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COMMISSION

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PART 2/38

**COMMISSION STAFF WORKING DOCUMENT**

***Accompanying the document***

**REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT**

**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 State reports for the period 2016–2019**

{COM(2021) 1000 final}

## 2. WATER QUALITY

### Monitoring

Table 1: Number of stations and station density (stations per 1 000 km$^2$ of land) of reported groundwater monitoring of annual average nitrate measurements in reporting periods 2008-2011, 2012-2015 and 2016-2019, the change (%) between the last two periods, and the annual average sampling frequency in 2016-2019.

| | | Number of Stations | | | Stations per 1000 km$^2$ | | | Change | Sampling per year |
|---|---|---|---|---|---|---|---|---|---|
| MS | Area km$^2$ | 2008-2011 | 2012-2015 | 2016-2019 | 2008-2011 | 2012-2015 | 2016-2019 | (%) | 2016-2019 |
| AT | 83944 | 1965 | 1965 | 1933 | 23.4 | 23.4 | 23.0 | -1.6 | 1.8 |
| BE | 30667 | 2974 | 2937 | 2905 | 97.0 | 95.8 | 94.7 | -1.1 | 4.4 |
| BG | 110995 | 426 | 406 | 488 | 3.8 | 3.7 | 4.4 | 20.2 | 5.7 |
| CY | 9249 | 244 | 230 | 241 | 26.4 | 24.9 | 26.1 | 4.8 | 1.8 |
| CZ | 78874 | 611 | 621 | 657 | 7.7 | 7.9 | 8.3 | 5.8 | 1.9 |
| DE | 357746 | 162 | 697 | 692 | 0.5 | 1.9 | 1.9 | -0.7 | 0.7 |
| DK | 43162 | 595 | 1201 | 1275 | 13.8 | 27.8 | 29.5 | 6.2 | 0.8 |
| EE | 45347 | 297 | 385 | 369 | 6.5 | 8.5 | 8.1 | -4.2 | 1.4 |
| EL | 131692 | 370 | 1078 | 1764 | 2.8 | 8.2 | 13.4 | 63.6 | 0.8 |
| ES | 505983 | 4778 | 4132 | 4157 | 9.4 | 8.2 | 8.2 | 0.6 | 1.7 |
| FI | 337547 | 79 | 187 | 193 | 0.2 | 0.6 | 0.6 | 3.2 | 1.4 |
| FR | 638474 | 2509 | 2598 | 2582 | 3.9 | 4.1 | 4.0 | -0.6 | 1.1 |
| HR | 56539 | NA | 126 | 132 | NA | 2.2 | 2.3 | 4.8 | 6.6 |
| HU | 93013 | 1763 | 1756 | 1788 | 19.0 | 18.9 | 19.2 | 1.8 | 1.7 |
| IE | 69946 | 211 | 205 | 200 | 3.0 | 2.9 | 2.9 | -2.4 | 2.9 |
| IT | 300578 | 5070 | 5035 | 4618 | 16.9 | 16.8 | 15.4 | -8.3 | 1.7 |
| LT | 64899 | 62 | 65 | 60 | 1.0 | 1.0 | 0.9 | -7.7 | 0.9 |
| LU | 2595 | 20 | 20 | 20 | 7.7 | 7.7 | 7.7 | 0.0 | 3.0 |
| LV | 64586 | 173 | 199 | 232 | 2.7 | 3.1 | 3.6 | 16.6 | 1.4 |
| MT | 315 | 41 | 41 | 44 | 130.2 | 130.2 | 139.7 | 7.3 | 1.8 |
| NL | 37368 | 1297 | 1318 | 1217 | 34.7 | 35.3 | 32.6 | -7.7 | 1.4 |
| PL | 311928 | 1258 | 1563 | 1421 | 4.0 | 5.0 | 4.6 | -9.1 | 0.7 |
| PT | 91971 | 657 | 580 | 520 | 7.1 | 6.3 | 5.7 | -10.3 | 1.6 |
| RO | 238368 | 1809 | 1256 | 1384 | 7.6 | 5.3 | 5.8 | 10.2 | 1.7 |
| SE | 449718 | 326 | 436 | 533 | 0.7 | 1.0 | 1.2 | 22.2 | 0.7 |
| SI | 20277 | 104 | 198 | 211 | 5.1 | 9.8 | 10.4 | 6.6 | 1.8 |
| SK | 49026 | 1717 | 1717 | 1788 | 35.0 | 35.0 | 36.5 | 4.1 | 1.7 |
| UK | 244574 | 3088 | 3139 | 2955 | 12.6 | 12.8 | 12.1 | -5.9 | 3.8 |
| **EU27+UK** | **4469381** | **32606** | **34091** | **34379** | **7.3** | **7.6** | **7.7** | **0.8** | **2.0** |

(*) NA: not available

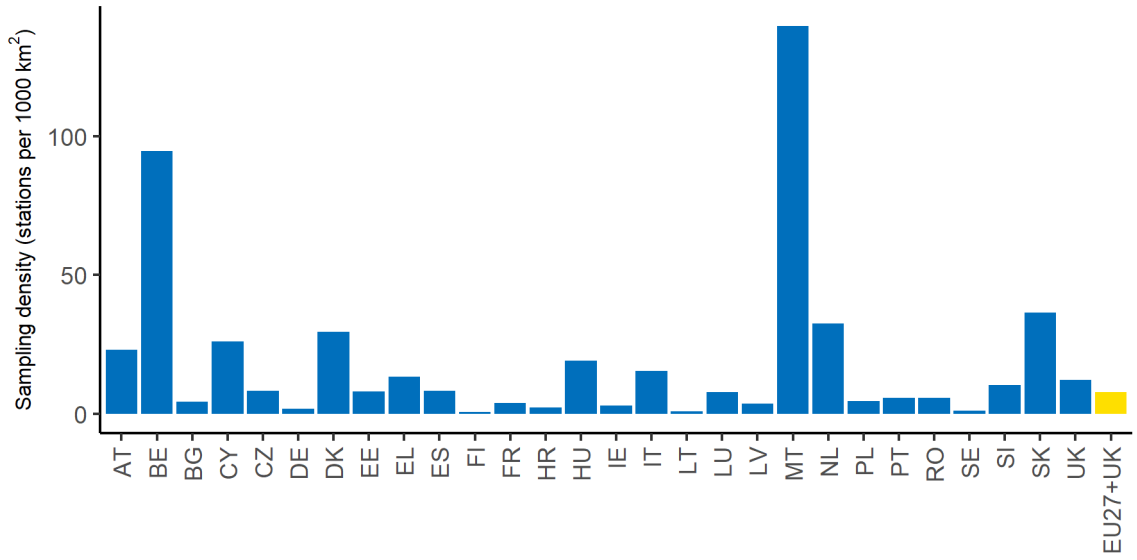



Figure 1: Groundwater station density (stations per 1 000 km$^2$ of land) in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

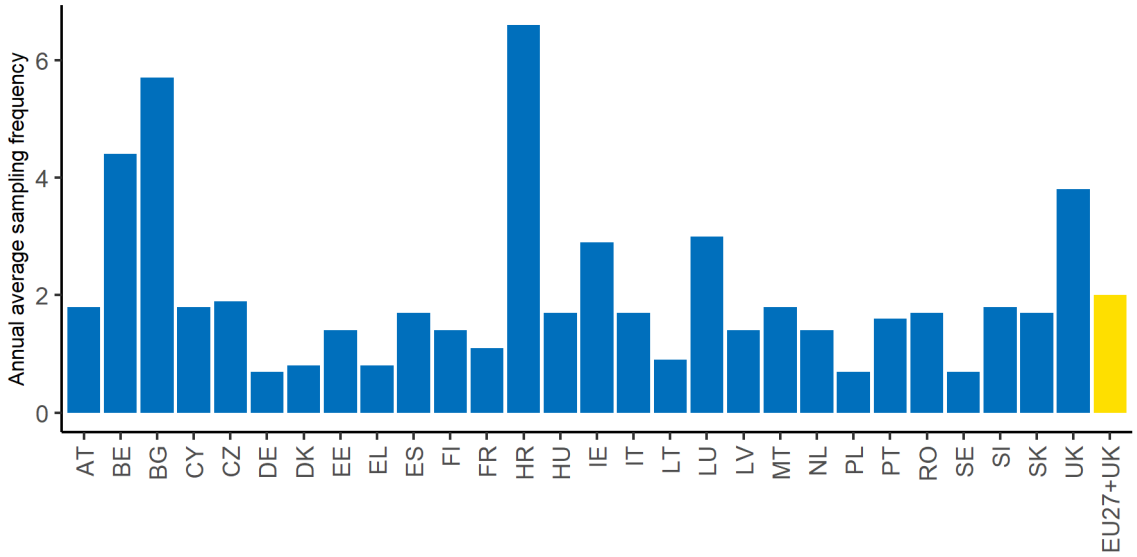



Figure 2: Average annual groundwater sampling frequency in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

Table 2: Number of stations and station density (stations per 1 000 km$^2$ of land) of reported fresh surface water monitoring of annual average nitrate measurements in reporting periods 2008-2011, 2012-2015 and 2016-2019, the change (%) between the last two periods, and the annual average sampling frequency in 2016 -2019.

| | | Number of Stations | | | Stations per 1000 km$^2$ | | | Change | Sampling per year |
|---|---|---|---|---|---|---|---|---|---|
| MS | Area km$^2$ | 2008-2011 | 2012-2015 | 2016-2019 | 2008-2011 | 2012-2015 | 2016-2019 | (%) | 2016-2019 |
| AT | 83944 | 109 | 108 | 128 | 1.3 | 1.3 | 1.5 | 18.5 | 10.9 |
| BE | 30667 | 857 | 835 | 819 | 27.9 | 27.2 | 26.7 | -1.9 | 7.0 |
| BG | 110995 | 305 | 318 | 320 | 2.7 | 2.9 | 2.9 | 0.6 | 5.6 |
| CY | 9249 | 10 | 13 | 13 | 1.1 | 1.4 | 1.4 | 0.0 | 8.5 |
| CZ | 78874 | 571 | 1917 | 2086 | 7.2 | 24.3 | 26.4 | 8.8 | 7.9 |
| DE | 357746 | 303 | 241 | 309 | 0.8 | 0.7 | 0.9 | 28.2 | 10.5 |
| DK | 43162 | 161 | 177 | 445 | 3.7 | 4.1 | 10.3 | 151.4 | 15.0 |
| EE | 45347 | 145 | 324 | 280 | 3.2 | 7.1 | 6.2 | -13.6 | 2.8 |
| EL | 131692 | 105 | 479 | 284 | 0.8 | 3.6 | 2.2 | -40.7 | 1.2 |
| ES | 505983 | 3730 | 3903 | 3525 | 7.4 | 7.7 | 7.0 | -9.7 | 3.6 |
| FI | 337547 | 141 | 167 | 147 | 0.4 | 0.5 | 0.4 | -12.0 | 6.2 |
| FR | 638474 | 3331 | 3390 | 3251 | 5.2 | 5.3 | 5.1 | -4.1 | 2.4 |
| HR | 56539 | NA | 64 | 75 | NA | 1.1 | 1.3 | 17.2 | 9.9 |
| HU | 93013 | 525 | 530 | 927 | 5.6 | 5.7 | 10.0 | 74.9 | 5.0 |
| IE | 69946 | 252 | 254 | 254 | 3.6 | 3.6 | 3.6 | 0.0 | 14.5 |
| IT | 300578 | 2463 | 3154 | 2288 | 8.2 | 10.5 | 7.6 | -27.5 | 4.8 |
| LT | 64899 | 291 | 320 | 289 | 4.5 | 4.9 | 4.5 | -9.7 | 3.4 |
| LU | 2595 | 16 | 16 | 16 | 6.2 | 6.2 | 6.2 | 0.0 | 6.4 |
| LV | 64586 | 338 | 222 | 435 | 5.2 | 3.4 | 6.7 | 95.9 | 2.1 |
| MT | 315 | 7 | 5 | NA | 22.2 | 15.9 | NA | NA | NA |
| NL | 37368 | 457 | 850 | 852 | 12.2 | 22.7 | 22.8 | 0.2 | 13.7 |
| PL | 311928 | 2802 | 2526 | 3935 | 9.0 | 8.1 | 12.6 | 55.8 | 3.0 |
| PT | 91971 | 146 | 154 | 158 | 1.6 | 1.7 | 1.7 | 2.6 | 4.4 |
| RO | 238368 | 1113 | 1224 | 1123 | 4.7 | 5.1 | 4.7 | -8.3 | 6.0 |
| SE | 449718 | 187 | 2792 | 2282 | 0.4 | 6.2 | 5.1 | -18.3 | 1.0 |
| SI | 20277 | 139 | 136 | 154 | 6.9 | 6.7 | 7.6 | 13.2 | 3.5 |
| SK | 49026 | 852 | 512 | 842 | 17.4 | 10.4 | 17.2 | 64.5 | 4.6 |
| UK | 244574 | 7378 | 8404 | 7947 | 30.2 | 34.4 | 32.5 | -5.4 | 5.6 |
| **EU27+UK** | **4469381** | **26734** | **33035** | **33184** | **6.0** | **7.4** | **7.4** | **0.5** | **6.3** |

(*) NA: not available

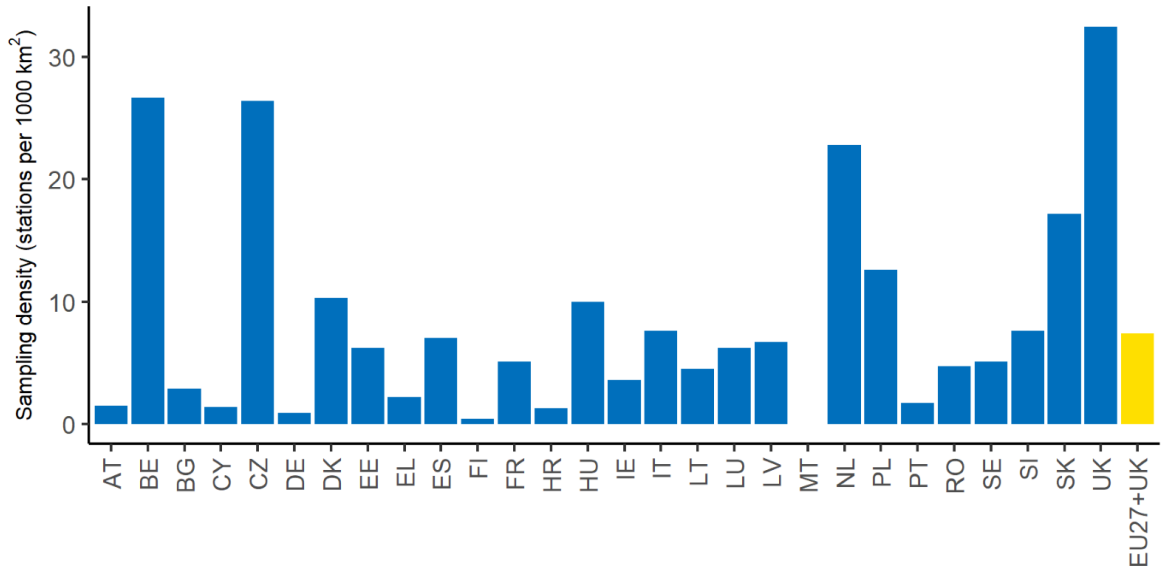



Figure 3: Fresh surface water station density (stations per 1 000 km$^2$ of land) in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

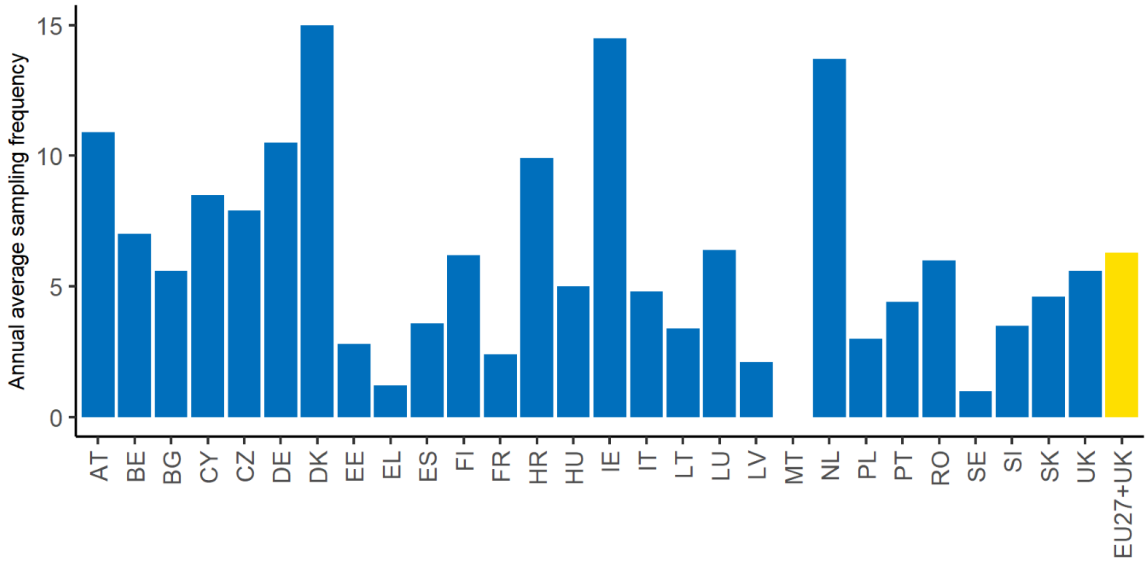



Figure 4: Annual average fresh surface water sampling frequency in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

Table 3: Number of stations of reported saline surface water monitoring of annual average nitrate measurements in reporting periods 2008-2011, 2012-2015 and 2016-2019, and the change (%) between the last two periods.

| | Number of Stations | | | Change | Sampling per year |
|---|---|---|---|---|---|
| MS | 2008-2011 | 2012-2015 | 2016-2019 | (%) | 2016-2019 |
| AT | NA | NA | NA | NA | NA |
| BE | 10 | 10 | 3 | -70.0 | 6.7 |
| BG | 7 | 6 | 6 | 0.0 | 1.8 |
| CY | 0 | 16 | 16 | 0.0 | 2.0 |
| CZ | NA | NA | NA | NA | NA |
| DE | 5 | 5 | 51 | 920.0 | 5.9 |
| DK | 70 | 44 | 66 | 50.0 | 15.6 |
| EE | 23 | 26 | 21 | -19.2 | 9.0 |
| EL | 11 | NA | 81 | NA | 1.1 |
| ES | 631 | 250 | 594 | 137.6 | 2.6 |
| FI | 44 | 75 | 76 | 1.3 | 4.5 |
| FR | 21 | 8 | 23 | 187.5 | 0.7 |
| HR | NA | NA | 11 | NA | 4.5 |
| HU | NA | NA | NA | NA | NA |
| IE | 124 | 117 | 122 | 4.3 | 3.4 |
| IT | 584 | 577 | 503 | -12.8 | 5.1 |
| LT | 17 | 16 | 16 | 0.0 | 8.8 |
| LU | NA | NA | NA | NA | NA |
| LV | 45 | 43 | 16 | -62.8 | 1.2 |
| MT | 31 | 49 | 62 | 26.5 | 1.4 |
| NL | 43 | 39 | 34 | -12.8 | 11.7 |
| PL | 46 | 19 | 19 | 0.0 | 28.3 |
| PT | 55 | 6 | 20 | 233.3 | 2.8 |
| RO | 54 | 35 | 32 | -8.6 | 3.2 |
| SE | 233 | 184 | 190 | 3.3 | 4.5 |
| SI | 5 | 5 | 5 | 0.0 | 12.0 |
| SK | NA | NA | NA | NA | NA |
| UK | 1064 | 674 | 586 | -13.1 | 5.4 |
| **EU27+UK** | **3123** | **2204** | **2553** | **15.8** | **6.2** |

(*) NA: not available

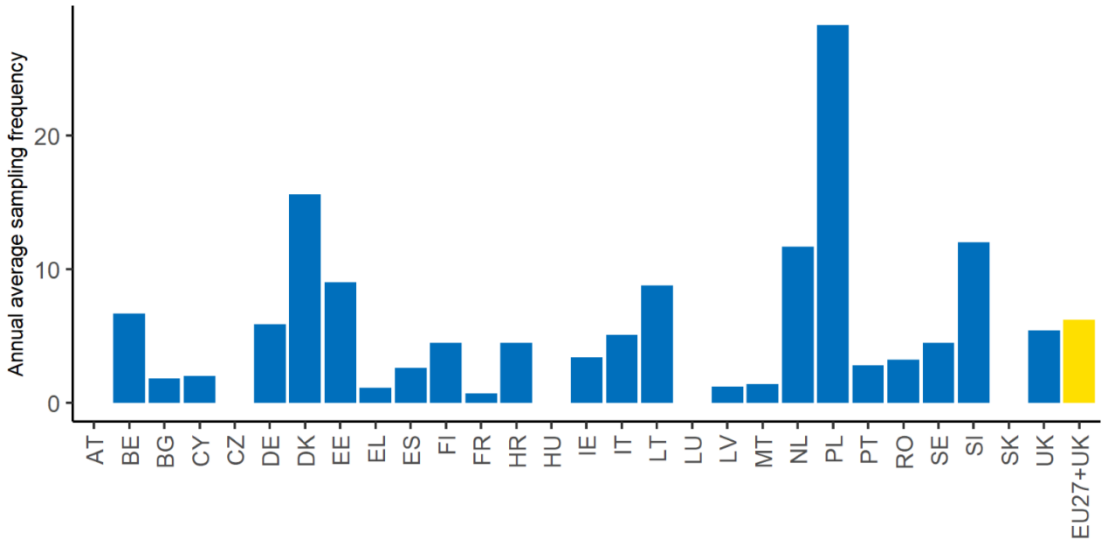



Figure 5: Annual average saline surface water sampling frequency in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

Table 4: Number of stations with trends for groundwater monitoring points in the periods 2008-2011, 2012-2015 and 2016-2019.

| | Stations with trends (#) | | |
|---|---|---|---|
| MS | 2008-2011 | 2012-2015 | 2016-2019 |
| AT | 1724 | 1906 | 1837 |
| BE | 2883 | 2836 | 2884 |
| BG | 115 | 359 | 368 |
| CY | 221 | 210 | 191 |
| CZ | 323 | 607 | 657 |
| DE | 162 | 692 | 689 |
| DK | 589 | 1001 | 1105 |
| EE | 45 | 108 | 332 |
| EL | 369 | 0 | 0 |
| ES | 2315 | 3035 | 3893 |
| FI | 52 | 187 | 193 |
| FR | 1039 | 2094 | 2360 |
| HR | 0 | 0 | 123 |
| HU | 1720 | 1736 | 1710 |
| IE | 204 | 205 | 200 |
| IT | 4193 | 4134 | 3431 |
| LT | 62 | 65 | 60 |
| LU | 19 | 20 | 20 |
| LV | 140 | 163 | 184 |
| MT | 0 | 41 | 41 |
| NL | 1253 | 1229 | 1160 |
| PL | 1125 | 1063 | 1304 |
| PT | 586 | 553 | 519 |
| RO | 929 | 849 | 1114 |
| SE | 0 | 99 | 109 |
| SI | 104 | 98 | 192 |
| SK | 681 | 1544 | 1298 |
| UK | 2323 | 2654 | 2749 |
| **EU27+UK** | **23176** | **27488** | **28723** |

(*) stations with trends between periods can be different

Table 5: Number of stations with trends for surface water monitoring points in the periods 2008-2011, 2012-2015 and 2016-2019.

| | Stations with trends (#) | | |
|---|---|---|---|
| MS | 2008-2011 | 2012-2015 | 2016-2019 |
| AT | 100 | 107 | 102 |
| BE | 856 | 830 | 815 |
| BG | 89 | 292 | 318 |
| CY | 28 | 26 | 29 |
| CZ | 554 | 502 | 1796 |
| DE | 0 | 0 | 298 |
| DK | 125 | 182 | 285 |
| EE | 74 | 138 | 152 |
| EL | 115 | 0 | 0 |
| ES | 2343 | 3289 | 3797 |
| FI | 183 | 240 | 155 |
| FR | 1202 | 2900 | 3025 |
| HR | 0 | 0 | 64 |
| HU | 212 | 313 | 414 |
| IE | 332 | 349 | 362 |
| IT | 2216 | 2450 | 2391 |
| LT | 83 | 233 | 222 |
| LU | 16 | 16 | 16 |
| LV | 189 | 199 | 180 |
| MT | 0 | 0 | 22 |
| NL | 269 | 204 | 808 |
| PL | 1607 | 1663 | 2199 |
| PT | 111 | 145 | 156 |
| RO | 930 | 962 | 996 |
| SE | 0 | 45 | 33 |
| SI | 114 | 121 | 140 |
| SK | 236 | 378 | 343 |
| UK | 6660 | 6099 | 7605 |
| **EU27+UK** | **18644** | **21683** | **26723** |

(*) stations with trends between periods can be different

## Groundwater quality

Table 6: Percentage of groundwater monitoring points per water quality class (annual average nitrate concentration in mg nitrate per l) for all stations of the EU 27 Member States and UK for the period 2016-2019.

| | 2016 - 2019 | | | |
|---|---|---|---|---|
| MS | <25 | [25,40) | [40,50) | ≥ 50 |
| AT | 76.7 | 10.7 | 5.5 | 7.2 |
| BE | 61.5 | 15.2 | 7.3 | 16.0 |
| BG | 62.1 | 18.0 | 5.3 | 14.5 |
| CY | 71.4 | 7.9 | 3.7 | 17.0 |
| CZ | 76.1 | 7.6 | 4.6 | 11.7 |
| DE | 49.6 | 14.0 | 9.7 | 26.7 |
| DK | 68.3 | 10.7 | 6.7 | 14.3 |
| EE | 77.8 | 12.5 | 6.8 | 3.0 |
| EL | 75.8 | 8.9 | 3.4 | 11.9 |
| ES | 57.7 | 12.9 | 6.3 | 23.1 |
| FI | 93.3 | 3.6 | 1.6 | 1.6 |
| FR | 49.3 | 25.1 | 12.8 | 12.8 |
| HR | 87.9 | 9.8 | 0.8 | 1.5 |
| HU | 86.9 | 4.0 | 1.9 | 7.3 |
| IE | 81.5 | 16.0 | 1.0 | 1.5 |
| IT | 68.1 | 13.7 | 5.6 | 12.5 |
| LT | 95.0 | 1.7 | 1.7 | 1.7 |
| LU | 40.0 | 25.0 | 15.0 | 20.0 |
| LV | 96.6 | 1.7 | 0.4 | 1.3 |
| MT | 4.5 | 18.2 | 13.6 | 63.6 |
| NL | 73.3 | 7.6 | 5.2 | 14.0 |
| PL | 87.1 | 5.8 | 2.4 | 4.6 |
| PT | 67.1 | 11.2 | 4.2 | 17.5 |
| RO | 75.3 | 8.7 | 3.5 | 12.6 |
| SE | 95.3 | 2.8 | 0.9 | 0.9 |
| SI | 73.9 | 10.9 | 6.2 | 9.0 |
| SK | 74.9 | 8.8 | 4.3 | 12.0 |
| UK | 61.5 | 19.1 | 7.2 | 12.2 |
| **EU27+UK** | **67.4** | **12.7** | **5.8** | **14.1** |

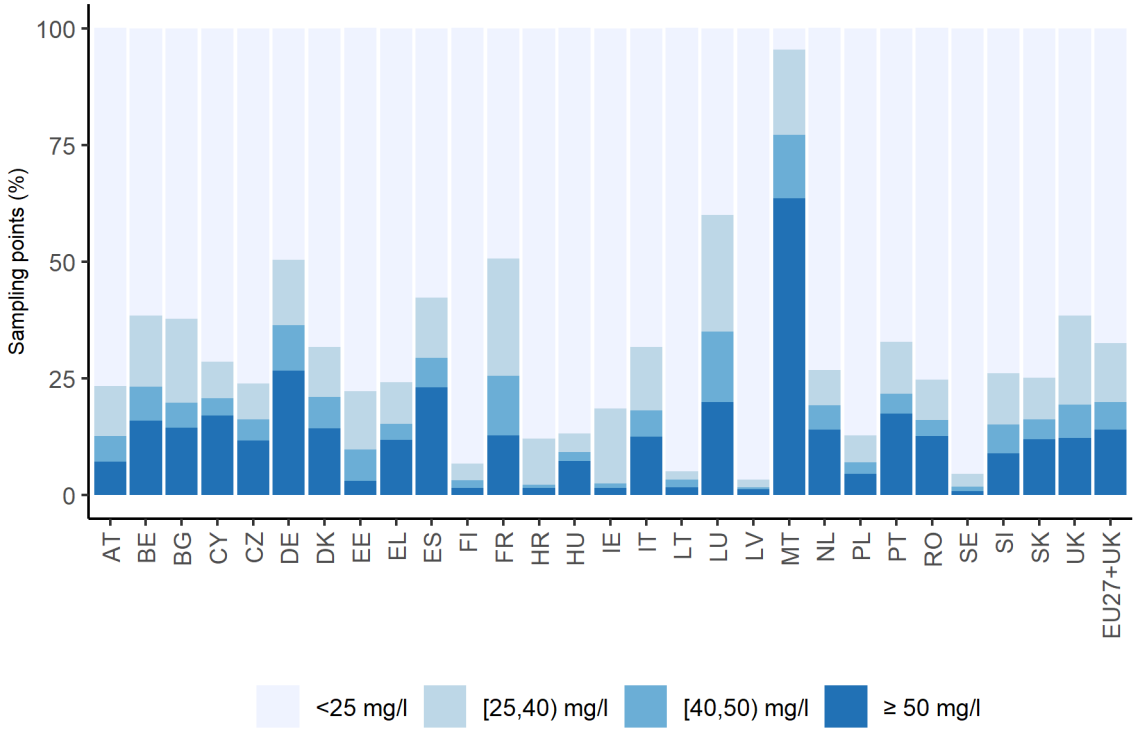



Figure 6: Frequency diagram of annual average nitrate concentrations in groundwater, at all depths, in reporting period 2016-2019.

Table 7: Percentage of groundwater stations (at all depth) with decreasing, stable or increasing trends in average groundwater nitrate concentrations between the reporting periods 2012-2015 and 2016-2019.

| | 2016 - 2019 | | | | |
|---|---|---|---|---|---|
| MS | < -5 | [-5,1) | [1,-1] | (1,5] | >5 |
| AT | 11.3 | 21.4 | 48.8 | 13.6 | 5.0 |
| BE | 16.6 | 16.9 | 36.9 | 15.0 | 14.5 |
| BG | 23.4 | 16.3 | 20.1 | 19.3 | 20.9 |
| CY | 12.0 | 12.0 | 44.5 | 14.1 | 17.3 |
| CZ | 9.1 | 11.3 | 63.5 | 9.7 | 6.4 |
| DE | 18.3 | 18.4 | 39.8 | 12.0 | 11.5 |
| DK | 18.9 | 12.4 | 50.4 | 7.6 | 10.7 |
| EE | 6.9 | 9.3 | 60.8 | 9.6 | 13.3 |
| EL | NA | NA | NA | NA | NA |
| ES | 18.7 | 17.0 | 33.4 | 15.9 | 15.0 |
| FI | 4.7 | 12.4 | 57.5 | 14.5 | 10.9 |
| FR | 12.6 | 19.8 | 34.8 | 21.5 | 11.4 |
| HR | 19.5 | 45.5 | 30.9 | 4.1 | 0.0 |
| HU | 5.8 | 9.8 | 68.7 | 8.7 | 7.0 |
| IE | 2.0 | 15.0 | 45.5 | 30.0 | 7.5 |
| IT | 17.7 | 20.2 | 39.4 | 13.8 | 8.9 |
| LT | 8.3 | 18.3 | 50.0 | 10.0 | 13.3 |
| LU | 5.0 | 25.0 | 45.0 | 15.0 | 10.0 |
| LV | 2.7 | 3.8 | 87.0 | 2.7 | 3.8 |
| MT | 41.5 | 26.8 | 12.2 | 12.2 | 7.3 |
| NL | 15.4 | 6.8 | 59.1 | 5.7 | 12.9 |
| PL | 6.0 | 10.2 | 70.4 | 8.0 | 5.4 |
| PT | 14.1 | 14.8 | 41.4 | 16.6 | 13.1 |
| RO | 18.5 | 14.9 | 32.0 | 15.4 | 19.2 |
| SE | 0.0 | 0.9 | 97.2 | 1.8 | 0.0 |
| SI | 9.9 | 21.4 | 51.6 | 14.1 | 3.1 |
| SK | 17.5 | 14.0 | 38.9 | 16.7 | 12.9 |
| UK | 9.2 | 19.9 | 48.1 | 15.0 | 7.8 |
| **EU27+UK** | **14.1** | **16.3** | **44.8** | **13.9** | **10.9** |

(*) NA: not available

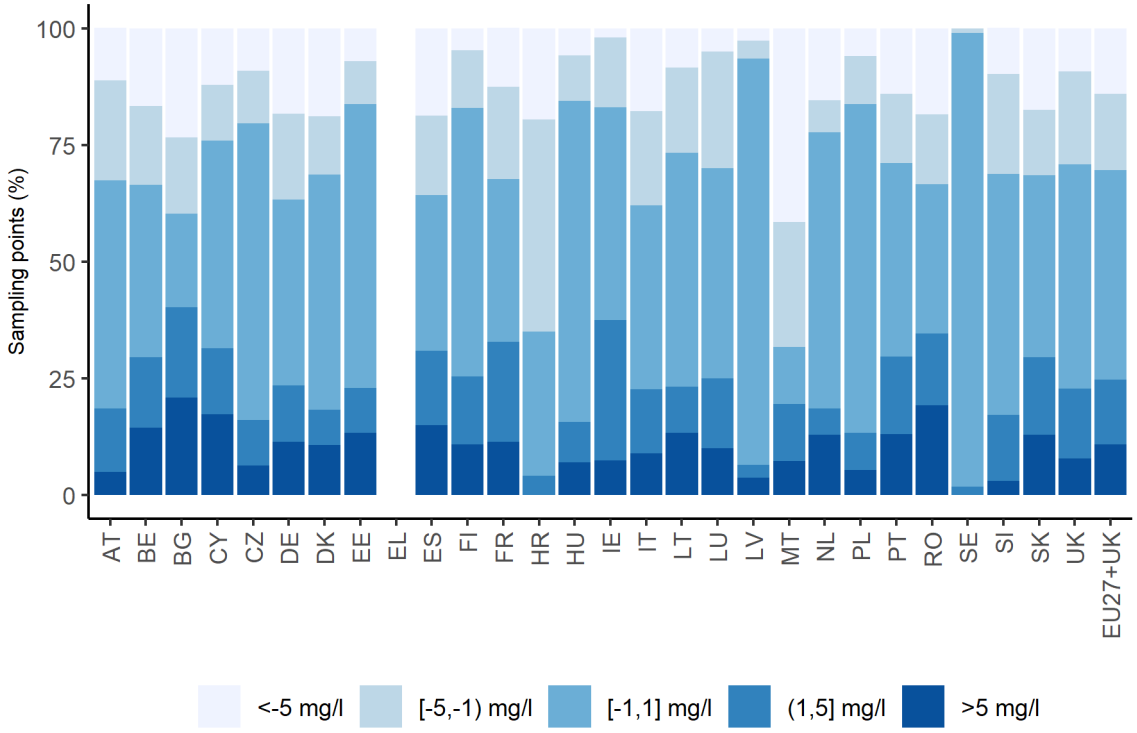



Figure 7: Frequency diagram of trends in annual average nitrate concentrations in groundwater, at all depths, in reporting period 2016-2019.

Table 26: Percentage of groundwater stations by classes of annual nitrate concentration, at different sampling depths, aggregated over all Member States. Reporting period 2016-2019.

| | Total stations | | Percentage of stations | | | |
|---|---|---|---|---|---|---|
| Depth | # | % | <25 mg/l | [25,40) mg/l | [40,50) mg/l | ≥ 50 mg/l |
| Phreatic groundwater (shallow): 0-5m | 9384 | 27.3 | 68.6 | 12.0 | 5.8 | 13.5 |
| Phreatic groundwater (deep): 5-15m | 7160 | 20.8 | 63.2 | 12.5 | 6.4 | 17.8 |
| Phreatic groundwater (deep): 15-30m | 4684 | 13.6 | 60.4 | 14.7 | 7.9 | 17.1 |
| Phreatic groundwater (deep): >30m | 5511 | 16.0 | 62.7 | 16.9 | 6.8 | 13.5 |
| Captive groundwater | 4258 | 12.4 | 87.2 | 6.2 | 2.6 | 4.0 |
| Karstic groundwater | 2618 | 7.6 | 80.4 | 11.2 | 3.3 | 5.1 |
| Not indicated | 764 | 2.2 | 61.6 | 15.1 | 6.7 | 16.6 |

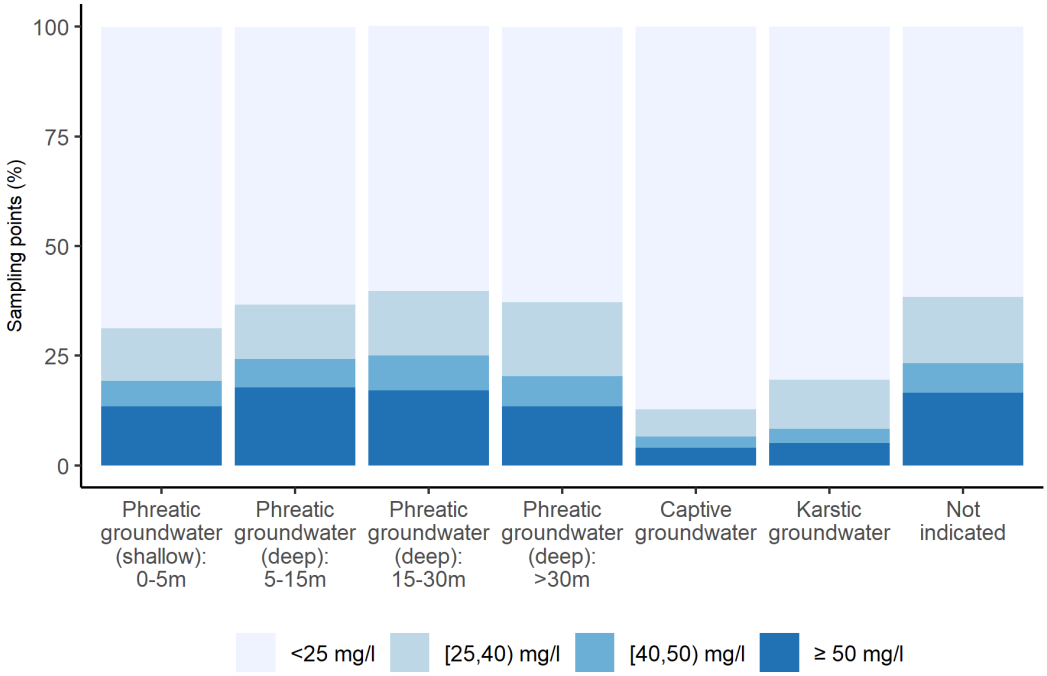



Figure 8: Frequency diagram of annual average nitrate concentrations in groundwater at different depths, aggregated over all Member States. Reporting period 2016-2019

Table 8: Percentage of groundwater stations with decreasing, stable or increasing trends at different depths, aggregated over all Member States. Reporting period 2016-2019

| | Total stations | | Percentage of stations | | | | |
|---|---|---|---|---|---|---|---|
| Depth | # | % | < -5 mg/l | [-5,-1) mg/l | [-1,1] mg/l | (1,5] mg/l | >5 mg/l |
| Phreatic groundwater (shallow): 0-5m | 8500 | 29.6 | 14.6 | 17.6 | 40.3 | 15.2 | 12.3 |
| Phreatic groundwater (deep): 5-15m | 6069 | 21.1 | 20.6 | 15.9 | 35.0 | 13.9 | 14.5 |
| Phreatic groundwater (deep): 15-30m | 3838 | 13.4 | 16.4 | 17.2 | 41.0 | 13.7 | 11.7 |
| Phreatic groundwater (deep): >30m | 4567 | 15.9 | 11.6 | 18.9 | 45.6 | 14.9 | 8.9 |
| Captive groundwater | 3552 | 12.4 | 6.0 | 10.4 | 71.6 | 7.8 | 4.1 |
| Karstic groundwater | 1835 | 6.4 | 7.0 | 14.4 | 55.0 | 16.8 | 6.8 |
| Not indicated | 362 | 1.3 | 13.8 | 18.0 | 30.4 | 18.0 | 19.9 |

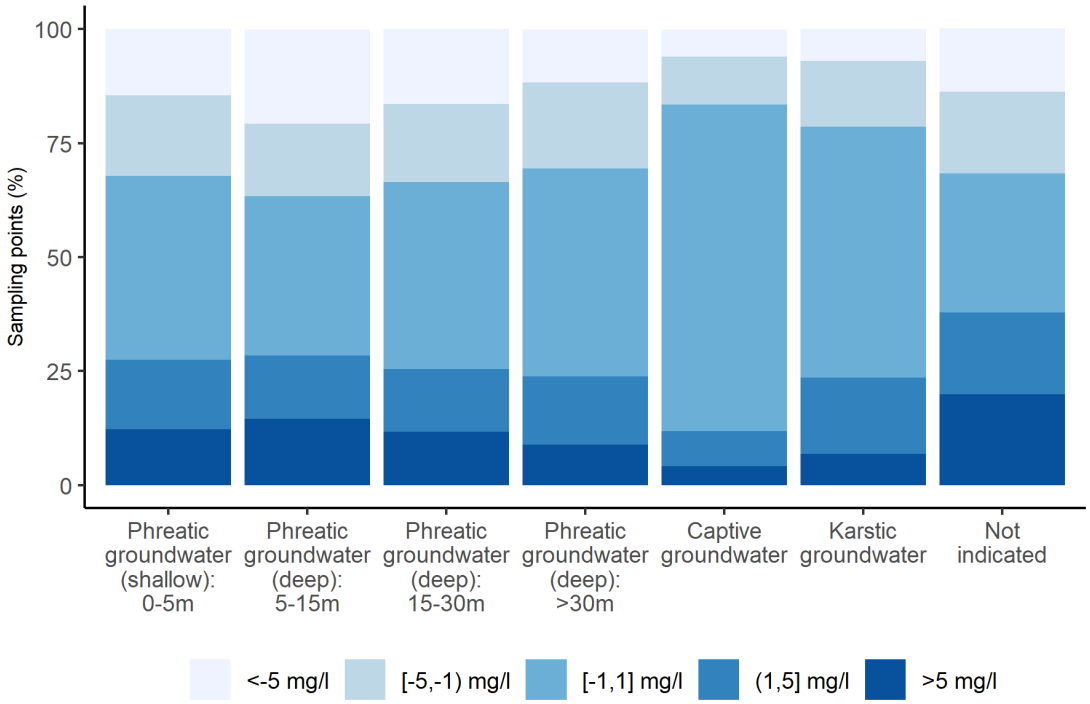



Figure 9: Frequency diagram of trends in annual average nitrate concentrations in groundwater at different depths, aggregated over all Member States. Reporting period 2016-2019