Internasjonalt miljøvernsamarbeid og miljøvern i polarområdene

Report Screening Procedure for the Norwegian West Coast

Common Procedure for Identification of the Eutrophication Status of Maritime Area of the Oslo and Paris Conventions

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Report Screening Procedure for the Norwegian West Coast

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Common Procedure for Identification of the Eutrophication Status of Maritime Area of the Oslo and Paris Conventions

Report on the Screening Procedure for the Norwegian Coast

From Lindesnes to Stad

Contents

Summary

As a contracting party to OSPAR, Norway has agreed to apply the Common Procedure for the Identification of Eutrophication Status of the Maritime Area of the Oslo and Paris Commissions on its coastal waters.

The Screening Procedure is here applied to the inshore waters of the Norwegian west coast.
This Procedure is the initial phase of the Common Procedure and is intended as a Broad Brush Assessment of readily available data to identify coastal waterbodies, which clearly do not show any potential for eutrophication.

Of a total of 106 areas, 46 areas are classified as Non Problem Areas (NPA). The other subareas should be subjected to the Comprehensive Procedure for a final classification.

There are relatively few observations along the coast, which implies a subjective assessment to large areas. The criteria used for areas without observations were:

Areas were classified as Non Problem Areas (NPA) when
- The anthropogenic nutrient load is low, and
- The areas have mainly high and unrestricted water exchange.

Areas with reported observations and any report of environmental disturbance that can be connected to nutrient enrichment should be subject to the Comprehensive Procedure.

There are many small/restricted areas (polls). These are only partly classified if there are observations. However, in some areas there are small polls or basins that are not assessed.

The frequent registrations of harmful algae and mussel toxins at a limited number of monitoring stations represent a problem in the classification process as such registration alone may classify an area as a potential problem area. Usually these observations cannot be connected to an anthropogenic load of nutrients. In this assessment, if harmful algae are the only observation in an area under consideration and the nutrient load is low, the area will be subject to the Comprehensive Procedure.

1. Background

As a contracting party to OSPAR, Norway has agreed to apply the Common Procedure for the Identification of Eutrophication Status of the Maritime Area of the Oslo and Paris Commissions on its coastal waters. Previously the Procedure has been applied to

- the coastal water of the Norwegian Skagerrak coast
- the inshore waters of the Norwegian Skagerrak coast
- the coastal water of the Norwegian west coast

The Screening Procedure is here applied to the inshore waters of the Norwegian west coast.
This Procedure is the initial phase of the Common Procedure and is intended as a Broad Brush Assessment of readily available data to identify coastal waterbodies, which clearly do not show any potential for eutrophication.

The natural conditions like topography, freshwater runoff and water exchange along the Norwegian west coast is highly varying. The same applies to the nutrient loads. For screening purpose the coast therefore has been divided into a large number of subareas.

The definition of eutrophication stresses the significance of adverse effects such as disturbance of biological communities and associated impairment of water quality. Information from monitoring of hard- and softbottom fauna, algal blooms, nutrients, chlorophyll *a* and oxygen are therefore primary sources for the classification. For this purpose readily available reports from environmental studies have been used, and these are listed in Chapter 4.

The Screening has used detailed information of the nutrient loads discharging to the inshore waters, including the loads from population, industry, aquaculture, and agriculture.

The results from the Screening Procedure are described in this report with a statement of initial eutrophication status for each area. The areas considered being “Non Problem Areas” with regard to nutrient enrichment are identified. The status of the other areas will be considered via the Comprehensive Procedure.

2. Data sources and data treatment

2.1 Topography and hydrography

According to the Urban Waste Water Directive the coast between the Swedish border and Lindesnes has been designated as a sensitive area, and this coastline was subjected to the Comprehensive Procedure in 2002 (**Figure 1**). The coast further to the west and to the north has been designated a less sensitive area under the same Directive (except for the Grimstadfjord near Bergen) and will now be subjected to the Screening Procedure.

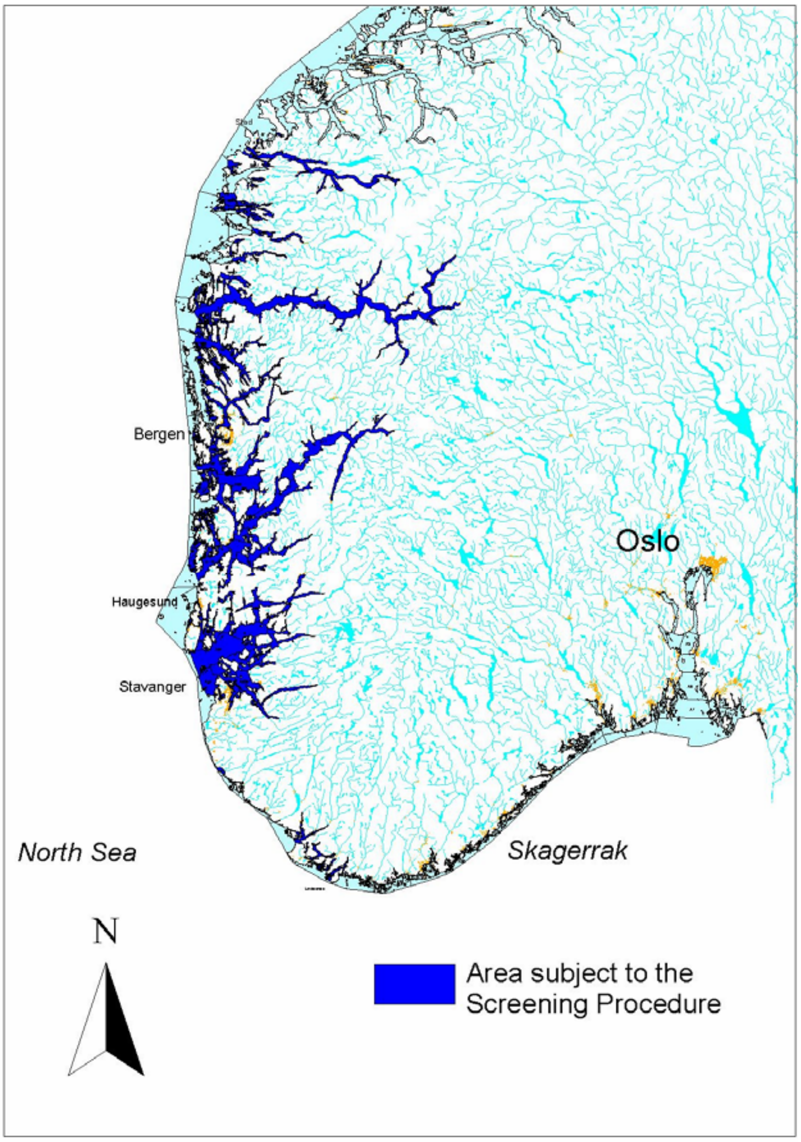


Figure 1. Overall view of the coastline of southern Norway. From Lindesnes to Stad the coastal areas are subjected to Screening under the Common Procedure.

The coastal zone of Norway has an extremely varied topography and spans a range of habitats and ecosystems from very sheltered fjords to fully open and exposed headlands. The most characteristic features are the fjords, which may reach 200 km into the mainland (the Sognefjord), and the archipelagos and skerries, which in many regions form a broad intermediate zone between the mainland and the open sea. A typical fjord has a deep fjord basin (up to 1300 m) and a shallow sill at the fjord entrance. The archipelagos are characterised by a mixture of shallow and deep sounds, channels and basins. With few exceptions the offshore waters are deep (> 200 m) close to the shore all along the coast.

The coastal waters along the coast of west Norway are basically a mixture of two water masses: Atlantic water (salinity>35) and freshwater. Most of the Atlantic water enters the North Sea through the passages between the Faroe Islands and Scotland and between the Faroe Island and Norway. Most of the freshwater comes from three sources, namely from local runoff to the coast, the Baltic Sea and the large rivers draining to the southern part of the North Sea. These water masses combine to form the Norwegian Coastal Current (NCC). (See **Figure 2**). The water volume transport of the NCC increases from typically 0.2-0.3 million m^3/s at the Skagerrak coast to 1 million m^3/s or more off the coast of west Norway.

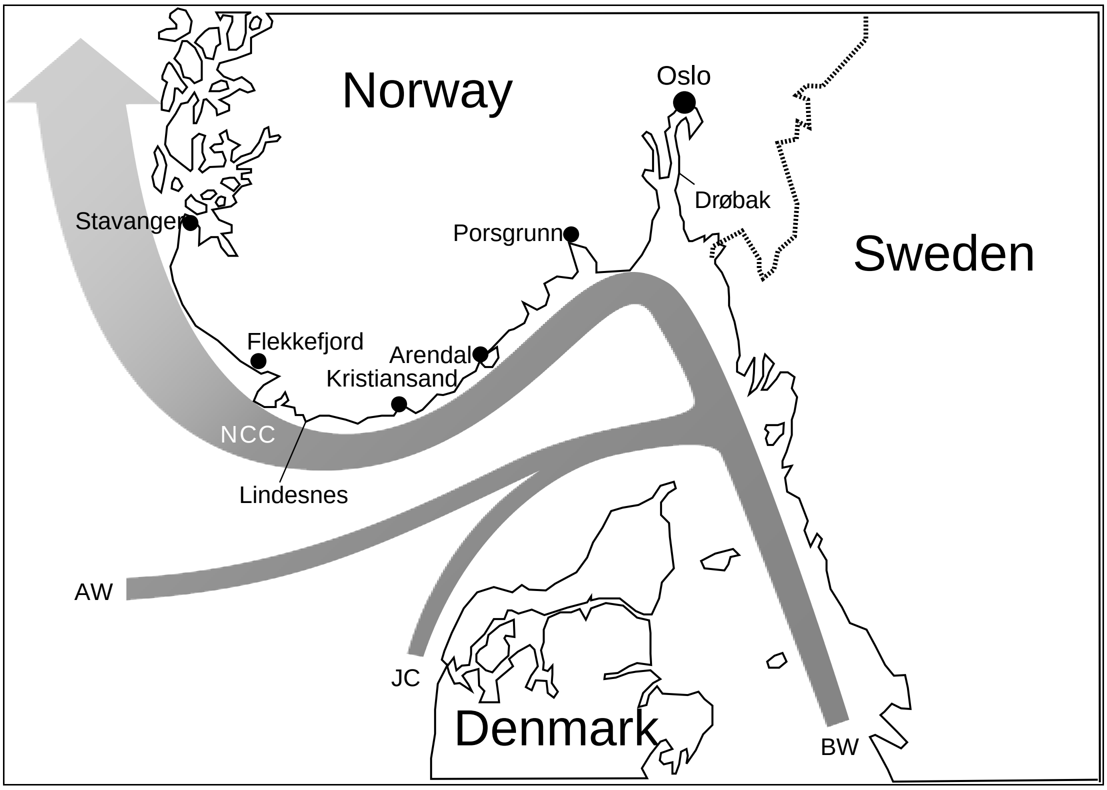


Figure 2. Dominating current pattern in the coastal water of southern Norway. The width of the arrows is not directly related to the current volume transport (AW: Atlantic Water, BW: Baltic Water, JC: Jutland Current, NCC: Norwegian Coastal Current. From ANON 1997).

The water exchange in the coastal zone is driven by input of fresh water, tidal currents and meteorological forces (wind stress and air pressure variations). In most areas, the exchange of surface and intermediate water masses is rapid and extensive, often the matter of a couple of days or weeks. The tidal amplitude increases from 0.1 m on the Skagerrak coast to more than 1 m in northern Norway. Combined with similar increasing meteorological forces, this leads generally to higher water exchange on the coast of western Norway than on the Skagerrak coast. The direction and volume of the coastal current combined with the vigorous exchange between coastal water and inshore waters imply that the latter are susceptible to transboundary loads.

2.2 Demographic data

The screening area includes part of West-Agder county and Rogaland, Hordaland and Sogn&Fjordane counties with a population of about 950.000, of which nearly 50% lives in urban regions. Approximately 45% lives in the three larges cities Bergen, Stavanger and Haugesund (**Figure 3**). The catchment area draining into this coastline is approximately 42000 km^2 and as a whole the population density is approximately 22 persons pr. km^2 .

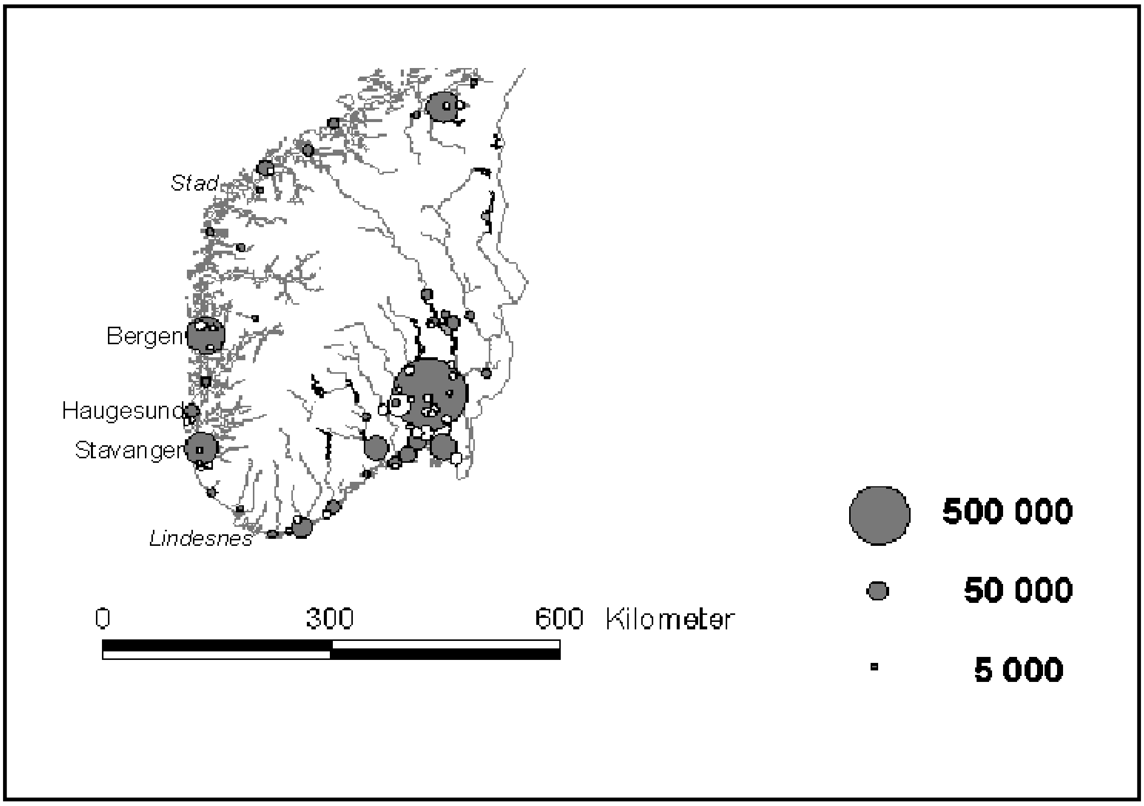


Figure 3. Population centres with more than 5000 inhabitants in southern Norway (From Statistics Norway 2000. Based on map from *Statens kartverk*, permission number LKS 82003-596).

2.3 Selection of coastal areas

Statististics Norway assemble statistics for so-called Statistical Areas, and from topographic and demographic parameters the coast was divided into 107 subareas each including one or more statistical areas. For each subarea the freshwater runoff and nutrient load was calculated (see following chapter). The same method was previously applied for the Comprehensive Procedure on the Norwegian Skagerrak coast.

2.4 Calculation of nutrient loads

2.4.1 Local load

The nutrient inputs from various sources to each subarea for the years 1985, 1990 and 1995-2000 have been quantified. For large rivers with monthly or fortnightly observations, these data are used for the calculations. For the other areas the nutrient load has been calculated by running the input model TEOTIL (Bratli and Tjomsland, 1996). The nutrient load has also been calculated pr. month and for each source. The model takes account of data from industrial sources, municipal wastewater, scattered dwellings, agriculture and aquaculture.

Run-off coefficients from various types of agricultural fields have been developed and are adjusted according to measures implemented. Concerning background losses of nutrients, fixed run-off coefficients have been developed for non-cultivated areas, as well as for deposition on water bodies. The inputs are theoretical and the annual meteorological variations are averaged out over the years.

In the assessment the average annual nutrient loads for the period 1997-2000 have been used. The environmental situation in the inshore waters is in general evaluated from the period 1990-2000, and in some cases going back to 1985.

2.4.2 Transboundary load

The Norwegian Coastal Current off the west coast favours transports from the Skagerrak and the west coast is therefore a potentially recipient of highly diluted water and properties associated with this areas. The impact is not evident and in general the coastal water holds a high quality (ANON 1997). The water exchange between the fjords/skerries and the coastal water is vigorous and increases from south to north (see Chapter 2.1).

2.5 Water quality and biological communities

The data on water quality and biological conditions for the subareas were collected from a large number of recipient studies. However, in general the studies have concentrated on local problems and therefore cover relatively small areas. In most cases they include nutrients, oxygen, temperature, salinity and soft bottom fauna. Some studies also include hard bottom flora and fauna. In general methods approved as national standards (where such exist) have been used. For screening purpose we have mainly used data from the period 1990-2000.

The evaluation of toxic algae and mussel infection (blue mussel) are mainly based on data from weekly sampling on 8 stations on the coast of west Norway (**Figure 4**). Stations 8-10 are located in Rogaland county, stations 11-13 in Hordaland county and stations 14-15 in Sogn and Fjordane county. In general these stations are considered representative for the situation on the coast. The sampling period is March-October. Water samples from the upper 3-10 m of the water column are analysed for *Dinophysis* spp., *Alexandrium* spp. and *Pseudo-nitzschia* spp. In addition dominating algae species and occurrence of other potential harmful algae are registered. The blue mussels are tested for DSP, PSP, and from 2002 also YTX, ASP, AZA, and PTX.

The cause to toxic algal blooms is uncertain – either naturally occurring or trigged by anthropogenic loads of nutrients.

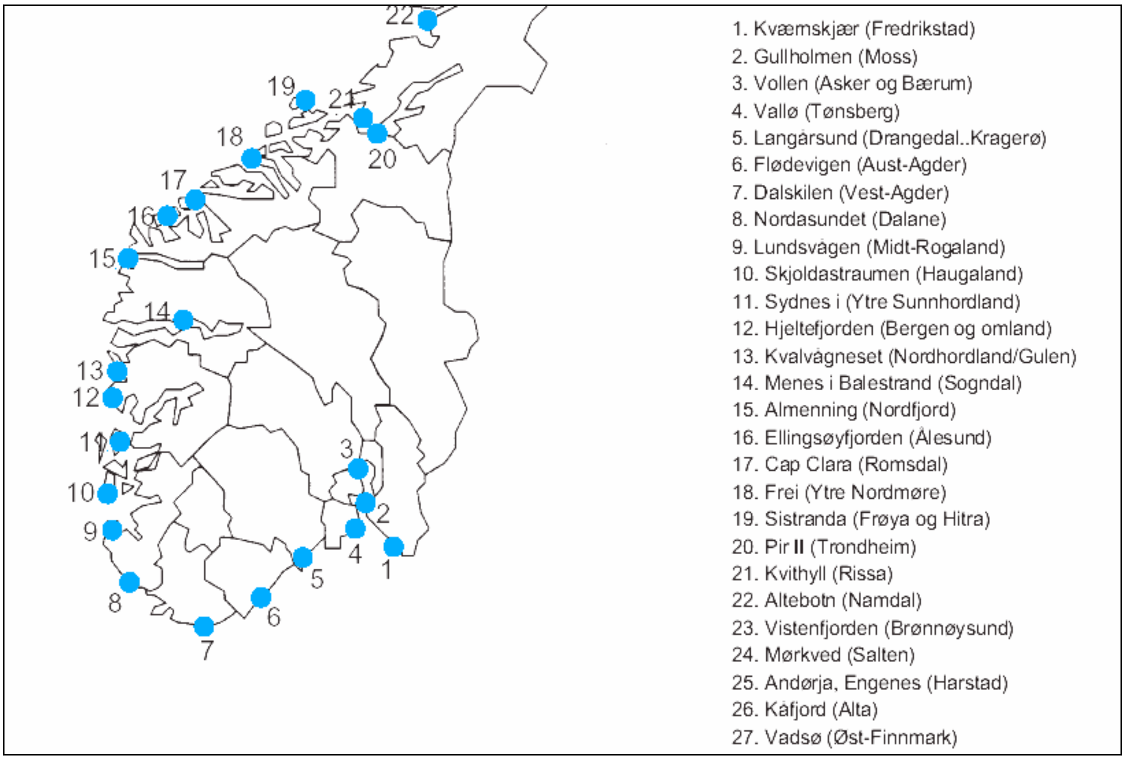


Figure 4. Stations for monitoring of toxic algae and mussel toxins in southern Norway (from Hestdal et al., 2001). Stations 8-15 are situated in the screening area.

3. Results from the Screening Procedure

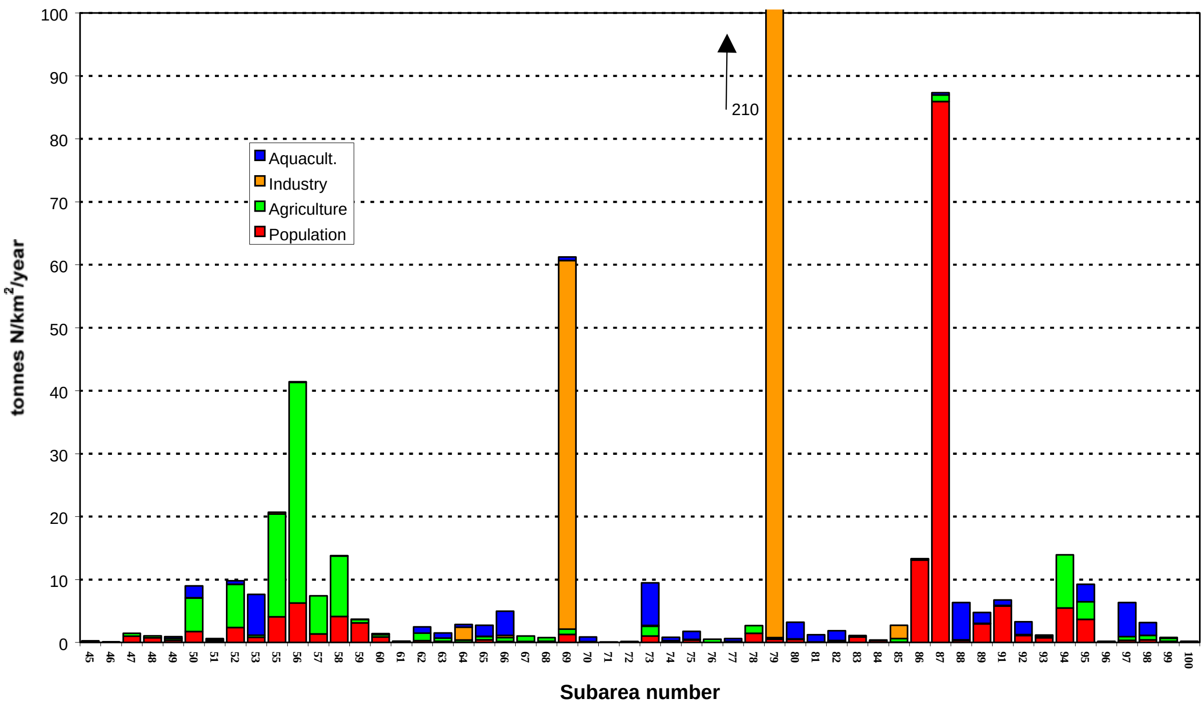
3.1 Nutrient loads

The nutrient loads and freshwater runoff are shown in Appendix B. As a start in the screening the anthropogenic nutrient load per km^2 and year of the fjord surface has been calculated for each area, as average for 1997-2000 (**Figure 5** and **Figure 6**). As seen from the legend the load is mostly dominated by nutrients from aquaculture, municipal wastewater, and industry.

The nutrient loads are highly varying, from 0.1 tonnes N/km^2/year to more than 100 tonnes N/km^2/year and from 0.01 tonnes P/km^2/year to more than 10 tonnes P/km^2/year.

Another characteristic feature is that the nutrient loads in the northern half of the screening area is significantly lower than in the southern half.

The impact on water quality from these nutrient loads depends on the water exchange. Using the model FjordEnviron (Stigebrandt 2001) on a typical fjord in Hordaland county (middle of the screening area) with area of 10 km^2, freshwater runoff 20 m^3/s, and sill depth of 15 m we find an average residence time of 4-5 days for the water body of 0-15 m depth. A relatively high nitrogen load of 10 tonnes N/km^2/year then increases the average total nitrogen concentration in 0-15 m depth by less than 10 mg N/m^3. For total phosphorus a typical high load should be 2 tonnes P/km^2/year or an average increase of 2 mg P/m^3. This example illustrates that in general the anthropogenic nutrient load in the screening area will have little impact on the nutrient concentrations in the fjord water.



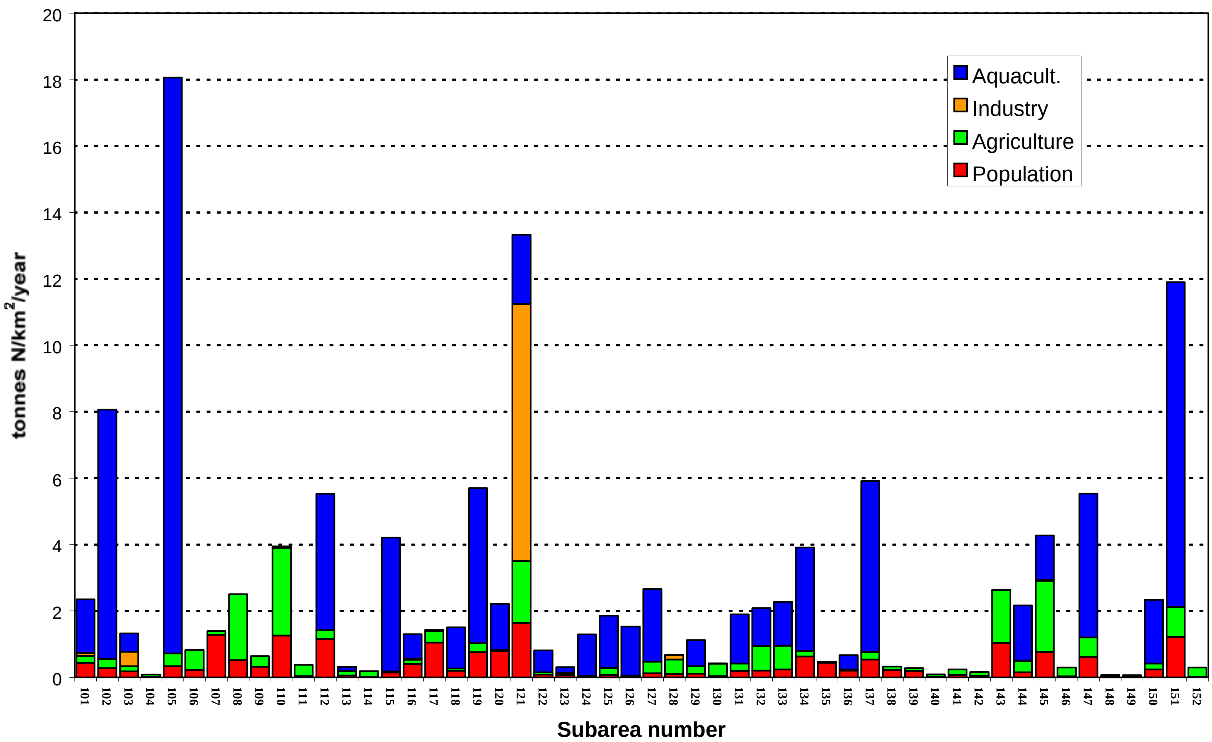


Figure 5. Nitrogen load pr. km^2 and year for Ospar areas, from Population, Industry, Agriculture and Aquaculture. Upper figure: subareas 45-100. Lower figure: subareas 101-152. Note different scale on the y-axis for the two figures

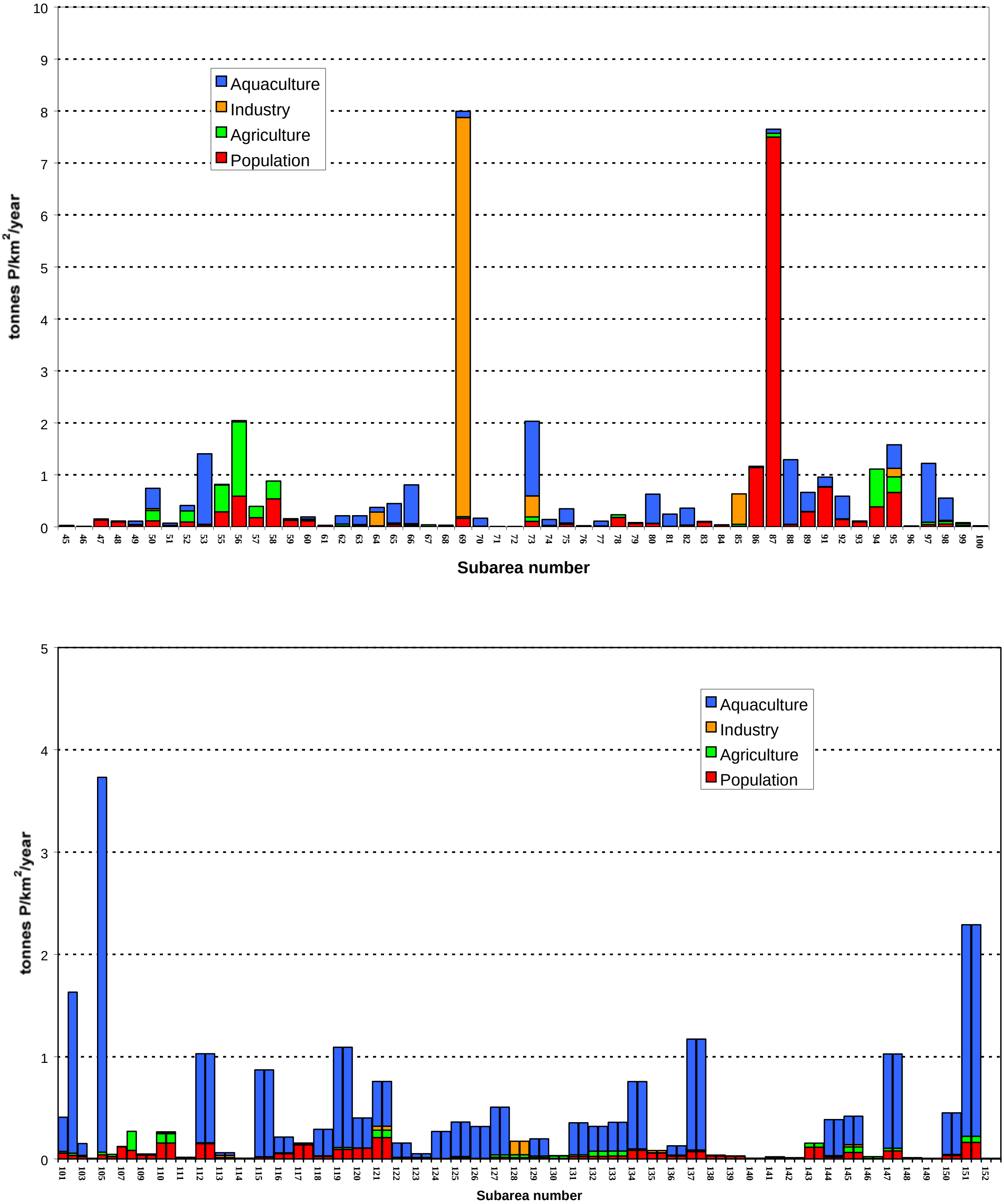


Figure 6. Phosphorus load pr. km^2 and year for Ospar areas, from Population, Industry, Agriculture and Aquaculture. Upper figure: subareas 45-100. Lower figure: subareas 101-152. Note different scale on the y-axis for the two figures.

3.2 Water quality

Data describing water quality is found in a large number of studies, but usually related to relatively small recipients and not covering the whole subarea that is under screening. With a few exceptions (like the monitoring programme for fjords around the city of Bergen and the inner part of Sørfjord) the studies cover a period of one year of less.

Usually the water quality parameters include nutrients (nitrate, phosphate and sometimes total nitrogen, total phosphorus and ammonium), chlorophyll *a*, secchi depth and oxygen. The results have been classified according to the Norwegian classification system (Molvaer et al., 1997) if the data have been sufficient for that purpose.

However, for a large number or fjords and inshore areas there are no data describing the water quality. These two limitations in space and in time make the evaluation difficult. Where there is no data the nutrient load (see Chapter 3.1), topography and the water exchange have been basis for the classification.

The results from the recipient studies indicate that the water quality in the upper 10-20 m of the inshore areas in general is Good – Very Good.

- High nutrient concentration and production is observed or indicated in a number of fjords and estuaries, and these subareas will be subjected to the Comprehensive Procedure.

In a number of areas there are occasional oxygen problems behind sills. This situation is usually caused by a combination of

- prolonged residence time (small supply of oxygen-rich water) for the basin water due to restricted water exchange
- oxygen consumption caused by a transboundary load of nutrient and organic matter
- oxygen consumption from a local load of nutrients and organic matter

The areas that experience such problems are in most cases only minor parts of the total area under consideration. Where it is <u>obvious</u> that the local load is very small, the area with oxygen problem covers only a small part and that natural conditions dominates the situation, the oxygen situation indicates Non Problem Area.

3.3 Biological communities

Data describing the biological communities is found in a large number of studies, but mostly related to relatively small recipients and not covering the whole Ospar area. With a few exceptions (like the monitoring programme for fjords around the city of Bergen and the inner part of Sørfjord and the monitoring programme for algal toxins) the studies cover a period of one year of less.

Usually the studies include soft bottom fauna, and in fewer cases also hardbottom flora and fauna. The soft bottom fauna have usually been classified according to the Norwegian classification system (Molvær et al., 1997).

For a large number of fjords and inshore areas there are no data describing the biological communities. The results from the recipient studies indicate that the hard bottom flora and fauna in the upper 10-20 m of the inshore areas in general is in a good condition.

The evaluation of toxic algae and mussel infection (blue mussel) is mainly based on data from weekly sampling on 8 stations on the coast of western Norway (**Figure 4**), see also chapter 2.5. The sampling period is March-October. Water samples from the upper 3-10 m of the water column are analysed for *Dinophysis* spp., *Alexandrium* spp. and *Pseudo-nitzschia* spp. In addition dominating algae species and occurrence of other potential harmful algae are registered. The blue mussels are tested for DSP, PSP, YTX, ASP, AZA, and PTX. The evaluation is based on data from 1998-2000 and in brief, from 2000 (**Table 1**):

Table 1. Number of weeks with warnings against consumption of blue mussels due to algal toxins (from Hestdal et al., 2001).

Station: number and name	Number of warnings against consumption of blue mussels				
	Alexandrium spp.	*Dinophysis spp.*	*Alexandrium+ Dinophysis*	*Pseudo-nitzschia spp.*	Total
8 Dalane	2	16			18
9 Middle Rogaland county	4	19			23
10 Haugaland	4	17			21
11 Outer Sunnhordaland	11	12			23
12 Bergen and surrounding area	7	11			18
13 North Hordaland	4	5			9
14 Sogndal	1	24	6	(6)	31
15 Nordfjord	10	3	3		16

Dinophysis spp. is the main problem in widely different fjords like the inner part of Hardangerfjord including the Sørfjord (areas 77 and 79) with an especially high nitrogen load, and the Sognefjord (areas 106-113, including station 14 in **Table 1**) where the nutrient load is low. The causes behind toxic alga blooms are uncertain and may be naturally occurring, trigged by local anthropogenic changing loads of nutrients or generally an effect from transboundary loads. Or more likely, combinations of several possible causes. There are yet no clear and established links to any particular causative influence, and in particular to nutrient enrichment.

Where the nutrient load is low and there otherwise are no indications of effects from nutrient enrichment, the algal toxin problem is attributed to natural effects and the area in question has been classified as Non Problem Area.

3.4 Overall assessment of eutrophication status

The overall classification is summarised in **Figure 7-Figure 11** and Appendix A. Note that for some areas the numbering is not consecutive.

Out of a total of 106 areas, 46 areas are classified as Non Problem Areas (NPA). The other subareas should be subjected to the Comprehensive Procedure for a final classification.

There are relatively few observations along the coast, which implies a subjective assessment to many areas. The criteria used for areas with few or without any observations were:

Classification as Non Problem Areas (NPA) if

- The anthropogenic nutrient load is low, and
- The areas have a mainly high and unrestricted water exchange.

Areas with reported observations and any report of environmental disturbance that can be connected to nutrient enrichment should be subjected to the Comprehensive Procedure.

There are many small/restricted areas (polls). These are only partly classified if there are observations. However, in some areas small polls or basins are not assessed.

The frequent registrations of harmful algae and mussel toxins at a limited number of monitoring stations represent a problem in the classification process as such registration alone may classify an area as a potential problem area. Usually these observations cannot be connected to an anthropogenic load of nutrients. In this assessment, if harmful algae is the only observation in an area under consideration and the nutrient load is low, the area should be subjected to the Comprehensive Procedure.

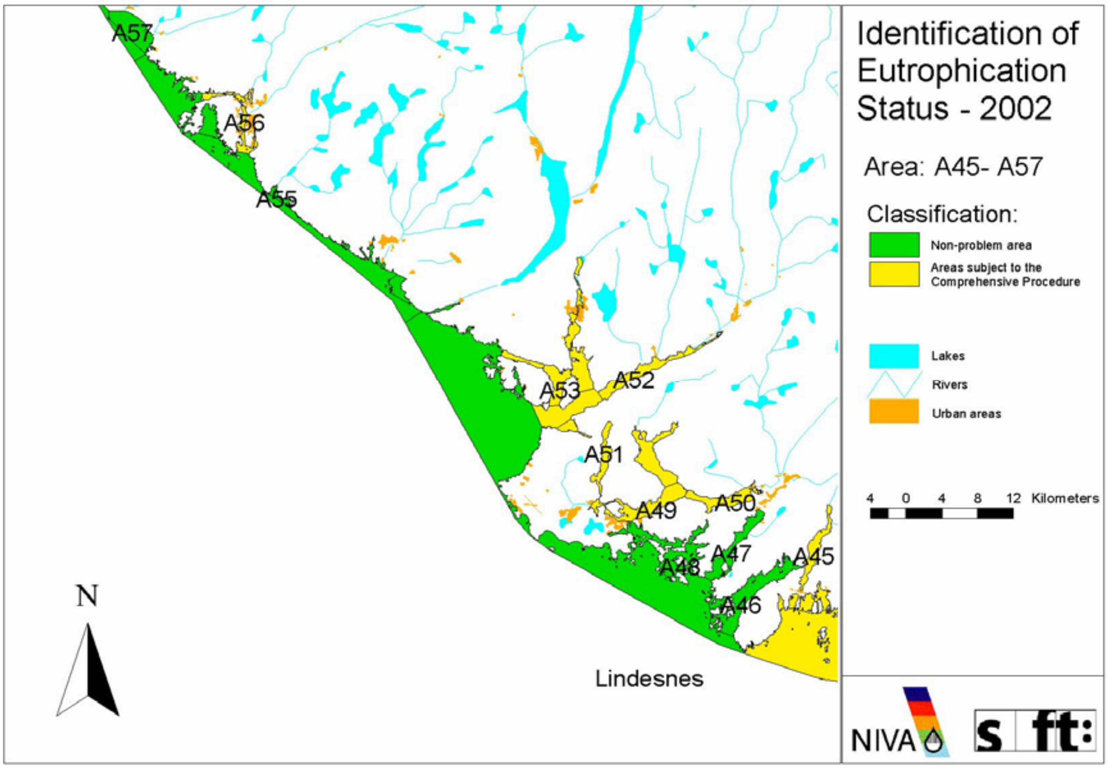


Figure 7. Classification of areas 45-57

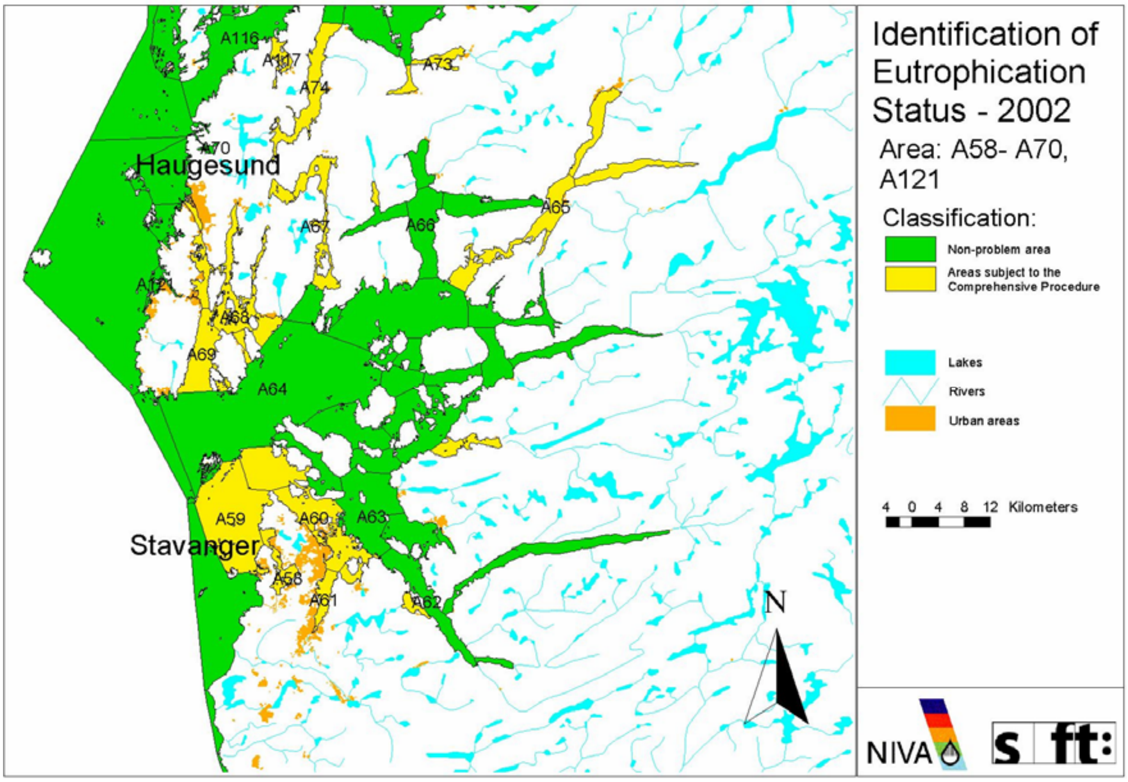


Figure 8. Classification of areas 58-70 and area 121.

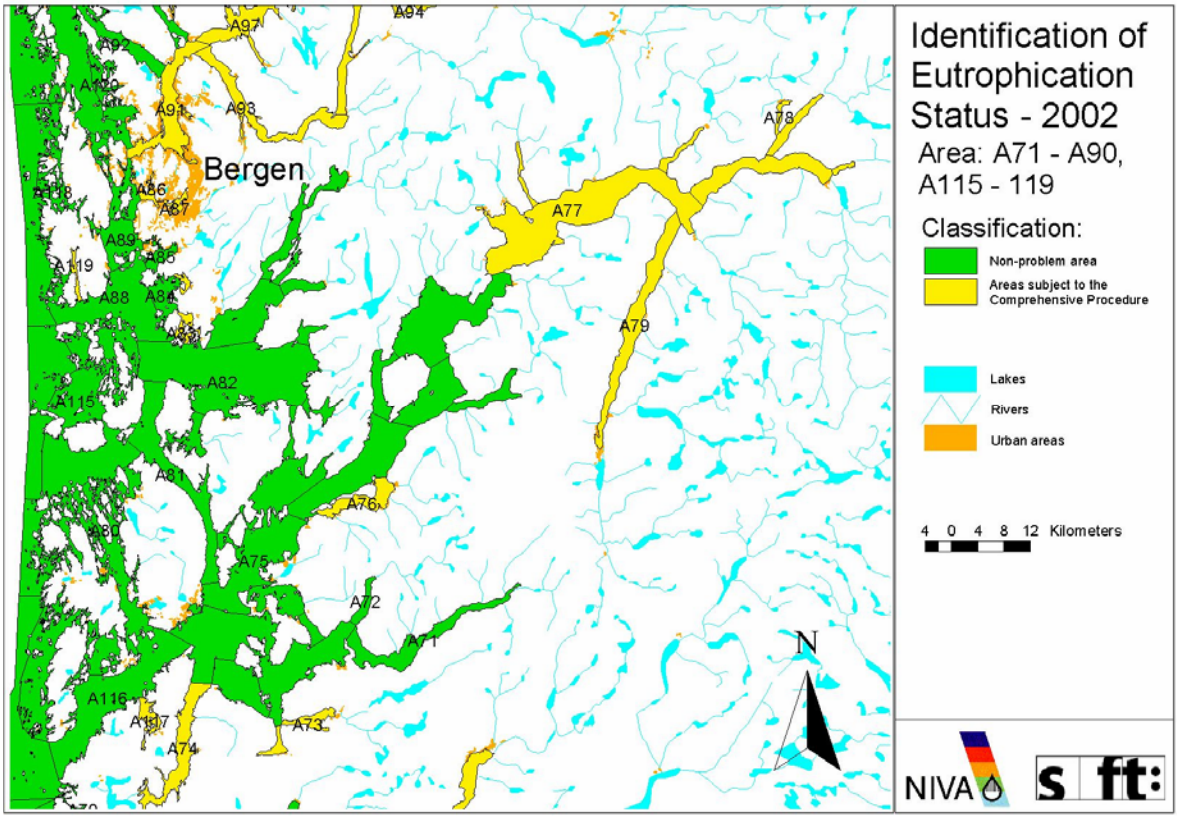


Figure 9. Classification of areas 71-90, 115, 116 and 119.

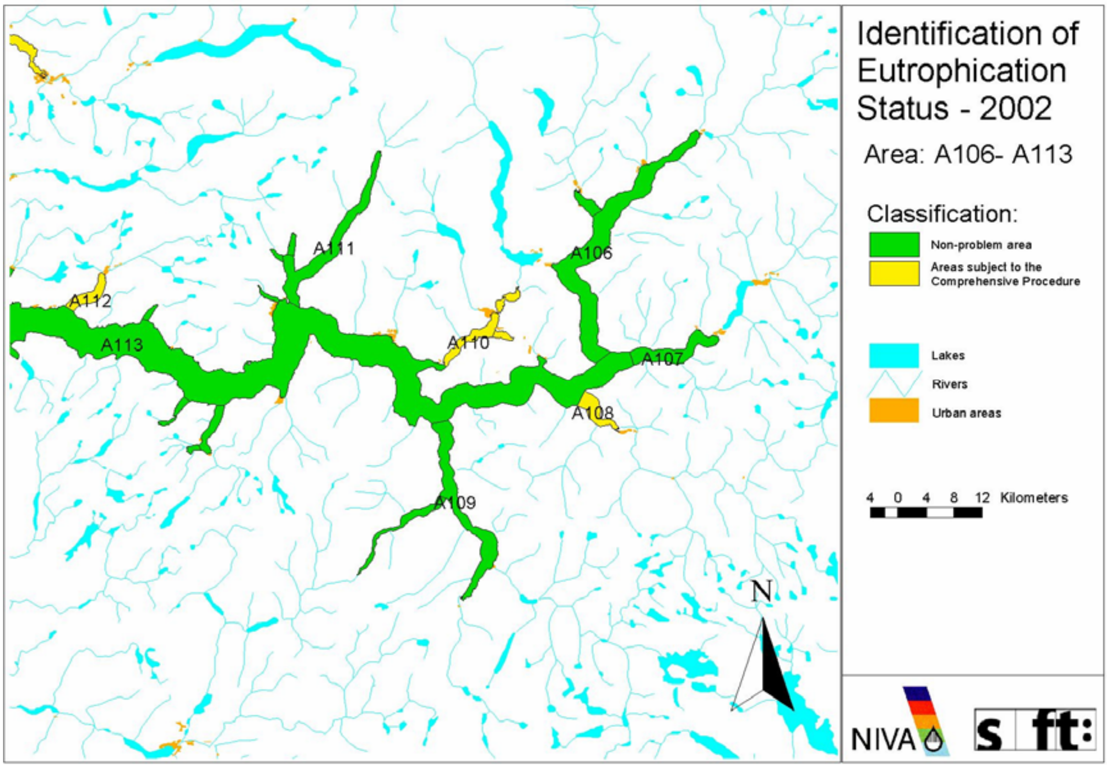


Figure 10. Classification of areas 106-113

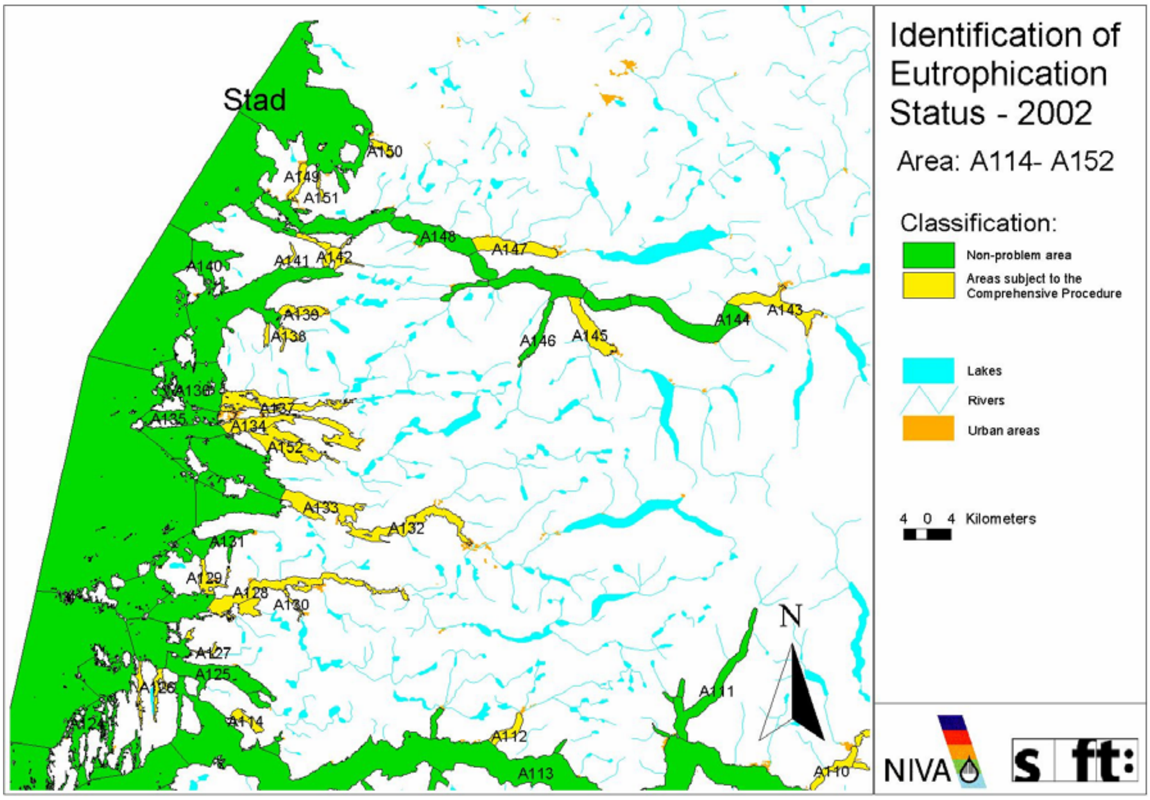


Figure 11. Classification of areas 114-152

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Appendix A. Classification table

Classification of areas 45-152 in the coastal zone between Lindesnes and Stad. (NPA= Non Problem Area, SCP= Subject to the Comprehensive Procedure).

Area no	Area name	Classification	Comments	Year of obs.	Report
45	Lenefjord	**SCP**		1989	X
46	Grønsfjord	**NPA**		1989	X
47	Rosfjord	**NPA**		1992	X
48	Skarvøy – Spindsfjord	**NPA**			
49	Lyngdalsfjord + Oftefjord + Helvikfjord	**SCP**		1998	X
50	Inner Lyngdalsfjord	**SCP**		1998	X
51	Framvaren	**SCP**			
52	Fedafjord	**SCP**		1992	X
53	Flekkefjord: Grisefjord - Lafjord	**SCP**		1994-95	X
55	Coastal area Hidra - Egersund	**NPA**			
56	Egersund	**SCP**		1983	X
57	Egersund – Hafrsfjord	**NPA**			
58	Hafrsfjord-Vistavik	**SCP**		1995	X
59	Håsteinfjord - Kvitsøyfjord	**SCP**		1995	X
60	Riskafjord – Åmøyfjord - Byfjord	**SCP**		1995	X
61	Gandsfjord	**SCP**		1995	X
62	Høgsfjord – Lysefjord - Høle basin	**NPA**	Høle basin SCP	1992	X
63	Talgjefjord – Idsefjord	**NPA**			X
64	Boknafjord with Jøsenfjord (Outer Årdalsfjord)	**NPA (SCP)**	Årdalsfjord SCP	1996-99	X
65	Sandsfjord - Saudafjord - Hylsfjord	**SCP**		200-2001	X
66	Vindafjord (Vatsfjord)	**NPA (SCP)**	Vatsfjord SCP	2002	X
67	Skjoldafjord	**SCP**		1981-89	X
68	Kårstø - Førdesfjord - Førlandsfjord	**SCP**		1997/1999	X
69	Karmsund	**SCP**		1997/1999/ 2000	X
70	Viksefjord og Mølstrevåg	**NPA**			
71	Åkrafjord	**NPA**			
72	Matrefjord	**NPA**			
73	Etnefjord and Ølen	**SCP**			
74	Ålfjord	**SCP**			
75	Klosterfjord area	**NPA**			
76	Rosendal	**SCP**			
77	Hardangerfjord	**NPA**	Partly SCP	1996	X
78	Ulvikpoll	**SCP**		1996, 1999-2000	X

Area no	Area name	Classification	Comments	Year of obs.	Report
79	Sørfjord	**SCP**		1998/1999/ 2000	X
80	Bømlo	**NPA**		Model	X
81	Langenuen	**NPA**			
82	Bjørnafjord - Samnangerfjord	**NPA**	Polls with problems	1992/93	X
83	Strøno	**SCP**		1999/2001	X
84	Lysefjord	**NPA**	Partly SCP	1993	X
85	Fanafjord	**NPA**		2001	X
86	Grimstadfjord	**SCP**		2001	
87	Nordåsvatn	**SCP**		2001	X
88	Korsfjord	**NPA**			
89	Raunefjorden - Kobbaleia	**NPA**		2001	X
91	Byfjord - Bergen	**SCP**		2001	X
92	Herdlafjord	**NPA**	Polls, SCP	2000	X
93	Sørfjorden - Veafjord	**SCP**		1994/2001	X
94	Bolstadfjord	**SCP**			
95	Eidsfjord	**SCP**			
96	Mofjord	**SCP**			
97	Osterfjord	**NPA**			
98	Manger - Radøyfjord	**NPA**			
99	Lurefjorden with Vatlestraumen	**SCP**		1989-90, 1995	X
100	Lindåspollene	**SCP**		1989-90	X
101	Austfjord	**SCP**			
102	Masfjord - Matrefjord	**SCP**			
103	Fensfjord	**NPA**			
104	Sandøy area	**SCP**			
105	Gulafjord	**SCP**			
106	Lusterfjord	**NPA**			
107	Årdalsfjord	**NPA**			
108	Lærdalsfjord	**SCP**			
109	Aurlandsfjord	**NPA**			
110	Sogndalsfjord	**SCP**		1999	X
111	Fjærlandsfjord	**NPA**			
112	Høyangsfjord	**SCP**			
113	Sognefjord (main area) - Sognesjøen	**NPA**			
114	Lifjord	**SCP**			
115	Austevoll	**NPA**			
116	Bømlafjord	**NPA**			
117	Førdespoll	**SCP**			
118	Møvik - Sotra	**NPA**			
119	Austefjorden - Sotra	**SCP**		1994	X
120	Hauglandsosen	**NPA**			
121	Veavågen, Karmøy	**NPA**			
122	Hopelandsosen	**NPA**			

Area no	Area name	Classification	Comments	Year of obs.	Report
123	Nordangsvågen	**NPA**			
124	Ytre Sula	**NPA**			
125	Åfjord	**NPA**			
126	Hagefjord-Dumbefjord	**SCP**			
127	Lillefjord-Bygdevåg	**SCP**			
128	Dalsfjord	**SCP**			
129	Granesund	**SCP**		1993-94	X
130	Flekkefjord	**SCP**			
131	Stongfjord	**NPA**			
132	Førdefjord-Inner	**SCP**		1999-2000	X
133	Førdefjord-Outer	**SCP**		1997	X
134	Solheimsfjord-Eikrefjord	**SCP**		1998	X
135	Skorpefjord	**NPA**		1998	X
136	Hellefjord	**NPA**		1998	X
137	Dalsfjord	**SCP**		2000	X
138	Southern-middle Gulen	**SCP**			
139	Nordgulen	**SCP**			
140	Bremangerpollen	**NPA**			
141	Berlepollen	**SCP**			
142	Hornelsfjord	**SCP**		1989	X
143	Nordfjord-Stryn	**SCP**		2000	X
144	Nordfjord-Middle	**NPA**			
145	Gloppen	**SCP**			
146	Hyenfjord	**NPA**			
147	Eidsfjord	**SCP**			
148	Nordfjord-Ytre	**NPA**			
149	Ulvesund	**SCP**		1992	X
150	Moldefjord	**SCP**		2000	X
151	Sørpollen	**SCP**			
152	Høydalsfjord	**SCP**			

Appendix B. Nutrient load pr. area

The nutrient load is average for the period 1997-2000 while the freshwater runoff (Q) is average for the 30-year period 1961-90.

Area no	Area name	Q m^3/s	Fjord area km^2	Nitrogen tonnes/year	Phosphorus tonnes/year
45	Lenefjord	0.3	7.4	1.9	0.2
46	Grønsfjord	0.3	20.3	1.9	0.2
47	Rosfjord	2.7	10.5	15.3	1.6
48	Skarøy-Spindsfjord	2.7	14.2	15.3	1.6
49	Lyngdalsfjord-Oftefjord	1.9	25.8	24.4	2.8
50	Lyngdalsfjord Indre	65.0	8.5	77.3	6.6
51	Framvaren	0.2	5.6	3.4	0.4
52	Fedafjord	166.8	9.4	91.7	3.9
53	Flekkefjord	8.2	38.8	296.0	54.5
55	Hidra-Egersund	215.5	6.1	133.0	5.7
56	Egersund	80.1	6.9	285.8	14.4
57	Egersund-Hafrsfjord	13.6	12.1	89.6	4.8
58	Hafrsfjord	2.2	12.2	169.0	10.7
59	Håsteinfjord-Kvitsøyfjord	2.6	187.9	697.6	29.8
60	Åmøyfjord-Kilsafjord	4.9	68.3	96.7	12.0
61	Gandsfjord	0.1	14.6	3.1	0.4
62	Høgsfjord-Lysefjord	88.9	107.2	267.4	22.6
63	Idsefjord-Talgjefjord	20.1	215.6	323.8	45.4
64	Boknafjord	133.6	802.9	665.7	91.3
65	Hylsfjord	121.9	99.4	269.8	43.1
66	Vindafjord	22.4	118.1	551.6	94.0
67	Skjoldafjord	4.4	43.7	45.3	1.8
68	Kårstå-Førdesfjord-Førlandsfjord	5.1	64.7	50.8	2.1
69	Karmsund	8.3	69.5	357.5	44.1
121	Veavågen	1.2	7.4	109.1	14.0
70	Viksefjord-Mølstrevåg	0.1	9.7	8.3	1.6
71	Åkrafjord	16.1	48.3	5.0	0.3
72	Matjefjord	9.9	9.1	1.4	0.1
73	Etnefjord-Ølen	17.9	17.3	163.2	28.9
74	Ålfjord	9.4	93.0	78.7	13.3
75	Klosterfjord	12.9	344.6	604.1	112.8
76	Rosendal	8.9	24.1	12.1	0.6
77	Hardangerfjord	182.2	604.5	372.6	64.5
78	Ulvikpollen	4.7	4.1	10.9	0.9
79	Sørfjorden	60.3	63.7	604.1	5.2
80	Bømlafjord	10.8	225.9	726.7	141.9
81	Langenuen	3.2	92.4	111.9	22.7
82	Bjørnafjord	40.7	363.4	676.9	130.6
115	Austevoll	3.8	108.7	457.5	94.6
116	Bømlafjord	4.9	131.9	167.5	28.5

Area no	Area name	QN m3/s	Fjord area km2	Nitrogen tonnes/year	Phosphorus tonnes/year
117	Førdespollen	0.9	10.7	15.2	1.7
83	Strøno	1.7	7.9	8.5	0.8
84	Lysefjord	1.7	21.6	8.5	0.8
85	Grimseidfjord-Fanafjord	1.8	10.2	36.4	12.9
86	Grimstadfjord	0.3	4.6	61.1	5.4
87	Nordåsvatn	1.8	4.9	427.8	37.5
118	Møvik	1.0	17.4	26.2	5.0
119	Austedfjord	1.0	4.6	26.2	5.0
120	Hauglandsosen	0.3	27.0	59.7	10.8
88	Korsfjorden	9.5	97.5	617.4	125.9
89	Raunefjorden-Kobbaleia	2.4	53.0	252.7	35.1
91	Byfjorden	3.0	54.7	369.6	52.3
92	Herdlefjord	1.3	30.7	100.8	18.1
93	Sørfjorden-Veafjorden	24.5	68.8	107.1	7.7
94	Bolstadfjorden	99.5	8.1	112.8	9.0
95	Eidsfjord	28.6	2.7	24.9	10.2
96	Mofjord-Indre	1.6	7.4	1.4	0.1
97	Osterfjord	41.1	71.2	452.4	87.0
98	Radfjord-Mangersfjord	5.2	50.0	157.8	26.9
99	Lurefjord med Vatlestraumen	4.9	56.0	47.7	4.4
122	Hopelandsosen	0.4	45.8	37.3	7.2
123	Nordangsvågen	0.4	27.2	8.4	1.4
100	Lindåspollene	0.5	15.2	5.2	0.3
101	Austfjorden	1.4	45.8	109.8	18.7
102	Masfjord-Matrefjord	23.1	27.2	219.3	44.3
103	Fensfjord	10.2	115.3	106.2	17.4
104	Sandøynaområdet	5.3	90.2	7.5	0.6
105	Gulafjord	3.5	27.2	491.3	101.5
106	Lusterfjord	120.6	101.8	83.8	4.6
107	Årdalsfjord	80.6	24.3	33.9	3.0
108	Lærdalsfjord	83.0	11.2	28.1	3.0
109	Aurlandsfjord	100.0	57.7	36.8	2.8
110	Sogndalsfjord	44.8	20.1	80.3	5.8
111	Fjærlandsfjord	20.4	44.8	17.1	0.7
112	Høyangsfjord	8.9	10.3	56.9	10.6
113	Sognefjord-Sognesjøen	97.7	863.0	274.2	34.0
114	Lifjorden	0.7	8.0	1.5	0.1
124	Ytre Sula	0.4	64.9	84.1	17.4
125	Åfjord	2.7	60.1	111.9	21.7
126	Hagefjord-Dumbefjord	0.1	13.7	21.0	4.4
127	Lillefjord-Bygdevåg	0.3	3.8	10.1	1.9
128	Dalsfjord	8.7	53.7	29.9	2.9
129	Granesund	0.5	10.3	11.6	2.0
130	Flekkefjord	0.2	2.5	1.2	0.1
131	Stongfjord	0.5	11.0	20.9	3.9
132	Førdefjord-Indre	14.4	35.0	73.1	11.1
133	Førdefjord-Ytre	12.9	30.3	68.9	10.9

Area no	Area name	QN m3/s	Fjord area km2	Nitrogen tonnes/year	Phosphorus tonnes/year
134	Solheimsfjord-Eikrefjord	4.6	17.7	69.1	13.3
135	Skorpefjord	0.4	25.7	12.2	1.6
136	Hellefjord	2.6	63.5	42.7	7.7
137	Dalsfjord	15.5	37.5	221.5	44.0
138	Søndre-midtre Gulen	4.1	9.0	2.9	0.3
139	Nordgulen	4.1	10.7	2.9	0.3
140	Bremangerpollen	0.3	29.6	2.6	0.2
141	Berlepollen	0.1	2.7	0.6	0.1
142	Hornelsfjorden	0.3	16.3	2.6	0.2
143	Nordfjord-Stryn	93.1	28.8	75.7	4.5
144	Nordfjord-Midtre	49.6	130.8	283.6	50.2
145	Gloppen	42.9	23.7	101.7	10.0
146	Hyenfjord	17.7	12.0	3.6	0.3
147	Eidsfjord	5.0	26.8	148.3	27.5
148	Nordfjord-Ytre	0.2	105.2	7.4	1.4
149	Ulvesund	0.3	38.9	2.6	0.2
150	Moldefjord	0.2	5.6	13.1	2.5
151	Sørpollen	0.2	1.1	13.1	2.5
152	Høydalsfjorden	26.0	34.9	10.3	0.2

Statens forurensningstilsyn (SFT)
Postboks 8100 Dep, 0032 Oslo
Besøksadresse: Strømsveien 96

Telefon: 22 57 34 00
Telefaks: 22 67 67 06
E-post: postmottak@sft.no
Internett: www.sft.no

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Tittel - norsk og engelsk Common Procedure for Identification of the Eutrophication status of Maritime Area of the Oslo and Paris Conventions. Report on the Screening Procedure for the Norwegian Coast from Lindesnes to Stad.

Sammendrag – summary

The Norwegian coast from Lindesnes to Stad has been subjected to the Screening Procedure. Out of a total of 106 areas, 46 areas are classified as Non Problem Areas (NPA). The other subareas should be subjected to the Comprehensive Procedure for a final classification. There are few observations along the coast, which implies a subjective assessment to large areas. Areas without observations were classified as Non Problem Areas (NPA) if

- The anthropogenic nutrient load is low, and
- The area have mainly high and unrestricted water exchange.

Areas with reported observations and any report of environmental disturbance that can be connected to nutrient enrichment should be subjectec to the Comprehensive Procedure.

4 emneord	4 subject words
Ospar	Ospar
Eutrofi	Eutrophication
Kystvann	Coastal water
Screening	Screening