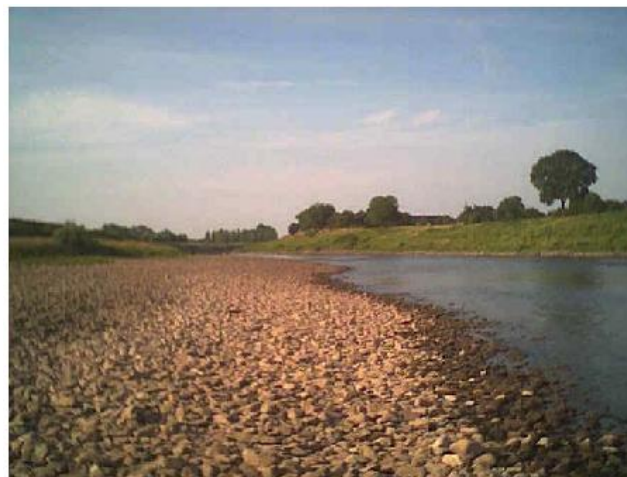


BTO 2006.073 (s)  
november 2006

*Addenda:*

**Effects of Droughts and Floods on  
the Water Quality and Drinking  
Water Function of the River Meuse**

*a Preview of Climate Change?*



**BTO 2006.073 (s)**  
november 2006

## *Addenda:*

# **Effects of Droughts and Floods on the Water Quality and Drinking Water Function of the River Meuse**

*a Preview of Climate Change?*

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# Colofon

**Title**

Effects of Droughts and Floods on the Water Quality  
and Drinking Water Function of the River Meuse:  
*a Preview of Climate Change?*

**Project number**

111.614.030

**Project manager**

Ir. T.A.B. Ramaker

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**Author**

M.T.H. van Vliet

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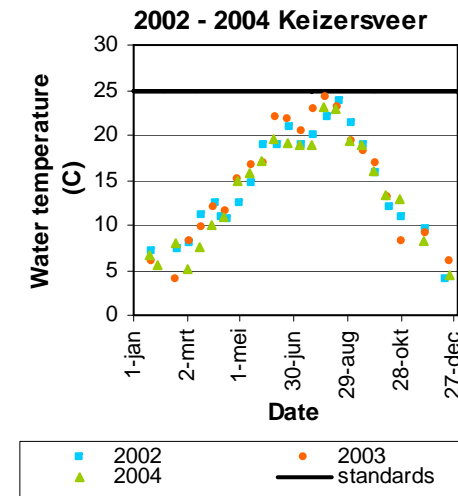
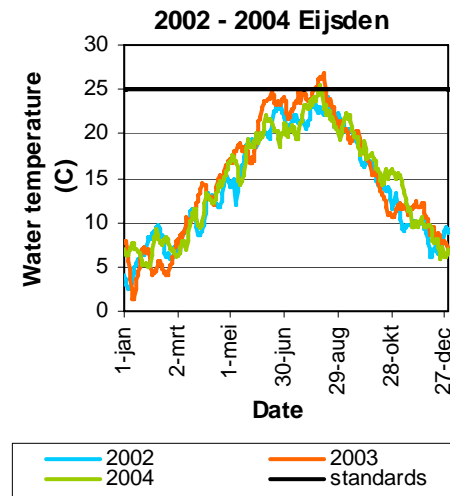
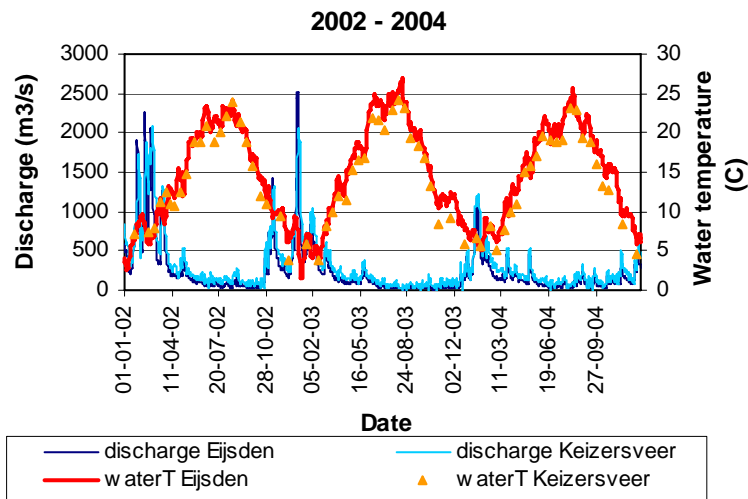
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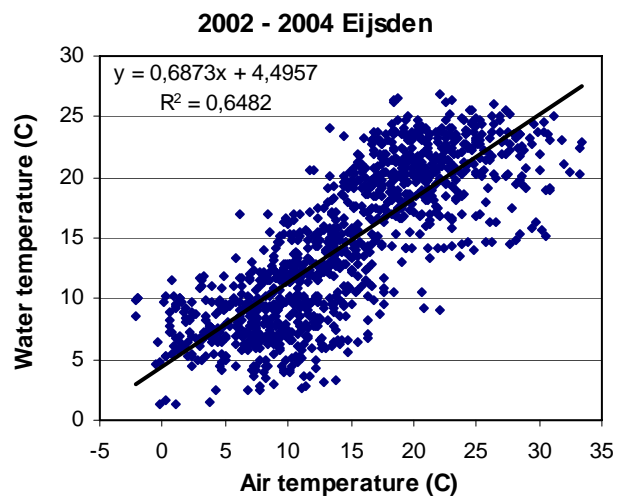
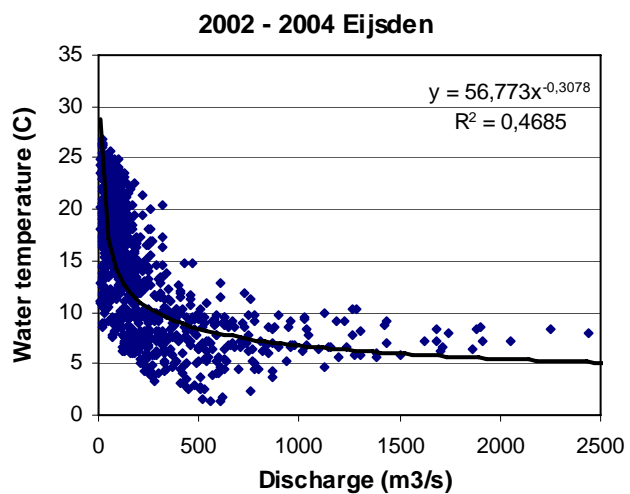


# Addendum A1: General water quality parameters during droughts

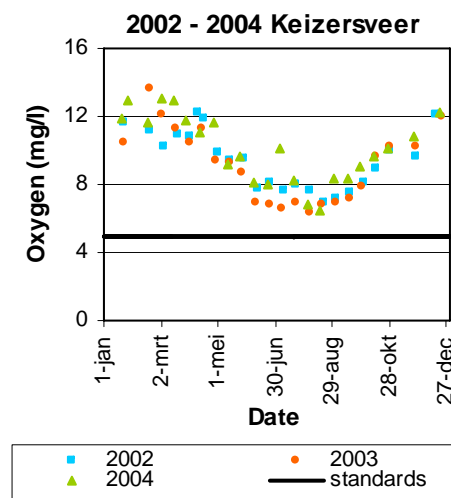
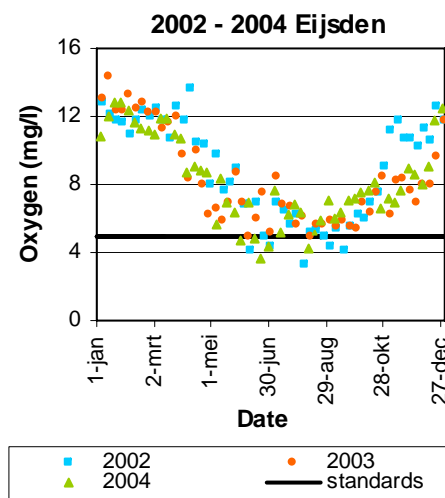
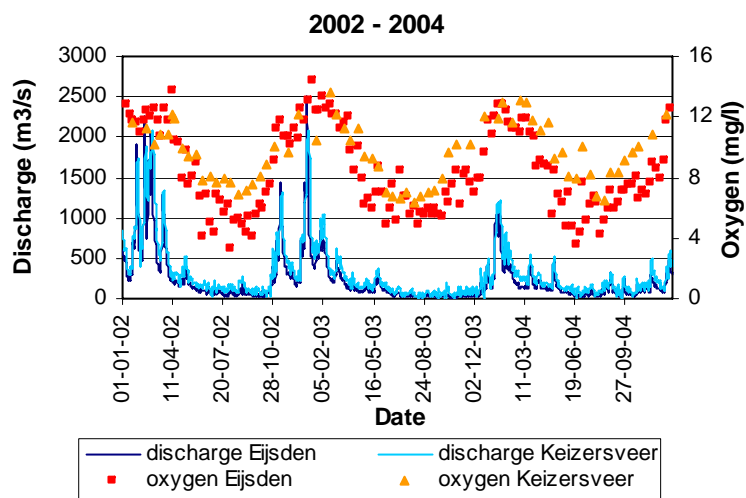
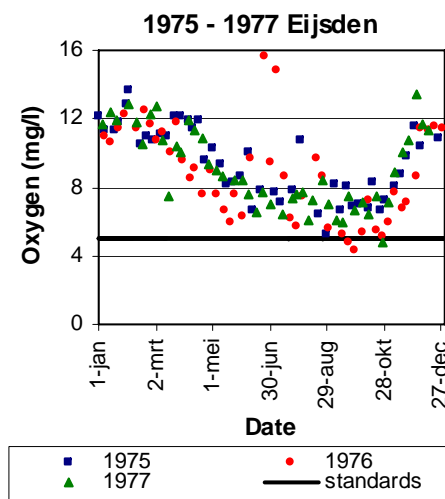
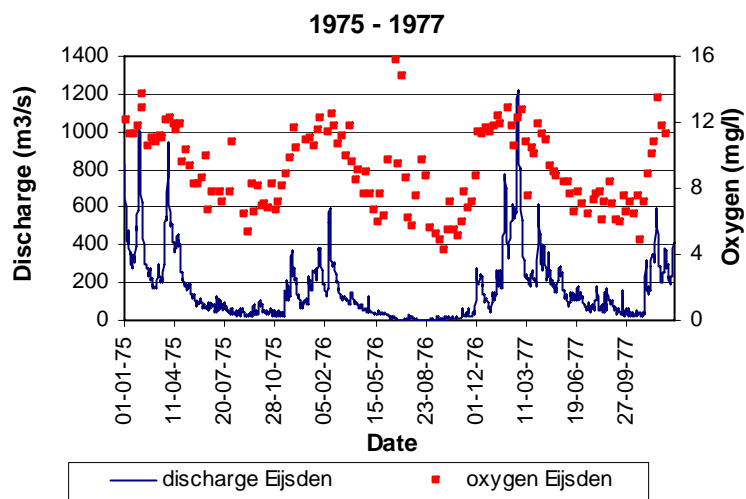
## A1.1 Water temperature



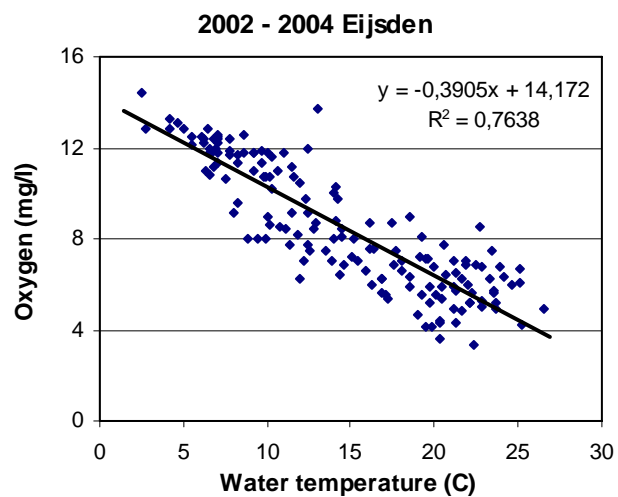
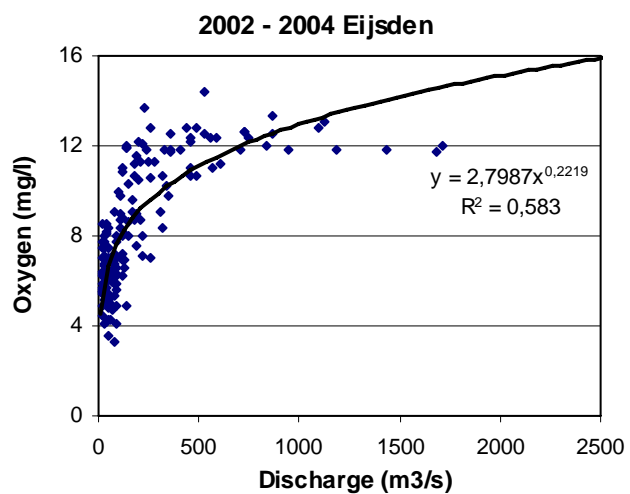
| location    | summer<br>(Jun-Aug) | median<br>waterT<br>(°C) | mean<br>waterT<br>(°C) | min<br>waterT<br>(°C) | max<br>waterT<br>(°C) | n  | n ><br>25 °C |
|-------------|---------------------|--------------------------|------------------------|-----------------------|-----------------------|----|--------------|
| Eijsden     | 1975                |                          |                        |                       |                       | 0  |              |
|             | 1976                |                          |                        |                       |                       | 0  |              |
|             | 1977                |                          |                        |                       |                       | 0  |              |
| Eijsden     | 2002                | 21.7                     | 21.7                   | 19.2                  | 24.1                  | 92 | 0            |
|             | 2003                | 23.7                     | 23.7                   | 20.7                  | 26.9                  | 92 | 12           |
|             | 2004                | 21.1                     | 21.5                   | 18.6                  | 25.6                  | 92 | 2            |
| Keizersveer | 2002                | 20.5                     | 20.8                   | 18.9                  | 23.8                  | 6  | 0            |
|             | 2003                | 22.5                     | 22.4                   | 20.4                  | 24.2                  | 6  | 0            |
|             | 2004                | 19.4                     | 20.3                   | 18.9                  | 23.2                  | 7  | 0            |



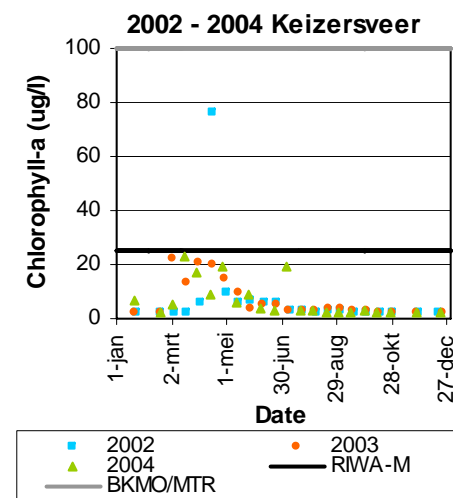
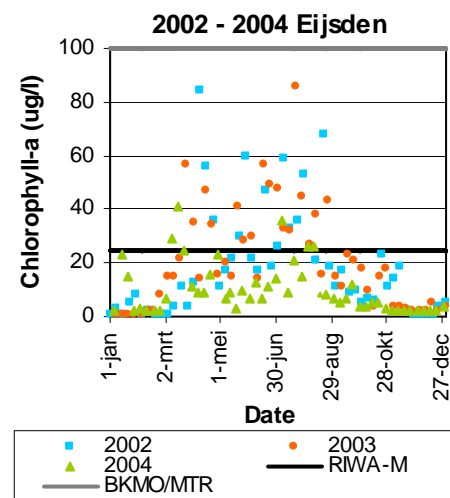
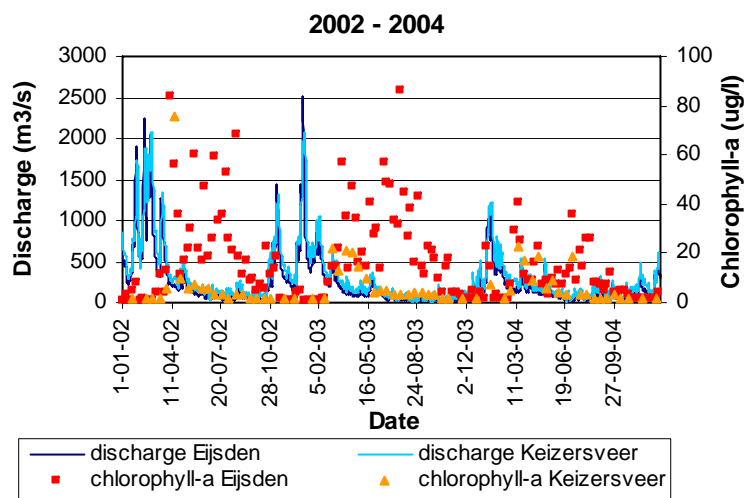
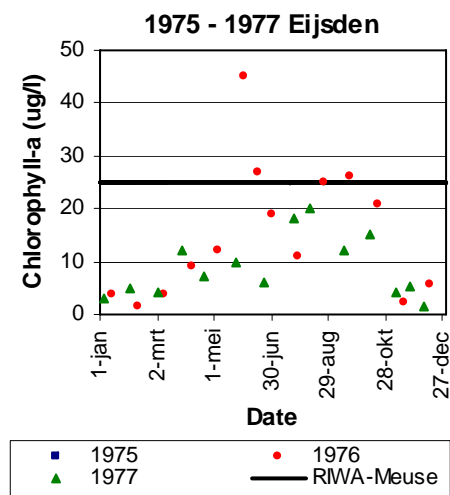
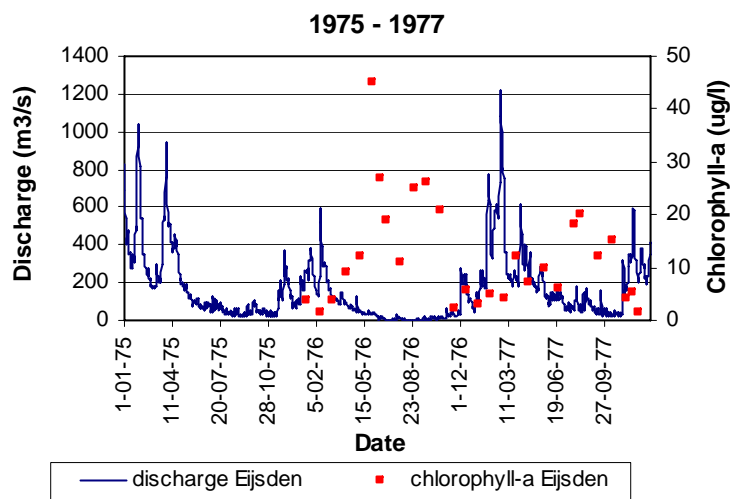
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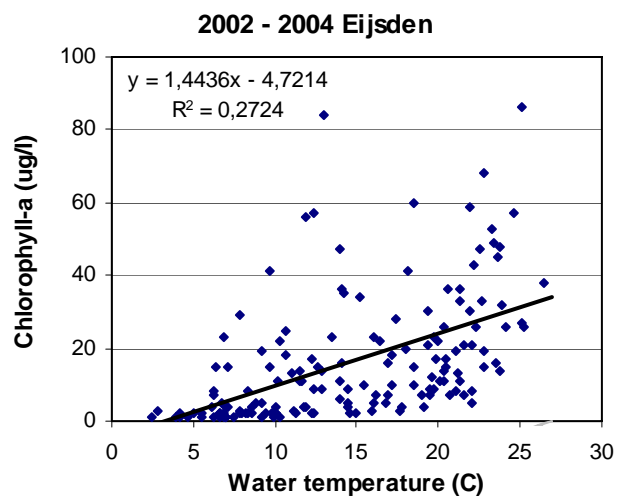
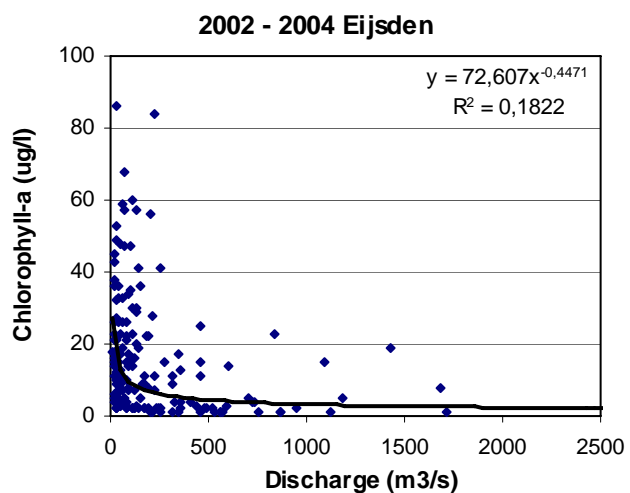
| location    | summer<br>(Jun-Aug) | median<br>O <sub>2</sub><br>(mg/l) | mean<br>O <sub>2</sub><br>(mg/l) | min<br>O <sub>2</sub><br>(mg/l) | max<br>O <sub>2</sub><br>(mg/l) | n  | n <<br>5 mg/l |
|-------------|---------------------|------------------------------------|----------------------------------|---------------------------------|---------------------------------|----|---------------|
| Eijsden     | 1975                | 7.8                                | 8.1                              | 6.4                             | 10.8                            | 9  | 0             |
|             | 1976                | 8.6                                | 8.5                              | 4.3                             | 15.7                            | 13 | 2             |
|             | 1977                | 7.3                                | 7.3                              | 6.1                             | 8.4                             | 13 | 0             |
| Eijsden     | 2002                | 5.3                                | 5.5                              | 3.3                             | 6.9                             | 13 | 4             |
|             | 2003                | 6.0                                | 6.2                              | 4.9                             | 8.5                             | 13 | 2             |
|             | 2004                | 5.6                                | 5.7                              | 3.6                             | 7.7                             | 14 | 5             |
| Keizersveer | 2002                | 7.8                                | 7.7                              | 6.9                             | 8.1                             | 6  | 0             |
|             | 2003                | 6.8                                | 6.8                              | 6.4                             | 7.0                             | 6  | 0             |
|             | 2004                | 8.1                                | 8.0                              | 6.5                             | 10.1                            | 7  | 0             |



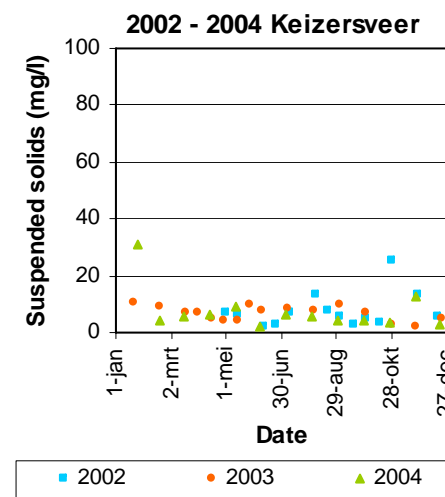
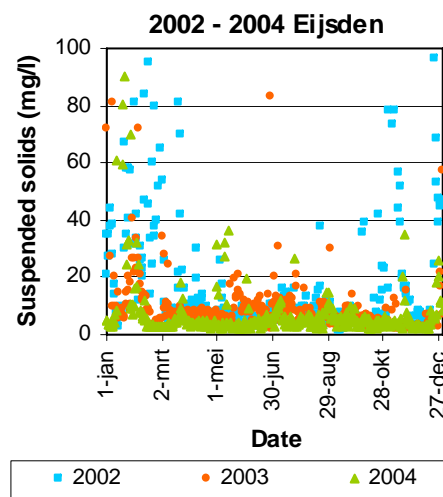
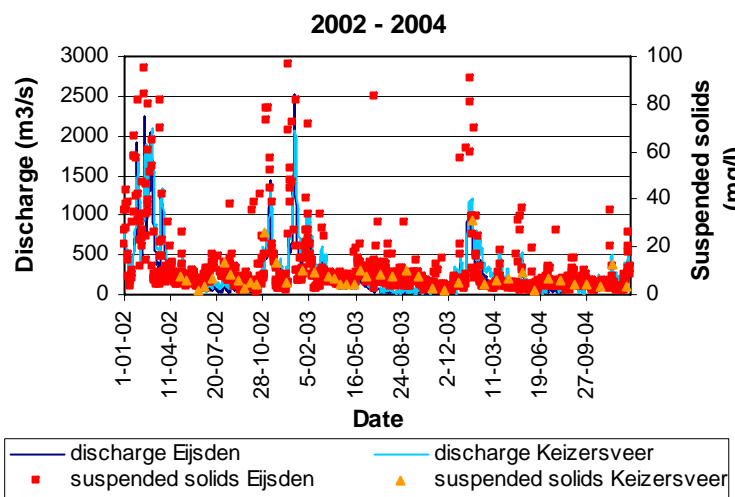
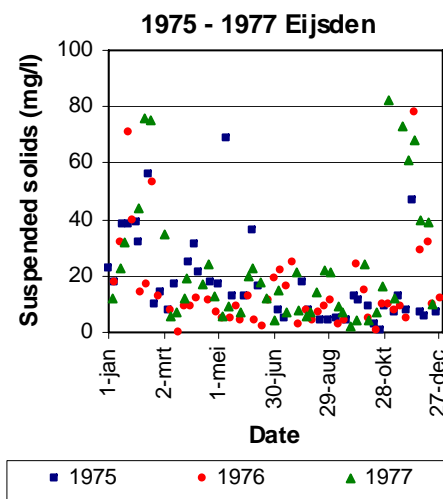
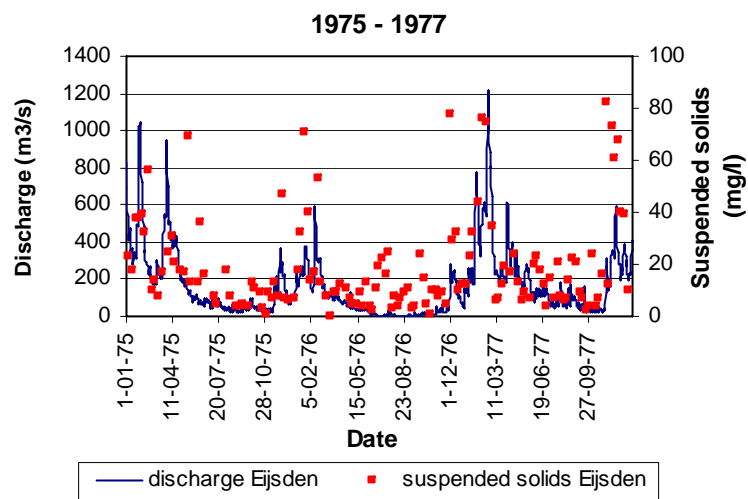
### A1.3 Chlorophyll-a



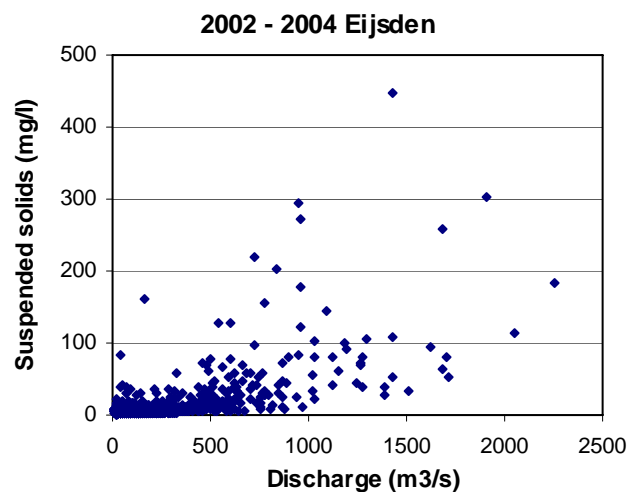
| location    | summer<br>(Jun-Aug) | median<br>Chl-a<br>(ug/l) | mean<br>Chl-a<br>(ug/l) | min<br>Chl-a<br>(ug/l) | max<br>Chl-a<br>(ug/l) | n  | n ><br>25 ug/l<br>RIWA-M | n ><br>100 ug/l<br>BKMO/MTR |
|-------------|---------------------|---------------------------|-------------------------|------------------------|------------------------|----|--------------------------|-----------------------------|
| Eijsden     | 1975                |                           |                         |                        |                        | 0  |                          |                             |
|             | 1976                | 25.0                      | 25.4                    | 11.0                   | 45.0                   | 5  | 2                        | 0                           |
|             | 1977                | 18.0                      | 14.7                    | 6.0                    | 20.0                   | 3  | 0                        | 0                           |
| Eijsden     | 2002                | 26.0                      | 34.3                    | 17.0                   | 68.0                   | 13 | 8                        | 0                           |
|             | 2003                | 38.0                      | 39.8                    | 14.0                   | 86.0                   | 13 | 11                       | 0                           |
|             | 2004                | 12.0                      | 14.9                    | 7.0                    | 36.0                   | 14 | 3                        | 0                           |
| Keizersveer | 2002                | 3.0                       | 3.8                     | 2.0                    | 6.0                    | 6  | 0                        | 0                           |
|             | 2003                | 3.5                       | 3.8                     | 3.0                    | 5.0                    | 6  | 0                        | 0                           |
|             | 2004                | 3.0                       | 5.1                     | 2.0                    | 19.0                   | 7  | 0                        | 0                           |



## A1.4 Suspended solids



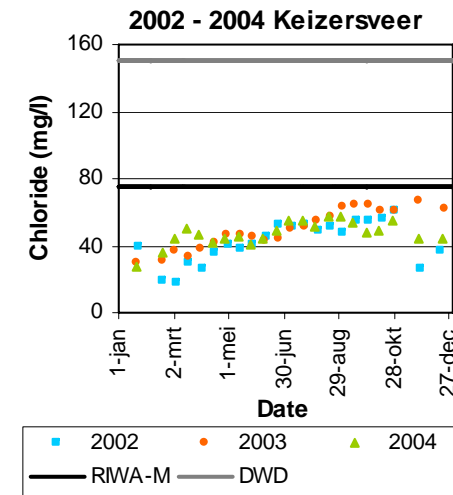
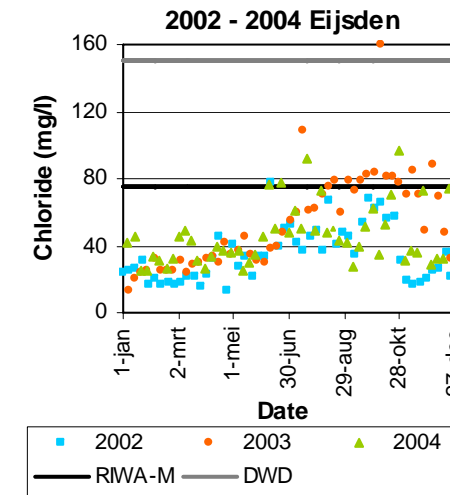
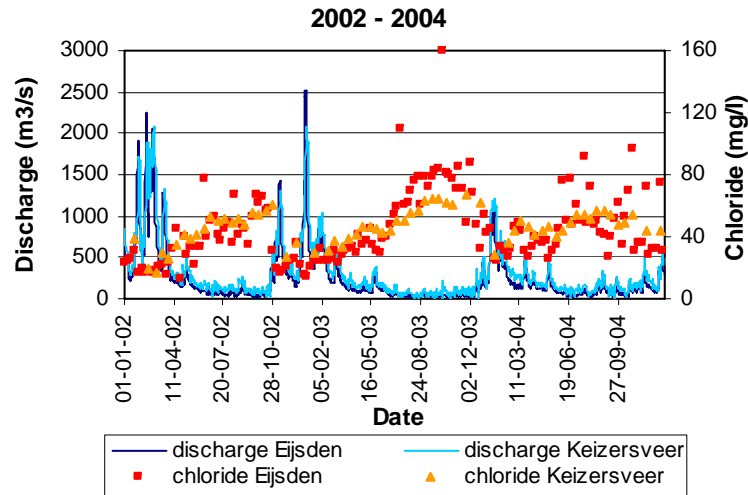
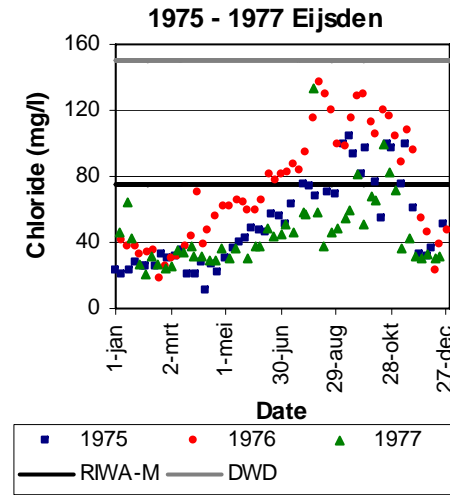
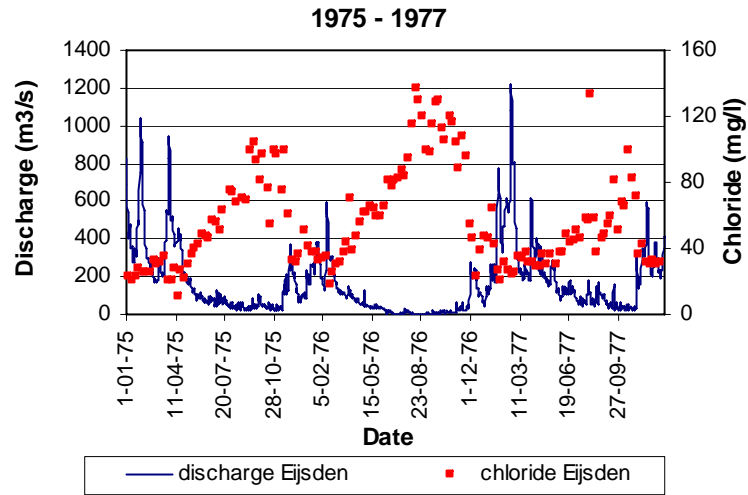
| location    | period<br>(Jun-Nov) | median<br>Susp_sol<br>(mg/l) | mean<br>Susp_sol<br>(mg/l) | min<br>Susp_sol<br>(mg/l) | max<br>Susp_sol<br>(mg/l) | n          |
|-------------|---------------------|------------------------------|----------------------------|---------------------------|---------------------------|------------|
| Eijsden     | 1975                | 8.0                          | 9.8                        | 1.0                       | 36.0                      | 20         |
|             | <b>1976</b>         | <b>9.0</b>                   | <b>9.9</b>                 | <b>1.0</b>                | <b>25.0</b>               | <b>25</b>  |
|             | 1977                | 13.0                         | 19.2                       | 2.0                       | 82.0                      | 26         |
| Eijsden     | 2002                | 7.0                          | 18.2                       | 1.1                       | 446.0                     | 171        |
|             | <b>2003</b>         | <b>6.0</b>                   | <b>7.4</b>                 | <b>1.7</b>                | <b>82.9</b>               | <b>183</b> |
|             | 2004                | 4.4                          | 5.3                        | 2.0                       | 35.0                      | 183        |
| Keizersveer | 2002                | 5.6                          | 8.1                        | 2.0                       | 25.7                      | 11         |
|             | <b>2003</b>         | <b>7.7</b>                   | <b>6.6</b>                 | <b>1.9</b>                | <b>10.1</b>               | <b>7</b>   |
|             | 2004                | 4.4                          | 5.6                        | 2.0                       | 13.0                      | 7          |



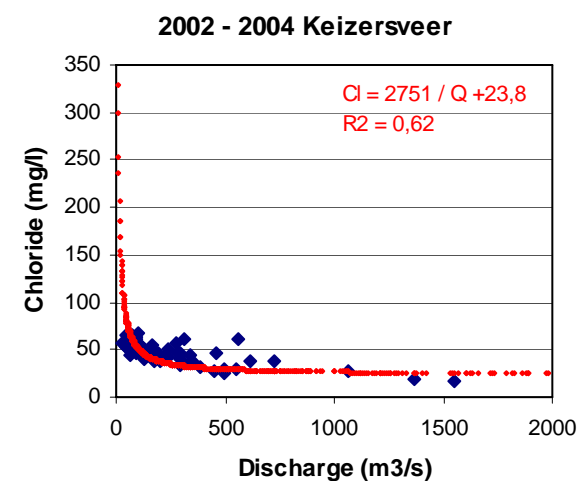
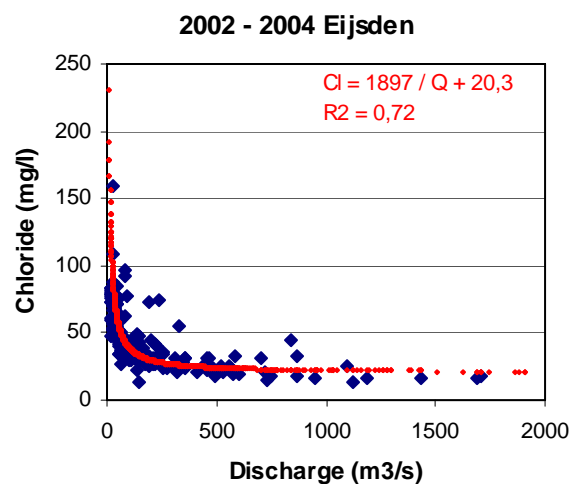
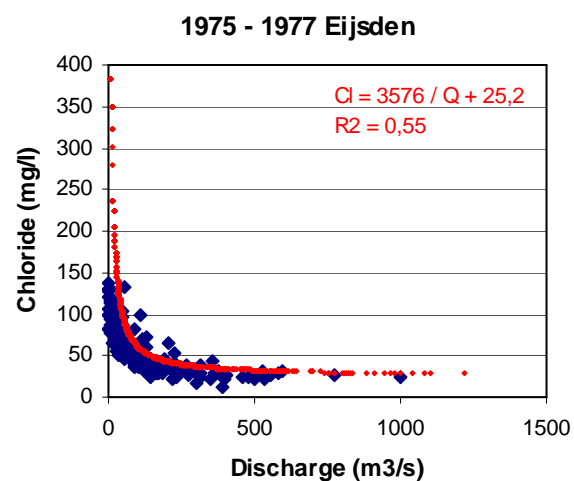


# Addendum A2: Conservative substances during droughts

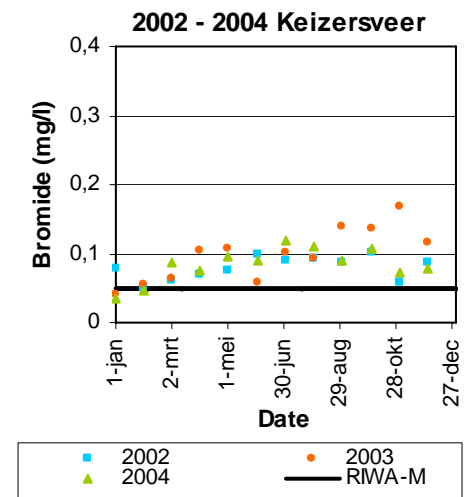
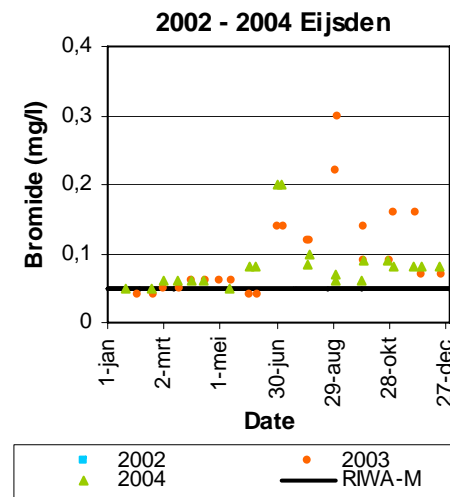
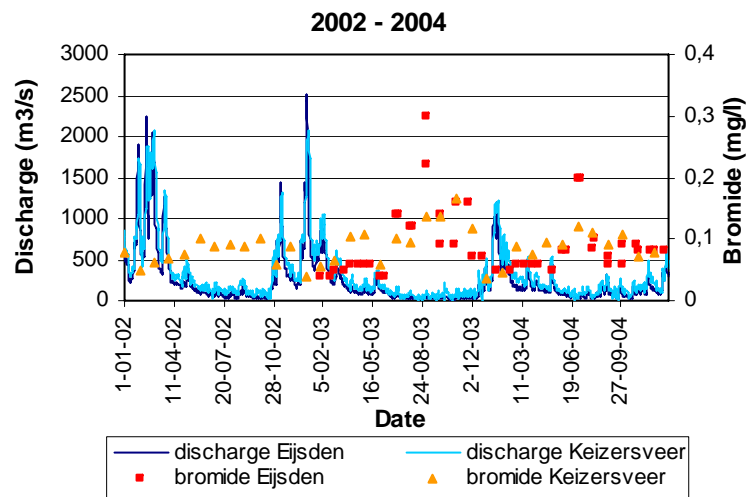
## A2.1 Chloride



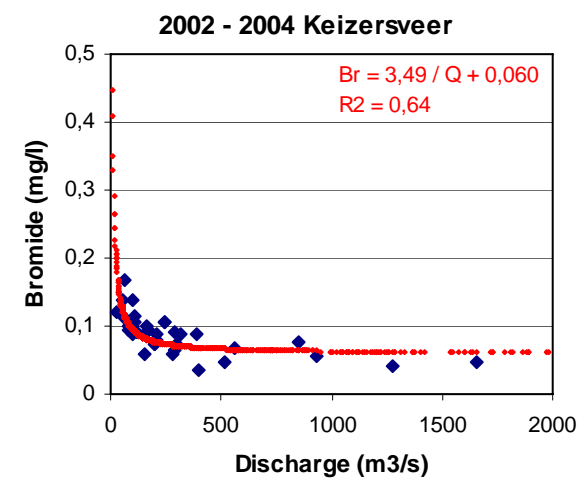
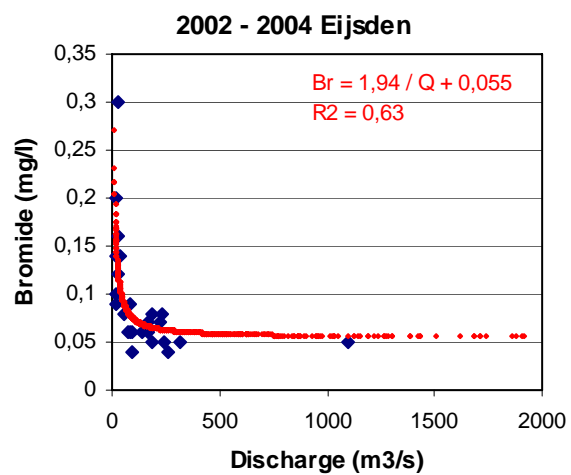
| location    | period<br>(Jun-Nov) | median<br>Cl<br>(mg/l) | mean<br>Cl<br>(mg/l) | min<br>Cl<br>(mg/l) | max<br>Cl<br>(mg/l) | n         | n ><br>75 mg/l<br>RIWA-M | n ><br>150 mg/l<br>DWD | n ><br>200 mg/l<br>BKMO |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|-----------|--------------------------|------------------------|-------------------------|
| Eijsden     | 1975                | 72.0                   | 73.4                 | 46.0                | 104.0               | 24        | 9                        | 0                      | 0                       |
|             | <b>1976</b>         | <b>102.0</b>           | <b>101.4</b>         | <b>60.0</b>         | <b>137.0</b>        | <b>26</b> | <b>24</b>                | <b>0</b>               | <b>0</b>                |
|             | 1977                | 51.0                   | 57.3                 | 32.0                | 133.0               | 26        | 4                        | 0                      | 0                       |
| Eijsden     | 2002                | 45.5                   | 44.9                 | 16.4                | 77.1                | 26        | 1                        | 0                      | 0                       |
|             | <b>2003</b>         | <b>71.9</b>            | <b>71.5</b>          | <b>30.1</b>         | <b>159.6</b>        | <b>26</b> | <b>12</b>                | <b>1</b>               | <b>0</b>                |
|             | 2004                | 49.8                   | 53.5                 | 26.9                | 96.3                | 27        | 4                        | 0                      | 0                       |
| Keizersveer | 2002                | 51.6                   | 50.2                 | 26.5                | 60.8                | 12        | 0                        | 0                      | 0                       |
|             | <b>2003</b>         | <b>58.9</b>            | <b>56.8</b>          | <b>42.4</b>         | <b>66.5</b>         | <b>12</b> | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|             | 2004                | 52.4                   | 51.5                 | 44.5                | 56.9                | 12        | 0                        | 0                      | 0                       |



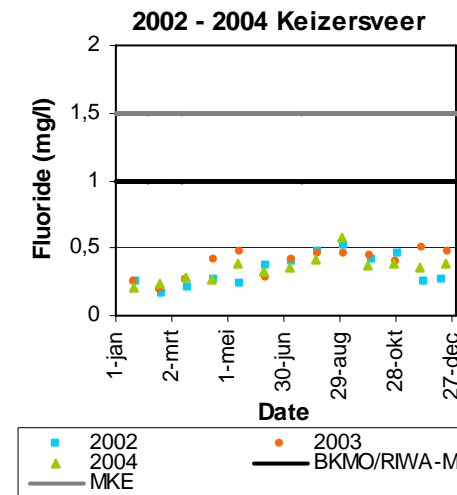
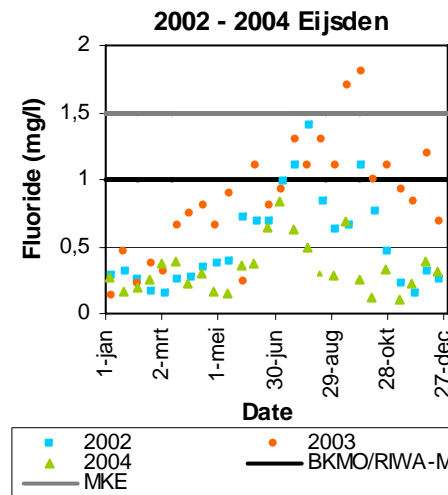
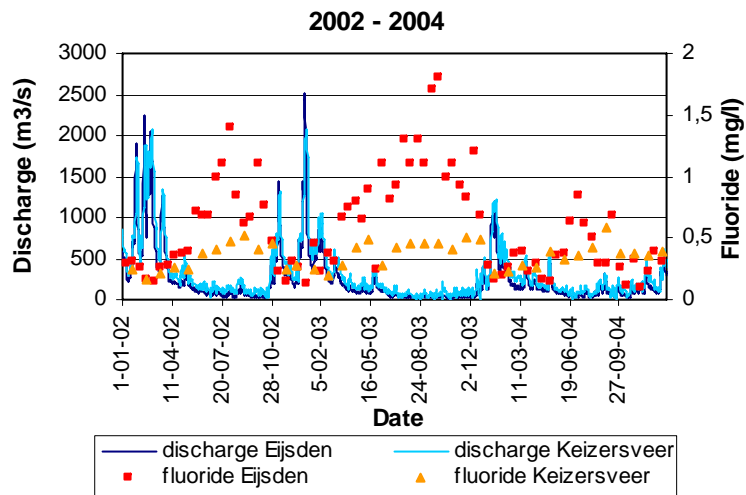
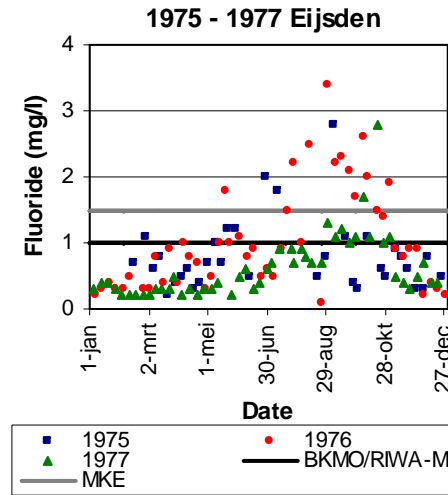
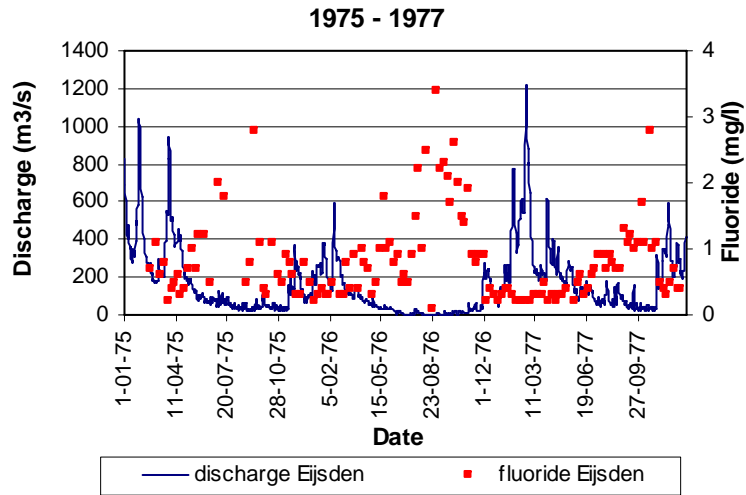
## A2.2 Bromide



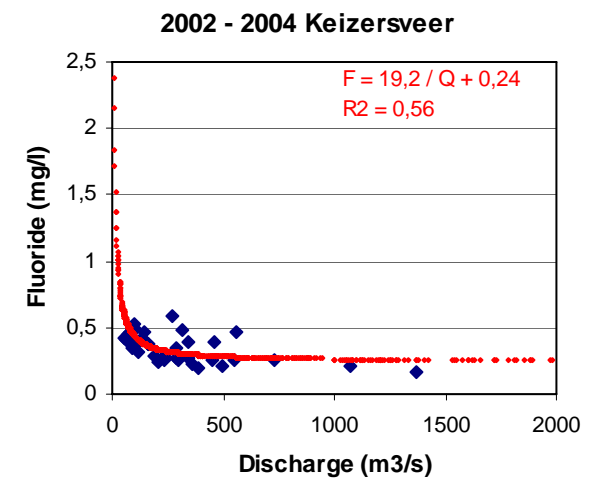
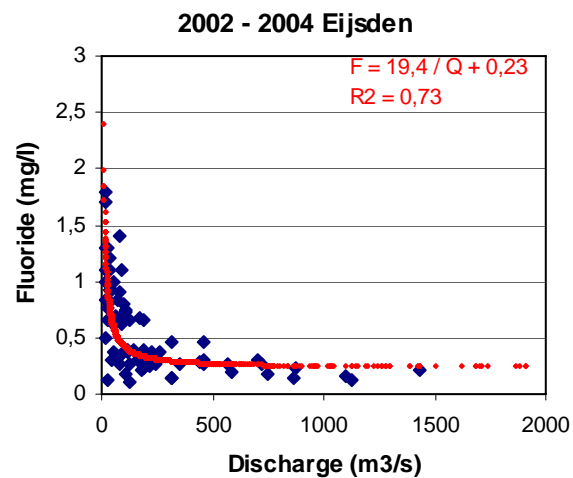
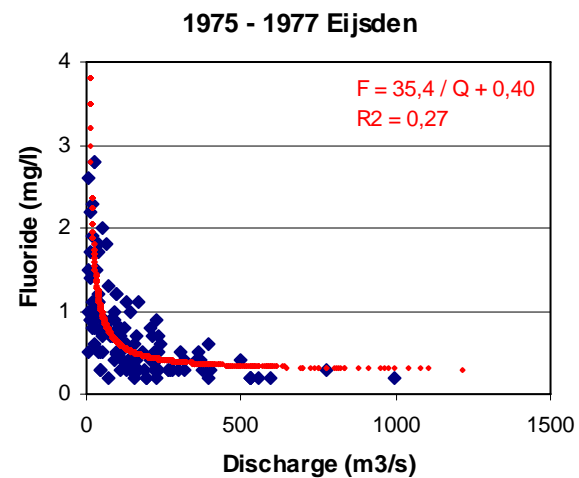
| location    | period<br>(Jun-Nov) | median<br>Br<br>(mg/l) | mean<br>Br<br>(mg/l) | min<br>Br<br>(mg/l) | max<br>Br<br>(mg/l) | n  | n ><br>0.05 mg/l<br>RIWA-M | n ><br>8 mg/l<br>MTR |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|----------------------------|----------------------|
| Eijsden     | 1975                |                        |                      |                     |                     | 0  |                            |                      |
|             | 1976                |                        |                      |                     |                     | 0  |                            |                      |
|             | 1977                |                        |                      |                     |                     | 0  |                            |                      |
| Eijsden     | 2002                |                        |                      |                     |                     | 0  |                            |                      |
|             | 2003                | 0.14                   | 0.14                 | 0.04                | 0.30                | 13 | 11                         | 0                    |
|             | 2004                | 0.08                   | 0.10                 | 0.06                | 0.20                | 13 | 13                         | 0                    |
| Keizersveer | 2002                | 0.09                   | 0.09                 | 0.06                | 0.10                | 6  | 6                          | 0                    |
|             | 2003                | 0.12                   | 0.12                 | 0.06                | 0.17                | 6  | 6                          | 0                    |
|             | 2004                | 0.10                   | 0.10                 | 0.07                | 0.12                | 6  | 6                          | 0                    |



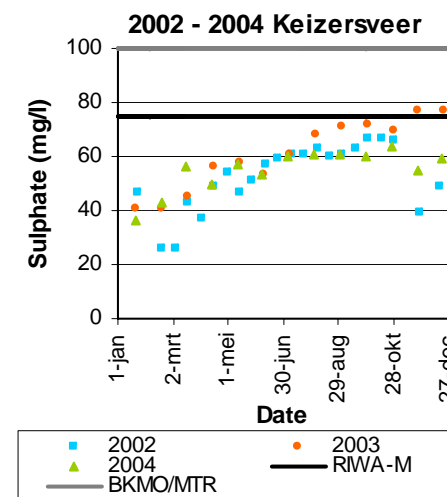
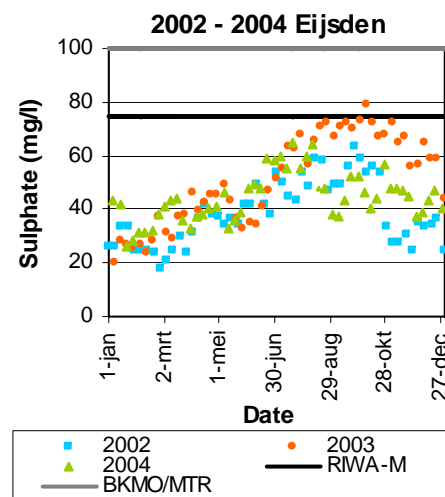
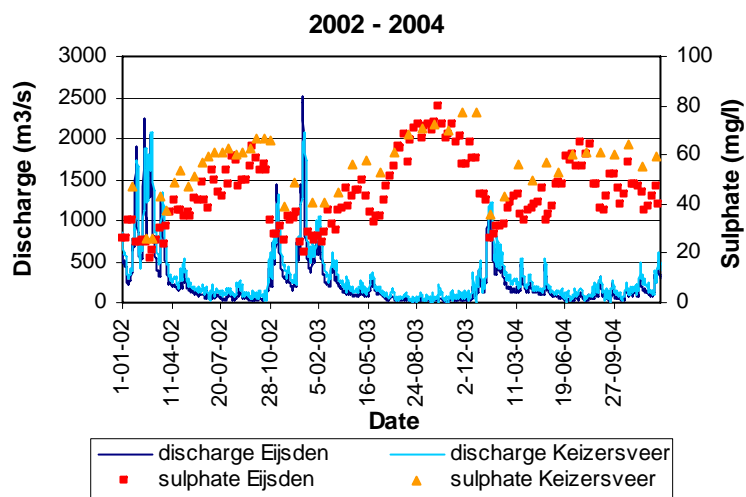
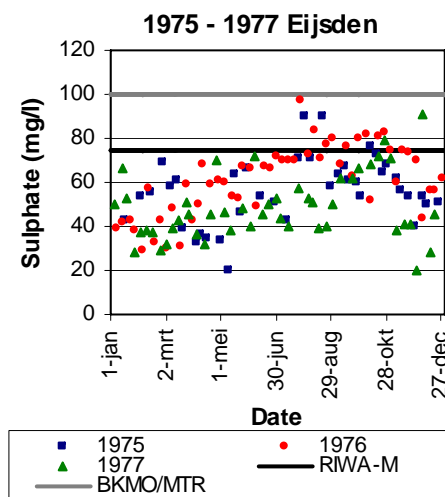
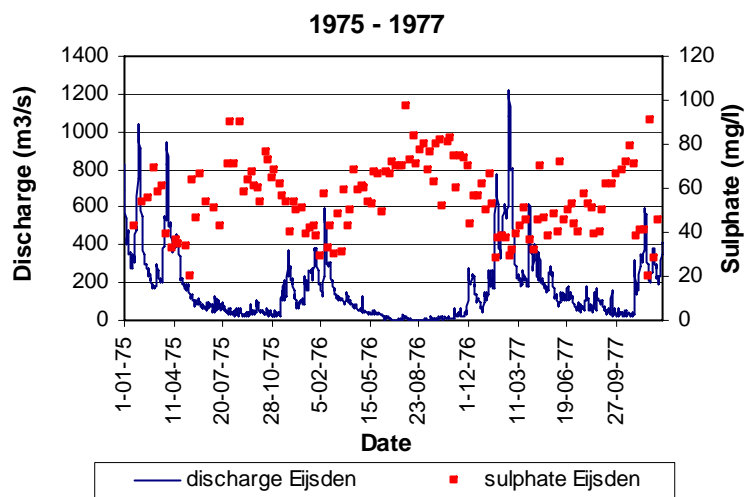
### A2.3 Fluoride



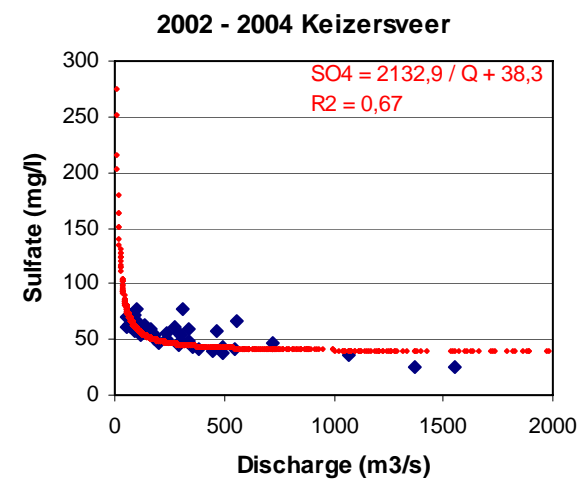
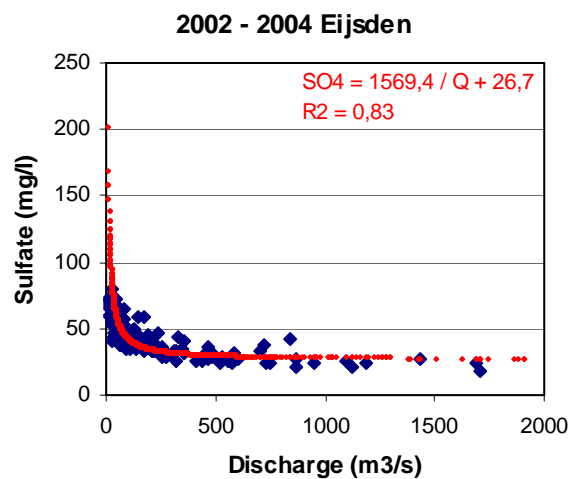
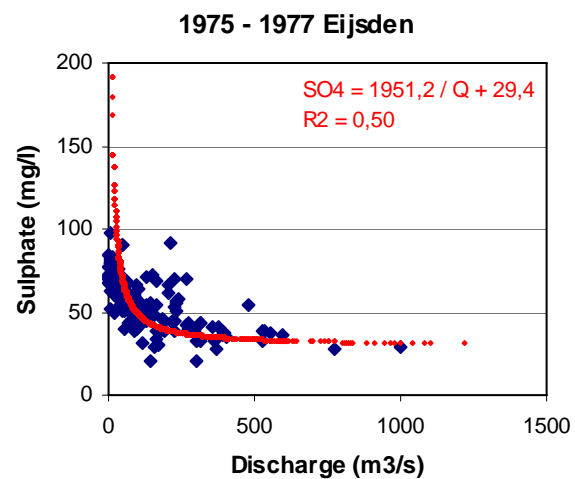
| location    | period<br>(Jun-Nov) | median<br>F<br>(mg/l) | mean<br>F<br>(mg/l) | min<br>F<br>(mg/l) | max<br>F<br>(mg/l) | n         | n ><br>1 mg/l<br>BKMO/RIWA-M | n ><br>1.1 mg/l<br>DWD | n ><br>1.5 mg/l<br>MKE |
|-------------|---------------------|-----------------------|---------------------|--------------------|--------------------|-----------|------------------------------|------------------------|------------------------|
| Eijsden     | 1975                | 0.80                  | 0.99                | 0.30               | 2.80               | 16        | 6                            | 4                      | 3                      |
|             | <b>1976</b>         | <b>1.40</b>           | <b>1.45</b>         | <b>0.10</b>        | <b>3.40</b>        | <b>25</b> | <b>14</b>                    | <b>13</b>              | <b>10</b>              |
|             | 1977                | 0.85                  | 0.90                | 0.30               | 2.80               | 26        | 8                            | 4                      | 2                      |
| Eijsden     | 2002                | 0.69                  | 0.75                | 0.15               | 1.40               | 13        | 3                            | 1                      | 0                      |
|             | <b>2003</b>         | <b>1.10</b>           | <b>1.15</b>         | <b>0.81</b>        | <b>1.80</b>        | <b>13</b> | <b>8</b>                     | <b>4</b>               | <b>2</b>               |
|             | 2004                | 0.33                  | 0.41                | 0.10               | 0.84               | 13        | 0                            | 0                      | 0                      |
| Keizersveer | 2002                | 0.41                  | 0.41                | 0.25               | 0.52               | 7         | 0                            | 0                      | 0                      |
|             | <b>2003</b>         | <b>0.45</b>           | <b>0.42</b>         | <b>0.28</b>        | <b>0.50</b>        | <b>7</b>  | <b>0</b>                     | <b>0</b>               | <b>0</b>               |
|             | 2004                | 0.37                  | 0.40                | 0.32               | 0.58               | 7         | 0                            | 0                      | 0                      |



## A2.4 Sulphate

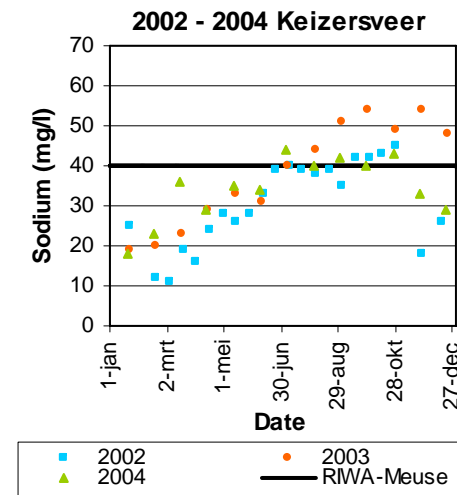
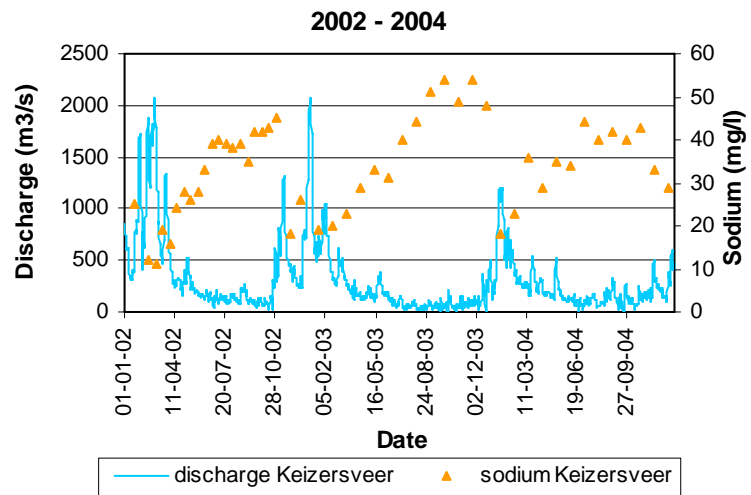


| location    | period<br>(Jun-Nov) | median<br>SO <sub>4</sub><br>(mg/l) | mean<br>SO <sub>4</sub><br>(mg/l) | min<br>SO <sub>4</sub><br>(mg/l) | max<br>SO <sub>4</sub><br>(mg/l) | n  | n ><br>75 mg/l<br>RIWA-M | n ><br>100 mg/l<br>BKMO/MTR | n ><br>150 mg/l<br>DWD |
|-------------|---------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|----|--------------------------|-----------------------------|------------------------|
| Eijsden     | 1975                | 64.0                                | 64.5                              | 43.0                             | 90.0                             | 21 | 3                        | 0                           | 0                      |
|             | 1976                | 72.5                                | 72.3                              | 49.0                             | 97.0                             | 26 | 9                        | 0                           | 0                      |
|             | 1977                | 51.0                                | 53.7                              | 38.0                             | 79.0                             | 23 | 1                        | 0                           | 0                      |
| Eijsden     | 2002                | 49.2                                | 46.6                              | 24.9                             | 63.4                             | 26 | 0                        | 0                           | 0                      |
|             | 2003                | 67.0                                | 62.5                              | 34.7                             | 79.3                             | 26 | 1                        | 0                           | 0                      |
|             | 2004                | 48.0                                | 50.0                              | 37.0                             | 65.0                             | 27 | 0                        | 0                           | 0                      |
| Keizersveer | 2002                | 61.0                                | 60.3                              | 39.0                             | 67.0                             | 12 | 0                        | 0                           | 0                      |
|             | 2003                | 70.0                                | 67.4                              | 53.0                             | 77.0                             | 7  | 1                        | 0                           | 0                      |
|             | 2004                | 60.0                                | 59.1                              | 53.0                             | 64.0                             | 7  | 0                        | 0                           | 0                      |

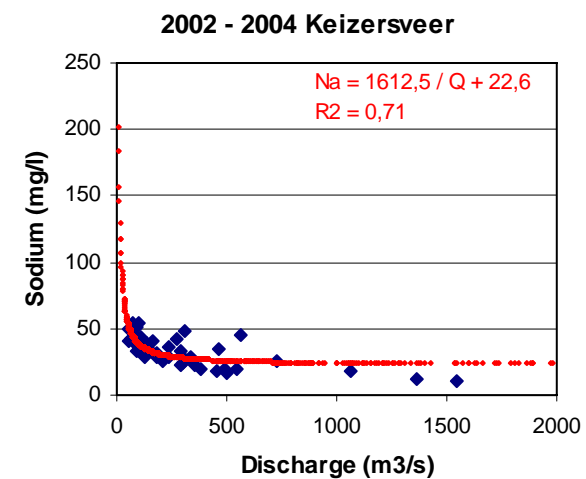




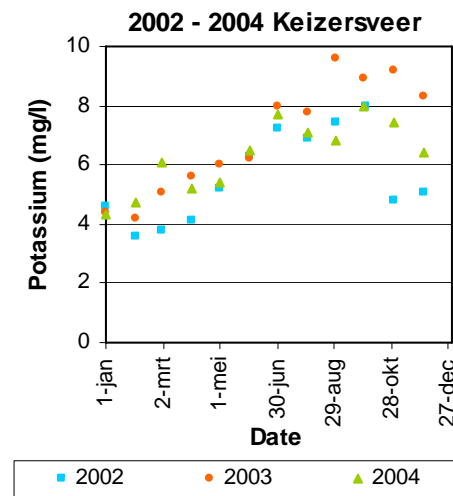
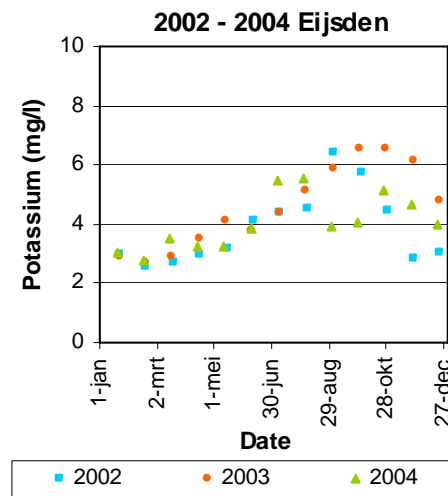
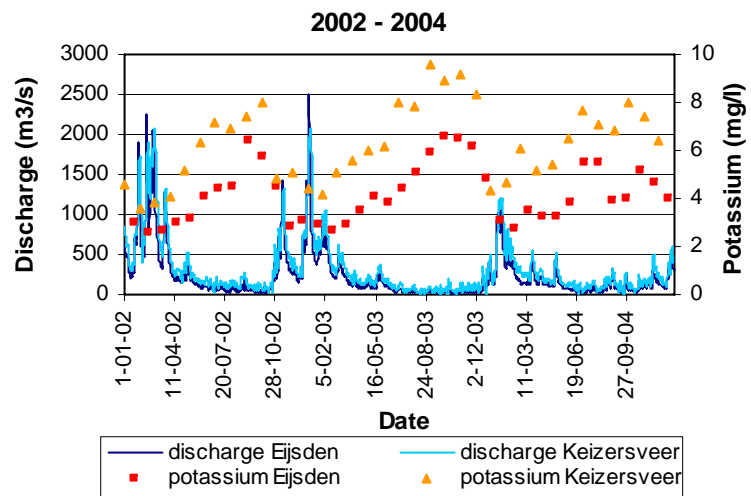
## A2.5 Sodium



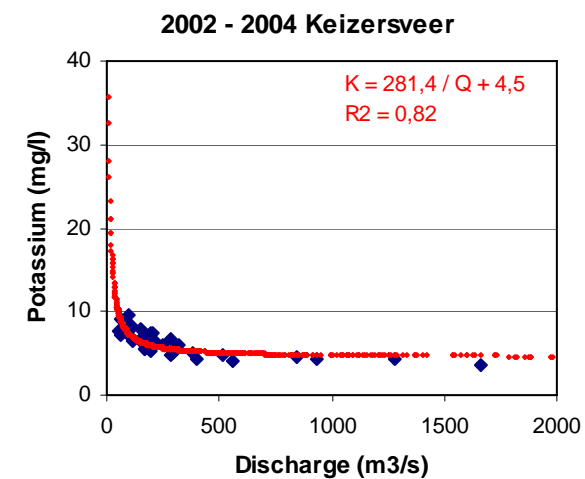
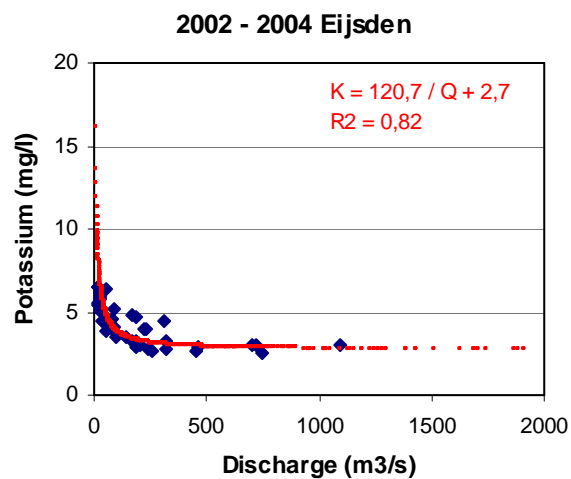
| location    | period<br>(Jun-Nov) | median<br>Na<br>(mg/l) | mean<br>Na<br>(mg/l) | min<br>Na<br>(mg/l) | max<br>Na<br>(mg/l) | n  | n ><br>40 mg/l<br>RIWA-M | n ><br>120 mg/l<br>BKMO | n ><br>150 mg/l<br>DWD |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|--------------------------|-------------------------|------------------------|
| Eijsden     | 1975                |                        |                      |                     |                     | 0  |                          |                         |                        |
|             | 1976                |                        |                      |                     |                     | 0  |                          |                         |                        |
|             | 1977                |                        |                      |                     |                     | 0  |                          |                         |                        |
| Eijsden     | 2002                |                        |                      |                     |                     | 0  |                          |                         |                        |
|             | 2003                |                        |                      |                     |                     | 0  |                          |                         |                        |
|             | 2004                |                        |                      |                     |                     | 0  |                          |                         |                        |
| Keizersveer | 2002                | 39                     | 38                   | 18                  | 45                  | 12 | 4                        | 0                       | 0                      |
|             | 2003                | 49                     | 46                   | 31                  | 54                  | 7  | 5                        | 0                       | 0                      |
|             | 2004                | 40                     | 39                   | 33                  | 44                  | 7  | 3                        | 0                       | 0                      |



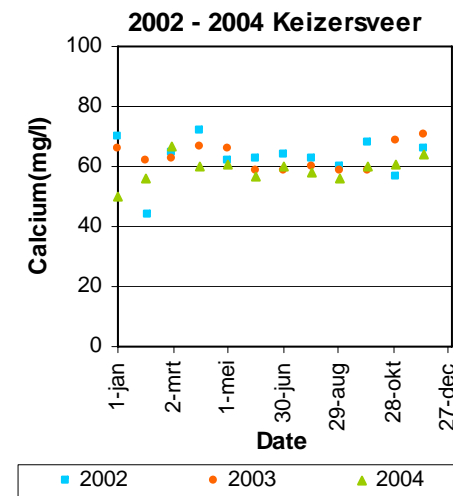
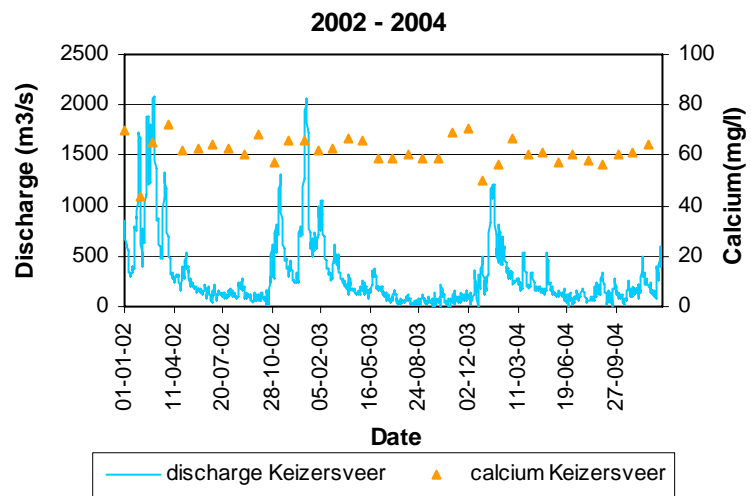
## A2.6 Potassium



| location    | period<br>(Jun-Nov) | median<br>K<br>(mg/l) | mean<br>K<br>(mg/l) | min<br>K<br>(mg/l) | max<br>K<br>(mg/l) | n |
|-------------|---------------------|-----------------------|---------------------|--------------------|--------------------|---|
| Eijsden     | 1975                |                       |                     |                    |                    | 0 |
|             | 1976                |                       |                     |                    |                    | 0 |
|             | 1977                |                       |                     |                    |                    | 0 |
| Eijsden     | 2002                | 4.5                   | 4.7                 | 2.8                | 6.4                | 7 |
|             | 2003                | 5.9                   | 5.5                 | 3.8                | 6.6                | 7 |
|             | 2004                | 4.7                   | 4.7                 | 3.8                | 5.5                | 7 |
| Keizersveer | 2002                | 7.1                   | 6.8                 | 4.8                | 8.0                | 6 |
|             | 2003                | 8.5                   | 8.3                 | 6.2                | 9.6                | 6 |
|             | 2004                | 7.3                   | 7.3                 | 6.5                | 8.0                | 6 |

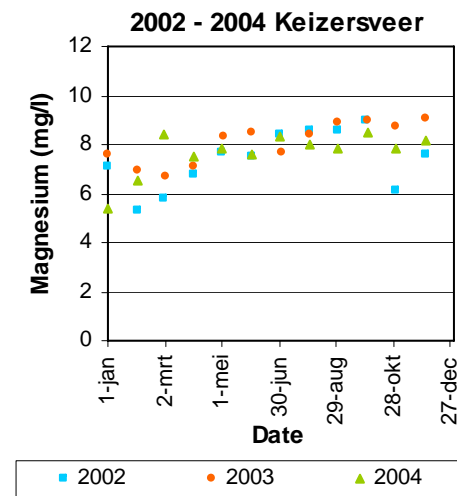
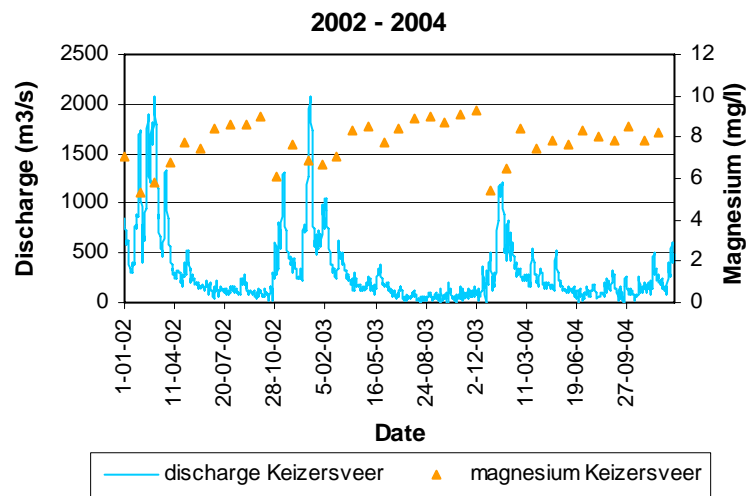


## A2.7 Calcium

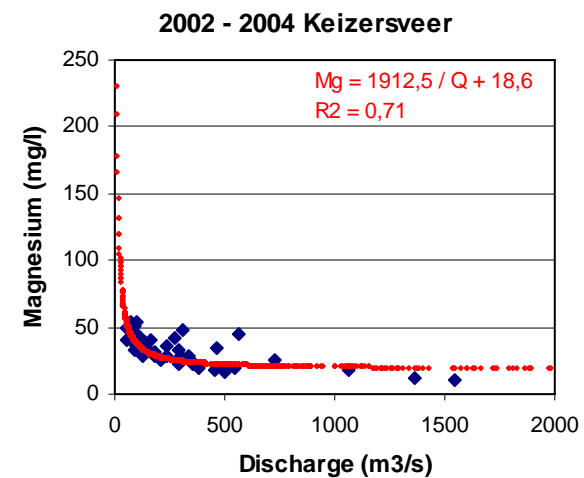


| <b>location</b> | <b>period</b><br><b>(Jun-Nov)</b> | <b>median</b><br><b>Ca</b><br><b>(mg/l)</b> | <b>mean</b><br><b>Ca</b><br><b>(mg/l)</b> | <b>min</b><br><b>Ca</b><br><b>(mg/l)</b> | <b>max</b><br><b>Ca</b><br><b>(mg/l)</b> | <b>n</b> |
|-----------------|-----------------------------------|---|---|--|--|----------|
| Eijsden         | 1975                              |   |   |  |  | 0        |
|                 | <b>1976</b>                       |   |   |  |  | <b>0</b> |
|                 | 1977                              |   |   |  |  | 0        |
| Eijsden         | 2002                              |   |   |  |  | 0        |
|                 | <b>2003</b>                       |   |   |  |  | <b>0</b> |
|                 | 2004                              |   |   |  |  | 0        |
| Keizersveer     | 2002                              | 63  | 63  | 57                                       | 68                                       | 6        |
|                 | <b>2003</b>                       | <b>59</b>                                   | <b>61</b>                                 | <b>59</b>                                | <b>69</b>                                | <b>6</b> |
|                 | 2004                              | 59  | 59  | 56                                       | 61                                       | 6        |

## A2.8 Magnesium



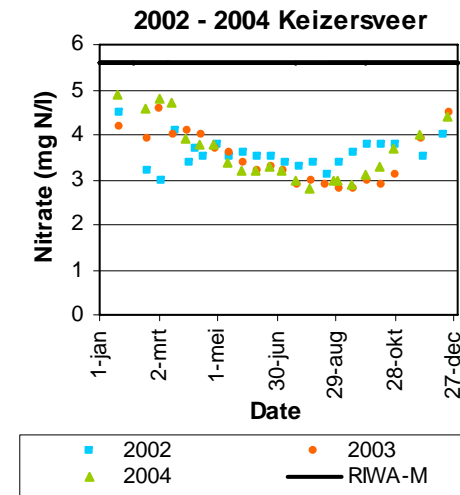
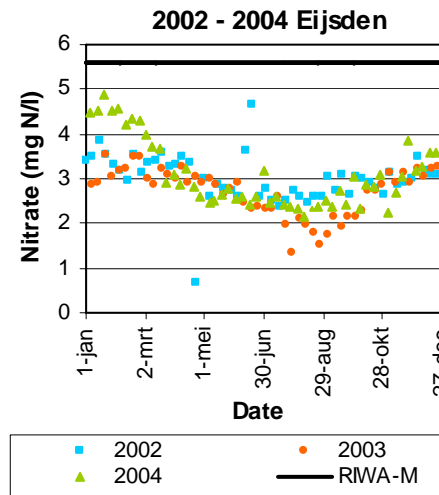
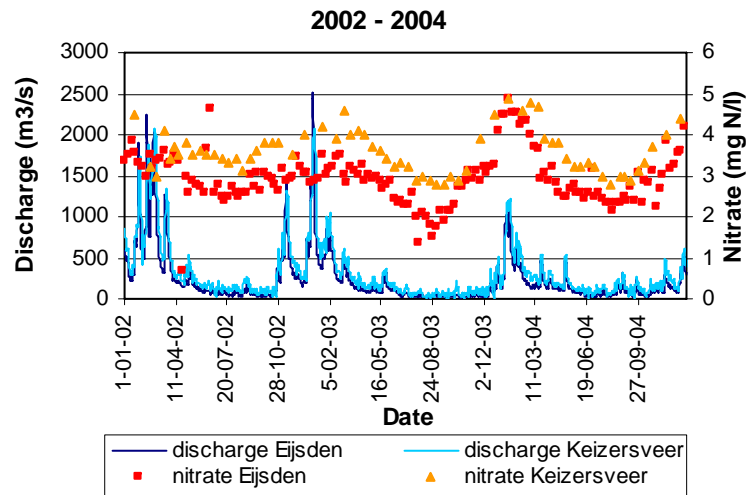
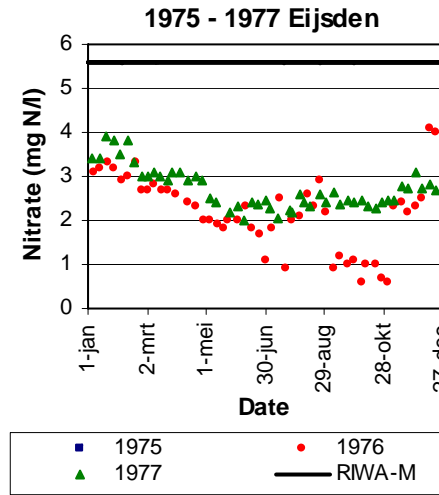
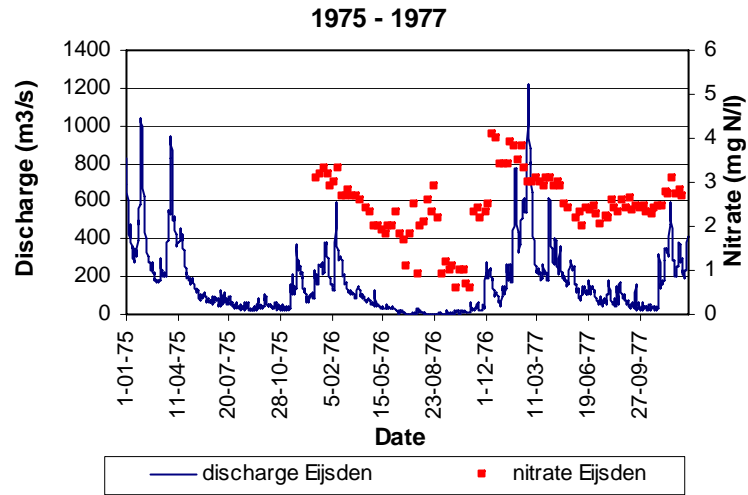
| location    | period<br>(Jun-Nov) | median<br>Mg<br>(mg/l) | mean<br>Mg<br>(mg/l) | min<br>Mg<br>(mg/l) | max<br>Mg<br>(mg/l) | n        |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----------|
| Eijsden     | 1975                |                        |                      |                     |                     | 0        |
|             | <b>1976</b>         |                        |                      |                     |                     | <b>0</b> |
|             | 1977                |                        |                      |                     |                     | 0        |
| Eijsden     | 2002                |                        |                      |                     |                     | 0        |
|             | <b>2003</b>         |                        |                      |                     |                     | <b>0</b> |
|             | 2004                |                        |                      |                     |                     | 0        |
| Keizersveer | 2002                | 8.5                    | 8.0                  | 6.1                 | 9.0                 | 6        |
|             | <b>2003</b>         | <b>8.8</b>             | <b>8.6</b>           | <b>7.7</b>          | <b>9.1</b>          | <b>6</b> |
|             | 2004                | 7.9                    | 8.0                  | 7.6                 | 8.5                 | 6        |



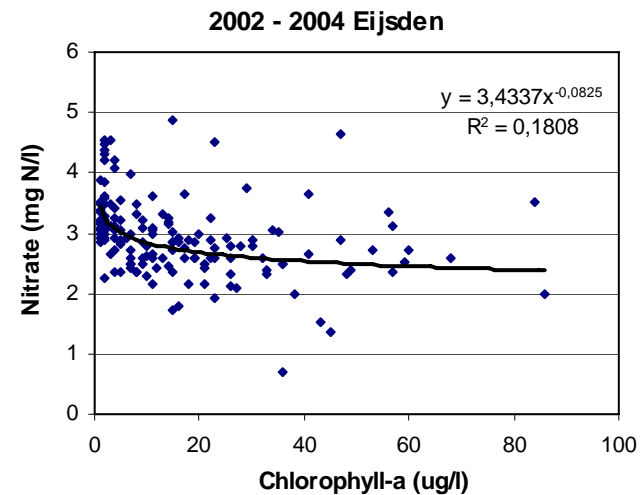
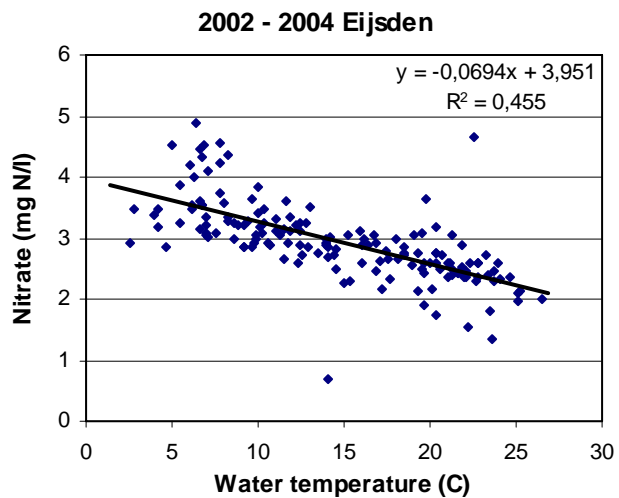
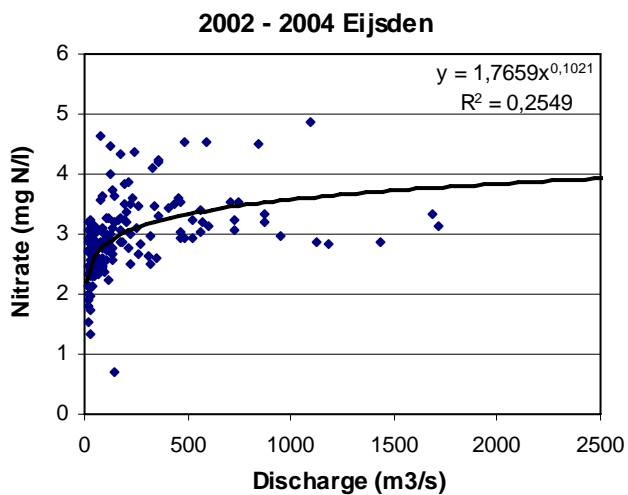


# Addendum 3: Nutrients during droughts

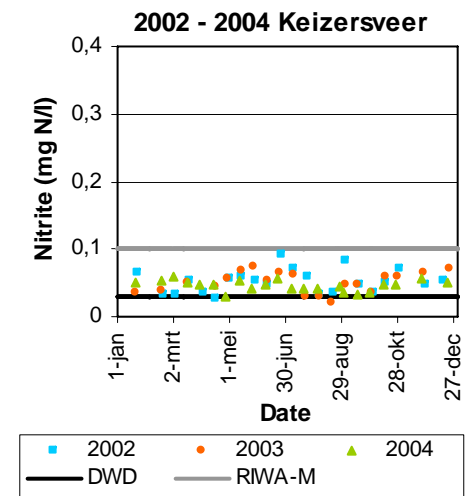
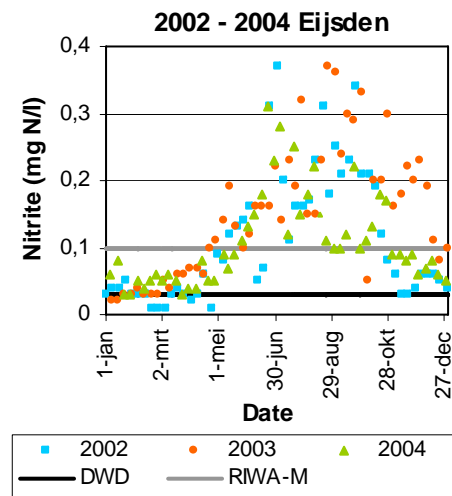
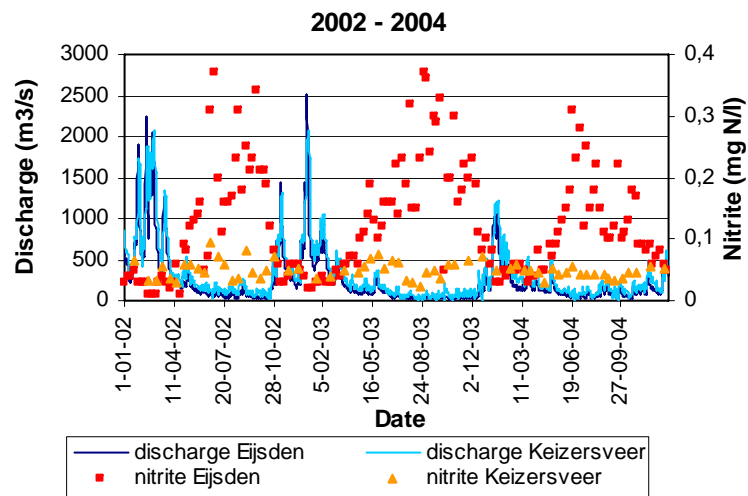
## A3.1 Nitrate



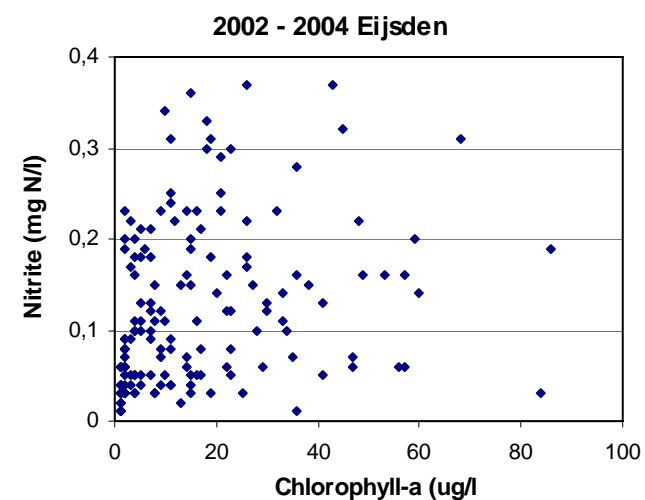
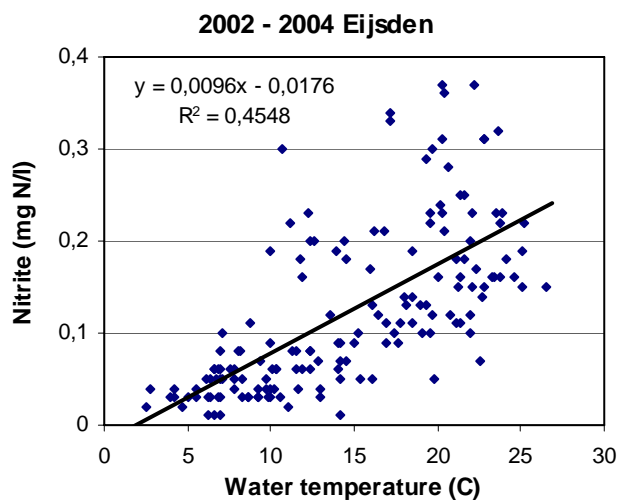
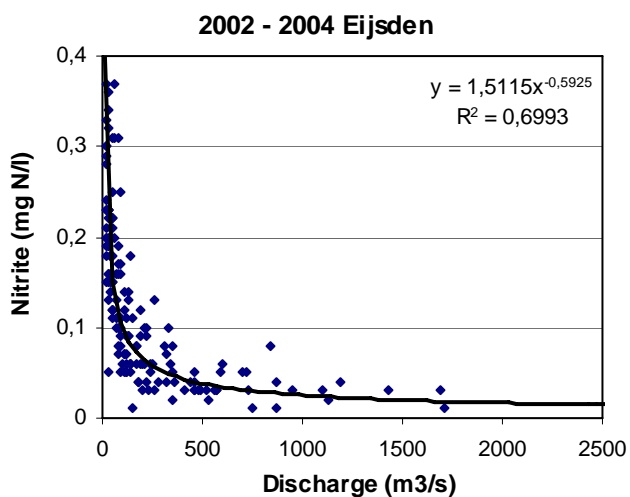
| location    | period<br>(Jun-Nov) | median<br>NO <sub>3</sub><br>(mg/l) | mean<br>NO <sub>3</sub><br>(mg/l) | min<br>NO <sub>3</sub><br>(mg/l) | max<br>NO <sub>3</sub><br>(mg/l) | n  | n ><br>5.6 mg/l<br>RIWA-M | n ><br>10 mg/l<br>BKMO | n ><br>11.3 mg/l<br>DWD |
|-------------|---------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|----|---------------------------|------------------------|-------------------------|
| Eijsden     | 1975                |                                     |                                   |                                  |                                  | 0  |                           |                        |                         |
|             | 1976                | 1.80                                | 1.66                              | 0.60                             | 2.90                             | 26 | 0                         | 0                      | 0                       |
|             | 1977                | 2.40                                | 2.40                              | 1.99                             | 2.79                             | 26 | 0                         | 0                      | 0                       |
| Eijsden     | 2002                | 2.75                                | 2.86                              | 2.38                             | 4.64                             | 26 | 0                         | 0                      | 0                       |
|             | 2003                | 2.31                                | 2.34                              | 1.35                             | 3.12                             | 26 | 0                         | 0                      | 0                       |
|             | 2004                | 2.57                                | 2.65                              | 2.13                             | 3.85                             | 27 | 0                         | 0                      | 0                       |
| Keizersveer | 2002                | 3.50                                | 3.51                              | 3.10                             | 3.80                             | 12 | 0                         | 0                      | 0                       |
|             | 2003                | 3.00                                | 3.08                              | 2.80                             | 3.90                             | 12 | 0                         | 0                      | 0                       |
|             | 2004                | 3.15                                | 3.21                              | 2.80                             | 4.00                             | 12 | 0                         | 0                      | 0                       |



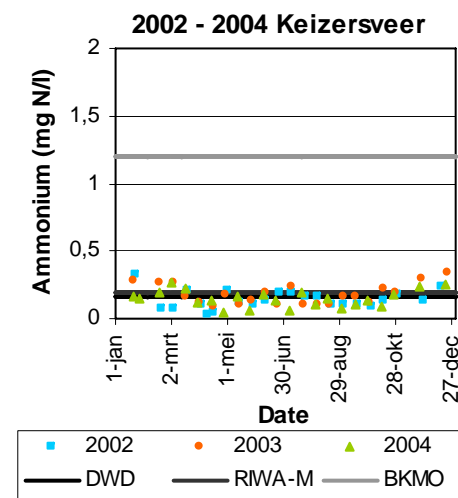
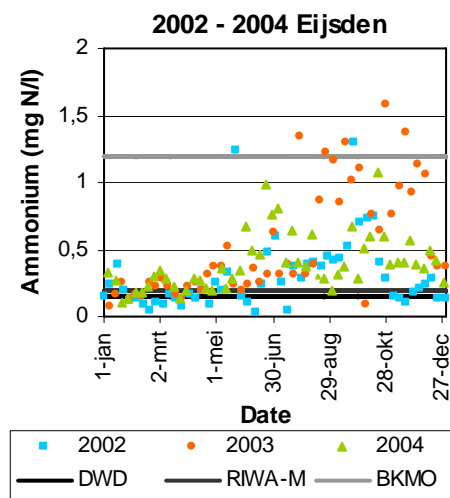
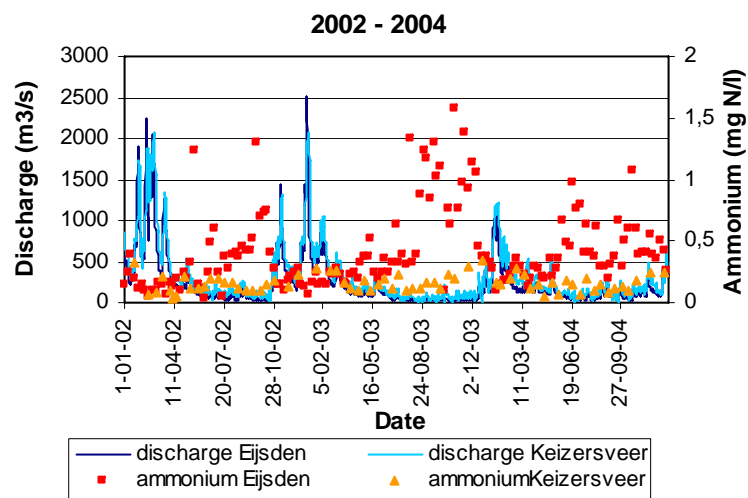
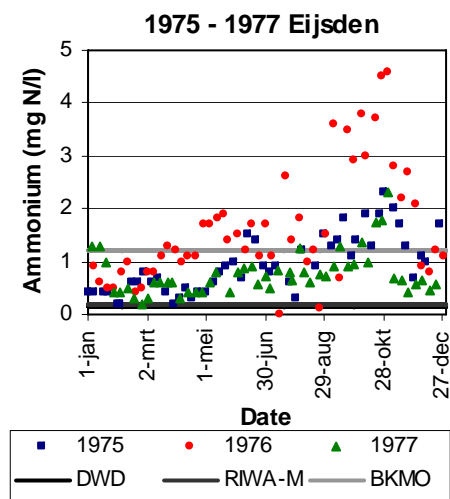
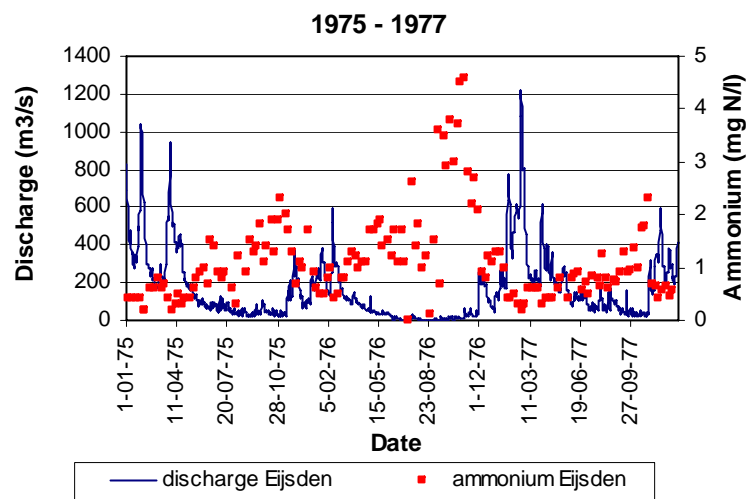
### A3.2 Nitrite



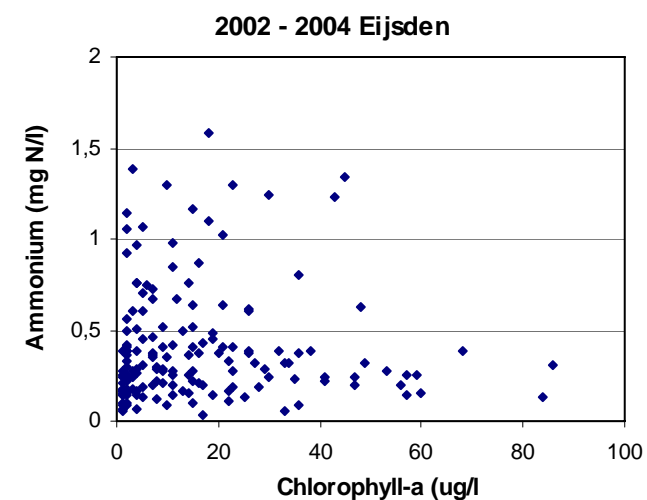
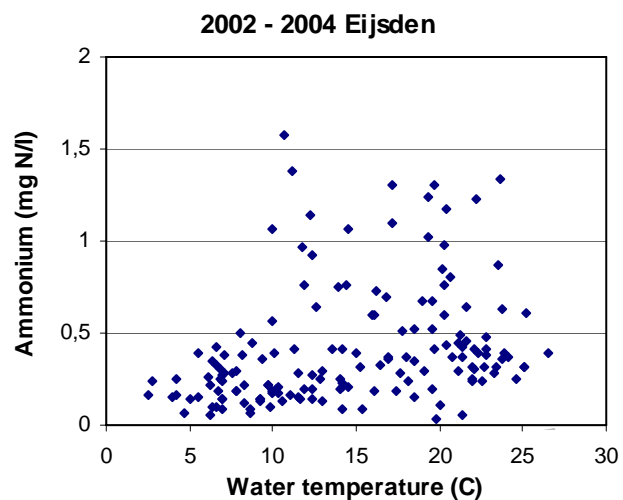
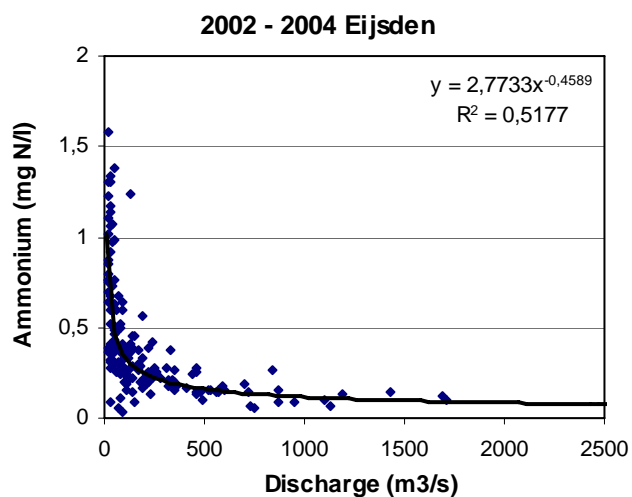
| location    | period<br>(Jun-Nov) | median<br>NO <sub>2</sub><br>(mg/l) | mean<br>NO <sub>2</sub><br>(mg/l) | min<br>NO <sub>2</sub><br>(mg/l) | max<br>NO <sub>2</sub><br>(mg/l) | n         | n ><br>0.03 mg/l<br>DWD | n ><br>0.1 mg/l<br>RIWA-M |
|-------------|---------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|-----------|-------------------------|---------------------------|
| Eijsden     | 1975                |                                     |                                   |                                  |                                  | 0         | 0                       | 0                         |
|             | 1976                |                                     |                                   |                                  |                                  | 0         | 0                       | 0                         |
|             | 1977                |                                     |                                   |                                  |                                  | 0         | 13                      | 9                         |
| Eijsden     | 2002                | 0.18                                | 0.17                              | 0.03                             | 0.37                             | 26        | 24                      | 19                        |
|             | 2003                | <b>0.20</b>                         | <b>0.22</b>                       | <b>0.05</b>                      | <b>0.37</b>                      | <b>26</b> | <b>26</b>               | <b>25</b>                 |
|             | 2004                | 0.13                                | 0.15                              | 0.06                             | 0.31                             | 27        | 27                      | 19                        |
| Keizersveer | 2002                | 0.05                                | 0.06                              | 0.03                             | 0.09                             | 12        | 12                      | 0                         |
|             | 2003                | <b>0.05</b>                         | <b>0.05</b>                       | <b>0.02</b>                      | <b>0.07</b>                      | <b>12</b> | <b>10</b>               | <b>0</b>                  |
|             | 2004                | 0.04                                | 0.04                              | 0.03                             | 0.06                             | 12        | 12                      | 0                         |



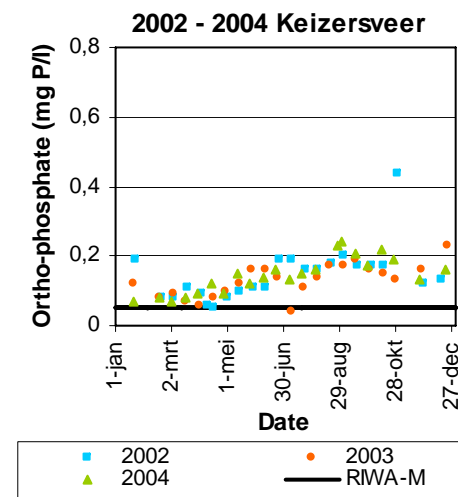
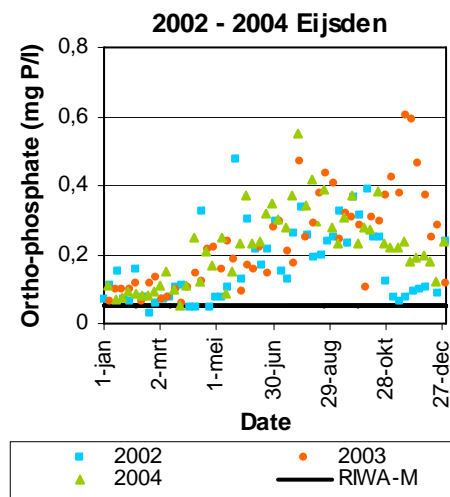
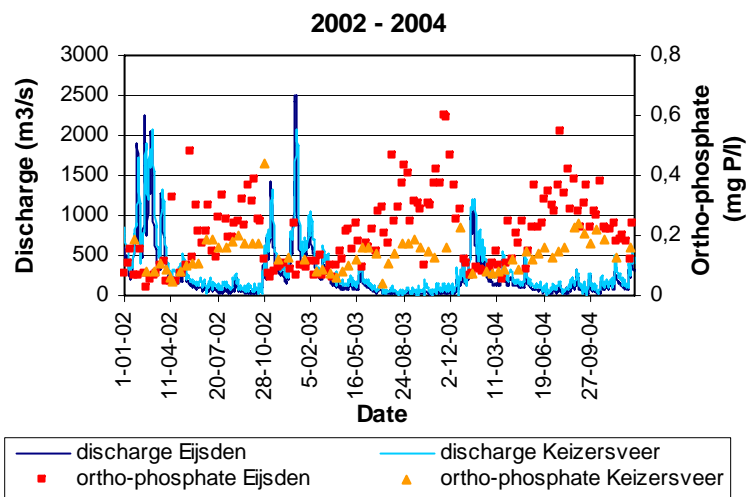
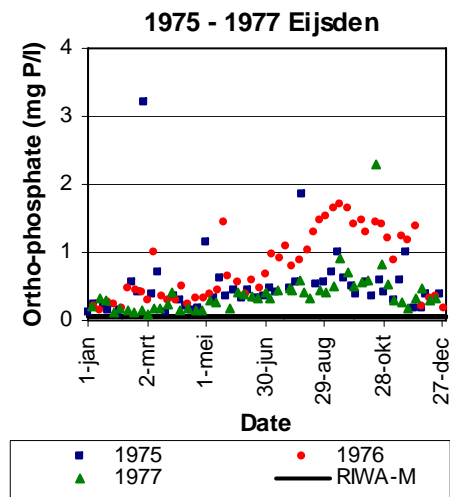
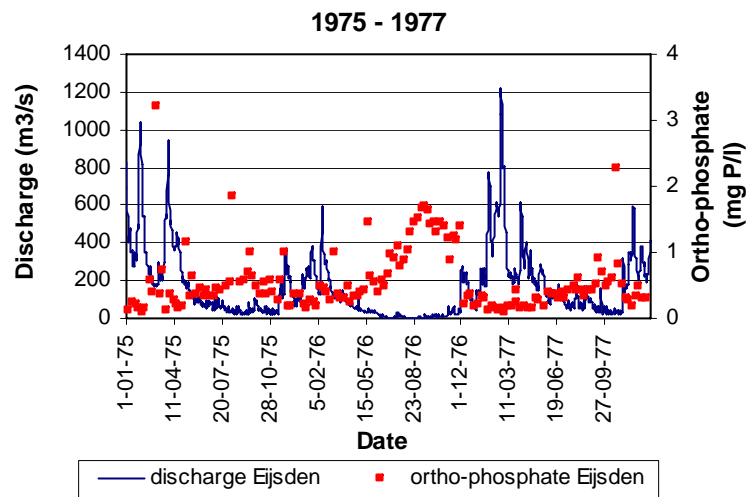
### A3.3 Ammonium



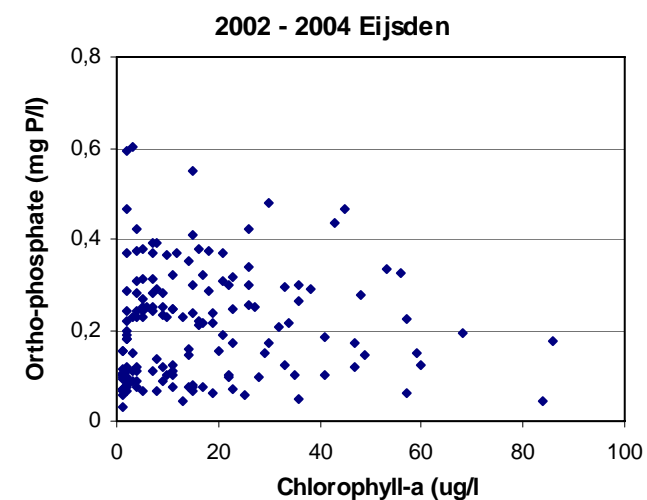
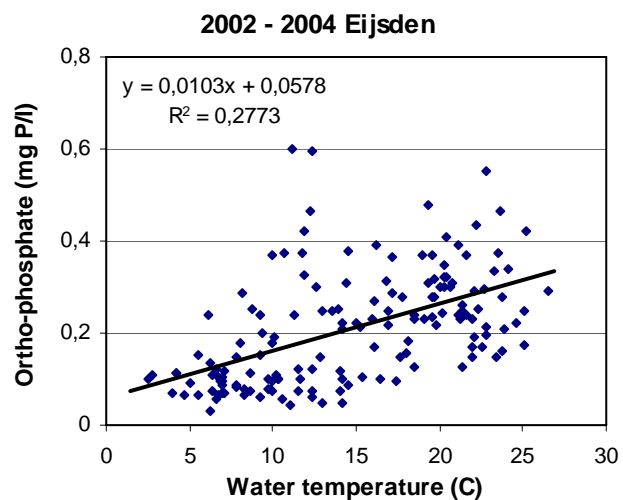
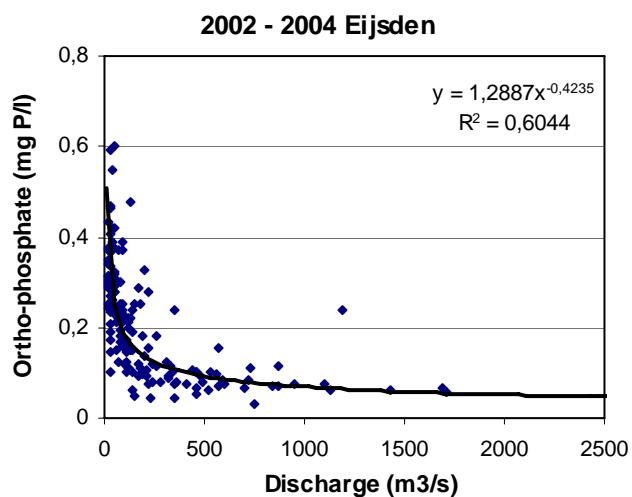
| location    | period<br>(Jun-Nov) | median                    | mean                      | min                       | max                       | n  | n >          | n >           | n >         |
|-------------|---------------------|---------------------------|---------------------------|---------------------------|---------------------------|----|--------------|---------------|-------------|
|             |                     | NH <sub>4</sub><br>(mg/l) | NH <sub>4</sub><br>(mg/l) | NH <sub>4</sub><br>(mg/l) | NH <sub>4</sub><br>(mg/l) |    | 0.156<br>DWD | 0.2<br>RIWA-M | 1.2<br>BKMO |
| Eijsden     | 1975                | 1.30                      | 1.30                      | 0.30                      | 2.30                      | 24 | 24           | 24            | 14          |
|             | 1976                | 1.75                      | 2.15                      | 0.00                      | 4.60                      | 26 | 24           | 24            | 18          |
|             | 1977                | 0.83                      | 0.95                      | 0.41                      | 2.32                      | 26 | 26           | 26            | 6           |
| Eijsden     | 2002                | 0.39                      | 0.39                      | 0.03                      | 1.30                      | 26 | 20           | 19            | 1           |
|             | 2003                | 0.76                      | 0.75                      | 0.09                      | 1.58                      | 26 | 25           | 25            | 5           |
|             | 2004                | 0.46                      | 0.52                      | 0.20                      | 1.07                      | 27 | 27           | 26            | 0           |
| Keizersveer | 2002                | 0.14                      | 0.14                      | 0.09                      | 0.19                      | 12 | 5            | 0             | 0           |
|             | 2003                | 0.17                      | 0.17                      | 0.10                      | 0.30                      | 12 | 7            | 3             | 0           |
|             | 2004                | 0.14                      | 0.14                      | 0.06                      | 0.24                      | 12 | 4            | 1             | 0           |



### A3.4 Ortho-phosphate

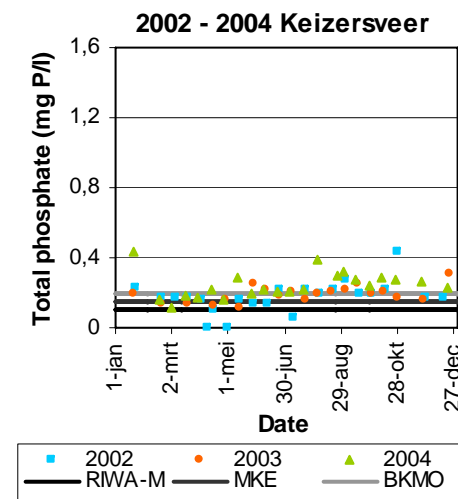
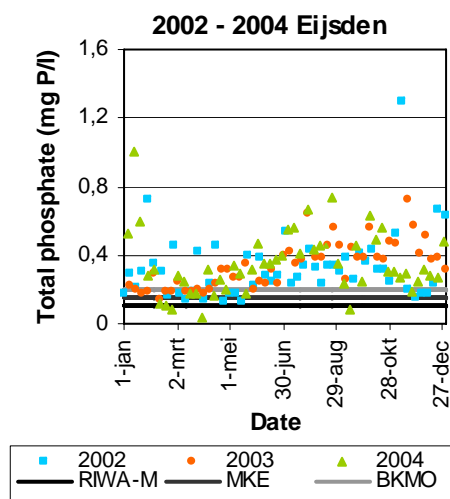
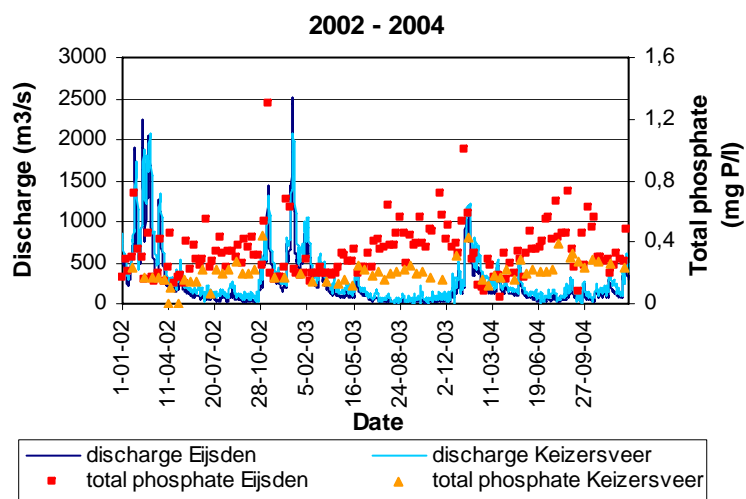
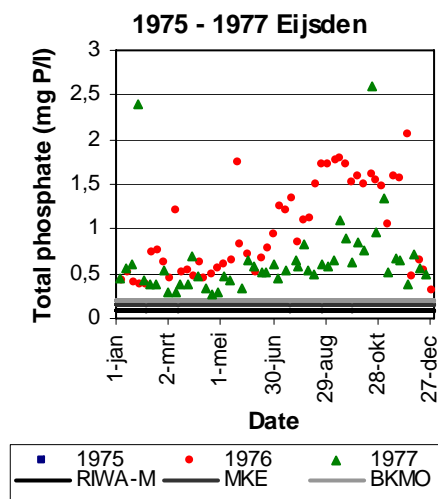
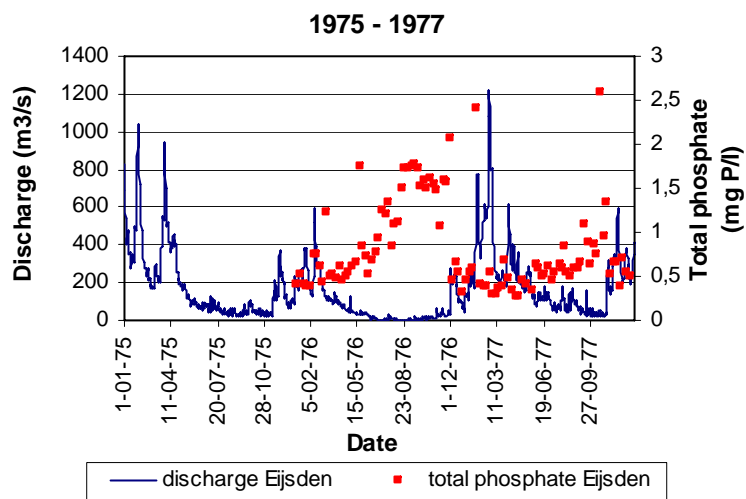


| location    | period<br>(Jun-Nov) | median<br>orthoPO <sub>4</sub><br>(mg/l) | mean<br>orthoPO <sub>4</sub><br>(mg/l) | min<br>orthoPO <sub>4</sub><br>(mg/l) | max<br>orthoPO <sub>4</sub><br>(mg/l) | n         | n ><br>0.05 mg/l<br>RIWA-M |
|-------------|---------------------|--|--|---------------------------------------|---------------------------------------|-----------|----------------------------|
| Eijsden     | 1975                | 0.48                                     | 0.57                                   | 0.28                                  | 1.84                                  | 24        | 24                         |
|             | <b>1976</b>         | <b>1.19</b>                              | <b>1.12</b>                            | <b>0.39</b>                           | <b>1.70</b>                           | <b>26</b> | <b>26</b>                  |
|             | 1977                | 0.43                                     | 0.53                                   | 0.19                                  | 2.28                                  | 26        | 26                         |
| Eijsden     | 2002                | 0.24                                     | 0.22                                   | 0.06                                  | 0.39                                  | 26        | 26                         |
|             | <b>2003</b>         | <b>0.30</b>                              | <b>0.31</b>                            | <b>0.10</b>                           | <b>0.60</b>                           | <b>26</b> | <b>26</b>                  |
|             | 2004                | 0.28                                     | 0.30                                   | 0.18                                  | 0.55                                  | 27        | 27                         |
| Keizersveer | 2002                | 0.17                                     | 0.19                                   | 0.11                                  | 0.44                                  | 12        | 12                         |
|             | <b>2003</b>         | <b>0.16</b>                              | <b>0.14</b>                            | <b>0.04</b>                           | <b>0.19</b>                           | <b>12</b> | <b>11</b>                  |
|             | 2004                | 0.17                                     | 0.18                                   | 0.13                                  | 0.24                                  | 12        | 12                         |

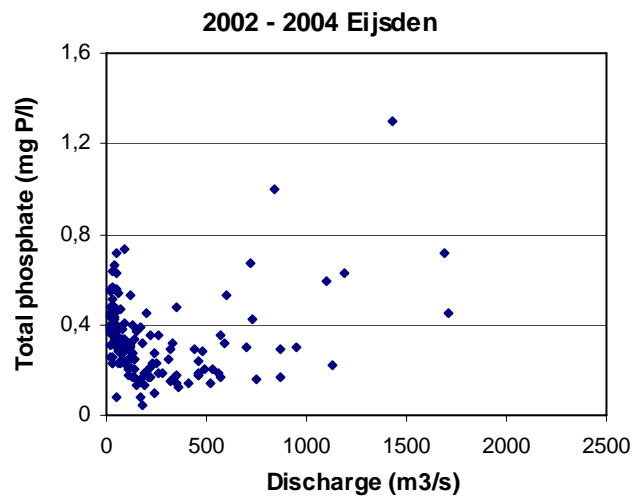




### A3.5 Total phosphate

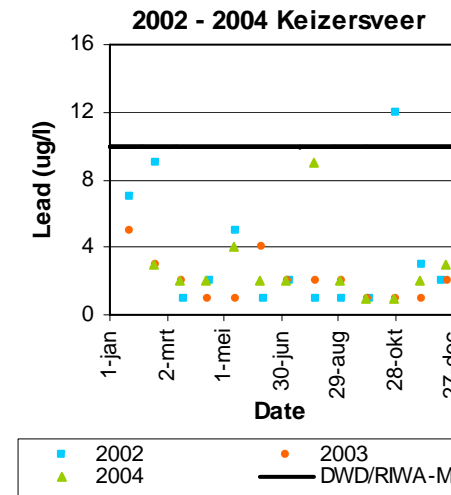
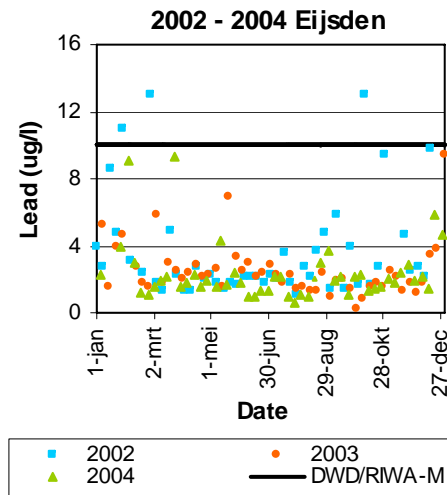
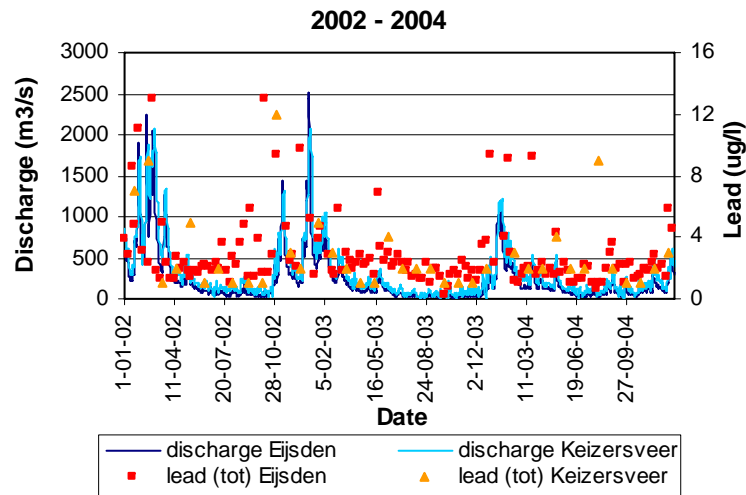
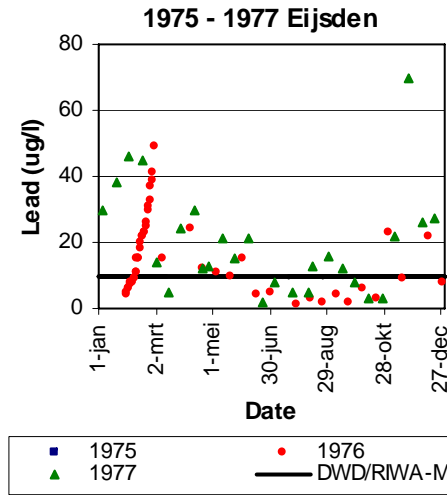
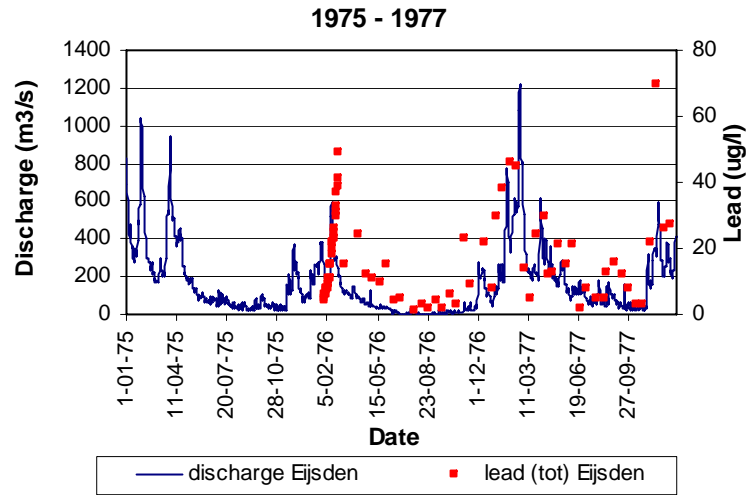


| location    | period<br>(Jun-Nov) | median<br>totPO <sub>4</sub><br>(mg/l) | mean<br>totPO <sub>4</sub><br>(mg/l) | min<br>totPO <sub>4</sub><br>(mg/l) | max<br>totPO <sub>4</sub><br>(mg/l) | n         | n ><br>0.1 mg/l<br>RIWA-M | n ><br>0.15 mg/l<br>MKE | n ><br>0.2 mg/l<br>BKMO |
|-------------|---------------------|--|--------------------------------------|-------------------------------------|-------------------------------------|-----------|---------------------------|-------------------------|-------------------------|
| Eijsden     | 1975                |  |                                      |                                     |                                     | 0         | 0                         | 0                       | 0                       |
|             | <b>1976</b>         | <b>1.49</b>                            | <b>1.31</b>                          | <b>0.52</b>                         | <b>1.78</b>                         | <b>26</b> | <b>26</b>                 | <b>26</b>               | <b>26</b>               |
|             | 1977                | 0.64                                   | 0.76                                 | 0.45                                | 2.60                                | 26        | 26                        | 26                      | 26                      |
| Eijsden     | 2002                | 0.32                                   | 0.36                                 | 0.15                                | 1.30                                | 26        | 26                        | 25                      | 24                      |
|             | <b>2003</b>         | <b>0.39</b>                            | <b>0.42</b>                          | <b>0.23</b>                         | <b>0.72</b>                         | <b>25</b> | <b>25</b>                 | <b>25</b>               | <b>25</b>               |
|             | 2004                | 0.40                                   | 0.40                                 | 0.08                                | 0.73                                | 27        | 26                        | 26                      | 25                      |
| Keizersveer | 2002                | 0.21                                   | 0.21                                 | 0.06                                | 0.44                                | 12        | 11                        | 10                      | 6                       |
|             | <b>2003</b>         | <b>0.21</b>                            | <b>0.20</b>                          | <b>0.16</b>                         | <b>0.25</b>                         | <b>12</b> | <b>12</b>                 | <b>12</b>               | <b>6</b>                |
|             | 2004                | 0.27                                   | 0.27                                 | 0.21                                | 0.39                                | 12        | 12                        | 12                      | 12                      |

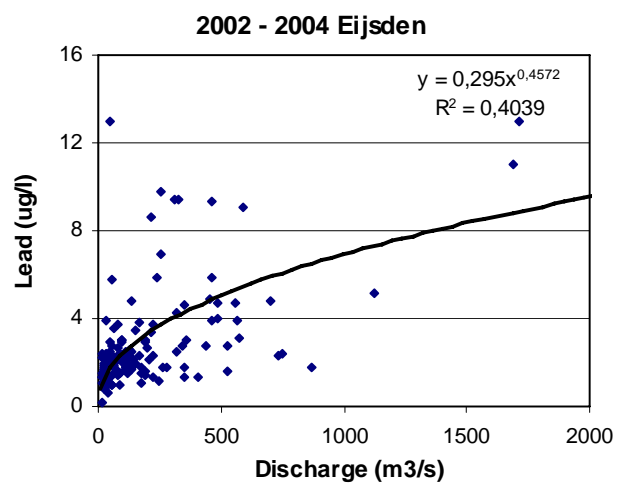


# Addendum 4a: Total heavy metals and metalloids during droughts

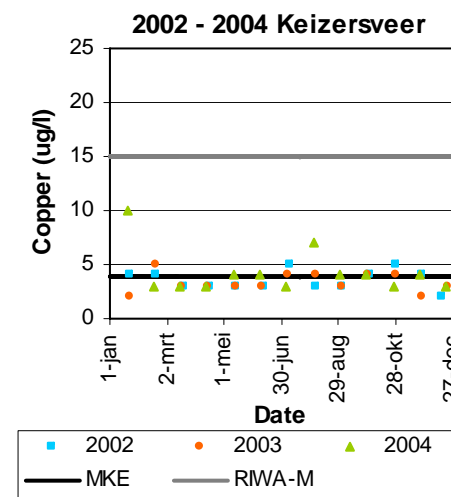
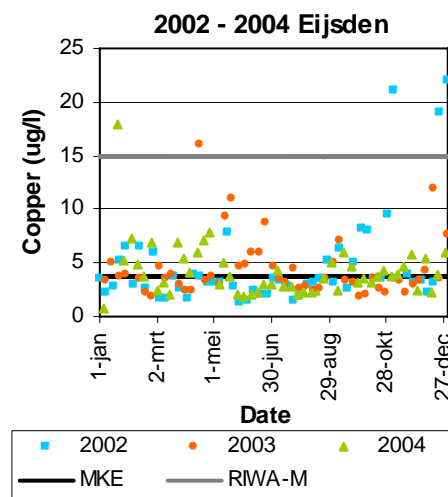
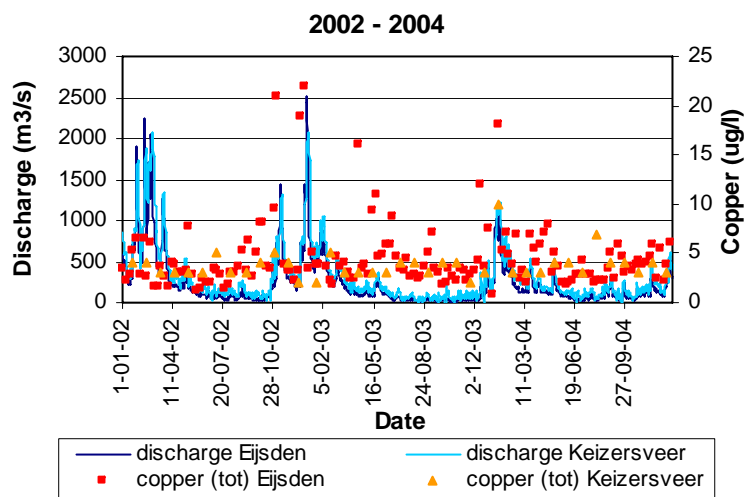
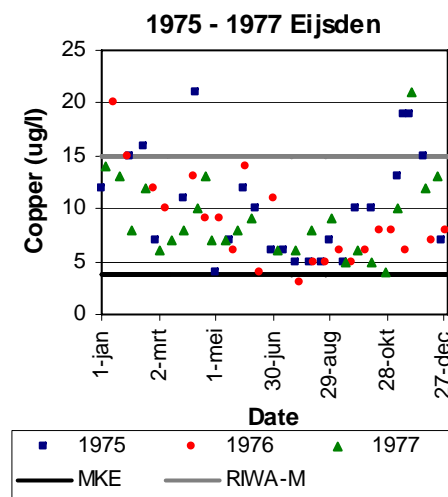
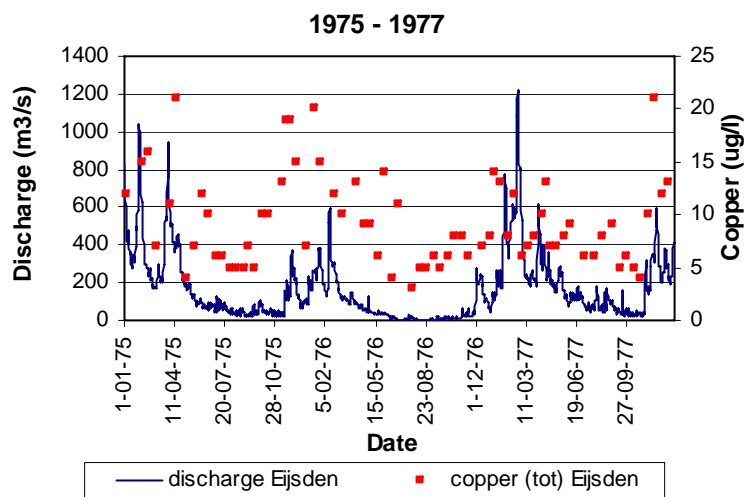
## A4a.1 Total lead



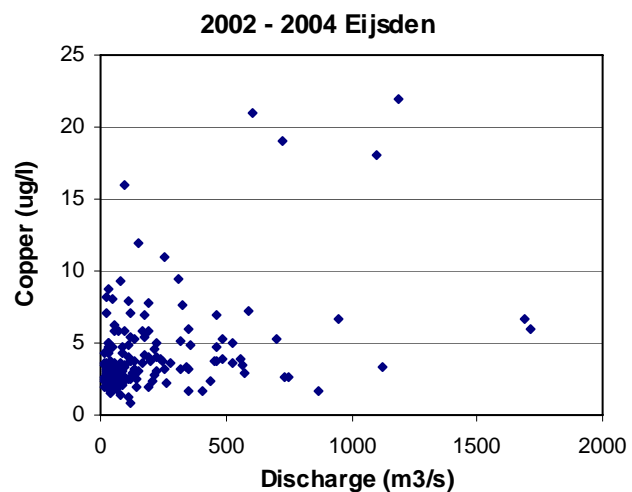
| location    | period<br>(Jun-Nov) | median<br>Pb<br>(µg/l) | mean<br>Pb<br>(µg/l) | min<br>Pb<br>(µg/l) | max<br>Pb<br>(µg/l) | n  | n ><br>10 µg/l<br>DWD/RIWA-M | n ><br>30 µg/l<br>BKMO | n ><br>220 µg/l<br>MKE |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|------------------------------|------------------------|------------------------|
| Eijsden     | 1975                |                        |                      |                     |                     | 0  |                              |                        |                        |
|             | 1976                | 4.0                    | 6.4                  | 1.0                 | 23.0                | 12 | 2                            | 0                      | 0                      |
|             | 1977                | 8.0                    | 14.5                 | 2.0                 | 70.0                | 13 | 6                            | 1                      | 0                      |
| Eijsden     | 2002                | 2.4                    | 5.8                  | 1.1                 | 47.0                | 26 | 3                            | 1                      | 0                      |
|             | 2003                | 1.8                    | 1.8                  | 0.2                 | 3.0                 | 26 | 0                            | 0                      | 0                      |
|             | 2004                | 1.8                    | 1.8                  | 0.6                 | 3.7                 | 27 | 0                            | 0                      | 0                      |
| Keizersveer | 2002                | 1.0                    | 3.0                  | 1.0                 | 12.0                | 7  | 1                            | 0                      | 0                      |
|             | 2003                | 2.0                    | 1.9                  | 1.0                 | 4.0                 | 7  | 0                            | 0                      | 0                      |
|             | 2004                | 2.0                    | 2.7                  | 1.0                 | 9.0                 | 7  | 0                            | 0                      | 0                      |



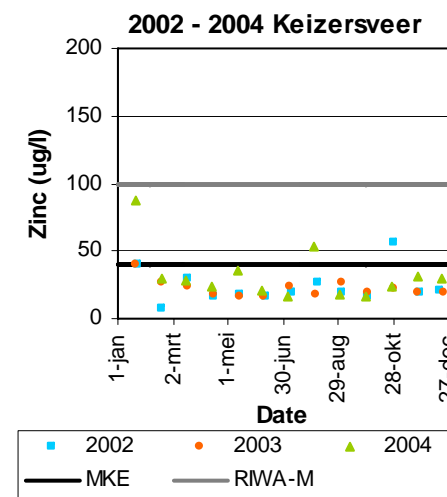
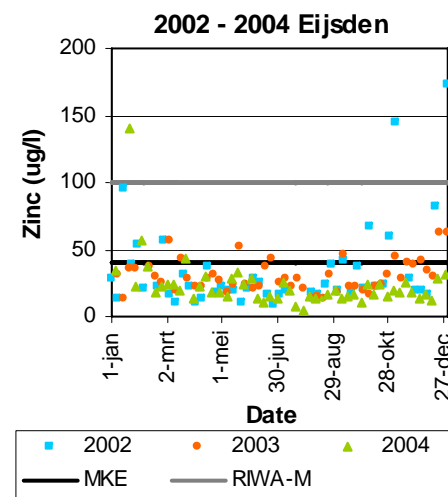
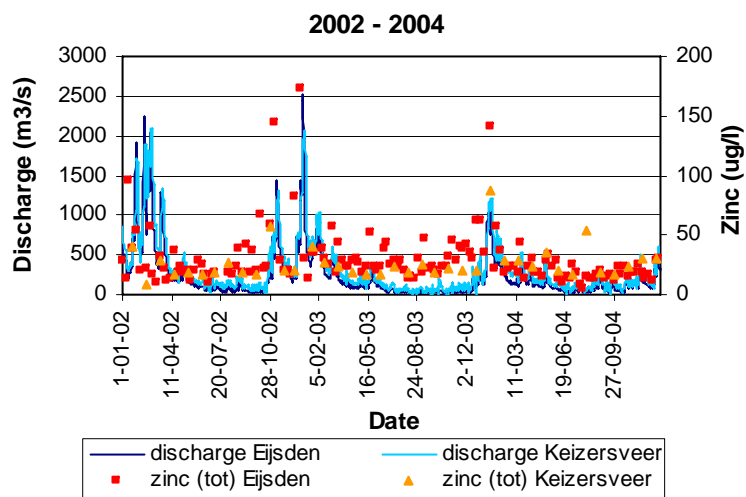
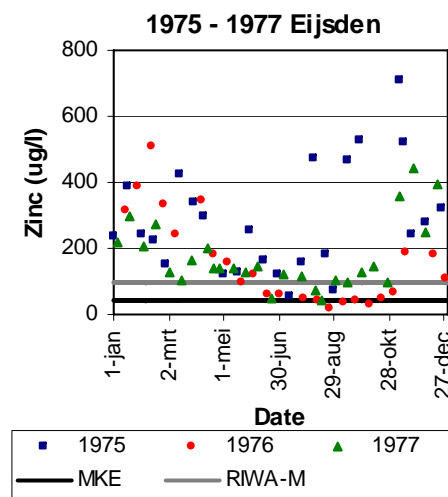
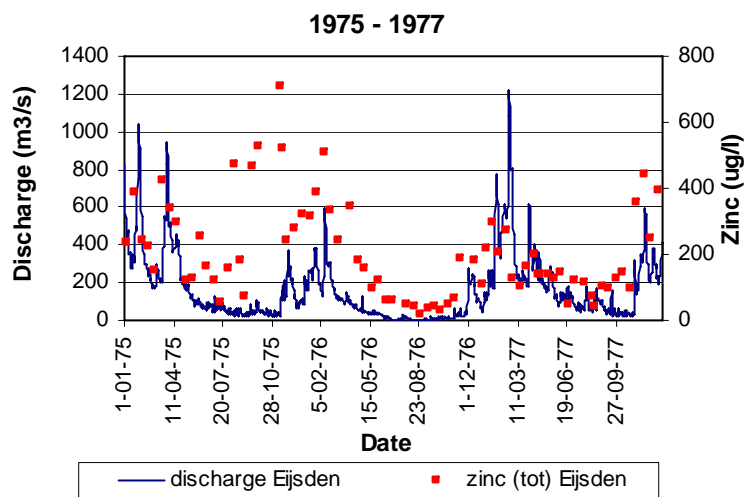
## A4a.2 Total copper



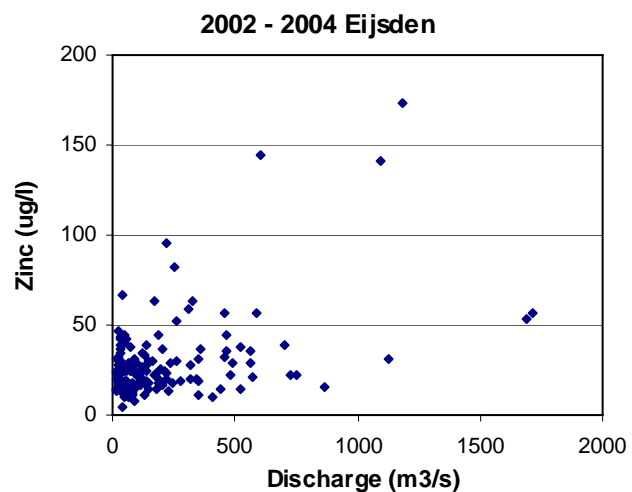
| location    | period<br>(Jun-Nov) | median<br>Cu<br>(µg/l) | mean<br>Cu<br>(µg/l) | min<br>Cu<br>(µg/l) | max<br>Cu<br>(µg/l) | n         | n ><br>3.8 µg/l<br>MKE | n ><br>15 µg/l<br>RIWA-M | n ><br>50 µg/l<br>BKMO | n ><br>2000 µg/l<br>DWD |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|-----------|------------------------|--------------------------|------------------------|-------------------------|
| Eijsden     | 1975                | 8.5                    | 9.4                  | 5.0                 | 19.0                | 14        | 1                      | 2                        | 0                      | 0                       |
|             | <b>1976</b>         | <b>6.0</b>             | <b>6.8</b>           | <b>3.0</b>          | <b>14.0</b>         | <b>12</b> | <b>11</b>              | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|             | 1977                | 6.0                    | 8.1                  | 4.0                 | 21.0                | 11        | 11                     | 1                        | 0                      | 0                       |
| Eijsden     | 2002                | 3.4                    | 5.6                  | 1.4                 | 31.0                | 26        | 20                     | 2                        | 0                      | 0                       |
|             | <b>2003</b>         | <b>3.4</b>             | <b>3.8</b>           | <b>1.9</b>          | <b>8.8</b>          | <b>26</b> | <b>25</b>              | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|             | 2004                | 3.1                    | 3.4                  | 1.8                 | 5.9                 | 27        | 27                     | 0                        | 0                      | 0                       |
| Keizersveer | 2002                | 4.0                    | 3.9                  | 3.0                 | 5.0                 | 7         | 7                      | 0                        | 0                      | 0                       |
|             | <b>2003</b>         | <b>4.0</b>             | <b>3.4</b>           | <b>2.0</b>          | <b>4.0</b>          | <b>7</b>  | <b>7</b>               | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|             | 2004                | 4.0                    | 4.1                  | 3.0                 | 7.0                 | 7         | 7                      | 0                        | 0                      | 0                       |



### A4a.3 Total zinc

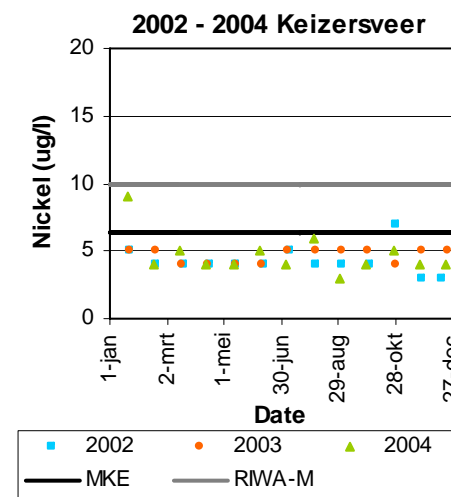
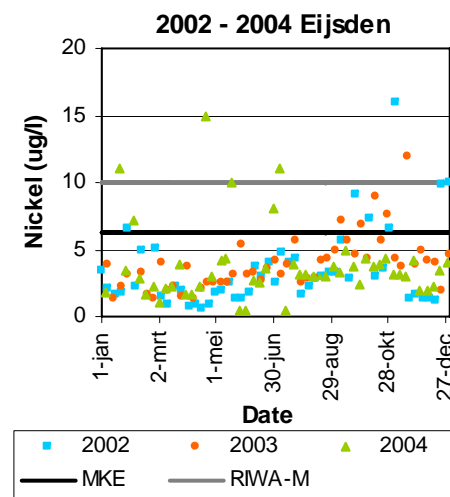
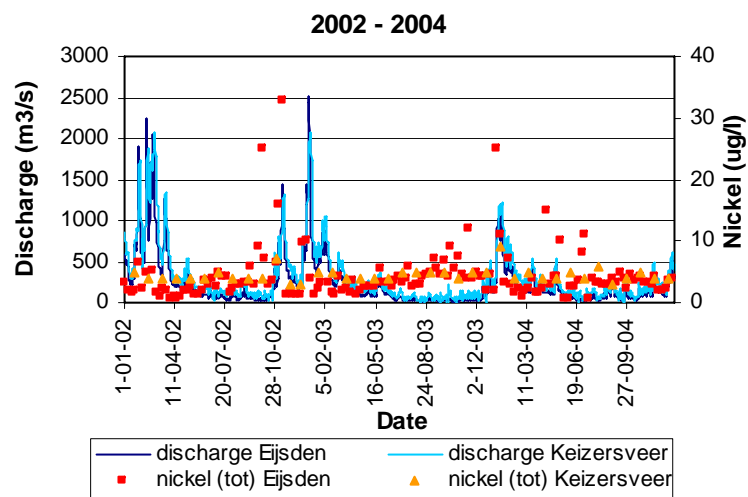
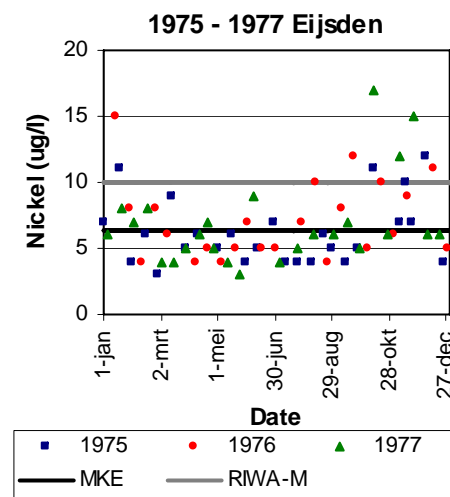
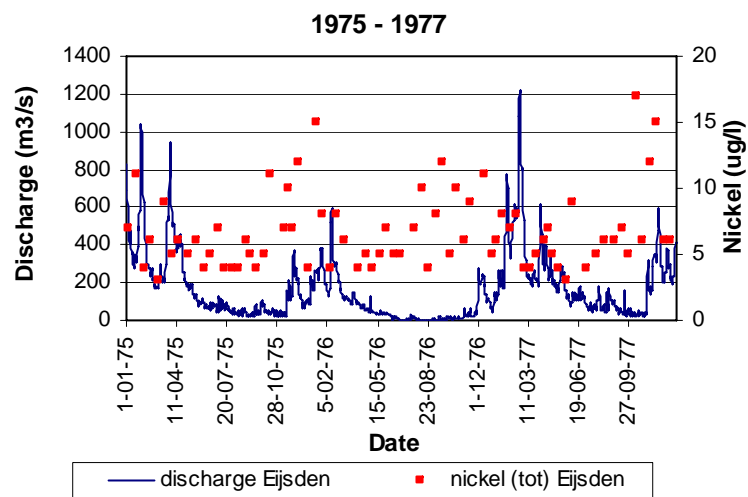


| location    | period<br>(Jun-Nov) | median<br>Zn<br>(µg/l) | mean<br>Zn<br>(µg/l) | min<br>Zn<br>(µg/l) | max<br>Zn<br>(µg/l) | n         | n ><br>40 µg/l<br>MKE | n ><br>100 µg/l<br>RIWA-M | n ><br>200 µg/l<br>BKMO | n ><br>3000 µg/l<br>BKMO |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|-----------|-----------------------|---------------------------|-------------------------|--------------------------|
| Eijsden     | 1975                | 249                    | 423                  | 55                  | 1972                | 14        | 1                     | 12                        | 8                       | 0                        |
|             | <b>1976</b>         | <b>50</b>              | <b>64</b>            | <b>20</b>           | <b>186</b>          | <b>12</b> | <b>11</b>             | <b>2</b>                  | <b>0</b>                | <b>0</b>                 |
|             | 1977                | 115                    | 146                  | 45                  | 440                 | 13        | 13                    | 8                         | 2                       | 0                        |
| Eijsden     | 2002                | 24                     | 42                   | 10                  | 261                 | 23        | 16                    | 2                         | 1                       | 0                        |
|             | <b>2003</b>         | <b>24</b>              | <b>27</b>            | <b>13</b>           | <b>47</b>           | <b>26</b> | <b>21</b>             | <b>0</b>                  | <b>0</b>                | <b>0</b>                 |
|             | 2004                | 15                     | 17                   | 5                   | 29                  | 27        | 18                    | 0                         | 0                       | 0                        |
| Keizersveer | 2002                | 19                     | 25                   | 16                  | 57                  | 7         | 5                     | 0                         | 0                       | 0                        |
|             | <b>2003</b>         | <b>20</b>              | <b>21</b>            | <b>17</b>           | <b>26</b>           | <b>7</b>  | <b>4</b>              | <b>0</b>                  | <b>0</b>                | <b>0</b>                 |
|             | 2004                | 21                     | 26                   | 16                  | 54                  | 7         | 6                     | 0                         | 0                       | 0                        |

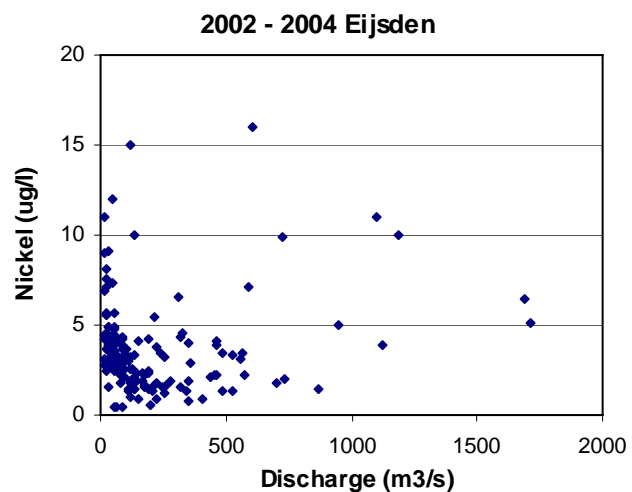




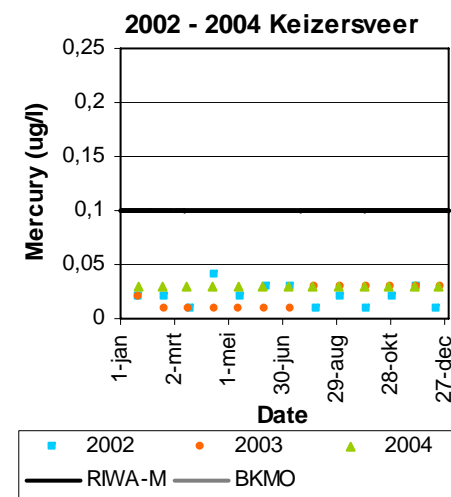
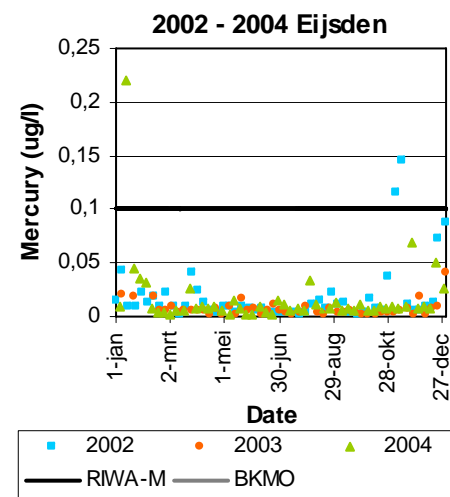
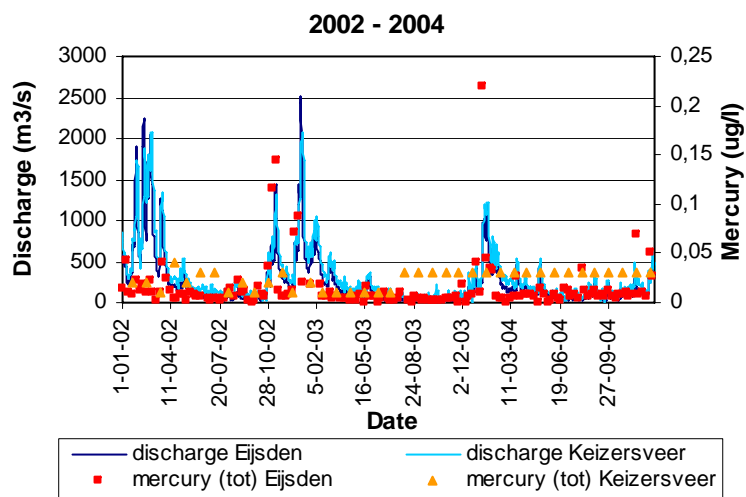
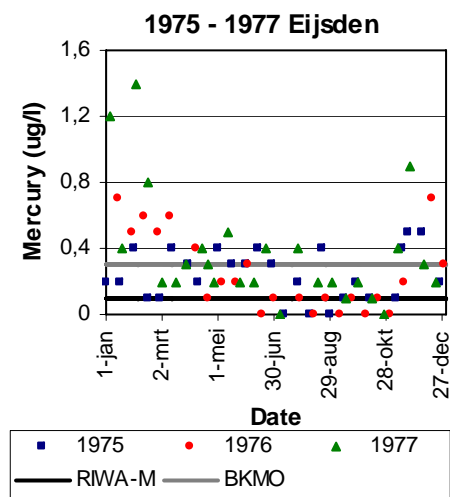
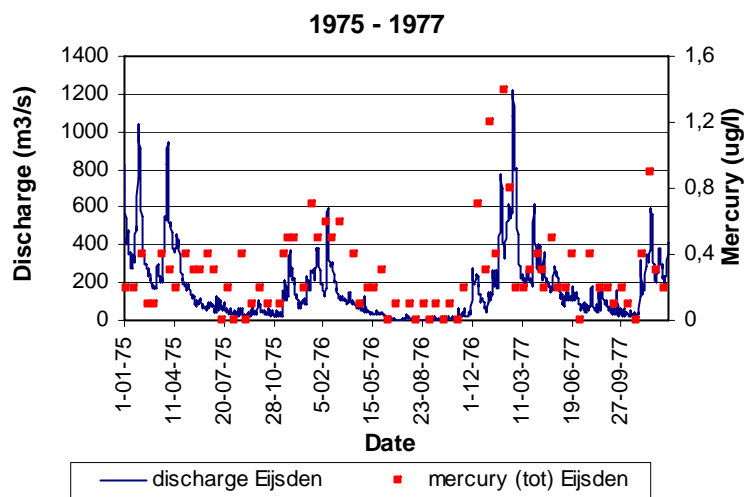
### A4a.4 Total nickel



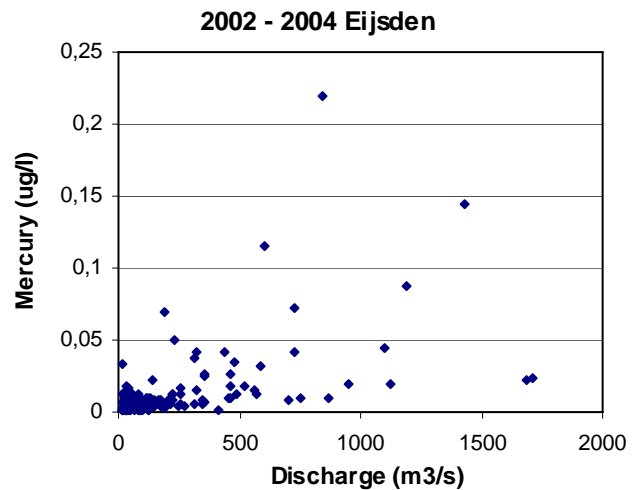
| location    | period<br>(Jun-Nov) | median<br>Ni<br>(µg/l) | mean<br>Ni<br>(µg/l) | min<br>Ni<br>(µg/l) | max<br>Ni<br>(µg/l) | n  | n ><br>6.3 µg/l<br>MKE | n ><br>10 µg/l<br>RIWA-M | n ><br>20 µg/l<br>DWD |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|------------------------|--------------------------|-----------------------|
| Eijsden     | 1975                | 5.0                    | 5.9                  | 4.0                 | 11.0                | 14 | 0                      | 1                        | 0                     |
|             | 1976                | 7.0                    | 7.3                  | 4.0                 | 12.0                | 12 | 7                      | 1                        | 0                     |
|             | 1977                | 6.0                    | 8.4                  | 4.0                 | 17.0                | 11 | 8                      | 3                        | 0                     |
| Eijsden     | 2002                | 3.5                    | 6.1                  | 1.3                 | 33.0                | 26 | 7                      | 3                        | 0                     |
|             | 2003                | 4.3                    | 4.9                  | 2.5                 | 12.0                | 26 | 8                      | 1                        | 0                     |
|             | 2004                | 3.2                    | 3.6                  | 0.5                 | 11.0                | 27 | 2                      | 1                        | 0                     |
| Keizersveer | 2002                | 4.0                    | 4.4                  | 3.0                 | 7.0                 | 7  | 1                      | 0                        | 0                     |
|             | 2003                | 5.0                    | 4.7                  | 4.0                 | 5.0                 | 7  | 0                      | 0                        | 0                     |
|             | 2004                | 4.0                    | 4.4                  | 3.0                 | 6.0                 | 7  | 1                      | 0                        | 0                     |



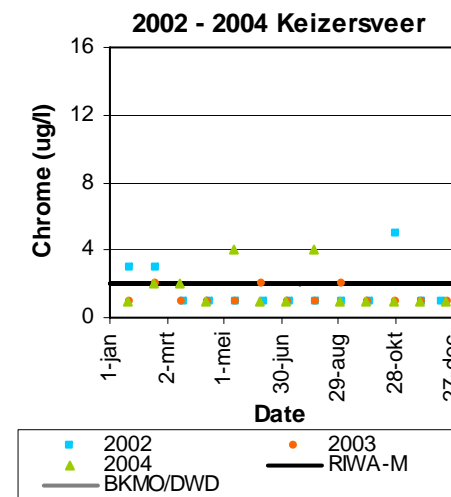
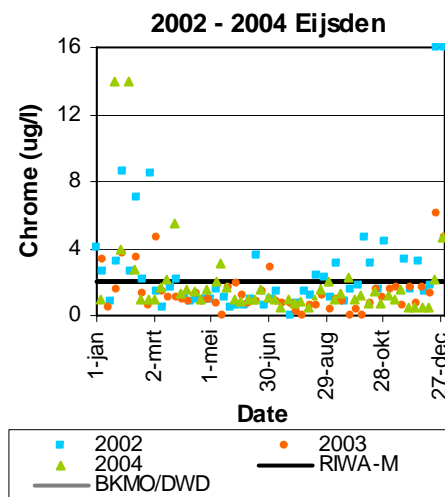
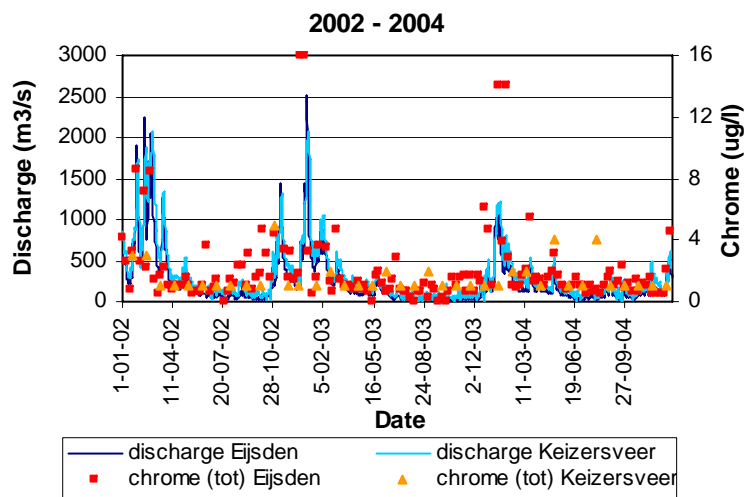
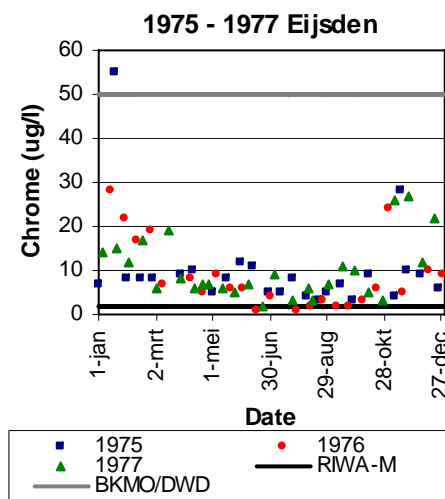
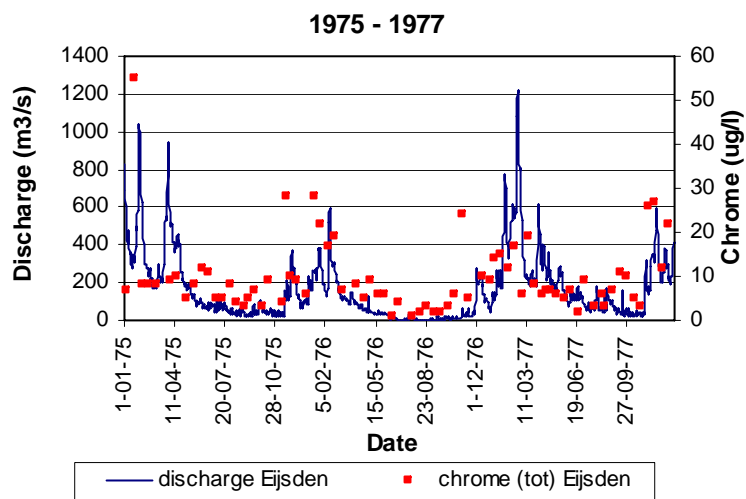
### A4a.5 Total mercury



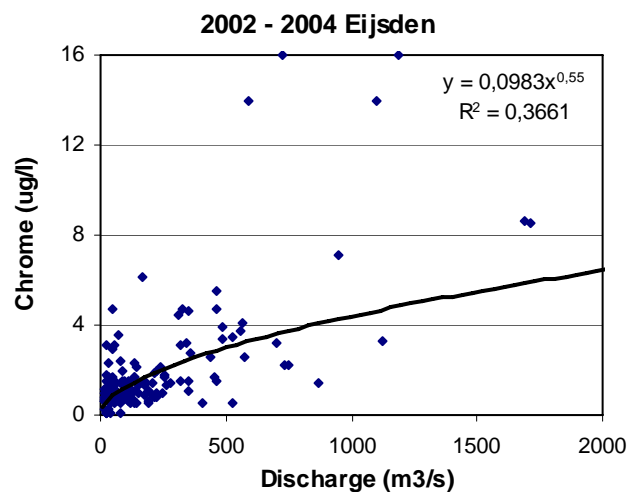
| location    | period<br>(Jun-Nov) | median<br>Hg<br>(µg/l) | mean<br>Hg<br>(µg/l) | min<br>Hg<br>(µg/l) | max<br>Hg<br>(µg/l) | n  | n ><br>0.1 µg/l<br>RIWA-M | n ><br>0.3 µg/l<br>BKMO | n ><br>1.0 µg/l<br>DWD | n ><br>1.2 µg/l<br>MKE |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|---------------------------|-------------------------|------------------------|------------------------|
| Eijsden     | 1975                | 0.200                  | 0.214                | 0.000               | 0.500               | 14 | 8                         | 4                       | 0                      | 0                      |
|             | 1976                | 0.100                  | 0.083                | 0.000               | 0.300               | 12 | 2                         | 0                       | 0                      | 0                      |
|             | 1977                | 0.200                  | 0.258                | 0.000               | 0.900               | 12 | 8                         | 4                       | 0                      | 0                      |
| Eijsden     | 2002                | 0.007                  | 0.019                | 0.001               | 0.145               | 25 | 2                         | 0                       | 0                      | 0                      |
|             | 2003                | 0.004                  | 0.004                | 0.001               | 0.011               | 25 | 0                         | 0                       | 0                      | 0                      |
|             | 2004                | 0.008                  | 0.011                | 0.002               | 0.069               | 27 | 0                         | 0                       | 0                      | 0                      |
| Keizersveer | 2002                | 0.020                  | 0.021                | 0.010               | 0.030               | 7  | 0                         | 0                       | 0                      | 0                      |
|             | 2003                | 0.030                  | 0.024                | 0.010               | 0.030               | 7  | 0                         | 0                       | 0                      | 0                      |
|             | 2004                | 0.030                  | 0.030                | 0.030               | 0.030               | 7  | 0                         | 0                       | 0                      | 0                      |



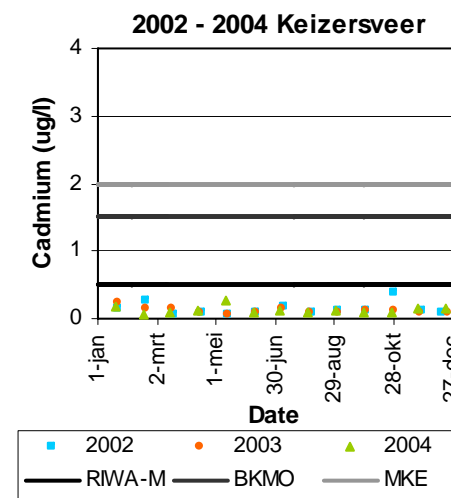
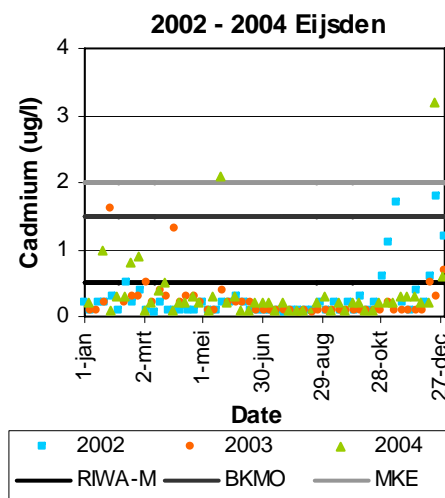
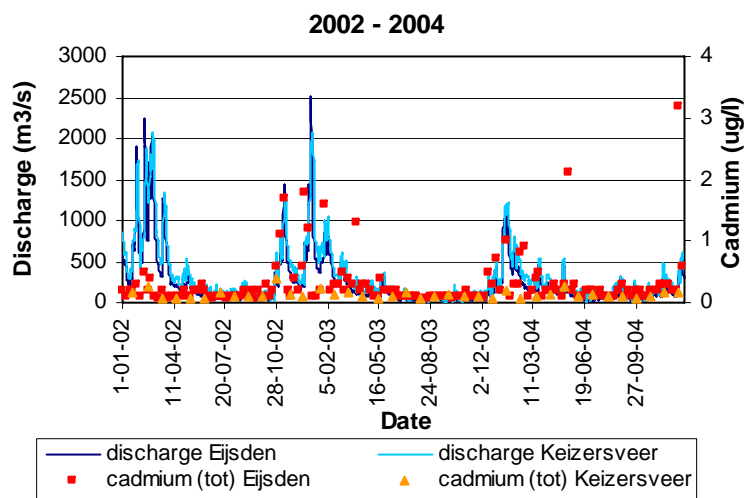
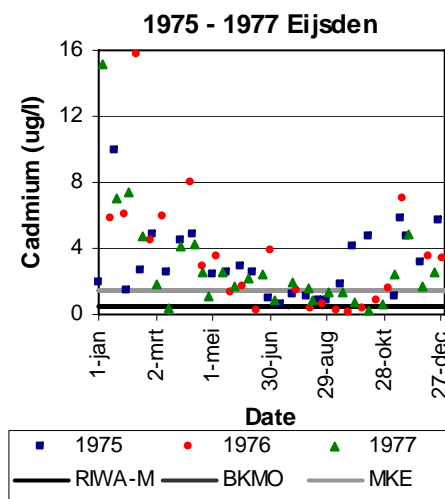
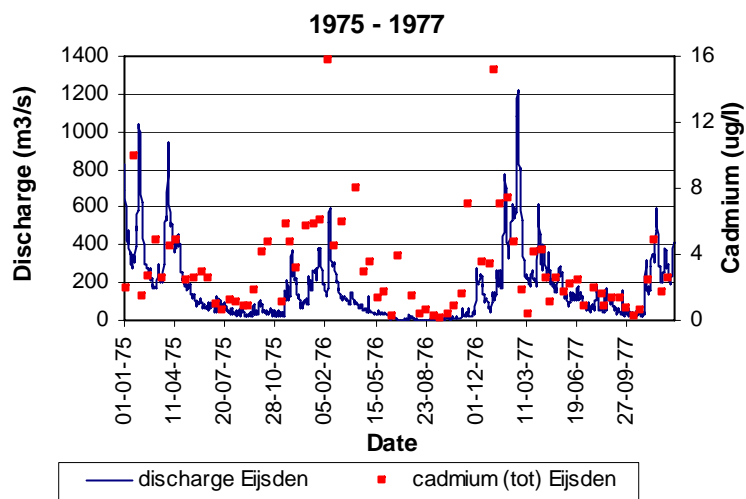
### A4a.6 Total chrome



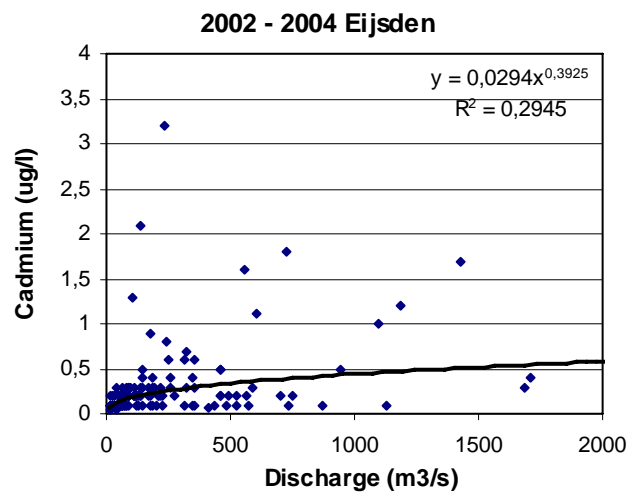
| location    | period<br>(Jun-Nov) | median<br>Cr<br>(µg/l) | mean<br>Cr<br>(µg/l) | min<br>Cr<br>(µg/l) | max<br>Cr<br>(µg/l) | n         | n ><br>2 µg/l<br>RIWA-M | n ><br>50 µg/l<br>BKMO/DWD | n ><br>84 µg/l<br>MKE/WFD(06) |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|-----------|-------------------------|----------------------------|-------------------------------|
| Eijsden     | 1975                | 6.0                    | 8.1                  | 3.0                 | 28.0                | 14        | 14                      | 0                          | 0                             |
|             | <b>1976</b>         | <b>3.0</b>             | <b>4.9</b>           | <b>1.0</b>          | <b>24.0</b>         | <b>12</b> | <b>7</b>                | <b>0</b>                   | <b>0</b>                      |
|             | 1977                | 7.0                    | 9.2                  | 2.0                 | 27.0                | 13        | 12                      | 0                          | 0                             |
| Eijsden     | 2002                | 1.5                    | 4.2                  | 0.1                 | 43.0                | 25        | 10                      | 0                          | 0                             |
|             | <b>2003</b>         | <b>0.8</b>             | <b>0.9</b>           | <b>0.1</b>          | <b>2.9</b>          | <b>26</b> | <b>1</b>                | <b>0</b>                   | <b>0</b>                      |
|             | 2004                | 1.0                    | 1.1                  | 0.5                 | 2.3                 | 27        | 1                       | 0                          | 0                             |
| Keizersveer | 2002                | 1.0                    | 1.6                  | 1.0                 | 5.0                 | 7         | 1                       | 0                          | 0                             |
|             | <b>2003</b>         | <b>1.0</b>             | <b>1.3</b>           | <b>1.0</b>          | <b>2.0</b>          | <b>7</b>  | <b>0</b>                | <b>0</b>                   | <b>0</b>                      |
|             | 2004                | 1.0                    | 1.4                  | 1.0                 | 4.0                 | 7         | 1                       | 0                          | 0                             |



### A4a.7 Total cadmium

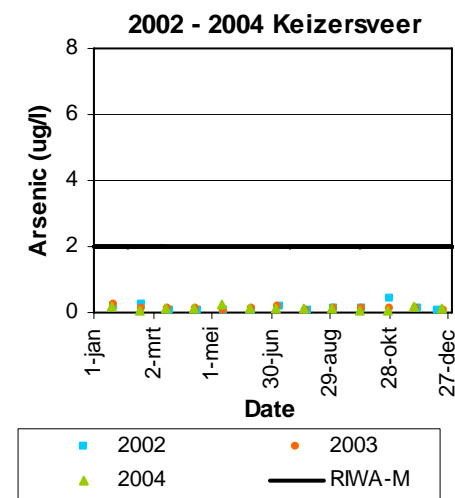
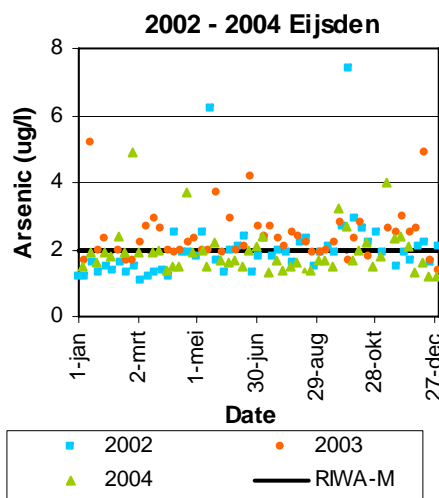
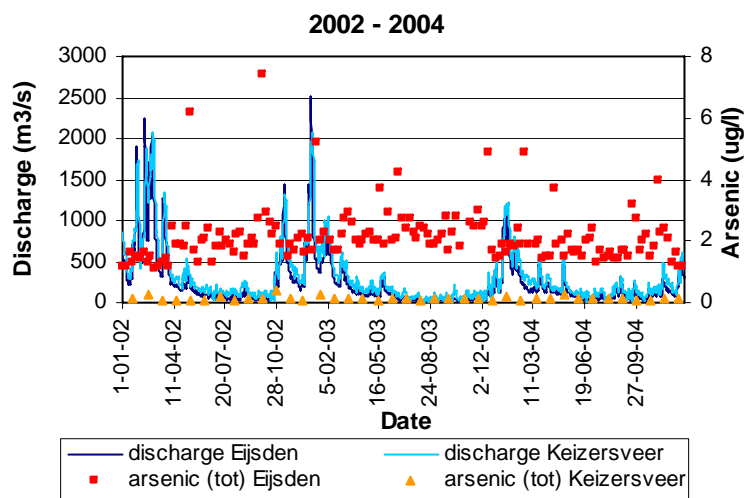
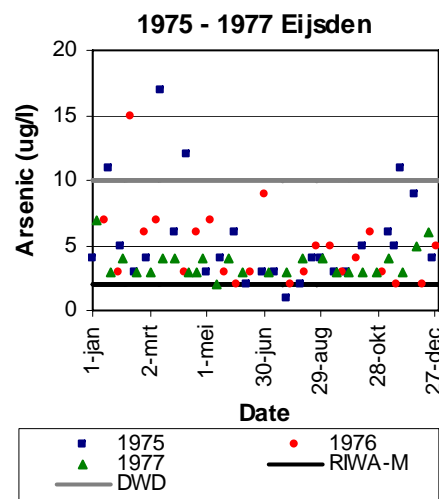
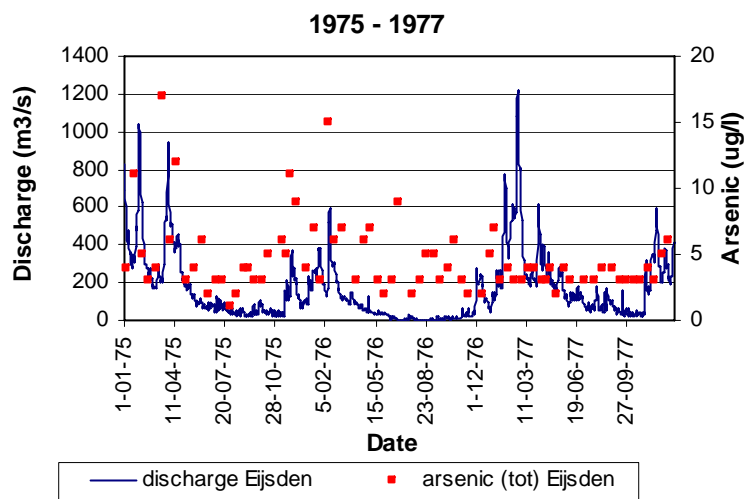


| location    | period<br>(Jun-Nov) | median<br>Cd<br>(µg/l) | mean<br>Cd<br>(µg/l) | min<br>Cd<br>(µg/l) | max<br>Cd<br>(µg/l) | n  | n ><br>0.5 µg/l<br>RIWA-M | n ><br>1.5 µg/l<br>BKMO | n ><br>2 µg/l<br>MKE | n ><br>5 µg/l<br>DWD |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|---------------------------|-------------------------|----------------------|----------------------|
| Eijsden     | 1975                | 1.5                    | 2.4                  | 0.6                 | 5.8                 | 14 | 14                        | 7                       | 1                    | 0                    |
|             | 1976                | 0.8                    | 1.5                  | 0.1                 | 7.0                 | 12 | 7                         | 4                       | 6                    | 0                    |
|             | 1977                | 1.3                    | 1.6                  | 0.3                 | 4.9                 | 13 | 12                        | 6                       | 8                    | 0                    |
| Eijsden     | 2002                | 0.1                    | 0.3                  | 0.1                 | 1.7                 | 26 | 3                         | 1                       | 0                    | 0                    |
|             | 2003                | 0.1                    | 0.1                  | 0.1                 | 0.2                 | 26 | 0                         | 0                       | 0                    | 0                    |
|             | 2004                | 0.2                    | 0.2                  | 0.1                 | 0.3                 | 27 | 0                         | 0                       | 0                    | 0                    |
| Keizersveer | 2002                | 0.1                    | 0.2                  | 0.1                 | 0.4                 | 7  | 0                         | 0                       | 0                    | 0                    |
|             | 2003                | 0.1                    | 0.1                  | 0.1                 | 0.2                 | 7  | 0                         | 0                       | 0                    | 0                    |
|             | 2004                | 0.1                    | 0.1                  | 0.1                 | 0.2                 | 7  | 0                         | 0                       | 0                    | 0                    |

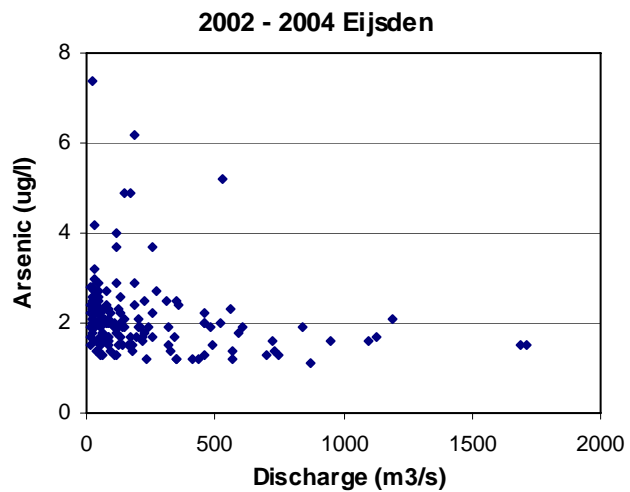




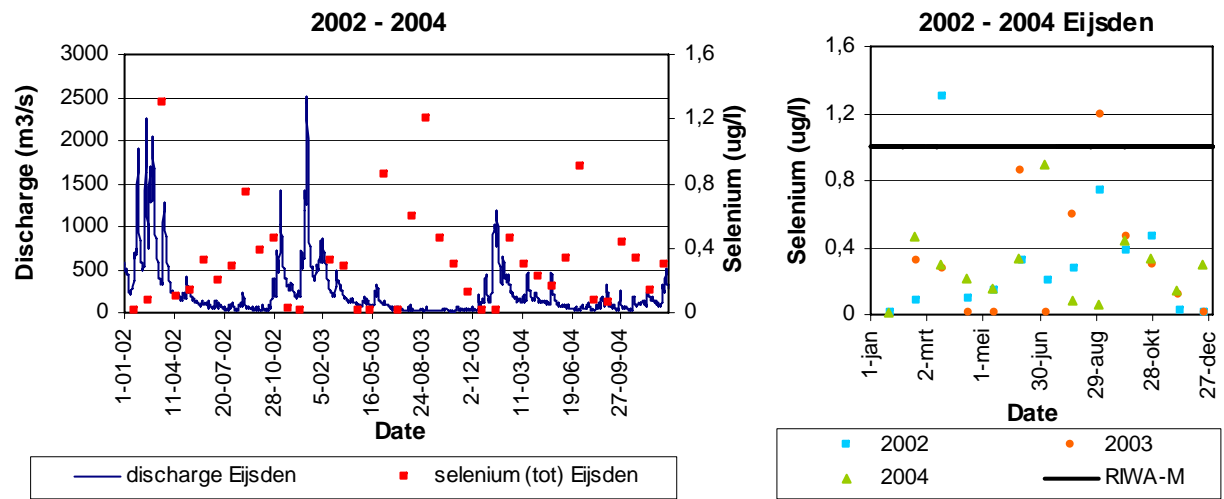
### A4a.8 Total arsenic



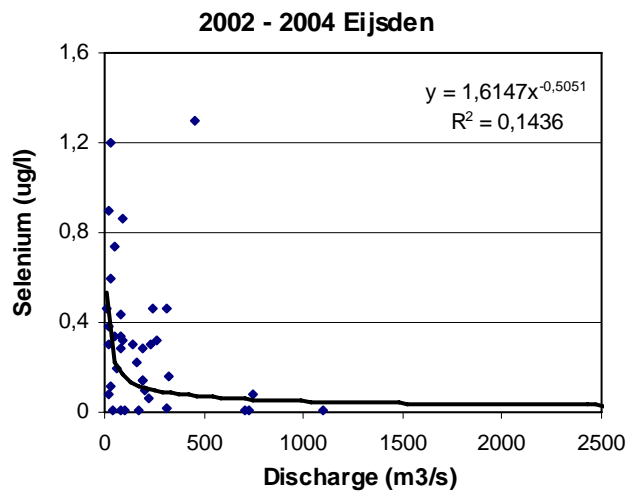
| location    | period<br>(Jun-Nov) | median<br>As<br>(µg/l) | mean<br>As<br>(µg/l) | min<br>As<br>(µg/l) | max<br>As<br>(µg/l) | n  | n ><br>2 µg/l<br>RIWA-M | n ><br>10 µg/l<br>DWD | n ><br>20 µg/l<br>BKMO | n ><br>32 µg/l<br>MKE |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----|-------------------------|-----------------------|------------------------|-----------------------|
| Eijsden     | 1975                | 3.5                    | 4.1                  | 1.0                 | 11.0                | 14 | 11                      | 1                     | 0                      | 0                     |
|             | 1976                | 3.0                    | 3.9                  | 2.0                 | 9.0                 | 12 | 9                       | 0                     | 0                      | 0                     |
|             | 1977                | 3.0                    | 3.3                  | 3.0                 | 4.0                 | 11 | 11                      | 0                     | 0                      | 0                     |
| Eijsden     | 2002                | 2.1                    | 2.8                  | 1.3                 | 16.0                | 26 | 13                      | 1                     | 0                      | 0                     |
|             | 2003                | 2.4                    | 2.4                  | 1.7                 | 4.2                 | 24 | 18                      | 0                     | 0                      | 0                     |
|             | 2004                | 1.7                    | 1.9                  | 1.3                 | 4.0                 | 27 | 9                       | 0                     | 0                      | 0                     |
| Keizersveer | 2002                | 0.1                    | 0.2                  | 0.1                 | 0.4                 | 7  | 0                       | 0                     | 0                      | 0                     |
|             | 2003                | 0.1                    | 0.1                  | 0.1                 | 0.2                 | 7  | 0                       | 0                     | 0                      | 0                     |
|             | 2004                | 0.1                    | 0.1                  | 0.1                 | 0.2                 | 7  | 0                       | 0                     | 0                      | 0                     |



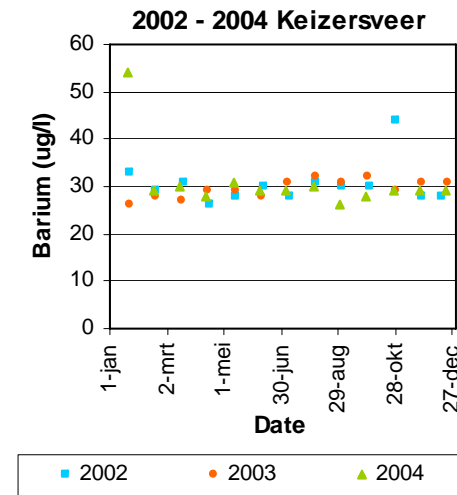
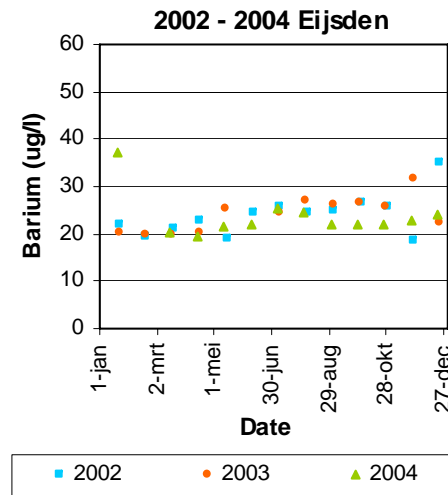
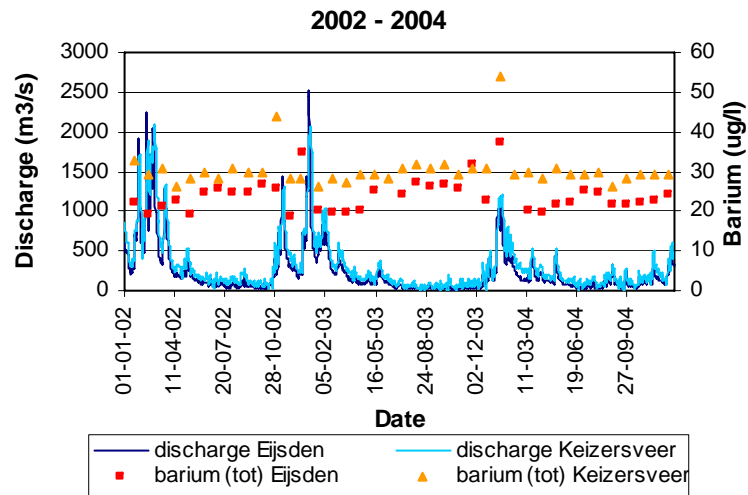
## A4a.9 Total selenium



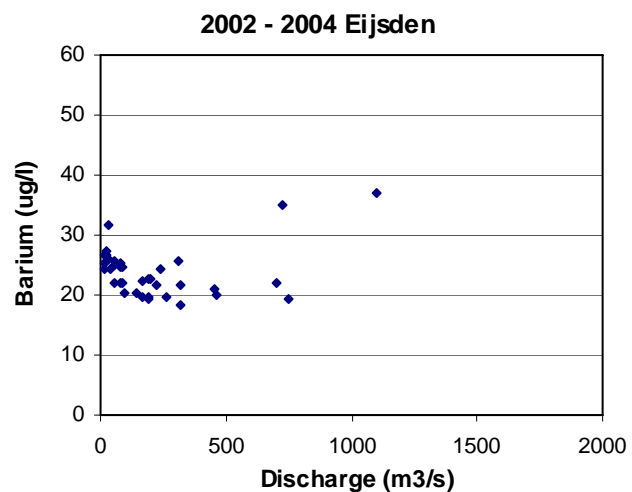
| location    | period<br>(Jun-Nov) | median<br>Se<br>(µg/l) | mean<br>Se<br>(µg/l) | min<br>Se<br>(µg/l) | max<br>Se<br>(µg/l) | n        | n ><br>1 µg/l<br>RIWA-M | n ><br>10 µg/l<br>BKMO/DWD | n ><br>5.4 µg/l<br>MKE |
|-------------|---------------------|------------------------|----------------------|---------------------|---------------------|----------|-------------------------|----------------------------|------------------------|
| Eijsden     | 1975                |                        |                      |                     |                     | 0        |                         |                            |                        |
|             | <b>1976</b>         |                        |                      |                     |                     | <b>0</b> |                         |                            |                        |
|             | 1977                |                        |                      |                     |                     | 0        |                         |                            |                        |
| Eijsden     | 2002                | 0.3                    | 0.3                  | 0.0                 | 0.7                 | 7        | 0                       | 0                          | 0                      |
|             | <b>2003</b>         | <b>0.5</b>             | <b>0.5</b>           | <b>0.0</b>          | <b>1.2</b>          | <b>7</b> | <b>1</b>                | <b>0</b>                   | <b>0</b>               |
|             | 2004                | 0.3                    | 0.3                  | 0.1                 | 0.9                 | 7        | 0                       | 0                          | 0                      |
| Keizersveer | 2002                |                        |                      |                     |                     | 0        |                         |                            |                        |
|             | <b>2003</b>         |                        |                      |                     |                     | <b>0</b> |                         |                            |                        |
|             | 2004                |                        |                      |                     |                     | 0        |                         |                            |                        |



# A4a.10 Total barium

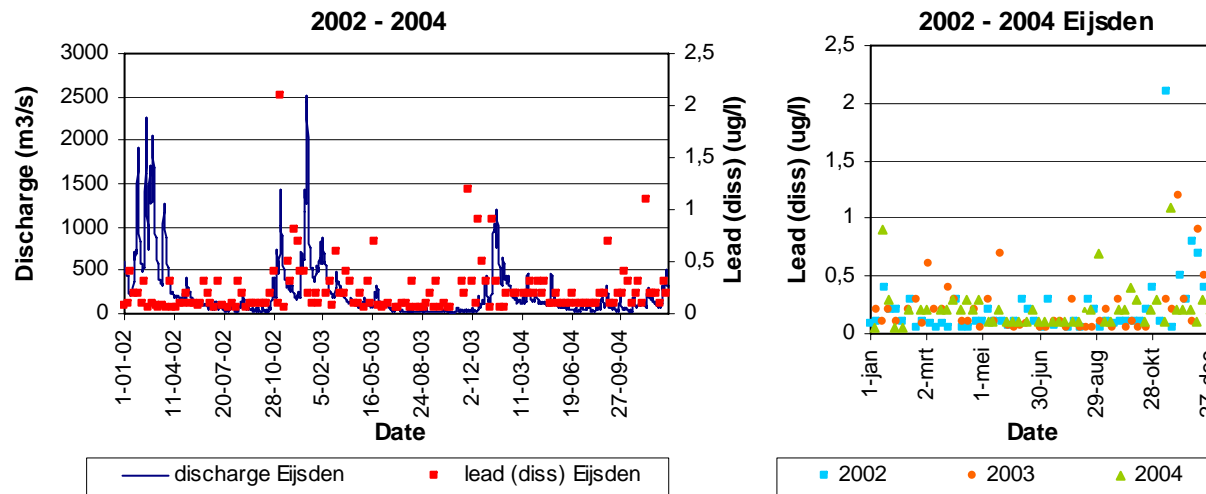


| location    | period<br>(Jun-Nov) | median<br>Ba<br>( $\mu\text{g/l}$ ) | mean<br>Ba<br>( $\text{mg/l}$ ) | min<br>Ba<br>( $\mu\text{g/l}$ ) | max<br>Ba<br>( $\mu\text{g/l}$ ) | n | n ><br>200 $\mu\text{g/l}$<br>BKMO | n ><br>230 $\mu\text{g/l}$<br>MKE |
|-------------|---------------------|-------------------------------------|---------------------------------|----------------------------------|----------------------------------|---|------------------------------------|-----------------------------------|
| Eijsden     | 1975                |                                     |                                 |                                  |                                  | 0 |                                    |                                   |
|             | 1976                |                                     |                                 |                                  |                                  | 0 |                                    |                                   |
|             | 1977                |                                     |                                 |                                  |                                  | 0 |                                    |                                   |
| Eijsden     | 2002                | 24.9                                | 24.4                            | 18.5                             | 26.7                             | 7 | 0                                  | 0                                 |
|             | 2003                | 26.3                                | 27.0                            | 24.4                             | 31.7                             | 6 | 0                                  | 0                                 |
|             | 2004                | 22.1                                | 22.9                            | 21.8                             | 25.4                             | 7 | 0                                  | 0                                 |
| Keizersveer | 2002                | 30.0                                | 31.6                            | 28.0                             | 44.0                             | 7 | 0                                  | 0                                 |
|             | 2003                | 31.0                                | 30.6                            | 28.0                             | 32.0                             | 7 | 0                                  | 0                                 |
|             | 2004                | 29.0                                | 28.6                            | 26.0                             | 30.0                             | 7 | 0                                  | 0                                 |

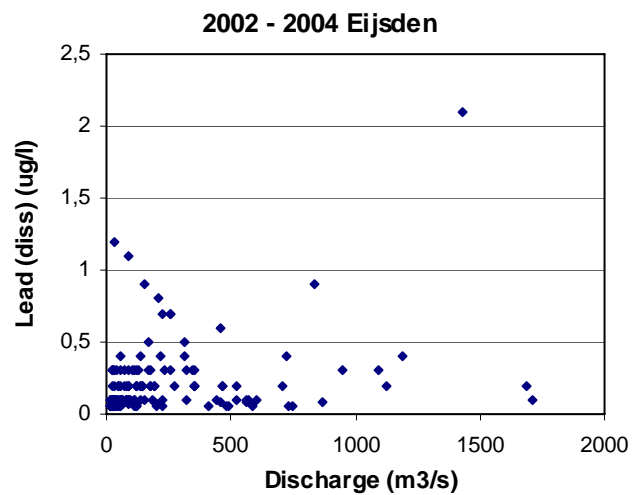


# Addendum A4b: Dissolved heavy metals during droughts

## A4b.1 Dissolved lead

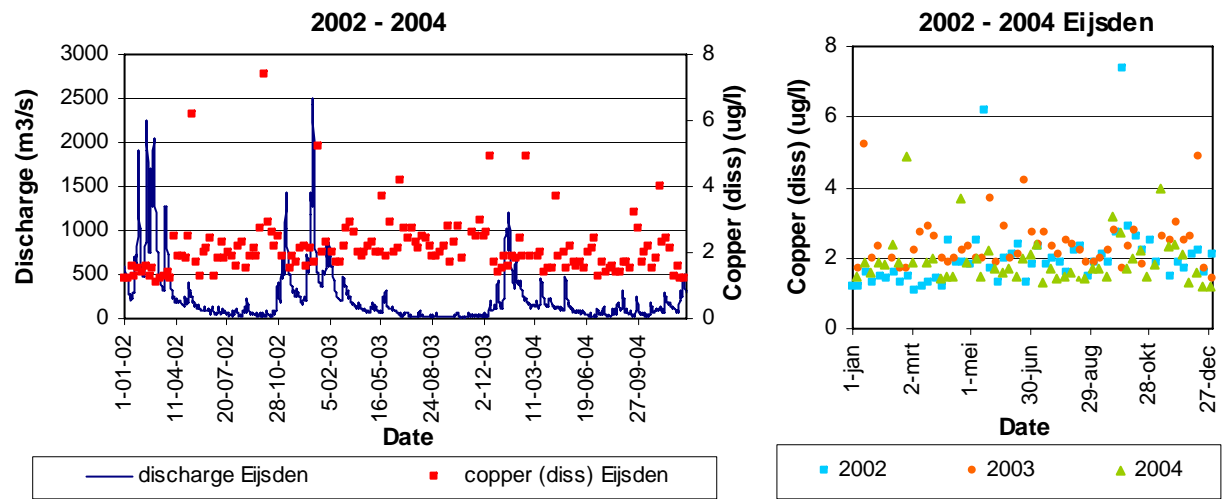


| location    | summer<br>(Jun-Nov) | median<br>Pb (diss)<br>( $\mu\text{g/l}$ ) | mean<br>Pb (diss)<br>( $\mu\text{g/l}$ ) | min<br>Pb (diss)<br>( $\mu\text{g/l}$ ) | max<br>Pb (diss)<br>( $\mu\text{g/l}$ ) | n         |
|-------------|---------------------|--|--|---|---|-----------|
| Eijsden     | 1975                |  |  |   |   | 0         |
|             | <b>1976</b>         |  |  |   |   | <b>0</b>  |
|             | 1977                |  |  |   |   | 0         |
| Eijsden     | 2002                | 0.1  | 0.2                                      | 0.1                                     | 2.1                                     | 25        |
|             | <b>2003</b>         | <b>0.1</b>                                 | <b>0.2</b>                               | <b>0.1</b>                              | <b>1.2</b>                              | <b>23</b> |
|             | 2004                | 0.1  | 0.2                                      | 0.1                                     | 1.1                                     | 27        |
| Keizersveer | 2002                |  |  |   |   | 0         |
|             | <b>2003</b>         |  |  |   |   | <b>0</b>  |
|             | 2004                |  |  |   |   | 0         |

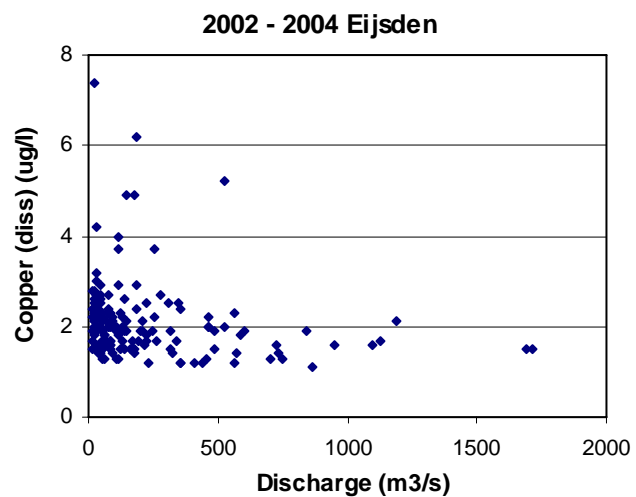




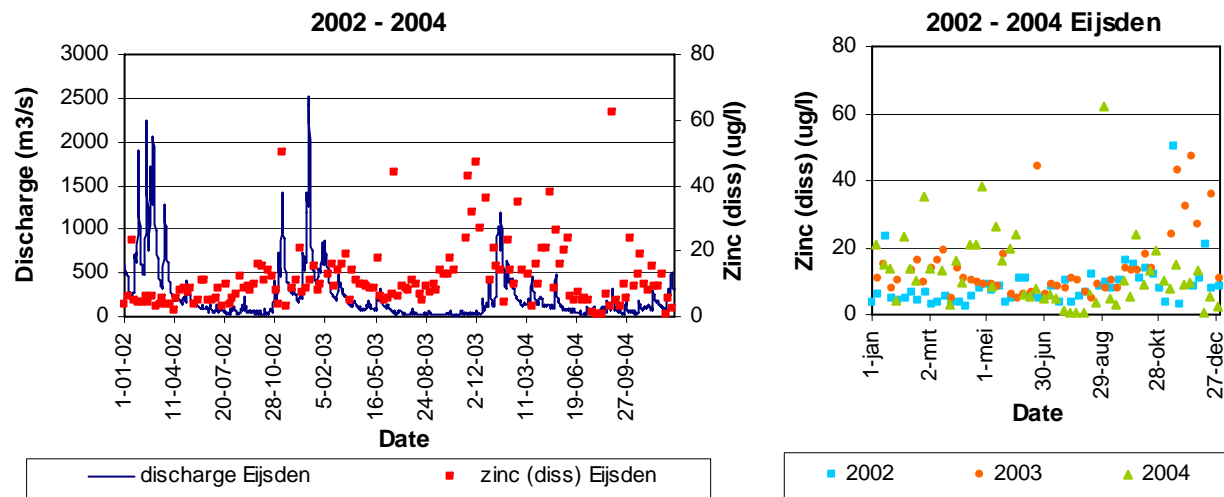
## A4b.2 Dissolved copper



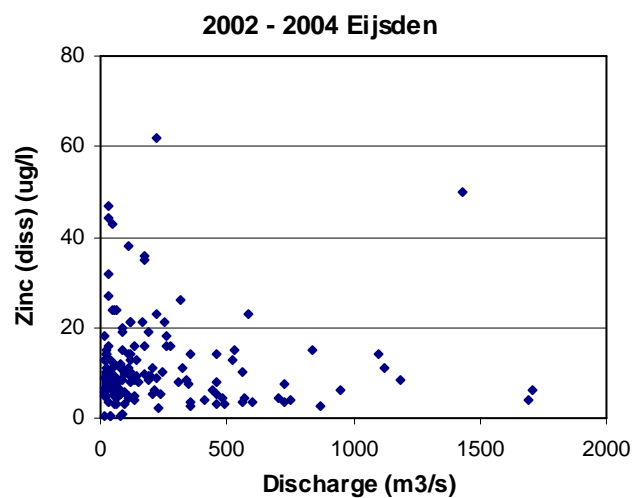
| location    | period<br>(Jun-Nov) | median<br>Cu (diss)<br>(µg/l) | mean<br>Cu (diss)<br>(µg/l) | min<br>Cu (diss)<br>(µg/l) | max<br>Cu (diss)<br>(µg/l) | n         |
|-------------|---------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------|
| Eijsden     | 1975                |                               |                             |                            |                            | 0         |
|             | <b>1976</b>         |                               |                             |                            |                            | <b>0</b>  |
|             | 1977                |                               |                             |                            |                            | 0         |
| Eijsden     | 2002                | 2.1                           | 2.8                         | 1.3                        | 16.0                       | 26        |
|             | <b>2003</b>         | <b>2.4</b>                    | <b>2.4</b>                  | <b>1.7</b>                 | <b>4.2</b>                 | <b>24</b> |
|             | 2004                | 1.7                           | 1.9                         | 1.3                        | 4.0                        | 27        |
| Keizersveer | 2002                |                               |                             |                            |                            | 0         |
|             | <b>2003</b>         |                               |                             |                            |                            | <b>0</b>  |
|             | 2004                |                               |                             |                            |                            | 0         |



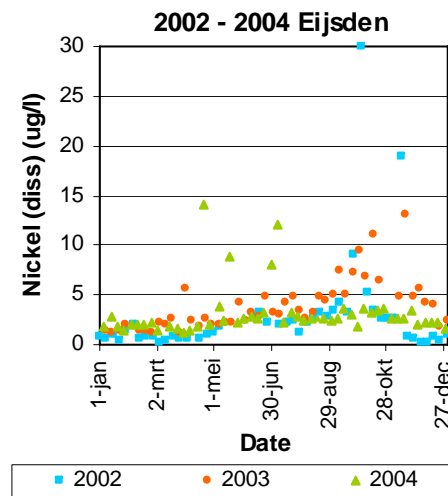
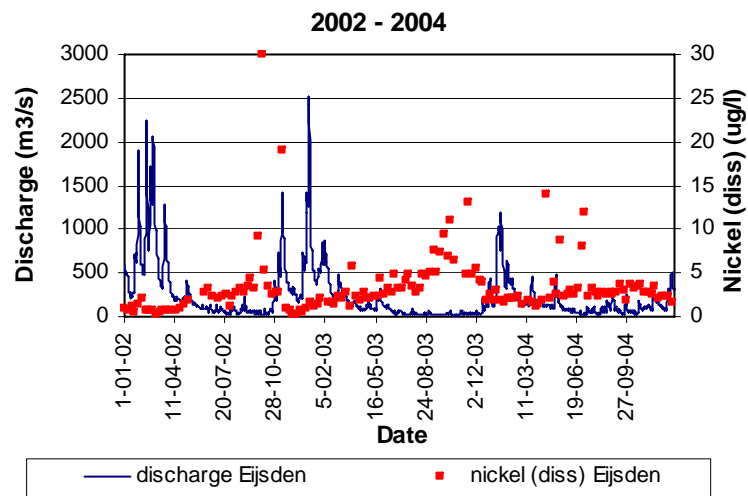
### A4b.3 Dissolved zinc



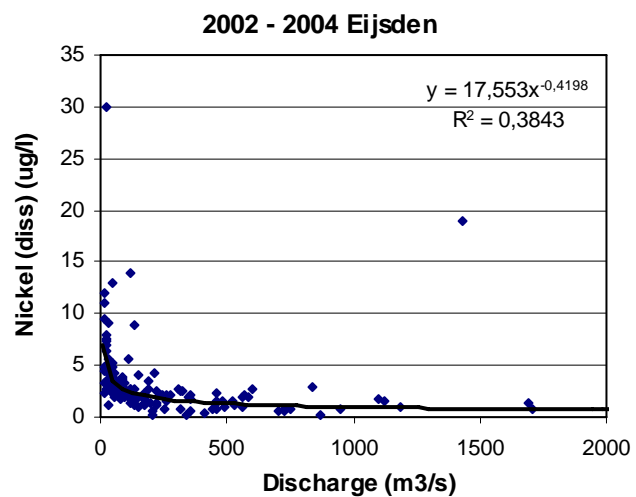
| location    | period<br>(Jun-Nov) | median<br>Zn (diss)<br>( $\mu\text{g/l}$ ) | mean<br>Zn (diss)<br>( $\mu\text{g/l}$ ) | min<br>Zn (diss)<br>( $\mu\text{g/l}$ ) | max<br>Zn (diss)<br>( $\mu\text{g/l}$ ) | n  |
|-------------|---------------------|--|--|---|---|----|
| Eijsden     | 1975                |  |  |   |   | 0  |
|             | 1976                |  |  |   |   | 0  |
|             | 1977                |  |  |   |   | 0  |
| Eijsden     | 2002                | 9  | 10                                       | 3                                       | 50                                      | 25 |
|             | 2003                | 10   | 14                                       | 5                                       | 44                                      | 24 |
|             | 2004                | 7  | 10                                       | 1                                       | 62                                      | 27 |
| Keizersveer | 2002                |  |  |   |   | 0  |
|             | 2003                |  |  |   |   | 0  |
|             | 2004                |  |  |   |   | 0  |



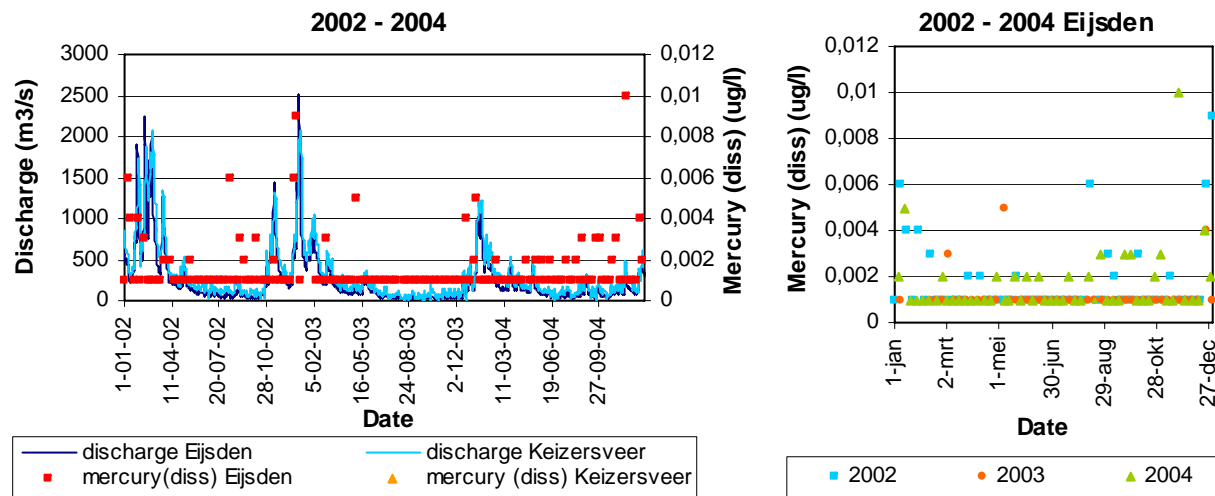
## A4b.4 Dissolved nickel



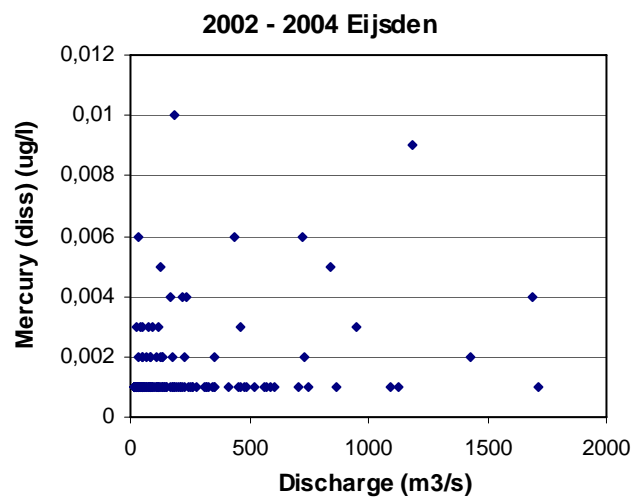
| location    | period<br>(Jun-Nov) | median<br>Ni (diss)<br>(µg/l) | mean<br>Ni (diss)<br>(µg/l) | min<br>Ni (diss)<br>(µg/l) | max<br>Ni (diss)<br>(µg/l) | n         |
|-------------|---------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------|
| Eijsden     | 1975                |                               |                             |                            |                            | 0         |
|             | <b>1976</b>         |                               |                             |                            |                            | <b>0</b>  |
|             | 1977                |                               |                             |                            |                            | 0         |
| Eijsden     | 2002                | 3                             | 5                           | 1                          | 30                         | 24        |
|             | <b>2003</b>         | <b>5</b>                      | <b>5</b>                    | <b>3</b>                   | <b>13</b>                  | <b>24</b> |
|             | 2004                | 3                             | 3                           | 2                          | 12                         | 27        |
| Keizersveer | 2002                |                               |                             |                            |                            | 0         |
|             | <b>2003</b>         |                               |                             |                            |                            | <b>0</b>  |
|             | 2004                |                               |                             |                            |                            | 0         |



## A4b.5 Dissolved mercury

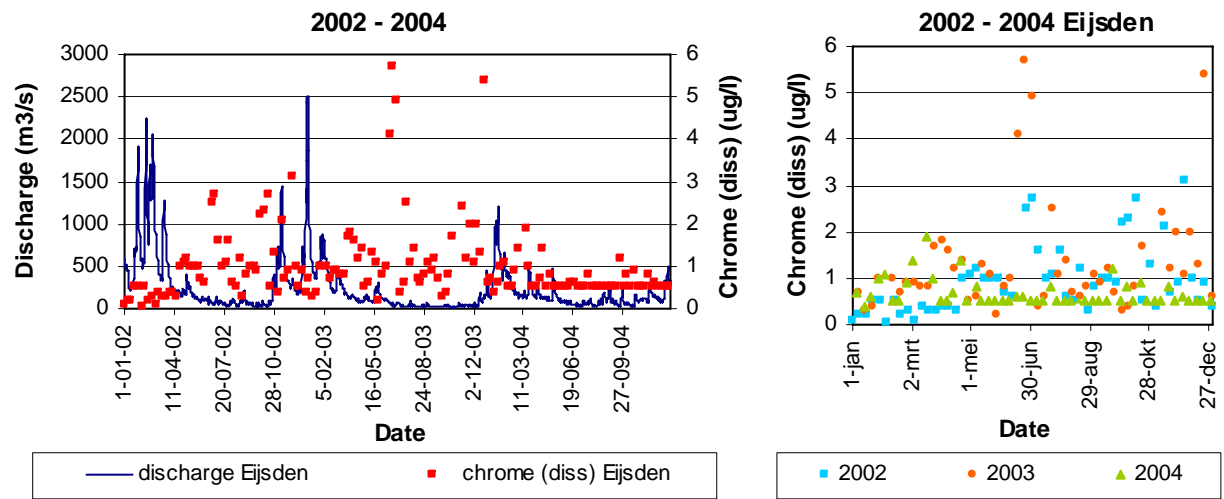


| location    | period<br>(Jun-Nov) | median<br>Hg (diss)<br>(µg/l) | mean<br>Hg (diss)<br>(µg/l) | min<br>Hg (diss)<br>(µg/l) | max<br>Hg (diss)<br>(µg/l) | n         | n ><br>0.07 (µg/l)<br>WFD(06) |
|-------------|---------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------|-------------------------------|
| Eijsden     | 1975                |                               |                             |                            |                            | 0         |                               |
|             | <b>1976</b>         |                               |                             |                            |                            | <b>0</b>  |                               |
|             | 1977                |                               |                             |                            |                            | 0         |                               |
| Eijsden     | 2002                | 0.00                          | 0.00                        | 0.00                       | 0.01                       | 26        | 0                             |
|             | <b>2003</b>         | <b>0.00</b>                   | <b>0.00</b>                 | <b>0.00</b>                | <b>0.00</b>                | <b>25</b> | <b>0</b>                      |
|             | 2004                | 0.00                          | 0.00                        | 0.00                       | 0.01                       | 27        | 0                             |
| Keizersveer | 2002                |                               |                             |                            |                            | 0         |                               |
|             | <b>2003</b>         |                               |                             |                            |                            | <b>0</b>  |                               |
|             | 2004                |                               |                             |                            |                            | 0         |                               |

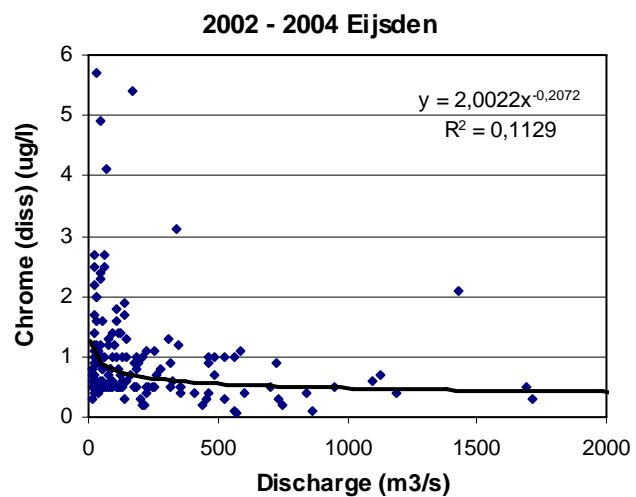




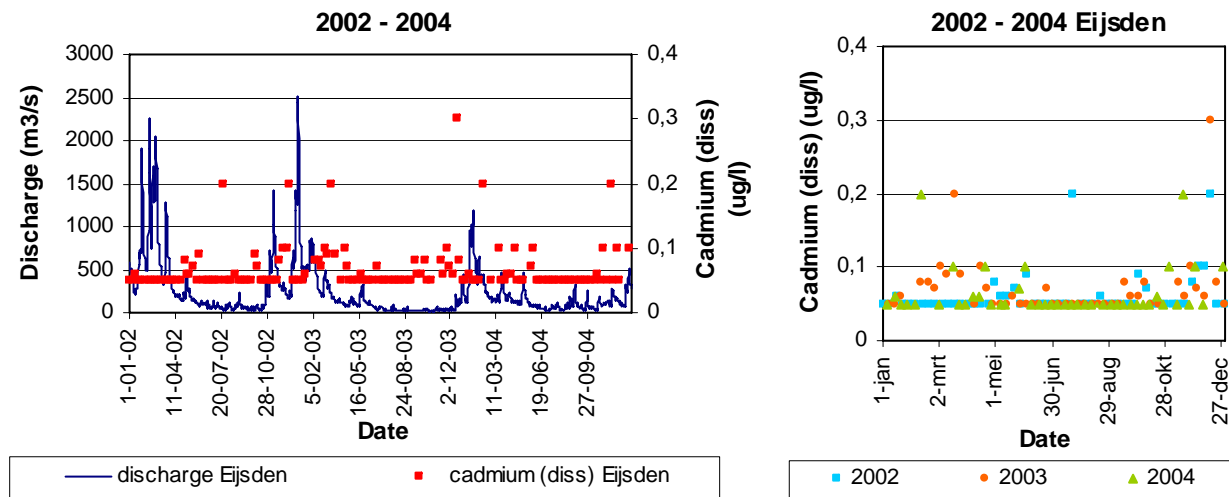
## A4b.6 Dissolved chrome



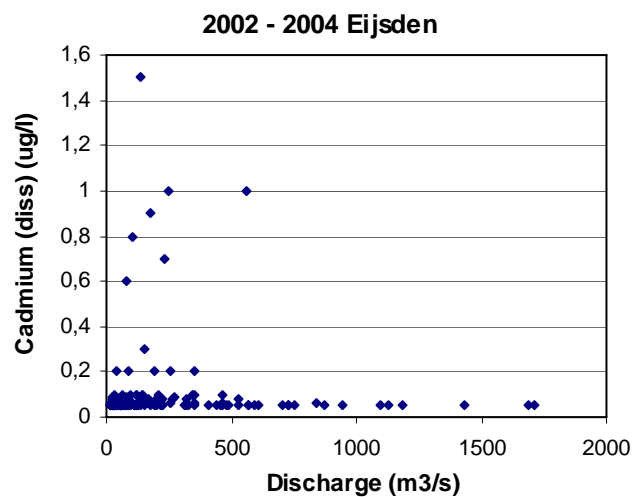
| location    | period<br>(Jun-Nov) | median<br>Cr (diss)<br>(µg/l) | mean<br>Cr (diss)<br>(µg/l) | min<br>Cr (diss)<br>(µg/l) | max<br>Cr (diss)<br>(µg/l) | n         |
|-------------|---------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------|
| Eijsden     | 1975                |                               |                             |                            |                            | 0         |
|             | <b>1976</b>         |                               |                             |                            |                            | <b>0</b>  |
|             | 1977                |                               |                             |                            |                            | 0         |
| Eijsden     | 2002                | 1.0                           | 1.2                         | 0.3                        | 2.7                        | 25        |
|             | <b>2003</b>         | <b>1.1</b>                    | <b>1.6</b>                  | <b>0.3</b>                 | <b>5.7</b>                 | <b>24</b> |
|             | 2004                | 0.5                           | 0.6                         | 0.5                        | 1.2                        | 27        |
| Keizersveer | 2002                |                               |                             |                            |                            | 0         |
|             | <b>2003</b>         |                               |                             |                            |                            | <b>0</b>  |
|             | 2004                |                               |                             |                            |                            | 0         |



## A4b.7 Dissolved cadmium

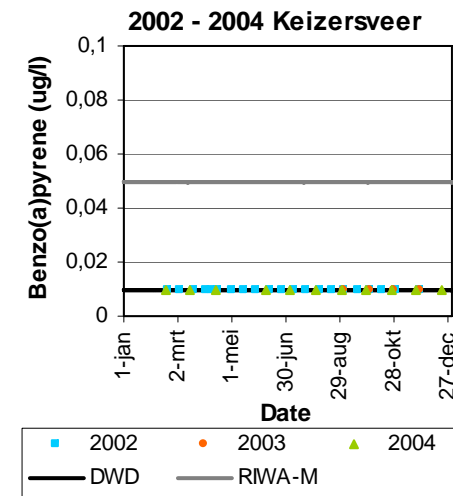
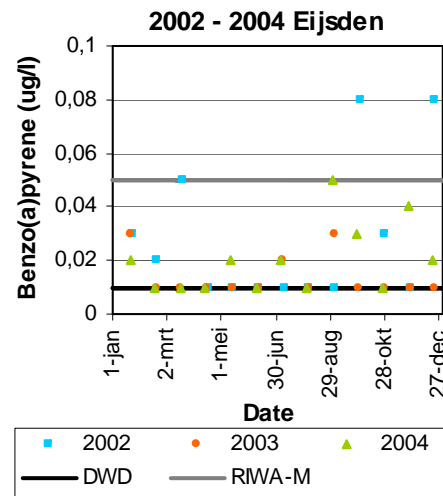
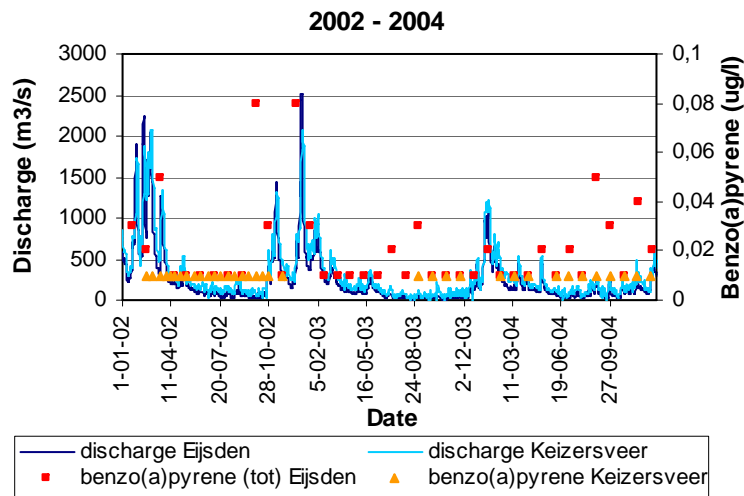


| location    | period<br>(Jun-Nov) | median<br>Cd (diss)<br>(µg/l) | mean<br>Cd (diss)<br>(µg/l) | min<br>Cd (diss)<br>(µg/l) | max<br>Cd (diss)<br>(µg/l) | n         | n ><br>1.5 µg/l<br>WFD(06) |
|-------------|---------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------|----------------------------|
| Eijsden     | 1975                |                               |                             |                            |                            | 0         |                            |
|             | 1976                |                               |                             |                            |                            | 0         |                            |
|             | 1977                |                               |                             |                            |                            | 0         |                            |
| Eijsden     | 2002                | 0.1                           | 0.1                         | 0.1                        | 0.2                        | 26        | 0                          |
|             | 2003                | <b>0.1</b>                    | <b>0.1</b>                  | <b>0.1</b>                 | <b>0.1</b>                 | <b>24</b> | <b>0</b>                   |
|             | 2004                | 0.1                           | 0.1                         | 0.1                        | 0.2                        | 27        | 0                          |
| Keizersveer | 2002                |                               |                             |                            |                            | 0         |                            |
|             | 2003                |                               |                             |                            |                            | 0         |                            |
|             | 2004                |                               |                             |                            |                            | 0         |                            |

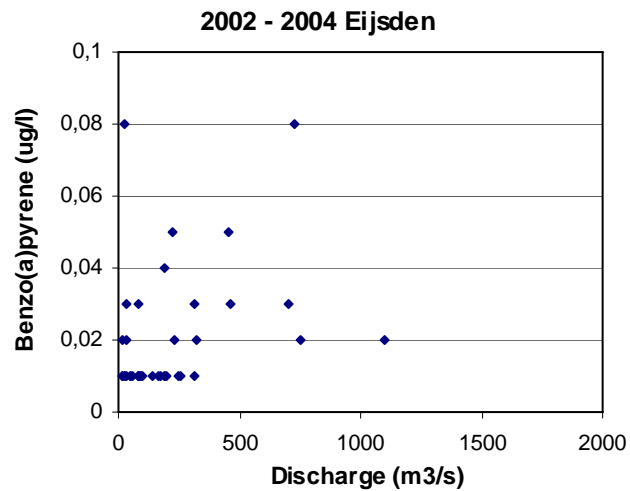


# Addendum A5a: Polycyclic aromatic hydrocarbons (PAHs) during droughts

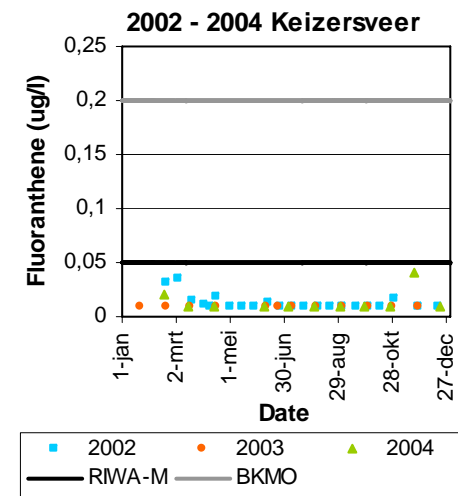
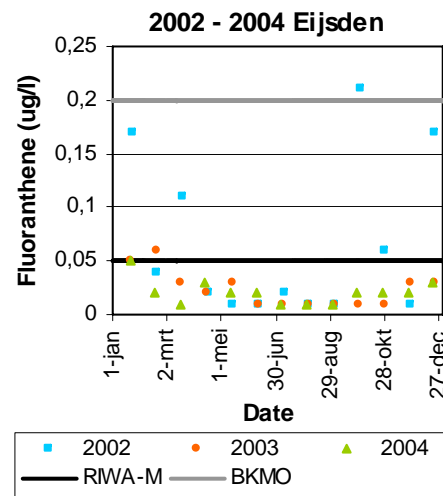
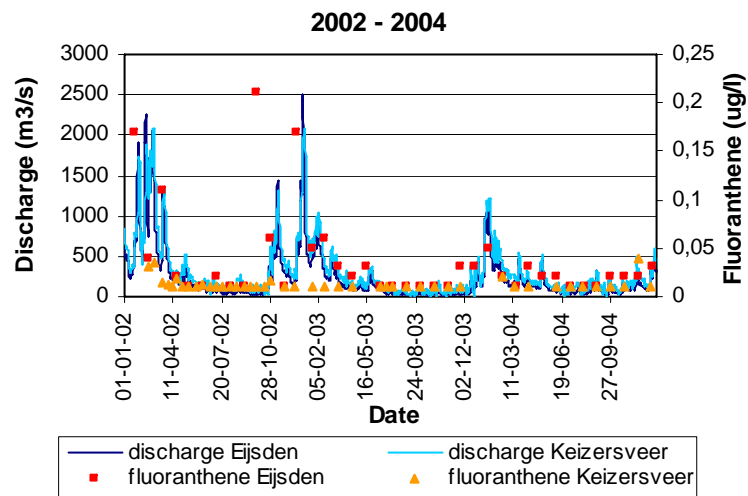
## A5a.1 Benzo(a)pyrene



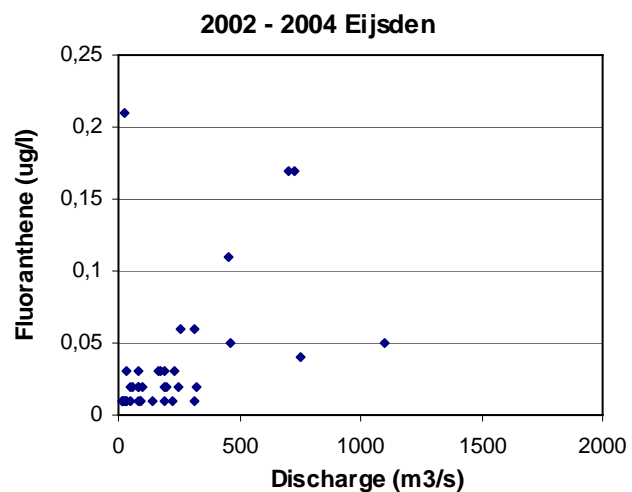
| location    | period<br>(Jun-Nov) | median<br>B(a)pyr<br>( $\mu\text{g/l}$ ) | mean<br>B(a)pyr<br>( $\mu\text{g/l}$ ) | min<br>B(a)pyr<br>( $\mu\text{g/l}$ ) | max<br>B(a)pyr<br>( $\mu\text{g/l}$ ) | n  | n ><br>0.01 $\mu\text{g/l}$<br>DWD | n ><br>0.05 $\mu\text{g/l}$<br>RIWA-M | n ><br>0.1 $\mu\text{g/l}$<br>WFD(06) | n ><br>0.2 $\mu\text{g/l}$<br>BKMO | n ><br>0.2 $\mu\text{g/l}$<br>MKE |
|-------------|---------------------|--|--|---------------------------------------|---------------------------------------|----|------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|-----------------------------------|
| Eijsden     | 1975                |  |  |                                       |                                       | 0  |                                    |                                       |                                       |                                    |                                   |
|             | 1976                |  |  |                                       |                                       | 0  |                                    |                                       |                                       |                                    |                                   |
|             | 1977                |  |  |                                       |                                       | 0  |                                    |                                       |                                       |                                    |                                   |
| Eijsden     | 2002                | 0.010                                    | 0.023                                  | 0.010                                 | 0.080                                 | 7  | 2                                  | 1                                     | 0                                     | 0                                  | 1                                 |
|             | 2003                | 0.010                                    | 0.014                                  | 0.010                                 | 0.030                                 | 7  | 2                                  | 0                                     | 0                                     | 0                                  | 0                                 |
|             | 2004                | 0.020                                    | 0.024                                  | 0.010                                 | 0.050                                 | 7  | 4                                  | 0                                     | 0                                     | 0                                  | 0                                 |
| Keizersveer | 2002                | 0.010                                    | 0.010                                  | 0.010                                 | 0.010                                 | 12 | 0                                  | 0                                     | 0                                     | 0                                  | 0                                 |
|             | 2003                | 0.010                                    | 0.010                                  | 0.010                                 | 0.010                                 | 4  | 0                                  | 0                                     | 0                                     | 0                                  | 0                                 |
|             | 2004                | 0.010                                    | 0.010                                  | 0.010                                 | 0.010                                 | 7  | 0                                  | 0                                     | 0                                     | 0                                  | 0                                 |



## A5a.2 Fluoranthene



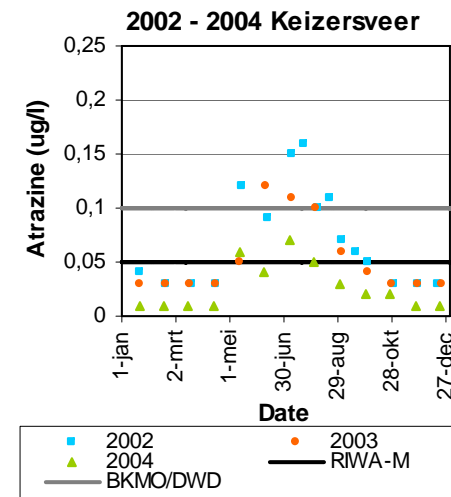
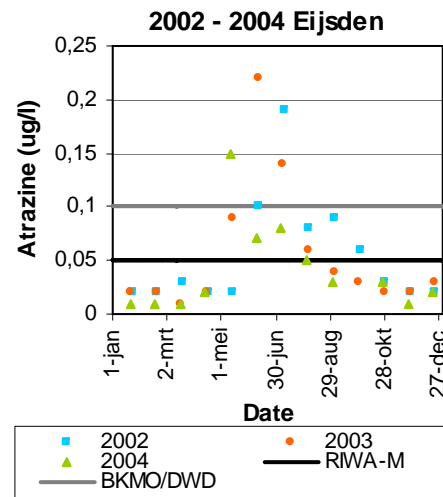
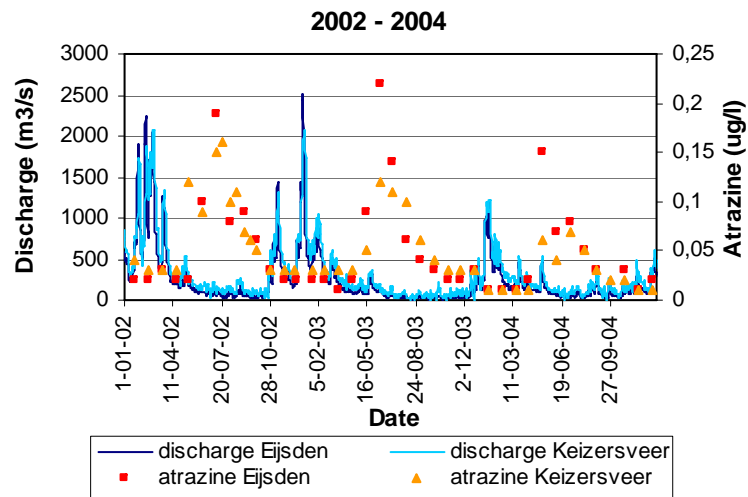
| location    | period<br>(Jun-Nov) | median<br>F-anth<br>( $\mu\text{g/l}$ ) | mean<br>F-anth<br>( $\mu\text{g/l}$ ) | min<br>F-anth<br>( $\mu\text{g/l}$ ) | max<br>F-anth<br>( $\mu\text{g/l}$ ) | n  | n ><br>0.05 $\mu\text{g/l}$<br>RIWA-M | n ><br>0.2 $\mu\text{g/l}$<br>BKMO | n ><br>0.5 $\mu\text{g/l}$<br>MKE | n ><br>1 $\mu\text{g/l}$<br>WFD(06) |
|-------------|---------------------|---|---------------------------------------|--------------------------------------|--------------------------------------|----|---------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|
| Eijsden     | 1975                |   |                                       |                                      |                                      | 0  |                                       |                                    |                                   |                                     |
|             | 1976                |   |                                       |                                      |                                      | 0  |                                       |                                    |                                   |                                     |
|             | 1977                |   |                                       |                                      |                                      | 0  |                                       |                                    |                                   |                                     |
| Eijsden     | 2002                | 0.010                                   | 0.047                                 | 0.010                                | 0.210                                | 7  | 2                                     | 1                                  | 0                                 | 0                                   |
|             | 2003                | <b>0.010</b>                            | <b>0.013</b>                          | <b>0.010</b>                         | <b>0.030</b>                         | 7  | <b>0</b>                              | <b>0</b>                           | <b>0</b>                          | <b>0</b>                            |
|             | 2004                | 0.020                                   | 0.016                                 | 0.010                                | 0.020                                | 7  | 0                                     | 0                                  | 0                                 | 0                                   |
| Keizersveer | 2002                | 0.010                                   | 0.011                                 | 0.010                                | 0.017                                | 12 | 0                                     | 0                                  | 0                                 | 0                                   |
|             | 2003                | <b>0.010</b>                            | <b>0.010</b>                          | <b>0.010</b>                         | <b>0.010</b>                         | 8  | <b>0</b>                              | <b>0</b>                           | <b>0</b>                          | <b>0</b>                            |
|             | 2004                | 0.010                                   | 0.014                                 | 0.010                                | 0.040                                | 7  | 0                                     | 0                                  | 0                                 | 0                                   |



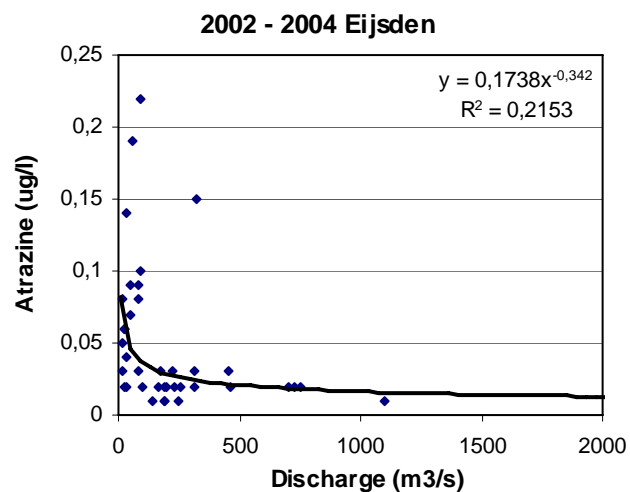


# Addendum A5b: Pesticides during droughts

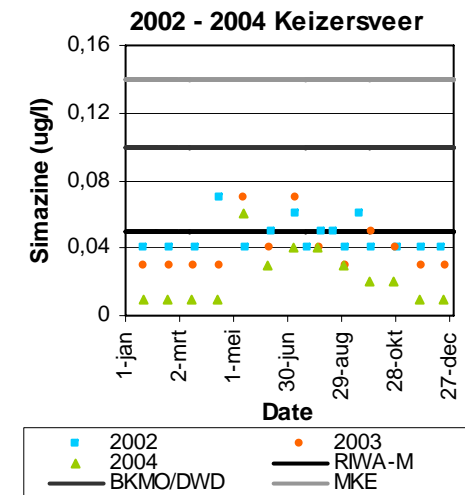
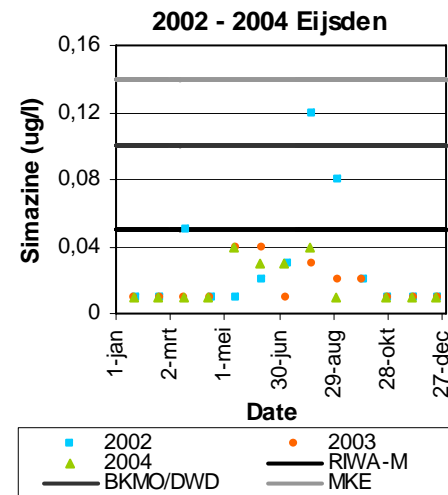
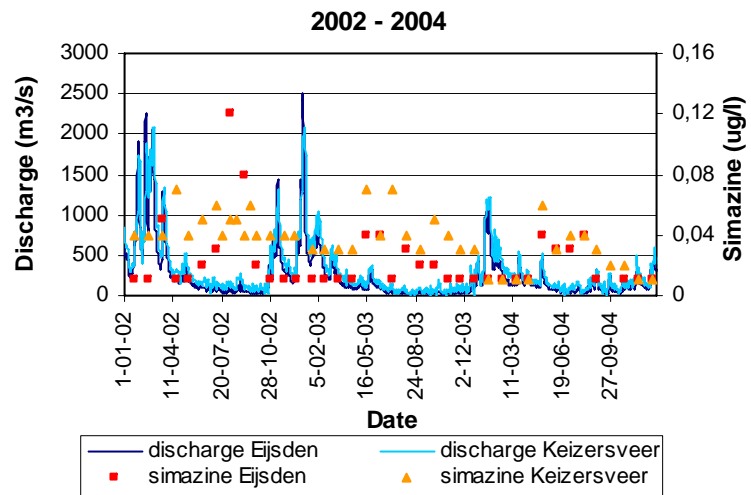
## A5b.1 Atrazine



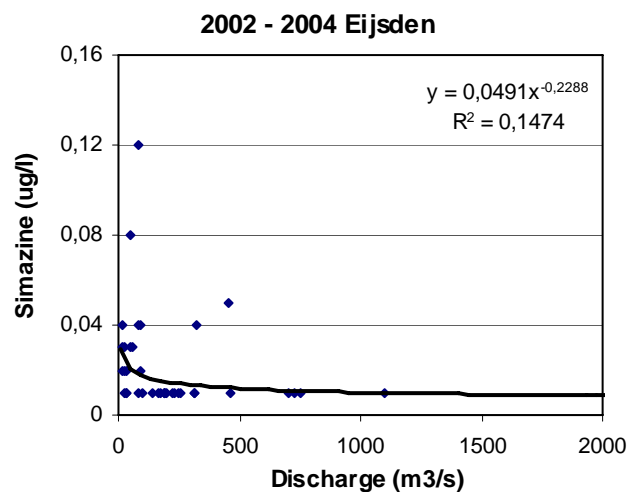
| location    | period<br>(Jun-Nov) | median<br>atraz<br>(µg/l) | mean<br>atraz<br>(µg/l) | min<br>atraz<br>(µg/l) | max<br>atraz<br>(µg/l) | n  | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>BKMO/DWD | n ><br>2 µg/l<br>WFD(06) | n ><br>2.4 µg/l<br>MKE |
|-------------|---------------------|---------------------------|-------------------------|------------------------|------------------------|----|----------------------------|-----------------------------|--------------------------|------------------------|
| Eijsden     | 1975                |                           |                         |                        |                        | 0  |                            |                             |                          |                        |
|             | 1976                |                           |                         |                        |                        | 0  |                            |                             |                          |                        |
|             | 1977                |                           |                         |                        |                        | 0  |                            |                             |                          |                        |
| Eijsden     | 2002                | 0.08                      | 0.08                    | 0.02                   | 0.19                   | 7  | 5                          | 1                           | 0                        | 0                      |
|             | 2003                | <b>0.04</b>               | <b>0.08</b>             | <b>0.02</b>            | <b>0.22</b>            | 7  | <b>3</b>                   | <b>2</b>                    | <b>0</b>                 | <b>0</b>               |
|             | 2004                | 0.04                      | 0.05                    | 0.01                   | 0.08                   | 6  | 2                          | 0                           | 0                        | 0                      |
| Keizersveer | 2002                | 0.08                      | 0.09                    | 0.03                   | 0.16                   | 10 | 7                          | 3                           | 0                        | 0                      |
|             | 2003                | <b>0.06</b>               | <b>0.07</b>             | <b>0.03</b>            | <b>0.12</b>            | 7  | <b>4</b>                   | <b>2</b>                    | <b>0</b>                 | <b>0</b>               |
|             | 2004                | 0.03                      | 0.03                    | 0.01                   | 0.07                   | 7  | 1                          | 0                           | 0                        | 0                      |



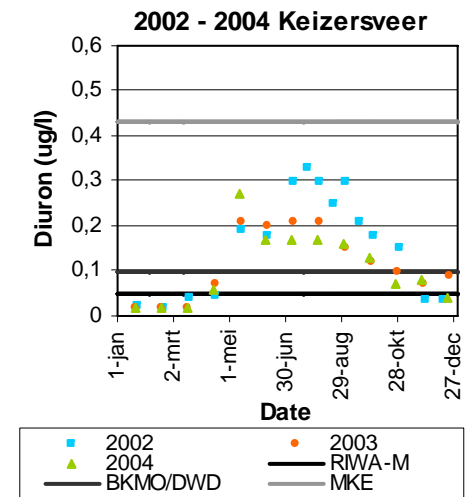
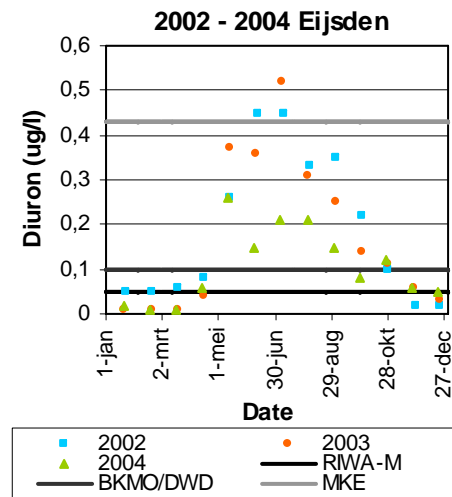
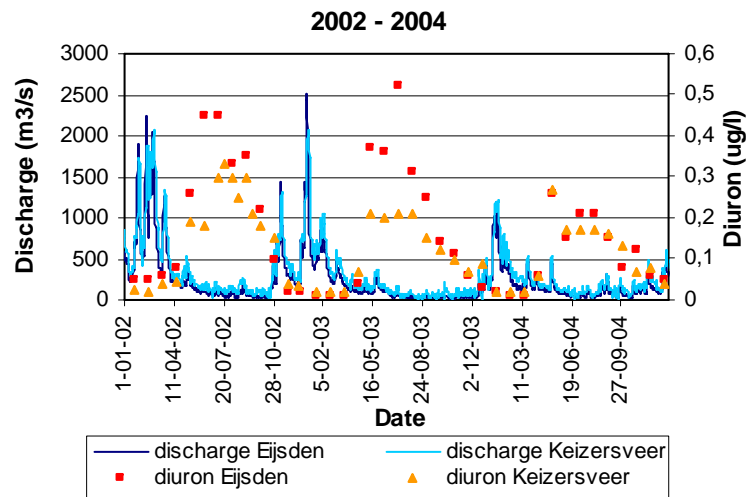
## A5b.2 Simazine



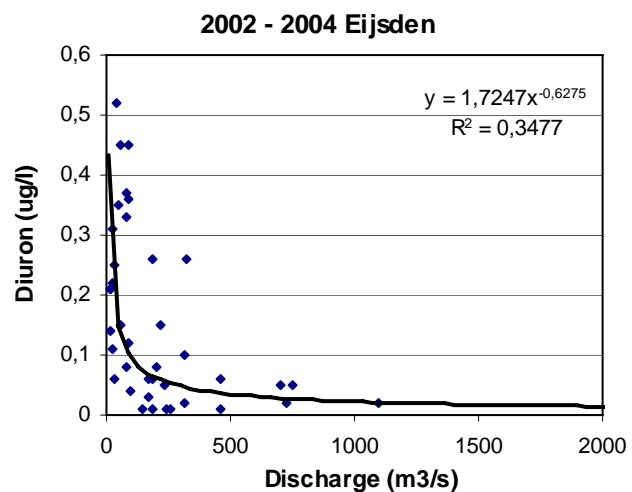
| location    | period<br>(Jun-Nov) | median<br>simaz<br>(µg/l) | mean<br>simaz<br>(µg/l) | min<br>simaz<br>(µg/l) | max<br>simaz<br>(µg/l) | n  | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>BKMO/DWD | n ><br>0.14 µg/l<br>MKE | n ><br>4 µg/l<br>WFD(06) |
|-------------|---------------------|---------------------------|-------------------------|------------------------|------------------------|----|----------------------------|-----------------------------|-------------------------|--------------------------|
| Eijsden     | 1975                |                           |                         |                        |                        | 0  |                            |                             |                         |                          |
|             | 1976                |                           |                         |                        |                        | 0  |                            |                             |                         |                          |
|             | 1977                |                           |                         |                        |                        | 0  |                            |                             |                         |                          |
| Eijsden     | 2002                | 0.02                      | 0.04                    | 0.01                   | 0.12                   | 7  | 2                          | 1                           | 0                       | 0                        |
|             | 2003                | <b>0.02</b>               | <b>0.02</b>             | <b>0.01</b>            | <b>0.04</b>            | 7  | <b>0</b>                   | <b>0</b>                    | <b>0</b>                | <b>0</b>                 |
|             | 2004                | 0.02                      | 0.02                    | 0.01                   | 0.04                   | 6  | 0                          | 0                           | 0                       | 0                        |
| Keizersveer | 2002                | 0.05                      | 0.05                    | 0.04                   | 0.06                   | 10 | 2                          | 0                           | 0                       | 0                        |
|             | 2003                | <b>0.04</b>               | <b>0.04</b>             | <b>0.03</b>            | <b>0.07</b>            | 7  | <b>1</b>                   | <b>0</b>                    | <b>0</b>                | <b>0</b>                 |
|             | 2004                | 0.03                      | 0.03                    | 0.01                   | 0.04                   | 7  | 0                          | 0                           | 0                       | 0                        |



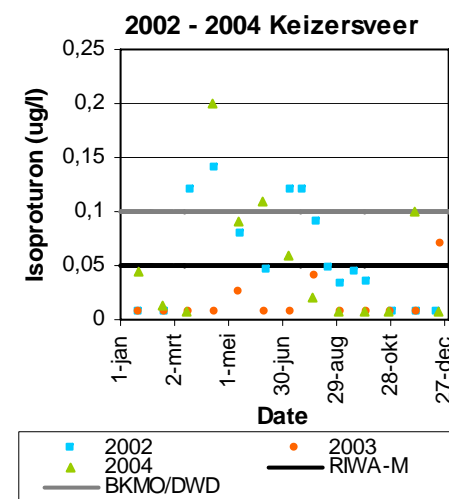
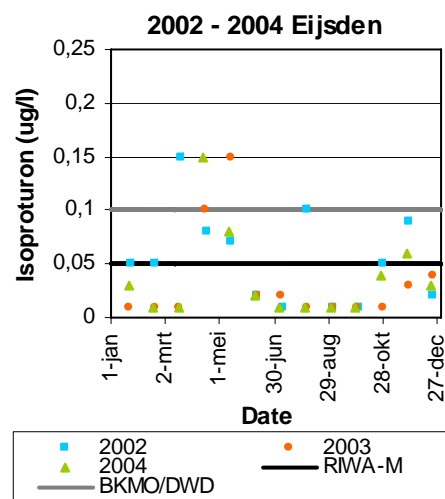
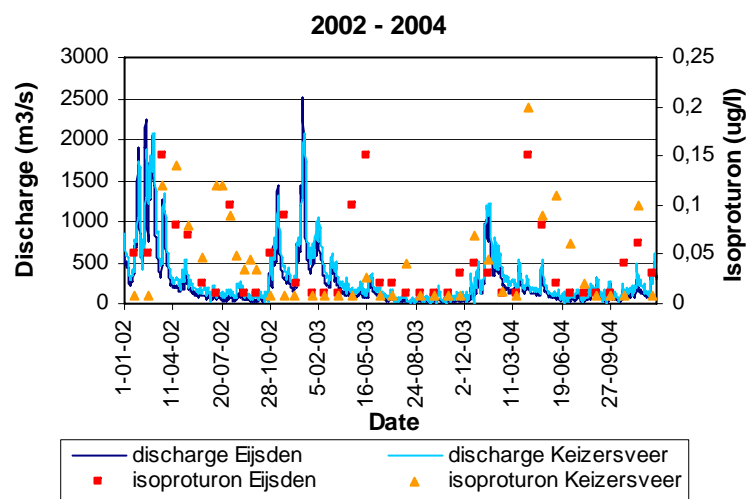
### A5b.3 Diuron



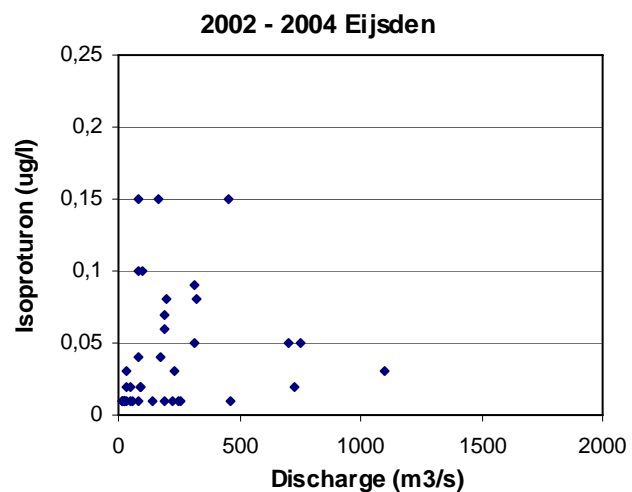
| location    | period<br>(Jun-Nov) | median<br>diuron<br>(µg/l) | mean<br>diuron<br>(µg/l) | min<br>diuron<br>(µg/l) | max<br>diuron<br>(µg/l) | n  | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>BKMO/DWD | n ><br>0.43 µg/l<br>MKE | n ><br>1.8 µg/l<br>WFD(06) |
|-------------|---------------------|----------------------------|--------------------------|-------------------------|-------------------------|----|----------------------------|-----------------------------|-------------------------|----------------------------|
| Eijsden     | 1975                |                            |                          |                         |                         | 0  |                            |                             |                         |                            |
|             | 1976                |                            |                          |                         |                         | 0  |                            |                             |                         |                            |
|             | 1977                |                            |                          |                         |                         | 0  |                            |                             |                         |                            |
| Eijsden     | 2002                | 0.33                       | 0.27                     | 0.02                    | 0.45                    | 7  | 6                          | 5                           | 2                       | 0                          |
|             | 2003                | 0.25                       | 0.25                     | 0.06                    | 0.52                    | 7  | 7                          | 6                           | 1                       | 0                          |
|             | 2004                | 0.15                       | 0.14                     | 0.06                    | 0.21                    | 7  | 7                          | 5                           | 0                       | 0                          |
| Keizersveer | 2002                | 0.23                       | 0.22                     | 0.04                    | 0.33                    | 10 | 9                          | 9                           | 0                       | 0                          |
|             | 2003                | 0.15                       | 0.15                     | 0.07                    | 0.21                    | 7  | 7                          | 5                           | 0                       | 0                          |
|             | 2004                | 0.16                       | 0.14                     | 0.07                    | 0.17                    | 7  | 7                          | 5                           | 0                       | 0                          |



## A5b.4 Isoproturon

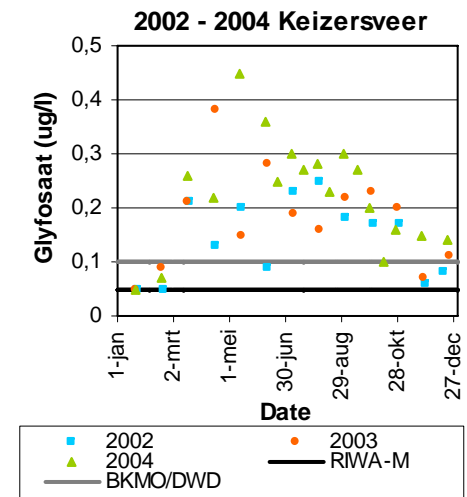
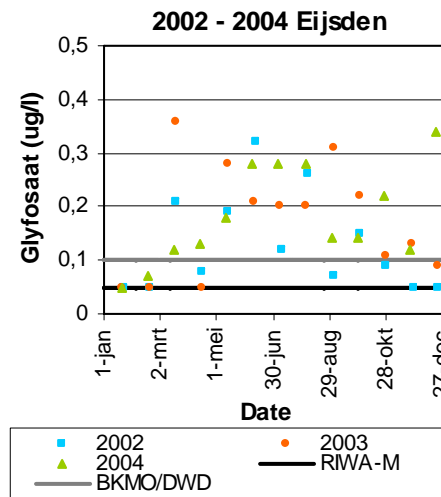
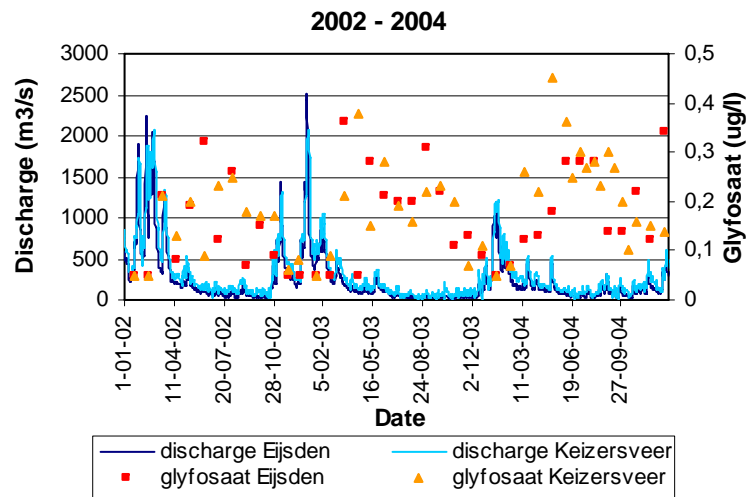


| location    | period<br>(Jun-Nov) | median<br>isopr<br>(µg/l) | mean<br>isopr<br>(µg/l) | min<br>isopr<br>(µg/l) | max<br>isopr<br>(µg/l) | n  | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>BKMO/DWD | n ><br>0.32 µg/l<br>MKE | n ><br>1.0 µg/l<br>WFD(06) |
|-------------|---------------------|---------------------------|-------------------------|------------------------|------------------------|----|----------------------------|-----------------------------|-------------------------|----------------------------|
| Eijsden     | 1975                |                           |                         |                        |                        | 0  |                            |                             |                         |                            |
|             | 1976                |                           |                         |                        |                        | 0  |                            |                             |                         |                            |
|             | 1977                |                           |                         |                        |                        | 0  |                            |                             |                         |                            |
| Eijsden     | 2002                | 0.020                     | 0.041                   | 0.010                  | 0.100                  | 7  | 2                          | 0                           | 0                       | 0                          |
|             | 2003                | <b>0.010</b>              | <b>0.016</b>            | <b>0.010</b>           | <b>0.030</b>           | 7  | <b>0</b>                   | <b>0</b>                    | <b>0</b>                | <b>0</b>                   |
|             | 2004                | 0.010                     | 0.023                   | 0.010                  | 0.060                  | 7  | 1                          | 0                           | 0                       | 0                          |
| Keizersveer | 2002                | 0.046                     | 0.055                   | 0.008                  | 0.120                  | 10 | 3                          | 2                           | 0                       | 0                          |
|             | 2003                | <b>0.008</b>              | <b>0.013</b>            | <b>0.008</b>           | <b>0.040</b>           | 7  | <b>0</b>                   | <b>0</b>                    | <b>0</b>                | <b>0</b>                   |
|             | 2004                | 0.020                     | 0.045                   | 0.008                  | 0.110                  | 7  | 3                          | 1                           | 0                       | 0                          |

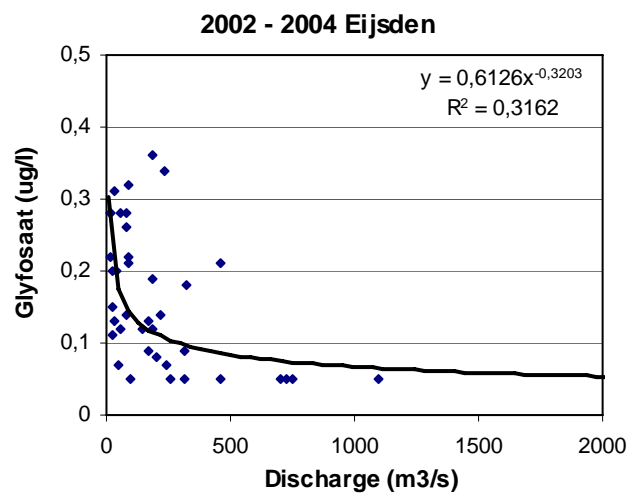




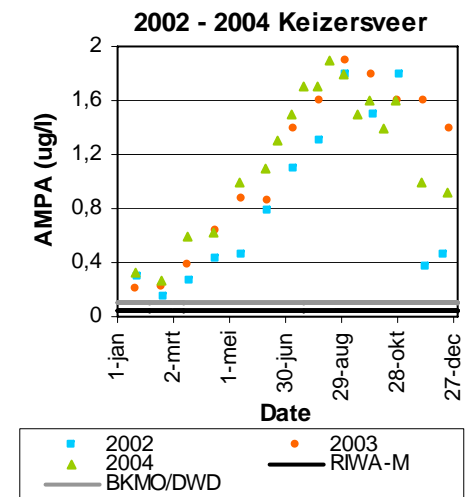
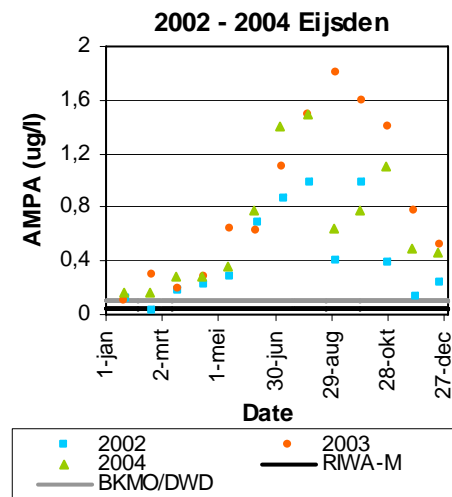
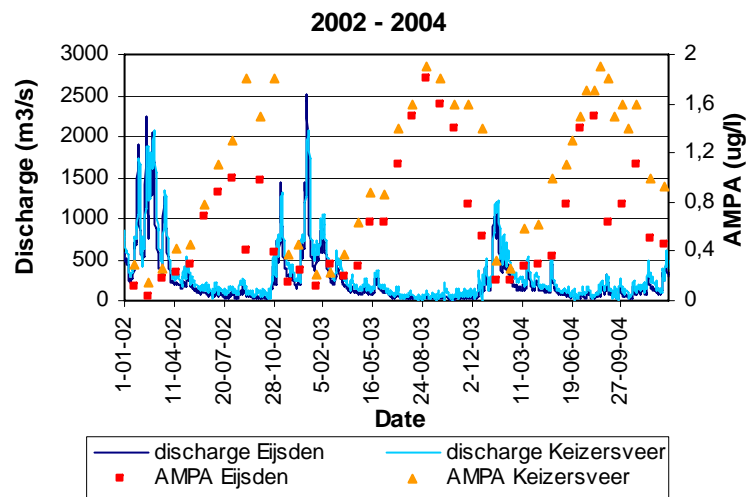
## A5b.5 Glyphosaat



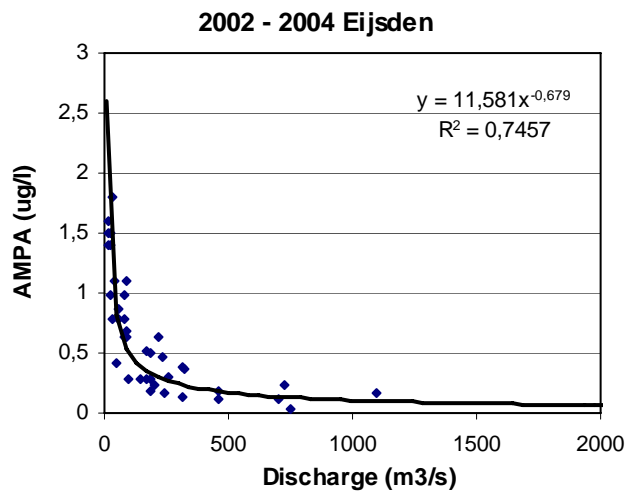
| location    | period<br>(Jun-Nov) | median<br>glyf<br>(µg/l) | mean<br>glyf<br>(µg/l) | min<br>glyf<br>(µg/l) | max<br>glyf<br>(µg/l) | n  | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>BKMO/DWD | n ><br>77 µg/l<br>MTR |
|-------------|---------------------|--------------------------|------------------------|-----------------------|-----------------------|----|----------------------------|-----------------------------|-----------------------|
| Eijsden     | 1975                |                          |                        |                       |                       | 0  |                            |                             |                       |
|             | 1976                |                          |                        |                       |                       | 0  |                            |                             |                       |
|             | 1977                |                          |                        |                       |                       | 0  |                            |                             |                       |
| Eijsden     | 2002                | 0.12                     | 0.15                   | 0.05                  | 0.32                  | 7  | 6                          | 4                           | 0                     |
|             | 2003                | <b>0.20</b>              | <b>0.20</b>            | <b>0.11</b>           | <b>0.31</b>           | 7  | 7                          | 7                           | <b>0</b>              |
|             | 2004                | 0.22                     | 0.21                   | 0.12                  | 0.28                  | 7  | 7                          | 7                           | 0                     |
| Keizersveer | 2002                | 0.17                     | 0.16                   | 0.06                  | 0.25                  | 7  | 7                          | 5                           | 0                     |
|             | 2003                | <b>0.20</b>              | <b>0.19</b>            | <b>0.07</b>           | <b>0.28</b>           | 7  | 7                          | <b>6</b>                    | <b>0</b>              |
|             | 2004                | 0.26                     | 0.24                   | 0.10                  | 0.36                  | 12 | 12                         | 11                          | 0                     |



# A5b.6 AMPA

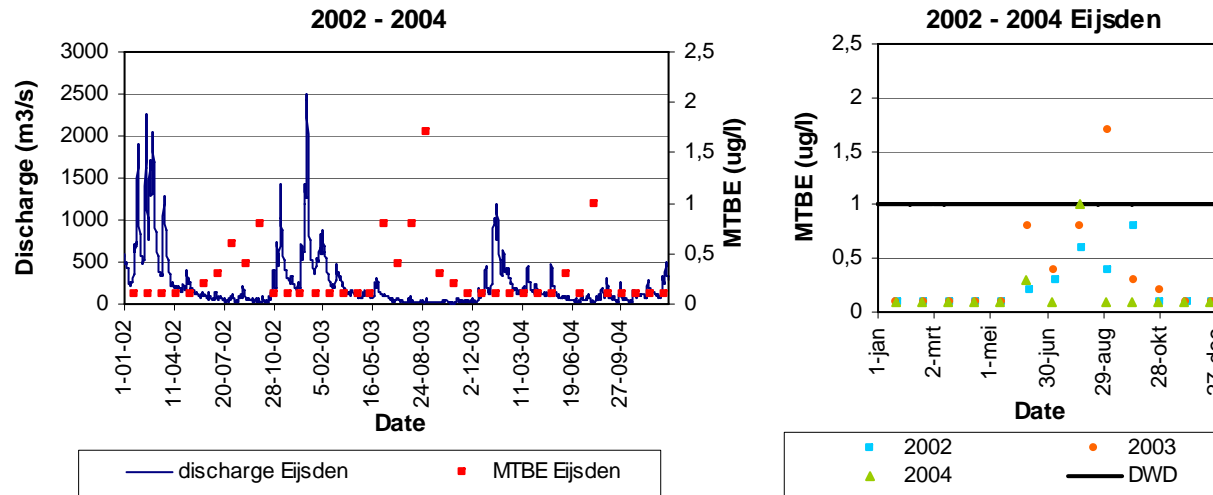


| location    | period<br>(Jun-Nov) | median<br>AMPA<br>(µg/l) | mean<br>AMPA<br>(µg/l) | min<br>AMPA<br>(µg/l) | max<br>AMPA<br>(µg/l) | n  | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>BKMO/DWD |
|-------------|---------------------|--------------------------|------------------------|-----------------------|-----------------------|----|----------------------------|-----------------------------|
| Eijsden     | 1975                |                          |                        |                       |                       | 0  |                            |                             |
|             | 1976                |                          |                        |                       |                       | 0  |                            |                             |
|             | 1977                |                          |                        |                       |                       | 0  |                            |                             |
| Eijsden     | 2002                | 0.69                     | 0.64                   | 0.14                  | 0.99                  | 7  | 7                          | 7                           |
|             | 2003                | <b>1.40</b>              | <b>1.26</b>            | <b>0.63</b>           | <b>1.80</b>           | 7  | 7                          | 7                           |
|             | 2004                | 0.78                     | 0.96                   | 0.50                  | 1.50                  | 7  | 7                          | 7                           |
| Keizersveer | 2002                | 1.30                     | 1.24                   | 0.37                  | 1.80                  | 7  | 7                          | 7                           |
|             | 2003                | <b>1.60</b>              | <b>1.54</b>            | <b>0.86</b>           | <b>1.90</b>           | 7  | 7                          | 7                           |
|             | 2004                | 1.55                     | 1.51                   | 0.99                  | 1.90                  | 12 | 12                         | 12                          |

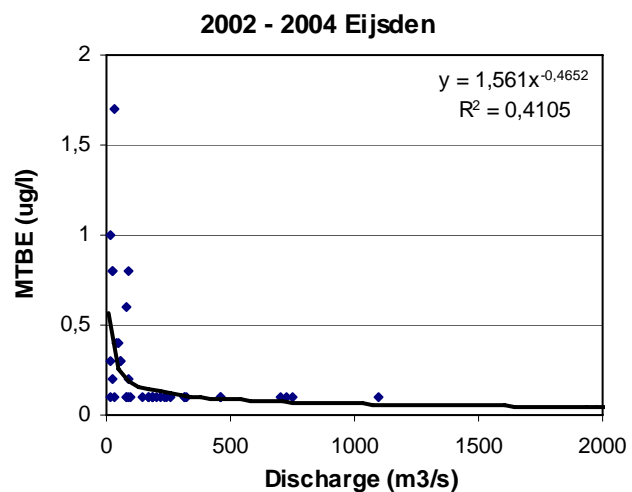


# Addendum A5c: Other organic micro pollutants during droughts

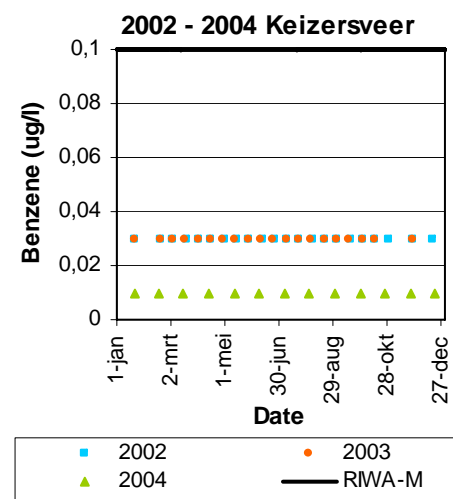
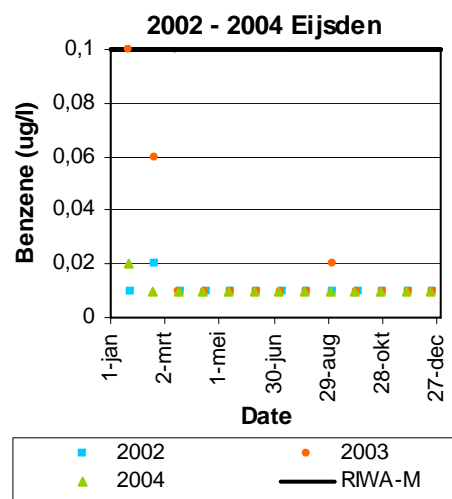
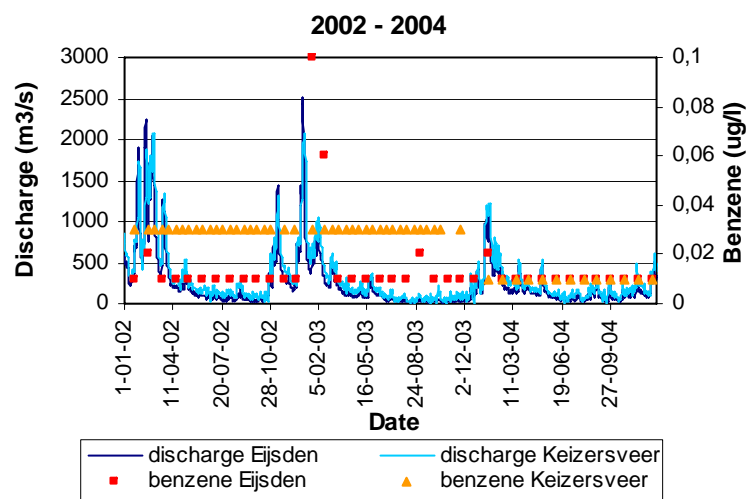
## A5c.1 MTBE



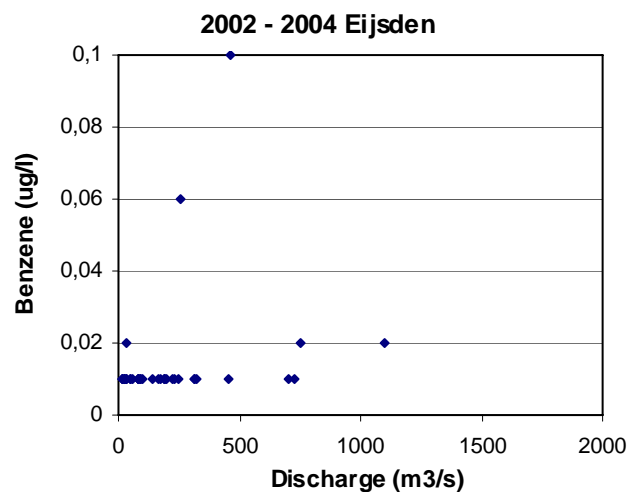
| location    | period<br>(Jun-Nov) | median<br>MTBE<br>(µg/l) | mean<br>MTBE<br>(µg/l) | min<br>MTBE<br>(µg/l) | max<br>MTBE<br>(µg/l) | n | n ><br>1 µg/l<br>DWD | n ><br>2600 µg/l<br>MTR |
|-------------|---------------------|--------------------------|------------------------|-----------------------|-----------------------|---|----------------------|-------------------------|
| Eijsden     | 1975                |                          |                        |                       |                       | 0 |                      |                         |
|             | 1976                |                          |                        |                       |                       | 0 |                      |                         |
|             | 1977                |                          |                        |                       |                       | 0 |                      |                         |
| Eijsden     | 2002                | 0.30                     | 0.36                   | 0.10                  | 0.80                  | 7 | 0                    | 0                       |
|             | 2003                | 0.40                     | 0.61                   | 0.10                  | 1.70                  | 7 | 1                    | 0                       |
|             | 2004                | 0.10                     | 0.26                   | 0.10                  | 1.00                  | 7 | 0                    | 0                       |
| Keizersveer | 2002                |                          |                        |                       |                       | 0 |                      |                         |
|             | 2003                |                          |                        |                       |                       | 0 |                      |                         |
|             | 2004                |                          |                        |                       |                       | 0 |                      |                         |



## A5c.2 Benzene

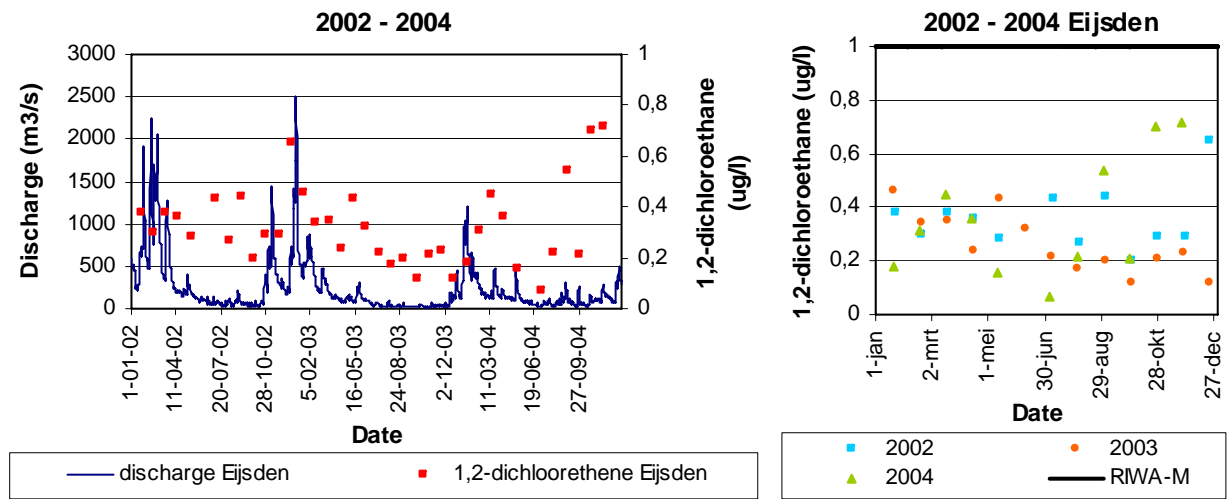


| location    | period<br>(Jun-Nov) | median<br>benz<br>(µg/l) | mean<br>benz<br>(µg/l) | min<br>benz<br>(µg/l) | max<br>benz<br>(µg/l) | n         | n ><br>0.1 µg/l<br>RIWA-M | n ><br>1 µg/l<br>DWD | n ><br>50 µg/l<br>WFD(06) | n ><br>240 µg/l<br>MKE |
|-------------|---------------------|--------------------------|------------------------|-----------------------|-----------------------|-----------|---------------------------|----------------------|---------------------------|------------------------|
| Eijsden     | 1975                |                          |                        |                       |                       | 0         |                           |                      |                           |                        |
|             | 1976                |                          |                        |                       |                       | 0         |                           |                      |                           |                        |
|             | 1977                |                          |                        |                       |                       | 0         |                           |                      |                           |                        |
| Eijsden     | 2002                | 0.01                     | 0.01                   | 0.01                  | 0.01                  | 7         | 0                         | 0                    | 0                         | 0                      |
|             | 2003                | <b>0.01</b>              | <b>0.01</b>            | <b>0.01</b>           | <b>0.02</b>           | 7         | <b>0</b>                  | <b>0</b>             | <b>0</b>                  | <b>0</b>               |
|             | 2004                | 0.01                     | 0.01                   | 0.01                  | 0.01                  | 7         | 0                         | 0                    | 0                         | 0                      |
| Keizersveer | 2002                | 0.03                     | 0.03                   | 0.03                  | 0.03                  | 12        | 0                         | 0                    | 0                         | 0                      |
|             | 2003                | <b>0.03</b>              | <b>0.03</b>            | <b>0.03</b>           | <b>0.03</b>           | <b>11</b> | <b>0</b>                  | <b>0</b>             | <b>0</b>                  | <b>0</b>               |
|             | 2004                | 0.01                     | 0.01                   | 0.01                  | 0.01                  | 7         | 0                         | 0                    | 0                         | 0                      |

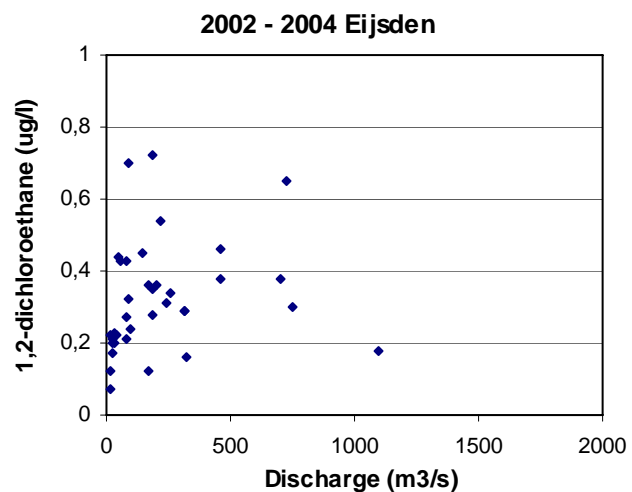




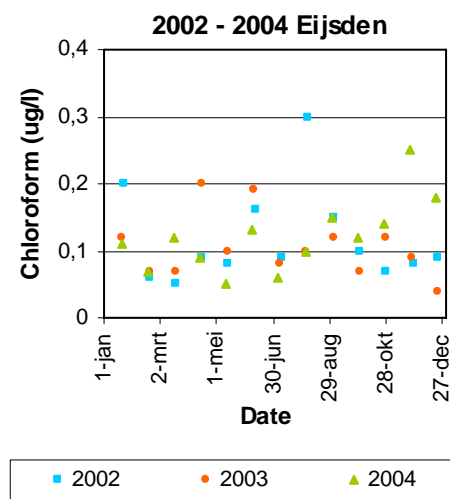
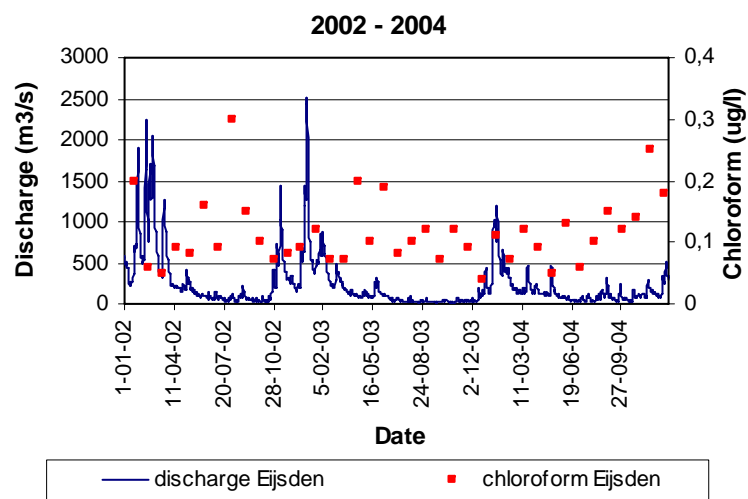
### A5c.3 1.2-Dichloroethane



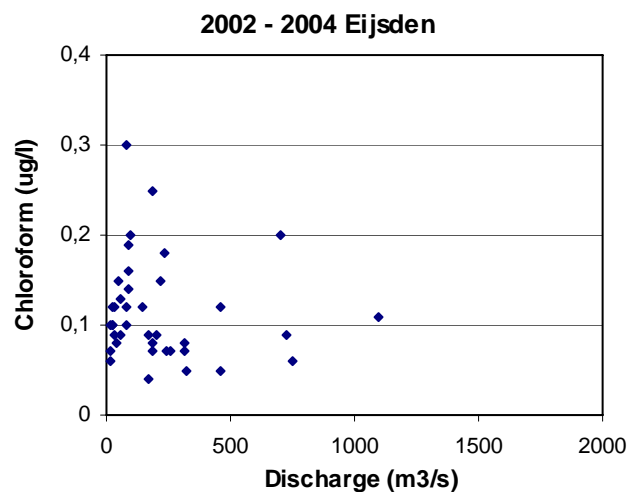
| location    | period<br>(Jun-Nov) | median<br>1,2-diCleth<br>(µg/l) | mean<br>1,2-diCleth<br>(µg/l) | min<br>1,2-diCleth<br>(µg/l) | max<br>1,2-diCleth<br>(µg/l) | n | n ><br>1 µg/l<br>RIWA-M | n ><br>3 µg/l<br>DWD |
|-------------|---------------------|---------------------------------|-------------------------------|------------------------------|------------------------------|---|-------------------------|----------------------|
| Eijsden     | 1975                |                                 |                               |                              |                              | 0 |                         |                      |
|             | 1976                |                                 |                               |                              |                              | 0 |                         |                      |
|             | 1977                |                                 |                               |                              |                              | 0 |                         |                      |
| Eijsden     | 2002                | 0.29                            | 0.43                          | 0.20                         | 1.10                         | 7 | 1                       | 0                    |
|             | 2003                | <b>0.21</b>                     | <b>0.21</b>                   | <b>0.12</b>                  | <b>0.32</b>                  | 7 | <b>0</b>                | <b>0</b>             |
|             | 2004                | 0.54                            | 0.55                          | 0.07                         | 1.40                         | 7 | 1                       | 0                    |
| Keizersveer | 2002                |                                 |                               |                              |                              | 0 |                         |                      |
|             | 2003                |                                 |                               |                              |                              | 0 |                         |                      |
|             | 2004                |                                 |                               |                              |                              | 0 |                         |                      |



## A5c.4 Chloroform

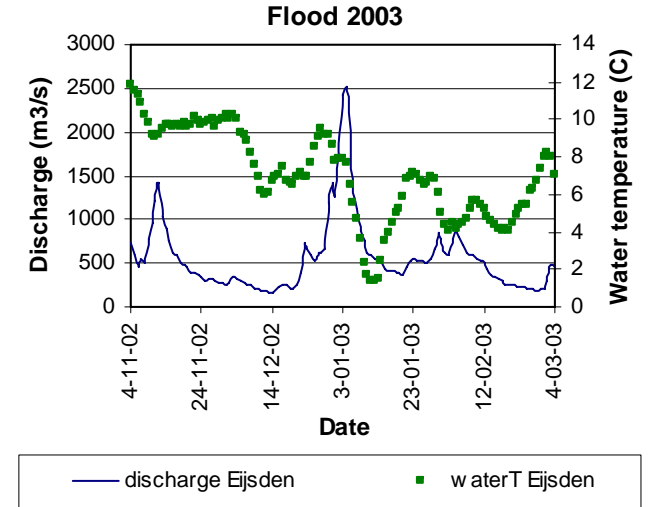
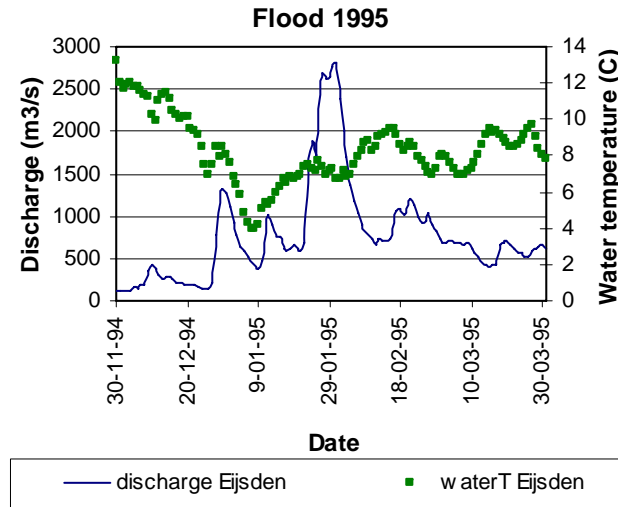
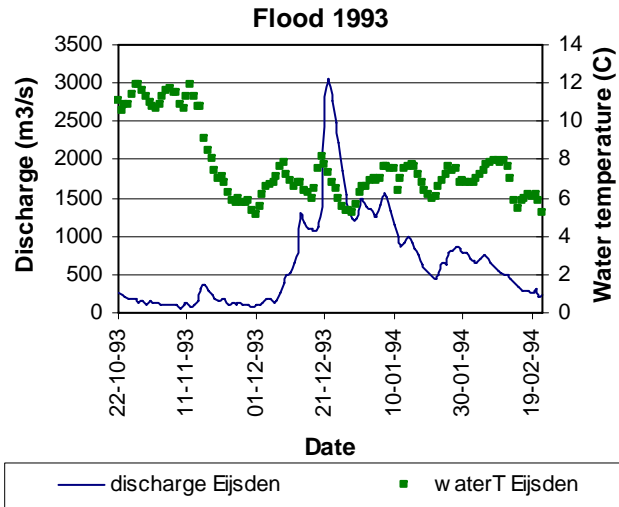


| location    | period<br>(Jun-Nov) | median<br>Cl-form<br>( $\mu\text{g/l}$ ) | mean<br>Cl-form<br>( $\mu\text{g/l}$ ) | min<br>Cl-form<br>( $\mu\text{g/l}$ ) | max<br>Cl-form<br>( $\mu\text{g/l}$ ) | n        | n ><br>1 $\mu\text{g/l}$<br>RIWA-M | n ><br>25 $\mu\text{g/l}$<br>DWD | n ><br>590 $\mu\text{g/l}$<br>MKE |
|-------------|---------------------|--|--|---------------------------------------|---------------------------------------|----------|------------------------------------|----------------------------------|-----------------------------------|
| Eijsden     | 1975                |  |  |                                       |                                       | 0        |                                    |                                  |                                   |
|             | <b>1976</b>         |  |  |                                       |                                       | <b>0</b> |                                    |                                  |                                   |
|             | 1977                |  |  |                                       |                                       | 0        |                                    |                                  |                                   |
| Eijsden     | 2002                | 0.10                                     | 0.14                                   | 0.07                                  | 0.30                                  | 7        | 0                                  | 1                                | 0                                 |
|             | <b>2003</b>         | <b>0.10</b>                              | <b>0.11</b>                            | <b>0.07</b>                           | <b>0.19</b>                           | 7        | <b>0</b>                           | <b>0</b>                         | <b>0</b>                          |
|             | 2004                | 0.13                                     | 0.14                                   | 0.06                                  | 0.25                                  | 7        | 0                                  | 0                                | 0                                 |
| Keizersveer | 2002                |  |  |                                       |                                       | 0        |                                    |                                  |                                   |
|             | <b>2003</b>         |  |  |                                       |                                       | <b>0</b> |                                    |                                  |                                   |
|             | 2004                |  |  |                                       |                                       | 0        |                                    |                                  |                                   |



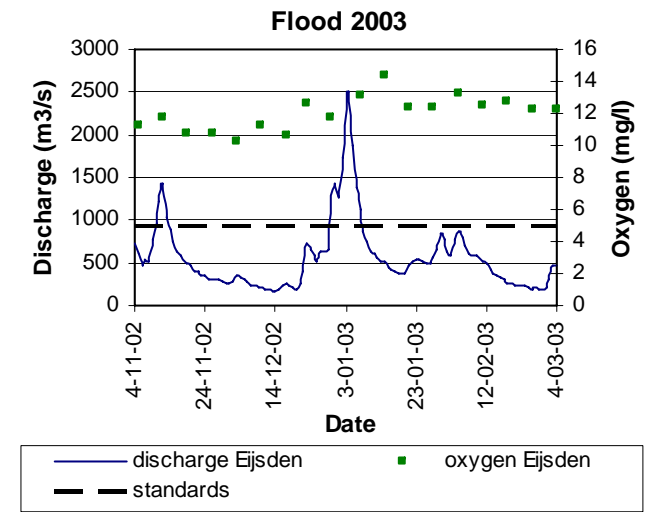
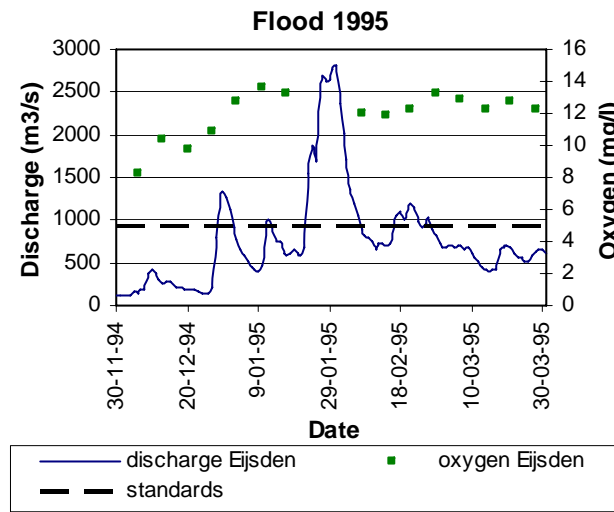
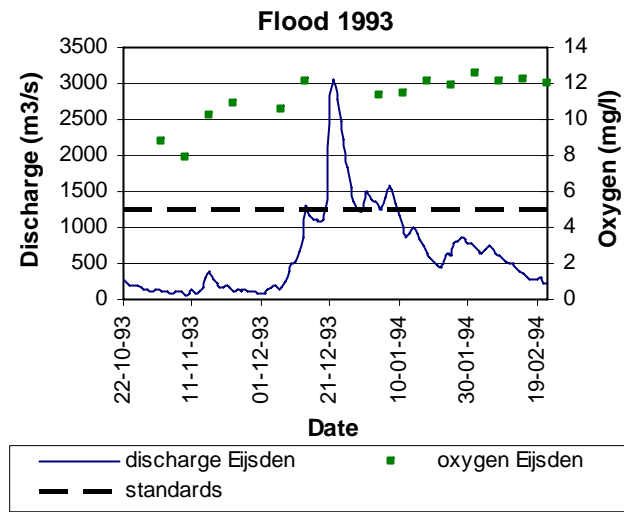
# Addendum B1: General water quality parameters during floods

## B1.1 Water temperature



| location | flood             | period                      | median<br>waterT<br>(C) | mean<br>waterT<br>(C) | min<br>waterT<br>(C) | max<br>waterT<br>(C) | n         | n ><br>25 °C<br>standards |
|----------|-------------------|-----------------------------|-------------------------|-----------------------|----------------------|----------------------|-----------|---------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 10.7                    | 9.1                   | 5.1                  | 11.9                 | 46        | 0                         |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>6.9</b>              | <b>6.8</b>            | <b>5.2</b>           | <b>8.1</b>           | <b>45</b> | <b>0</b>                  |
|          | reference         | 21-1-1994/22-2-1994         | 6.9                     | 6.8                   | 5.2                  | 7.9                  | 33        | 0                         |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 8.5                     | 8.5                   | 4.0                  | 13.2                 | 52        | 0                         |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>7.4</b>              | <b>7.5</b>            | <b>6.7</b>           | <b>8.8</b>           | <b>22</b> | <b>0</b>                  |
|          | reference         | 12-2-1995/31-3-1995         | 8.5                     | 8.4                   | 7.0                  | 9.7                  | 48        | 0                         |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 9.7                     | 9.1                   | 6.0                  | 11.9                 | 46        | 0                         |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>7.0</b>              | <b>6.1</b>            | <b>1.4</b>           | <b>9.5</b>           | <b>26</b> | <b>0</b>                  |
|          | reference         | 15-1-2002/4-3-2003          | 5.2                     | 5.6                   | 3.5                  | 8.2                  | 49        | 0                         |

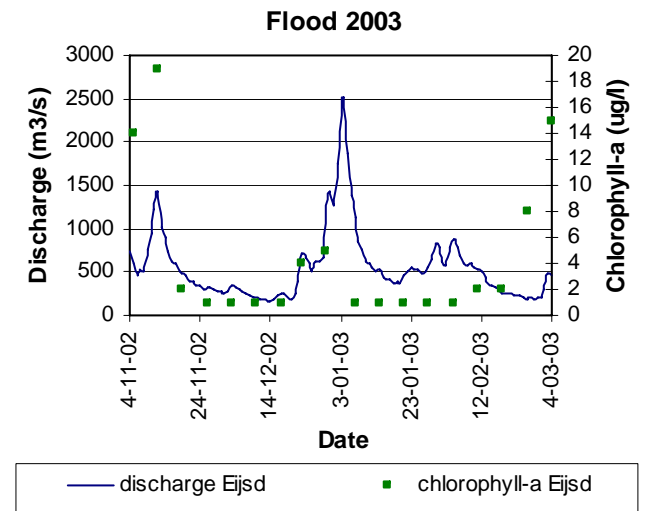
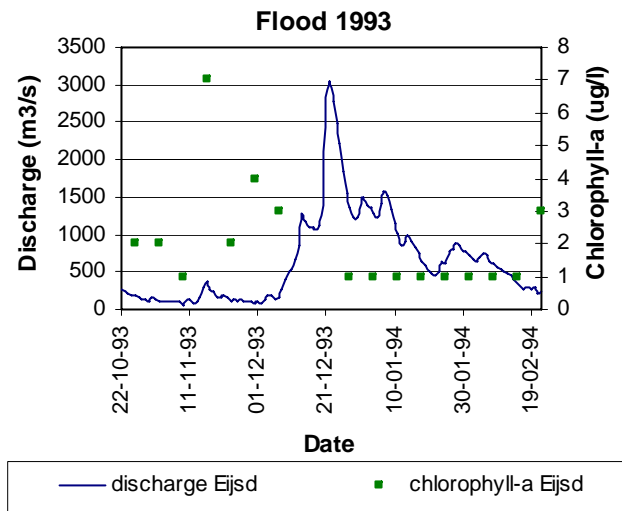
## B1.2 Oxygen



| location | flood             | period                      | median<br>O <sub>2</sub><br>(mg/l) | mean<br>O <sub>2</sub><br>(mg/l) | min<br>O <sub>2</sub><br>(mg/l) | max<br>O <sub>2</sub><br>(mg/l) | n        | n <<br>5 mg/l<br>standards |
|----------|-------------------|-----------------------------|------------------------------------|----------------------------------|---------------------------------|---------------------------------|----------|----------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 9.5                                | 9.5                              | 7.9                             | 10.9                            | 4        | 0                          |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>11.4</b>                        | <b>11.5</b>                      | <b>10.6</b>                     | <b>12.1</b>                     | <b>5</b> | <b>0</b>                   |
|          | reference         | 21-1-1994/22-2-1994         | 12.1                               | 12.2                             | 11.9                            | 12.6                            | 5        | 0                          |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 10.9                               | 11.3                             | 8.3                             | 13.6                            | 7        | 0                          |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>12.0</b>                        | <b>12.0</b>                      | <b>12.0</b>                     | <b>12.0</b>                     | <b>1</b> | <b>0</b>                   |
|          | reference         | 12-2-1995/31-3-1995         | 12.3                               | 12.5                             | 11.9                            | 13.2                            | 7        | 0                          |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 10.7                               | 10.9                             | 10.2                            | 11.8                            | 7        | 0                          |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>12.9</b>                        | <b>13.0</b>                      | <b>11.8</b>                     | <b>14.4</b>                     | <b>4</b> | <b>0</b>                   |
|          | reference         | 15-1-2002/4-3-2003          | 12.4                               | 12.5                             | 12.2                            | 13.3                            | 7        | 0                          |

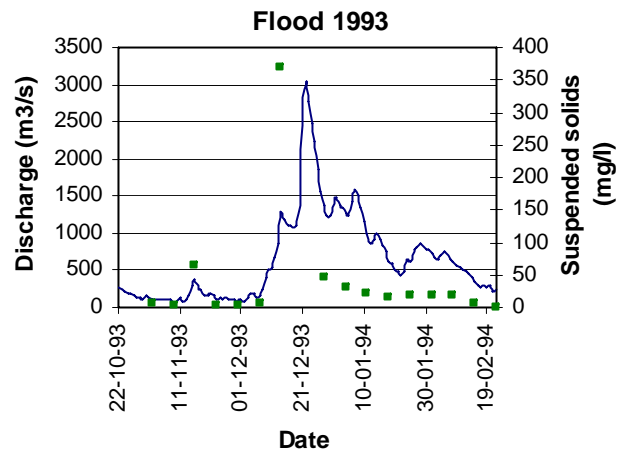


### B1.3 Chlorophyll-a

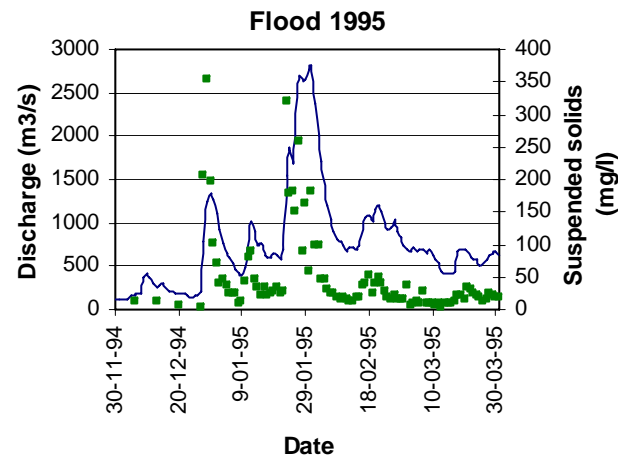


| location | flood             | period                      | median<br>Clf-a<br>(µg/l) | mean<br>Clf-a<br>(µg/l) | min<br>Clf-a<br>(µg/l) | max<br>Clf-a<br>(µg/l) | n        | n ><br>25 µg/l<br>RIWA-M | n ><br>100 µg/l<br>BKMO/MTR |
|----------|-------------------|-----------------------------|---------------------------|-------------------------|------------------------|------------------------|----------|--------------------------|-----------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 2                         | 3                       | 1                      | 7                      | 6        | 0                        | 0                           |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>1</b>                  | <b>1</b>                | <b>1</b>               | <b>3</b>               | <b>5</b> | <b>0</b>                 | <b>0</b>                    |
|          | reference         | 21-1-1994/22-2-1994         | 1                         | 1                       | 1                      | 3                      | 5        | 0                        | 0                           |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                           |                         |                        |                        | 0        |                          |                             |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                           |                         |                        |                        | <b>0</b> |                          |                             |
|          | reference         | 12-2-1995/31-3-1995         |                           |                         |                        |                        | 0        |                          |                             |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 1                         | 6                       | 1                      | 19                     | 7        | 0                        | 0                           |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>3</b>                  | <b>3</b>                | <b>1</b>               | <b>5</b>               | <b>4</b> | <b>0</b>                 | <b>0</b>                    |
|          | reference         | 15-1-2002/4-3-2003          | 2                         | 4                       | 1                      | 15                     | 7        | 0                        | 0                           |

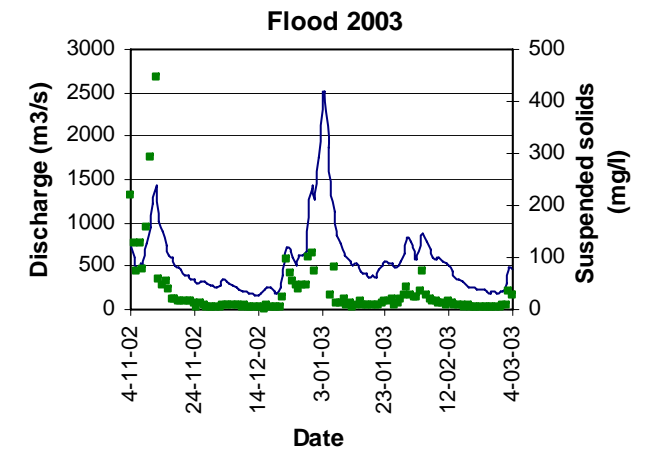
### B1.4 Suspended solids



— discharge Eijsden    ■ suspended solids Eijsd



— discharge Eijsden    ■ suspended solids Eijsd

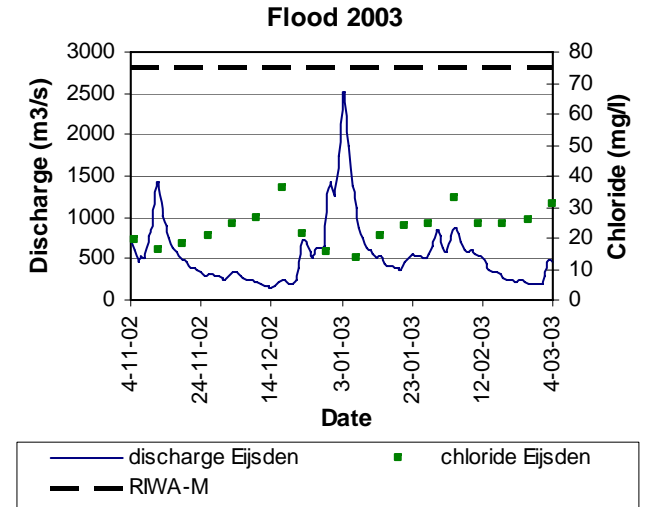
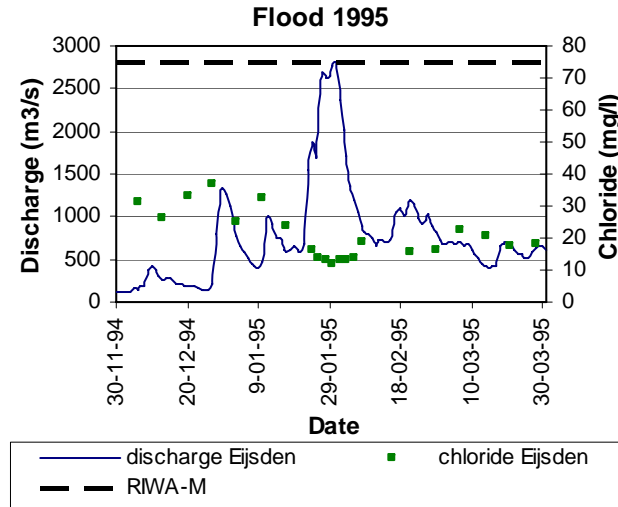
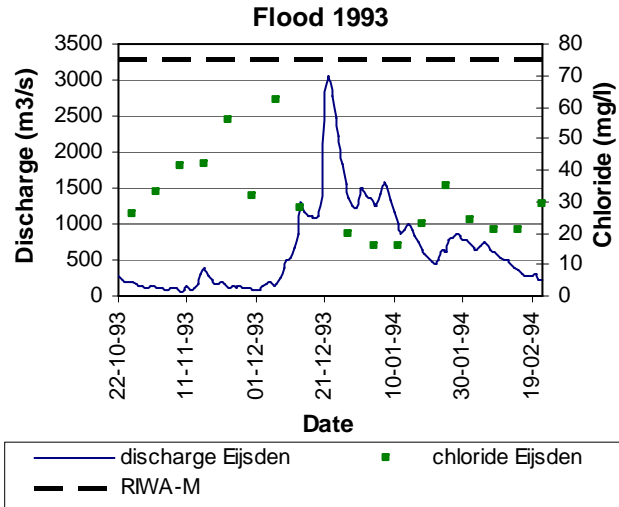


— discharge Eijsden    ■ suspended solids Eijsd

| location | flood             | period                      | median<br>susp sol<br>(mg/l) | mean<br>susp sol<br>(mg/l) | min<br>susp sol<br>(mg/l) | max<br>susp sol<br>(mg/l) | n         |
|----------|-------------------|-----------------------------|------------------------------|----------------------------|---------------------------|---------------------------|-----------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 4.0                          | 16.0                       | 3.0                       | 64.0                      | 5         |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>26.0</b>                  | <b>81.5</b>                | <b>6.0</b>                | <b>370.0</b>              | <b>6</b>  |
|          | reference         | 21-1-1994/22-2-1994         | 18.0                         | 12.8                       | 1.0                       | 20.0                      | 5         |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 33.0                         | 58.6                       | 3.4                       | 355.0                     | 28        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>53.5</b>                  | <b>94.6</b>                | <b>14.0</b>               | <b>320.5</b>              | <b>22</b> |
|          | reference         | 12-2-1995/31-3-1995         | 17.5                         | 20.0                       | 4.5                       | 51.0                      | 48        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 8.1                          | 43.8                       | 1.8                       | 446.0                     | 45        |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>33.1</b>                  | <b>40.4</b>                | <b>4.6</b>                | <b>109.5</b>              | <b>22</b> |
|          | reference         | 15-1-2002/4-3-2003          | 9.2                          | 14.1                       | 2.6                       | 71.7                      | 49        |

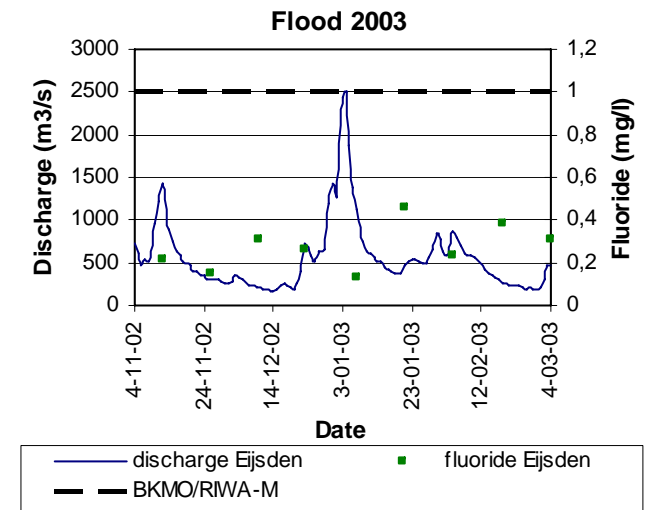
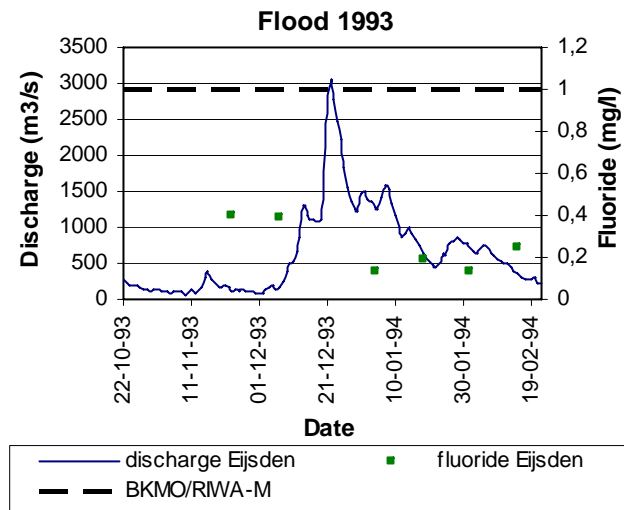
# Addendum B2: Conservative substances during floods

## B2.1 Chloride



| location | flood             | period                      | median<br>Cl<br>(mg/l) | mean<br>Cl<br>(mg/l) | min<br>Cl<br>(mg/l) | max<br>Cl<br>(mg/l) | n        | n ><br>75 mg/l<br>RIWA-M | n ><br>150 mg/l<br>DWD | n ><br>200 mg/l<br>BKMO |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|--------------------------|------------------------|-------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 37.0                   | 38.3                 | 26.0                | 56.0                | 6        | 0                        | 0                      | 0                       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>21.5</b>            | <b>27.5</b>          | <b>16.0</b>         | <b>62.0</b>         | <b>6</b> | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|          | reference         | 21-1-1994/22-2-1994         | 24.0                   | 26.0                 | 21.0                | 35.0                | 5        | 0                        | 0                      | 0                       |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 31.0                   | 29.7                 | 23.5                | 37.0                | 7        | 0                        | 0                      | 0                       |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>13.5</b>            | <b>14.3</b>          | <b>12.0</b>         | <b>19.0</b>         | <b>8</b> | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|          | reference         | 12-2-1995/31-3-1995         | 17.9                   | 18.5                 | 15.7                | 22.3                | 6        | 0                        | 0                      | 0                       |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 20.5                   | 23.0                 | 16.4                | 35.9                | 7        | 0                        | 0                      | 0                       |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>18.3</b>            | <b>17.9</b>          | <b>13.7</b>         | <b>21.4</b>         | <b>4</b> | <b>0</b>                 | <b>0</b>               | <b>0</b>                |
|          | reference         | 15-1-2002/4-3-2003          | 24.7                   | 26.7                 | 24.0                | 32.7                | 7        | 0                        | 0                      | 0                       |

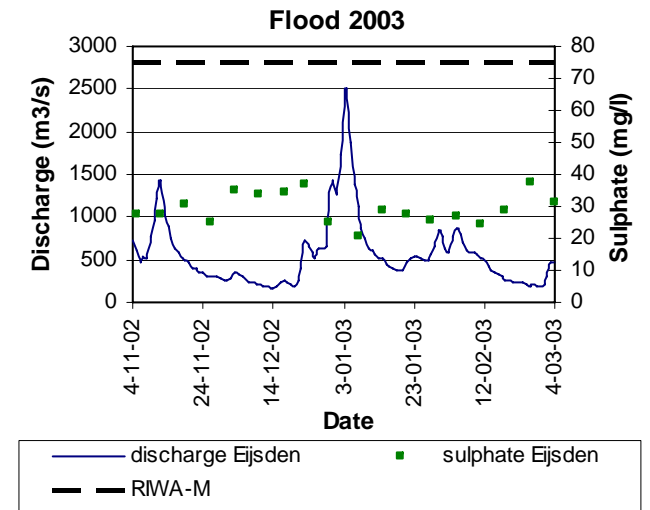
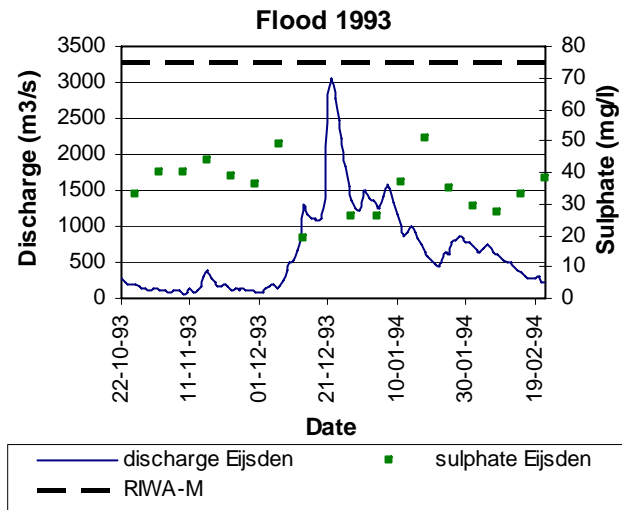
## B2.2 Fluoride



| location | flood             | period                      | median<br>F<br>(mg/l) | mean<br>F<br>(mg/l) | min<br>F<br>(mg/l) | max<br>F<br>(mg/l) | n        | n ><br>1 mg/l<br>BKMO/RIWA-M | n ><br>1.1 mg/l<br>DWD | n ><br>1.5 mg/l<br>MKE |
|----------|-------------------|-----------------------------|-----------------------|---------------------|--------------------|--------------------|----------|------------------------------|------------------------|------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.40                  | 0.40                | 0.40               | 0.40               | 1        | 0                            | 0                      | 0                      |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.19</b>           | <b>0.24</b>         | <b>0.13</b>        | <b>0.39</b>        | <b>3</b> | <b>0</b>                     | <b>0</b>               | <b>0</b>               |
|          | reference         | 21-1-1994/22-2-1994         | 0.19                  | 0.19                | 0.13               | 0.25               | 2        | 0                            | 0                      | 0                      |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                       |                     |                    |                    | 0        |                              |                        |                        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                       |                     |                    |                    | <b>0</b> |                              |                        |                        |
|          | reference         | 12-2-1995/31-3-1995         |                       |                     |                    |                    | 0        |                              |                        |                        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.22                  | 0.23                | 0.15               | 0.31               | 3        | 0                            | 0                      | 0                      |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.20</b>           | <b>0.20</b>         | <b>0.13</b>        | <b>0.26</b>        | <b>2</b> | <b>0</b>                     | <b>0</b>               | <b>0</b>               |
|          | reference         | 15-1-2002/4-3-2003          | 0.35                  | 0.35                | 0.23               | 0.46               | 4        | 0                            | 0                      | 0                      |

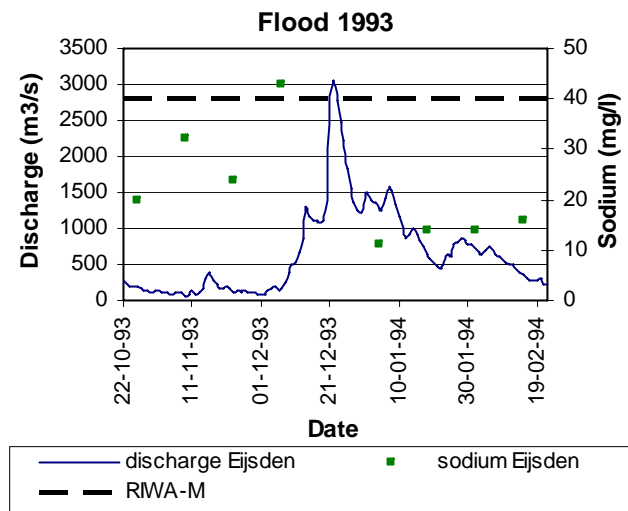


### B2.3 Sulphate



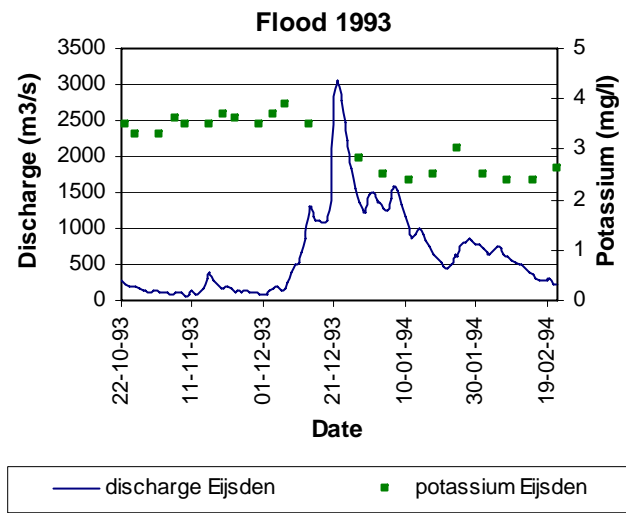
| location | flood             | period                      | median<br>SO <sub>4</sub><br>(mg/l) | mean<br>SO <sub>4</sub><br>(mg/l) | min<br>SO <sub>4</sub><br>(mg/l) | max<br>SO <sub>4</sub><br>(mg/l) | n        | n ><br>75 mg/l<br>RIWA-M | n ><br>100 mg/l<br>BKMO/MTR | n ><br>150 mg/l<br>DWD |
|----------|-------------------|-----------------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|----------|--------------------------|-----------------------------|------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 39.5                                | 38.7                              | 33.0                             | 44.0                             | 6        | 0                        | 0                           | 0                      |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>31.5</b>                         | <b>34.7</b>                       | <b>19.0</b>                      | <b>51.0</b>                      | <b>6</b> | <b>0</b>                 | <b>0</b>                    | <b>0</b>               |
|          | reference         | 21-1-1994/22-2-1994         | 33.0                                | 32.4                              | 27.0                             | 38.0                             | 5        | 0                        | 0                           | 0                      |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                                     |                                   |                                  |                                  | 0        |                          |                             |                        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                                     |                                   |                                  |                                  | <b>0</b> |                          |                             |                        |
|          | reference         | 12-2-1995/31-3-1995         |                                     |                                   |                                  |                                  | 0        |                          |                             |                        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 30.7                                | 30.4                              | 24.9                             | 35.0                             | 7        | 0                        | 0                           | 0                      |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>26.7</b>                         | <b>27.7</b>                       | <b>20.5</b>                      | <b>36.9</b>                      | <b>4</b> | <b>0</b>                 | <b>0</b>                    | <b>0</b>               |
|          | reference         | 15-1-2002/4-3-2003          | 27.2                                | 28.7                              | 24.1                             | 37.5                             | 7        | 0                        | 0                           | 0                      |

## B2.4 Sodium



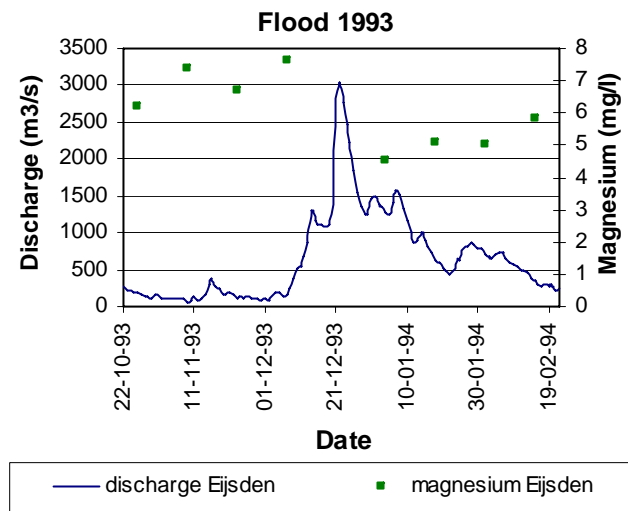
| location | flood             | period                      | median<br>Na<br>(mg/l) | mean<br>Na<br>(mg/l) | min<br>Na<br>(mg/l) | max<br>Na<br>(mg/l) | n        | n ><br>40 mg/l<br>RIWA-M | n ><br>120 mg/l<br>BKMO | n ><br>150 mg/l<br>DWD |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|--------------------------|-------------------------|------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 24                     | 25                   | 20                  | 32                  | 3        | 0                        | 0                       | 0                      |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>14</b>              | <b>23</b>            | <b>11</b>           | <b>43</b>           | <b>3</b> | <b>1</b>                 | <b>0</b>                | <b>0</b>               |
|          | reference         | 21-1-1994/22-2-1994         | 15                     | 15                   | 14                  | 16                  | 2        | 0                        | 0                       | 0                      |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |                          |                         |                        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | <b>0</b> |                          |                         |                        |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |                          |                         |                        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        |                        |                      |                     |                     | 0        |                          |                         |                        |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> |                        |                      |                     |                     | <b>0</b> |                          |                         |                        |
|          | reference         | 15-1-2002/4-3-2003          |                        |                      |                     |                     | 0        |                          |                         |                        |

## B2.5 Potassium



| location | flood             | period                      | median<br>K<br>(mg/l) | mean<br>K<br>(mg/l) | min<br>K<br>(mg/l) | max<br>K<br>(mg/l) | n        |
|----------|-------------------|-----------------------------|-----------------------|---------------------|--------------------|--------------------|----------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 3.5                   | 3.5                 | 3.3                | 3.7                | 10       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>2.7</b>            | <b>2.9</b>          | <b>2.4</b>         | <b>3.9</b>         | <b>6</b> |
|          | reference         | 21-1-1994/22-2-1994         | 2.5                   | 2.6                 | 2.4                | 3.0                | 5        |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                       |                     |                    |                    | 0        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                       |                     |                    |                    | <b>0</b> |
|          | reference         | 12-2-1995/31-3-1995         |                       |                     |                    |                    | 0        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        |                       |                     |                    |                    | 0        |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> |                       |                     |                    |                    | <b>0</b> |
|          | reference         | 15-1-2002/4-3-2003          |                       |                     |                    |                    | 0        |

## B2.6 Magnesium

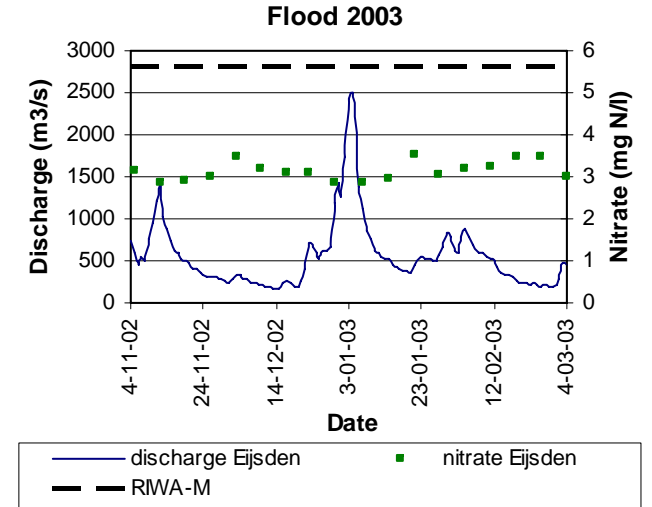
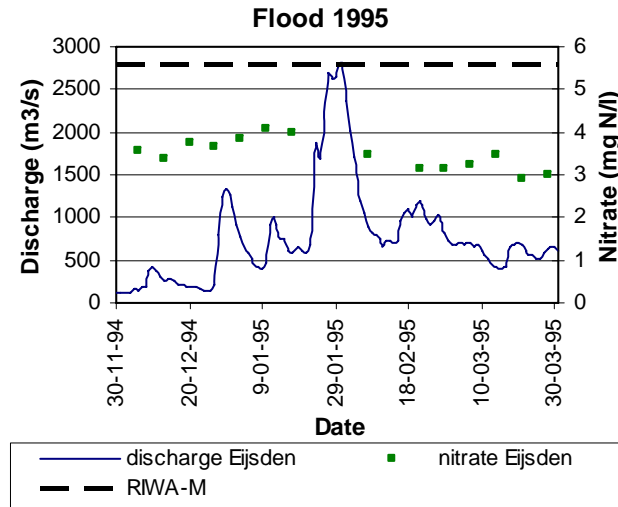
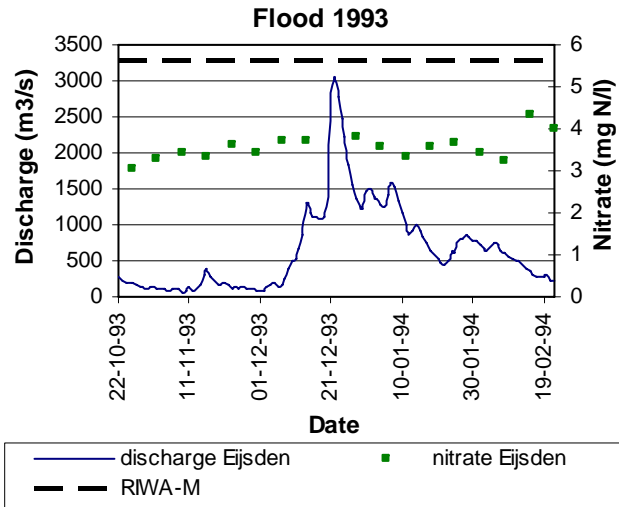


| location | flood             | period                      | median<br>Mg<br>(mg/l) | mean<br>Mg<br>(mg/l) | min<br>Mg<br>(mg/l) | max<br>Mg<br>(mg/l) | n        |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 6.7                    | 6.8                  | 6.2                 | 7.4                 | 3        |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>5.1</b>             | <b>5.7</b>           | <b>4.5</b>          | <b>7.6</b>          | <b>3</b> |
|          | reference         | 21-1-1994/22-2-1994         | 5.4                    | 5.4                  | 5.0                 | 5.8                 | 2        |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | <b>0</b> |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        |                        |                      |                     |                     | 0        |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> |                        |                      |                     |                     | <b>0</b> |
|          | reference         | 15-1-2002/4-3-2003          |                        |                      |                     |                     | 0        |



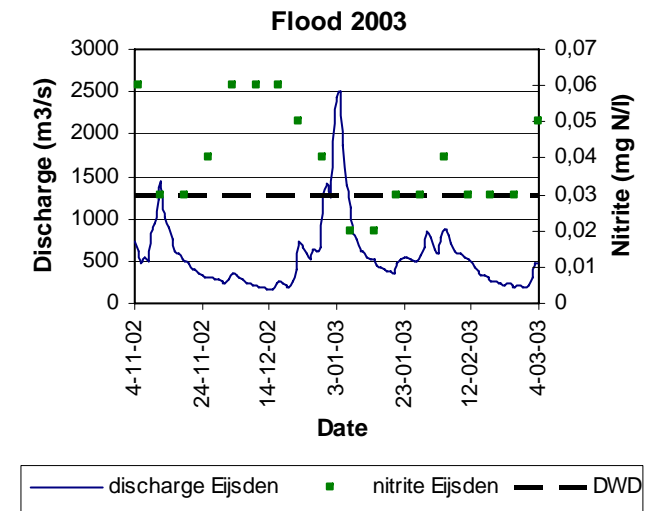
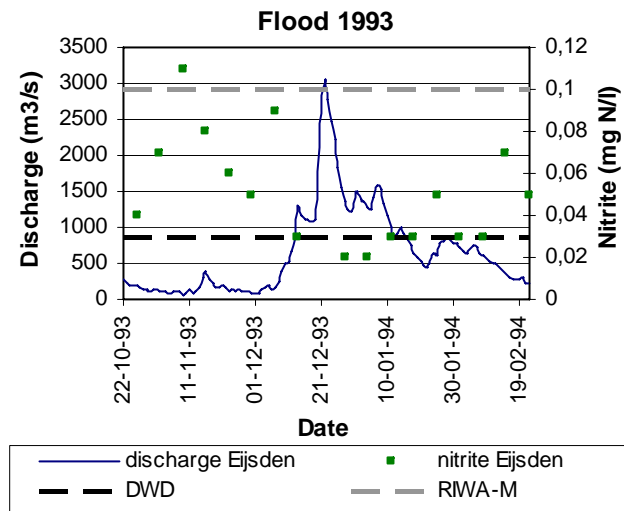
# Addendum B3: Nutrients during floods

## B3.1 Nitrate



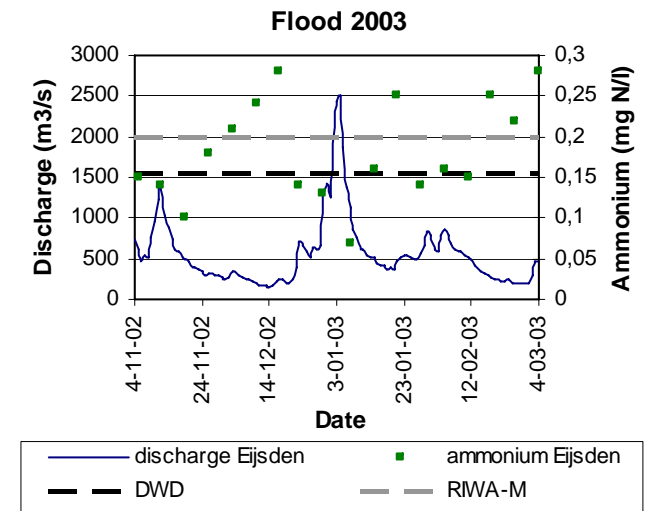
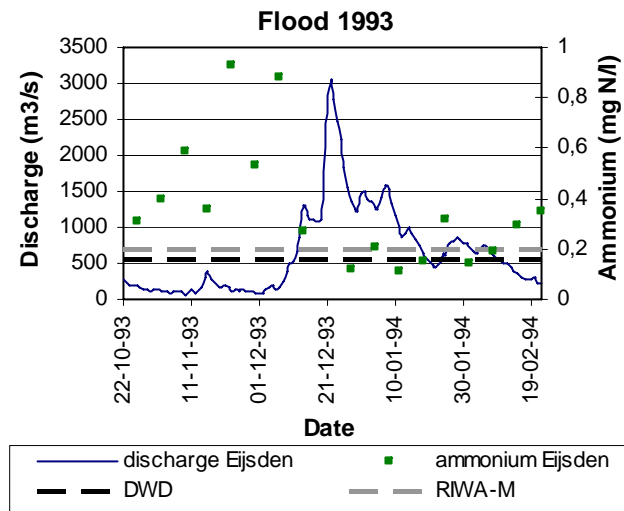
| location | flood             | period                      | median<br>NO <sub>3</sub><br>(mg/l) | mean<br>NO <sub>3</sub><br>(mg/l) | min<br>NO <sub>3</sub><br>(mg/l) | max<br>NO <sub>3</sub><br>(mg/l) | n        | n ><br>5.6 mg/l<br>RIWA-M | n ><br>10 mg/l<br>BKMO | n ><br>11.3 mg/l<br>DWD |
|----------|-------------------|-----------------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|----------|---------------------------|------------------------|-------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 3.38                                | 3.36                              | 3.05                             | 3.63                             | 6        | 0                         | 0                      | 0                       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>3.66</b>                         | <b>3.63</b>                       | <b>3.33</b>                      | <b>3.80</b>                      | <b>6</b> | <b>0</b>                  | <b>0</b>               | <b>0</b>                |
|          | reference         | 21-1-1994/22-2-1994         | 3.68                                | 3.74                              | 3.26                             | 4.33                             | 5        | 0                         | 0                      | 0                       |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 3.74                                | 3.75                              | 3.37                             | 4.07                             | 7        | 0                         | 0                      | 0                       |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>3.45</b>                         | <b>3.45</b>                       | <b>3.45</b>                      | <b>3.45</b>                      | <b>1</b> | <b>0</b>                  | <b>0</b>               | <b>0</b>                |
|          | reference         | 12-2-1995/31-3-1995         | 3.12                                | 3.15                              | 2.90                             | 3.49                             | 6        | 0                         | 0                      | 0                       |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 3.09                                | 3.10                              | 2.86                             | 3.48                             | 7        | 0                         | 0                      | 0                       |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>2.90</b>                         | <b>2.93</b>                       | <b>2.84</b>                      | <b>3.08</b>                      | <b>4</b> | <b>0</b>                  | <b>0</b>               | <b>0</b>                |
|          | reference         | 15-1-2002/4-3-2003          | 3.23                                | 3.28                              | 3.02                             | 3.53                             | 7        | 0                         | 0                      | 0                       |

### B3.2 Nitrite



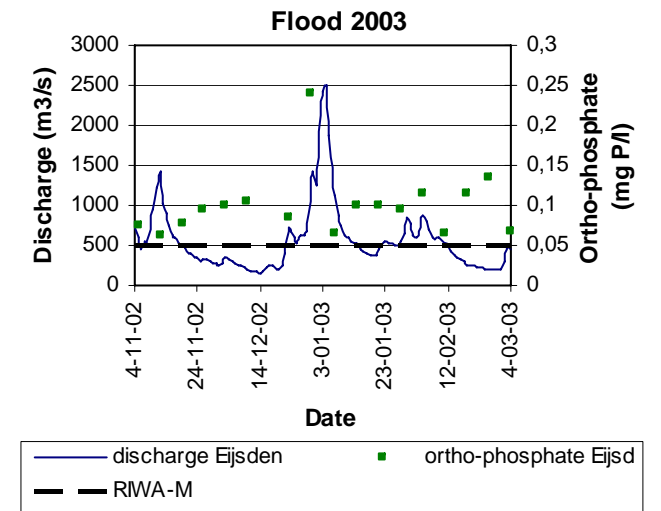
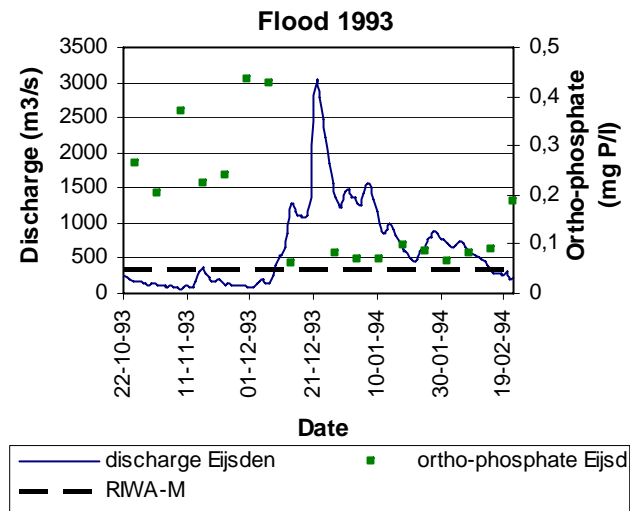
| location | flood             | period                      | median<br>NO <sub>2</sub><br>(mg/l) | mean<br>NO <sub>2</sub><br>(mg/l) | min<br>NO <sub>2</sub><br>(mg/l) | max<br>NO <sub>2</sub><br>(mg/l) | n        | n ><br>0.03 mg/l<br>DWD | n ><br>0.1 mg/l<br>RIWA-M |
|----------|-------------------|-----------------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|----------|-------------------------|---------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.07                                | 0.07                              | 0.04                             | 0.11                             | 6        | 6                       | 1                         |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.03</b>                         | <b>0.04</b>                       | <b>0.02</b>                      | <b>0.09</b>                      | <b>6</b> | <b>1</b>                | <b>0</b>                  |
|          | reference         | 21-1-1994/22-2-1994         | 0.05                                | 0.05                              | 0.03                             | 0.07                             | 5        | 3                       | 0                         |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                                     |                                   |                                  |                                  | 0        |                         |                           |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                                     |                                   |                                  |                                  | <b>0</b> |                         |                           |
|          | reference         | 12-2-1995/31-3-1995         |                                     |                                   |                                  |                                  | 0        |                         |                           |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.06                                | 0.05                              | 0.03                             | 0.06                             | 7        | 5                       | 0                         |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.03</b>                         | <b>0.03</b>                       | <b>0.02</b>                      | <b>0.05</b>                      | <b>4</b> | <b>2</b>                | <b>0</b>                  |
|          | reference         | 15-1-2002/4-3-2003          | 0.03                                | 0.03                              | 0.03                             | 0.05                             | 7        | 2                       | 0                         |

### B3.3 Ammonium



| location | flood             | period                      | median<br>NH <sub>4</sub><br>(mg/l) | mean<br>NH <sub>4</sub><br>(mg/l) | min<br>NH <sub>4</sub><br>(mg/l) | max<br>NH <sub>4</sub><br>(mg/l) | n        | n ><br>0.156 mg/l<br>DWD | n ><br>0.2 mg/l<br>RIWA-M | n ><br>1.2 mg/l<br>BKMO |
|----------|-------------------|-----------------------------|-------------------------------------|-----------------------------------|----------------------------------|----------------------------------|----------|--------------------------|---------------------------|-------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.47                                | 0.52                              | 0.31                             | 0.93                             | 6        | 6                        | 6                         | 0                       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.18</b>                         | <b>0.29</b>                       | <b>0.11</b>                      | <b>0.88</b>                      | <b>6</b> | <b>3</b>                 | <b>3</b>                  | <b>0</b>                |
|          | reference         | 21-1-1994/22-2-1994         | 0.29                                | 0.26                              | 0.14                             | 0.35                             | 5        | 4                        | 3                         | 0                       |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                                     |                                   |                                  |                                  | 0        |                          |                           |                         |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                                     |                                   |                                  |                                  | <b>0</b> |                          |                           |                         |
|          | reference         | 12-2-1995/31-3-1995         |                                     |                                   |                                  |                                  | 0        |                          |                           |                         |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.18                                | 0.19                              | 0.10                             | 0.28                             | 7        | 4                        | 3                         | 0                       |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.14</b>                         | <b>0.13</b>                       | <b>0.07</b>                      | <b>0.16</b>                      | <b>4</b> | <b>1</b>                 | <b>0</b>                  | <b>0</b>                |
|          | reference         | 15-1-2002/4-3-2003          | 0.22                                | 0.21                              | 0.14                             | 0.28                             | 7        | 5                        | 4                         | 0                       |

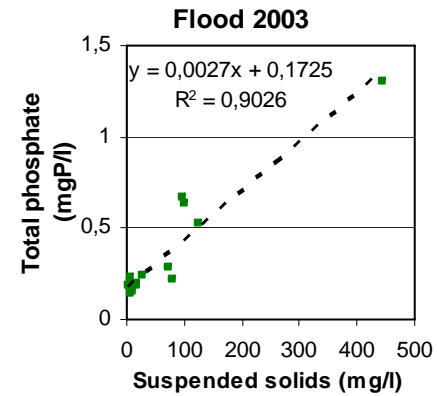
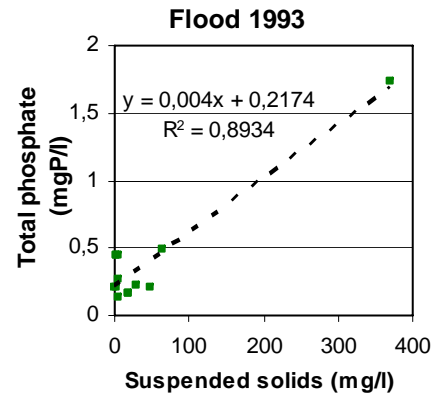
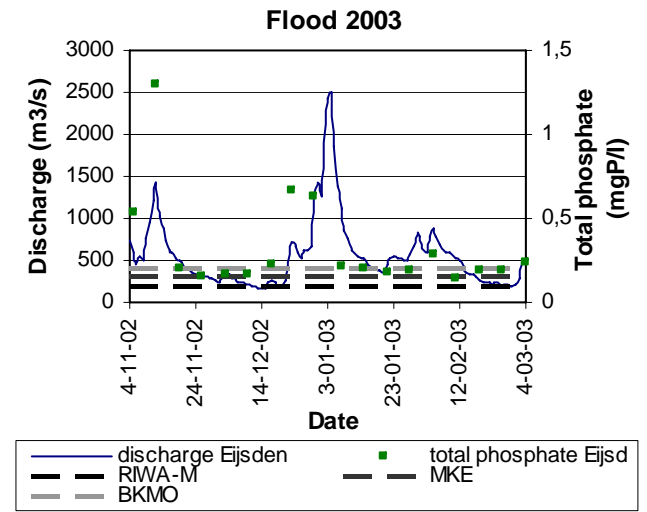
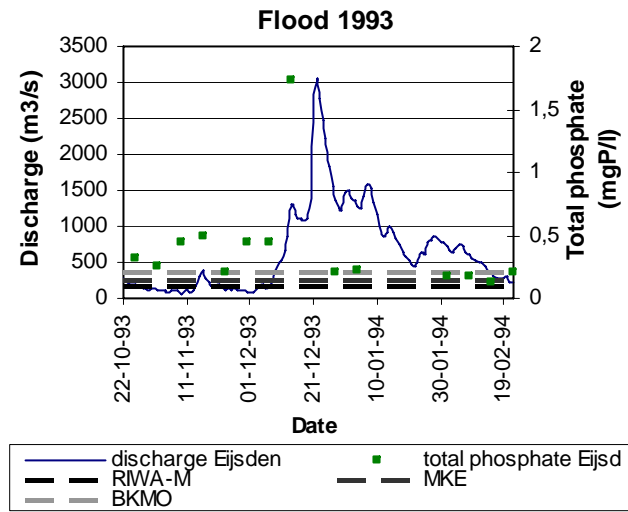
### B3.4 Ortho-phosphate



| location | flood             | period                      | median<br>orthoPO <sub>4</sub><br>(mg/l) | mean<br>orthoPO <sub>4</sub><br>(mg/l) | min<br>orthoPO <sub>4</sub><br>(mg/l) | max<br>orthoPO <sub>4</sub><br>(mg/l) | n        | n ><br>0.05 mg/l<br>RIWA-M |
|----------|-------------------|-----------------------------|--|--|---------------------------------------|---------------------------------------|----------|----------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.25                                     | 0.29                                   | 0.20                                  | 0.44                                  | 6        | 6                          |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.08</b>                              | <b>0.14</b>                            | <b>0.06</b>                           | <b>0.43</b>                           | <b>6</b> | <b>6</b>                   |
|          | reference         | 21-1-1994/22-2-1994         | 0.08                                     | 0.10                                   | 0.07                                  | 0.19                                  | 5        | 5                          |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |  |  |                                       |                                       | 0        |                            |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |  |  |                                       |                                       | <b>0</b> |                            |
|          | reference         | 12-2-1995/31-3-1995         |  |  |                                       |                                       | 0        |                            |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.09                                     | 0.09                                   | 0.06                                  | 0.10                                  | 6        | 6                          |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.09</b>                              | <b>0.12</b>                            | <b>0.06</b>                           | <b>0.24</b>                           | <b>4</b> | <b>4</b>                   |
|          | reference         | 15-1-2002/4-3-2003          | 0.10                                     | 0.10                                   | 0.06                                  | 0.14                                  | 7        | 7                          |



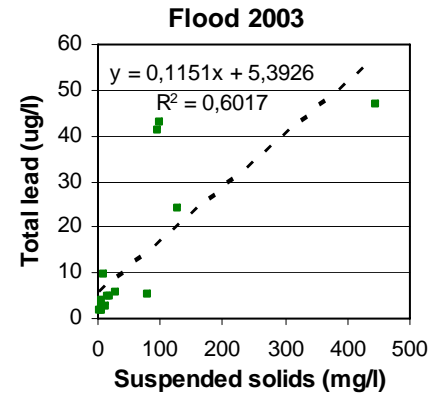
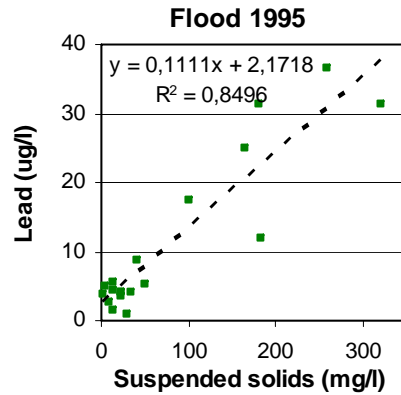
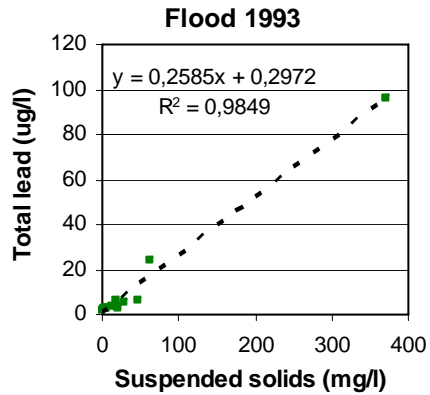
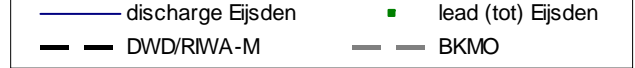
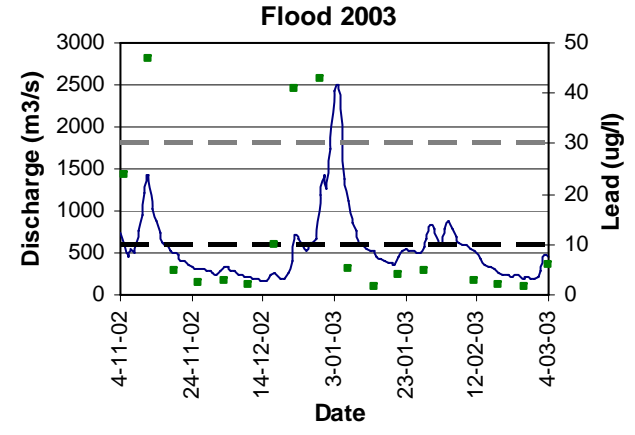
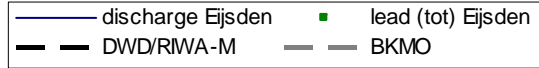
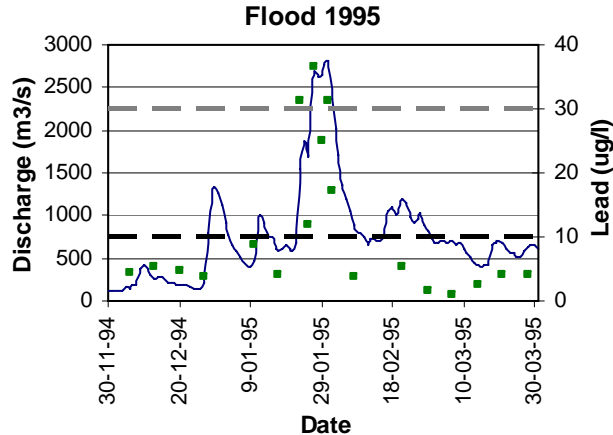
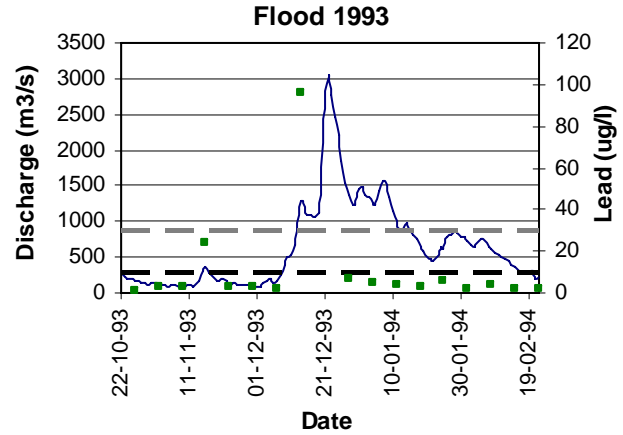
### B3.5 Total phosphate



| location | flood             | period                      | median<br>totPO <sub>4</sub><br>(mg/l) | mean<br>totPO <sub>4</sub><br>(mg/l) | min<br>totPO <sub>4</sub><br>(mg/l) | max<br>totPO <sub>4</sub><br>(mg/l) | n        | n ><br>0.1 mg/l<br>RIWA-M | n ><br>0.15 mg/l<br>MKE | n ><br>0.2 mg/l<br>BKMO |
|----------|-------------------|-----------------------------|--|--------------------------------------|-------------------------------------|-------------------------------------|----------|---------------------------|-------------------------|-------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.38                                   | 0.36                                 | 0.21                                | 0.49                                | 6        | 6                         | 6                       | 6                       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.33</b>                            | <b>0.65</b>                          | <b>0.21</b>                         | <b>1.73</b>                         | <b>4</b> | <b>4</b>                  | <b>4</b>                | <b>4</b>                |
|          | reference         | 21-1-1994/22-2-1994         | 0.17                                   | 0.17                                 | 0.13                                | 0.21                                | 4        | 4                         | 3                       | 1                       |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |  |                                      |                                     |                                     | 0        |                           |                         |                         |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |  |                                      |                                     |                                     | <b>0</b> |                           |                         |                         |
|          | reference         | 12-2-1995/31-3-1995         |  |                                      |                                     |                                     | 0        |                           |                         |                         |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.20                                   | 0.39                                 | 0.15                                | 1.30                                | 7        | 7                         | 6                       | 3                       |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.43</b>                            | <b>0.43</b>                          | <b>0.20</b>                         | <b>0.67</b>                         | <b>4</b> | <b>4</b>                  | <b>4</b>                | <b>3</b>                |
|          | reference         | 15-1-2002/4-3-2003          | 0.19                                   | 0.20                                 | 0.14                                | 0.29                                | 7        | 7                         | 6                       | 2                       |

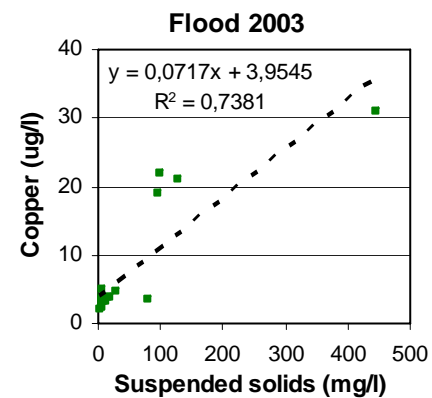
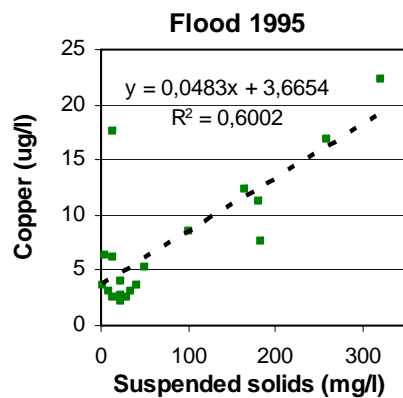
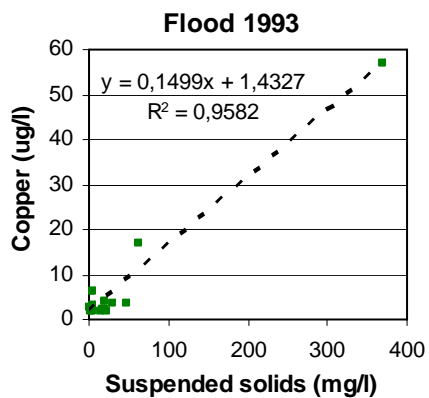
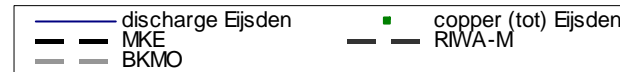
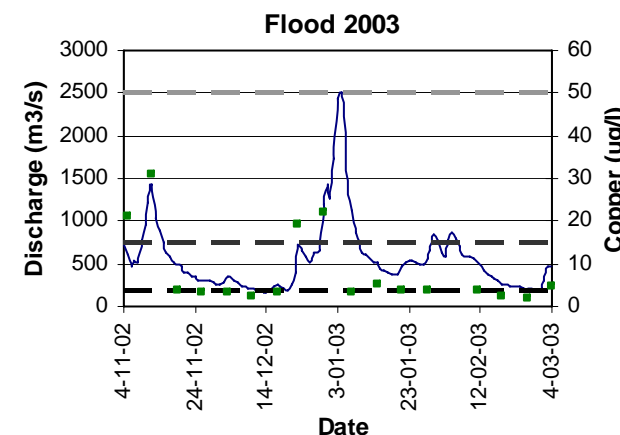
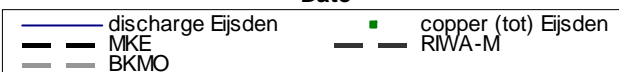
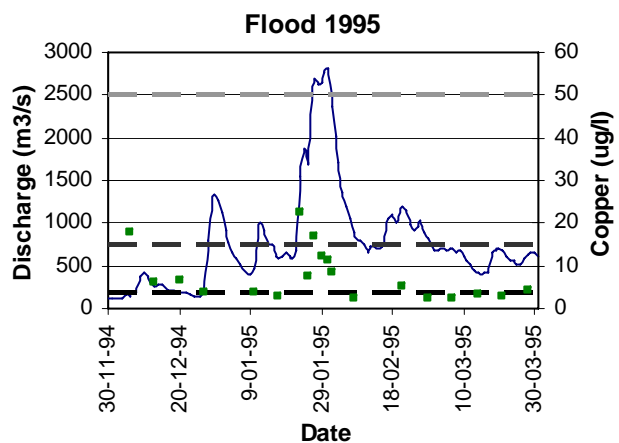
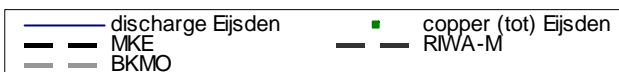
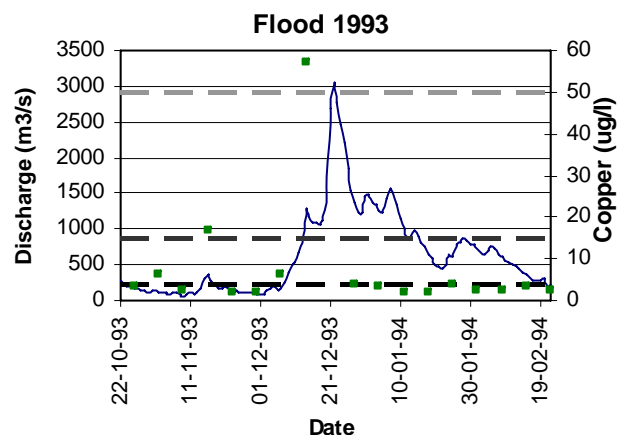
# Addendum B4: Total heavy metals and metalloids during floods

## B4.1 Total Lead



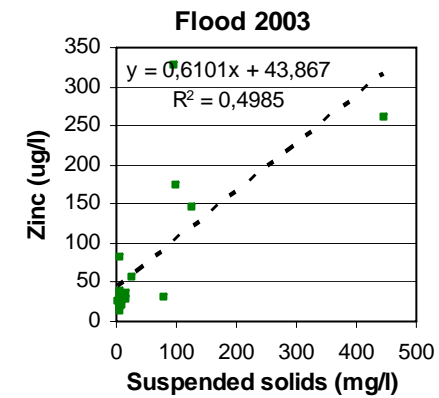
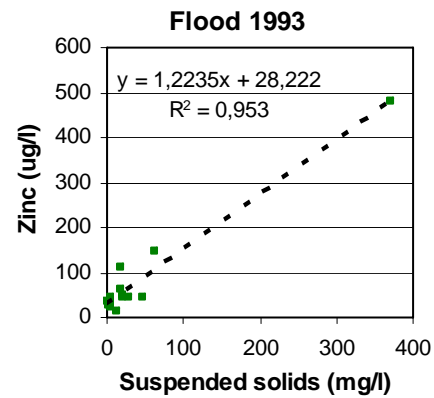
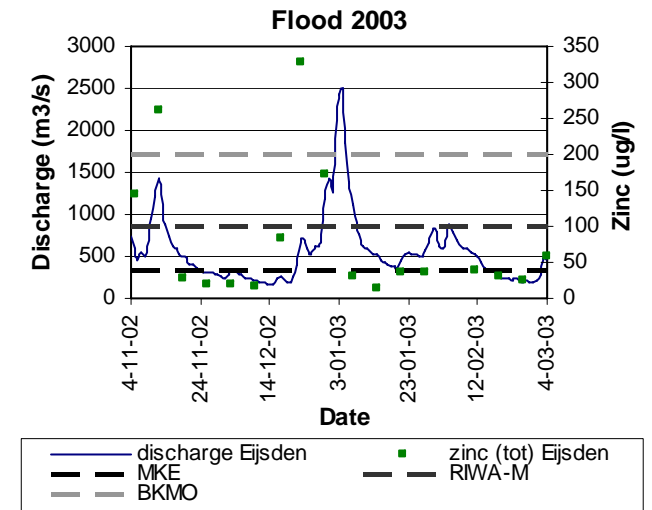
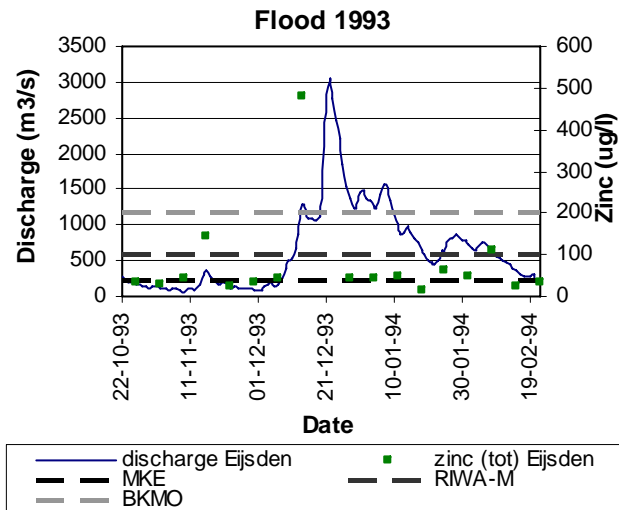
| location | flood             | period                      | median<br>Pb<br>(µg/l) | mean<br>Pb<br>(µg/l) | min<br>Pb<br>(µg/l) | max<br>Pb<br>(µg/l) | n        | n ><br>10 µg/l<br>DWD/RIWA-M | n ><br>30 µg/l<br>BKMO | n ><br>220 µg/l<br>MKE |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|------------------------------|------------------------|------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 2.8                    | 6.1                  | 1.3                 | 23.9                | 6        | 1                            | 0                      | 0                      |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>4.4</b>             | <b>19.5</b>          | <b>2.3</b>          | <b>96.0</b>         | <b>6</b> | <b>1</b>                     | <b>1</b>               | <b>0</b>               |
|          | reference         | 21-1-1994/22-2-1994         | 2.4                    | 3.3                  | 2.1                 | 6.0                 | 5        | 0                            | 0                      | 0                      |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 4.6                    | 5.2                  | 3.8                 | 8.7                 | 6        | 0                            | 0                      | 0                      |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>25.0</b>            | <b>22.4</b>          | <b>3.6</b>          | <b>36.6</b>         | <b>7</b> | <b>6</b>                     | <b>3</b>               | <b>0</b>               |
|          | reference         | 12-2-1995/31-3-1995         | 3.3                    | 3.1                  | 0.9                 | 5.3                 | 6        | 0                            | 0                      | 0                      |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 4.7                    | 13.3                 | 2.1                 | 47.0                | 7        | 2                            | 1                      | 0                      |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>23.1</b>            | <b>22.7</b>          | <b>1.6</b>          | <b>43.0</b>         | <b>4</b> | <b>2</b>                     | <b>2</b>               | <b>0</b>               |
|          | reference         | 15-1-2002/4-3-2003          | 3.4                    | 3.5                  | 1.6                 | 5.9                 | 6        | 0                            | 0                      | 0                      |

## B4.2 Total copper



| location | flood             | period                      | median<br>Cu<br>(µg/l) | mean<br>Cu<br>(µg/l) | min<br>Cu<br>(µg/l) | max<br>Cu<br>(µg/l) | n        | n ><br>3.8 µg/l<br>MKE | n ><br>15 µg/l<br>RIWA-M | n ><br>50 µg/l<br>BKMO | n ><br>2000 µg/l<br>DWD |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|------------------------|--------------------------|------------------------|-------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 2.9                    | 5.5                  | 1.9                 | 17.0                | 6        | 5                      | 1                        | 0                      | 0                       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>3.6</b>             | <b>12.3</b>          | <b>1.7</b>          | <b>57.0</b>         | <b>6</b> | <b>2</b>               | <b>1</b>                 | <b>1</b>               | <b>1</b>                |
|          | reference         | 21-1-1994/22-2-1994         | 2.6                    | 2.8                  | 2.2                 | 3.9                 | 5        | 3                      | 0                        | 0                      | 0                       |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 4.9                    | 6.7                  | 2.8                 | 17.6                | 6        | 4                      | 1                        | 0                      | 0                       |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>11.2</b>            | <b>11.6</b>          | <b>2.2</b>          | <b>22.3</b>         | <b>7</b> | <b>0</b>               | <b>2</b>                 | <b>0</b>               | <b>0</b>                |
|          | reference         | 12-2-1995/31-3-1995         | 3.1                    | 3.4                  | 2.5                 | 5.2                 | 6        | 2                      | 0                        | 0                      | 0                       |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 3.3                    | 9.7                  | 2.3                 | 31.0                | 7        | 6                      | 2                        | 0                      | 0                       |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>12.0</b>            | <b>12.4</b>          | <b>3.4</b>          | <b>22.0</b>         | <b>4</b> | <b>3</b>               | <b>2</b>                 | <b>0</b>               | <b>0</b>                |
|          | reference         | 15-1-2002/4-3-2003          | 3.7                    | 3.4                  | 1.9                 | 4.7                 | 6        | 6                      | 0                        | 0                      | 0                       |

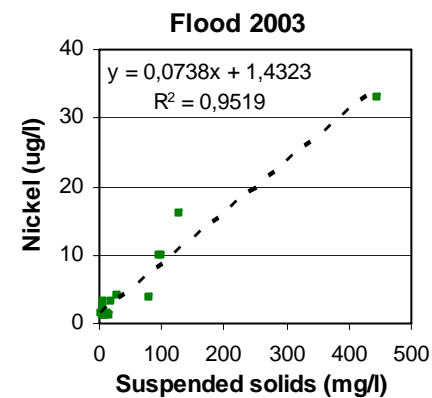
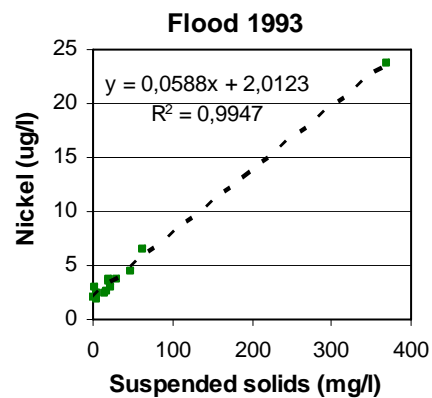
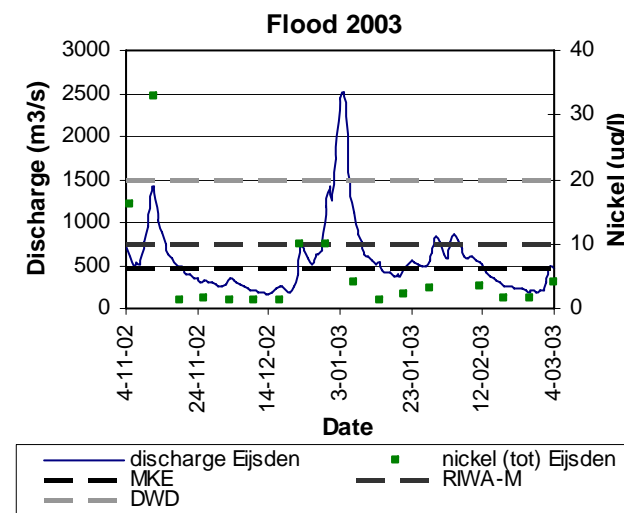
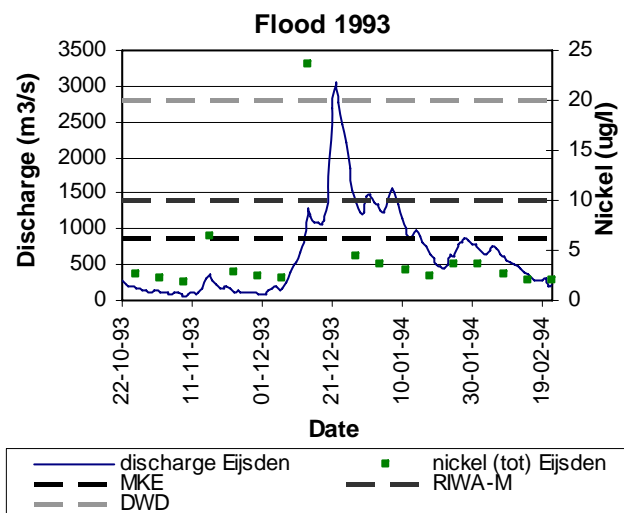
### B4.3 Total zinc



| location | flood             | period                      | median<br>Zn<br>(µg/l) | mean<br>Zn<br>(µg/l) | min<br>Zn<br>(µg/l) | max<br>Zn<br>(µg/l) | n        | n ><br>40 µg/l<br>MKE | n ><br>100 µg/l<br>RIWA-M | n ><br>200 µg/l<br>BKMO | n ><br>3000 µg/l<br>DWD |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|-----------------------|---------------------------|-------------------------|-------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 35                     | 423                  | 26                  | 145                 | 6        | 5                     | 1                         | 0                       | 0                       |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>44</b>              | <b>64</b>            | <b>13</b>           | <b>480</b>          | <b>6</b> | <b>4</b>              | <b>1</b>                  | <b>1</b>                | <b>0</b>                |
|          | reference         | 21-1-1994/22-2-1994         | 47                     | 146                  | 23                  | 110                 | 5        | 5                     | 1                         | 0                       | 0                       |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |                       |                           |                         |                         |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | <b>0</b> |                       |                           |                         |                         |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |                       |                           |                         |                         |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 29                     | 25                   | 17                  | 261                 | 7        | 5                     | 2                         | 1                       | 0                       |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>102</b>             | <b>21</b>            | <b>14</b>           | <b>328</b>          | <b>4</b> | <b>2</b>              | <b>2</b>                  | <b>1</b>                | <b>0</b>                |
|          | reference         | 15-1-2002/4-3-2003          | 36                     | 26                   | 26                  | 57                  | 6        | 6                     | 0                         | 0                       | 0                       |

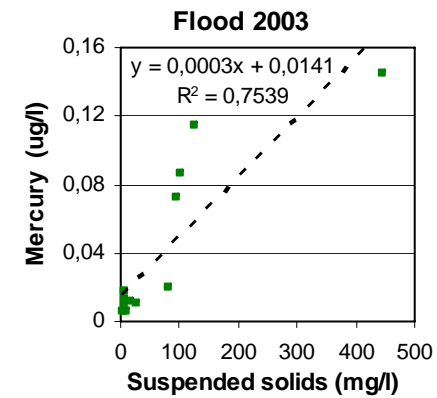
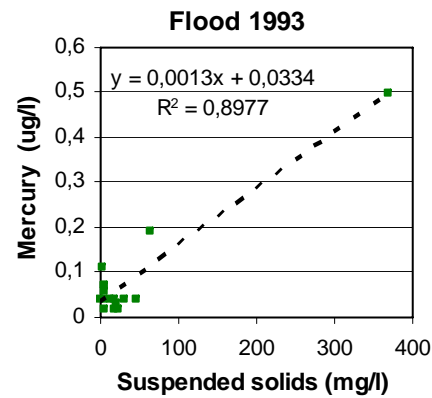
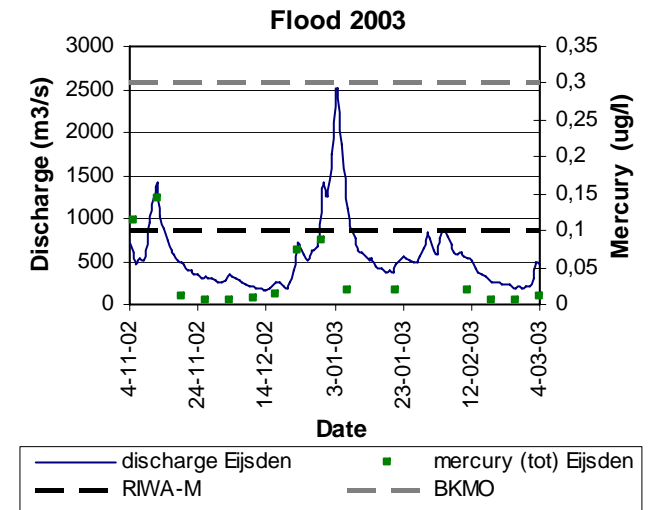
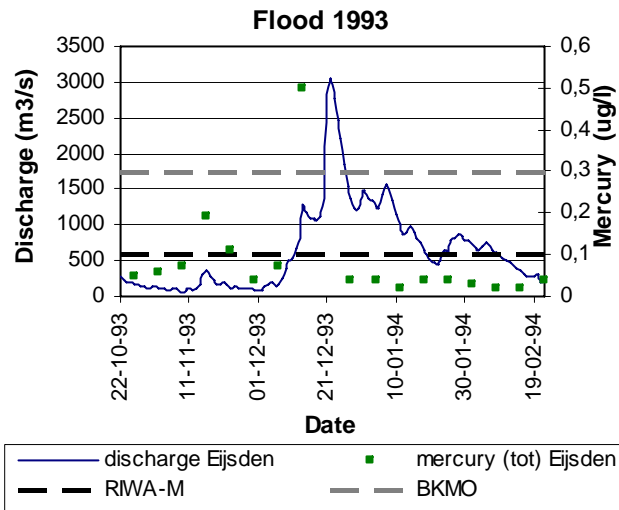


### B4.4 Total nickel



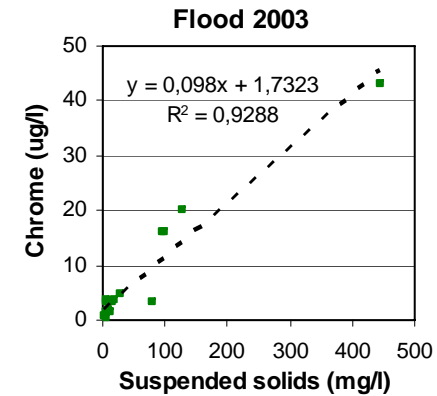
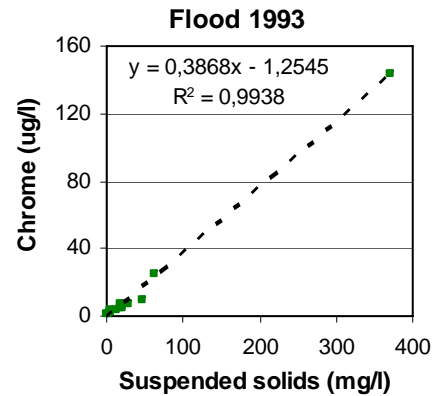
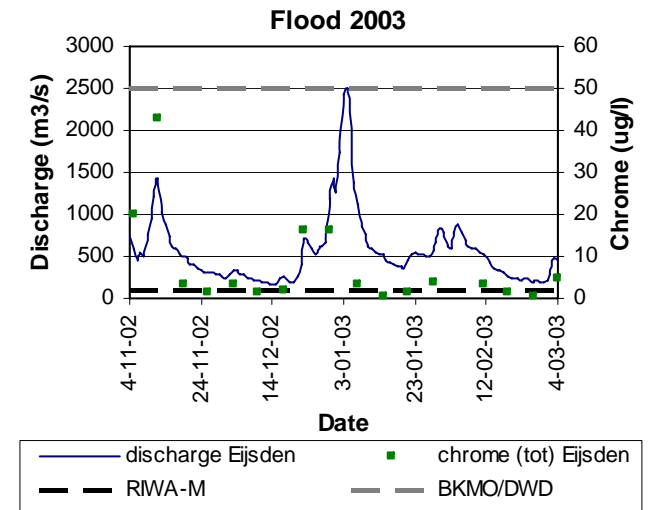
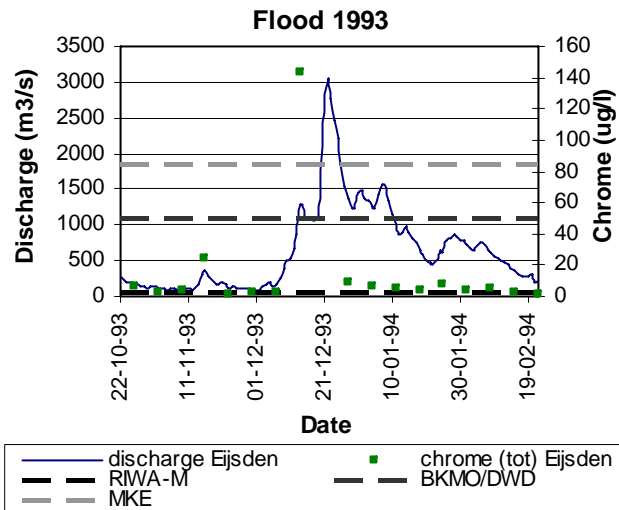
| location | flood             | period                      | median<br>Ni<br>(µg/l) | mean<br>Ni<br>(µg/l) | min<br>Ni<br>(µg/l) | max<br>Ni<br>(µg/l) | n        | n ><br>6.3 µg/l<br>MKE | n ><br>10 µg/l<br>RIWA-M | n ><br>20 µg/l<br>DWD |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|------------------------|--------------------------|-----------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 2.5                    | 3.1                  | 1.9                 | 6.4                 | 6        | 0                      | 0                        | 0                     |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>3.4</b>             | <b>6.6</b>           | <b>2.2</b>          | <b>23.7</b>         | <b>6</b> | <b>1</b>               | <b>1</b>                 | <b>1</b>              |
|          | reference         | 21-1-1994/22-2-1994         | 2.6                    | 2.8                  | 2.0                 | 3.7                 | 5        | 0                      | 0                        | 0                     |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |                        |                          |                       |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | <b>0</b> |                        |                          |                       |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |                        |                          |                       |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 1.3                    | 8.0                  | 1.2                 | 33.0                | 7        | 2                      | 2                        | 1                     |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>6.9</b>             | <b>6.3</b>           | <b>1.3</b>          | <b>10.0</b>         | <b>4</b> | <b>2</b>               | <b>0</b>                 | <b>0</b>              |
|          | reference         | 15-1-2002/4-3-2003          | 2.7                    | 2.6                  | 1.4                 | 4.1                 | 6        | 0                      | 0                        | 0                     |

### B4.5 Total mercury



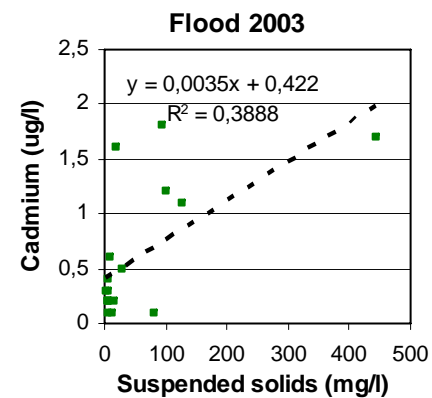
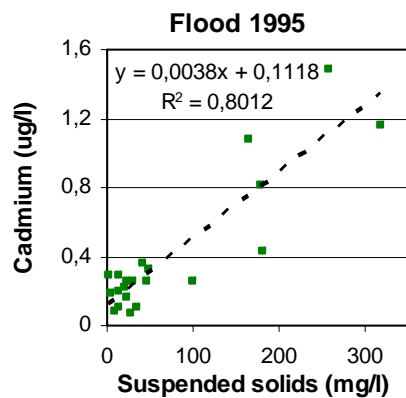
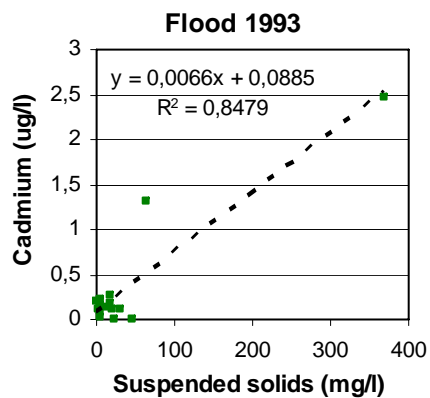
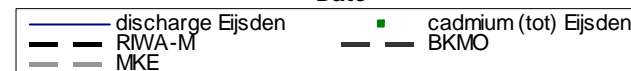
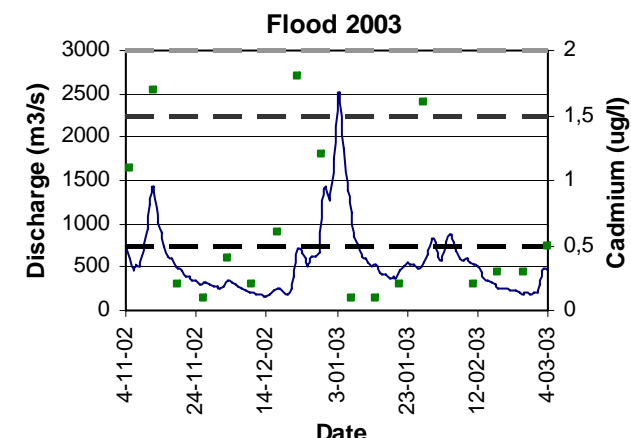
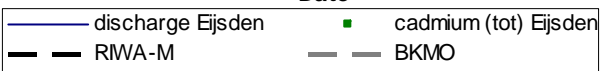
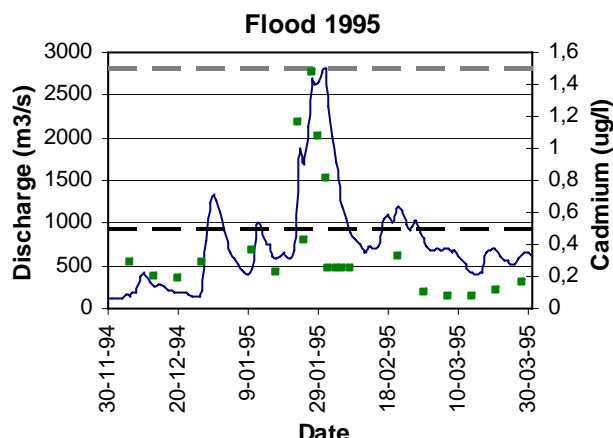
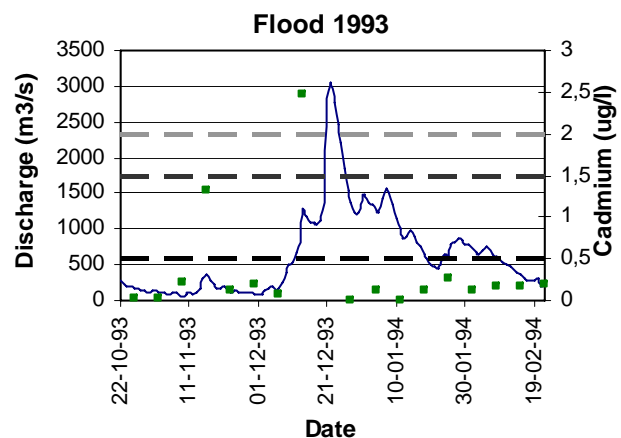
| location | flood             | period                      | median<br>Hg<br>(µg/l) | mean<br>Hg<br>(µg/l) | min<br>Hg<br>(µg/l) | max<br>Hg<br>(µg/l) | n        | n ><br>0.1 µg/l<br>RIWA-M | n ><br>0.3 µg/l<br>BKMO | n ><br>1.0µg/l<br>DWD | n ><br>1.2 µg/l<br>MKE |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|---------------------------|-------------------------|-----------------------|------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.1                    | 0.1                  | 0.0                 | 0.2                 | 6        | 2                         | 0                       | 0                     | 0                      |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.0</b>             | <b>0.1</b>           | <b>0.0</b>          | <b>0.5</b>          | <b>6</b> | <b>1</b>                  | <b>1</b>                | <b>0</b>              | <b>0</b>               |
|          | reference         | 21-1-1994/22-2-1994         | 0.0                    | 0.0                  | 0.0                 | 0.0                 | 5        | 0                         | 0                       | 0                     | 0                      |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |                           |                         |                       |                        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | <b>0</b> |                           |                         |                       |                        |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |                           |                         |                       |                        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.0                    | 0.0                  | 0.0                 | 0.1                 | 7        | 2                         | 0                       | 0                     | 0                      |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.1</b>             | <b>0.1</b>           | <b>0.0</b>          | <b>0.1</b>          | <b>3</b> | <b>0</b>                  | <b>0</b>                | <b>0</b>              | <b>0</b>               |
|          | reference         | 15-1-2002/4-3-2003          | 0.0                    | 0.0                  | 0.0                 | 0.0                 | 5        | 0                         | 0                       | 0                     | 0                      |

### B4.6 Total chrome



| location | flood             | period                      | median<br>Cr<br>(µg/l) | mean<br>Cr<br>(µg/l) | min<br>Cr<br>(µg/l) | max<br>Cr<br>(µg/l) | n        | n ><br>2 µg/l<br>RIWA-M | n ><br>50 µg/l<br>BKMO/DWD | n ><br>84 µg/l<br>MKE/WFD(06) |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|-------------------------|----------------------------|-------------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 3.0                    | 6.9                  | 1.5                 | 24.7                | 6        | 5                       | 0                          | 0                             |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>6.3</b>             | <b>28.5</b>          | <b>2.2</b>          | <b>143.0</b>        | <b>6</b> | <b>6</b>                | <b>1</b>                   | <b>0</b>                      |
|          | reference         | 21-1-1994/22-2-1994         | 4.2                    | 3.9                  | 1.0                 | 7.7                 | 5        | 3                       | 0                          | 0                             |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |                         |                            |                               |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | <b>0</b> |                         |                            |                               |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |                         |                            |                               |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 3.2                    | 10.6                 | 1.4                 | 43.0                | 7        | 4                       | 0                          | 0                             |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>9.7</b>             | <b>9.0</b>           | <b>0.5</b>          | <b>16.0</b>         | <b>4</b> | <b>3</b>                | <b>0</b>                   | <b>0</b>                      |
|          | reference         | 15-1-2002/4-3-2003          | 2.5                    | 2.6                  | 0.6                 | 4.7                 | 6        | 3                       | 0                          | 0                             |

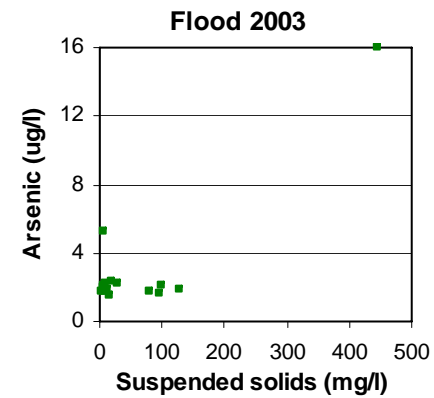
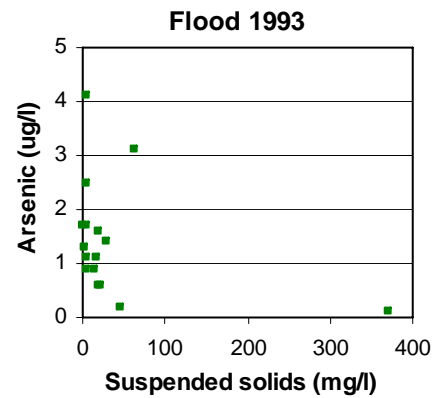
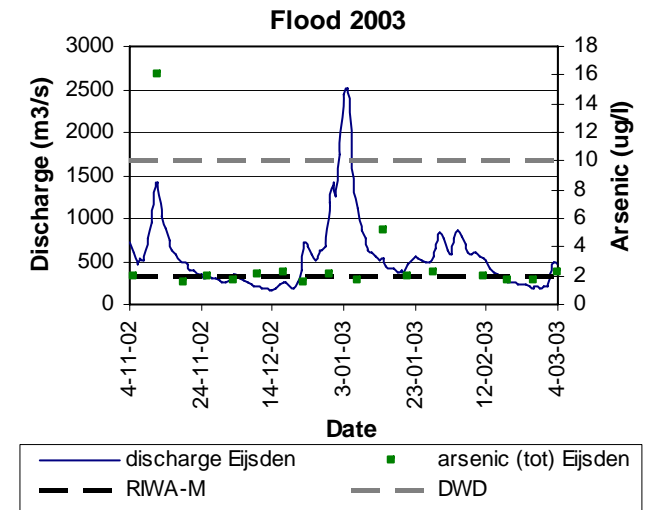
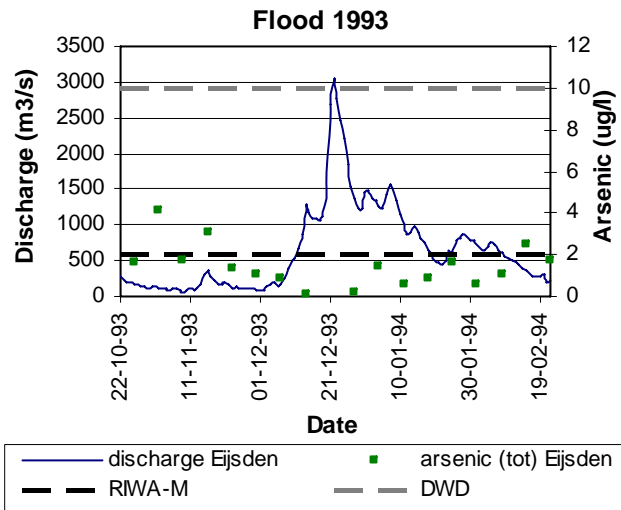
### B4.7 Total cadmium



| location | flood             | period                      | median<br>Cd<br>(µg/l) | mean<br>Cd<br>(µg/l) | min<br>Cd<br>(µg/l) | max<br>Cd<br>(µg/l) | n        | n ><br>0.5 µg/l<br>RIWA-M | n ><br>1.5 µg/l<br>BKMO | n ><br>2 µg/l<br>MKE | n ><br>5 µg/l<br>DWD |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|---------------------------|-------------------------|----------------------|----------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 0.2                    | 0.3                  | 0.0                 | 1.3                 | 6        | 1                         | 0                       | 0                    | 0                    |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.1</b>             | <b>0.5</b>           | <b>0.0</b>          | <b>2.5</b>          | <b>6</b> | <b>1</b>                  | <b>1</b>                | <b>0</b>             | <b>0</b>             |
|          | reference         | 21-1-1994/22-2-1994         | 0.2                    | 0.2                  | 0.1                 | 0.3                 | 5        | 0                         | 0                       | 0                    | 0                    |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 0.3                    | 0.3                  | 0.2                 | 0.4                 | 6        | 0                         | 0                       | 0                    | 0                    |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>0.4</b>             | <b>0.7</b>           | <b>0.3</b>          | <b>1.5</b>          | <b>9</b> | <b>4</b>                  | <b>0</b>                | <b>0</b>             | <b>0</b>             |
|          | reference         | 12-2-1995/31-3-1995         | 0.1                    | 0.1                  | 0.1                 | 0.3                 | 6        | 0                         | 0                       | 0                    | 0                    |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 0.4                    | 0.6                  | 0.1                 | 1.7                 | 7        | 3                         | 1                       | 0                    | 0                    |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>0.7</b>             | <b>0.8</b>           | <b>0.1</b>          | <b>1.8</b>          | <b>4</b> | <b>2</b>                  | <b>1</b>                | <b>0</b>             | <b>0</b>             |
|          | reference         | 15-1-2002/4-3-2003          | 0.3                    | 0.5                  | 0.2                 | 1.6                 | 6        | 1                         | 1                       | 1                    | 0                    |



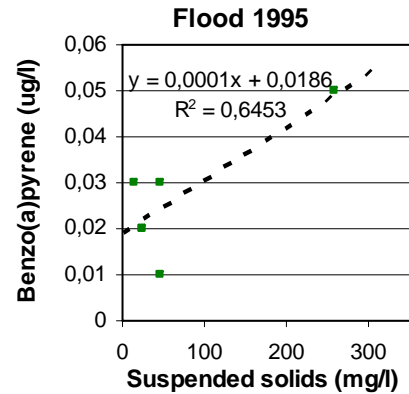
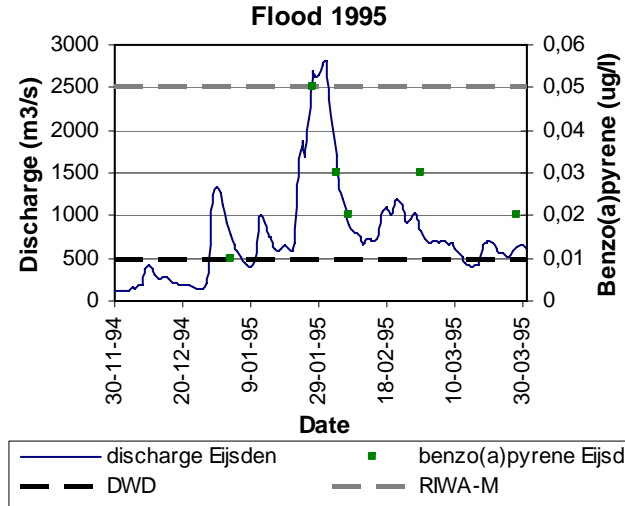
### B4.8 Total arsenic



| location | flood             | period                      | median<br>As<br>(µg/l) | mean<br>As<br>(µg/l) | min<br>As<br>(µg/l) | max<br>As<br>(µg/l) | n        | n ><br>2 µg/l<br>RIWA-M | n ><br>10 µg/l<br>DWD | n ><br>20 µg/l<br>BKMO | n ><br>32 µg/l<br>MKE/WFD(04) |
|----------|-------------------|-----------------------------|------------------------|----------------------|---------------------|---------------------|----------|-------------------------|-----------------------|------------------------|-------------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        | 1.7                    | 2.2                  | 1.1                 | 4.1                 | 6        | 2                       | 0                     | 0                      | 0                             |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  | <b>0.8</b>             | <b>0.7</b>           | <b>0.1</b>          | <b>1.4</b>          | <b>6</b> | <b>0</b>                | <b>0</b>              | <b>0</b>               | <b>0</b>                      |
|          | reference         | 21-1-1994/22-2-1994         | 1.6                    | 1.5                  | 0.6                 | 2.5                 | 5        | 1                       | 0                     | 0                      | 0                             |
| Eijsden  | reference         | 30-11-1994/20-1-1995        |                        |                      |                     |                     | 0        |                         |                       |                        |                               |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  |                        |                      |                     |                     | 0        |                         |                       |                        |                               |
|          | reference         | 12-2-1995/31-3-1995         |                        |                      |                     |                     | 0        |                         |                       |                        |                               |
| Eijsden  | reference         | 4-11-2002/19-12-2002        | 1.9                    | 3.9                  | 1.5                 | 16.0                | 7        | 3                       | 1                     | 0                      | 0                             |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> | <b>1.9</b>             | <b>2.7</b>           | <b>1.6</b>          | <b>5.2</b>          | <b>4</b> | <b>2</b>                | <b>0</b>              | <b>0</b>               | <b>0</b>                      |
|          | reference         | 15-1-2002/4-3-2003          | 2.0                    | 2.0                  | 1.7                 | 2.3                 | 6        | 2                       | 0                     | 0                      | 0                             |

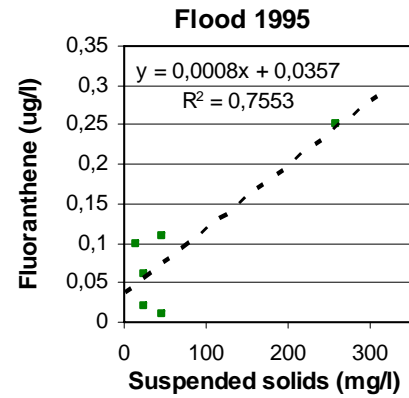
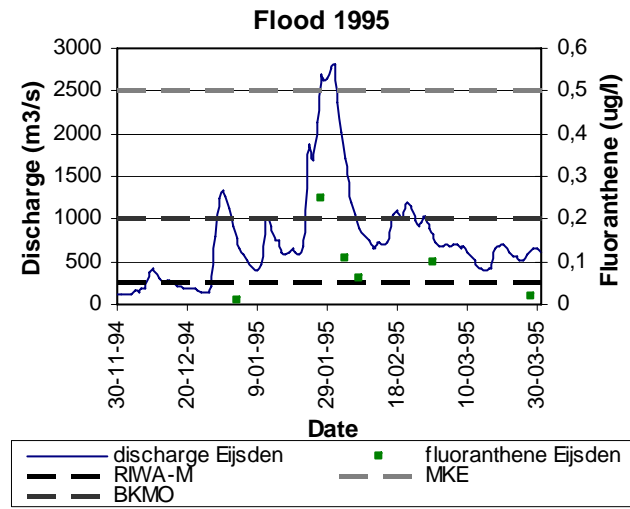
# Addendum B5: Polycyclic aromatic hydrocarbons (PAHs) during floods

## B5.1 Benzo(a)pyrene



| location | flood             | period                      | median<br>B(a)pyr<br>(µg/l) | mean<br>B(a)pyr<br>(µg/l) | min<br>B(a)pyr<br>(µg/l) | max<br>B(a)pyr<br>(µg/l) | n        | n ><br>0.01 µg/l<br>DWD | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.1 µg/l<br>WFD(06) | n ><br>0.2 µg/l<br>MKE |
|----------|-------------------|-----------------------------|-----------------------------|---------------------------|--------------------------|--------------------------|----------|-------------------------|----------------------------|----------------------------|------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        |                             |                           |                          |                          | 0        |                         |                            |                            |                        |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  |                             |                           |                          |                          | <b>0</b> |                         |                            |                            |                        |
|          | reference         | 21-1-1994/22-2-1994         |                             |                           |                          |                          | 0        |                         |                            |                            |                        |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 0.010                       | 0.010                     | 0.010                    | 0.010                    | 1        | 0                       | 0                          | 0                          | 0                      |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>0.030</b>                | <b>0.033</b>              | <b>0.020</b>             | <b>0.050</b>             | <b>3</b> | <b>3</b>                | <b>0</b>                   | <b>0</b>                   | <b>0</b>               |
|          | reference         | 12-2-1995/31-3-1995         | 0.025                       | 0.025                     | 0.020                    | 0.030                    | 2        | 2                       | 0                          | 0                          | 0                      |
| Eijsden  | reference         | 4-11-2002/19-12-2002        |                             |                           |                          |                          | 0        |                         |                            |                            |                        |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> |                             |                           |                          |                          | <b>0</b> |                         |                            |                            |                        |
|          | reference         | 15-1-2002/4-3-2003          |                             |                           |                          |                          | 0        |                         |                            |                            |                        |

## B5.2 Fluoranthene



| location | flood             | period                      | median<br>F-anth<br>(µg/l) | mean<br>F-anth<br>(µg/l) | min<br>F-anth<br>(µg/l) | max<br>F-anth<br>(µg/l) | n        | n ><br>0.05 µg/l<br>RIWA-M | n ><br>0.2 µg/l<br>BKMO | n ><br>0.5 µg/l<br>MKE | n ><br>1 µg/l<br>WFD(06) |
|----------|-------------------|-----------------------------|----------------------------|--------------------------|-------------------------|-------------------------|----------|----------------------------|-------------------------|------------------------|--------------------------|
| Eijsden  | reference         | 22-10-1993/6-12-1993        |                            |                          |                         |                         | 0        |                            |                         |                        |                          |
|          | <b>flood 1993</b> | <b>7-12-1993/20-1-1994</b>  |                            |                          |                         |                         | <b>0</b> |                            |                         |                        |                          |
|          | reference         | 21-1-1994/22-2-1994         |                            |                          |                         |                         | 0        |                            |                         |                        |                          |
| Eijsden  | reference         | 30-11-1994/20-1-1995        | 0.010                      | 0.010                    | 0.010                   | 0.010                   | 1        | 0                          | 0                       | 0                      | 0                        |
|          | <b>flood 1995</b> | <b>21-1-1995/11-2-1995</b>  | <b>0.110</b>               | <b>0.140</b>             | <b>0.060</b>            | <b>0.250</b>            | <b>3</b> | <b>3</b>                   | <b>1</b>                | <b>0</b>               | <b>0</b>                 |
|          | reference         | 12-2-1995/31-3-1995         | 0.060                      | 0.060                    | 0.020                   | 0.100                   | 2        | 1                          | 0                       | 0                      | 0                        |
| Eijsden  | reference         | 4-11-2002/19-12-2002        |                            |                          |                         |                         | 0        |                            |                         |                        |                          |
|          | <b>flood 2003</b> | <b>20-12-2002/14-1-2003</b> |                            |                          |                         |                         | <b>0</b> |                            |                         |                        |                          |
|          | reference         | 15-1-2002/4-3-2003          |                            |                          |                         |                         | 0        |                            |                         |                        |                          |

## Addendum C1: Discharge projections of Meuse for 2050

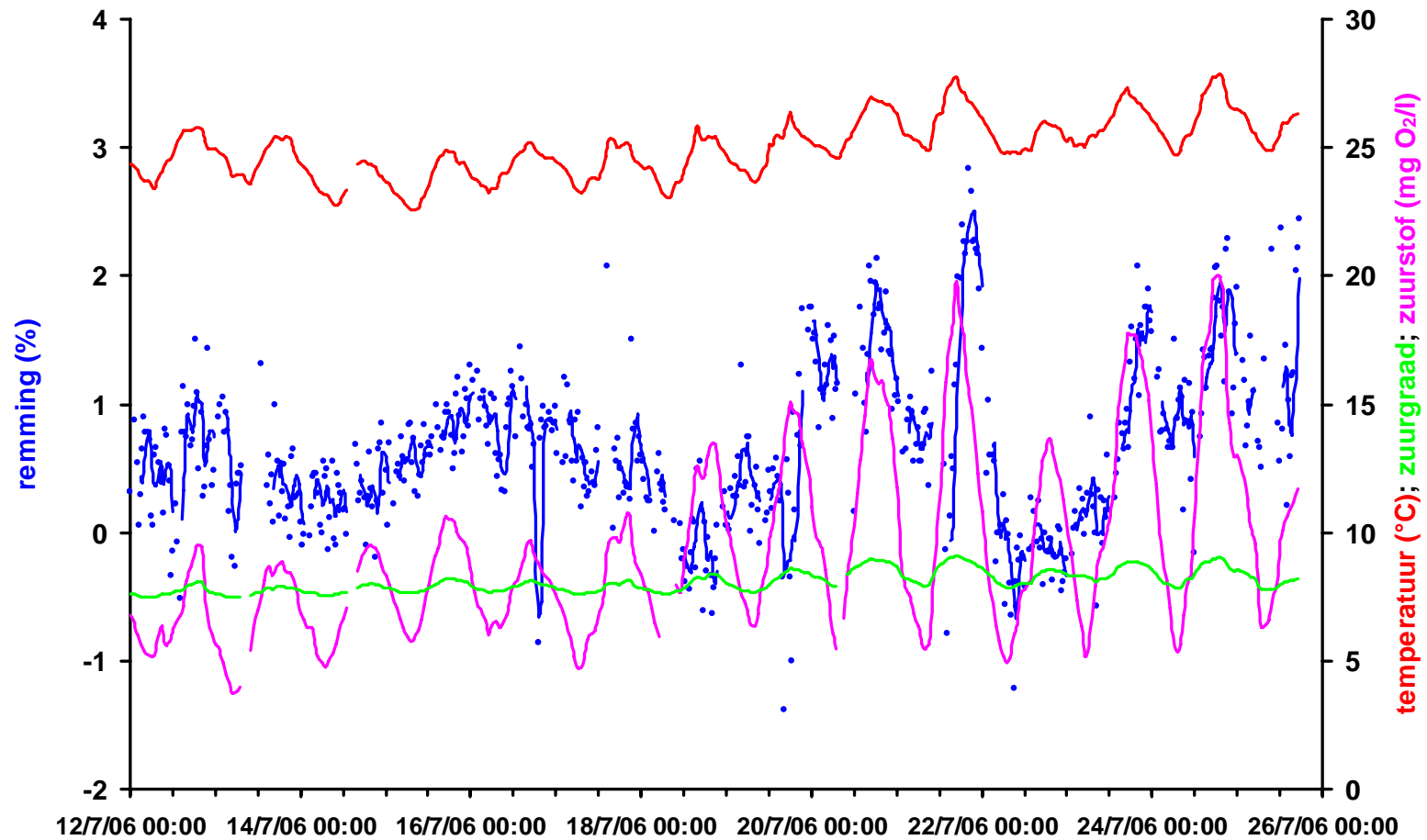
The relative changes in discharge (%) at Borgharen between the control run (1967-1995) and scenario run (2050) on 10-day basis for the three climate change scenarios (Van Deursen, 2002,2003)

| 10 day | date   | (Können, 2001) |           | (Beersma et al., 2004)   |
|--------|--------|----------------|-----------|--------------------------|
|        |        | +1 °C (%)      | +2 °C (%) | dry climate scenario (%) |
| 1      | 1-jan  | 13.3           | 26.7      | -3.41                    |
| 2      | 11-jan | 11.8           | 23.6      | -0.71                    |
| 3      | 21-jan | 12.4           | 24.9      | 9.23                     |
| 4      | 1-feb  | 9.6            | 19.1      | 9.48                     |
| 5      | 11-feb | 10.1           | 20.2      | 8.44                     |
| 6      | 21-feb | 8.0            | 16.0      | 5.10                     |
| 7      | 1-mrt  | 8.6            | 17.3      | 5.77                     |
| 8      | 11-mrt | 8.8            | 17.6      | 4.81                     |
| 9      | 21-mrt | 9.5            | 19.0      | 3.32                     |
| 10     | 1-apr  | 8.2            | 16.5      | -0.60                    |
| 11     | 11-apr | 8.0            | 16.0      | -3.29                    |
| 12     | 21-apr | 8.8            | 17.5      | -4.74                    |
| 13     | 1-mei  | 4.4            | 8.8       | -8.01                    |
| 14     | 11-mei | 3.9            | 7.7       | -10.78                   |
| 15     | 21-mei | 3.6            | 7.2       | -12.58                   |
| 16     | 1-jun  | 3.4            | 6.7       | -15.34                   |
| 17     | 11-jun | 3.7            | 7.3       | -16.97                   |
| 18     | 21-jun | 2.2            | 4.5       | -24.96                   |

| 10 day | date   | (Können, 2001) |           | (Beersma et al., 2004)   |
|--------|--------|----------------|-----------|--------------------------|
|        |        | +1 °C (%)      | +2 °C (%) | dry climate scenario (%) |
| 19     | 1-jul  | 0.7            | 1.4       | -27.36                   |
| 20     | 11-jul | 0.4            | 0.8       | -28.69                   |
| 21     | 21-jul | 0.2            | 0.4       | -31.27                   |
| 22     | 1-aug  | -0.6           | -1.2      | -31.52                   |
| 23     | 11-aug | -1.3           | -2.5      | -33.50                   |
| 24     | 21-aug | -0.9           | -1.8      | -30.13                   |
| 25     | 1-sep  | -2.2           | -4.5      | -28.85                   |
| 26     | 11-sep | -3.1           | -6.1      | -29.60                   |
| 27     | 21-sep | -6.6           | -13.2     | -35.30                   |
| 28     | 1-okt  | 0.0            | -0.1      | -47.26                   |
| 29     | 11-okt | 2.6            | 5.2       | -48.95                   |
| 30     | 21-okt | 2.0            | 4.0       | -34.06                   |
| 31     | 1-nov  | -2.5           | -5.1      | -41.71                   |
| 32     | 11-nov | -1.6           | -3.3      | -42.88                   |
| 33     | 21-nov | -1.2           | -2.5      | -27.35                   |
| 34     | 1-dec  | 6.3            | 12.5      | -20.00                   |
| 35     | 11-dec | 8.5            | 16.9      | -10.19                   |
| 36     | 21-dec | 7.7            | 15.3      | -13.59                   |

# Addendum C2: Day-night fluctuations in oxygen concentrations in Meuse at Eijsden during heat wave of July 2006

(www.aqualarm.nl)





# Addendum C3: Concentration projections of conservative substances for 2050

Projected average concentrations at Eijsden (2050) throughout the year for present-day discharge regime and emissions (black), altered discharge regime under climate change with current emissions (red), and altered discharge regime under climate change with emission reduction of 20% in chemical load and 10% in background concentration (green)

