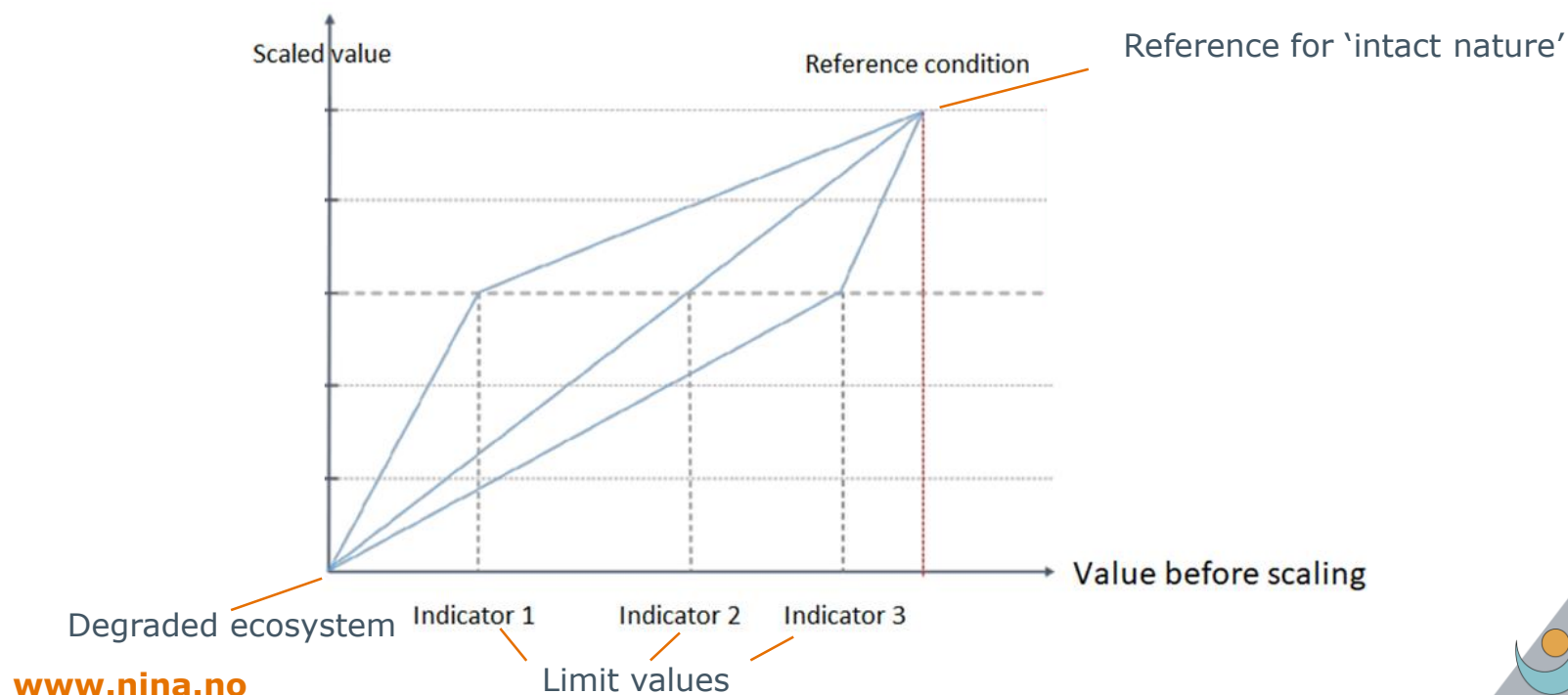
Stage 2: Reference levels

- Need for additional scaling parameter(s)?
 - ▶ Degraded ecosystem ('zero')
 - ▶ Limit value ('threshold')
 - ▶ Negative indicators*
 - ▶ Two-sided indicators*

** Out of scope for this presentation*

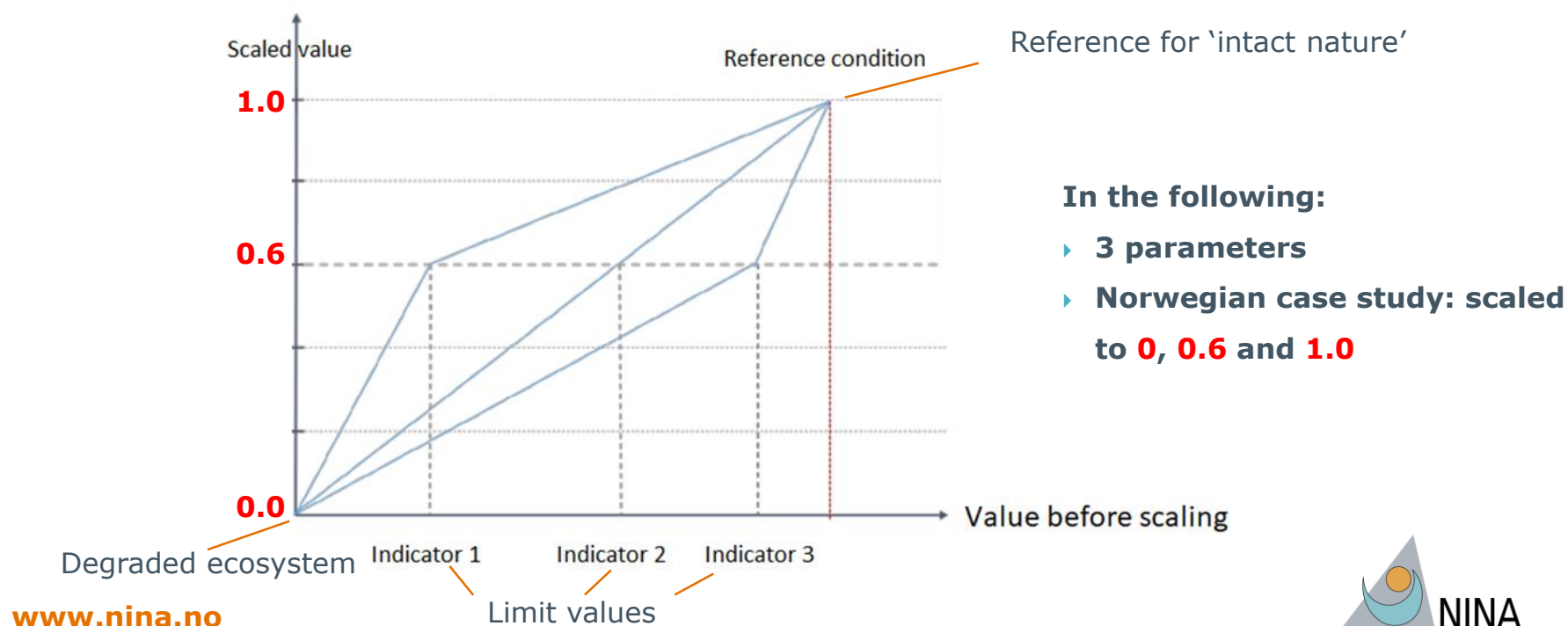
Stage 2: Reference levels

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Stage 2: Reference levels

- Need for additional scaling parameter(s)?
 - ▶ Degraded ecosystem ('zero')
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Stage 2: Reference levels

STAGE 1

STAGE 2

ECT Class	Descriptor	Unit	Variable value	Reference level values ⁵		
			Year 1**	Degraded (0.0)	Limit	Reference (1.0)
Ecosystem extent	<i>Extent</i>	km ²	16 600	-----	-----	-----
Physical state	-	-	-			
Chemical state	Nitrogen deposition	kg N/ha/yr	3.74	25.00	5.00	0.00
	Indicator value of vegetation for nitrogen	Community index ¹	0.75	0.00	0.60	1.00
Compositional state	Predator populations	Individuals (Lynx eqv.)	162.25	0.00	1802.10	3003.50
	Deer populations****	Individuals (Moose eqv.)	82.86	0/140	42/98	70.00
	Deciduous tree species (cover; 3 species)	Volume m3/ha	3.04	0.00	4.20	7.00
	Bilberry coverage	% area coverage	8.59	0.00	7.50	12.50
	Area proportion without invasive species	% area coverage	99.98	0.00	95.00	100.00
Structural state	Dead wood total volume	Volume index ²	0.17	0.00	0.60	1.00
	Dead wood >30 cm volume	Volume index ²	0.15	0.00	0.60	1.00
Functional state	-	-	-			
Landscape level characteristics	Area proportion old growth forest	% area coverage	20.57	0.00	36.00	60.00
	Area proportion >1 km from infrastructure	% area coverage	20.17	0.00	60.00	100.00



Stage 2: Reference levels

STAGE 1

STAGE 2

ECT Class	Descriptor	Unit	Variable value	Reference level values ⁵		
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0.6



Stage 2: Reference levels

STAGE 1

STAGE 2

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0.6



Stage 2: Reference levels

STAGE 1

STAGE 2

ECT Class	Descriptor	Measurement unit	Variable values	Reference level values ⁵		
			Year 1**	Degraded (0.0)	Limit	Reference (1.0)
Ecosystem extent	<i>Extent</i>	km ²	9 500	-----	-----	-----
Physical state	-	-	-			
Chemical state	Nitrogen deposition	kg N/ha/yr	2.75	25	5	0
	Indicator value of vegetation for light	Community index ¹	0.70	0.00	0.60	1
	Indicator value of vegetation for nitrogen	Community index ¹	0.74	0.00	0.60	1
	Indicator value of vegetation for pH	Community index ¹	0.55	0.00	0.60	1
Compositional state	Wild reindeer population	Individuals/km ²	0.59	0	0.93-0.96	1.16-1.20
	Willow ptarmigan population	Individuals	22.19	0	21.6	36
	Polar fox population	Individuals	77.25	0	96	160
	Wolverine population	Individuals	97.60	0	242.4	404
	Rodents populations	Population index ³	6.05	0	12	20
	Area proportion without invasive species	% area coverage	100.00	0	95	100
Structural state	-	-	-			
Functional state	-	-	-			
Landscape level characteristics	Area proportion >1 km from infrastructure	% area coverage	91.62	0	60	100



Stage 2: Reference levels

STAGE 1

STAGE 2

ECT Class	Descriptor	Measurement unit	Variable values	Reference level values ⁵		
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Ecosystem extent	<i>Extent</i>	km ²	9 500	-----	-----	-----
Physical state	-	-	-			
Chemical state	Nitrogen deposition	kg N/ha/yr	2.75	25	5	0
	Indicator value of vegetation for light	Community index ¹	0.70	0.00	0.60	1
	Indicator value of vegetation for nitrogen	Community index ¹	0.74	0.00	0.60	1
	Indicator value of vegetation for pH	Community index ¹	0.55	0.00	0.60	1
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Landscape level characteristics	Area proportion >1 km from infrastructure	% area coverage	91.62	0	60	100

0.6



Stage 2: Reference levels

STAGE 1

STAGE 2

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Ecosystem extent	<i>Extent</i>	km ²	9 500	-----	-----	-----
Physical state	-	-	-	-	-	-
Chemical state	Nitrogen deposition	kg N/ha/yr	2.75	25	5	0
	Indicator value of vegetation for light	Community index ⁴	0.70	0.00	0.60	1
	Indicator value of vegetation for nitrogen	Community index ¹	0.74	0.00	0.60	1
	Indicator value of vegetation for pH	Community index ¹	0.55	0.00	0.60	1
Compositional state	Wild reindeer population	Individuals/km2	0.59	0	0.93-0.96	1.16-1.20
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	Area proportion without invasive species	% area coverage	100.00	0	95	100
Structural state	-	-	-	-	-	-
Functional state	-	-	-	-	-	-
Landscape level characteristics	Area proportion >1 km from infrastructure	% area coverage	91.62	0	60	100

0.6

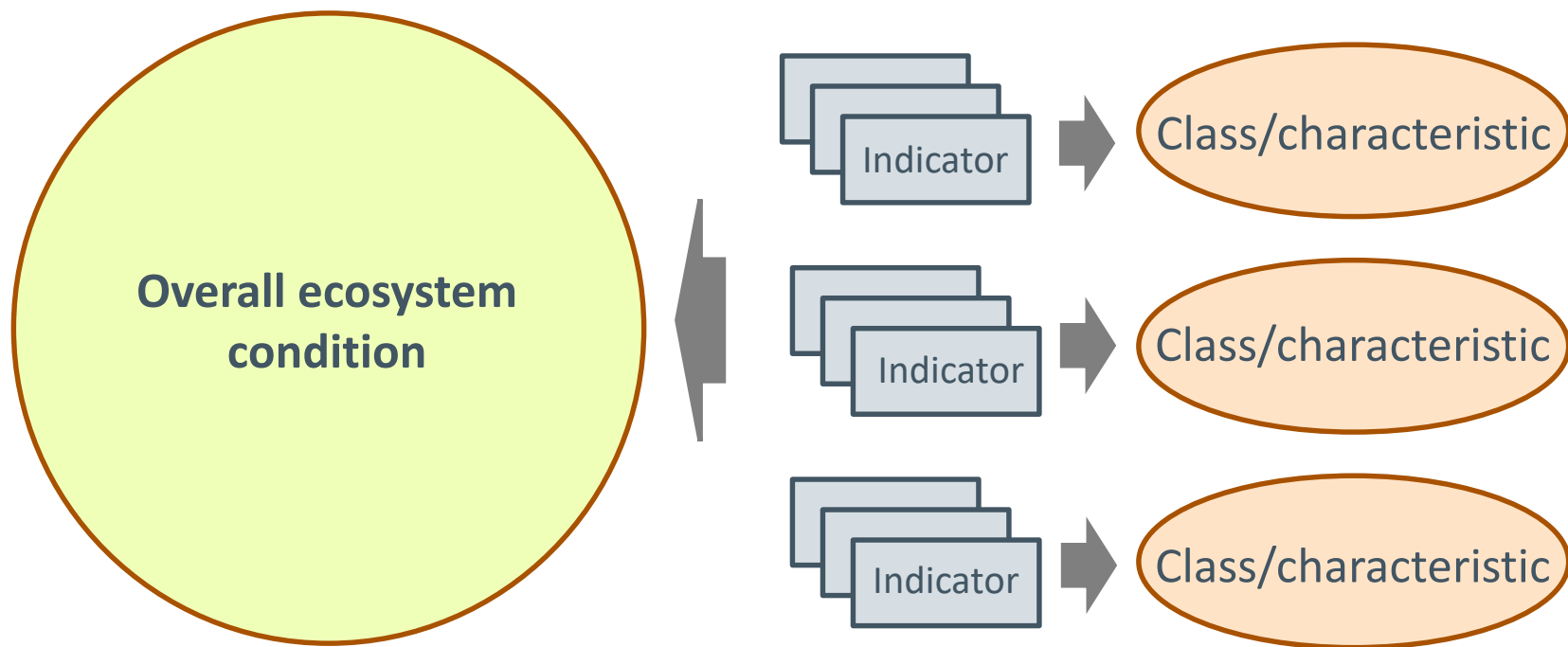


Stage 3: Aggregation

- Indicators => Classes/Characteristics => Overall

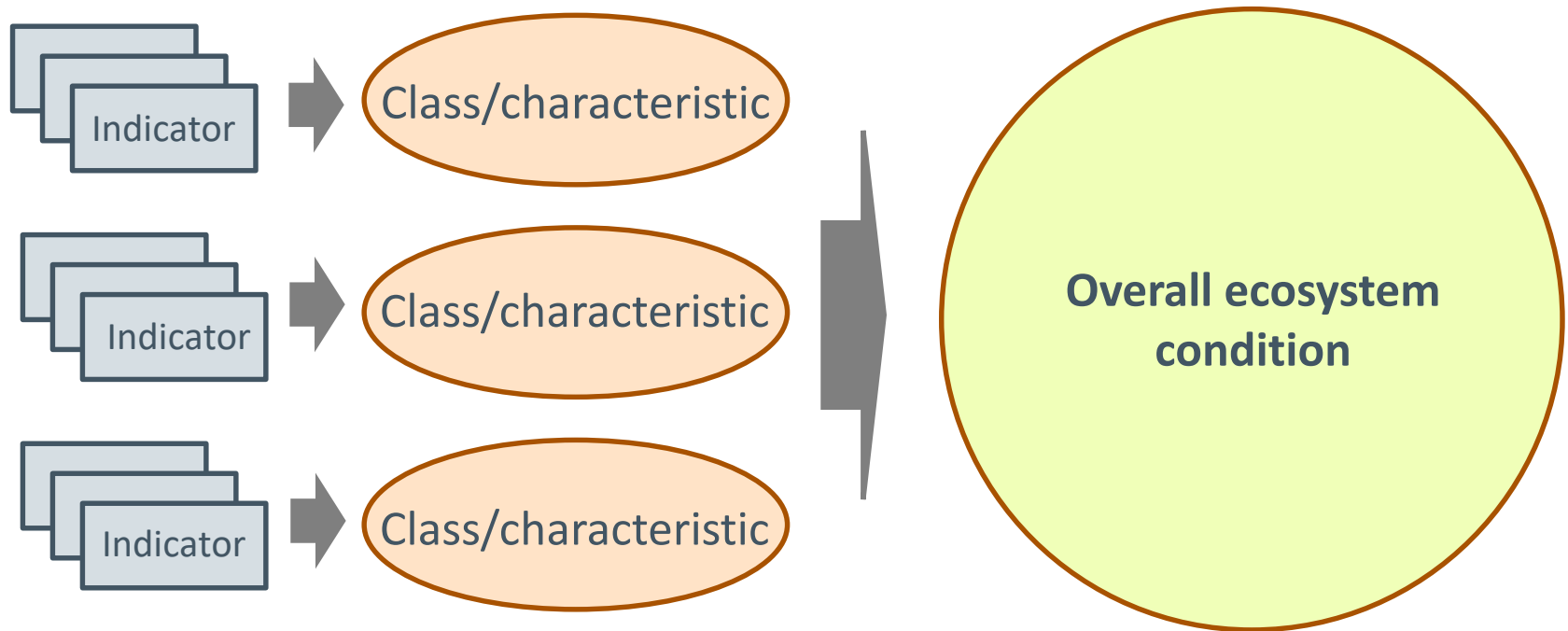
Stage 3: Aggregation

- Original Norwegian approach: flat aggregation



Stage 3: Aggregation

- Original Norwegian approach: flat aggregation
- SEEA-EEA guidance: hierarchical aggregation



Stage 3: Aggregation

STAGE 1

STAGE 2

STAGE 3

ECT Class	Descriptor	Unit	Variable value	Reference level values ⁵			Scaled	Aggregated
			Year 1**	Degraded (0.0)	Limit	Reference (1.0)	Year 1**	Year 1**
Ecosystem extent	<i>Extent</i>	km ²	16 600	-----	-----	-----	-----	-----
Physical state	-	-	-				-	-
Chemical state	Nitrogen deposition	kg N/ha/yr	3.74	25.00	5.00	0.00	0.70	0.73
	Indicator value of vegetation for nitrogen	Community index ¹	0.75	0.00	0.60	1.00	0.75	
Compositional state	Predator populations	Individuals (Lynx eqv.)	162.25	0.00	1802.10	3003.50	0.05	0.60
	Deer populations****	Individuals (Moose eqv.)	82.86	0/140	42/98	70.00	0.82	
	Deciduous tree species (cover; 3 species)	Volume m3/ha	3.04	0.00	4.20	7.00	0.43	
	Bilberry coverage	% area coverage	8.59	0.00	7.50	12.50	0.69	
	Area proportion without invasive species	% area coverage	99.98	0.00	95.00	100.00	1.00	
Structural state	Dead wood total volume	Volume index ²	0.17	0.00	0.60	1.00	0.17	0.16
	Dead wood >30 cm volume	Volume index ²	0.15	0.00	0.60	1.00	0.15	
Functional state	-	-	-				-	-
Landscape level characteristics	Area proportion old growth forest	% area coverage	20.57	0.00	36.00	60.00	0.34	0.27
	Area proportion >1 km from infrastructure	% area coverage	20.17	0.00	60.00	100.00	0.20	

*Weights = 1



Stage 3: Aggregation

STAGE 1

STAGE 2

STAGE 3

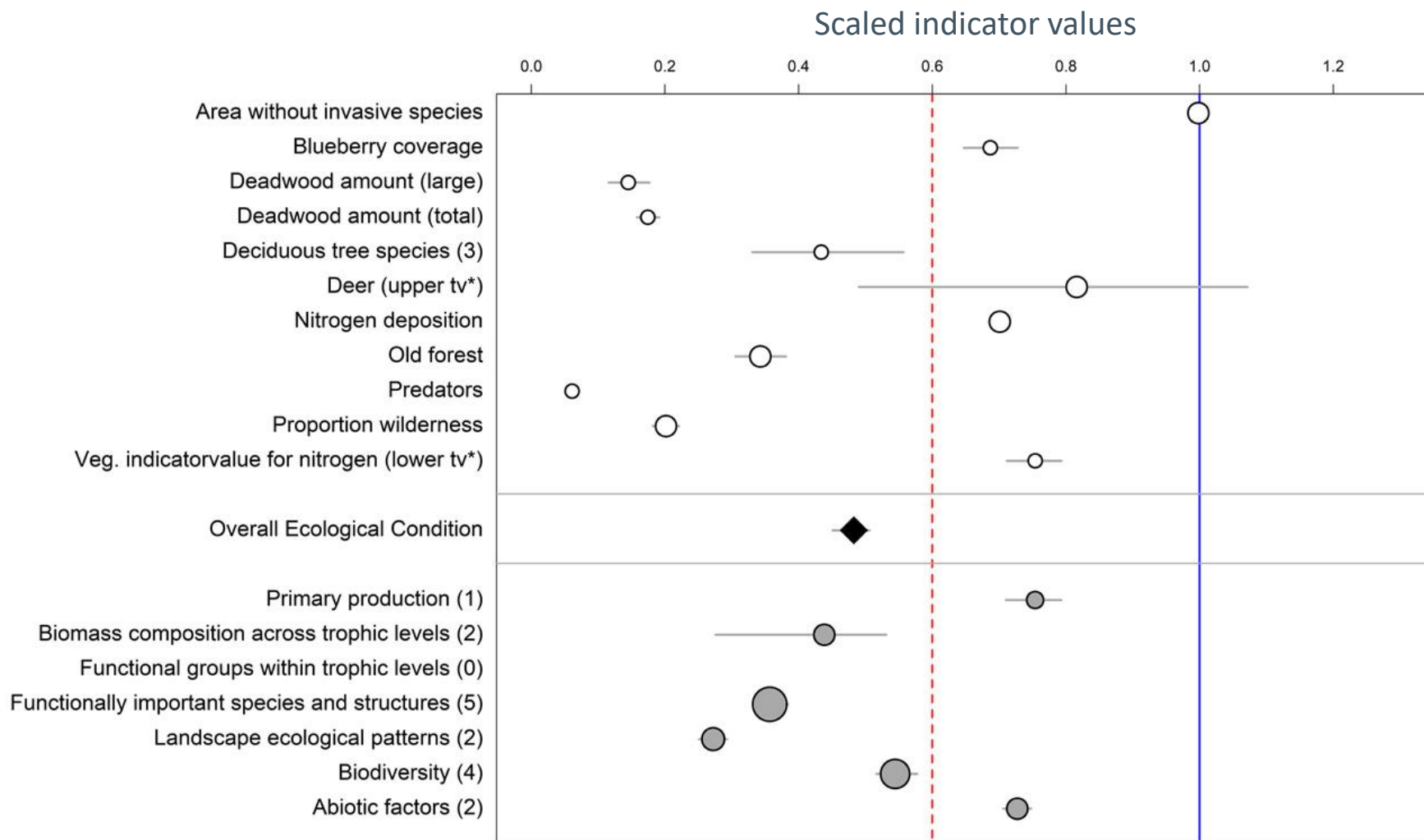
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			Year 1**	Degraded (0.0)	Limit	Reference (1.0)	Year 1**	Year 1**
Ecosystem extent	<i>Extent</i>	km ²	9 500	-----	-----	-----	-----	-----
Physical state	-	-	-				-	-
Chemical state	Nitrogen deposition	kg N/ha/yr	2.75	25	5	0	0.78	0.69
	Indicator value of vegetation for light	Community index ¹	0.70	0.00	0.60	1	0.70	
	Indicator value of vegetation for nitrogen	Community index ¹	0.74	0.00	0.60	1	0.74	
	Indicator value of vegetation for pH	Community index ¹	0.55	0.00	0.60	1	0.55	
Compositional state	Wild reindeer population	Individuals/km2	0.59	0	0.93-0.96	1.16-1.20	0.45	0.52
	Willow ptarmigan population	Individuals	22.19	0	21.6	36	0.62	
	Polar fox population	Individuals	77.25	0	96	160	0.48	
	Wolverine population	Individuals	97.60	0	242.4	404	0.24	
	Rodents populations	Population index ³	6.05	0	12	20	0.30	
	Area proportion without invasive species	% area coverage	100.00	0	95	100	1.00	
Structural state	-	-	-				-	-
Functional state	-	-	-				-	-
Landscape level characteristics	Area proportion >1 km from infrastructure	% area coverage	91.62	0	60	100	0.92	0.92

*Weights = 1



Stage 3: Incl. uncertainty?

Stage 3: Incl. uncertainty?



Nybø, S., Framstad, E., Jakobsson, S., Evju, M., Lyngstad, A., Sickel, H., Sverdrup-Thygeson, A., Töpper, J., Vandvik, V., Velle, L.G. & Aarrestad, P.A. 2019. Test of the system for assessing ecological condition for terrestrial ecosystems in Trøndelag. NINA Report 1672. Norwegian institute for Nature Research.

Identified issues/challenges

- Reference levels, several steps => scaling:
 - ▶ '0 --- threshold --- 1'
- Flat vs. hierarchical aggregation?
- Lack of uncertainty estimation guidance
- Incomplete indicator coverage
- Most countries rely on existing monitoring, how to achieve a common framework?

Cooperation and expertise for a sustainable future



Photo: A. Staverlakk

Points for discussion

- Questions & comments to Simon on the **Norwegian approach**
- How do you think the current guidance in Ch5 can be improved?
 - ▶ What kinds of **indicators** would be useful? For example, a minimum list of indicators or a typology for indicators or something else?
 - ▶ What kind of guidance will help countries choose appropriate **reference conditions**?
 - ▶ What are your views on the **aggregation** methods?