Marine Ecosystem Accounting in Finland: from theory to practise

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Finnish Environment Institute SYKE

MAIA Marine Accounting Webinar

19.5.2021

A spatial approach to EA

Extent of key species and habitats

Condition of the environment

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Our challenge: the mosaic archipelago

Archipelago Sea

Kvarken

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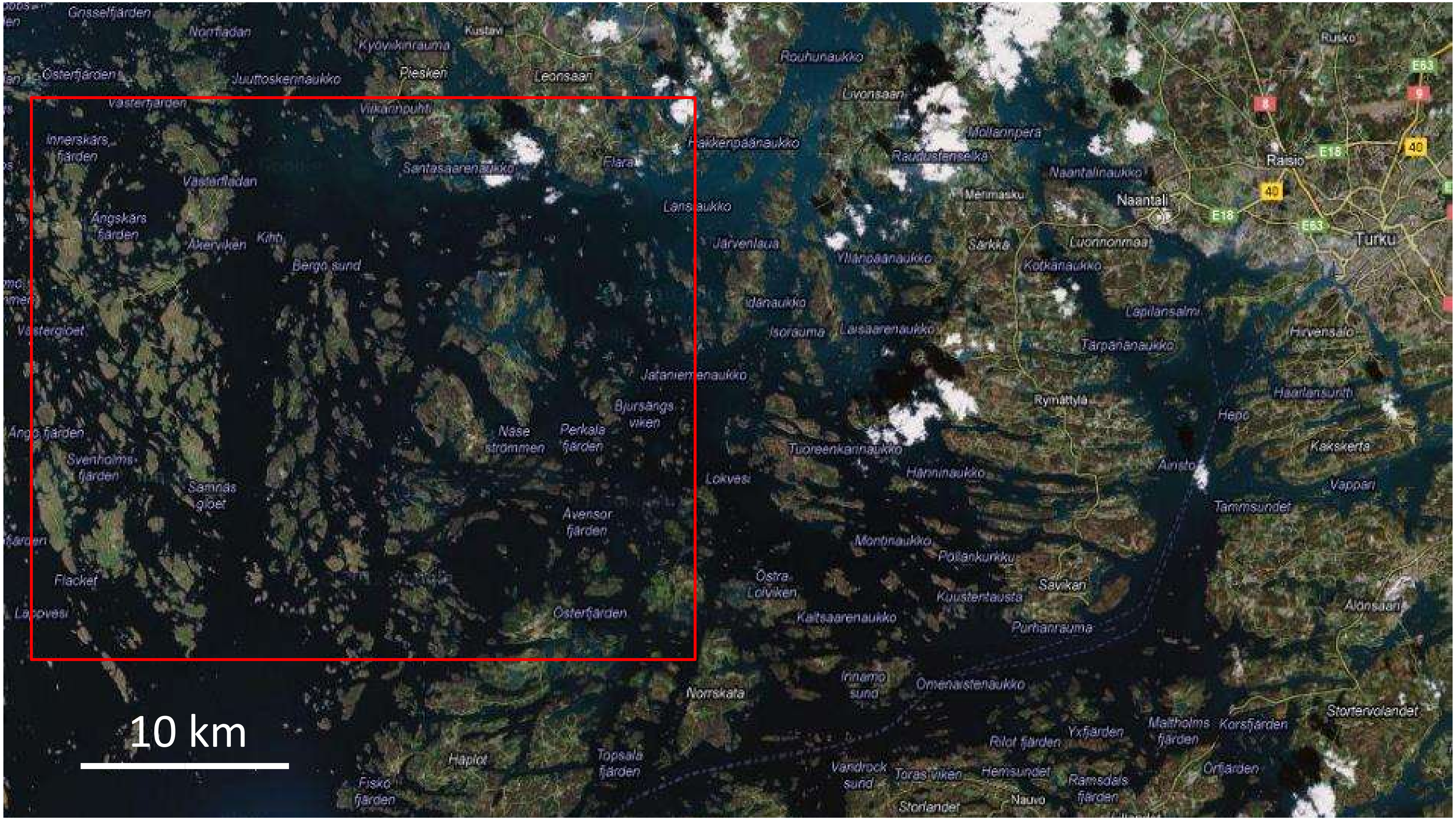
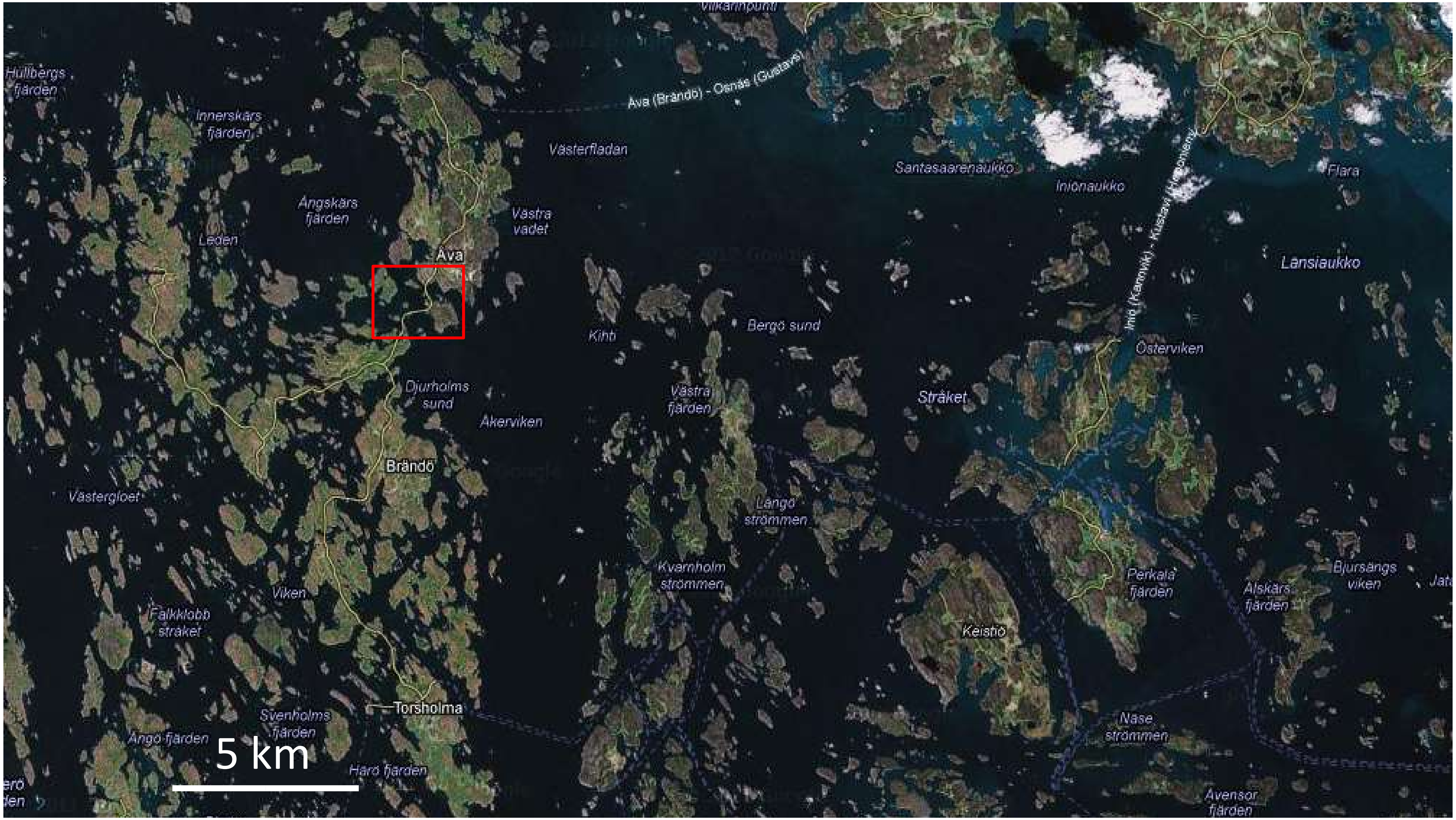
Føroyar
Faroe
Islands
Norge
Norway
Sverige
Sweden
Suomi
Finland
Eesti
Estonia
Baltic Sea
Latvija
Latvia
North Sea
United
Kingdom
Danmark
Denmark
Lietuva
Lithuania
Беларусь
Belarus
Polska
Poland
Nederland
Netherlands
België
Belgique
Belgium
Deutschland
Germany


Archipelago Sea
Gulf of Finland


Taivassalo
Kustavi
Lieto
Turku
Åbo
Naantali
Kaarina
Rymättylä
Pargas
Parainen
Saltvik
Mariehamn
80 km
Skärgårdshavets
nationalpark
Saaristomeren

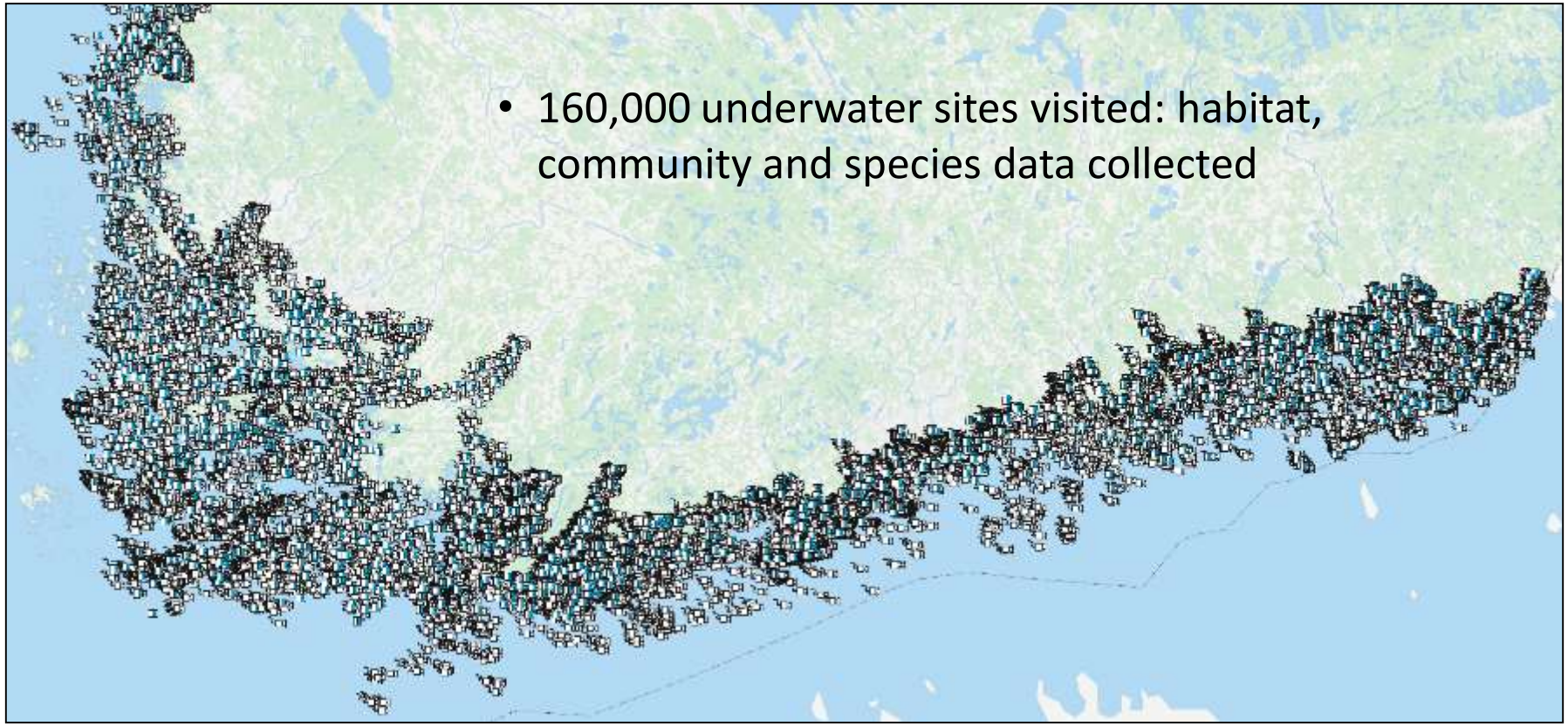

Grisselfjärden
Norrfladan
Kustavi
Kyövikinrauma
Österfjärden
Juuttoskerinaukko
Pleskeri
Leonsaari
Rouhunaukko
Livonsaari
Rusko
Västerfjärden
Viikarinpuhti
Innerskärs fjärden
Santasaarenaukko
Raisio
Naantali
Turku
Västerfladan
Ängskärs fjärden
Åkerviken
Bergo sund
Västergloet
Ängo fjärden
Svenholms fjärden
Samnäs gloet
Näse strömmen
Perkala fjärden
Bjursängs viken
Aversor fjärden
Flacket
Österfjärden
Lokvesi
Rymättylä
Hirvensalo
Kakskerta
Airisto
Tammsundet
Norrskata
Houtskär?
Haplot
Topsala fjärden
Nauvo
Storlandet
Korsfjärden
Stortervolandet
Orfjärden
10 km



Hullbergs fjärden
Innerskärs fjärden
Ava (Brändö) - Osnäs (Gustavs)
Västerfladan
Santasaarenaukko
Iniönaukko
Flara
Ängskärs fjärden
Leden
Västra vadet
Ava
Länsiaukko
Kihti
Bergö sund
Österviken
Djurholms sund
Åkerviken
Västra fjärden
Stråket
Brändö
Västergloet
Långö strömmen
Kvarnholm strömmen
Perkala fjärden
Alskärs fjärden
Bjursängs viken
Viken
Falkklobb stråket
Keistiö
Torsholma
Svenholms fjärden
Ängö fjärden
5 km
Hårö fjärden
Näse strömmen
Avensor fjärden


Åvavägen, Ålands skärgård, Ahvenanmaa
Osoite on summittainen
Åvavägen

Solution: a lot of observations on species and habitats!



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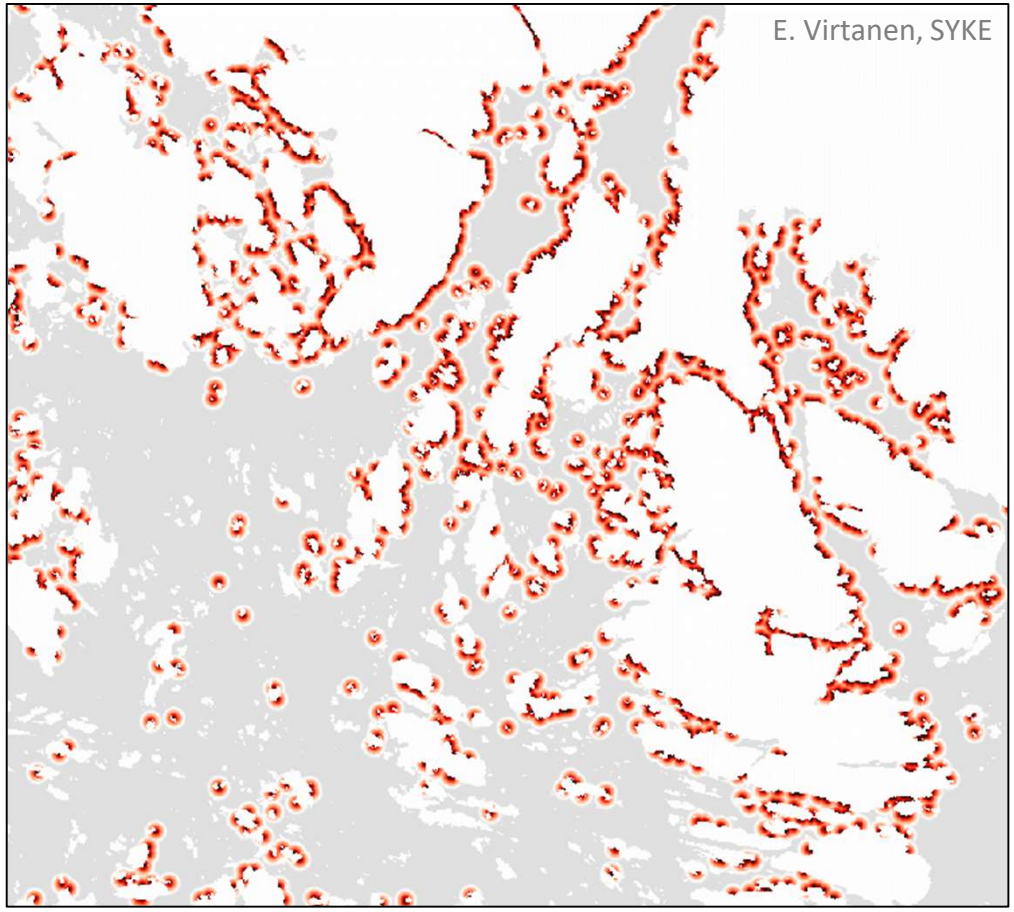
A lot of data on human activities

115,000 sites identified where anthropogenic pressures take place



Intensity of small dredgings in SW Finland – identified from aerial images across the Finnish coast.

Courtesy: Parks & Wildlife Finland

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A spatial approach to Marine Accounting

1) Define extent of the ecosystem (*i.e.* habitats/species producing ES)

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A spatial approach to Marine Accounting

1) Define extent of the ecosystem (*i.e.* habitats/species producing ES)
2) Determine condition of the ecosystem (*i.e.* habitats/species)
3) From 1) and 2), assess capacity of habitats/species to supply benefits for humans

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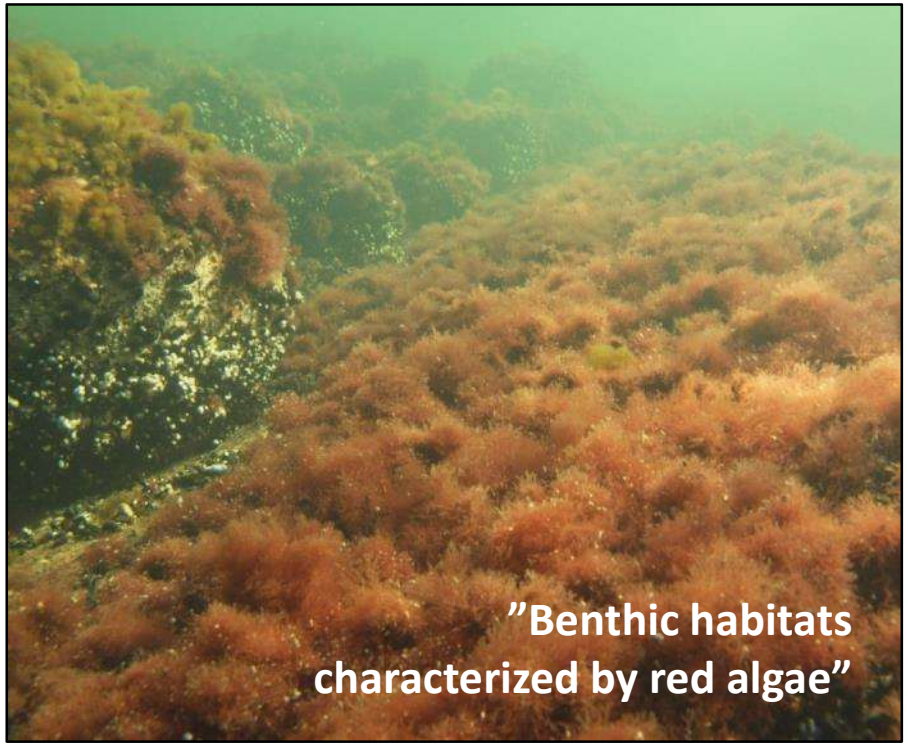
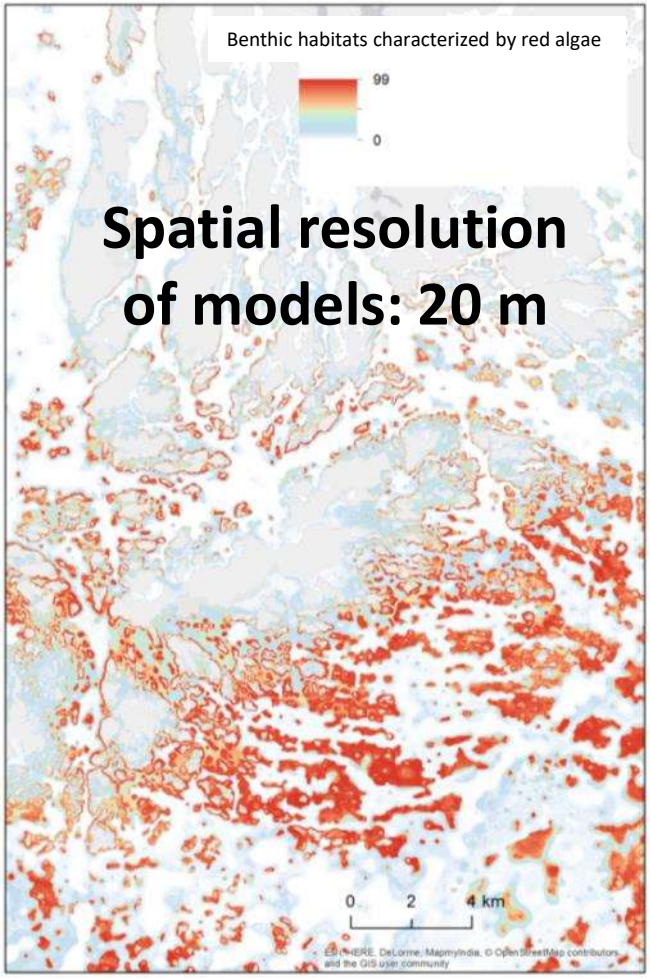
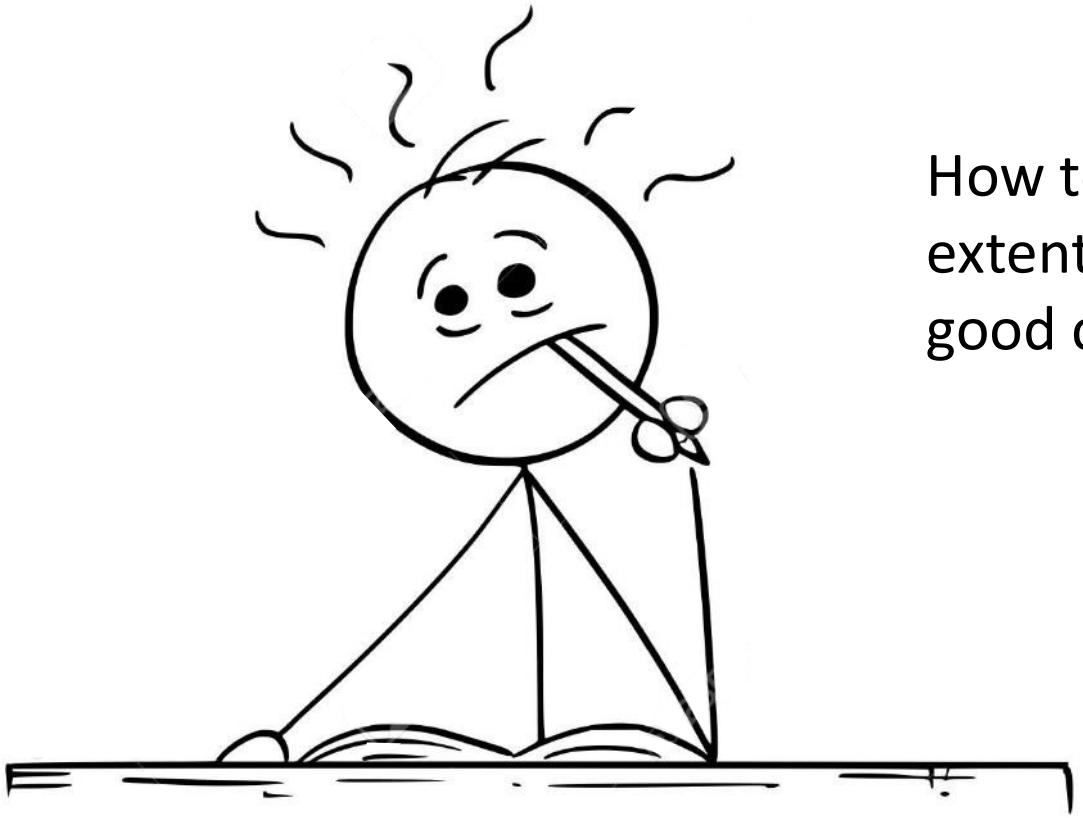
Spatial distribution models of species and habitats





Elina Virtanen, SYKE



How to estimate the extent of habitats in good condition?

→ Assess areas that are
a) severely degraded, and
b) disturbed

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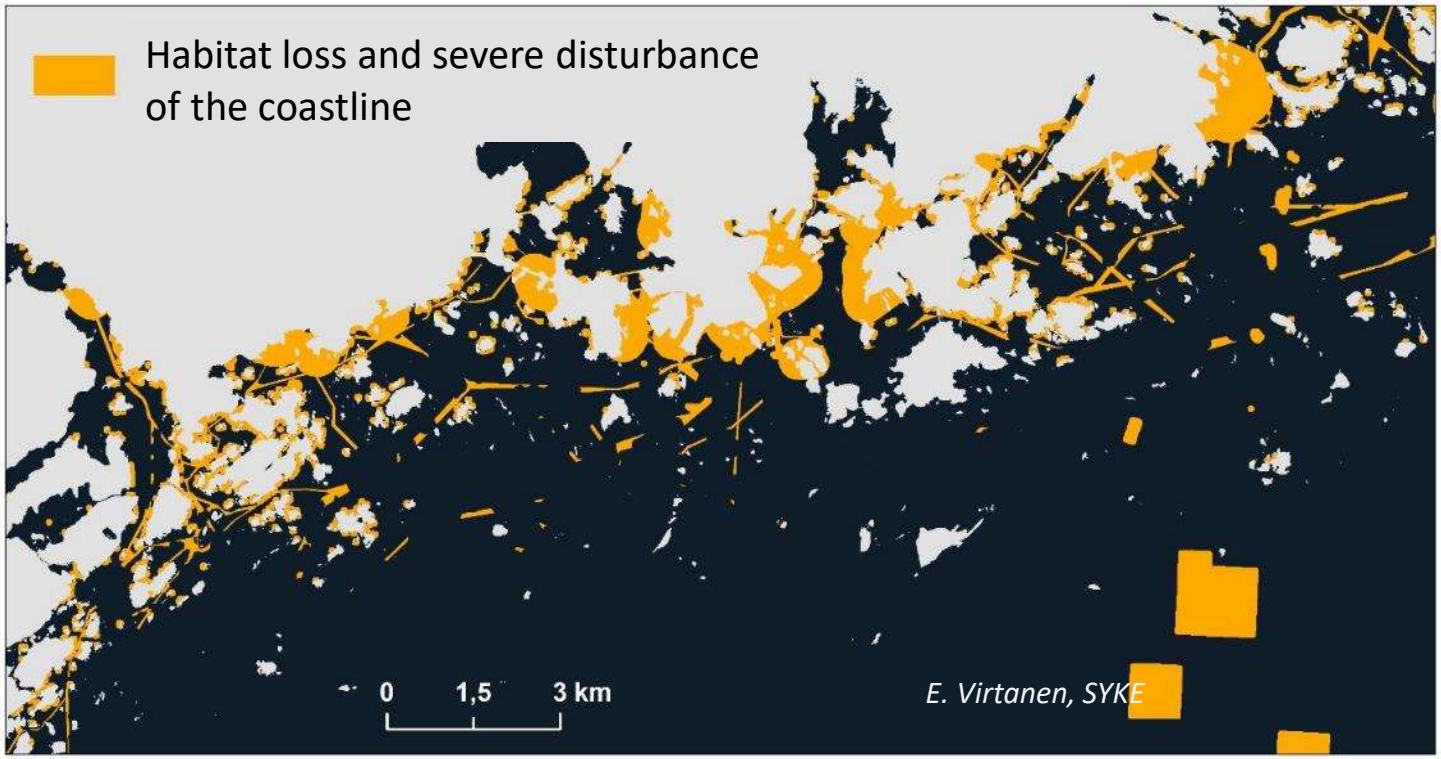
Define ecosystem condition

Approach a): Assess degraded habitats



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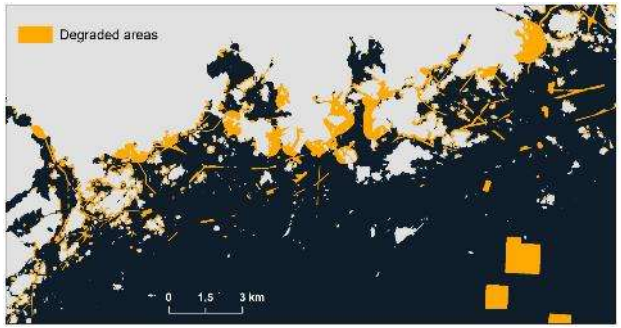
Define ecosystem condition

Approach a): Assess degraded habitats



	Total sea area, km^2	Total extent of EU habitats, km^2 (% of marine areas)	Extent of degraded habitats, km^2 (% of total extent of EU habitats)	Extent of habitats <u>not</u> degraded, km^2 (% of marine areas)
EU Habitats Directive Annex I habitats	81,700 km^2	5477 km^2 (6,7 %)	162 km^2 (3 %)	5315 km^2 (6,5 %)

E. Virtanen, SYKE

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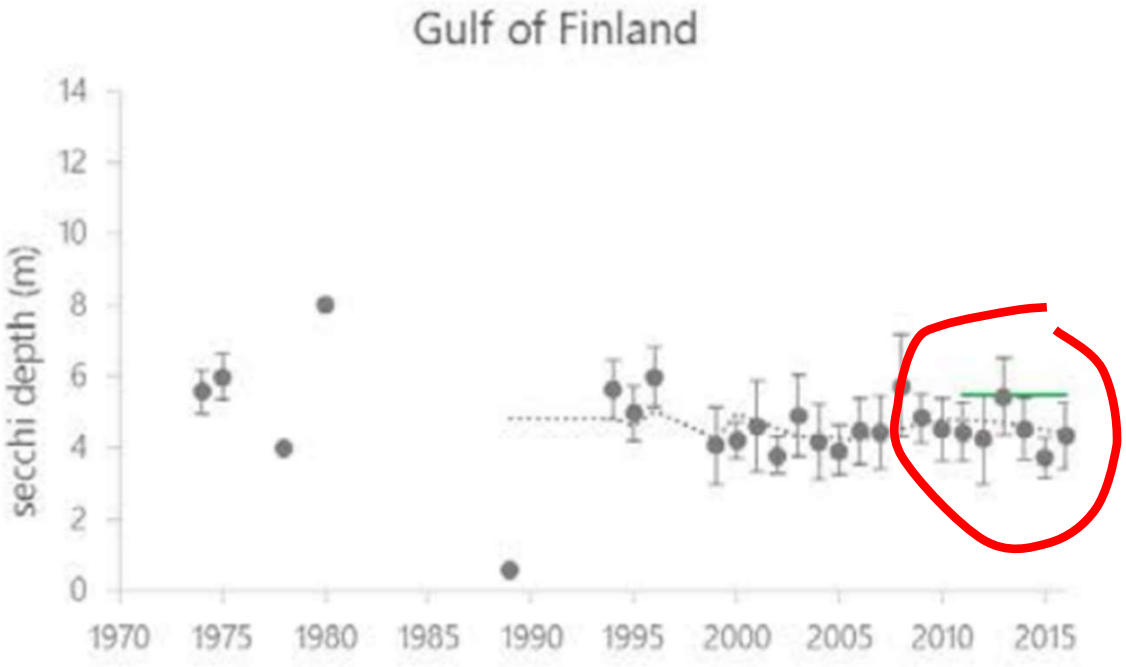
Define ecosystem condition

Approach b): Assess disturbed habitats

Secchi depth (water transparency) in the Gulf of Finland



https://helcom.fi/wp-content/uploads/2019/08/Water-clarity-HELCOM-core-indicator-2018.pdf

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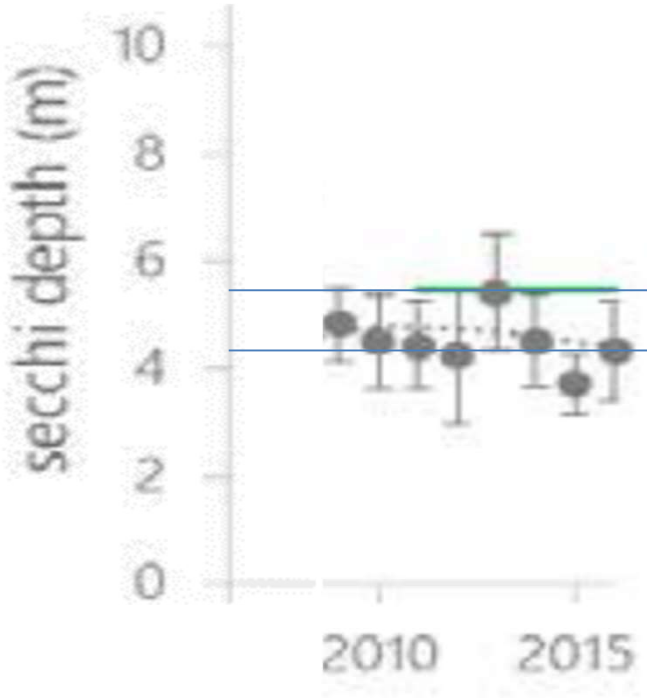
Define ecosystem condition

Approach b): Assess disturbed habitats



Target secchi depth 5.5 m

Present secchi depth 4.2 m

Difference 1.3 m

→ *Condition* is poor

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How can these data, e.g. secchi 4.2 and 5.5 m, be used in estimating ecosystem extent and condition?

Many species very sensitive to the lack of light

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How can these data, e.g. secchi 4.2 and 5.5 m, be used in estimating ecosystem extent and condition?

1. Model present day species distribution at secchi 4.2 m
2. Model species distribution at target secchi 5.5 m
3. Assume that the ”lost” distribution means a corresponding decline in ecosystem condition (→ a decline in capacity to produce ecosystem benefits)

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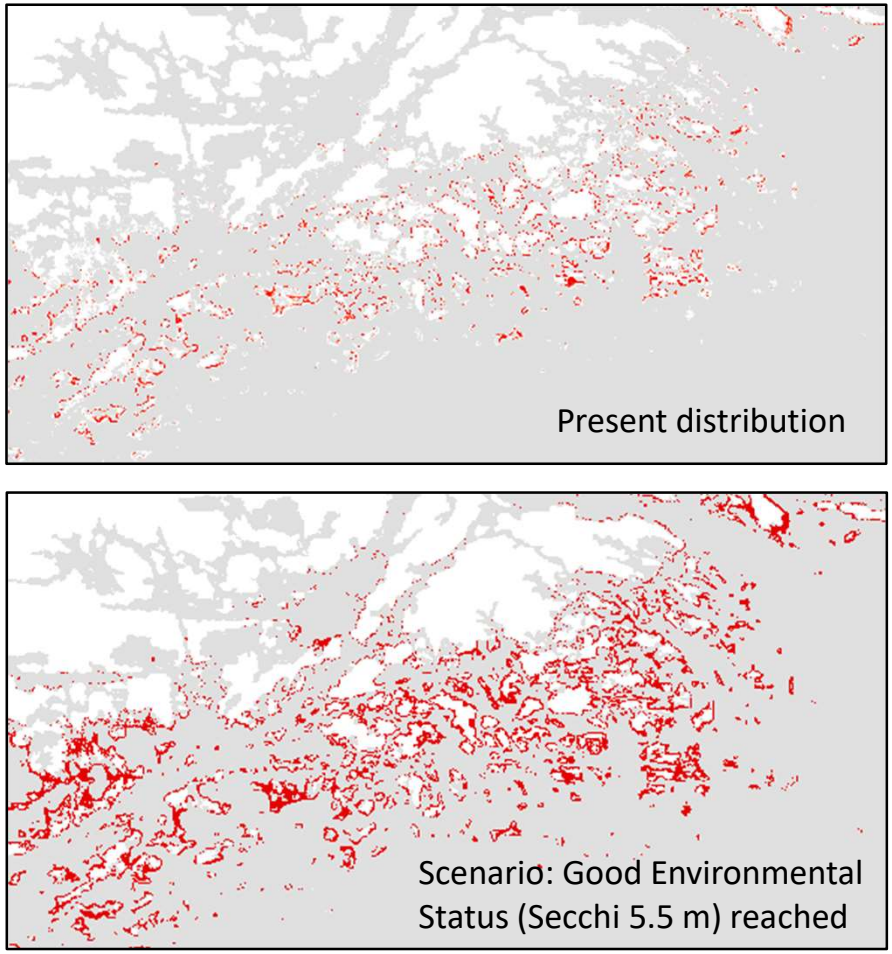
Bladderwrack (*Fucus vesiculosus)*, a habitat forming species

- Provides food and shelter for fish (provisioning service)
- Stores carbon (regulation service)
- An ”iconic species” (cultural service)

Parks & Wildlife Finland



Conclusion

The potential of the marine ecosystem to produce ecosystem benefits can be determined from the amount of (a) degraded habitats, and (b) disturbed habitats

Approach allows clear targets to be set for ecosystem condition to provide ecosystem benefits

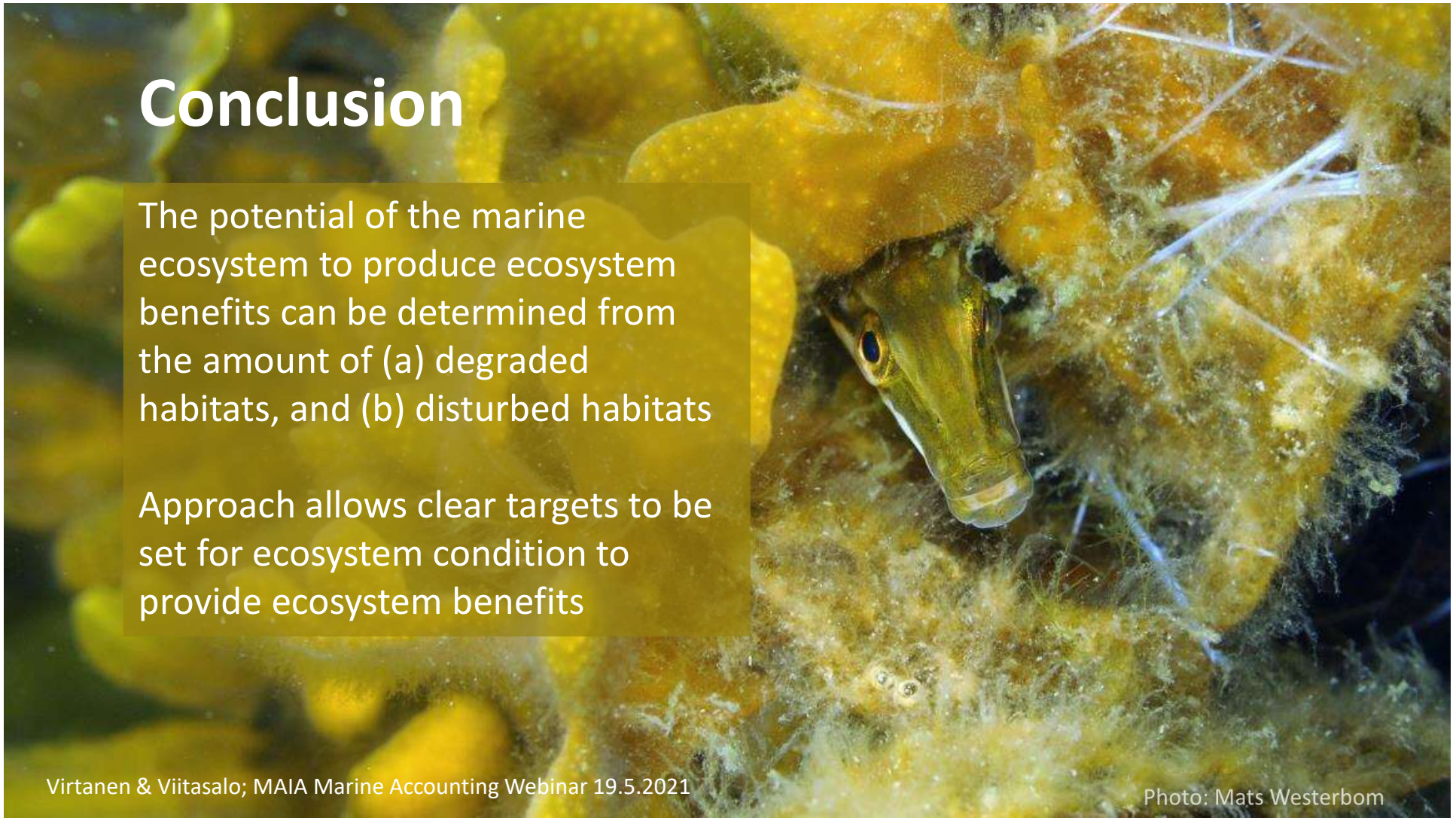


Photo: Mats Westerbom


Thank You for Your attention
Photo: Mats Westerbom