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COVER NOTE

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Delegations will find attached document SWD(2026) 232 final - Part 7/27.

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PART 7/27

COMMISSION STAFF WORKING DOCUMENT

Member State country fiche
on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member States reports for the period 2020–2023

Denmark

Country staff working document
on the implementation of the Nitrates Directive

Period: 2020-2023

Contents

1. KEY FINDINGS AND RECOMMENDATIONS

Denmark submitted its report under the Nitrates Directive for the period 2020-2023 in September 2024 ([1]) via electronic reporting on Reportnet 3 portal ([2]).

This country staff working document is presented in line with the reporting guidelines and it is based on the data reported by the Member State ([3]), Eurostat and other EU official data sources. The Danish authorities were consulted for factual correctness. There may be differences with the information presented in their national report ([4]).

The numbers presented below are indicators of the situation in the Member State but need further interpretation to draw specific conclusions. In some cases, changes in the monitoring networks and in methodology for assessing trophic status may complicate comparisons between reporting periods.

1.1. Key findings

Pressures from agriculture

In Denmark, the utilised agricultural area (UAA) accounts for 63% of the country's total land area, which is higher than the EU average (38%). The livestock density is 1.4 livestock units per hectare (LSU/ha) of UAA, which is higher than the EU average of 0.7 LSU/ha, and there are regional variations with higher livestock densities in some regions. Denmark did not report the gross nitrogen and phosphorus balances to Eurostat for the period 2020-2023.

Monitoring network

For groundwater, the density of the monitoring network is around 23 stations per 1 000 km^2, which is higher than the EU average (8 stations). Compared to the previous reporting period, the density decreased by 22%.

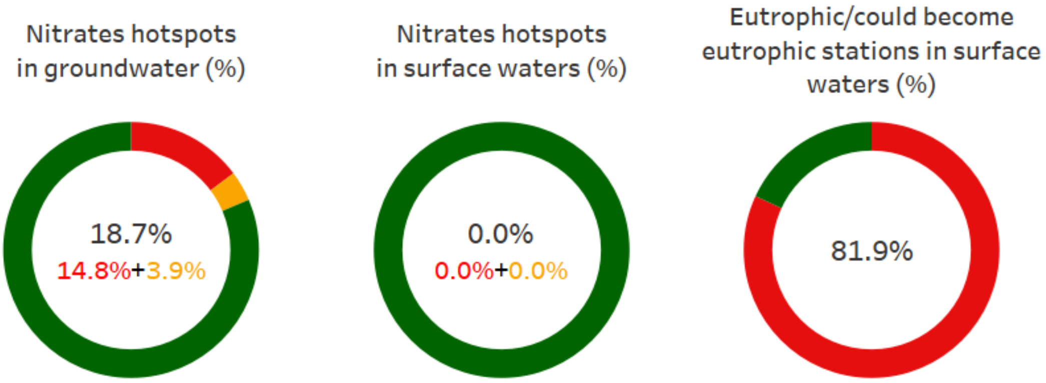
For surface freshwater, the density of the monitoring network is around 10 stations per 1 000 km^2, which is above the EU average (7 stations). Compared to the previous reporting period, the density decreased by 4%. The Danish surface water monitoring network includes river stations and lake/water reservoir stations.

For surface saline waters, the monitoring network includes coastal waters and marine waters. Trophic status is not reported for marine water stations.

(1) Final version was received in May 2025.
(2) https://reportnet.europa.eu/Reportnet 3 is an e-Reporting platform for reporting environmental and climate data to the European Environment Agency (EEA).
(3) Only monitoring points electronically reported with nitrate concentration or trophic status, which were not removed from the monitoring network were considered for this assessment.
(4) A uniform data-processing approach is applied to all Member States. In some instances this may not fully correspond to the specific methodology used in the Member State.

Water quality

Figure 1 – Share of monitoring points showing pollution in groundwater and surface waters



Note: The percentage share of **nitrate hotspots** refers to monitoring points with average annual nitrate concentrations ≥ 50 mg/l (red), or between 37.5 and 49.99 mg/l with an increasing trend (orange). This is calculated relative to the total number of points with measurements. The percentage share of monitoring points classified as **eutrophic or could become eutrophic** (red) is calculated relative to the total number of points with trophic status reported.

In groundwater, 85.2% of monitoring points show nitrate concentrations below 50 mg/l.

Overall, 18.7% of monitoring points fall in two categories illustrated in Figure 1, i.e., they show nitrate concentrations ≥ 50 mg/l (14.8%) or between 37.5 and 49.99 mg/l with an increasing trend (3.9%). Compared to the data reported in the previous reporting period, this represents an increase of 1.7 percentage points (from 17.0% to 18.7%). The regions with the highest share are Region Nordjylland (26.9%), Region Midtjylland (20.8%) and Region Sjælland (16.5%).

Compared to the previous reporting period, nitrate concentrations decreased in 29.5% of groundwater monitoring points and increased in 18.4%. Among points with nitrate concentration ≥ 50 mg/l, decreases (49.7%) were also more frequent than increases (42.8%).

In surface water, 100% of monitoring points show nitrate concentrations below 50 mg/l and 18.1% are classified as non-eutrophic.

None of the monitoring points show nitrate concentrations ≥ 50 mg/l, or between 37.5 and 49.99 mg/l with an increasing trend as illustrated in Figure 1. Compared to the data reported in the previous period, this represents a decrease of 0.4 percentage points (from 0.4% to 0%). 50% of surface water monitoring stations show nitrate concentrations ≥ 10 mg/l, which is relevant for eutrophication.

Compared to the previous reporting period, nitrate concentrations decreased in 46.8% of surface water monitoring points and increased in 3.0%.

The share of monitoring points reported as eutrophic/could become eutrophic is 81.9% as illustrated in Figure 1. This represents an increase of 2.5 percentage points compared to the data reported in the previous period (from 79.4% to 81.9%). Those regions with the highest share were the Region Nordjylland (85.9%), Sjælland (85.7%) and Hovedstaden (85.0%).

Nitrate Vulnerable Zones

In line with Article 3 paragraph 5,, Denmark applies an action programme with mandatory measures throughout the entire national territory.

Action Programme

During the reporting period, Denmark modified its action programme as it receives annual updates. Most amendments concerned the standards for fertiliser application which are updated every three years.

Derogation

During the reporting period, a derogation allowed Denmark the application of livestock manure up to a limit of 230 kg N/ha per year on cattle farms on which at least 80% of the acreage available for manure application were cultivated with crops with high nitrogen uptake and long growing season. The derogation expired in 2024.

1.2. Recommendations

- Review and where necessary reinforce measures to improve water quality, notably with a view to addressing:
    - high or increasing nitrate concentrations in groundwaters
    - high or increasing nitrate concentrations in surface waters
    - eutrophication of surface water bodies including coastal and marine waters.
- Close existing data gaps on nutrient balances in the reporting to Eurostat
- When preparing the Nitrates Action Programme:
    - take into account objectives and deadlines of the Water Framework Directive, ensuring coherence with the 4th RBMP
    - consider introducing limitations on phosphorus fertilisation, if not yet implemented
    - ensure the cooperation between competent authorities in different sectors, such as agriculture and water, and with stakeholders
    - consider where measures could be simplified without compromising on results, working with the Commission and the other member States in the light of the findings of the evaluation of the Nitrates Directive
- Promote the dissemination of best practice, scientific knowledge and innovation to:
    - improve the analysis of expected future evolution in water quality and develop gap assessments for the nutrient load reductions required to reach water quality objectives
    - accelerate preparedness and resilience of action programmes and measures in the context of climate change

2. PRESSURES FROM AGRICULTURE

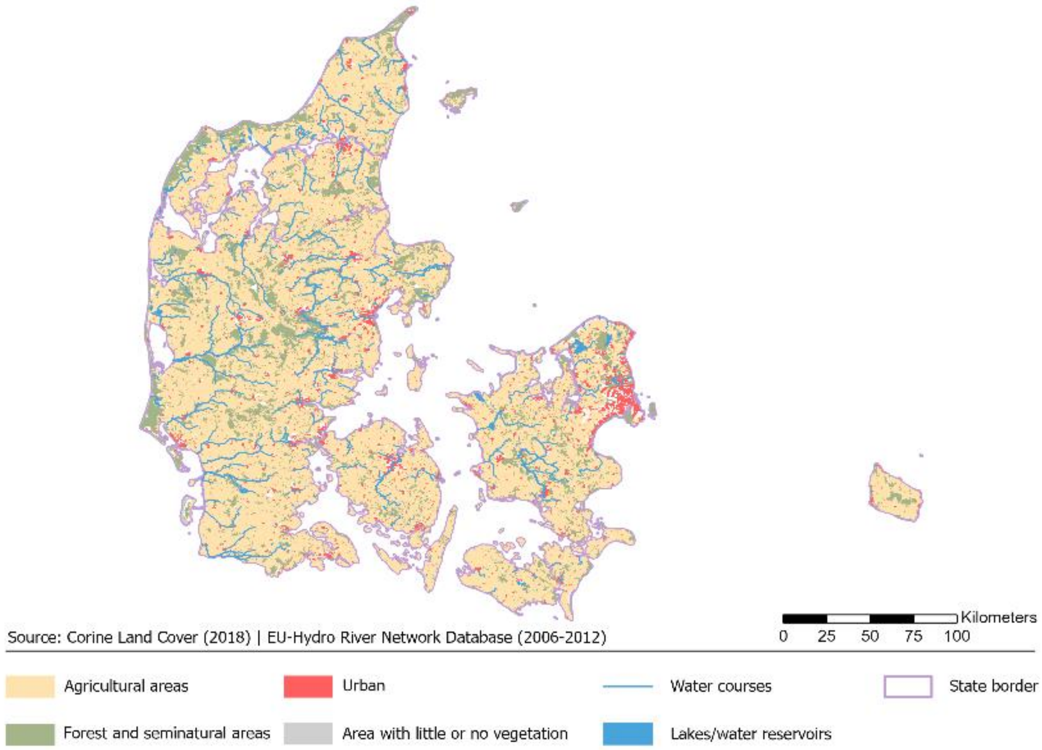
In Denmark, animal production accounted for the largest portion of the agricultural sector's total output value at 57.5% in the reporting period 2020-2023. Crop production followed with 36.3%, and other outputs made up 6.2%. ([5]) The share of agricultural land used for organic farming increased from 9.3% in the reporting period 2016-2019 to 11.5% in the reporting period 2020-2023. ([6])

The risk of diffuse pollution of waters by nutrients from agriculture is primarily dependent on the agricultural pressures in the Member State, expressed in terms of utilised agricultural area (UAA), livestock density, the use of mineral and manure fertilisers, as well as the nitrogen and phosphorus balance. This section describes the evolution of these indicators.

2.1. Land use

The map below presents the distribution of land use in Denmark along with watercourses and lakes/water reservoirs.

Figure 2 – Land use distribution in Denmark



([5]) Source: Eurostat (aact_eaa01)
([6]) Source: Eurostat (ef_m_org)

The utilised agricultural area (UAA) in Denmark covered 2.6 million hectares in 2023, making up 62.6% of the country's total land area. Arable land accounts for 89.8% of UAA, followed by permanent grassland at 9.1% and permanent crops at 1.1%.

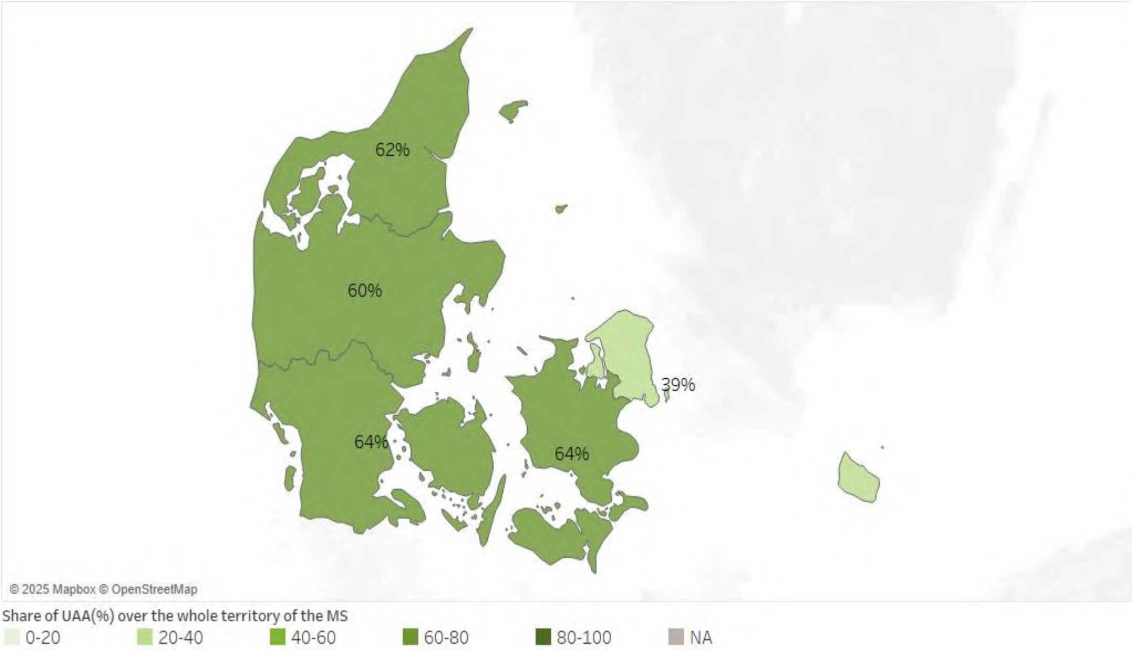
Table 1 – Evolution of the utilised agricultural area

	2010	2013	2016	2020	2023
utilised agricultural area (1000 ha)	2,647	2,619	2,615	2,630	2,627
arable land (1000 ha)	2,419	2,397	2,361	2,373	2,359
permanent grassland (1000 ha)	200	195	226	228	239
permanent crops (1000 ha)	28	27	28	29	29
kitchen gardens (1000 ha)	0	0	0	0	0

Source: Eurostat (ef_lus_main)

In 2020, the share of the UAA ranged from 64% of UAA in Region Sjælland and Region Syddanmark, to 39% in Region Hovedstaden.

Figure 3 – Share of utilised agricultural area (UAA) at NUTS2 level in 2020 ([7])



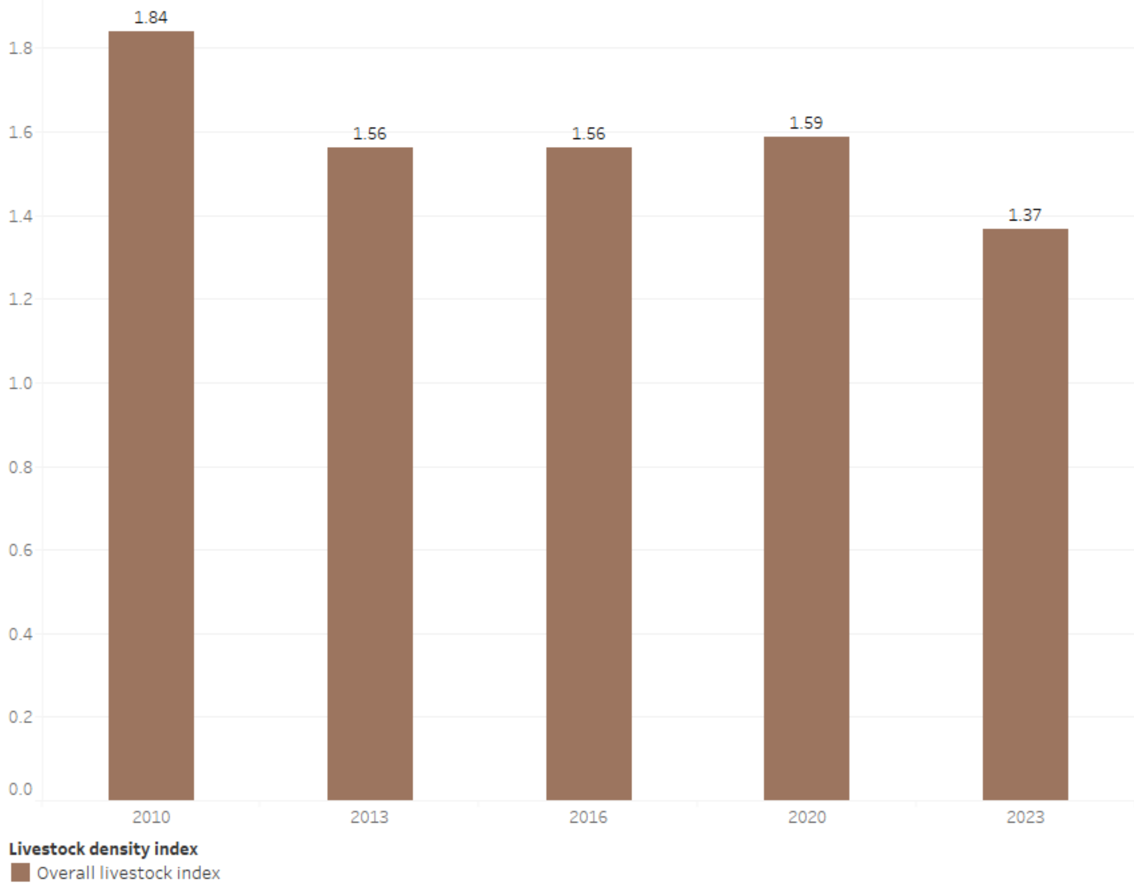
Source: Eurostat (ef_lus_main)

([7]) Latest available data.

2.2. Livestock density

In Denmark the livestock density was 1.37 livestock units per hectare (LSU/ha) of UAA in 2023. The livestock density has decreased since 2010.

Figure 4 – Evolution of the livestock density (LSU/ha UAA)



Source: Eurostat (ef_fsi_lskds)

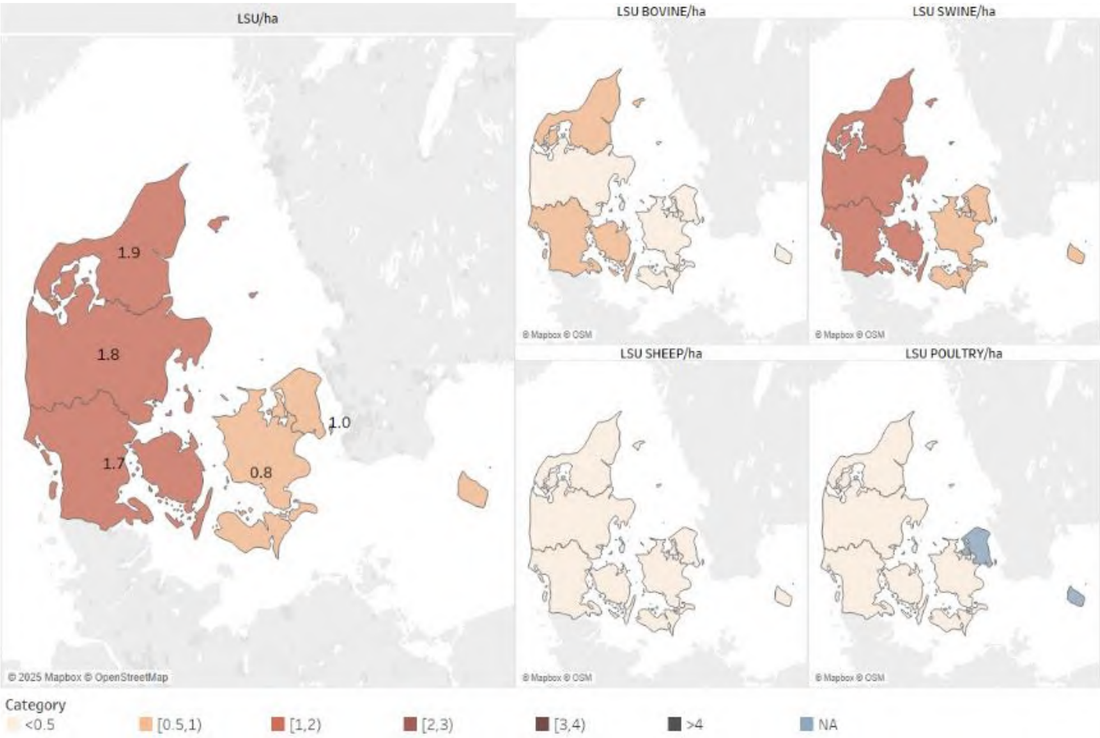
Table 2 – Evolution of the livestock numbers by animal type

	2007	2010	2013	2016	2020	2023
live bovines (Million heads)	1.55	1.63	1.58	1.55	1.50	1.43
of which dairy cows (Million heads)	0.55	0.57	0.57	0.57	0.57	0.55
live pigs (Million heads)	13.17	12.29	12.40	12.28	13.39	11.37
live poultry (Million heads)	NA	18.73	19.43	18.51	22.05	20.16
live sheep (Million heads)	NA	0.16	0.15	0.15	0.14	0.15
Source of data: Eurostat						

Source: Eurostat, for live poultry and live sheep data complemented with FAOSTAT

There are regional variations, with livestock densities being higher in the western parts of the country.

Figure 5 – Livestock density distribution by animal type (LSU/ha UAA) at NUTS2 level in 2020 (8)



Source: Eurostat (Livestock units: ef_lsk_main; Utilised agricultural area: ef_lus_main)

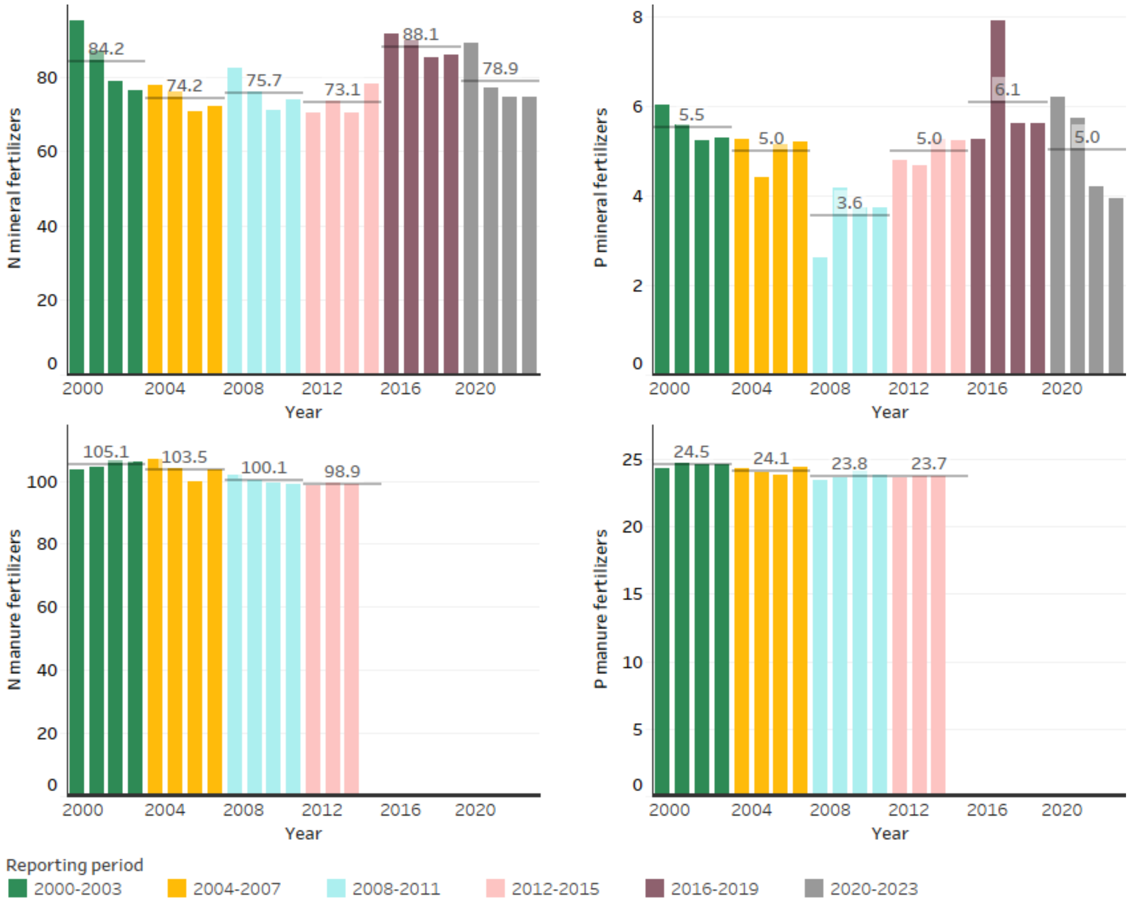
(8) Latest available data.

2.3. Nitrogen and phosphorus fertiliser use

In Denmark, the use of **nitrogen (N) fertilisers** was 78.9 kg/ha UAA for mineral fertilisers in 2020-2023 and 98.9 kg/ha UAA for manure fertilisers in 2012-2014 ([9]). The use of N mineral fertilisers has decreased by 9.2 kg/ha UAA. No data on the use of N manure fertilisers are available at Eurostat since 2015 ([10]).

The use of **phosphorus (P) fertilisers** was 5.0 kg/ha UAA for mineral fertilisers in 2020-2023 and 23.7 kg/ha UAA for manure fertilisers in 2012-2014 ([11]). The use of P mineral fertilisers decreased by 1.1 kg/ha UAA since the last reporting period. No data on the use of P manure fertilisers are available at Eurostat since 2015 ([12]).

Figure 6 – Evolution of nitrogen and phosphorus fertiliser use (kg/ha UAA)



Source: Eurostat (aei_pr_gnb)

([9]) According to the most recent values estimated by Eurostat.
([10]) Additional data were included in the national report.
([11]) According to the most recent values estimated by Eurostat.
([12]) Additional data were included in the national report.

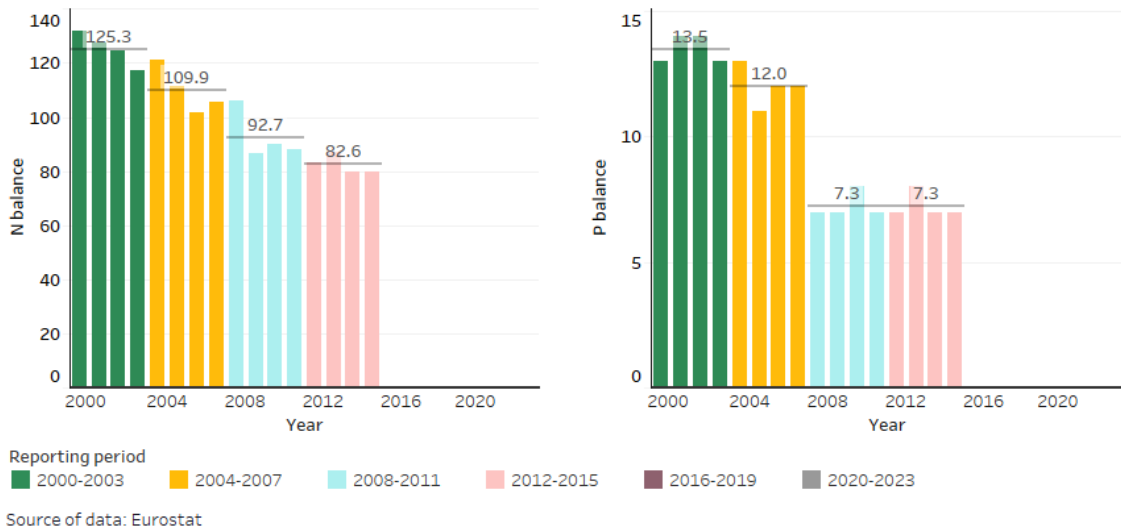
2.4. Nitrogen and phosphorus balance

The nutrient balance ([13]) per hectare of agricultural land (kg/ha UAA) is an indicator of the success that farmers have had in implementing balanced fertilisation and of the resulting nutrient pressure from agriculture. A high surplus (positive balance) indicates a risk of emissions into water and air.

In Denmark, the **gross nitrogen (N) balance** was 82.6 kg/ha UAA in 2012-2015 ([14]). No data are available at Eurostat since 2016 ([15]).

The gross **phosphorus (P) balance** was 7.3 kg/ha UAA in 2012-2015 ([16]). No data are available at Eurostat since 2016 ([17]).

Figure 7 – Evolution of gross nitrogen and phosphorus balance (kg/ha UAA)



Source: Eurostat (aei_pr_gnb)

2.5. Nitrogen discharge to the environment

Denmark provided information that the total nitrogen losses to the sea amounted to 52 kilotonnes (water discharge-normalized) for the year 2022. The agricultural sector's contribution to total nitrogen losses was 69%.

([13]) Gross nutrient balance (aei_pr_gnb)
([14]) According to the most recent values estimated by Eurostat.
([15]) Additional data were included in the national report.
([16]) According to the most recent values estimated by Eurostat.
([17]) Additional data were included in the national report.

3. NITRATE VULNERABLE ZONES

In line with Article 3 paragraph 5, Denmark applies an action programme with mandatory measures throughout the entire national territory (whole country approach) since 1993 and is thus exempted from designating NVZ.

4. NITRATES IN GROUNDWATER

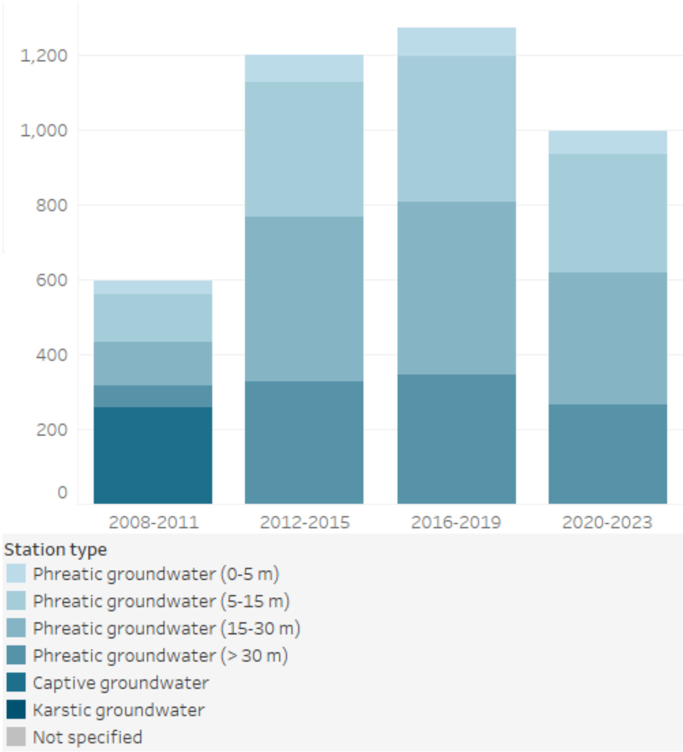
4.1. Monitoring of nitrate concentrations in groundwater

The groundwater monitoring network in Denmark is part of the national monitoring network NOVANA, which is used to assess groundwater quality in accordance with the Water Framework Directive (WFD). Since previous reporting periods, adjustments have been made to the monitoring network to focus on monitoring points influenced by agricultural activities. This may have contributed to the general decrease in the number of monitoring points. For groundwater measurements, some stations have the same coordinates due to different depths.

During the reporting period 2020-2023 nitrate concentrations were reported at 995 groundwater monitoring points. The station density was 23.2 stations per 1 000 km^2.

The overall number of monitoring points decreased by 280 (22.0%) compared to the previous reporting period. From 2008-2011 to 2016-2019 the total number of points had increased significantly. The graph below presents the changes in the monitoring network over the last four reporting periods.

Figure 8 – Evolution of groundwater monitoring network (monitoring points with measurements of nitrates)



In this reporting period, changes in nitrate concentrations compared to the previous monitoring period (trends) were assessed for 991 monitoring points, accounting for 99.6% of all points with measurements. The share of monitoring points with trends increased compared to the previous reporting period, where it was 86.7% (18). The table below presents the number of monitoring points with measurements and trends in the last four reporting periods.

Table 3 – Number of groundwater monitoring points with measurements of nitrates and trends by station type (19)

	Stations with measurements				Stations with trends			
Station type	2008-2011	2012-2015	2016-2019	2020-2023	2008-2011	2012-2015	2016-2019	2020-2023
Phreatic groundwater (0-5 m)	33	73	77	61	33	69	68	61
Phreatic groundwater (5-15 m)	129	362	392	315	129	321	338	312
Phreatic groundwater (15-30 m)	118	438	462	355	118	389	412	355
Phreatic groundwater (> 30 m)	56	328	344	264	56	222	287	263
Captive groundwater	258				252			
Karstic groundwater								
Not specified	1				1			
Total	595	1,201	1,275	995	589	1,001	1,105	991

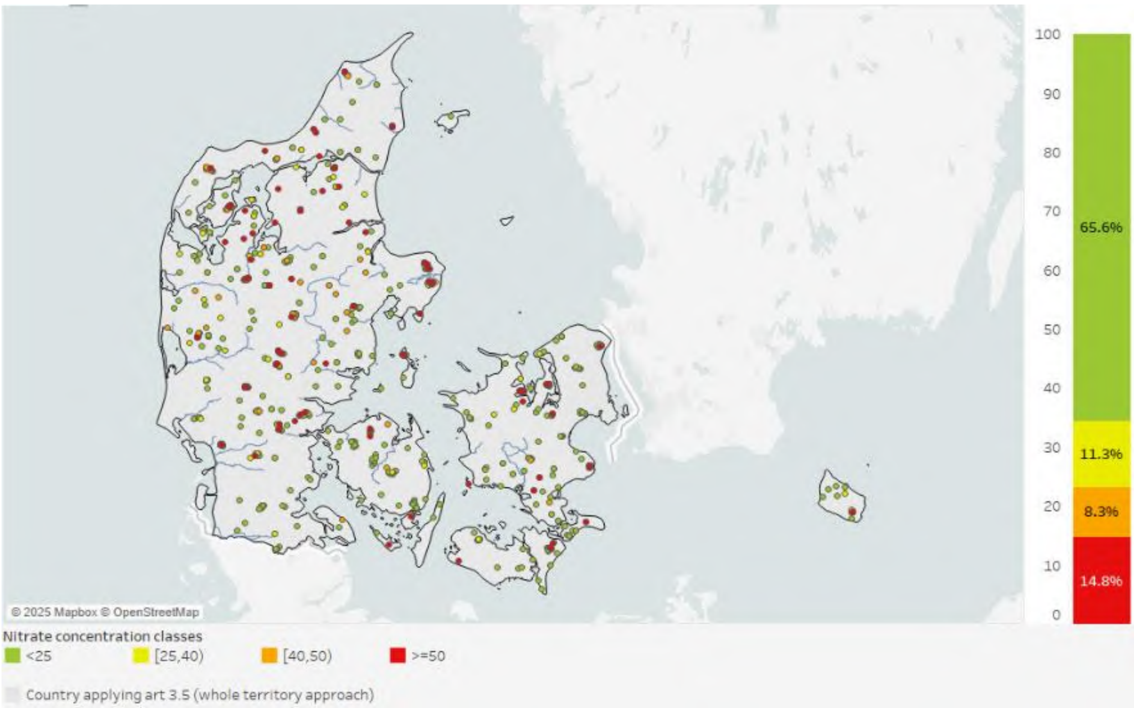
(18) Note that the Member State can report a monitoring point with trends that was monitored but not reported in the previous reporting period.

(19) Denmark reported that monitoring was discontinued in 287 monitoring points relative to the previous reporting period. Discontinuation may be due to nitrate concentrations below 25 mg/l, change in station code or type, or other specific reasons.

4.2. Nitrate concentrations in groundwater

In Denmark, 14.8% of groundwater monitoring points showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, whereas 8.3% had concentrations between 40-49.99 mg/l, 11.3% showed concentrations between 25-39.99 mg/ and 65.6% below 25 mg/l. The figure below shows a spatial distribution of the average nitrate concentrations and the shares in corresponding nitrate concentration classes.

Figure 9 – Map of average annual mean nitrate concentrations in groundwater and share of monitoring points by nitrate concentration class in the reporting period 2020-2023



Note: In the map, monitoring points with higher values are plotted on top.

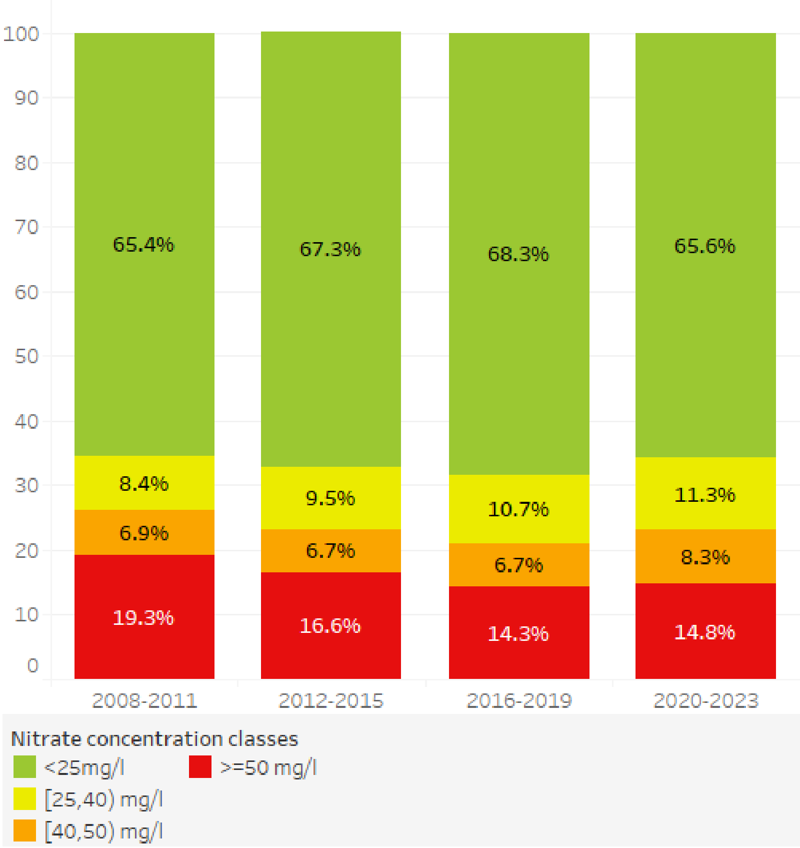
The station type category with the highest share of points with nitrate concentrations equal to or above the drinking water threshold of 50 mg/l was phreatic groundwaters at depth 5-15m with a share of 20.3%, as shown in the table below.

Table 4 – Share of groundwater monitoring points by nitrate concentration class (mg/l) in the reporting period 2020-2023, categorised by station type

	Number of stations	% of Total	<25	[25,40)	[40,50)	>=50
Phreatic groundwater (0-5 m)	61	6.1%	57.4%	16.4%	6.6%	19.7%
Phreatic groundwater (5-15 m)	315	31.7%	59.0%	11.4%	9.2%	20.3%
Phreatic groundwater (15-30 m)	355	35.7%	60.0%	13.5%	11.0%	15.5%
Phreatic groundwater (> 30 m)	264	26.5%	83.0%	6.8%	4.2%	6.1%
Captive groundwater						
Karstic groundwater						
Total	995	100.0%	65.6%	11.3%	8.3%	14.8%

Compared to the data reported in the previous reporting period, the share of monitoring points with concentration ≥ 50 mg/l increased from 14.3% to 14.8% ([20]). The graph below presents the share of monitoring points per class of nitrate concentration in the last four reporting periods.

Figure 10 – Share of monitoring points in groundwater by class of nitrate concentration ([21]) in the current and previous reporting periods



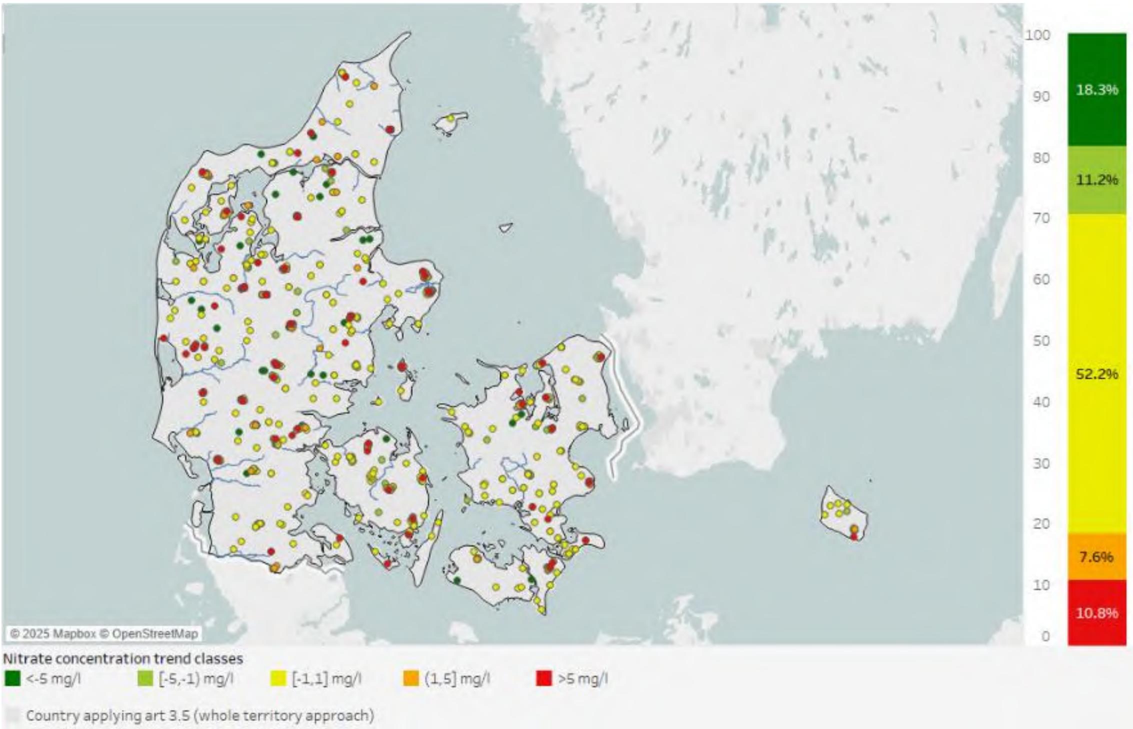
[20]) As mentioned above, Denmark changed its network in this reporting period to better focus on points affected by agriculture.

([21]) Average of annual mean values over the reporting period.

4.3. Trends in nitrate concentrations in groundwater

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 29.5% of monitoring points and an increase in 18.4%. For the remaining 52.2% there was no significant change. The increase or decrease can be categorised as weak if it is between 1 and 5 mg/l, and as strong if it is above 5mg/l.

Figure 11 – Map of trends in average annual mean nitrate concentrations ([22]) in groundwater between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



Note: In the map, monitoring points with higher values are plotted on top.

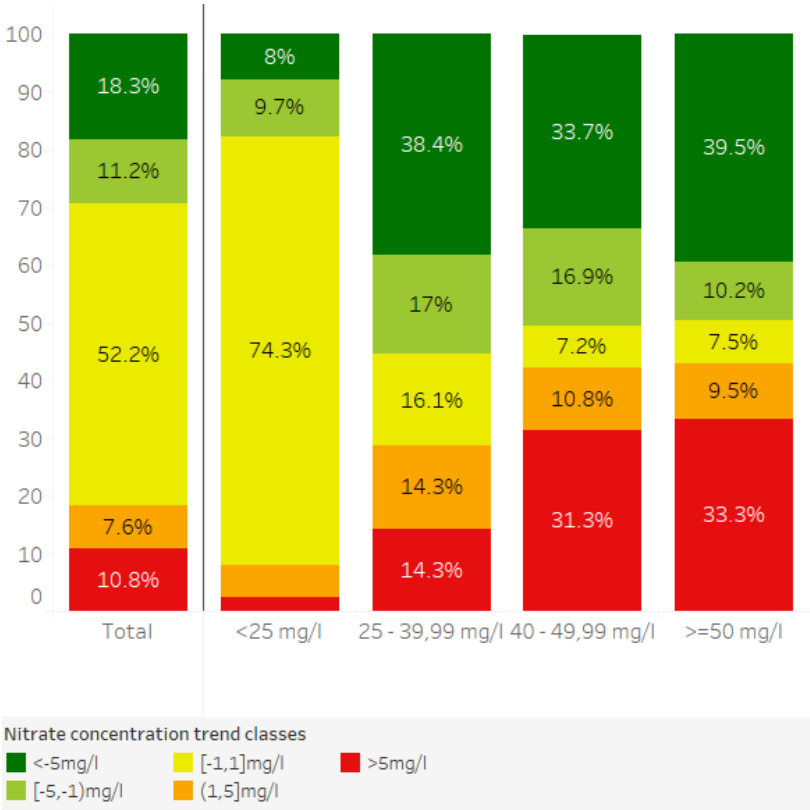
Table 5 – Share of groundwater monitoring points by trend class (mg/l) between the periods 2016-2019 and 2020-2023, categorised by station type

	Total Number of Stations	% Total Number of Stations	<-5	[-5,-1)	[-1,1]	(1,5]	>5
Phreatic groundwater (0-5 m)	61	6.2%	29.5%	11.5%	31.1%	13.1%	14.8%
Phreatic groundwater (5-15 m)	312	31.5%	22.1%	11.2%	43.9%	8%	14.7%
Phreatic groundwater (15-30 m)	355	35.8%	21.1%	14.1%	46.8%	7%	11%
Phreatic groundwater (>30 m)	263	26.5%	7.2%	7.2%	74.1%	6.5%	4.9%
Captive groundwater							
Karstic groundwater							
Total	991	100.0%	18.3%	11.2%	52.2%	7.6%	10.8%

([22]) The average of annual mean values of nitrate concentrations over the reporting period 2020-2023 compared to the average for the reporting period 2016-2019.

When looking at the trend for waters that are polluted in the current reporting period (equal to or above 50 mg/l), there has been an increase of nitrate concentration for 42.8% and a decrease for 49.7% between the previous and the current reporting periods. The graph below shows the increase (in red and orange) and decreases (in green) per nitrate concentration class.

Figure 12 – Share of groundwater monitoring points by classes of trend between the periods 2016-2019 and 2020-2023, across different nitrate concentration classes (<24.99 mg/l, 25-39.99 mg/l, 40-49.99 mg/l and ≥50mg/l) ([23])

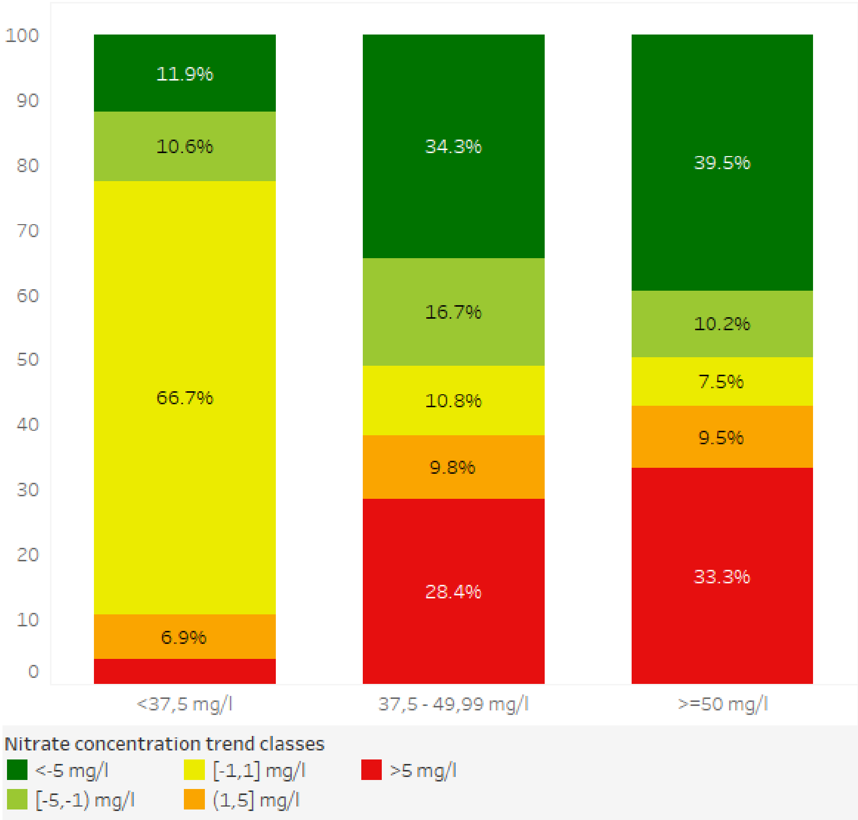


Note: The percentages below 5% are not labelled.

([23]) Nitrate concentration classes as per the Nitrates Directive report.

To better align the water quality assessment with the thresholds defined under the Groundwater Directive, trends were also calculated for the water quality class with nitrate concentrations between 37.5-49.99 mg/l. When looking at the trend in this concentration category, there has been an increase of nitrate concentration for 38.2% and a decrease for 51.0% of monitoring points.

Figure 13 – Share of groundwater monitoring points by classes of trend between the periods 2016-2019 and 2020-2023, in different nitrate concentration classes (<37.5 mg/l, 37.5-49.99 mg/l and ≥50mg/l) ([24])

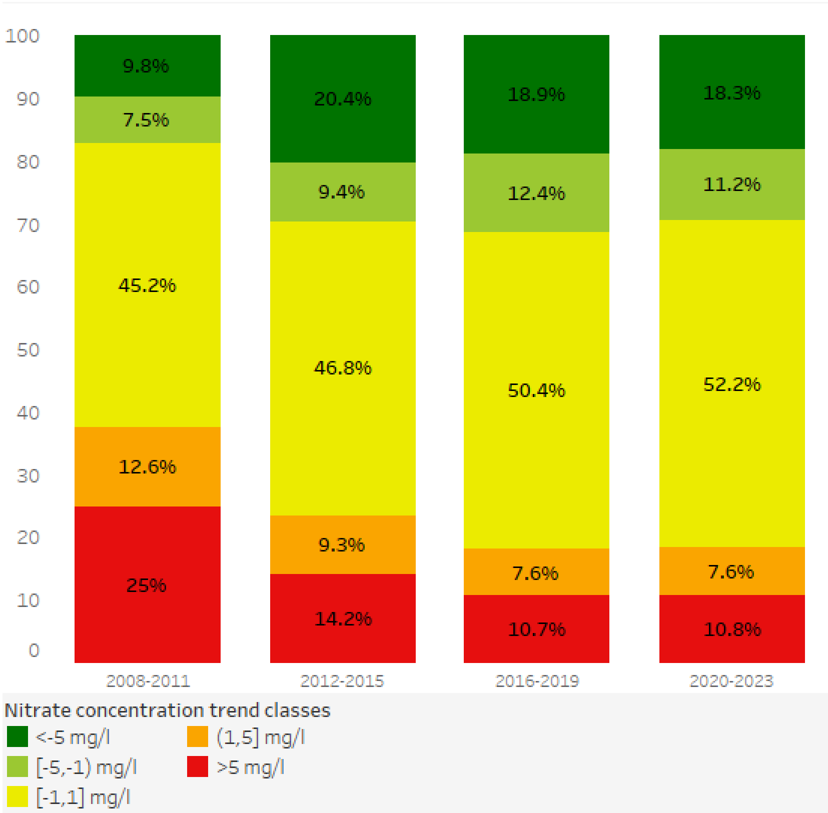


Note: The percentages below 5% are not labelled.

([24]) Nitrate concentration classes as in the Water Framework Directive guidance on GW status and trend assessment as division of nitrates quality standard (50mg/l and 75 % of this value [37.5 mg/l]).

Compared to the previous reporting period, there is a lower share of monitoring points with decreasing nitrate concentrations (29.5% in the current reporting period compared to 31.3% in the previous reporting period) and a slightly higher share of monitoring points with increasing nitrate concentrations (18.4% compared to 18.3%). The graph below shows the share of monitoring points with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 14 – Share of groundwater monitoring points by class of nitrate concentration trend ([25]) in the current and previous reporting periods

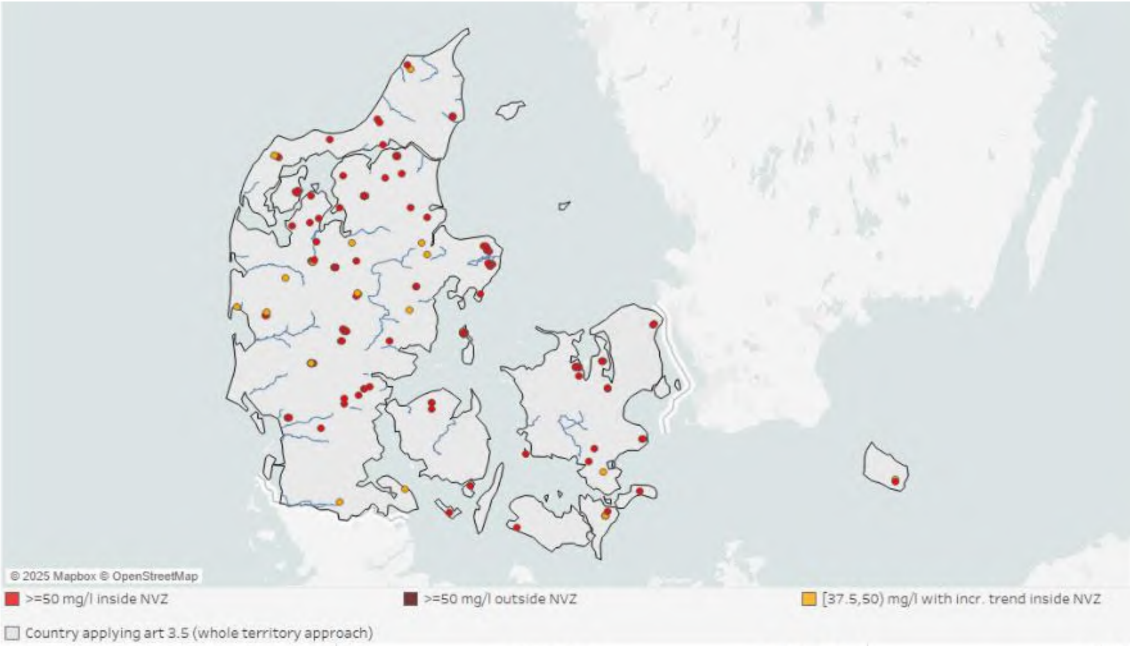


([25]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

4.4. Nitrate pollution hotspots in groundwater

A nitrate pollution hotspot in groundwater is defined here as a monitoring point where the average annual nitrate concentration is either ≥ 50 mg/l or between 37.5 and 49.99 mg/l with an increasing trend. In Denmark there are 186 groundwater nitrate pollution hotspots.

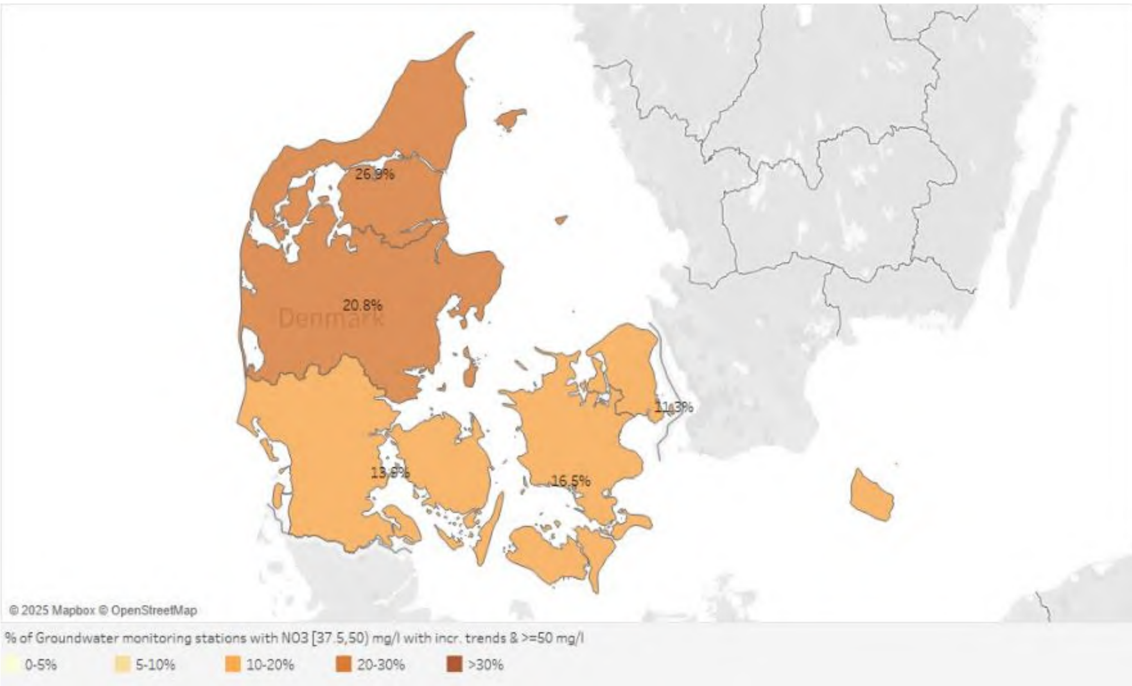
Figure 15 – Groundwater nitrate pollution hotspots



		inside NVZ	outside NVZ	Total
Groundwater	[37.5,50) with incr. trend	39		39
	>=50	147		147
Total		186		186

The NUTS2 regions with the highest share of hotspots are Region Nordjylland (26.90%), Region Midtjylland (20.8%) and Region Sjælland (16.5%).

Figure 16 – Share of groundwater nitrate pollution hotspots at NUTS2 level



5. NITRATES IN SURFACE WATERS

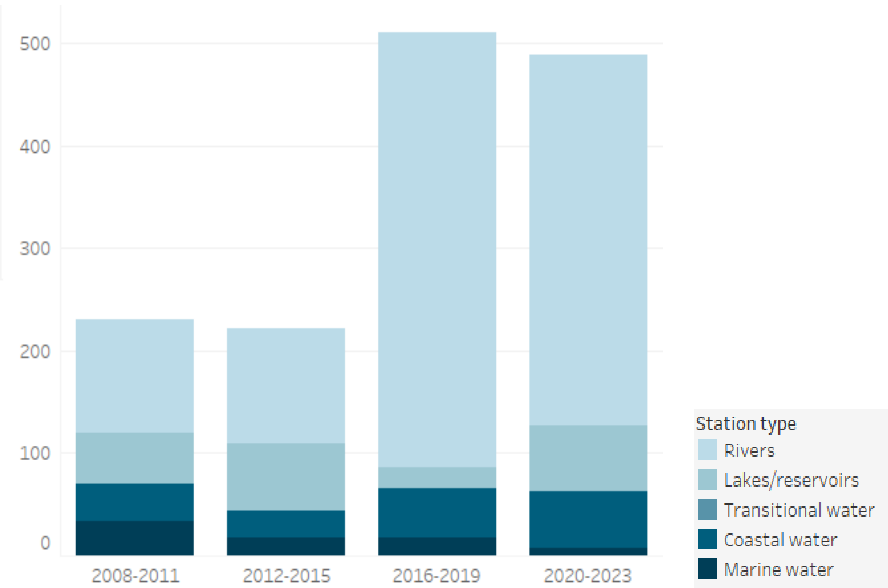
5.1. Monitoring of nitrate concentrations in surface waters

Nitrate concentrations in watercourses, lakes and coastal waters are extracted from the "ODA database" from which a selection of monitoring stations relevant to agricultural pressures are considered. The analysis focused on flow-weighted averages for annual and winter periods. A minimum of seven samples per year was required for a reliable annual average.

During the reporting period 2020-2023, nitrate concentrations were reported at 488 surface water monitoring points. Among these, 74.0% were in rivers, 13.3% were in lakes or reservoirs, and 12.7% were in saline waters. The surface freshwater monitoring points density was 9.9 stations per 1 000 km^2.

The overall number of monitoring points decreased by 23 (4.5%) compared to the previous reporting period. The change was mainly driven by the removal of 64 river points while 45 lake points were added. The amount of monitored lakes has been increased since the previous reporting period and lakes have been sampled in different sampling frequencies. From 2012-2015 there was a strong increase in the total number of monitoring points, mainly driven by the addition of river monitoring stations. The graph below presents the changes in the monitoring network over the last four reporting periods.

Figure 17 – Evolution of surface water monitoring network (monitoring points with measurements of nitrates)



In this reporting period, changes in nitrate concentrations compared to the previous monitoring period (trends) were assessed for 440 monitoring points, accounting for 90.2% of all points with measurements. The share of monitoring points with trends increased compared to the previous reporting period (55.8% in reporting period 2016-2019) ([26]). The table below presents the number of monitoring points and the number of monitoring points with trends in the last four reporting periods.

Table 6 – Number of surface water monitoring points with measurements of nitrates and trends per type ([27])

Station type	Stations with measurements				Stations with trends			
	2008-2011	2012-2015	2016-2019	2020-2023	2008-2011	2012-2015	2016-2019	2020-2023
Rivers	111	111	425	361	111	111	209	358
Lakes/reservoirs	50	66	20	65	14	27	20	20
Transitional water								
Coastal water	36	27	48	54		27	43	54
Marine water	34	17	18	8		17	13	8
Total	231	221	511	488	125	182	285	440

([26]) The Member State can report a monitoring point with trends that was monitored but not reported in the previous reporting period.

([27]) Denmark reported that monitoring was discontinued in 14 monitoring points relative to the previous reporting period. Discontinuation may be due to nitrate concentrations below 25 mg/l, change in station code or type, or other specific reasons.

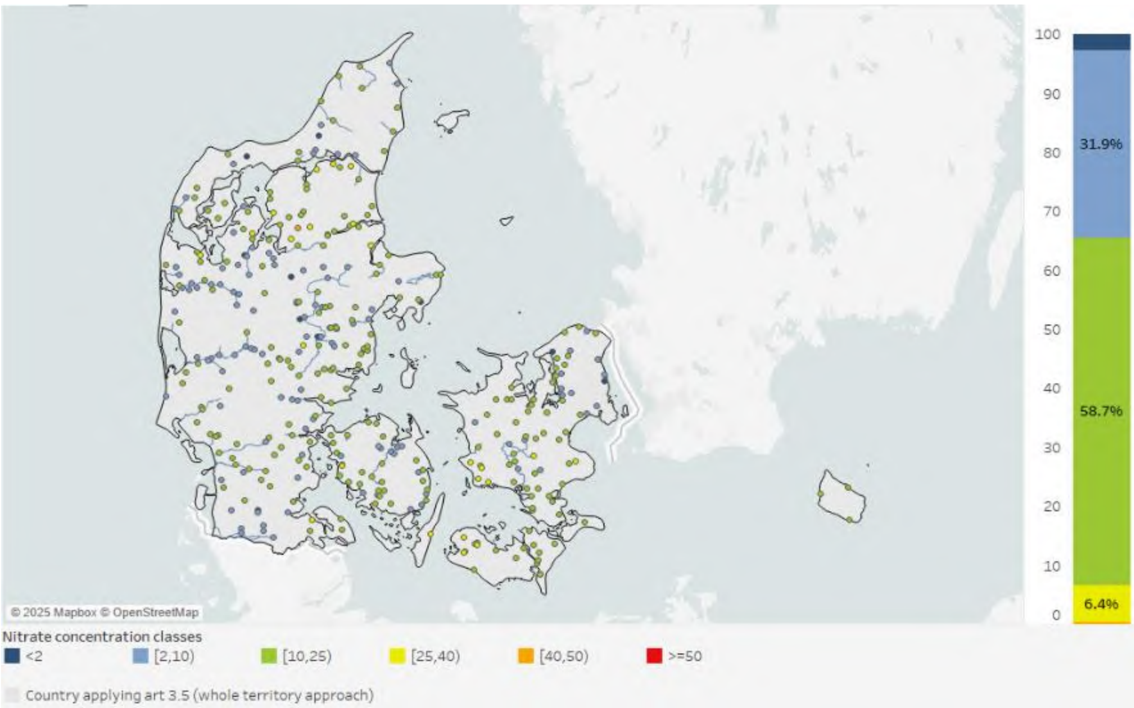
5.2. Nitrate concentrations in surface waters

Rivers

In Denmark, none of the monitoring points in rivers showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, whereas 0.3% had concentrations between 40-49.99 mg/l, 6.4% showed concentrations between 25-39.99 mg/, 58.7% in the class 10-24.99 mg/l, 31.9% in the class 2-9.99 mg/l and 2.8% below 2 mg/l.

It is relevant to look at the distribution in nitrate concentration classes much lower than 50 mg/l for surface water as freshwater can be at risk of eutrophication even with nitrate concentrations below 25 mg/l.

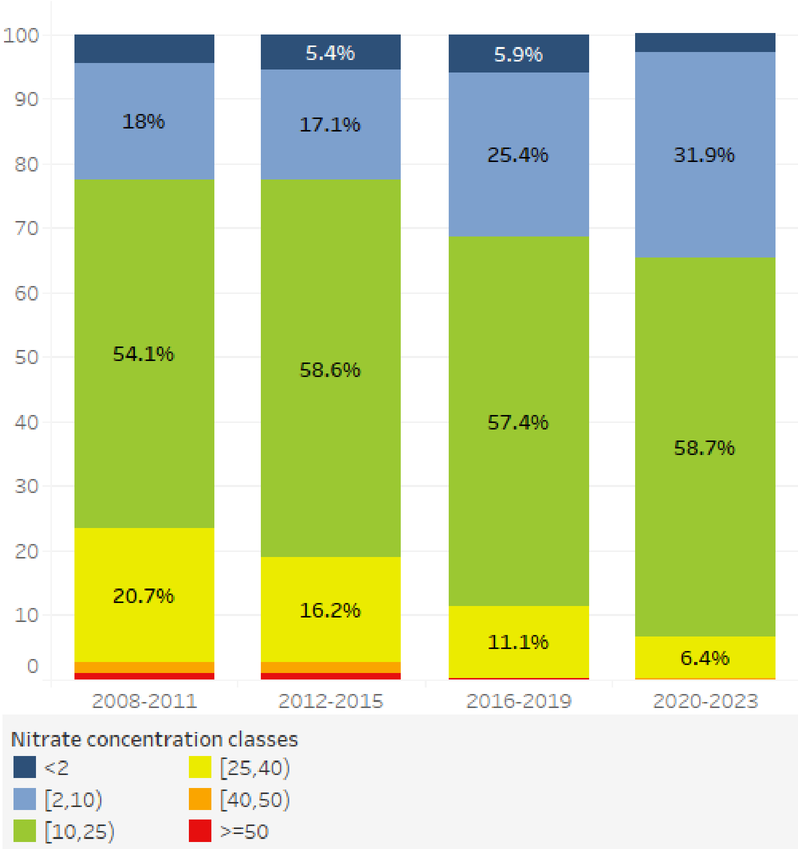
Figure 18 – Map of average annual mean nitrate concentrations in rivers and share of monitoring points by concentration class in the reporting period 2020-2023



Note: In the map, monitoring points with higher values are plotted on top. In the graph, the percentages below 5% are not labelled.

Compared to the data reported in the previous reporting period, the share of monitoring points in rivers with concentrations ≥ 50 mg/l decreased from 0.2% to 0%. The graph below presents the shares of monitoring points per classes of nitrate concentration in the last four reporting periods.

Figure 19 – Share of monitoring points in rivers by class of nitrate concentration ([28]) in the current and previous reporting periods



Note: The percentages below 5% are not labelled.

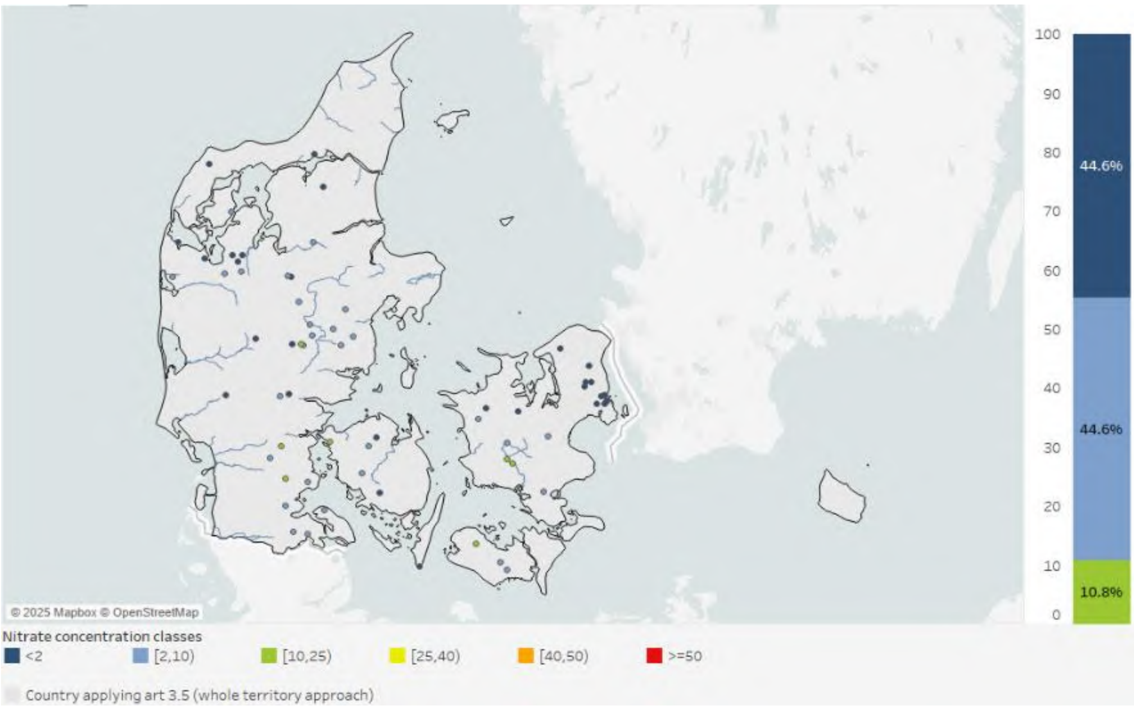
([28]) Average of annual mean values over the reporting period.

Lakes/water reservoirs

In Denmark, none of the freshwater monitoring points in lakes/water reservoirs showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, or equal to or above 25 mg/l, whereas 10,8% had concentrations between 10-24.99 mg/l, 44.6% in the class 2-9.99 mg/l and 44.6% below 2 mg/l.

It is relevant to look at the distribution in nitrate concentration classes much lower than 50 mg/l for surface water as fresh surface water can be at risk of eutrophication even with nitrate concentrations below 25 mg/l.

Figure 20 – Map of average annual mean nitrate concentrations in lakes/water reservoirs and share of monitoring points by concentration class in the reporting period 2020-2023



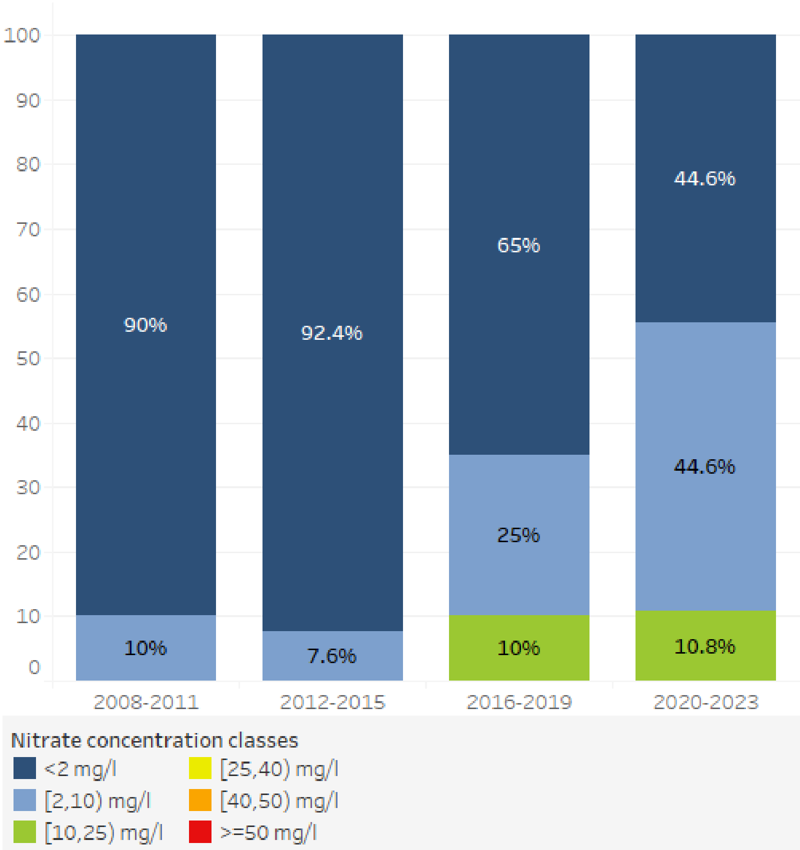
Note: In the map, monitoring points with higher values are plotted on top.

Table 7 – Share of freshwater monitoring points by nitrate concentration class (mg/l) in reporting period 2020-2023, categorised by station type

	Number of stations	% of Total	<2	[2,10)	[10,25)	[25,40)	[40,50)	>=50
Rivers	361	84.7%	2.8%	31.9%	58.7%	6.4%	0.3%	
Lakes/reservoirs	65	15.3%	44.6%	44.6%	10.8%			
Total	426	100.0%	9.2%	33.8%	51.4%	5.4%	0.2%	

Compared to the data reported in the previous reporting period, the share of monitoring points in lakes/water reservoirs with concentrations ≥ 50 mg/l remained at 0%. The graph below presents the shares of monitoring points per class of nitrate concentration in the last four reporting periods.

Figure 21 – Share of monitoring points in lakes/water reservoirs by class of nitrate concentration ([29]) in the current and previous reporting periods



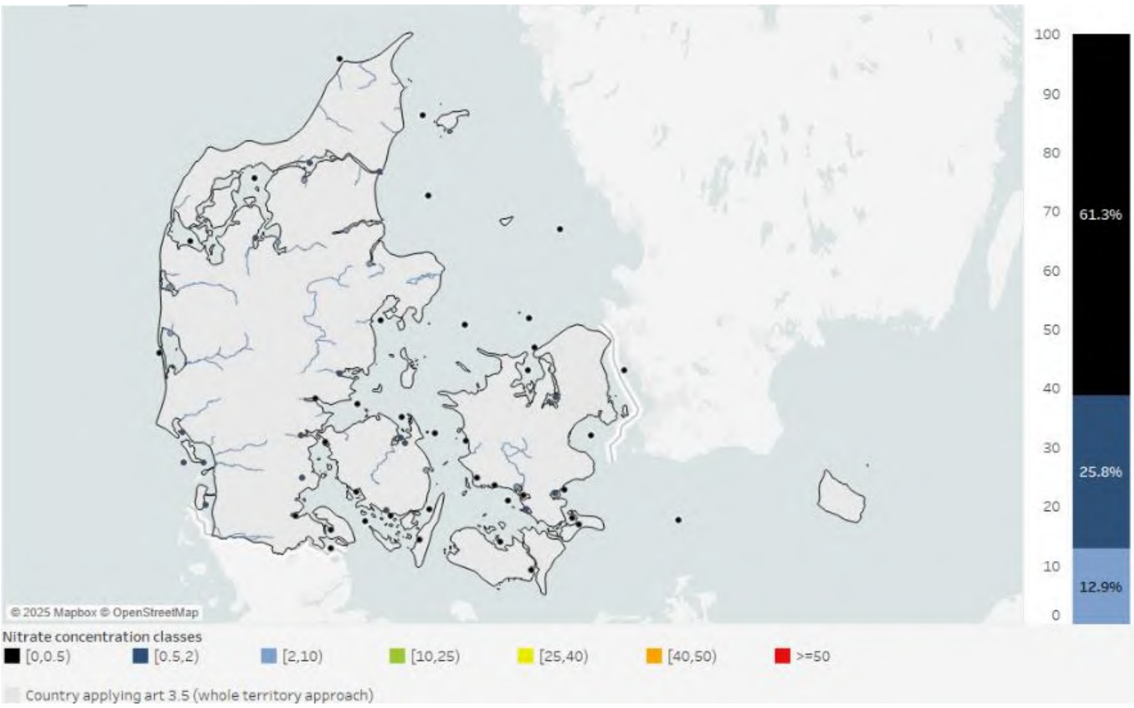
([29]) Average of annual mean values over the reporting period.

Saline waters (30)

No points in saline waters monitoring points showed average nitrate concentrations ≥ 10 mg/l, 12.9% showed concentrations between 2-9.99 mg/l and 25.8% between 0.5-2 mg/l and 61.3% below 0.5 mg/l.

It is relevant to look in detail at very low nitrate concentrations, also below 0.5 mg/l and between 0.5 mg/l and 2 mg/l, because saline waters tend to have very low concentrations and some saline waters can become eutrophic even at concentrations below 2 mg/l.

Figure 22 – Map of average annual mean nitrate concentrations in saline waters and share of monitoring points by concentration class in reporting period 2020-2023



Note: In the map, monitoring points with higher values are plotted on top.

It is also relevant to look separately at transitional waters as they typically show higher nitrate concentrations. However, no Danish saline surface water bodies have been identified as falling within the category 'transitional waters'.

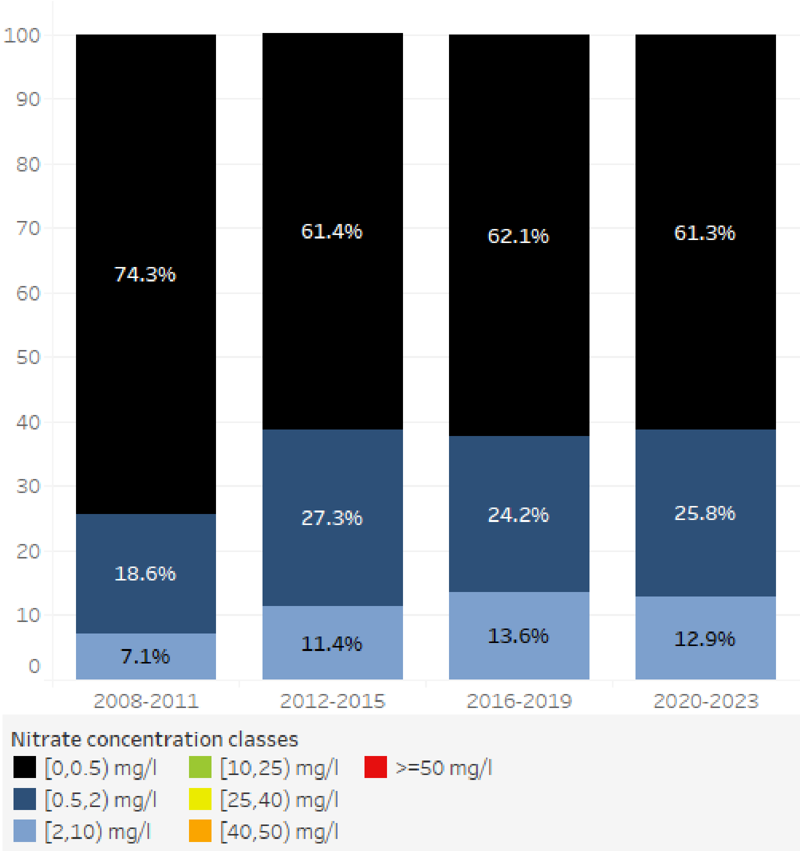
Table 8 – Share of saline water monitoring points by nitrate concentration class (mg/l) in the reporting period 2020-2023, categorised by station type

	Number of stations	% of Total	<0.5	[0.5,2)	[2,10)	[10,25)	[25,40)	[40,50)	>=50
Transitional water									
Coastal water	54	87.1%	55.6%	29.6%	14.8%				
Marine water	8	12.9%	100.0%						
Total	62	100.0%	61.3%	25.8%	12.9%				

(30) This includes coastal, marine and transitional waters.

The graph below presents the shares of monitoring points per class of nitrate concentration in the last four reporting periods.

Figure 23 – Share of monitoring points in saline waters by class of nitrate concentration ([31]) in the current and previous reporting periods



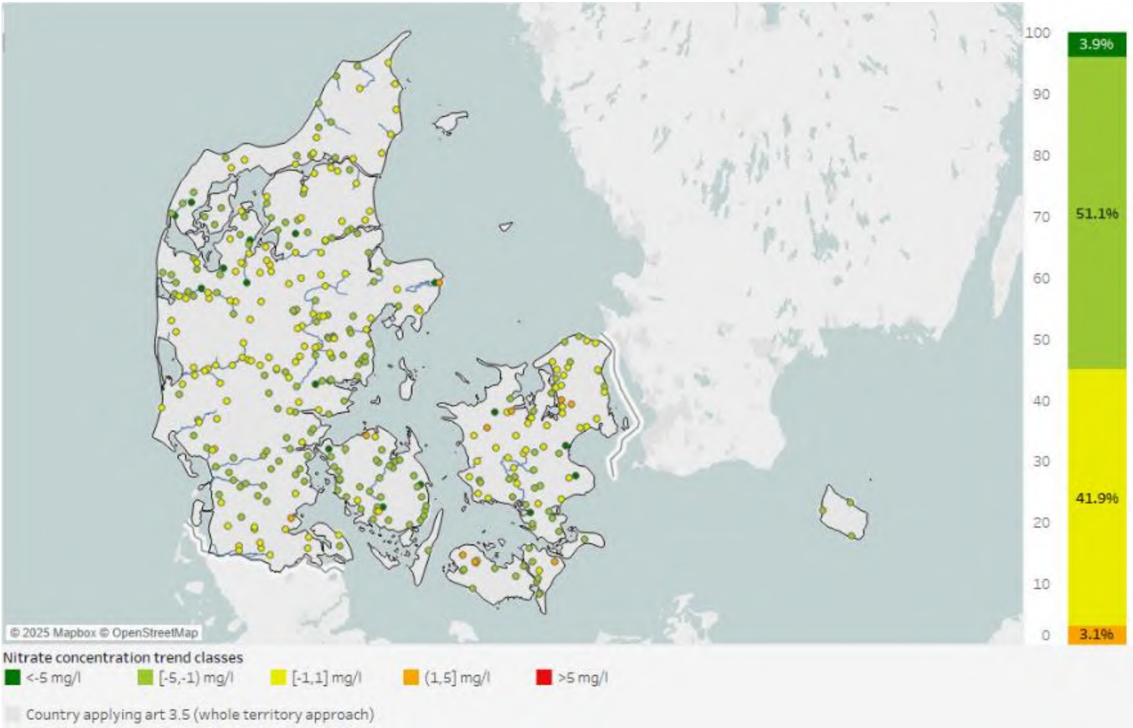
([31]) Average of annual mean values over the reporting period.

5.3. Trends in nitrate concentrations in surface waters

Rivers

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 55.0% of monitoring points in rivers and an increase in 3.1%. For the remaining 41.9% there was no significant change. The increase or decrease can be categorised as weak if it is between 1 and 5 mg/l, and as strong if it is above 5 mg/l.

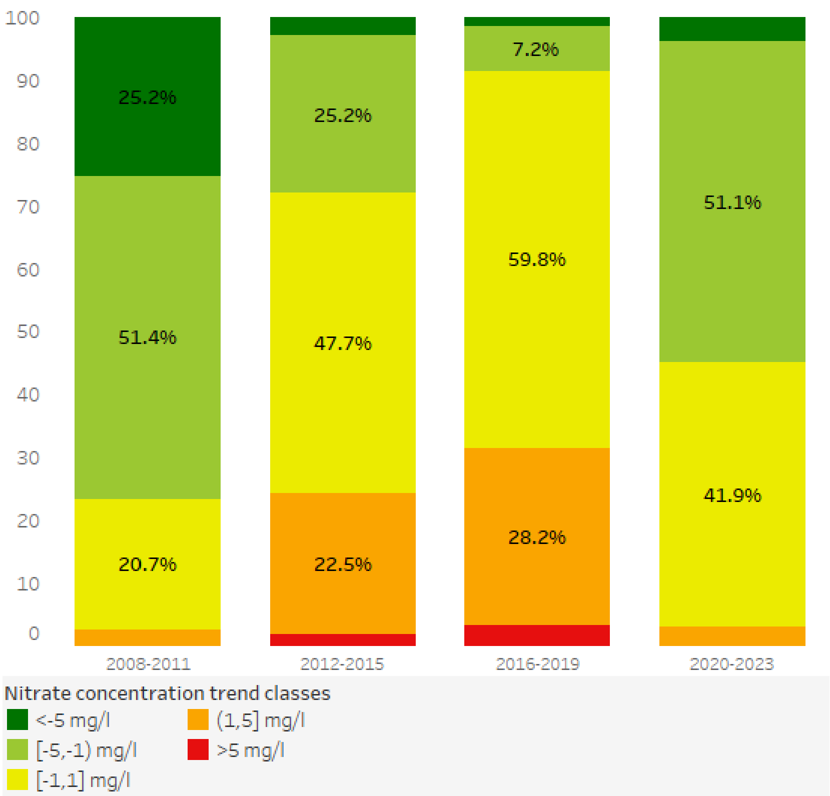
Figure 24 – Map of trends in average annual mean nitrate concentrations in rivers between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



Note: In the map, monitoring points with higher values are plotted on top.

Compared to the previous reporting period, there is a higher share of monitoring points in rivers with decreasing nitrate concentrations (55.0% in the current reporting period compared to 8.6% in the previous reporting period) and a lower share of monitoring points with increasing nitrate concentrations (3.1% compared to 31.5%). The graph below shows the share of monitoring points in rivers with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 25 – Share of monitoring points in rivers by class of nitrate concentration trend (32) in the current and previous reporting periods



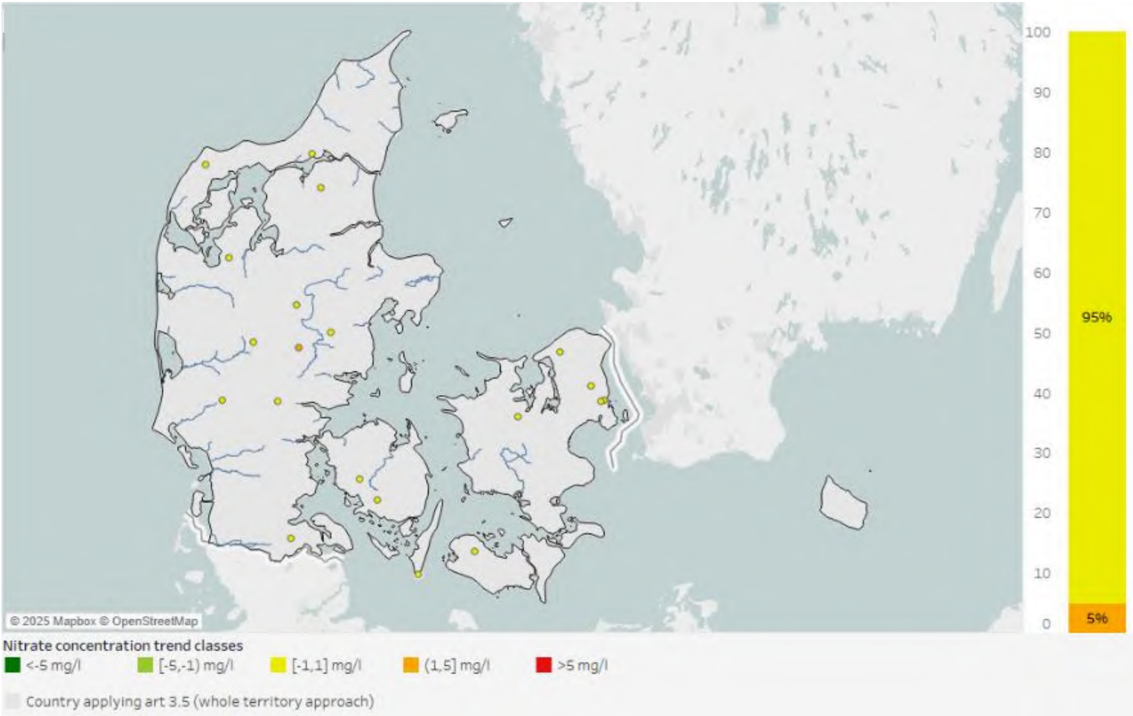
Note: The percentages below 5% are not labelled.

(32) Change in average annual mean nitrate concentrations compared to the previous reporting period.

Lakes and water reservoirs

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 0% of monitoring points in lakes/water reservoirs and an increase in 5.0%. For the remaining 95.0% there was no significant change. The increase or decrease can be categorised as weak if it is between 1 and 5 mg/l, and as strong if it is above 5 mg/l.

Figure 26 – Map of trends in average annual mean nitrate concentrations in lakes/water reservoirs between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



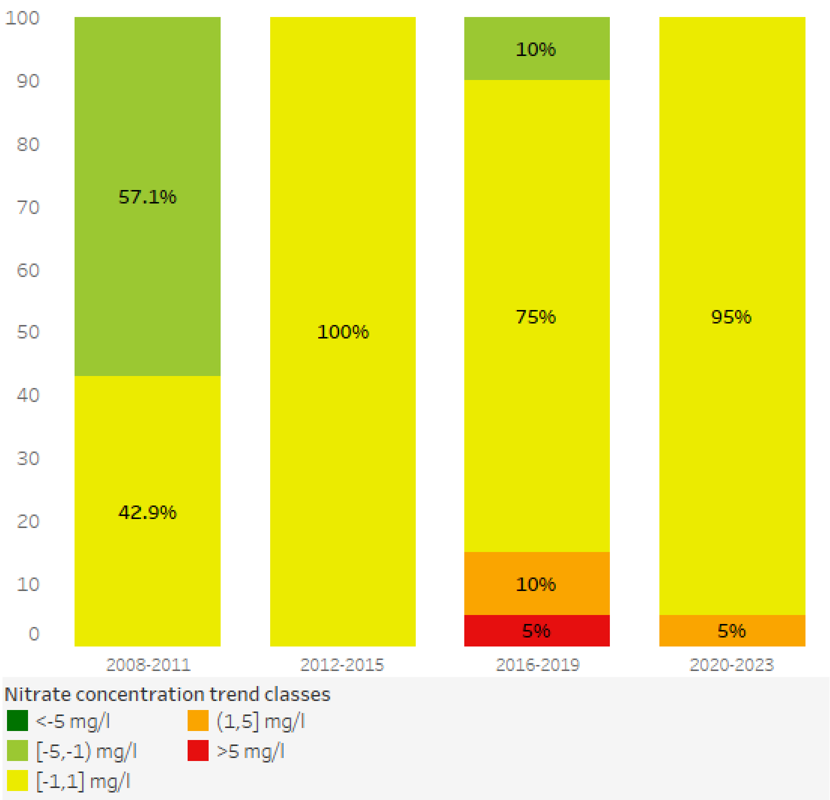
Note: In the map, monitoring points with higher values are plotted on top.

Table 9 – Share of freshwater monitoring points by trend class (mg/l) between the periods 2016-2019 and 2020-2023, categorised by station type

	Total Number of Stations	% Total Number of Stations	<-5	[-5,-1)	[-1,1]	(1,5]	>5
River	358	94.7%	3.9%	51.1%	41.9%	3.1%	
Lake/Reservoir	20	5.3%			95%	5%	
Total	378	100.0%	3.7%	48.4%	44.7%	3.2%	

Compared to the previous reporting period, there is lower share of monitoring points in lakes/water reservoirs with decreasing nitrate concentrations (0% in the current reporting period compared to 10.0% in the previous reporting period) but also a lower share of monitoring points with increasing nitrate concentrations (5.0% compared to 15.0%). The graph below shows the share of monitoring points in lakes/water reservoirs with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 27 – Share of monitoring points in lakes/water reservoirs by class of nitrate concentration trend ([33]) in the current and previous reporting periods

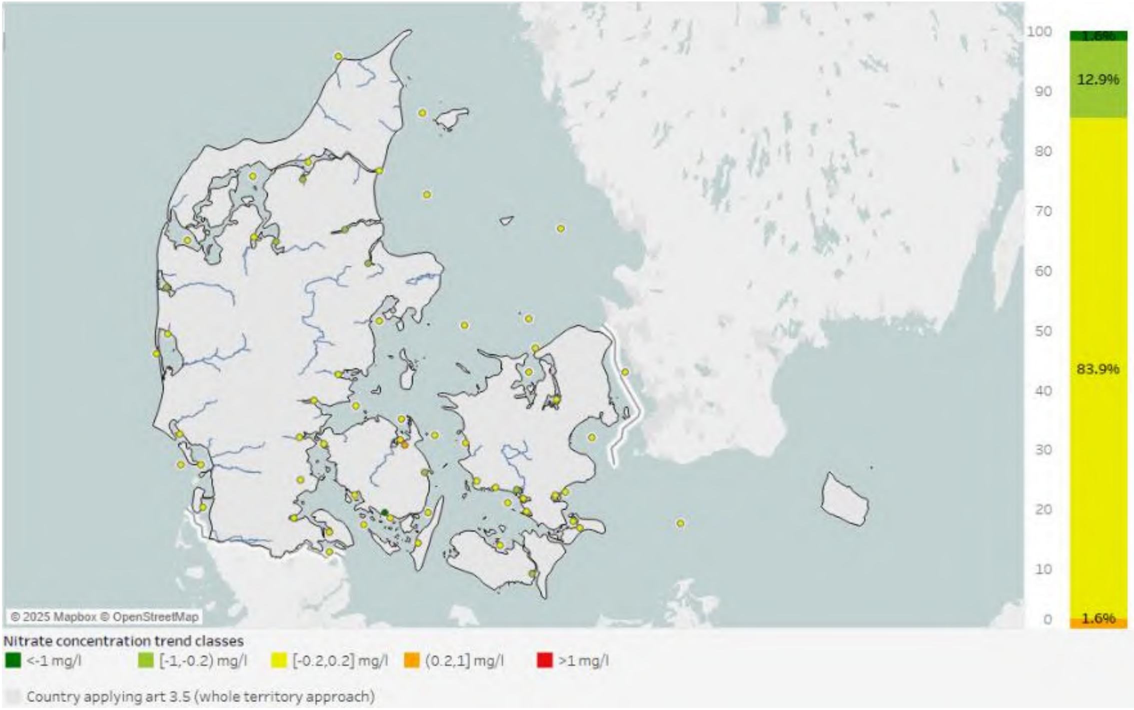


([33]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

Saline waters

Compared to the last reporting period, there has been a decrease of nitrate concentrations in saline waters in 14.5% of monitoring points and an increase in 1.6%. For the remaining 83.9% there was no significant change. The increase or decrease can be categorised as weak if it is between 0.2 and 1 mg/l, and as strong if it is above 1 mg/l.

Figure 28 – Map of trends in average annual mean nitrate concentrations in saline waters between periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



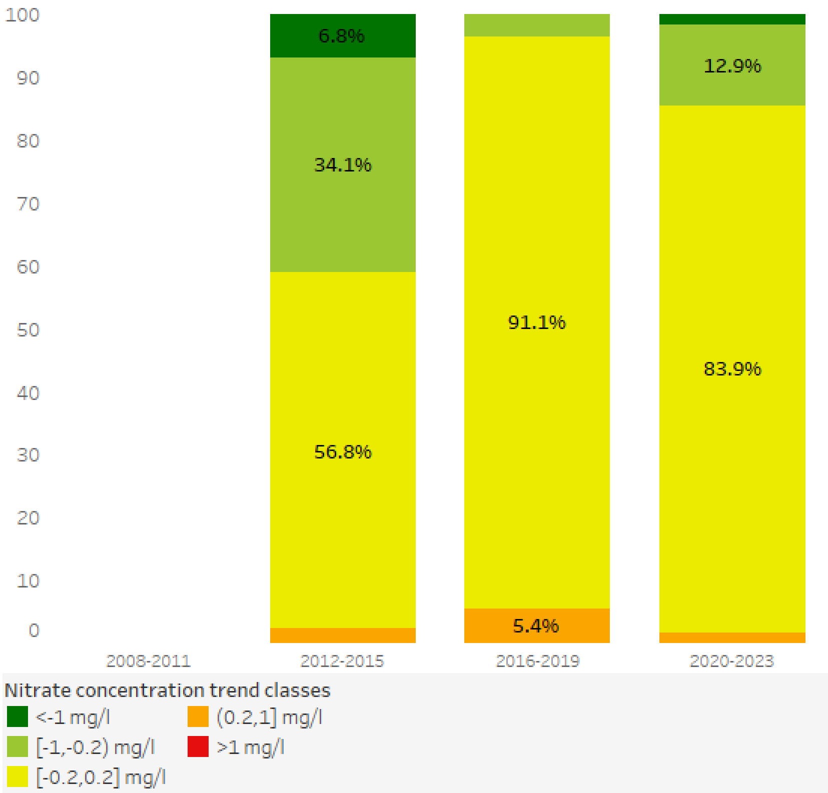
Note: In the map, monitoring points with higher values are plotted on top.

Table 10 – Share of saline water monitoring points by trend class (mg/l) between the periods 2016-2019 and 2020-2023, categorised by station type

	Total Number of Stations	% Total Number of Stations	<-1	[-1,-0.2)	[-0.2,0.2]	(0.2,1]	>1
Transitional water							
Coastal water	54	87.1%	1.9%	14.8%	81.5%	1.9%	
Marine water	8	12.9%			100%		
Total	62	100.0%	1.6%	12.9%	83.9%	1.6%	

Compared to the previous reporting period, there is higher share of monitoring points in saline waters with decreasing nitrate concentrations (13.5% in the current reporting period compared to 3.6% in the previous reporting period) and a lower share of monitoring points with increasing nitrate concentrations (1.6% compared to 5.4%). The graph below shows the share of monitoring points in saline waters with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 29 – Share of monitoring points in saline waters by classes of nitrate concentrations ([34]) in the current and previous reporting periods



Note: The percentages below 5% are not labelled.

([34]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

5.4. Nitrate pollution hotspots in surface waters

A nitrate pollution hotspot is defined here as a monitoring point where the average annual nitrate concentration is ≥ 50 mg/l or between 37.5 and 49.99 mg/l with an increasing trend. There are no surface water nitrate pollution hotspots in Denmark in this reporting period.

6. EUTROPHICATION OF SURFACE WATERS

6.1. Monitoring of trophic status in surface waters

Denmark is a country with very short distances from any point on land to the coast and Danish streams are generally too small for planktonic algae to become very abundant. Therefore, Denmark has focused its environmental monitoring in streams on organic matter indicators such as biological oxygen demand (BOD), and there is no monitoring of secchi depth, chlorophyll a or similar eutrophication indicators. In addition, the Danish monitoring of nutrients in streams focuses on the resulting nutrient loadings in vulnerable surface waters, that is, lakes and coastal waters. The lakes included in the trophic status assessment are a selection of Danish lakes > 5 hectares covered by the Water Framework Directive. For coastal waters approximately half of the monitoring stations of the River Basin Management Plan (RBMP) have been included into the assessment. The data period used for the assessment was 2014-2019. In marine waters, the ecological status is not assessed, so no eutrophication status was reported.

During the reporting period 2020-2023, trophic status was reported at 481 monitoring points. Among these, 75.1% were in rivers, 13.5% were in lakes or reservoirs, and 11.4% were in saline waters. The station density of monitoring points where trophic status was assessed was 9.9 stations per 1 000 km^2.

The overall number of freshwater monitoring points reporting on the trophic status decreased by 368 (46.3%), and the number of saline water monitoring points remained stable at 55 compared to the previous reporting period. In 2008-2011 only lake/water reservoir points were assessed for their trophic status, while for 2012-2015 no trophic status data was reported.

Figure 30 – Evolution in surface water monitoring network (number of points with trophic status reported)

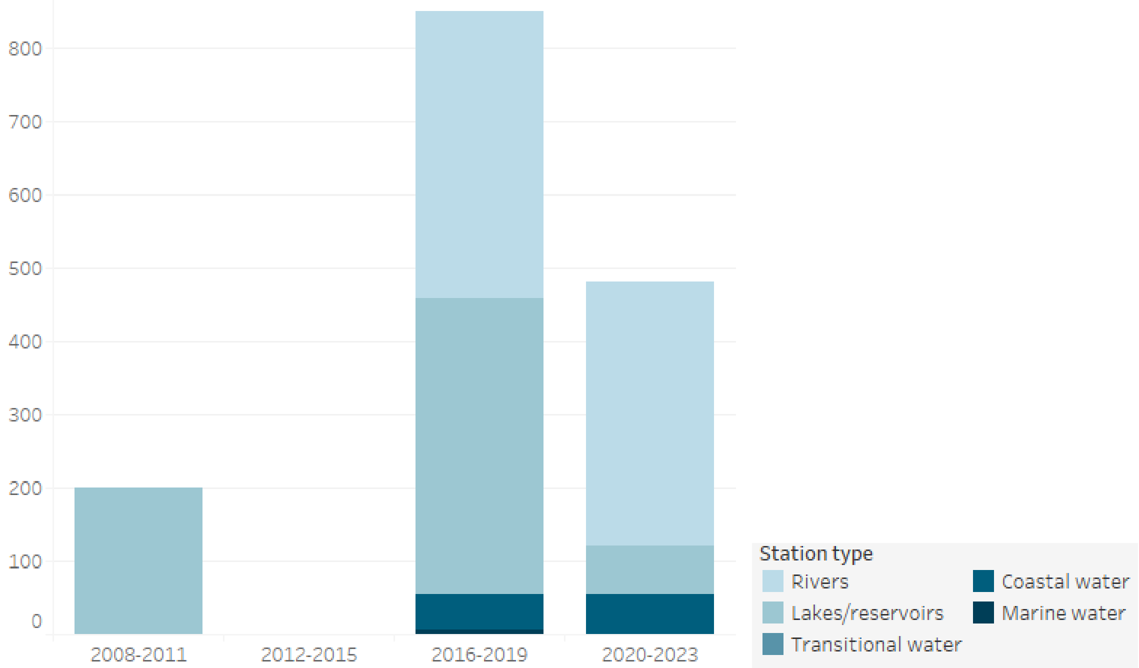


Table 11 – Number of monitoring points reporting trophic status by station type ([35])

Station type	Stations With Trophic Status 2008-2011	2012-2015	2016-2019	2020-2023
Rivers			391	361
Lakes/reservoirs	200		403	65
Transitional water				
Coastal water			48	55
Marine water			7	
Total	200		849	481

6.2. Methodology for the assessment of trophic status

The classification of ecological state is based on data from the third River Basin Management Plan (RBMP), with the term “non-eutrophic” covering water bodies in high and good status, and the term "eutrophic" covering water bodies in moderate, poor or bad status. The same methodology is used for lakes, coastal waters and large rivers.

The classification of the ecological state of lakes is based on monitoring data from the 3rd RBMP for the biological elements (chlorophyll a, phytoplankton, other aquatic flora, macrophytes, benthic invertebrates and fish) and chemical and physio-chemical elements (transparency, oxygenation conditions, nutrient conditions and river basin specific pollutants) sampled during the period 2014-2020. Not all these parameters have been applied for every monitoring point.

Due to adjusted typologies and targets in saline waters in the 3rd RBMP, comparisons with previous trophic status assessments were not assumed meaningful in the report.

Denmark reported that the parameters and limit values used in the eutrophication assessment for the Nitrates Directive align with those of the Water Framework Directive.

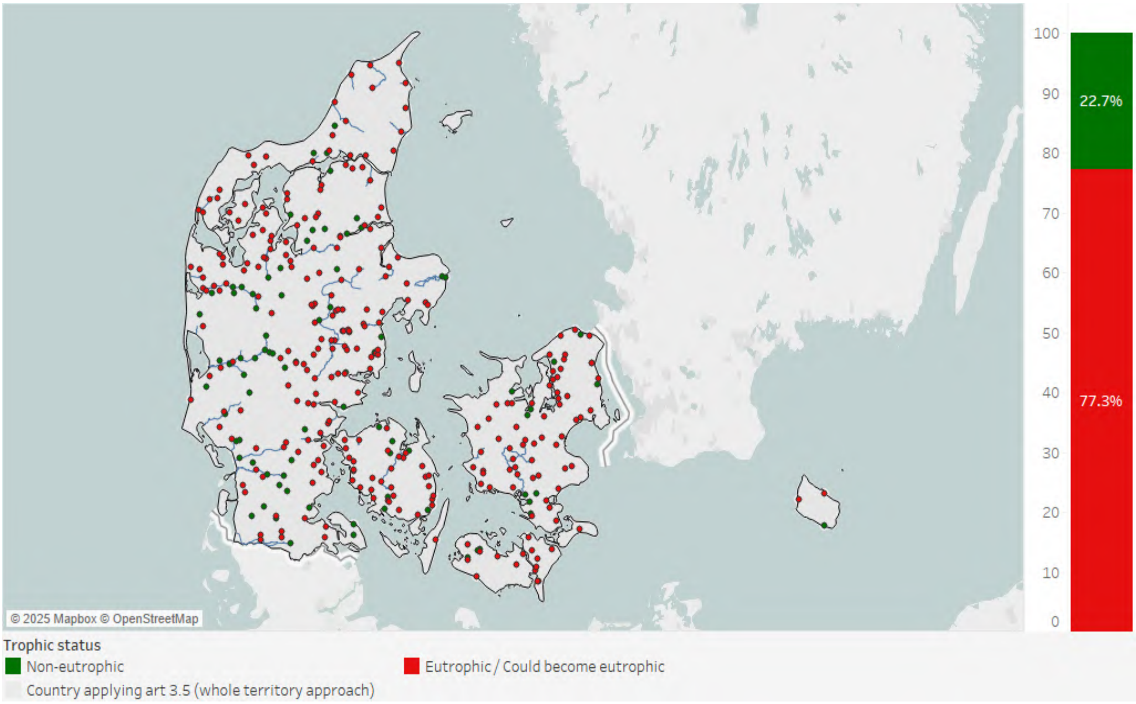
([35]) Denmark reported that monitoring was discontinued in 496 monitoring points relative to the previous reporting period. Discontinuation may be due to nitrate concentrations below 25 mg/l, change in station code or type, or other specific reasons.

6.3. Eutrophication of surface waters

Rivers

77.3% of monitoring points in rivers were eutrophic/could become eutrophic. The figure below shows the shares in respective classes in a graph and spatial distribution in the map.

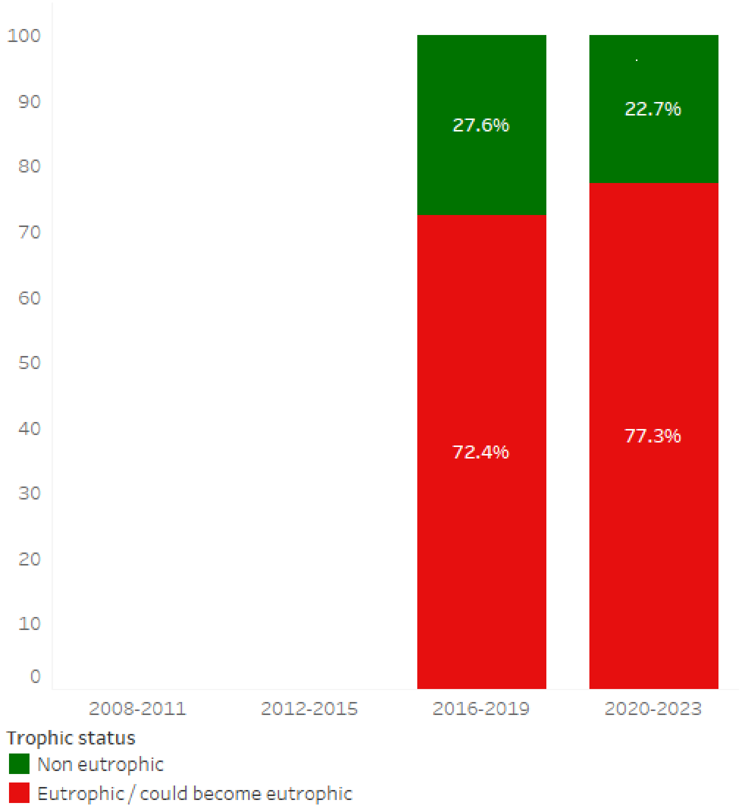
Figure 31 – Map of trophic status in rivers and share of monitoring points by trophic class in the reporting period 2020-2023



Note: In the map, eutrophic/could become eutrophic monitoring points are plotted on top.

Compared to the data reported in the previous reporting period, the share of eutrophic/could become eutrophic monitoring points in rivers increased from 72.4% to 77.3%. The graph below presents the shares of monitoring points in rivers according to their trophic status in the last four reporting periods. In 2008-2011 and 2012-2012 no trophic status was reported for rivers.

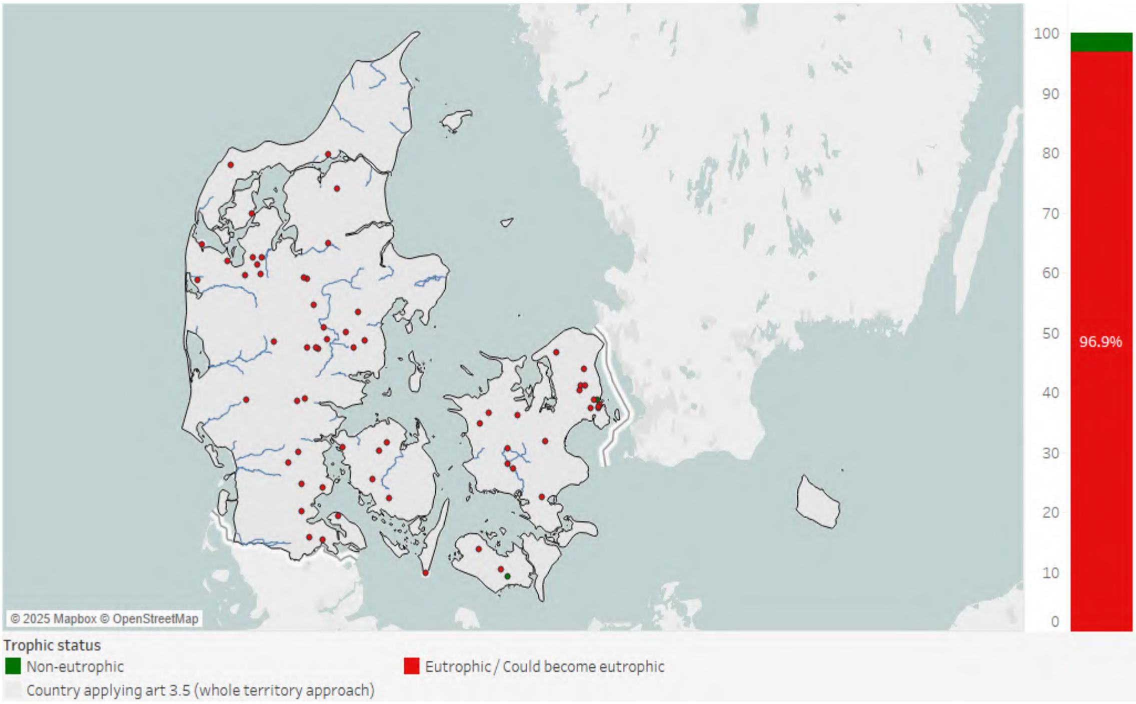
Figure 32 – Share of monitoring points in rivers by class of trophic status in the current and previous reporting periods



Lakes and water reservoirs

96.9% of monitoring points in lakes/water reservoirs were eutrophic/could become eutrophic. The figure below shows the shares in respective classes in a graph and spatial distribution in the map.

Figure 33 – Map of trophic status in lakes/water reservoirs and share of monitoring points by trophic class in the reporting period 2020-2023



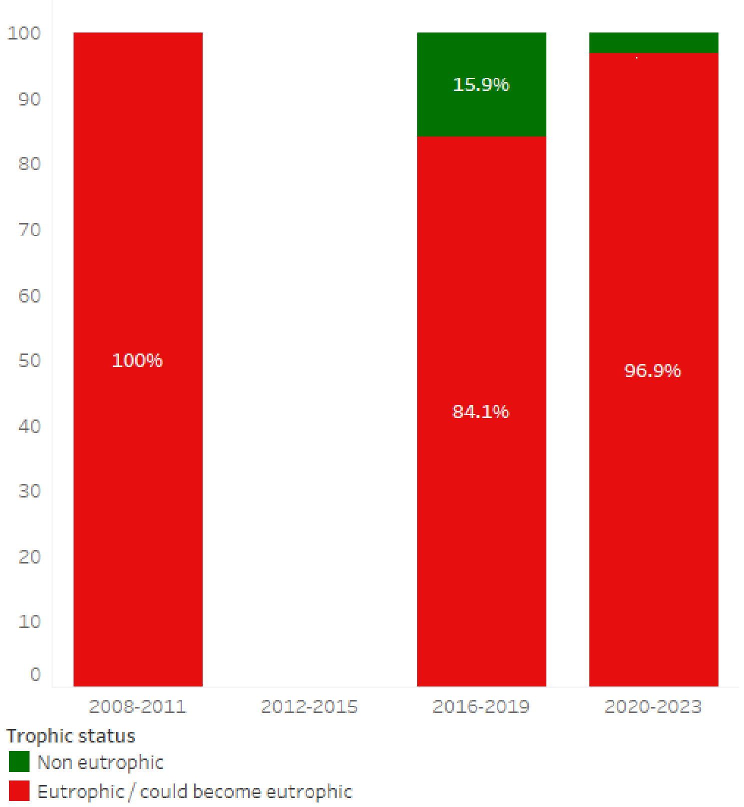
Note: In the map, monitoring points with higher values are plotted on top. In the graph, the percentages below 5% are not labelled.

Table 12 – Share of freshwater monitoring points by class of trophic status, categorised by station type

Station type	Number of Stations	% of Total	Non-eutrophic	Eutrophic/could become eutrophic
Rivers	361	84.7%	22.7%	77.3%
Lakes/reservoirs	65	15.3%	3.1%	96.9%
Total	426	100.0%	19.7%	80.3%

Compared to the data reported in the previous reporting period, the share of eutrophic/could become eutrophic monitoring points in lakes/water reservoirs increased from 84.1% to 96.6%. The graph below presents the shares of monitoring points in lakes/water reservoirs according to their trophic status in the last four reporting periods. In 2008-2011 the share of eutrophic/could become eutrophic stations in lakes/reservoirs was 100%, while in 2012-2015 no data was reported.

Figure 34 – Share of monitoring points in lakes/water reservoirs by class of trophic status in the current and previous reporting periods

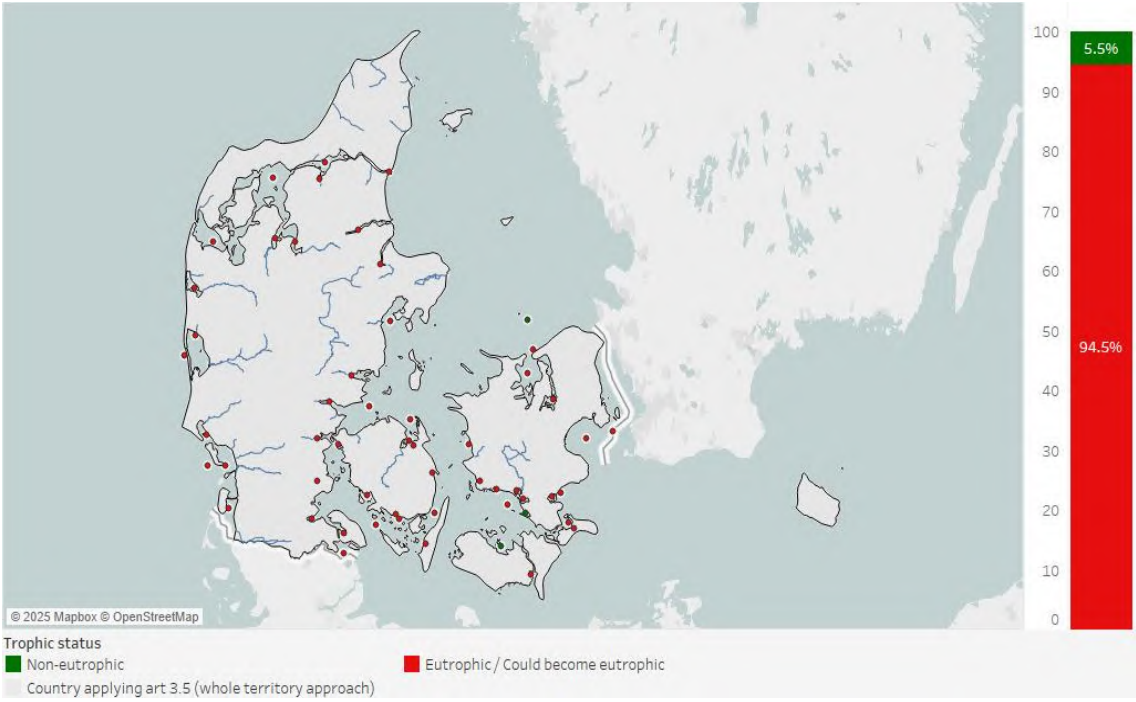


Note: The percentages below 5% are not labelled.

Saline waters

94.5% of saline water monitoring points were eutrophic/could become eutrophic. The figure below shows the shares in respective classes in a graph and spatial distribution in the map.

Figure 35 – Map of trophic status in saline waters and share of monitoring points by trophic class in the reporting period 2020-2023



Note: In the map, eutrophic/could become eutrophic monitoring points are plotted on top.

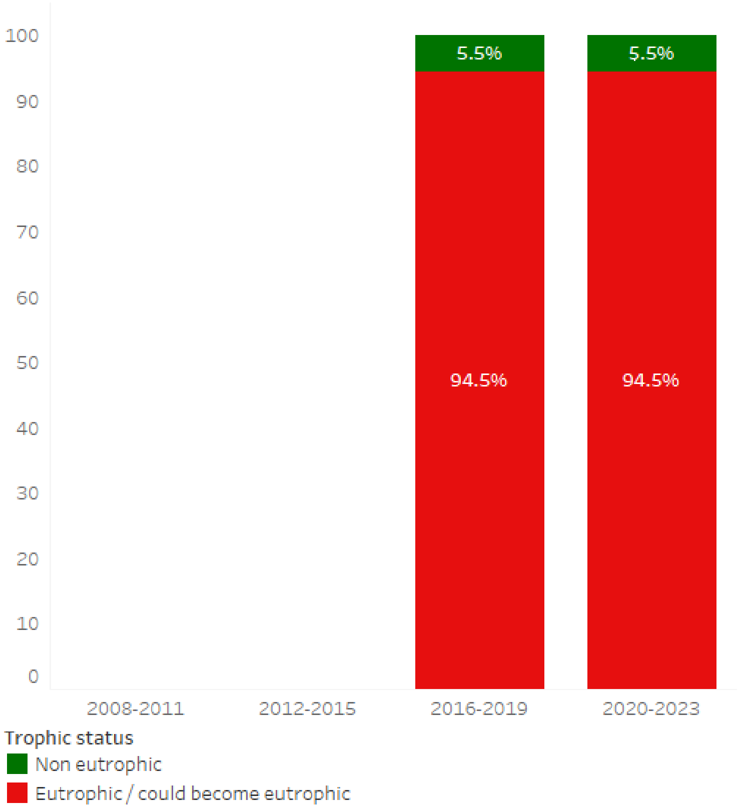
It is relevant to look separately at different types of saline waters (transitional, coastal and marine). In Denmark, no transitional waters were identified and 94.5% of coastal water monitoring points were eutrophic/could become eutrophic, as shown in the table below. No eutrophication status was reported for marine waters.

Table 13 – Share of saline water monitoring points by class of trophic status, categorised by station type

Station type	Number of Stations	% of Total	Non-eutrophic	Eutrophic/could become eutrophic
Transitional water				
Coastal water	55	100.0%	5.5%	94.5%
Marine water				
Total	55	100.0%	5.5%	94.5%

Compared to the previous reporting period, the share of eutrophic/could become eutrophic monitoring points in saline waters remained at 94.5%. The graph below presents the shares of monitoring points in saline waters according to their trophic status in the last four reporting periods. In 2008-2011 and 2012-2015 no trophic status was reported for saline waters.

Figure 36 – Share of monitoring points in saline waters by class of trophic status in the current and previous reporting periods



6.4. Eutrophication hotspots in surface waters

A eutrophication hotspot in surface waters is defined here as a monitoring point with trophic status evaluated as “eutrophic” or “could become eutrophic”. Overall, there are 394 surface water monitoring points which were reported eutrophic/could become eutrophic.

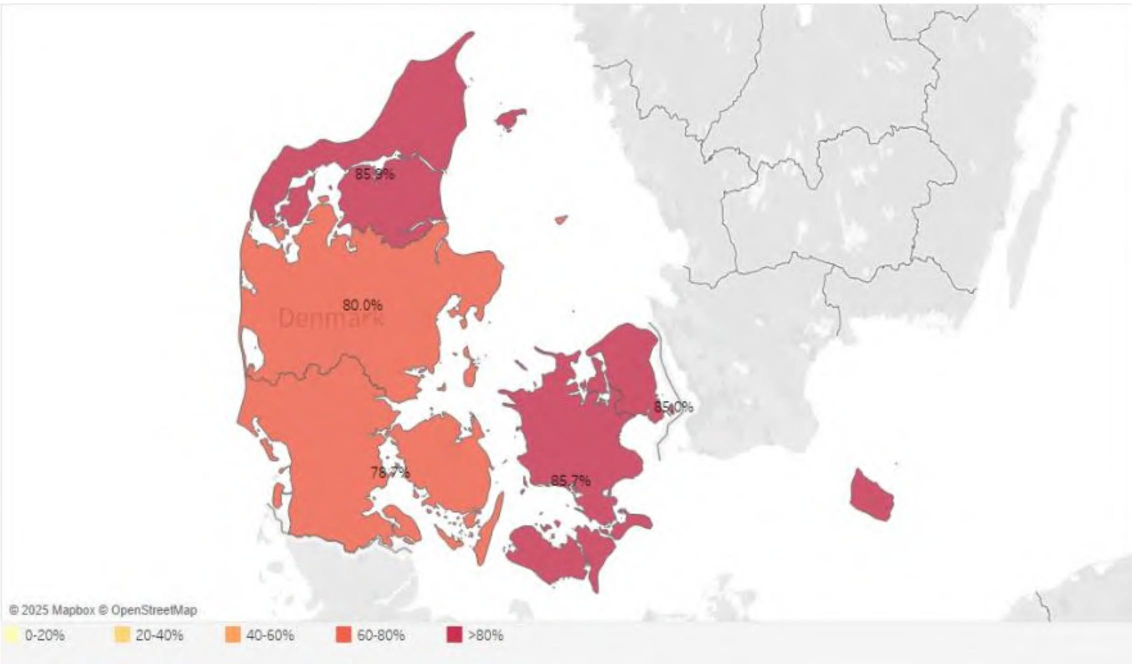
Figure 37 – Eutrophic/could become eutrophic monitoring points

Eutrophic/could become eutrophic inside NVZ
Eutrophic/could become eutrophic outside NVZ
Country applying art 3.5 (whole territory approach)

	inside NVZ	Total
Rivers	279	279
Lakes	63	63
Coastal water	52	52
Total	394	394

The highest share of the hotspots is in NUTS2 regions Region Nordjylland (85.9%), Region Sjælland (85.7%) and Region Hovedstaden (85.0%).

Figure 38 – Share of eutrophic/could become eutrophic monitoring points at NUTS2 level



7. NITRATES ACTION PROGRAMME

The Nitrates Directive mandates the establishment of a code of good agricultural practice that shall be implemented by farmers on a voluntary basis, and promoted through training and information for farmers. Action programmes with mandatory requirements for farms should be established and enforced in NVZ or across the entire territory with mandatory measures applicable to all farms in those areas. These requirements primarily focus on implementing good practices for the handling of fertilisers and manure on farms to minimise the risk of nutrient leaching and run-off from fields. Annex II and III of the directive set the types of measures to be included. The directive leaves wide discretion to Member States to design the measures in line with local circumstances. Compliance with the action programme measures is monitored by public authorities.

The action programmes contain measures concerning fertiliser application (periods when land application of different types of fertilisers is prohibited, land application on steeply sloping ground, prohibition of land application on water-saturated, flooded, frozen or snow-covered ground, the conditions for land application of fertiliser near water courses, balanced fertilisation and the amount of livestock manure that can be applied to the land), and the capacity of storage vessels for livestock manure. They may also include additional measures in relation to fertilizer planning and record keeping, land use management, including the use of crop rotation systems, minimum vegetation cover during sensitive periods, irrigation systems and other relevant measures complementing the nitrates action programme.

7.1. Measures in the action programme and code of good agricultural practices

The concept of good agricultural practice (GAP) in Denmark had developed since the late 1980s in the context of comprehensive environmental legislation. Measures under the code of good agricultural practice, pursuant to Annex II of the Nitrates Directive, are incorporated into the action programme as mandatory requirements and are considered equivalent to the measures laid down under Annex III of the Directive.

Denmark implements its action programme through a combination of legislative acts and executive orders, including, inter alia, the Fertilisation Act-LBK no. 1053 of 10/07/2023 and the Livestock Act-LBK no. 1065 of 21/08/2025 as amended. Executive orders are regularly updated, in some cases on an annual basis. National policy addressing nitrate pollution dates back to 1985. In 1998, the Action Plan on the Aquatic Environment (APAE) II was approved by the European Commission as Denmark’s Nitrate Action Programme.

During the 2020-2023 reporting period, the action programme was further strengthened through lower application standards for crops and grass in rotation on humus soils and higher utilisation requirements for organic fertilisers.

A consolidated overview of the action programme currently in force is provided in a separate document ([36]).

Derogations

Paragraph 2 of Annex III to the Nitrates Directive establishes that Member States intending to apply more livestock manure than corresponding to 170 kg N/ha can fix such higher amounts, based on objective criteria, provided this does not prejudice the achievement of the directive’s objectives. Denmark was granted a derogation for the first time in 2002, which was renewed in 2005, 2008, 2012, 2017, 2018, and 2020. The derogation granted in 2020 by the Decision (EU) 2020/10744 allowed Denmark the application of livestock manure up to a limit of 230 kg N/ha per year on cattle farms on which at least 80 % of the acreage available for manure application are cultivated with crops with high nitrogen uptake and long growing season. The Derogation Decision expired on 31 July 2024.

7.2. Controls

The provisions of the action programme are enforced by administrative staff of the Agency for Green Transition and Aquatic Environment (formerly the Danish Agricultural Agency). Controls consist of both administrative checks and on-the-spot inspections to verify farm-level compliance.

In the 2020/2021 planning period, a total of 683 controls were conducted, comprising 69 combined on-the-spot and administrative inspections and 614 administrative checks of submitted fertilizer accounts. This corresponds to approximately 2.3 % of all agricultural holdings required to submit a fertiliser account.

Combined on-the-spot and administrative inspections identified non-compliance rates ranging from 4.4% and 16.2 %, corresponding to between 3 and 11 non-compliant holdings out of the 68 completed investigations. Administrative checks of fertiliser accounts identifed 36.9 % of cases with respect to nitrogen quotas and in 4.6% of cases regarding the annual application of organic manure, corresponding to 209 and 29 holdings, respectively, out of 567 completed administrative controls.

The Danish national report does not report any significant difficulties in the implementation of the action programme measures.

([36]) https://environment.ec.europa.eu/publications/summaries-national-nitrates-action-programmes_en

8. WATER QUALITY OUTLOOK

In their report, Denmarks states the application of forecast models within their 3rd River Basin Management Plan (RBMP) for 2021-2027. In the model calculations it is assumed that other member states reduce their load correspondingly to a level that supports the achievement of the targets (burden-sharing). It is estimated that land-based nitrogen losses to Danish coastal waters need to be reduced to approximately 38 300 tons of nitrogen per year to enable these waters to achieve good ecological status.

The forecast for 2027 estimates nitrogen loads at 51 300 tons/year, considering planned measures and reduction of agricultural area, leaving a 13 000-ton gap for the achievement of good ecological status. This projection includes a 4 900-ton baseline reduction effect from measures and land-use changes between 2019-2027.

Groundwater bodies in poor chemical status in general are expected to reach good chemical status after 2027. The forecast indicates that current efforts at the time of reporting was not sufficient to fully achieve the Water Framework Directive's ecological status goals by 2027.