Influence of Eutrophication on biodiversity in the Baltic Sea

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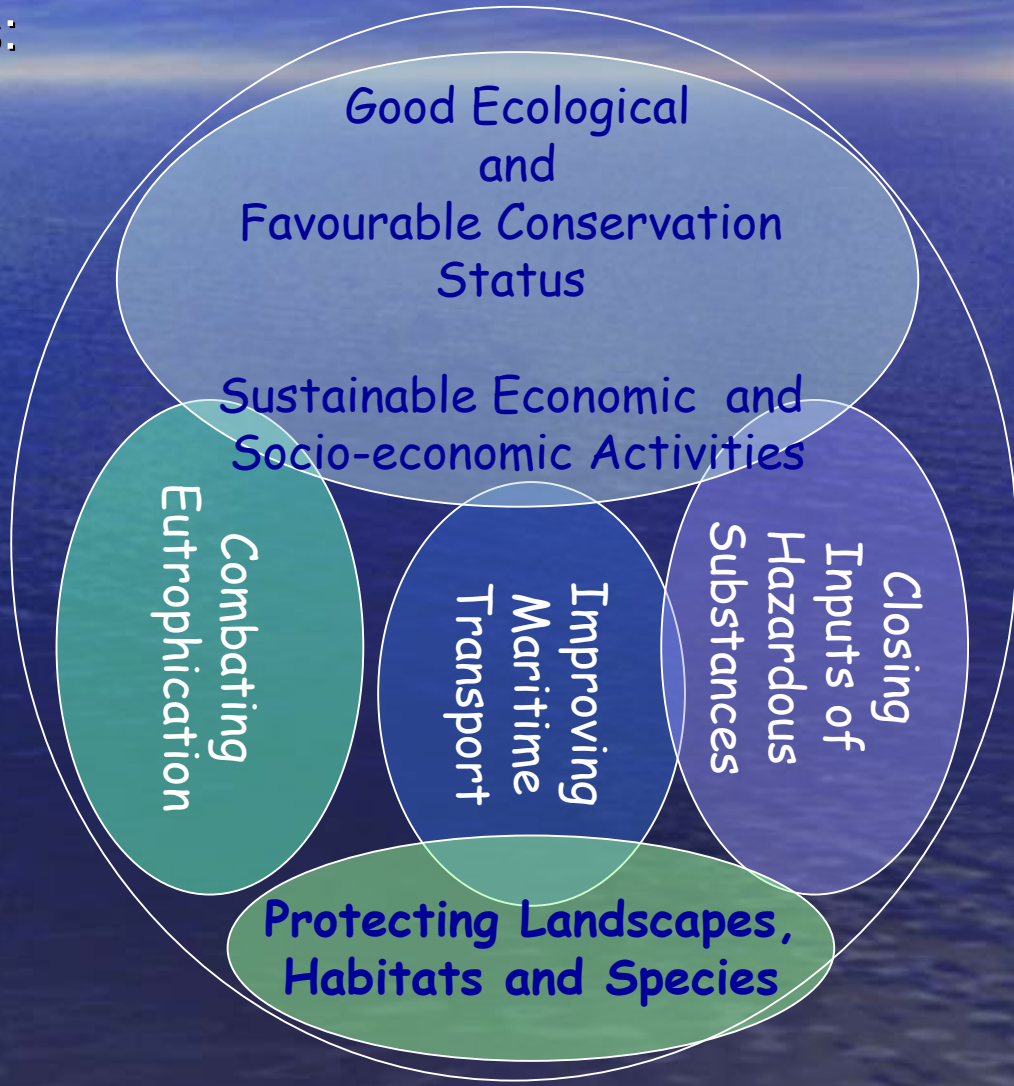
HELCOM Baltic Sea Action Plan

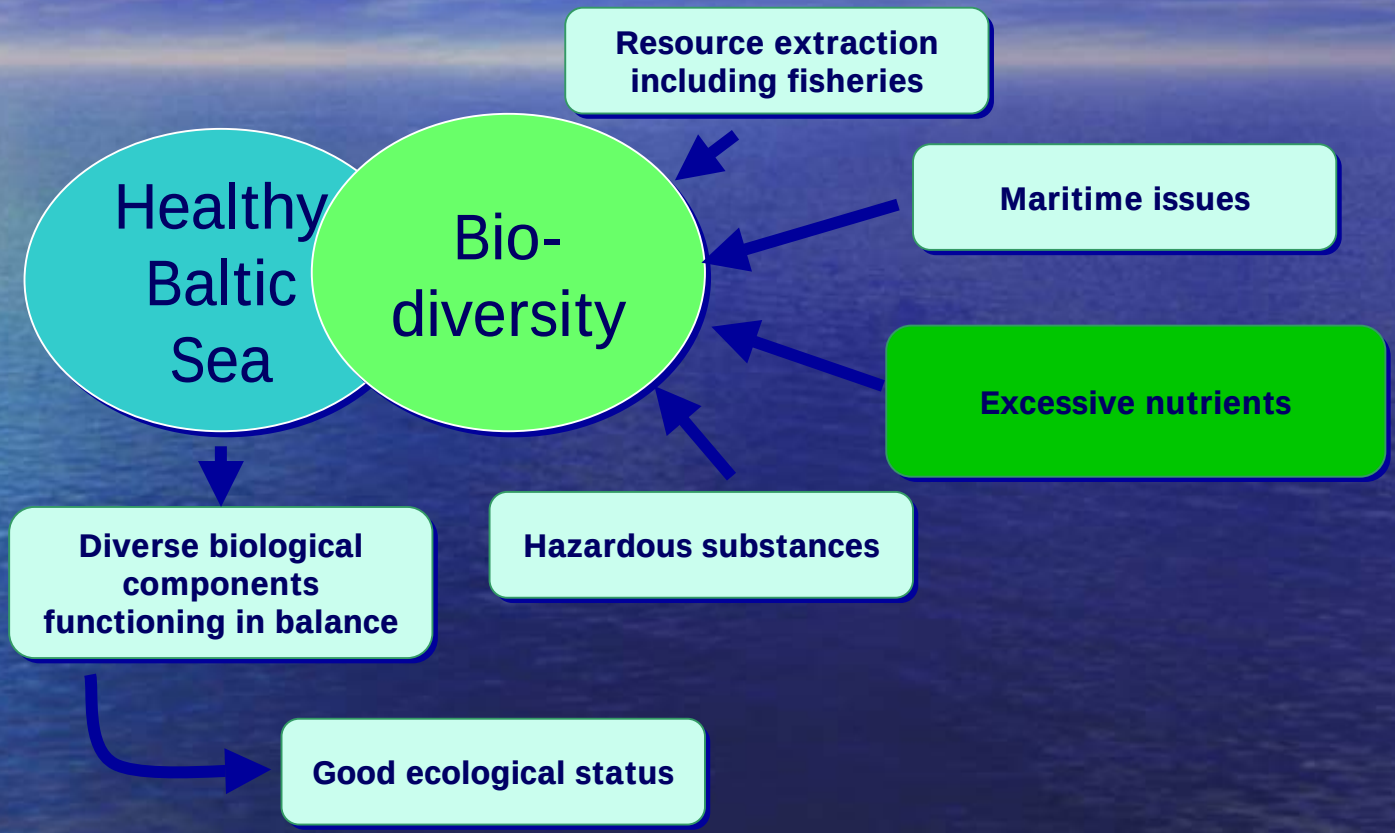
It consists of four main segments:

- Eutrophication
- Biodiversity,
- Hazardous substances,
- Activities at sea

To apply the Ecosystem Based Approach in the
HELCOM Baltic Sea Action Plan



Healthy sea - diverse biological components functioning in balance



Nature Protection in the Baltic Sea Action Plan – towards Baltic Sea biodiversity in favourable status

Baltic Sea unaffected by eutrophication

Nutrients close to natural levels

Clear water

Natural oxygen levels

Natural level of algal blooms

Natural distribution and occurrence of plants and animals

Favourable status of Baltic Sea biodiversity

Natural coastal and marine landscapes

Thriving and balances communities of plants and animals

Viable populations of species

Baltic Sea life undisturbed by hazardous substances

Healthy wildlife

All fish safe to eat

Radioactivity at pre-Chernobyl level

Maritime activities carried out in an environmentally friendly way

No illegal pollution

Safe maritime traffic without accidental pollution

Efficient response capacity

No introduction of alien species

How the goals established in the biodiversity section of the HELCOM Baltic Sea Action Plan can be achieved by reducing eutrophication ?

Eutrophication has effects on most elements of the marine biodiversity but actions which depend on biodiversity are especially

Protection reintroduction -and natural distribution of habitat forming species sensitive to eutrophication such as eelgrass and bladder wrack.

Protection of commercial fish species such as cod and eel and also non commercial fish species sensitive to eutrophication.

Protection of other threatened/declining species, habitats and biotopes of the Baltic Sea, sensitive to eutrophication.

Eutrophication influence on the Baltic Sea Ecosystems

Causes:

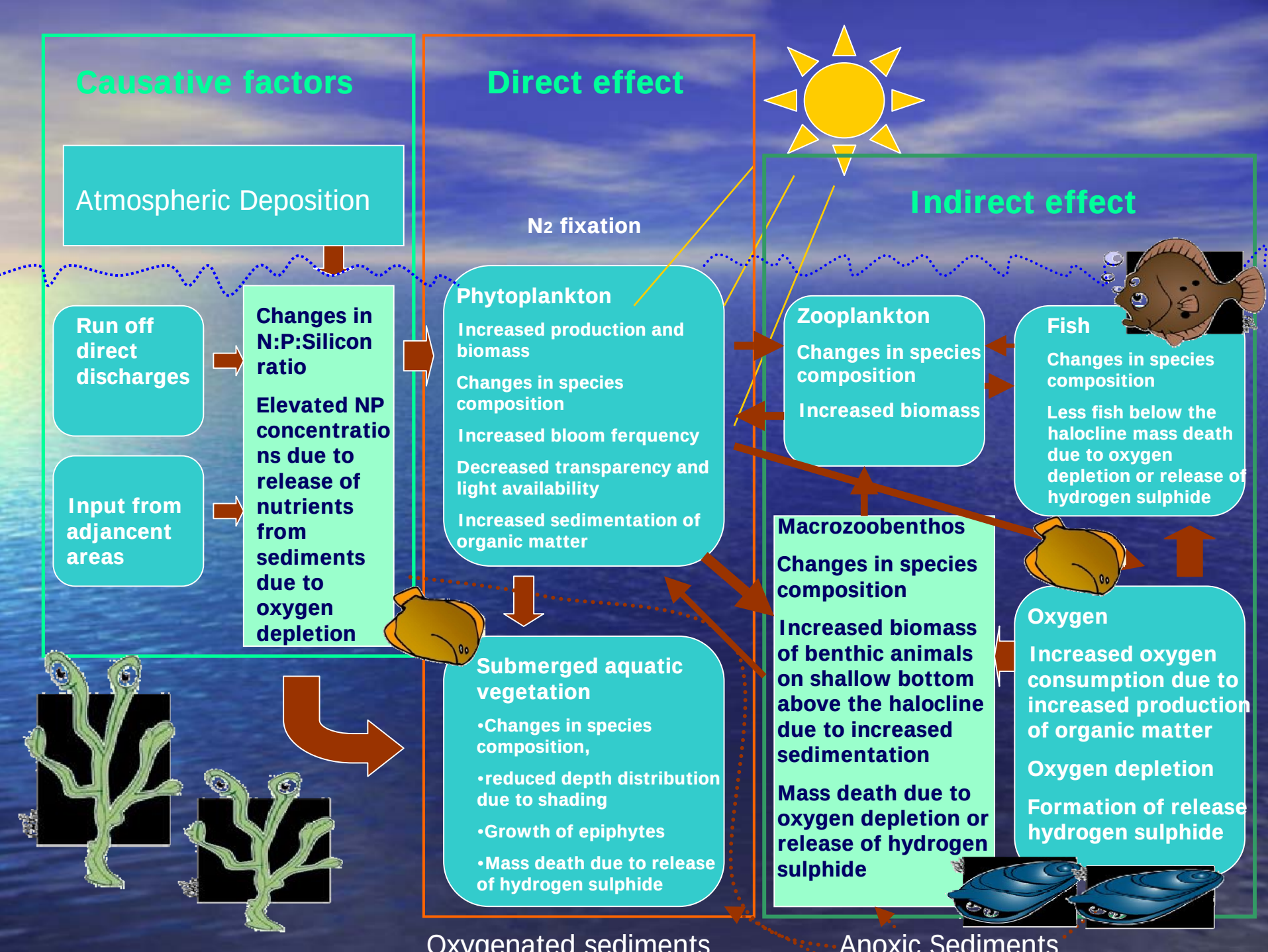
- Ecessive input of nutrients,

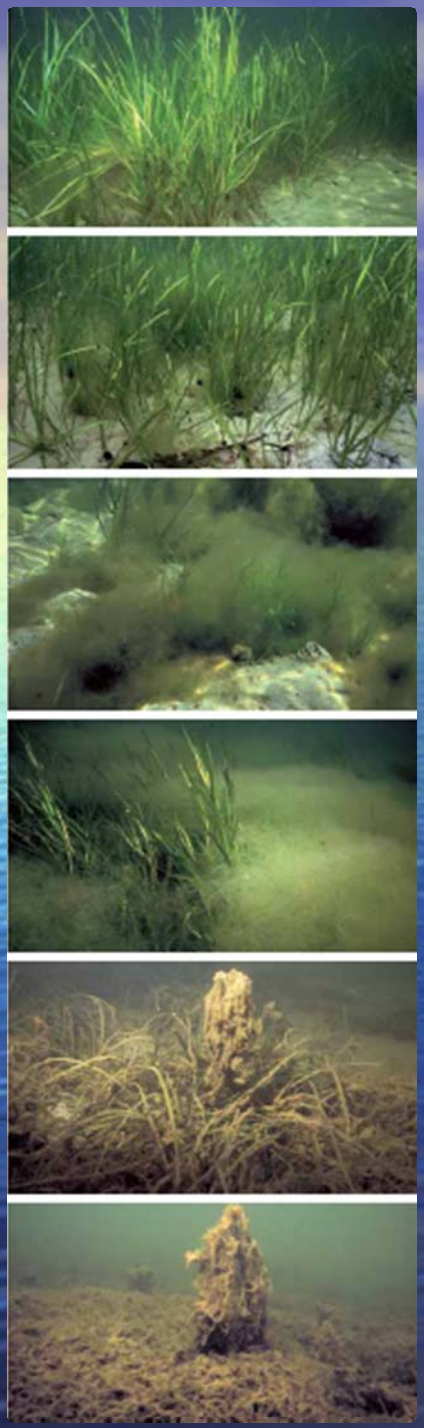
From rivers, point sources, diffuse sources (nitrogen, phosphorus),

From air (nitrogen).

Main Effects:

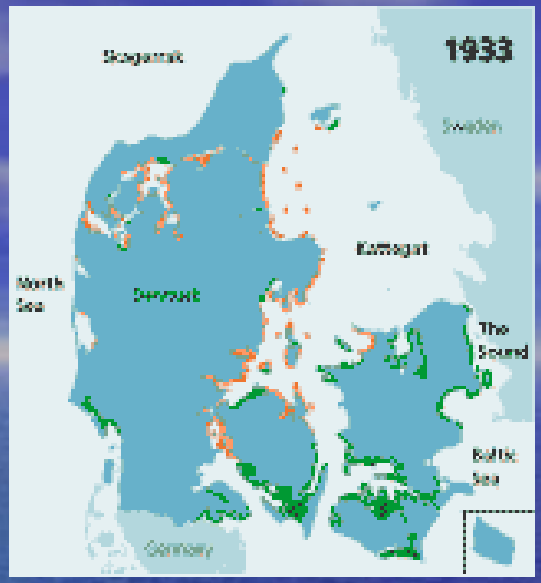
- Fertilisation as well as internal loading as a reason of oxygen depletion,
- Oxygen depletion,
- Decreased transparency.

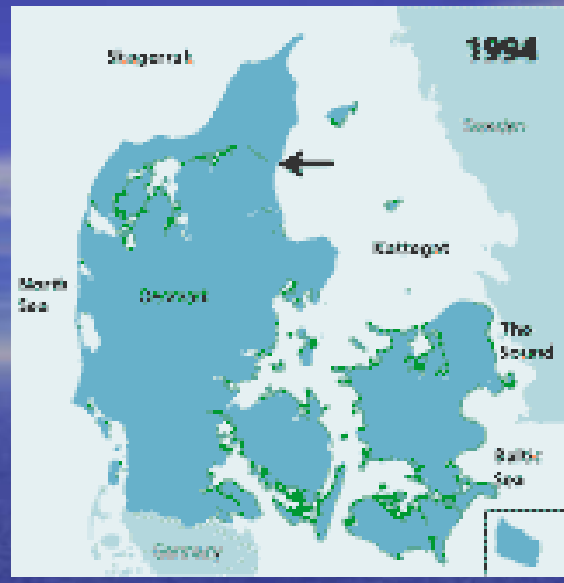

Causative factors
Atmospheric Deposition
Run off direct discharges
Input from adjancent areas
Changes in N:P:Silicon ratio
Elevated NP concentrations due to release of nutrients from sediments due to oxygen depletion
Direct effect
N2 fixation
Phytoplankton
Increased production and biomass
Changes in species composition
Increased bloom ferquency
Decreased transparency and light availability
Increased sedimentation of organic matter
Submerged aquatic vegetation
•Changes in species composition,
•reduced depth distribution due to shading
•Growth of epiphytes
•Mass death due to release of hydrogen sulphide
Indirect effect
Zooplankton
Changes in species composition
Increased biomass
Fish
Changes in species composition
Less fish below the halocline mass death due to oxygen depletion or release of hydrogen sulphide
Macrozoobenthos
Changes in species composition
Increased biomass of benthic animals on shallow bottom above the halocline due to increased sedimentation
Mass death due to oxygen depletion or release of hydrogen sulphide
Oxygen
Increased oxygen consumption due to increased production of organic matter
Oxygen depletion
Formation of release hydrogen sulphide
Oxygenated sediments
Anoxic Sediments



Destruction of habitat forming species due to EUTROPHICATION

Changes in eelgrass in epiphyte biomass with increased eutrophication.





Distribution of Eelgrass in Danish straits in 20th century.

Changes in *Fucus* density and epiphyte biomass with increasing eutrophication status.

Changes in species composition

with changes of the oxygen amount in marine water

Oxygen depletion

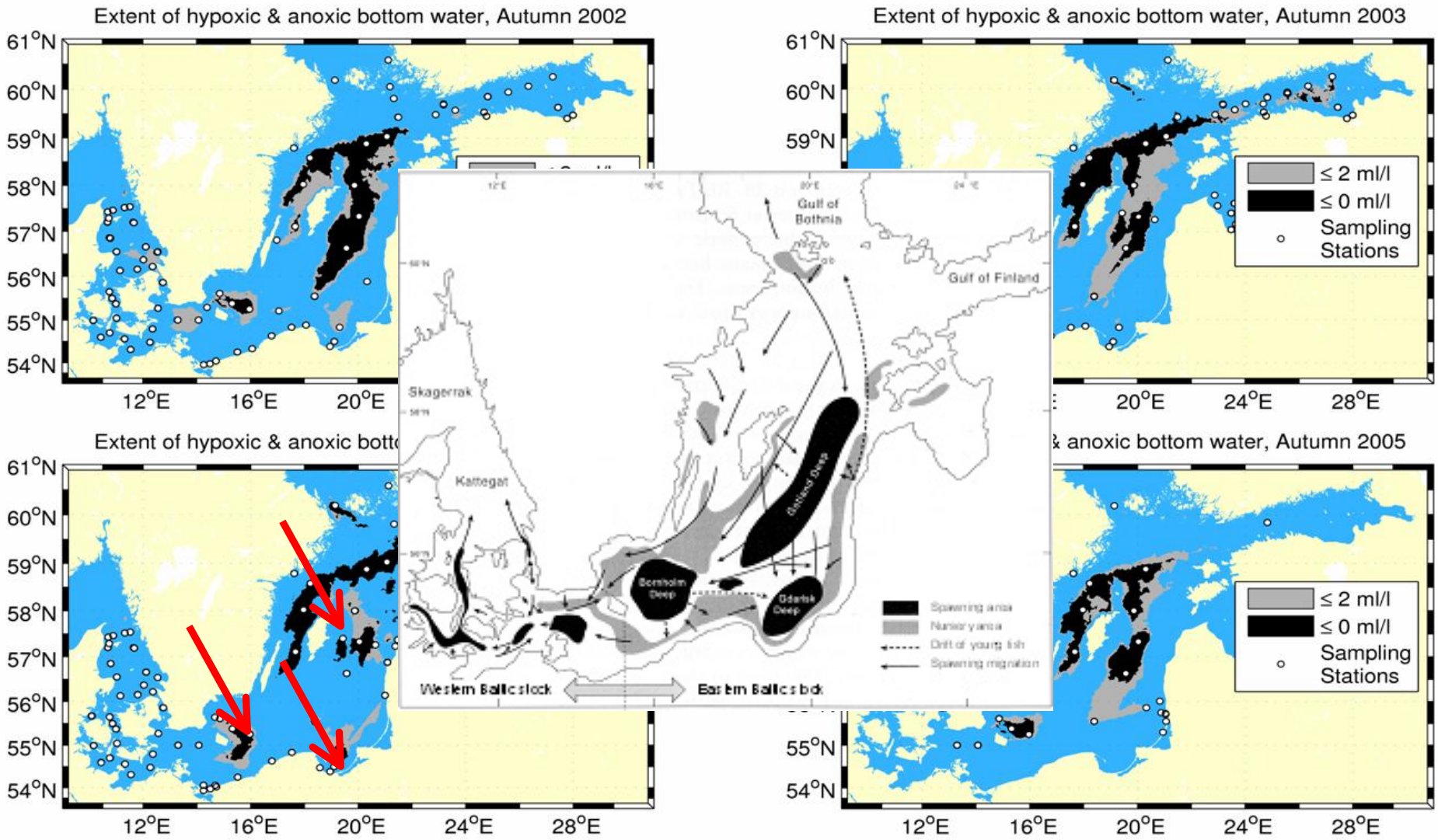
Fish sensitive to eutrophication
Examples

Cod and Eel

Cods' spawning grounds in the Baltic are severly affected by the eutrophication.

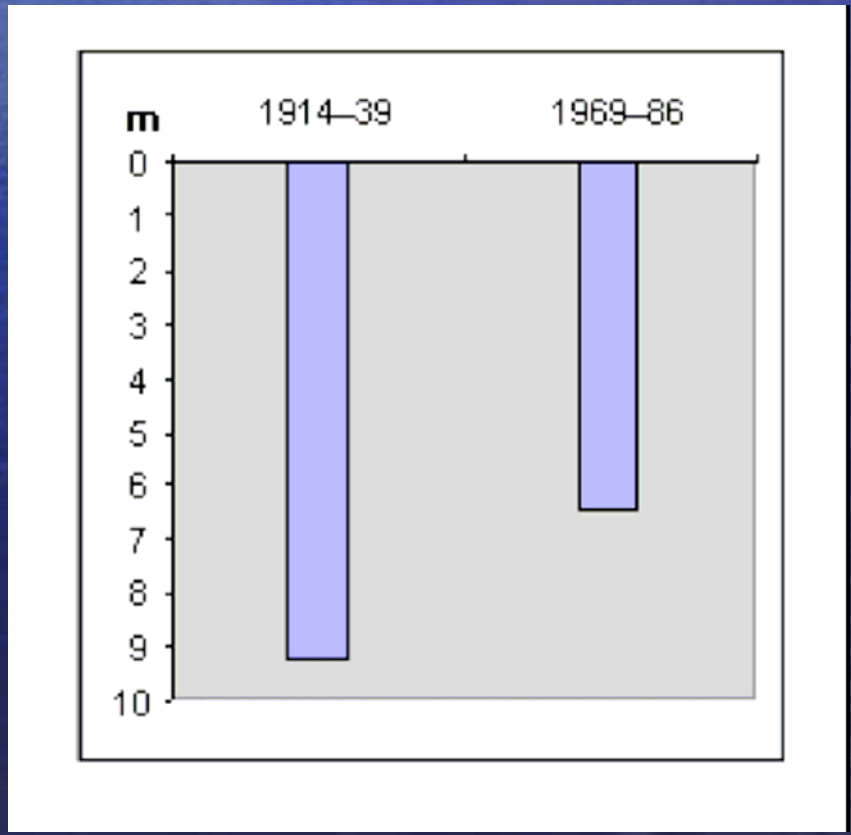
Eel has a scaleless, very sensitive skin to chemicals.

Oxygen depletion and spawning of cod



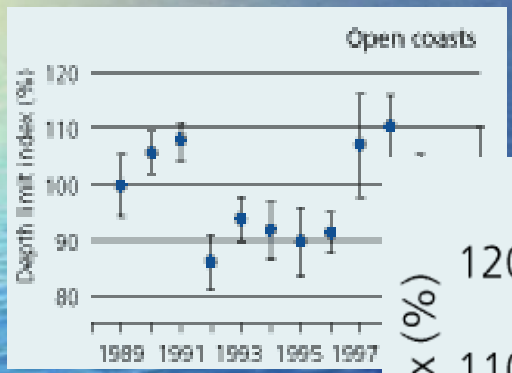
Decreased transparency

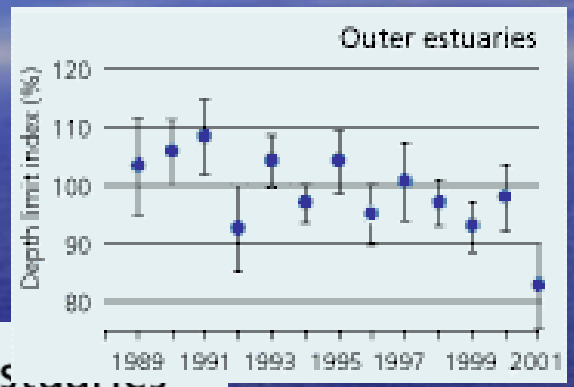
Change in water transparency (m) of the Baltic Sea during the early and late 20 th century, (EEA 2002.)

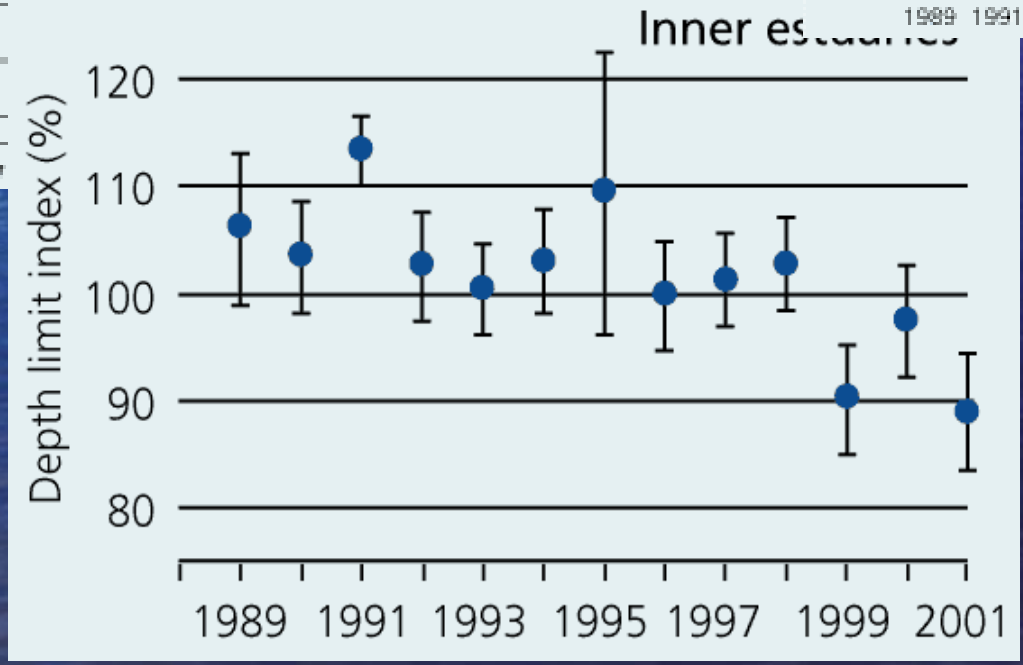


Changes in distribution pattern of species due to decreased transparency.

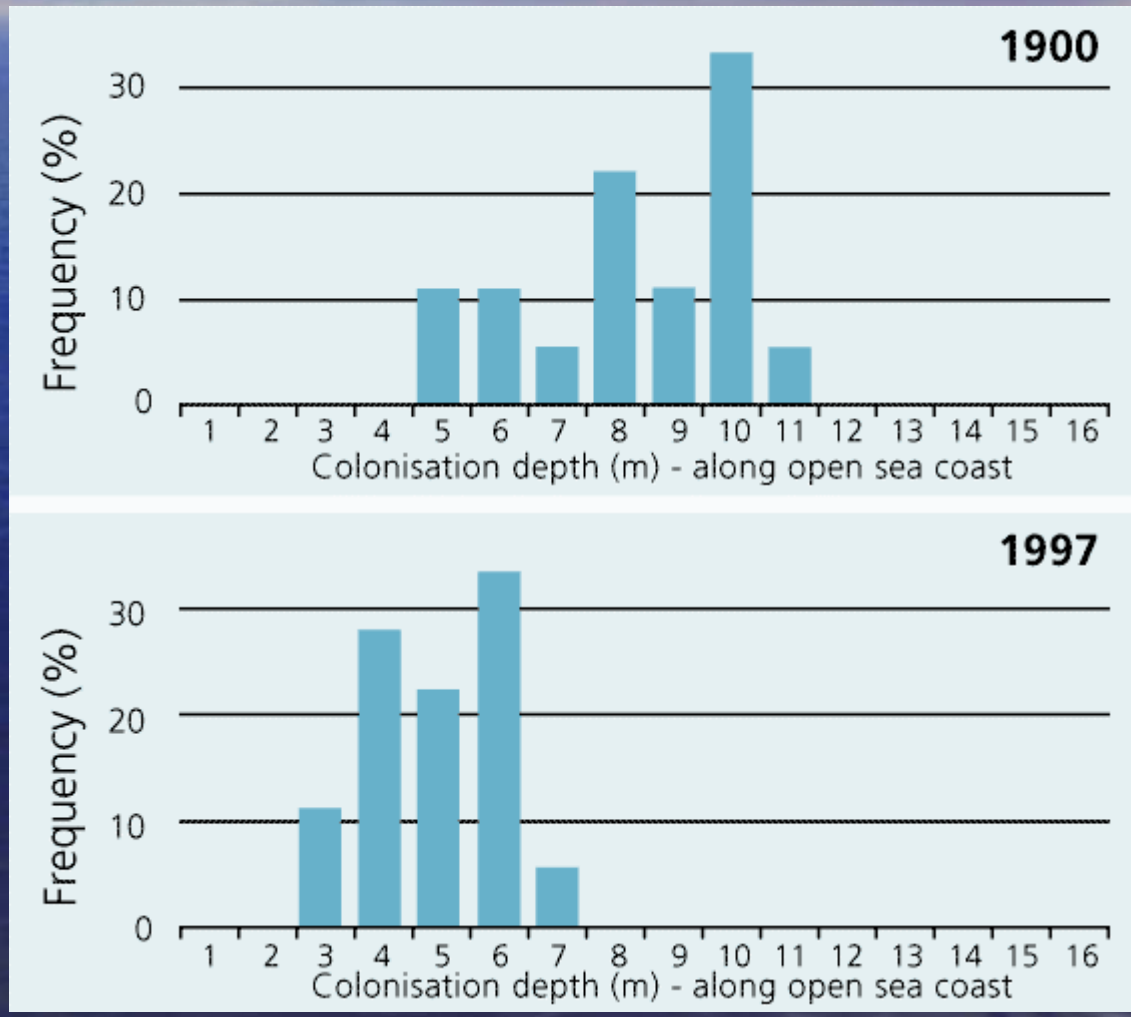
EELGRASS







Maximum colonisation depth of Danish eelgrass patches along open coasts and in estuaries.



Based on data from 18 sites along open coasts and 12 sites in estuaries investigated by Ostenfeld (1908) in 1900 and by the Danish Aquatic Monitoring and Assessment Programme in 1996/1997
(Boström et al. 2003).

Eutrophication & Biodiversity

Eurtophication has a significant adverse effect on most elements of the Baltic Sea ecosystems.

It has also very important influence on species composition causing that with increasing eutrophication we have strong decline in biodiversity, because not many species can stand difficult eutrophic conditions.

It is also the most problematic threat nowadays .

Photo: Metsähallitus 2004

THANK YOU !!!!