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The Finnish Inventory Programme for Underwater Marine Diversity

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Defining Restoration Targets for the Finnish Marine Environment

Louise Forsblom, Elina Virtanen, Niko Kallio, Antti Takolander, Vivi Fleming, Jonna Piiparinen, Elina Miettunen, Janne Ropponen, Katriina Juva, Jaakko Haapamäki, Samuli Korpinen, Markku Viitasalo

Here we present a brief account of how the Favourable Reference Area (FRA), extent and condition have been defined for the Annex II habitat groups of Nature Restoration Regulation relevant for Finland. The habitat groups considered here include seagrass beds, macroalgal forests, shellfish beds as well as sponge, coral and coralligenous beds.

Juuso Haapaniemi / Parks and Wildlife Finland

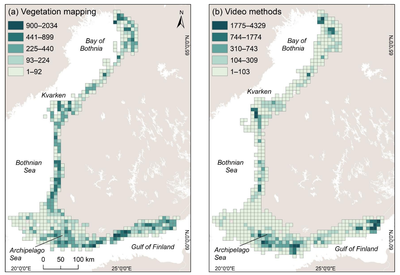
Expected benefits from re-establishment

- By mitigating eutrophication, the prospects to re-establish habitat groups are excellent
- Shellfish beds will recover in the Gulf of Finland
- Largest recovery of macroalgal forests is expected along the outer reefs of the Bothnian Sea and in the southern Archipelago Sea
- Species specific approach also reveals recovery potential in the innermost archipelago areas

1) Two Decades of Marine Mapping

The Finnish Inventory Programme for Underwater Marine Diversity, Velmu, has collected over 190,000 observations on marine biodiversity (Fig 1) [1].

These observations have significantly contributed to national processes, including the assessment and designation of marine protected areas [2] and key ecosystem service areas [3], identifying nationally ecologically important marine areas [4], designing offshore wind energy development to areas of least ecological harm [5], as well as formed the basis for marine ecosystem extent and condition accounts [6].



From Forsblom et al. 2024 *Scientific Data*

Figure 1, Observations collected per grid cell with vegetation mapping, representing mainly diving and comparable methods (a), video observation methods (b), visualized in 10 × 10 km grids (Jenks natural breaks).

2) Assessing FRA and Habitat Extent

The Favourable Reference Area (FRA) was defined based on the observations collected by Velmu, statistical modelling and nutrient scenarios from a national biogeochemical model.

1) Model the current distribution of species belonging to the annex II habitat groups
2) Develop nutrient scenarios representing good ecological status as defined by the WFD [7].
3) Predict the extent of the habitat groups under good ecological status (Fig. 2)
4) Assess lost habitat area from the impacts of sea uses such as dredging
5) Estimate the current extent and re-establishment potential (Fig. 3)

3) Assessing Habitat Condition

The condition of the habitat groups were assessed based on four approaches (Fig. 4).

1) Based on the ecological status as defined in WFD on the level of waterbodies
2) Based on assessment of impacts of human pressures [8]
3) Using an index of particulate accumulated matter on surfaces as a fine-grain proxy for eutrophication (i.e., the major pressure) [9]
4) Areas suffering from hypoxia [10]

4) Preparing National Restoration Plan

The information produced by the KASMERI-project will support preparing the National Restoration Plan. Restoration measures (controlling nutrient emissions) need to be placed in watersheds affecting sea areas where habitats are in poor condition.

The Water Framework Directive and Marine Strategy Framework Directive need to be fully implemented to achieve the goals of the Restoration Law in the Finnish sea area.

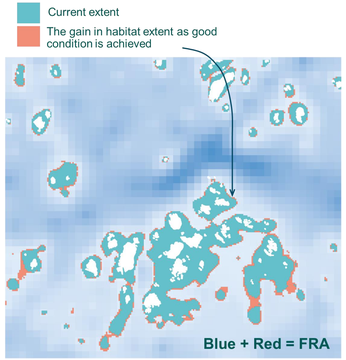


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Figure 2. The current extent, and the predicted area gain under good condition, for bladderwrack (*Fucus vesiculosus*) in the Archipelago Sea, SW Finland.

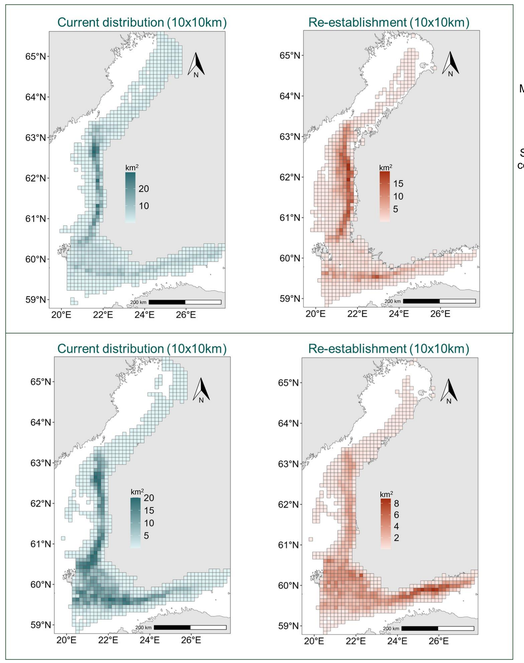

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Figure 3. The left maps shows the current distribution of macroalgal forests (upper) and shellfish beds (lower) in Finland and the right one the area available for re-establishment if good ecological status is achieved.

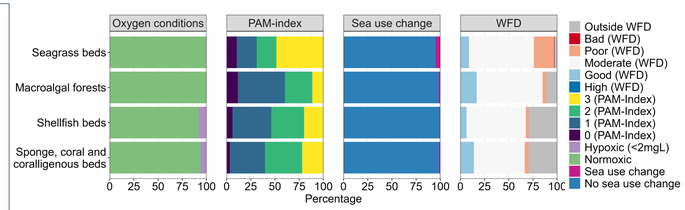

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Figure 4. Condition defined as the proportion of the current distribution of each habitat group based on the four assessment approaches.

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For more information contact louise.forsblom@syke.fi