Title: Nutrient export from Finnish rivers into the Baltic Sea has not decreased despite water protection measures

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Table S1. Land cover characteristics and runoff.

| Basin number | River           | Area km² | Runoff mm | Water % | Field % | Forest % | Urban % | Peatland % | Open Peatland % | Ditched % |
|--------------|-----------------|----------|-----------|---------|---------|----------|---------|------------|-----------------|-----------|
| 4            | VIJOKSI         | 61466    | 319       | 19      | 5       | 45       | 3       | 14         | 13              | 19        |
| 11           | VIRONJOKI       | 357      | 392       | 3       | 15      | 54       | 4       | 10         | 15              | 13        |
| 14           | KYMIOKI         | 37159    | 262       | 18      | 7       | 49       | 4       | 8          | 13              | 13        |
| 16           | KOSKENKLÄNKOKI  | 895      | 287       | 4       | 30      | 40       | 6       | 3          | 17              | 5         |
| 18           | PORVOONJOKI     | 1273     | 320       | 2       | 31      | 38       | 10      | 3          | 17              | 5         |
| 19           | MUSTIOKI        | 783      | 283       | 2       | 30      | 39       | 8       | 6          | 15              | 8         |
| 21           | VANTAANJOKI     | 1686     | 303       | 2       | 25      | 37       | 20      | 4          | 13              | 7         |
| 23           | KARJAANJOKI     | 2046     | 289       | 11      | 18      | 46       | 9       | 3          | 12              | 6         |
| 24           | KISKANJOKI      | 1047     | 312       | 6       | 23      | 48       | 7       | 5          | 12              | 8         |
| 25           | USKELANJOKI     | 566      | 328       | 1       | 43      | 34       | 9       | 4          | 10              | 6         |
| 27           | PAIMONJOKI      | 1088     | 276       | 2       | 43      | 34       | 8       | 4          | 10              | 7         |
| 28           | AURAJOKI        | 874      | 288       | 1       | 37      | 33       | 12      | 7          | 11              | 10        |
| 34           | EURAJOKI        | 1336     | 236       | 13      | 23      | 39       | 7       | 8          | 10              | 12        |
| 35           | KOKEMÄENJOKI    | 27046    | 281       | 11      | 16      | 46       | 6       | 9          | 12              | 13        |
| 37           | LAPVÄRTINJOKI   | 1098     | 409       | 0       | 13      | 50       | 3       | 22         | 11              | 32        |
| 39           | NÄRPÄNJOKI      | 992      | 291       | 1       | 21      | 47       | 4       | 16         | 11              | 23        |
| 42           | KYRÖNJOKI       | 4923     | 275       | 1       | 25      | 36       | 5       | 19         | 13              | 24        |
| 44           | LAPAIANJOKI     | 4122     | 245       | 3       | 22      | 39       | 5       | 18         | 14              | 25        |
| 49           | PERHONJOKI      | 2524     | 300       | 3       | 10      | 38       | 3       | 30         | 16              | 38        |
| 51           | LESTIJOKI       | 1373     | 283       | 6       | 11      | 39       | 2       | 25         | 17              | 36        |
| 53           | KALAIKOKI       | 4247     | 306       | 2       | 16      | 47       | 3       | 17         | 15              | 31        |
| 54           | PYHÄJOKI        | 3712     | 276       | 5       | 10      | 50       | 3       | 18         | 13              | 35        |
| 57           | SIIMAJOI        | 4218     | 310       | 2       | 9       | 45       | 2       | 32         | 10              | 52        |
| 59           | OULIJOKI        | 22845    | 359       | 12      | 3       | 44       | 2       | 23         | 17              | 36        |
| 60           | KIIMINGIJOI     | 3814     | 367       | 3       | 2       | 39       | 2       | 40         | 14              | 53        |
| 61           | ILIOI           | 14191    | 375       | 6       | 2       | 42       | 1       | 31         | 18              | 42        |
| 63           | KUVIJOI         | 1355     | 388       | 3       | 2       | 40       | 1       | 40         | 15              | 57        |
| 64           | SIMIJOKI        | 3160     | 427       | 6       | 2       | 37       | 1       | 39         | 16              | 52        |
| 65           | KUMIJOI         | 51127    | 348       | 4       | 1       | 52       | 1       | 24         | 18              | 37        |
| 67           | TORNIOJOKI      | 34781    | 381       | 5       | 1       | 49       | 1       | 19         | 25              | 34        |

1) Source: Geological Survey of Finland
| Basin number | River          | Parameter | Flow vs. concentration | Number of annual samples |
|-------------|---------------|-----------|------------------------|--------------------------|
| 4           | VUOKSI        | TN        | 0.013                  | 32 36 33 25 23 25 26 24 24 23 24 24 27 27 27 22 23 28 30 22 12 |
| 11          | VIROISI       | TN        | 0.534                  | 6 6 7 15 18 16 15 14 20 11 17 12 12 11 11 12 10 10 9 13 |
| 14          | KYMIOIUKI     | TN        | 0.037                  | 27 32 35 27 28 30 26 26 25 23 30 26 23 24 23 32 22 21 21 16 13 |
| 16          | KOSKENKYLVJOKI| TN        | 0.017                  | 17 17 27 23 28 29 24 24 21 24 27 28 23 27 22 21 20 26 22 22 19 |
| 18          | PORVOONJOKI   | TN        | 0.095                  | 14 12 24 21 25 26 21 24 21 25 27 28 23 27 22 21 20 25 26 22 22 19 |
| 19          | MUSTIOIUKI    | TN        | 0.293                  | 14 23 14 20 25 26 21 24 21 25 27 28 23 27 22 21 20 25 26 22 22 19 |
| 21          | VANTAANJOKI   | TN        | 0.292                  | 14 12 24 20 25 29 22 24 21 25 27 29 22 31 25 24 23 26 22 22 21 19 |
| 23          | KARIAANJOKI   | TN        | 0.083                  | 19 17 27 26 22 31 22 26 26 25 25 28 30 27 30 25 22 20 23 21 27 20 13 |
| 24          | KSIKONJOKI    | TN        | 0.438                  | 12 13 12 16 13 21 22 21 20 22 20 24 22 22 25 22 21 21 21 17 21 20 13 |
| 25          | USKELANJOKI   | TN        | 0.528                  | 15 16 16 15 17 24 25 23 25 23 21 24 22 22 20 22 20 21 22 23 23 19 19 |
| 27          | PAIMIOJOKI    | TN        | 0.138                  | 15 15 15 15 17 20 25 22 24 23 23 26 24 25 27 24 24 21 22 22 19 20 |
| 28          | AURAJOIUKI    | TN        | 0.218                  | 28 30 28 38 35 25 43 39 28 33 27 30 39 43 52 46 52 49 49 44 37 34 24 |
| 34          | EURAJOKI      | TN        | 0.081                  | 18 21 16 26 20 21 20 21 17 26 15 21 19 25 26 19 19 19 27 25 24 18 10 14 |
| 35          | KOHEMAENJOIUKI| TN        | 0.376                  | 18 12 21 20 20 19 20 19 21 15 19 19 20 19 19 19 24 20 23 20 21 15 |
| 37          | LAPVAARTINJOKI| TN        | 0.534                  | 11 12 12 12 14 18 13 13 13 13 13 15 13 13 12 16 15 19 15 12 12 |
| 39          | NAPPOJOKI     | TN        | 0.314                  | 11 11 14 10 16 10 15 16 17 15 16 16 17 15 16 15 17 13 16 16 18 16 18 |
| 42          | KYRAJOIUKI    | TN        | 0.659                  | 15 14 15 17 18 15 17 15 17 17 15 15 13 15 13 15 13 15 14 13 13 13 |
| 44          | LAPJOKIUKI    | TN        | 0.567                  | 6 11 12 12 13 18 16 15 17 18 15 13 13 13 13 13 13 13 13 15 12 12 13 |
| 49          | PERHONJOKI    | TN        | 0.273                  | 14 15 12 18 17 16 15 17 13 14 13 13 19 16 13 17 17 14 15 14 12 14 |
| 51          | LESTIUKI      | TN        | 0.434                  | 15 15 10 19 13 16 18 17 13 14 13 13 17 16 15 18 18 17 13 16 17 14 13 13 |
| 52          | KALAJOKI      | TN        | 0.486                  | 16 15 12 15 13 21 15 14 14 15 14 18 19 15 15 17 16 16 13 13 13 13 |
| 54          | PIKAJOIUKI    | TN        | 0.565                  | 16 11 18 17 19 19 19 14 17 20 17 18 22 20 19 19 16 17 20 15 15 18 |
| 57          | SIKAJOIUKI    | TN        | 0.609                  | 18 22 25 22 23 23 25 20 23 25 19 16 18 18 20 17 13 15 13 14 14 13 |
| 59          | OULLUJOIUKI   | TN        | -0.114                 | 14 22 21 20 22 22 20 20 14 14 14 14 16 13 13 13 13 13 16 13 12 12 |
| 60          | KIMINGINJOKI  | TN        | 0.309                  | 15 14 20 26 24 24 22 18 21 17 18 18 17 17 15 14 12 13 13 13 13 13 |
| 61          | UIKOIUKI      | TN        | 0.431                  | 18 16 21 19 23 24 23 19 18 17 18 17 18 17 16 14 14 14 14 14 14 14 |
| 63          | KUVAJOKI      | TN        | -0.207                 | 13 14 18 18 18 25 26 23 22 18 17 19 18 17 17 14 13 14 12 11 10 4 14 |
| 64          | SIMIOJOKI     | TN        | 0.392                  | 16 12 17 17 17 17 16 20 22 19 19 14 13 13 13 13 13 14 13 13 13 13 |
| 65          | KEMIOJOKI     | TN        | 0.529                  | 16 12 17 17 17 18 18 19 18 18 15 15 15 14 14 13 14 14 14 14 14 13 |
| 67          | TORNIOJOKI    | TN        | 0.241                  | 15 18 16 17 17 17 16 18 18 17 18 20 22 22 20 17 17 18 18 17 18 17 17 |

Table S2. Pearson correlation (r) flow vs. TN & TP concentrations and the number of annual TN and TP analyses from 1995 to 2016,
Table S3. Trends in riverine TN, NH4-N, NO2,3-N, TP, PO4-P and suspended solids concentrations in 1995–2016. Downward arrow indicates statistically significant (p<0.05) decrease and upward arrow statistically significant increase. Only statistically significant slopes and trends are shown.

| River          | Basin no | p Slope | Trend | p Slope | Trend | p Slope | Trend | p Slope | Trend | p Slope | Trend | Suspended solids |
|----------------|----------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|------------------|
| VUOKSI         | 4        | 0.320   | 0.003 | -0.08 ↘ | 0.973 | 0.014   | -0.04 ↘ | 0.308 |
| VYIJOJKI       | 11       | 0.322   | 0.002 | -0.75 ↘ | 0.18  | 0.832   | 0.298 | 0.444 |
| KYMIJOKI       | 14       | 0.747   | 0.000 | -0.88 ↘ | 0.002 | 2.64     | 0.216 | 0.211 |
| KOSKENYLÄJOKI  | 16       | 0.040   | 14.1  | 0.190 | 0.595 | 0.002   | 1.84 ✔ | 0.009 | 1.14 ✔ |
| PORVOONJOKI    | 18       | 0.042   | -35.0 | -0.12 ↘ | 0.335 | 0.018   | -0.31 ▼ | 0.686 |
| MUSTJOJKI      | 19       | 0.954   | 0.000 | 1.22  ▼ | 0.041 | -13.9 ▼ | 0.363 | 0.338 |
| VANTAANJOKI    | 21       | 0.017   | -18.2 | 0.190 | 0.469 | 0.355   | 0.148 | 0.169 |
| KYMIJOKI       | 23       | 0.979   | 0.000 | -3.17 ▼ | 0.979 | 0.063   | 0.758 | 0.686 |
| KISSJOJKI      | 24       | 0.479   | 0.057 | 0.099 | 0.464 | 0.346   | 0.436 | 0.479 |
| USKELANJOKI    | 25       | 0.113   | 0.002 | -2.27 ▼ | 0.080 | 0.602   | 0.046 | 0.422 |
| PAIMIONJOKI    | 27       | 0.942   | 0.572 | 0.845 | 0.583 | 0.239   | 0.15  | 0.649 |
| AURAJOKI       | 28       | 0.675   | 0.799 | 0.747 | 0.386 | 0.162   | 0.17  | 0.075 |
| EURAJOKI       | 34       | 0.971   | 0.021 | -3.00 ▼ | 0.456 | 0.054   | 0.127 | 0.010 | -0.28 ▼ |
| KOKEMÄNJOJKI   | 35       | 0.450   | 0.001 | -1.86 ▼ | 0.028 | 5.68 ▲  | 0.001 | 0.008 | -0.20 ▼ |
| LAPVÄÄRTINJOKI | 37       | 0.399   | 0.000 | -1.60 ▼ | 0.633 | 0.109   | 0.059 | 0.549 |
| NÄRPJONJOKI    | 39       | 0.003   | 22.7  ▲ | 0.000 | 35.4 ▲  | 0.001 | 1.89 ▲  | 0.000 | 0.414 |
| KYRÖNJOJKI     | 42       | 0.069   | 0.001 | -3.33 ▼ | 0.028 | 17.5 ▲  | 0.071 | 0.612 |
| LAPJONJOKI     | 44       | 0.643   | 0.000 | -4.45 ▼ | 0.040 | 8.22 ▲  | 0.013 | 0.633 |
| PERHONJOKI     | 49       | 0.265   | 0.001 | -1.82 ▼ | 0.340 | 0.148   | 0.930 | 0.719 |
| LESTIJOJKI     | 51       | 0.836   | 0.001 | -1.13 ▼ | 0.440 | 0.009   | 0.59 ▼  | 0.038 | -0.20 ▼ |
| KALAJOKI       | 53       | 0.212   | 0.002 | -1.20 ▼ | 0.402 | 0.001   | -1.05 ▼  | 0.117 | -0.20 ▼ |
| PYYHÄJOJKI     | 54       | 0.156   | 0.028 | -0.40 ▼ | 0.589 | 0.925   | 0.984 | 0.922 |
| SIKAJOJKI      | 57       | 0.022   | 9.5   ▲ | 0.032 | 0.533 | 0.402   | 0.631 | 0.047 |
| OULUJOJKI      | 59       | 0.003   | 3.2   ▲ | 0.001 | 0.29 ▼  | 0.045 | 0.58 ▲  | 0.361 | 0.945 |
| KIMINGINJOJKI  | 60       | 0.044   | 2.5   ▲ | 0.114 | 0.008 | 0.99 ▼  | 0.431 | 0.298 |
| IIIJOJKI       | 61       | 0.175   | 0.004 | -0.17 ▼ | 0.001 | -0.80 ▼  | 0.339 | 0.262 |
| KUIJAJOKI      | 63       | 0.018   | -4.4  ▼ | 0.000 | -0.57 ▼ | 0.001 | -3.23 ▼  | 0.315 | 0.030 | -0.14 ▼  |
| SIMOJOJKI      | 64       | 0.452   | 0.013 | -0.05 ▼ | 0.006 | -0.56 ▼  | 0.363 | 0.888 |
| KEMIJOJKI      | 65       | 0.521   | 0.063 | 0.435 | 0.099 | 0.482   | 0.000 | 0.633 |
| TORNIONJOKI    | 67       | 0.645   | 0.418 | 0.017 | -0.11 ▼ | 0.863 | 0.947 | 0.978 |

Trend: ▼ Decrease No change ▲ Increase
Fig. S1. Direct TN loads from point sources into different sea-regions from 1985 to 2016.

Fig. S2. Direct TP loads from point sources into different sea-regions from 1985 to 2016.
Figure S3. The average (years 2000–2016) TN and TP export in January-November and in December and the respective exports in 2015.