



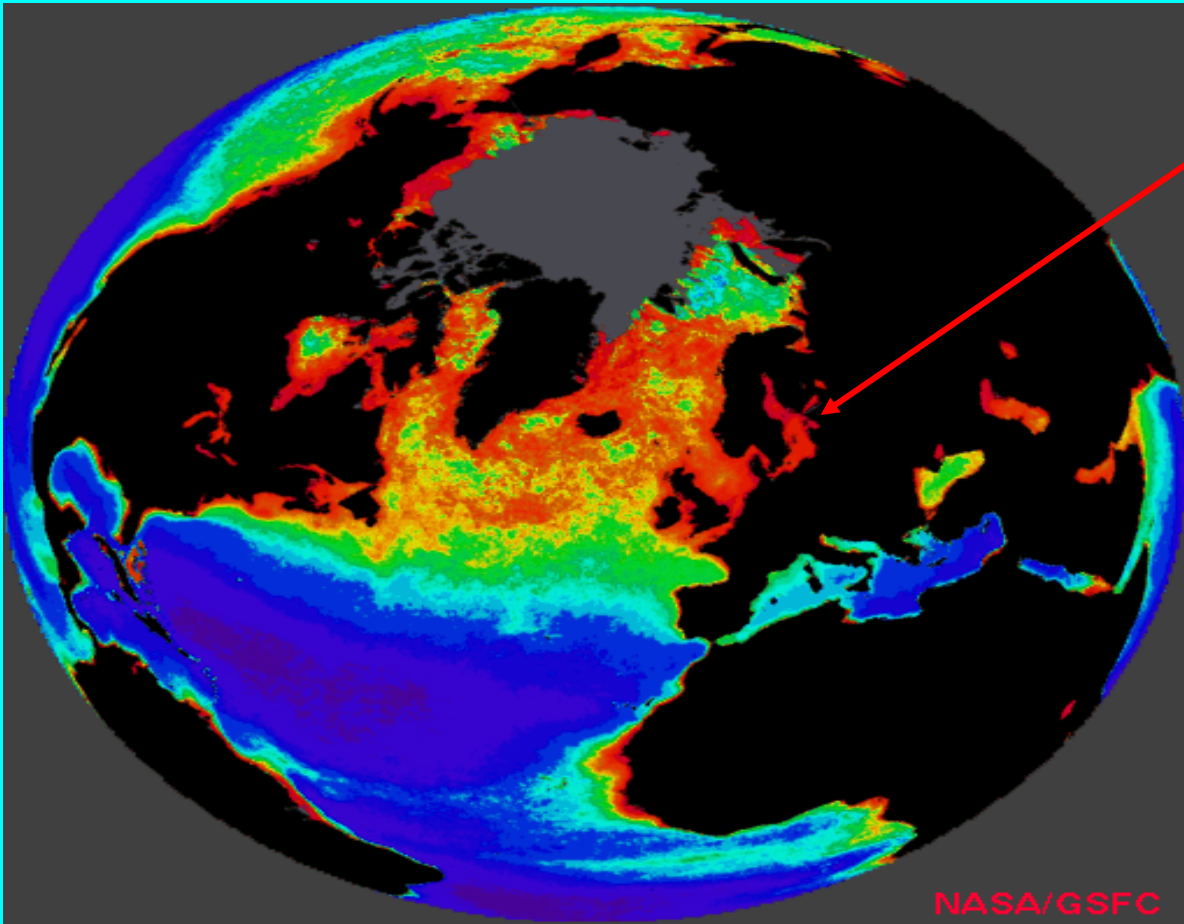
Combating eutrophication in the Baltic Sea – HELCOM's activities

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2nd TFRN meeting

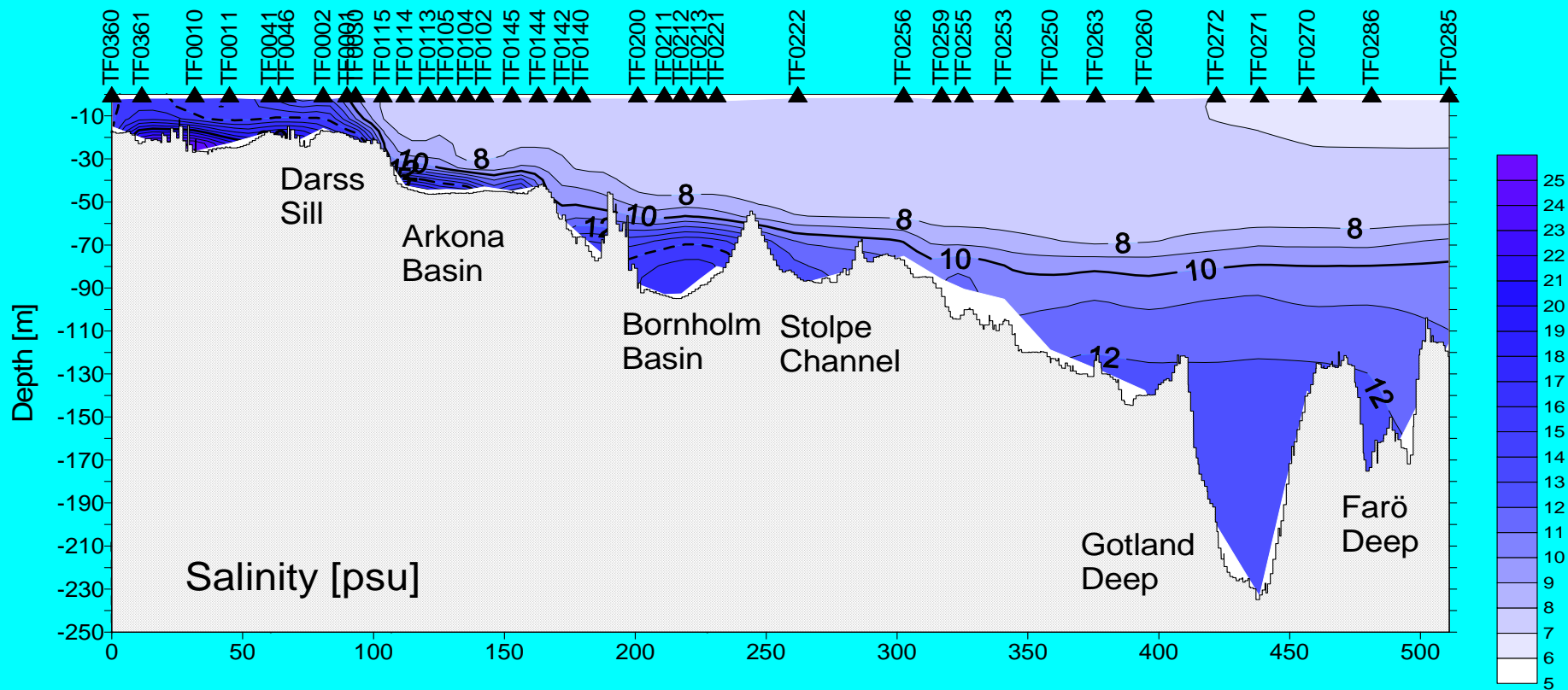
Garmisch-Partenkirchen, 28./29. April 2009



Baltic Sea

- semi-enclosed intra-continental shelf sea
- narrow straits, sills restricted horizontal water exchange
- humid climate
freshwater surplus
brackish environment
- humid climate
permanent salinity stratification
restricted vertical exchange

Modified after L.Postel



Salinity distribution between Kiel Bight and northern Gotland Basin
20. – 25. July 2005

Baltic Sea surface:
412 000 km²

Catchment area:
1 770 000 km²

Mean depth:
52m

Max. depth:
459m



Population: 85 million



Industry



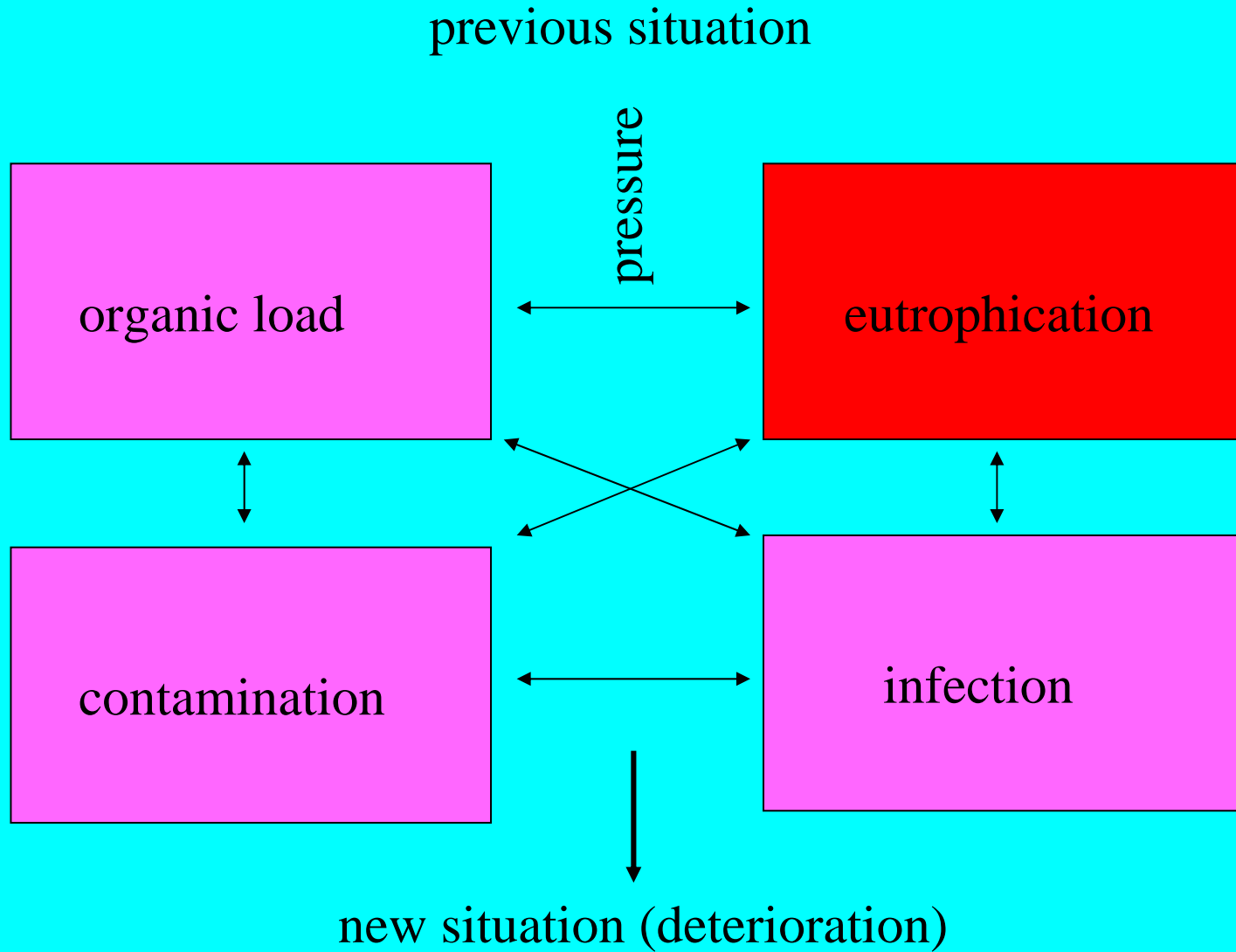
Agriculture



Ship traffic



Main categories of marine pollution, interactions and influences



Nutrient inputs into the Baltic Sea in 1990 (1000 t)

	Phosphorus	Nitrogen	Organic load (BOD ₇)
Gulf of Bothnia	5.4	96	258
Gulf of Finland	11.8	140	286
Gulf of Riga	3.4	85	142
Baltic Proper	> 17.8	209	> 609
Belt Sea	4.7	62	> 66
Kattegat	2.7	69	> 39
Baltic Sea	> 45.8	662	>1400

There is an additional input of 300 000 t nitrogen from the atmosphere

Source: HELCOM Second Pollution Load Compilation 1993

Estimated inputs of total nitrogen and phosphorus into the Baltic Sea (t/a)

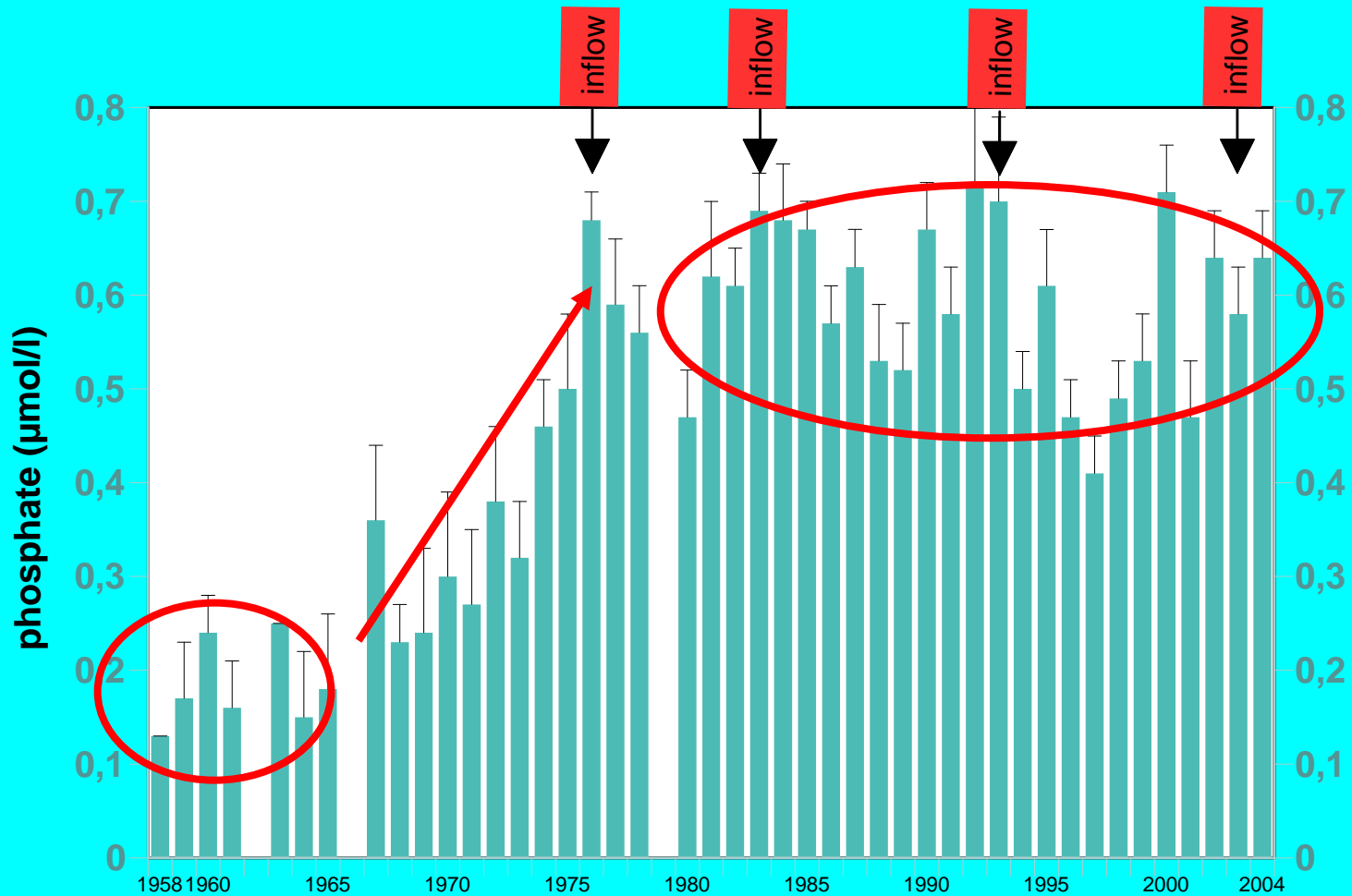
a) rivers

	1900	1985
total phosphorus	6 800	51 600
total nitrogen	150 000	640 500

b) atmosphere

total phosphorus	2 800	5 500
total nitrogen	83 000	322 000

Source: Larsson, Elmgren, and Wulff (1985)



**Phosphate concentrations in the winter surface layer
are nearly twice as high as in the 1960s**

The same holds for the inorganic nitrogen compounds



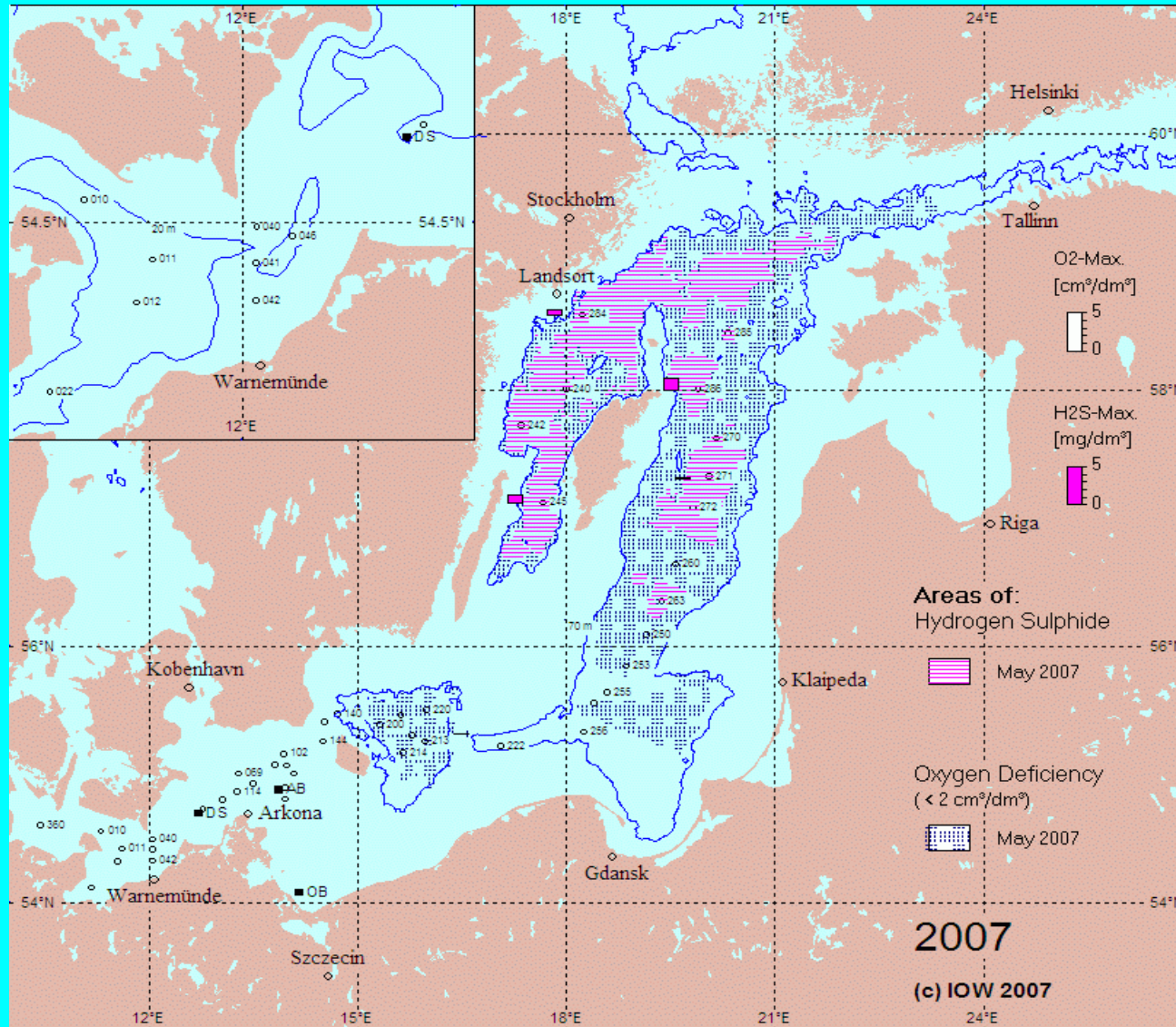
Cyanobacteria
bloom
13. July 2005

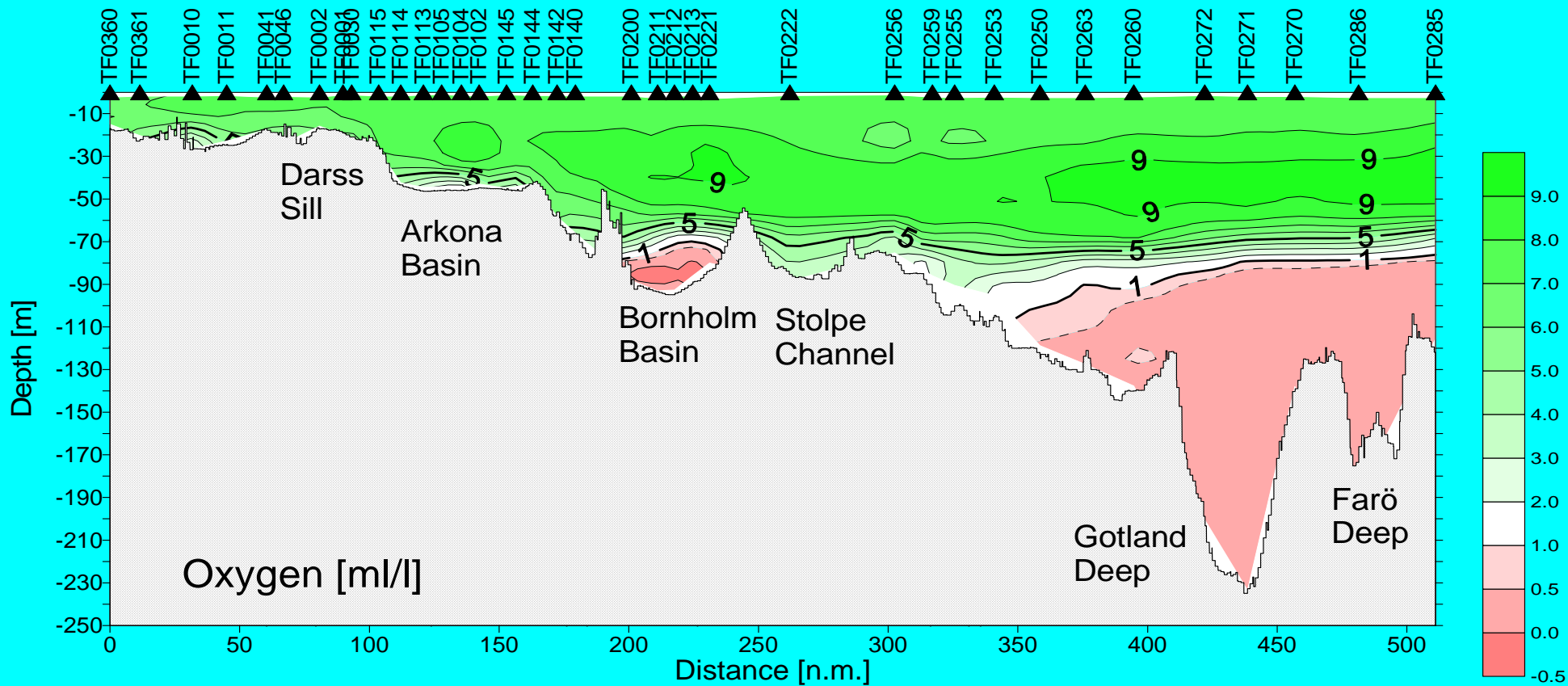
Nitrogen fixation:

434 000 t N –
792 000 t N

Wasmund et al. 2005:
Mar Ecol Progr Ser 297, 23-31.

Suboxic and anoxic zones in the Baltic Sea deep waters





Oxygen distribution between Kiel Bight and northern Gotland Basin
20. – 25. July 2005

The Helsinki Convention

(Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1974 and 1992)

Contracting parties to HELCOM:

- Denmark
- Estonia
- European Commission
- Finland
- Germany
- Latvia
- Lithuania
- Poland
- Russia
- Sweden

„The Contracting Parties shall individually or jointly take all appropriate legislative, administrative or other relevant measures to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance.“ Article 3/1

STRUCTURE OF HELCOM



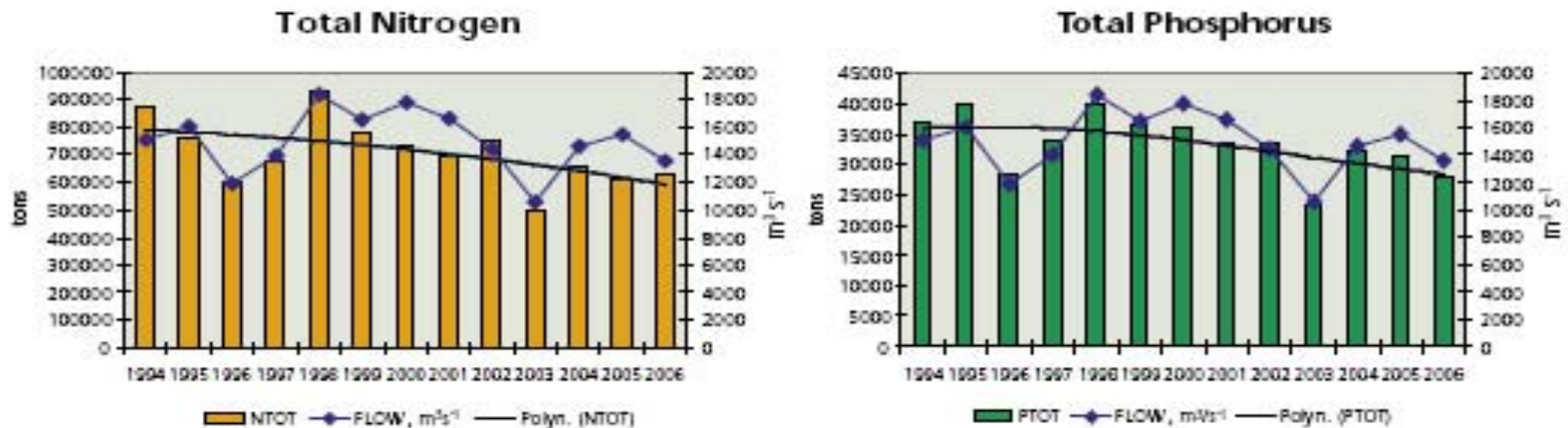
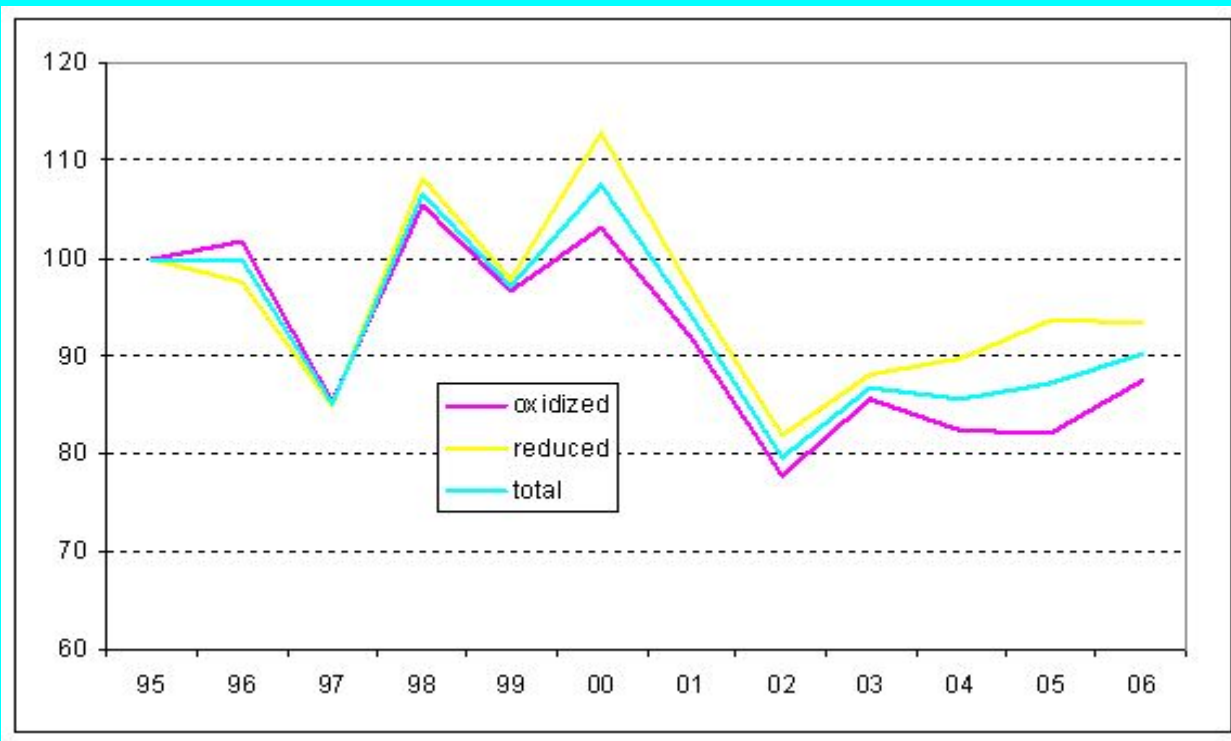


Figure 3.10 Riverine and direct point-source Inputs into the Baltic Sea from 1994–2006. NTOT = Total nitrogen; PTOT = Total phosphorus.

In 2001-2006, the average annual total waterborne (riverine, coastal areas, and direct point and diffuse sources) load of nitrogen entering the Baltic Sea amounted to **641 000 t** and of **30 200 t** total phosphorus.

Compared with the previous six year period 1995-2000 total loads decreased for both nitrogen (-13.7%) and phosphorus (-15.3%). At the same time, the average annual flow also decreased by 9.8%. Therefore, it is obvious that almost two-thirds of the observed decrease can be explained by the differences in hydrological conditions during these two periods.

HELCOM (2009): Eutrophication of the Baltic Sea – An integrated thematic assessment of the effects of nutrient enrichment and eutrophication in the Baltic Sea region. – Balt. Sea Environ. Proc. 115B, 1-148.



Atmospheric deposition of oxidized, reduced and total nitrogen to the entire Baltic Sea basin for the period 1995-2006 in per cent of 1995

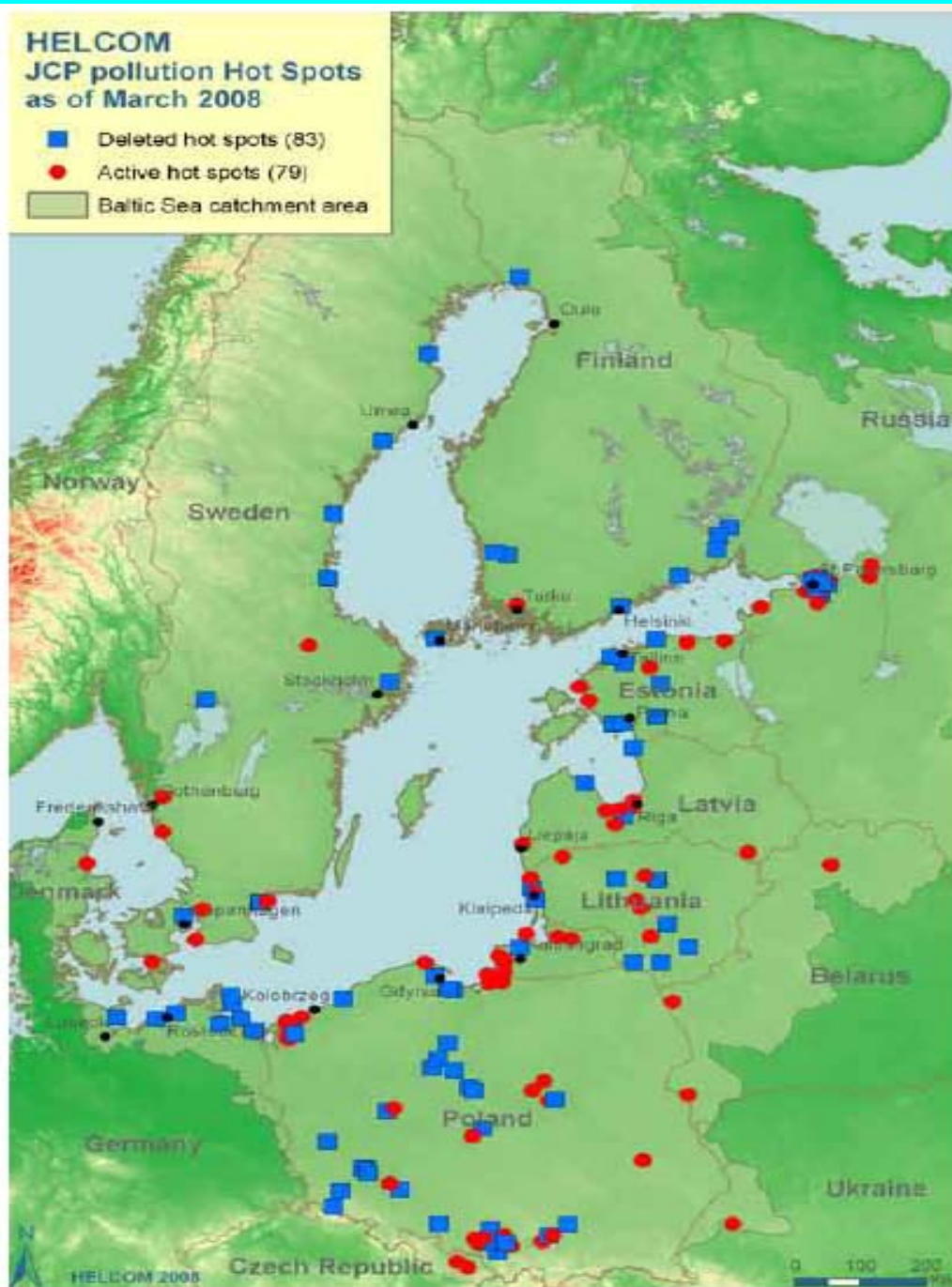
Key message

The **total deposition of nitrogen to the Baltic Sea in 2006 was 197 ktonnes**. The annual load varies across different parts of the Baltic Sea: from 300 mg/m² N in the northern Gulf of Bothnia up to 1000 mg/m² N in the Belt Sea. Mainly because of interannual changes in meteorological conditions, annual nitrogen deposition to the Baltic Sea and its sub-basins varies significantly from one year to another in the period 1995 - 2006.

- The nitrogen deposition has decreased by about 33% during 1980 and 2005
- In the future the nitrogen deposition is assumed to increase because of increased precipitation and growing contribution from shipping and agriculture sectors.

HELCOM
JCP pollution Hot Spots
as of March 2008

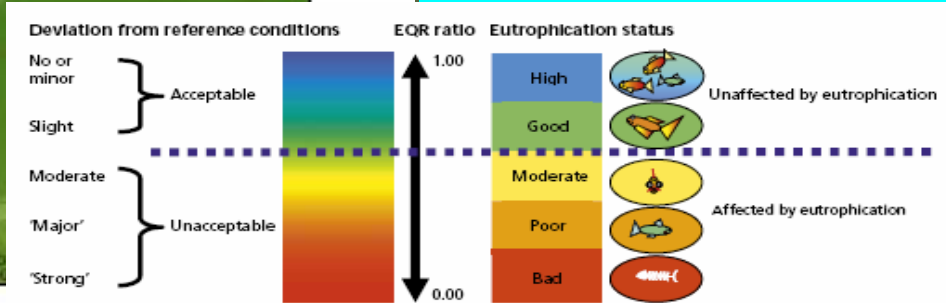
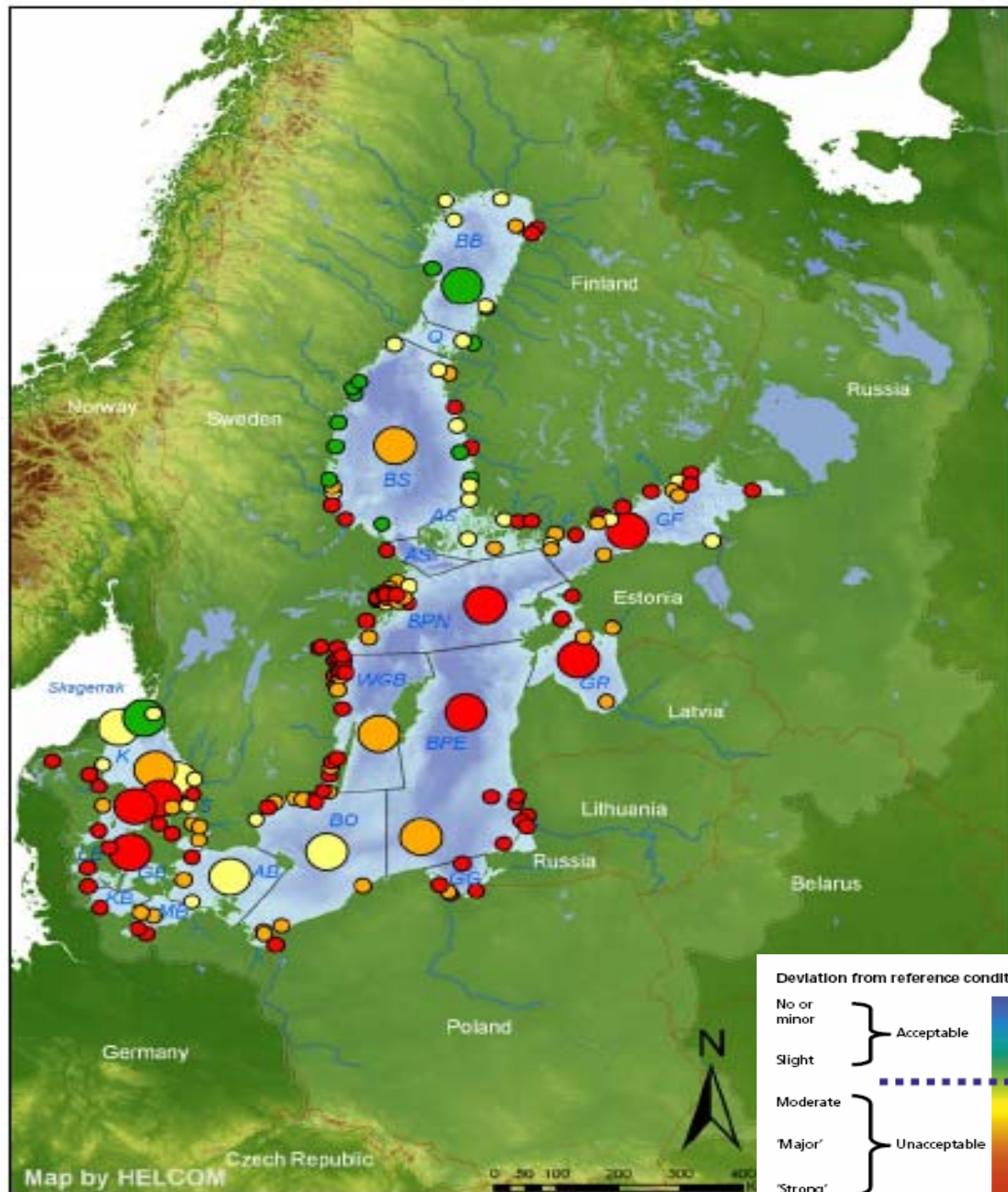
- Deleted hot spots (83)
- Active hot spots (79)
- Baltic Sea catchment area



Hot spots in the Baltic Sea
Catchment area

Blue: deleted

Red: still existing



The new „Baltic Sea Action Plan“

November 2007

Vision

A healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable human economic and social activities

Goals

Baltic Sea undisturbed by excessive inputs of nutrients

Concentrations of hazardous substances close to natural levels

Favourable conservation status of Baltic Sea biodiversity

Maritime traffic and offshore activities carried out in environmentally friendly way

Vision

A healthy Baltic Sea environment, with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable human economic and social activities

Goals

Baltic Sea unaffected by eutrophication

Baltic Sea life undisturbed by hazardous substances

Favourable status of Baltic Sea biodiversity

Maritime activities in the Baltic Sea carried out in an environmentally friendly way

Objectives

Concentrations of nutrients close to natural levels

Clear water

Natural level of algal blooms

Natural distribution and occurrence of plants and animals

Natural oxygen levels

Concentrations of hazardous substances close to natural levels

All fish safe to eat

Healthy wildlife

Radioactivity at pre-Chernobyl levels

Natural landscapes and seascapes

Thriving and balanced communities of plants and animals

Viable populations of species

No illegal pollution

Safe maritime traffic without accidental pollution

Efficient response capability

No introductions of alien species from ships

Minimum air pollution from ships

Zero discharges from offshore platforms

Country-wise allocation of nutrient load reduction

	Phosphorus (t)	Nitrogen (t)
Denmark	16	17 207
Estonia	222	896
Finland	146	1 199
Germany	242	5 621
Latvia	300	2 561
Lithuania	881	11 746
Poland	8 755	62 395
Russia	2 500	6 967
Sweden	291	20 780
Transboundary common pool	1 662	3 779
Total	15 014	133 152
Full impl. of improved WWT	6 700	19 000
Remaining	8 314	114 152



Thank you for your attention

Photos: S. Feistel