Närsaltkoncentrationer och trender i vattendrag kring Östersjön

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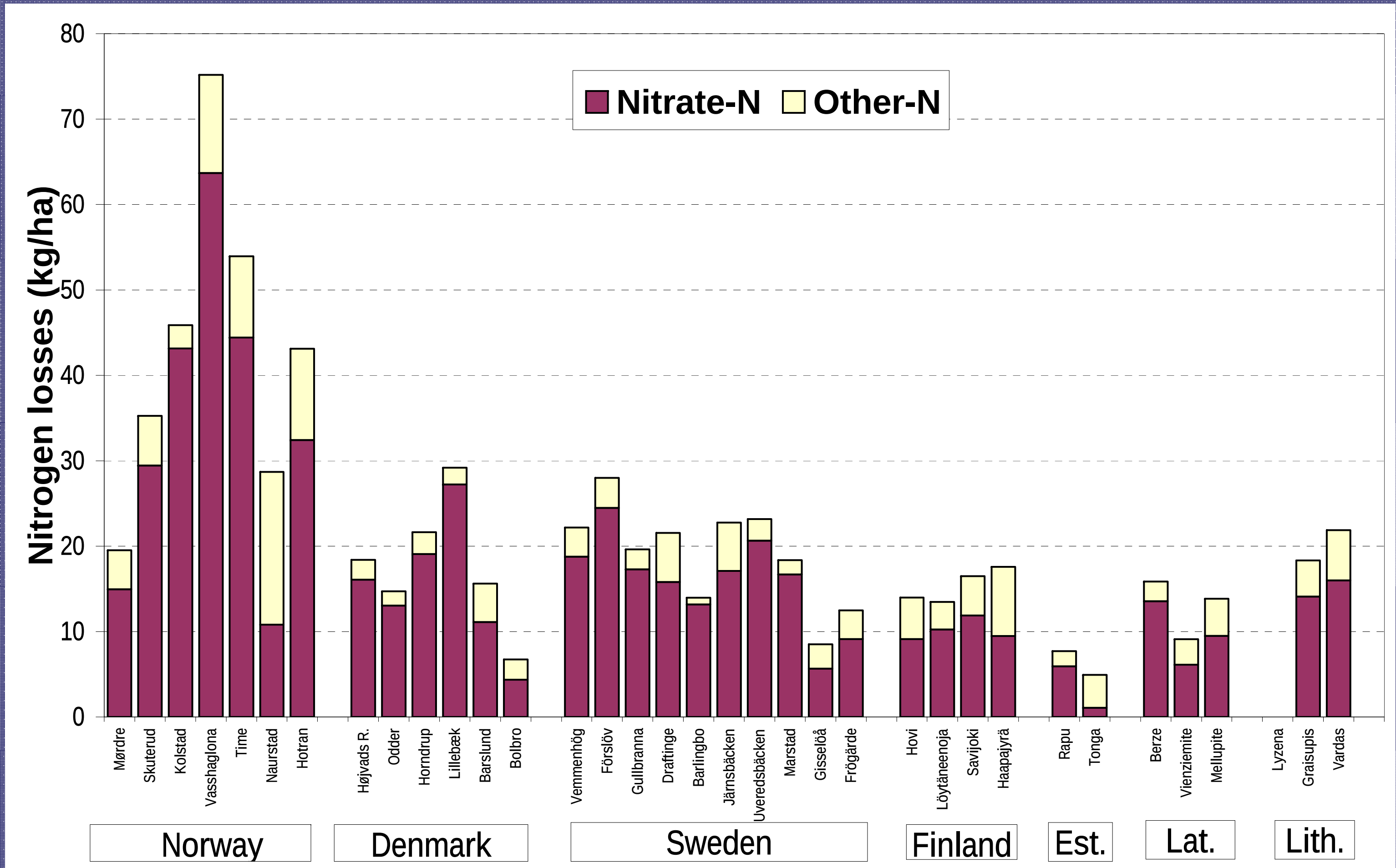
Outline

1. Variation in space
2. Variation in time
3. Retention from source to river mouth
4. Efficiency of mitigation measures
5. Concluding remarks

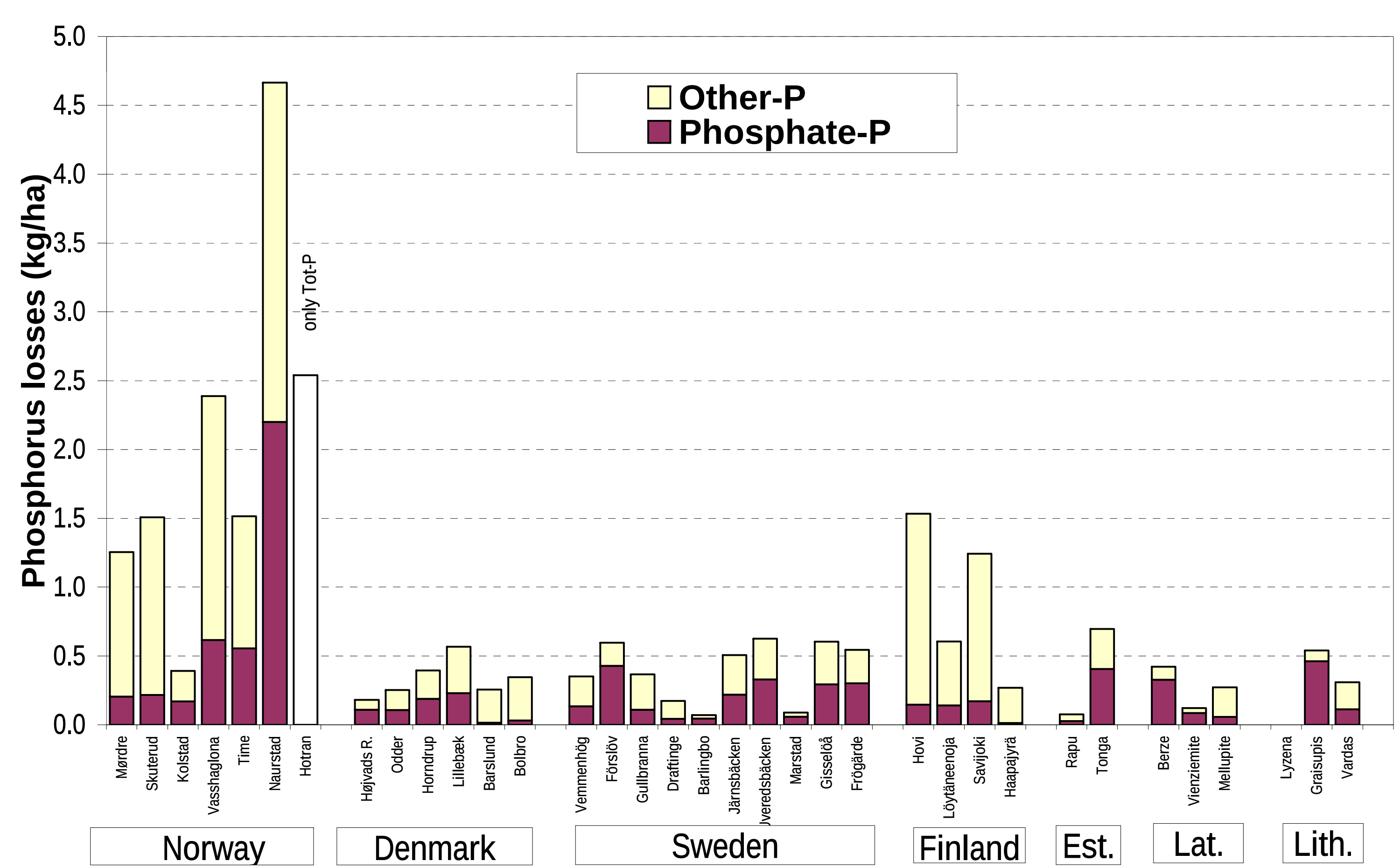
Part 1. Variation in space

Between catchment variability in N-losses (5-year mean) from 35 small agricultural catchments (12 to 2000 ha); Vagstad et al, (2004)



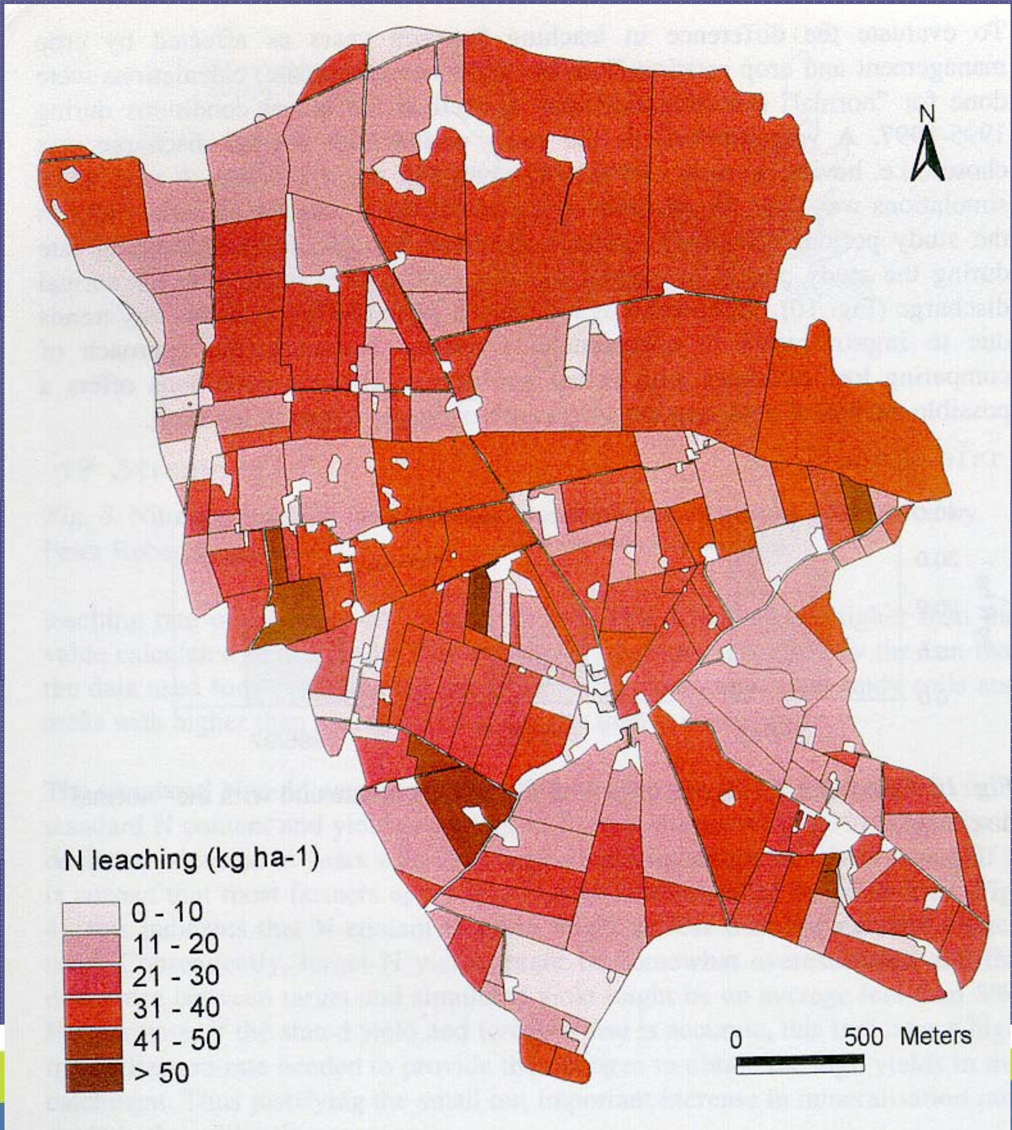
Vagstad et al., (2004)

<u>Between</u> catchment variability in P-losses (5-year mean) from 35 small agricultural catchments (12 to 2000 ha); Vagstad et al, (2004)



Vagstad et al., (2004)

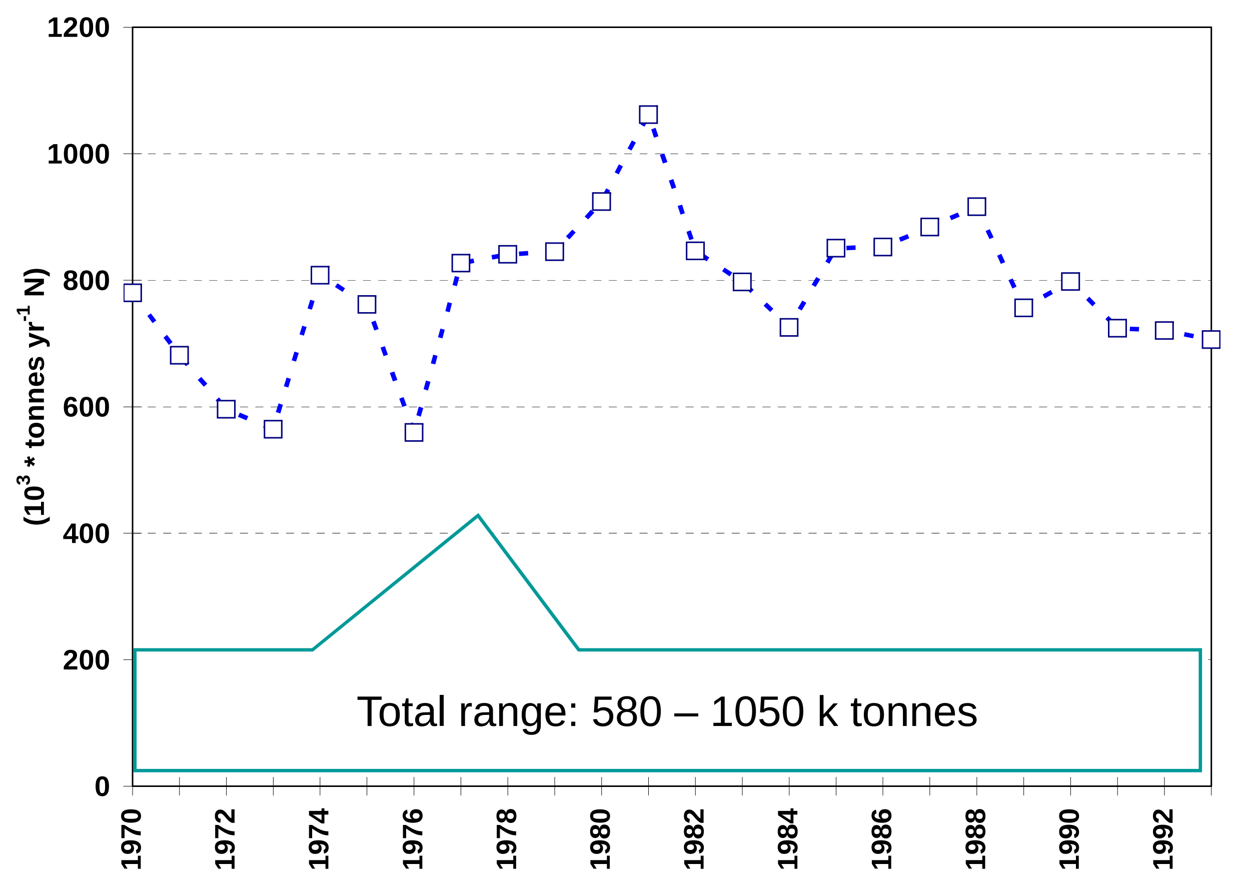
Modelled within catchment N-loss variability
(Sweden; Hoffmann&Johnsson)



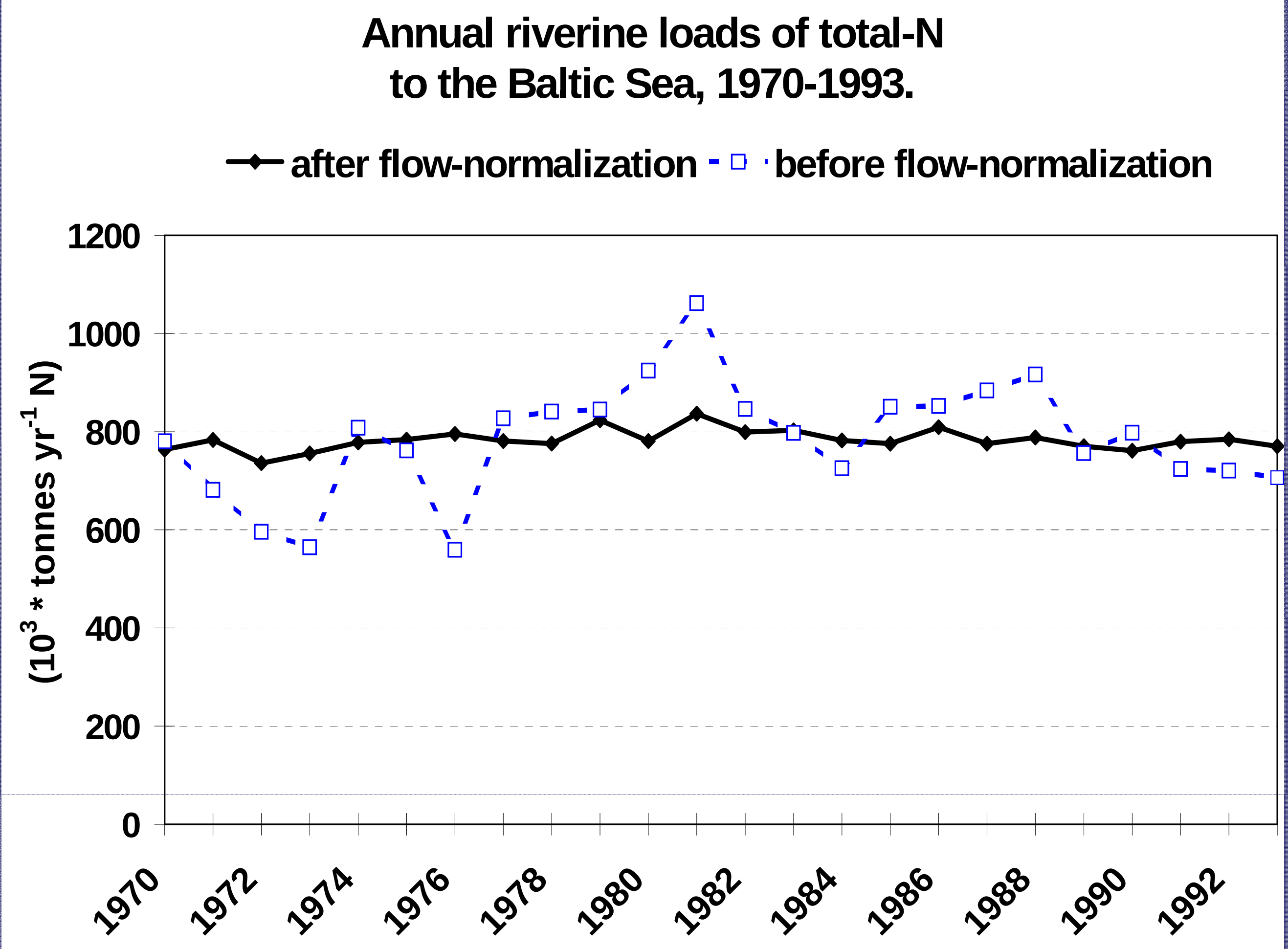
Part 2. Variation in time

A large interannual variation – Nitrogen loads to Baltic Sea 1970-1993

(Stålnacke et al., 1999)

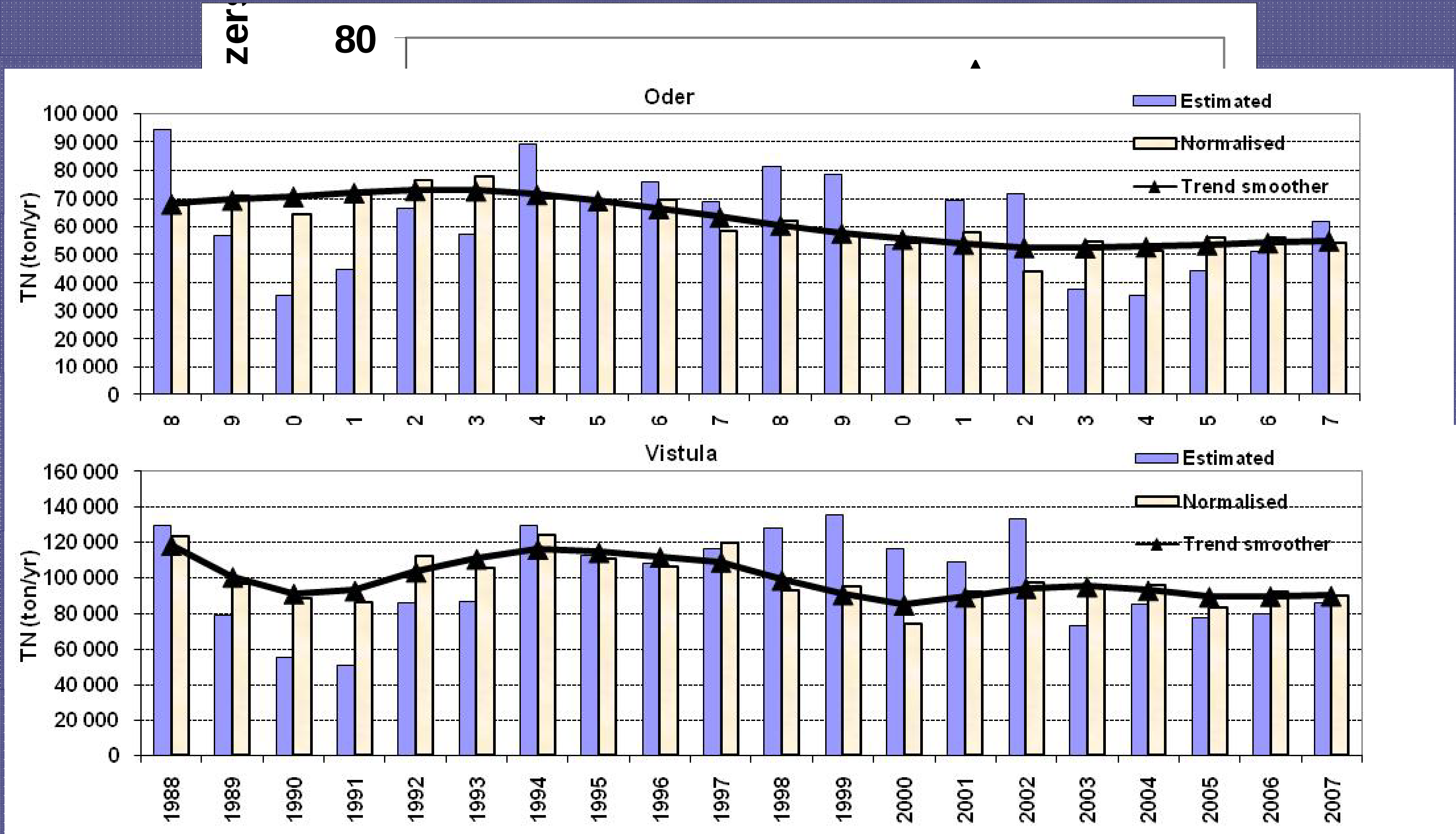


Natural variation often the cause

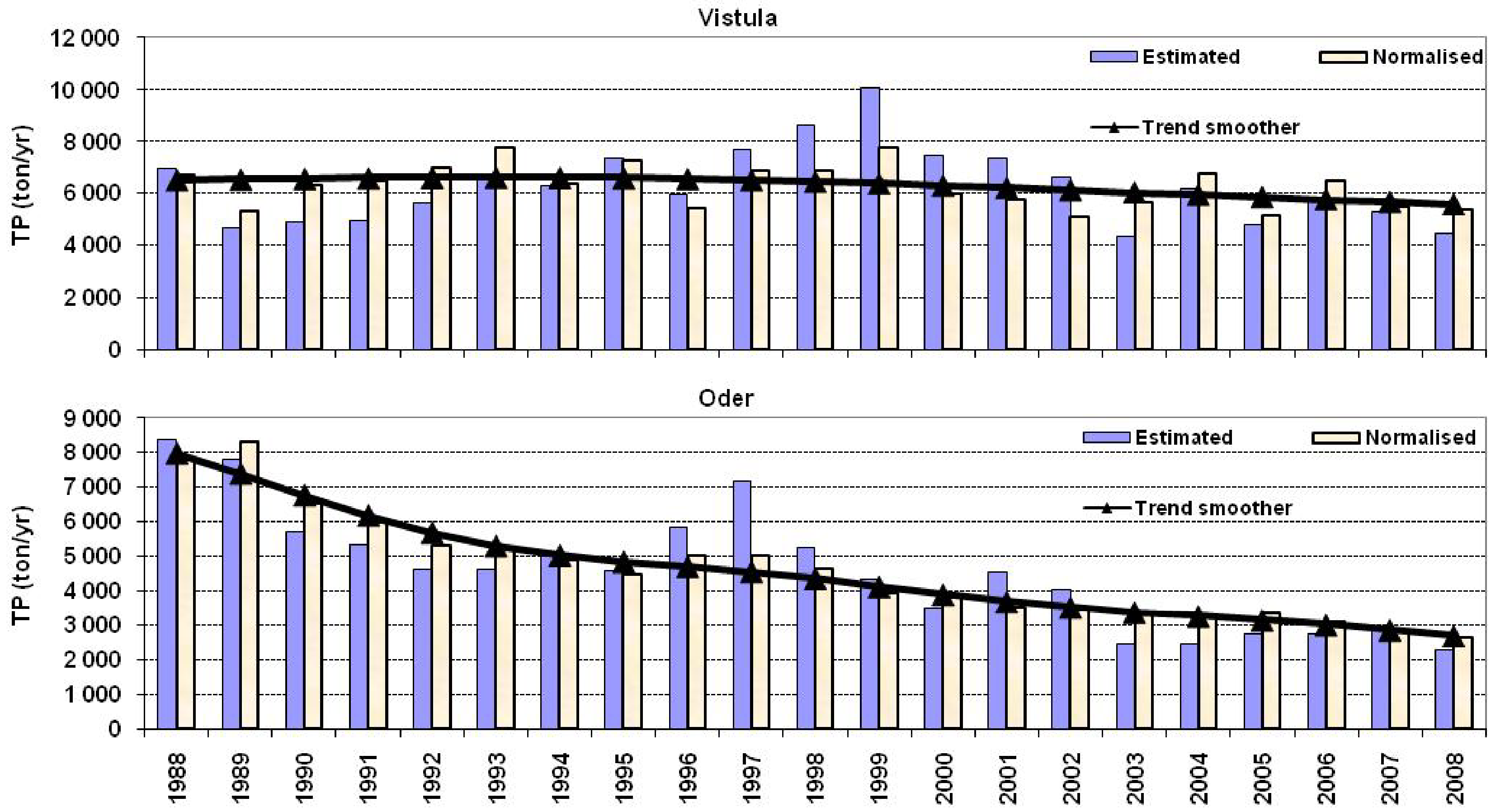


(Stålnacke et al., 1999)

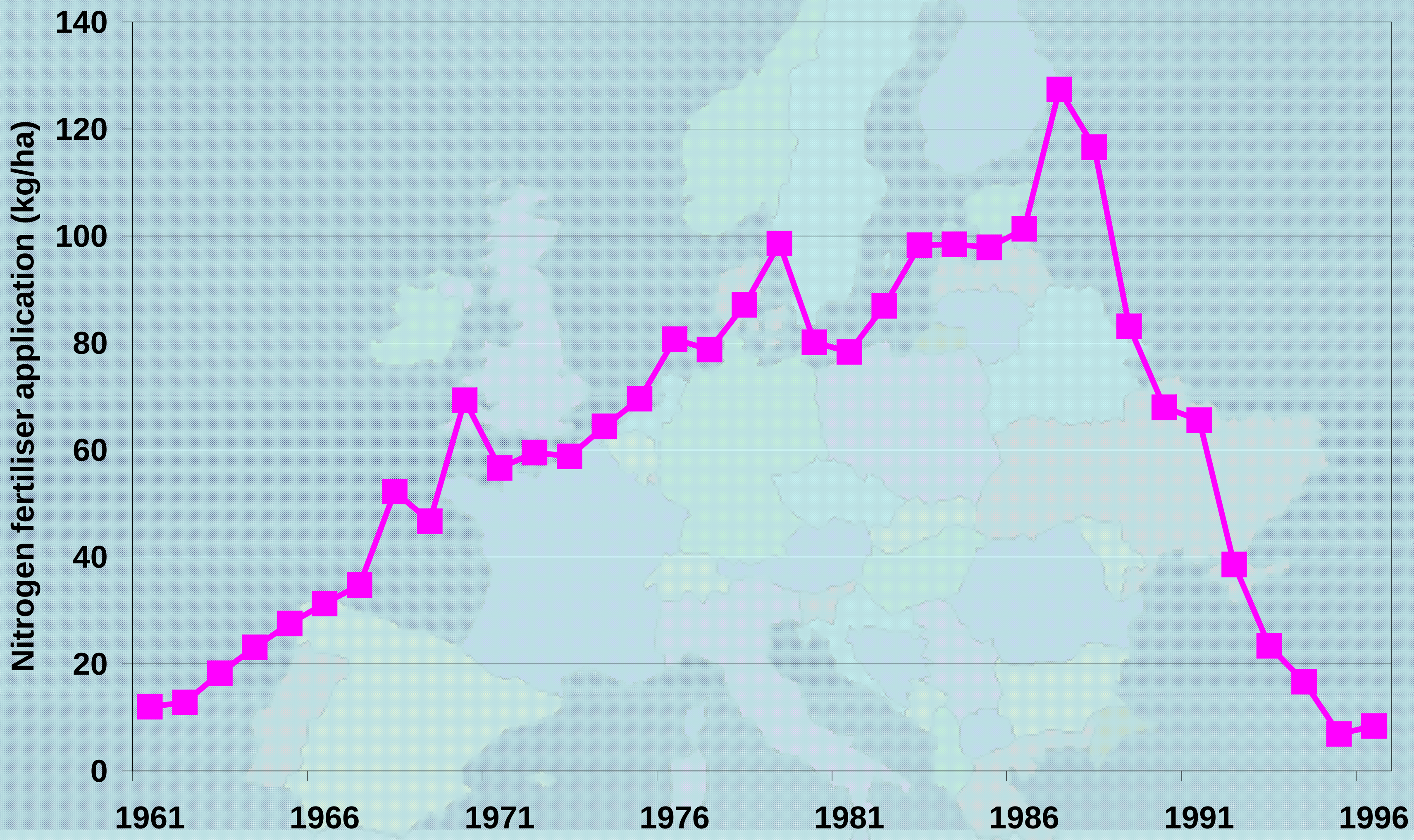
Nitrogen in the 2 large Polish rivers (Pastuszak, Stålnacke, submitted)



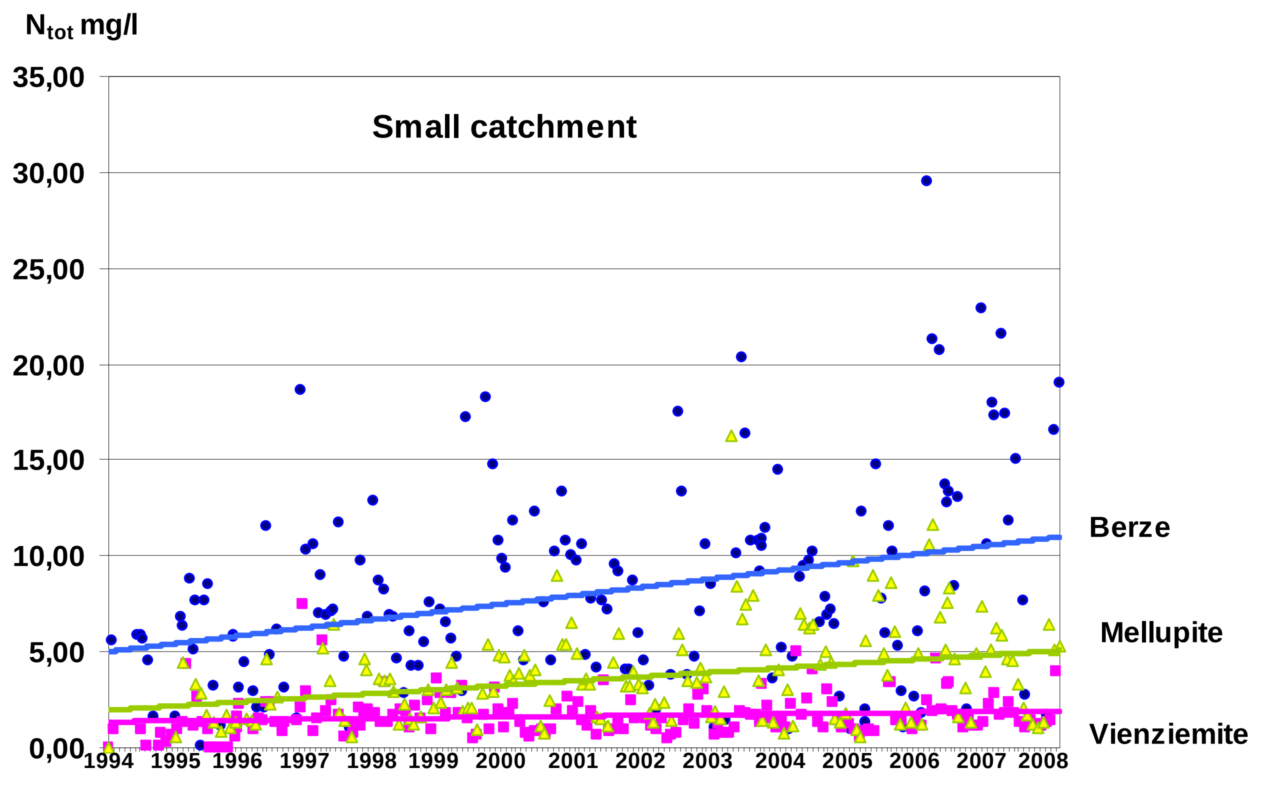
Phosphorus in the 2 large Polish rivers (Pastuszak, Stålnacke, submitted)



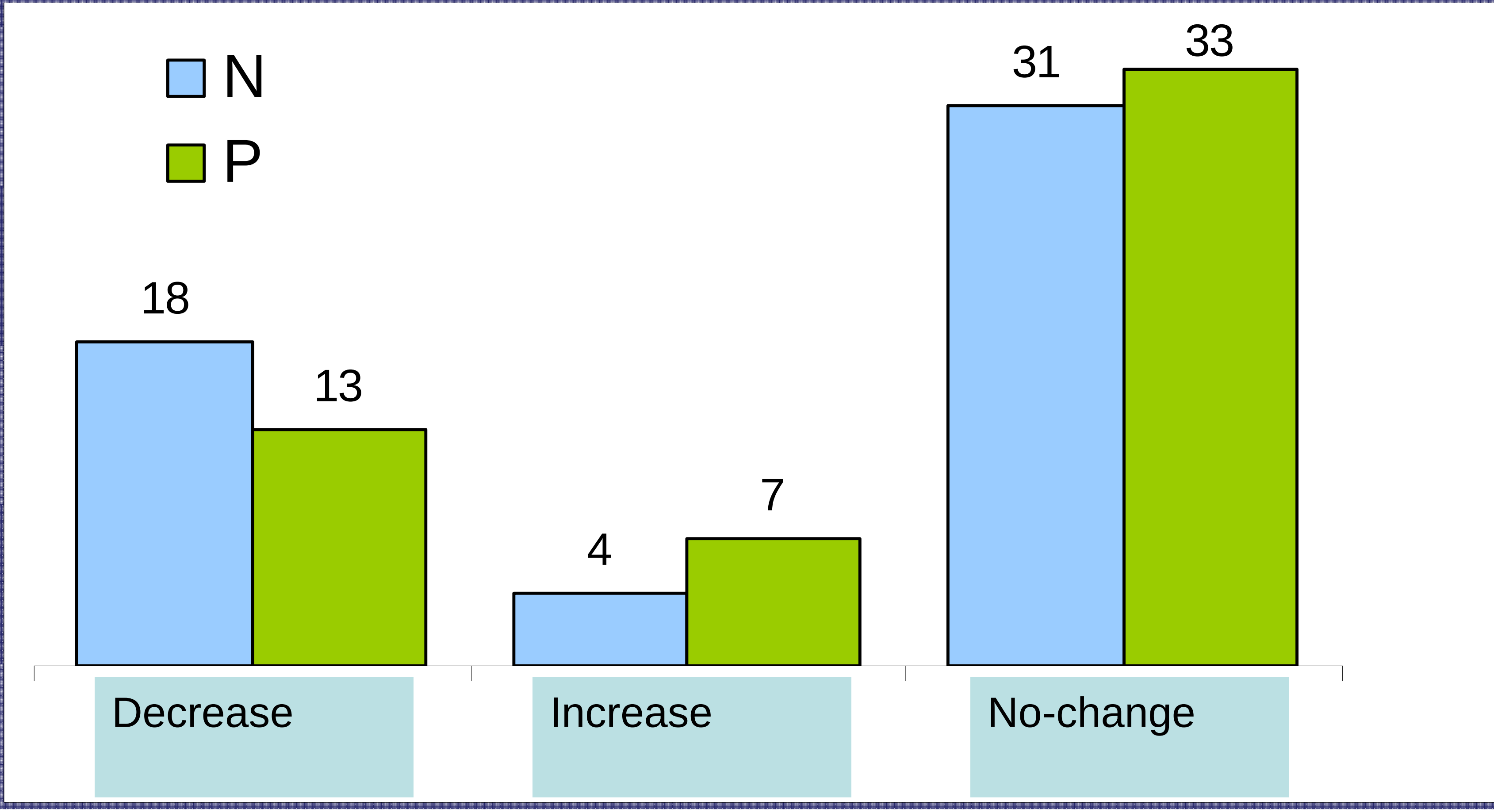
Large drop in commercial fertiliser use in Latvia (60-90%)



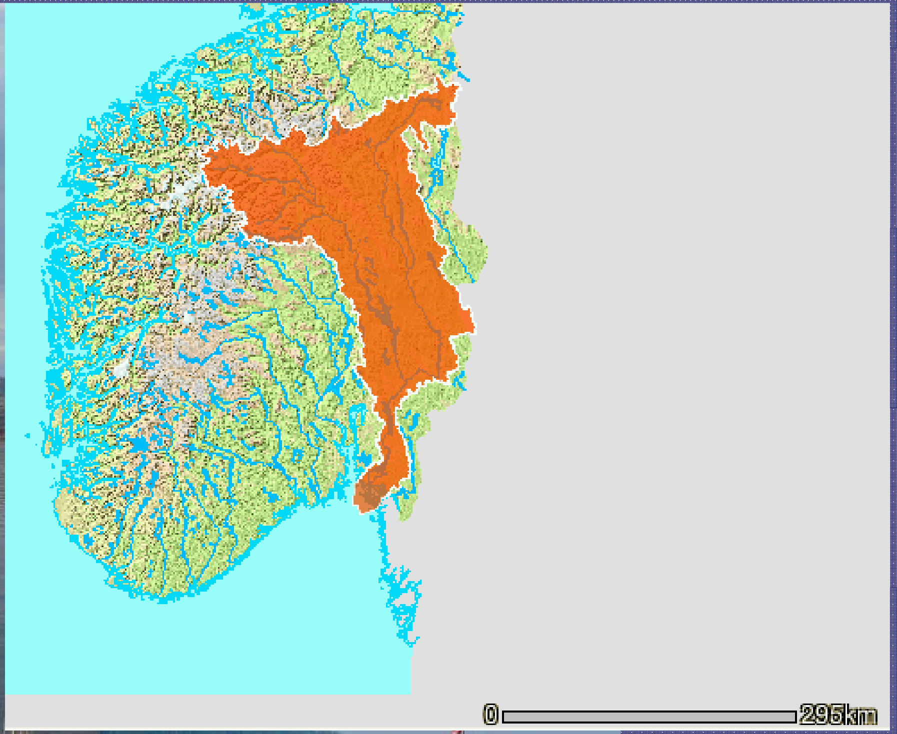
Long-term trends in nitrogen concentrations at 3 agricultural streams in Latvia (Jansons, unpublished)

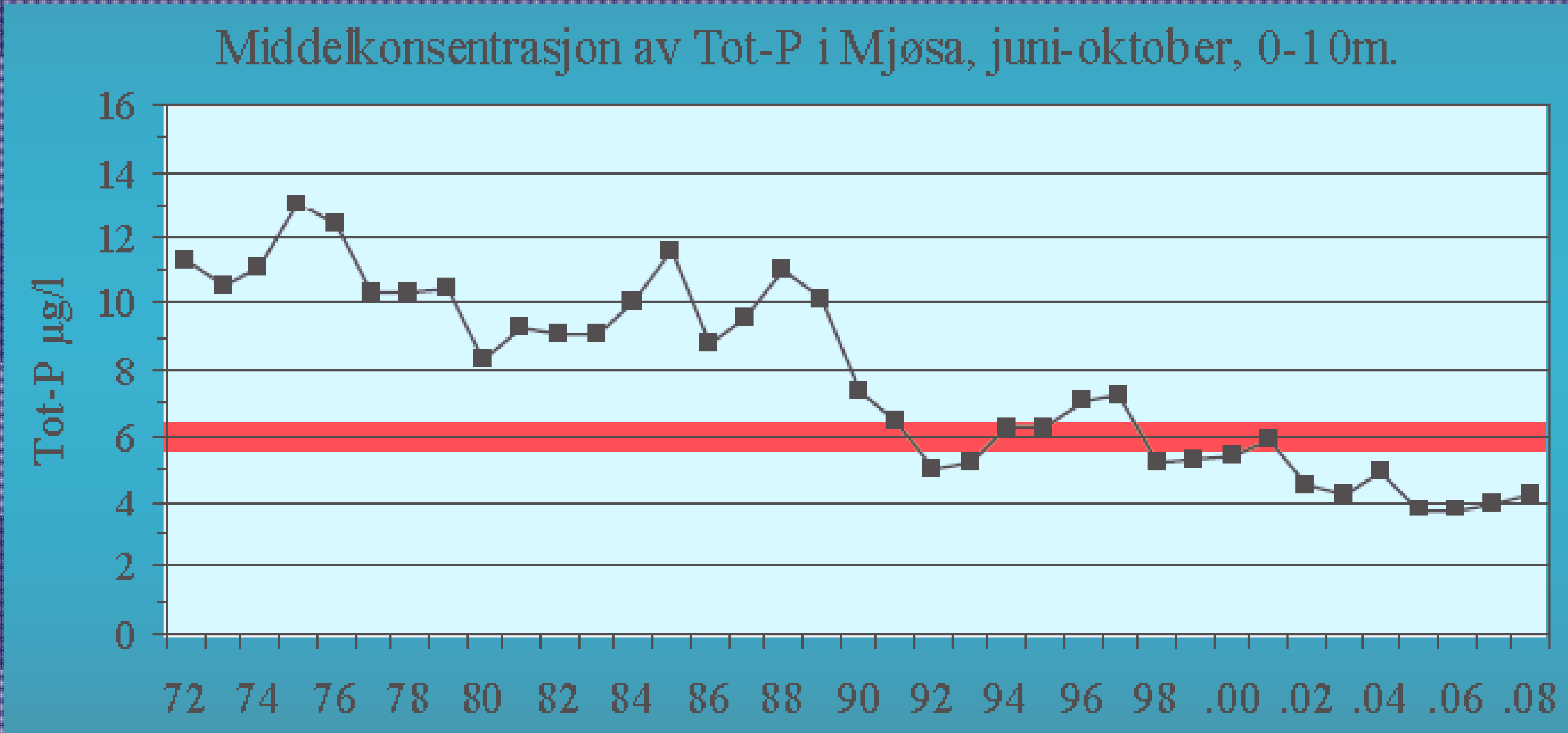


No. of TN and TP trends in 53 Estonian rivers over the past 15-20 years (Iital, unpublished)

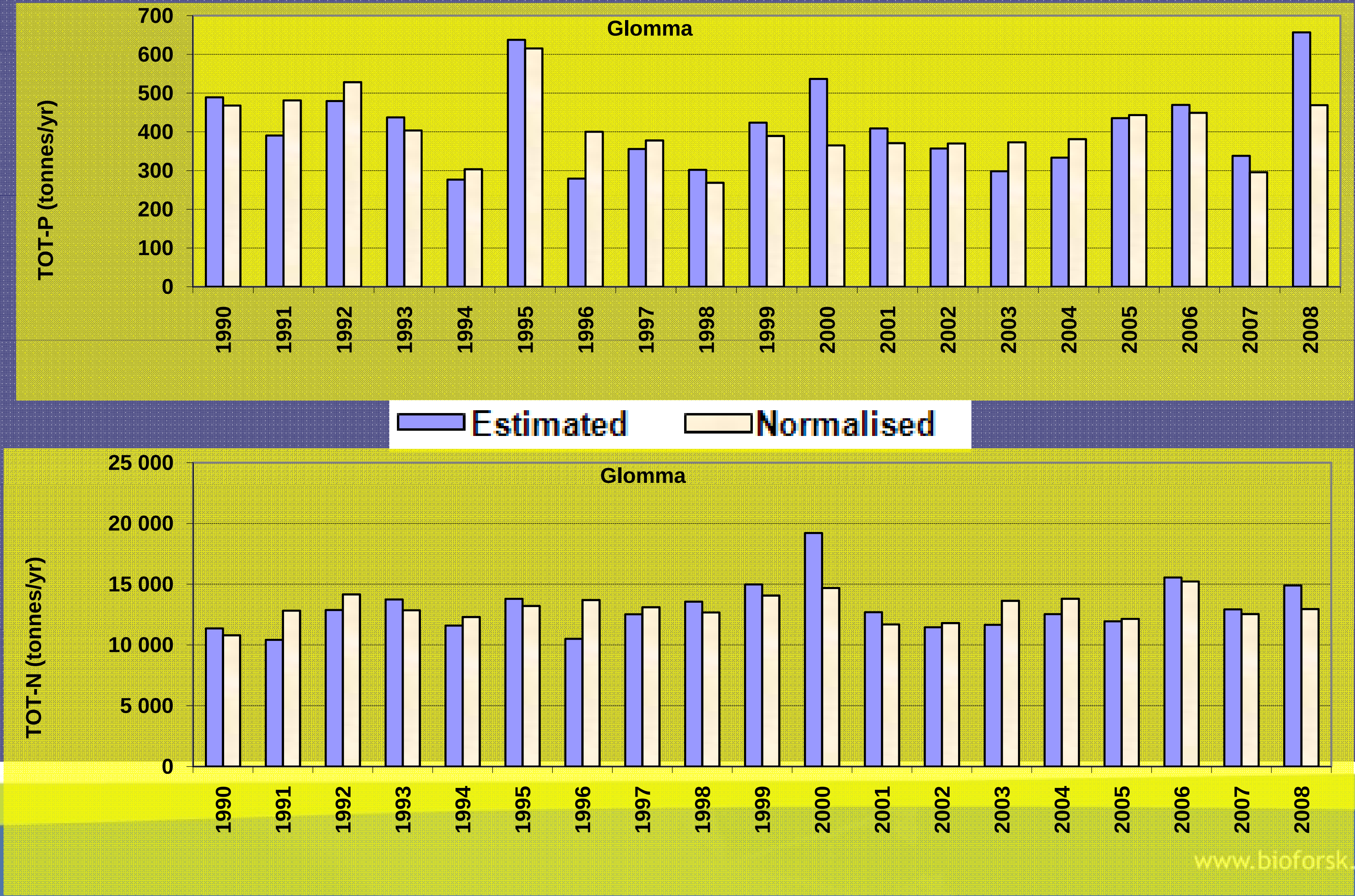


Glomma case (Mjøsa aktionen på 70-talet)



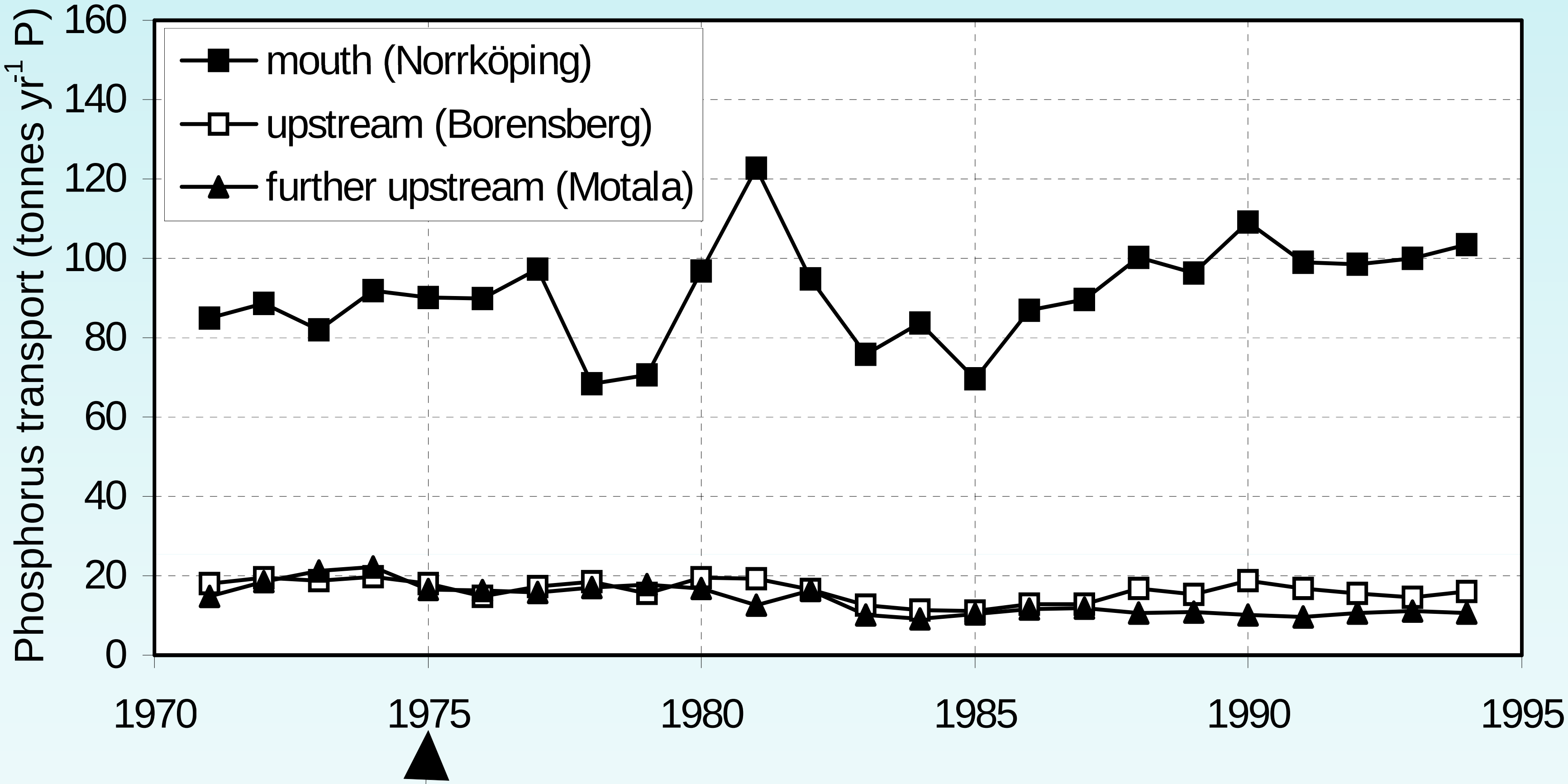

Middelkonsentrasjon av Tot-P i Mjøsa, juni-oktober, 0-10m.
Tot-P µg/l
16
14
12
10
8
6
4
2
0
72 74 76 78 80 82 84 86 88 90 92 94 96 98 .00 .02 .04 .06 .08

Fosfor och kväve transport i utloppet vid Sarpfossen i Glomma (SFT-RID; Skarbøvik et al., 2009)



Riverine response to decreased point source P-emissions

Motala Ström in Sweden (Grimvall & Stålnacke, 2000)



Introduction of tertiary treatment (90% or 200 tonnes)

Winter episode (Øygarden, 2000)

January 30

Runoff: 25 mm

Soil loss: 2 kg ha^{-1}

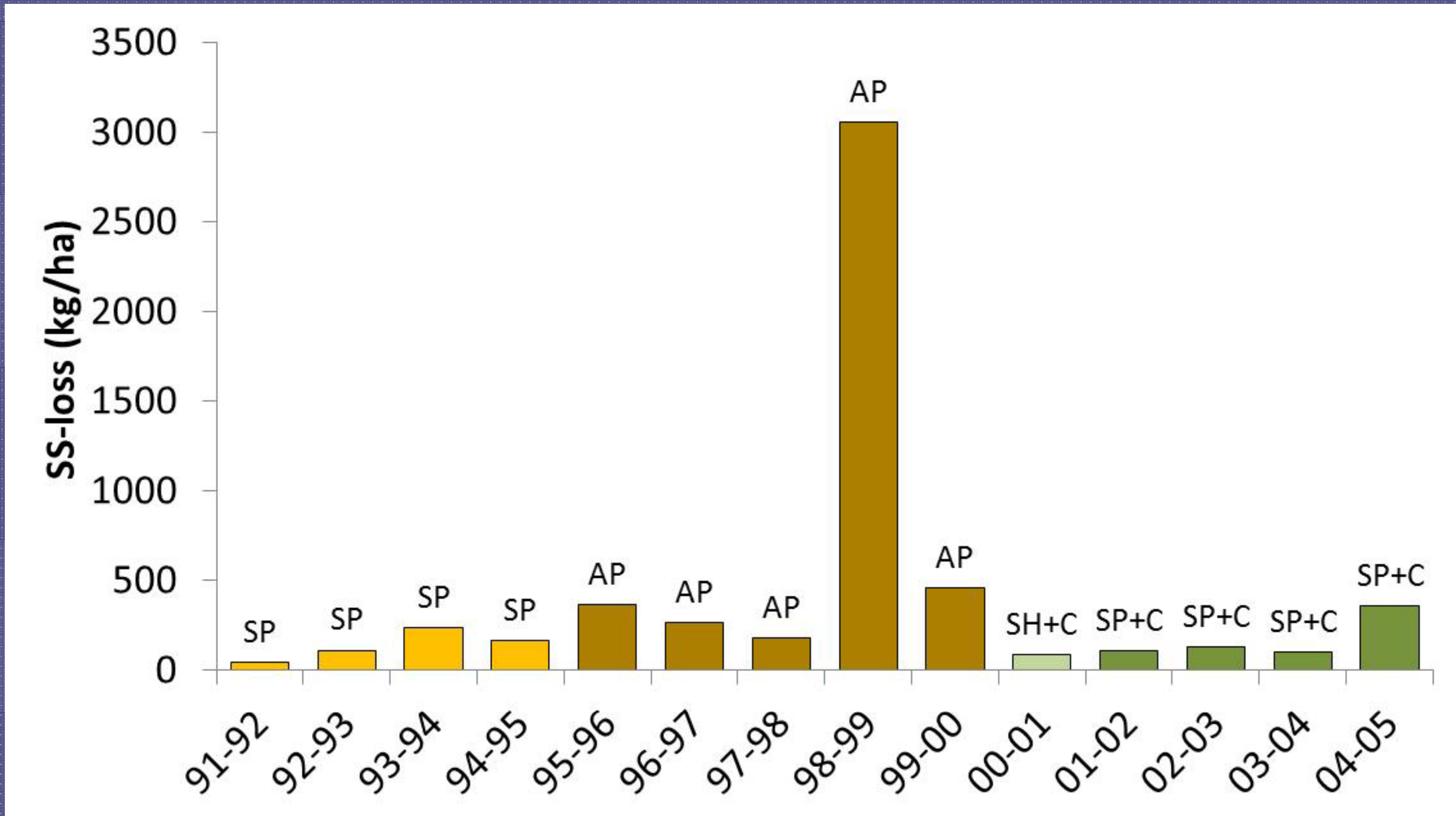
January 31

Runoff: 77 mm

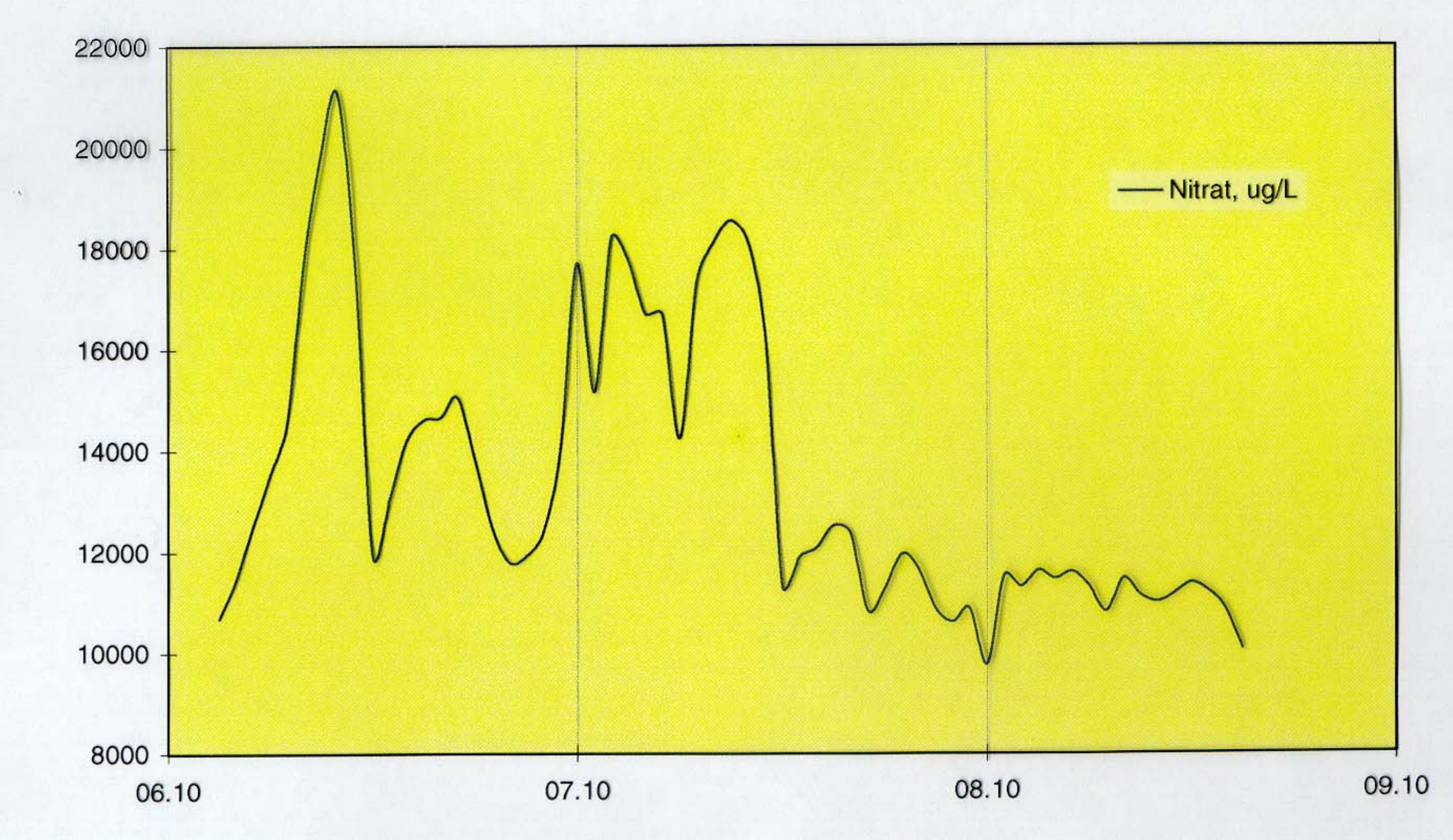
Soil loss: 3 050 kg ha^{-1}

Dynamic soil loss at field scale

SP=spring ploughing; AP=autumn ploughing



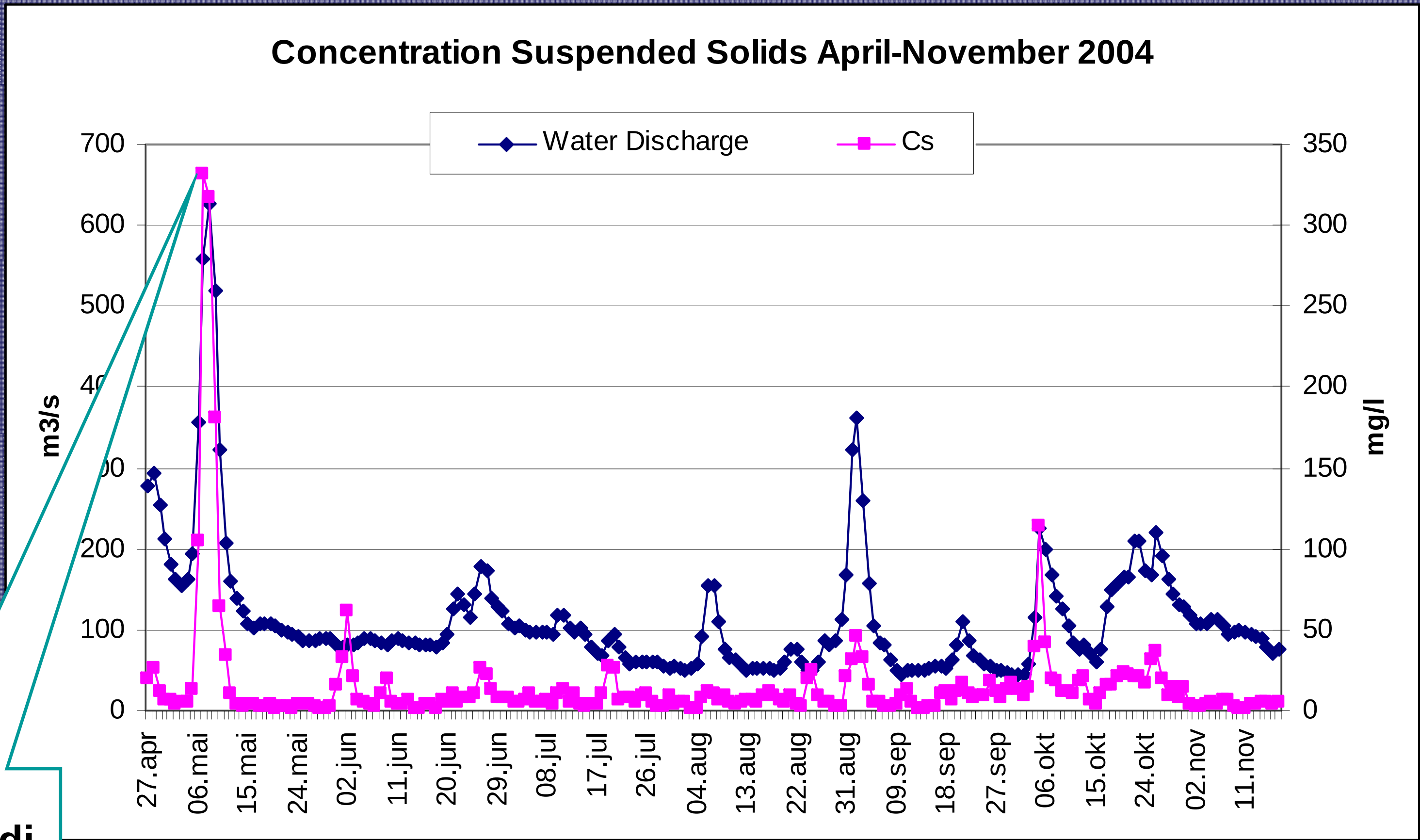
Short-term variability in nitrate-N concentrations on a small agricultural catchment (Høyjord /S Norway) October 6-9, 1995



(Vagstad, Deelstra and Eggestad)

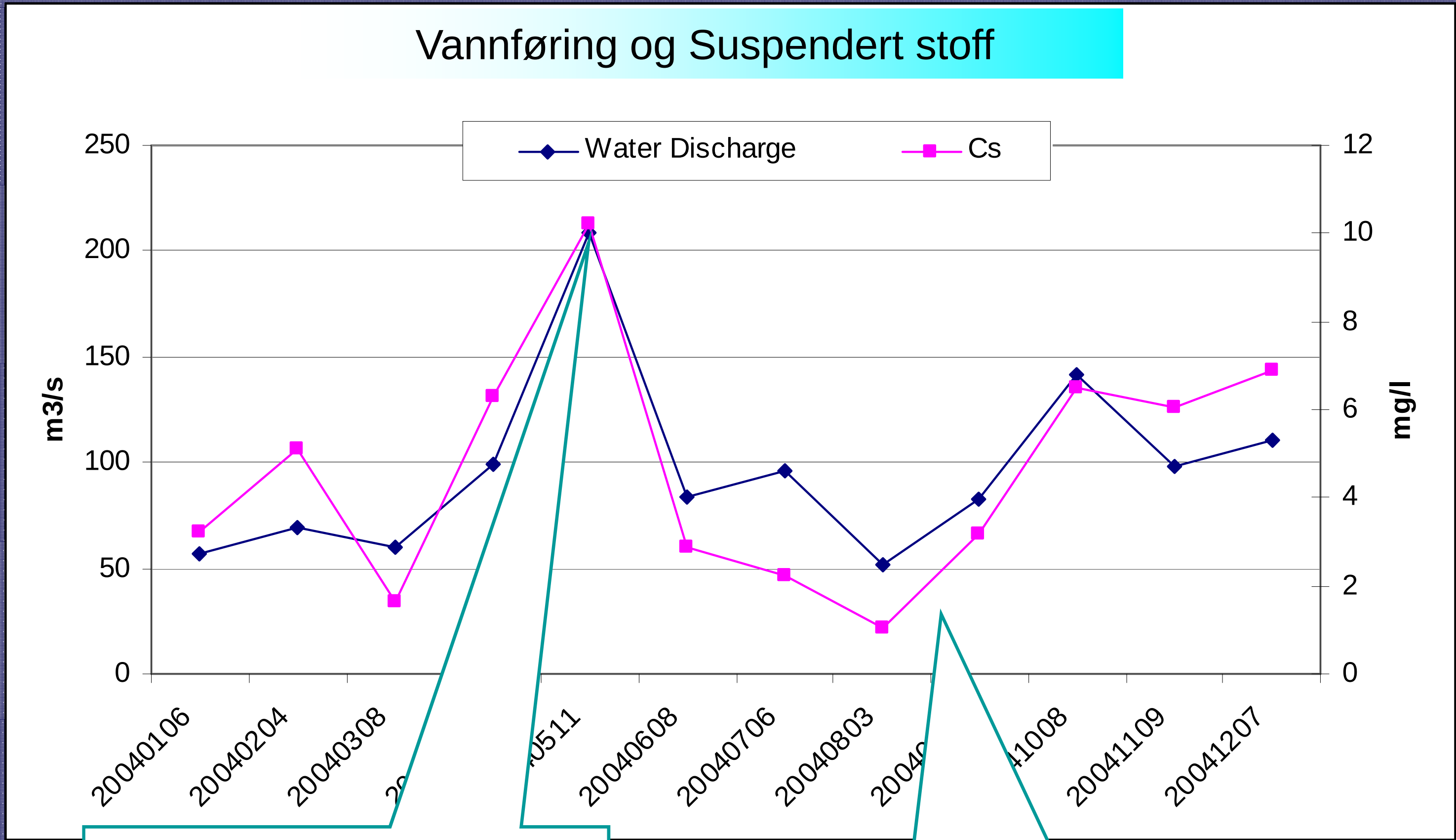
Daglige målinger: NVE 2001-2004

(Skarbøvik, Stålnacke et al. Manuskript)



Høyeste verdi – 325 mg/l

Data fra det nasjonale overvåkingsprogrammet – RID (månedsprøvetaking; Borgvang et al., 2006)

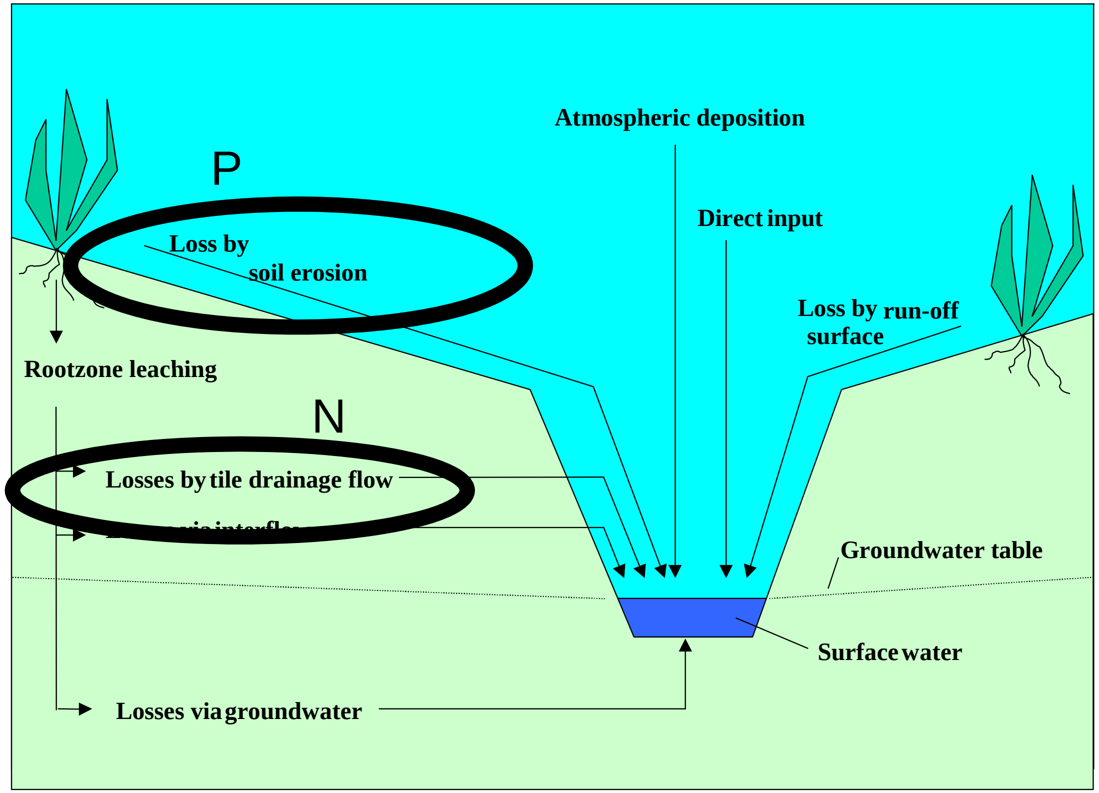


Høyeste verdi– 10 mg/l. 300 mg/l mindre enn høyeste ved daglige målinger

Hvordan kan man gjette hva som skjer mellom to prøvetakinger

Part 3. Nutrient losses via the various hydrological pathways?

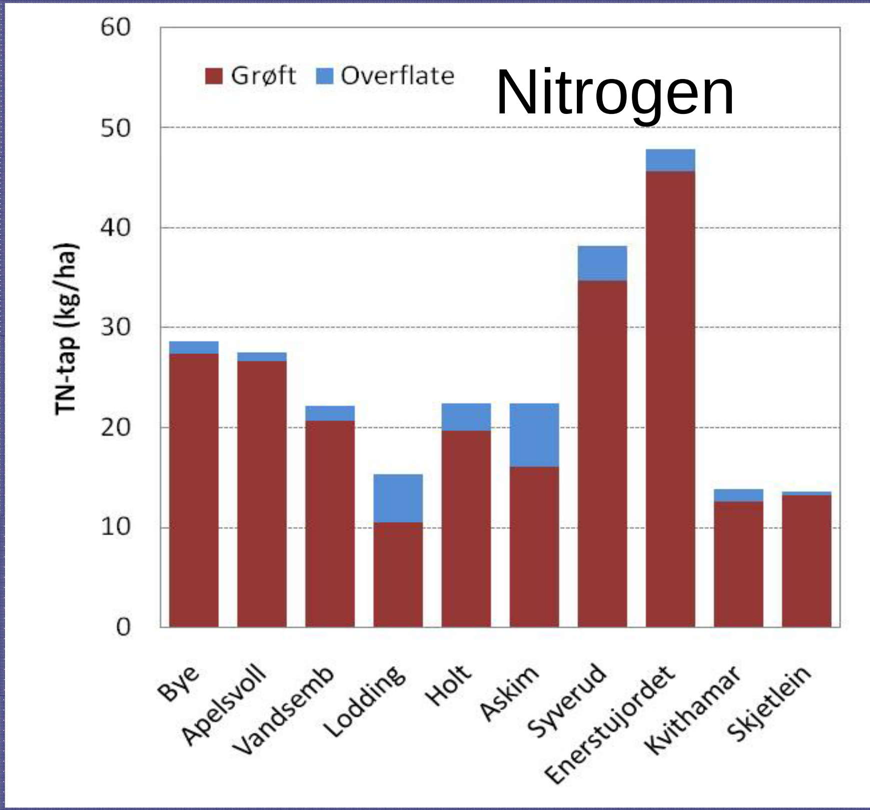
The most important 'hydrological' pathways as regards nitrogen and phosphorus losses from diffuse sources to surface waters

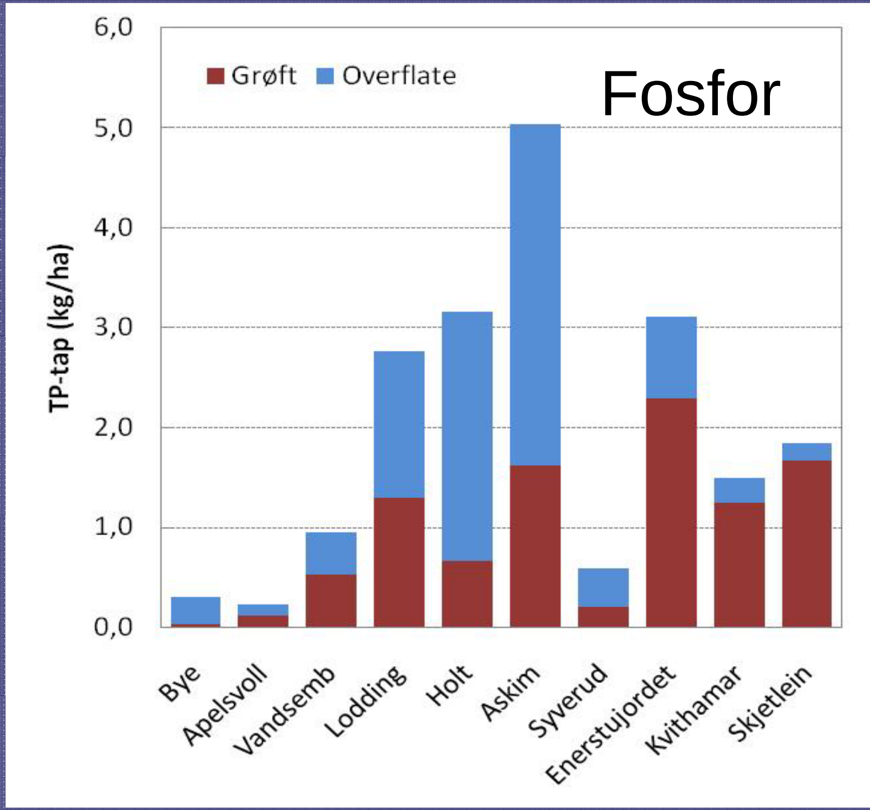


Source: Borgvang and Selvik (2000)

Grøfte- og overflatevann

Grøfteavrenning gir N-tap
Overflateavrenning gir P-tap



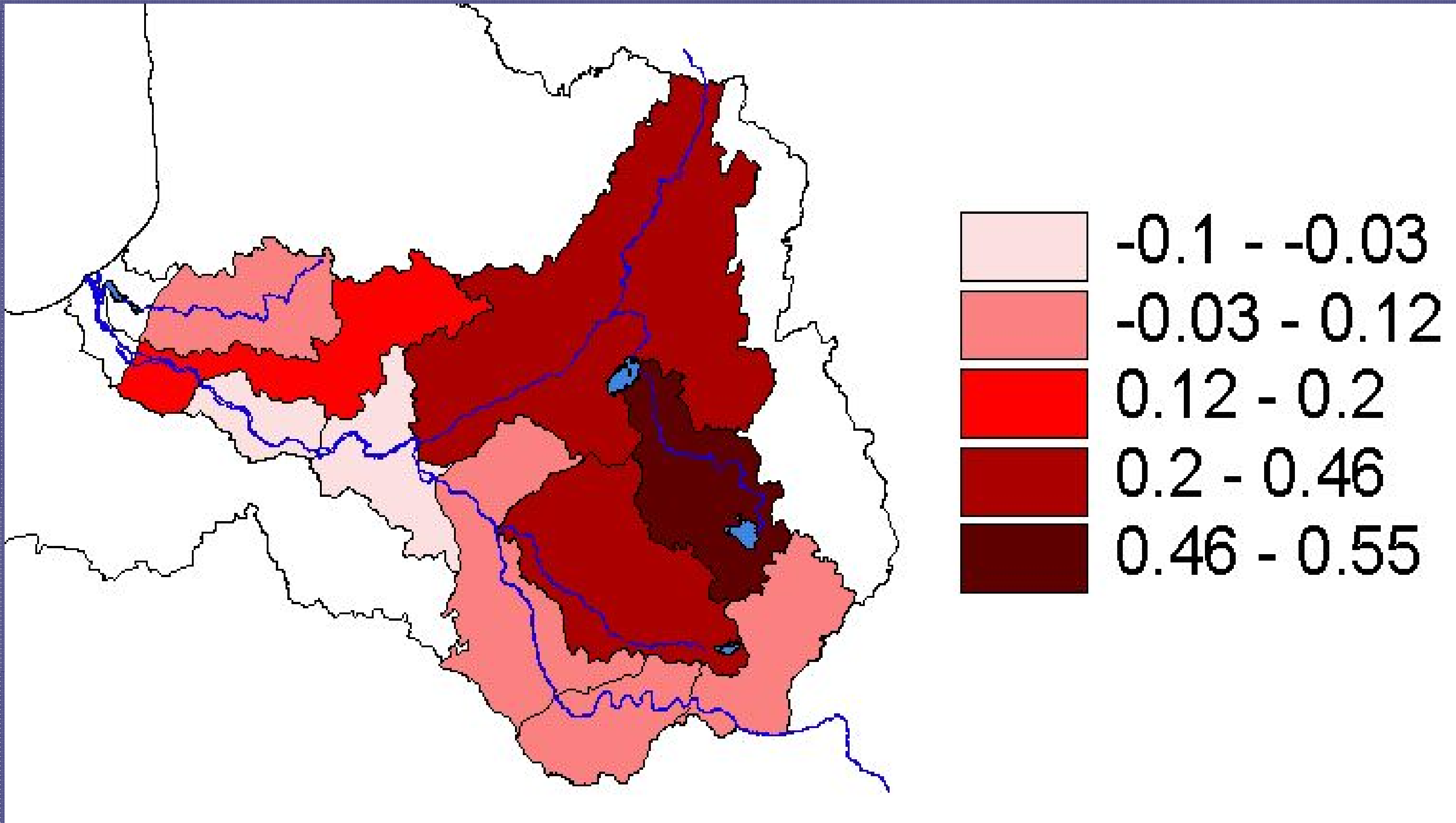


Part 3.Retention from source to river mouth

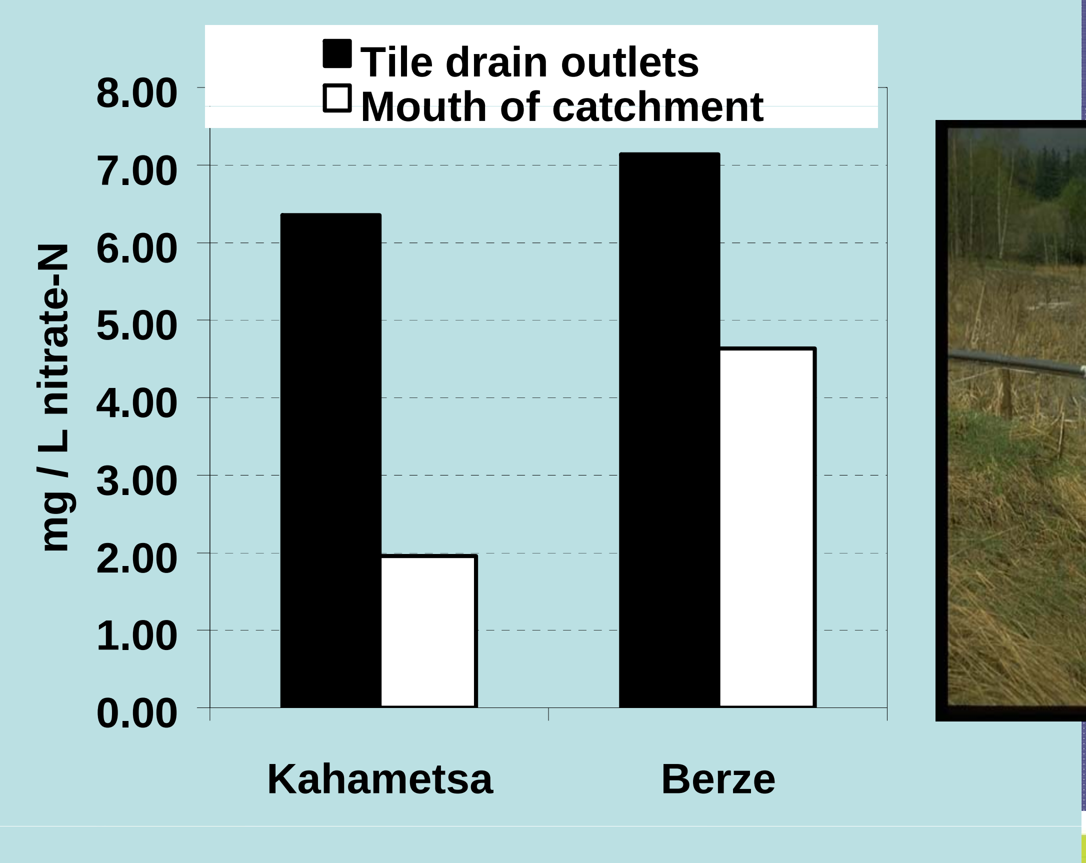
Retention processes (Howarth et al. 1996):

- storage in catchment biomass as for instance in aggrading forests;
- storage or denitrification in catchment soils;
- storage or denitrification in groundwater;
- denitrification or storage in wetlands or riparian zones, i.e. at the interface between ground- and surface water;
- in-stream processes of retention, either by benthic or planktonic denitrification or by storage in sediments.

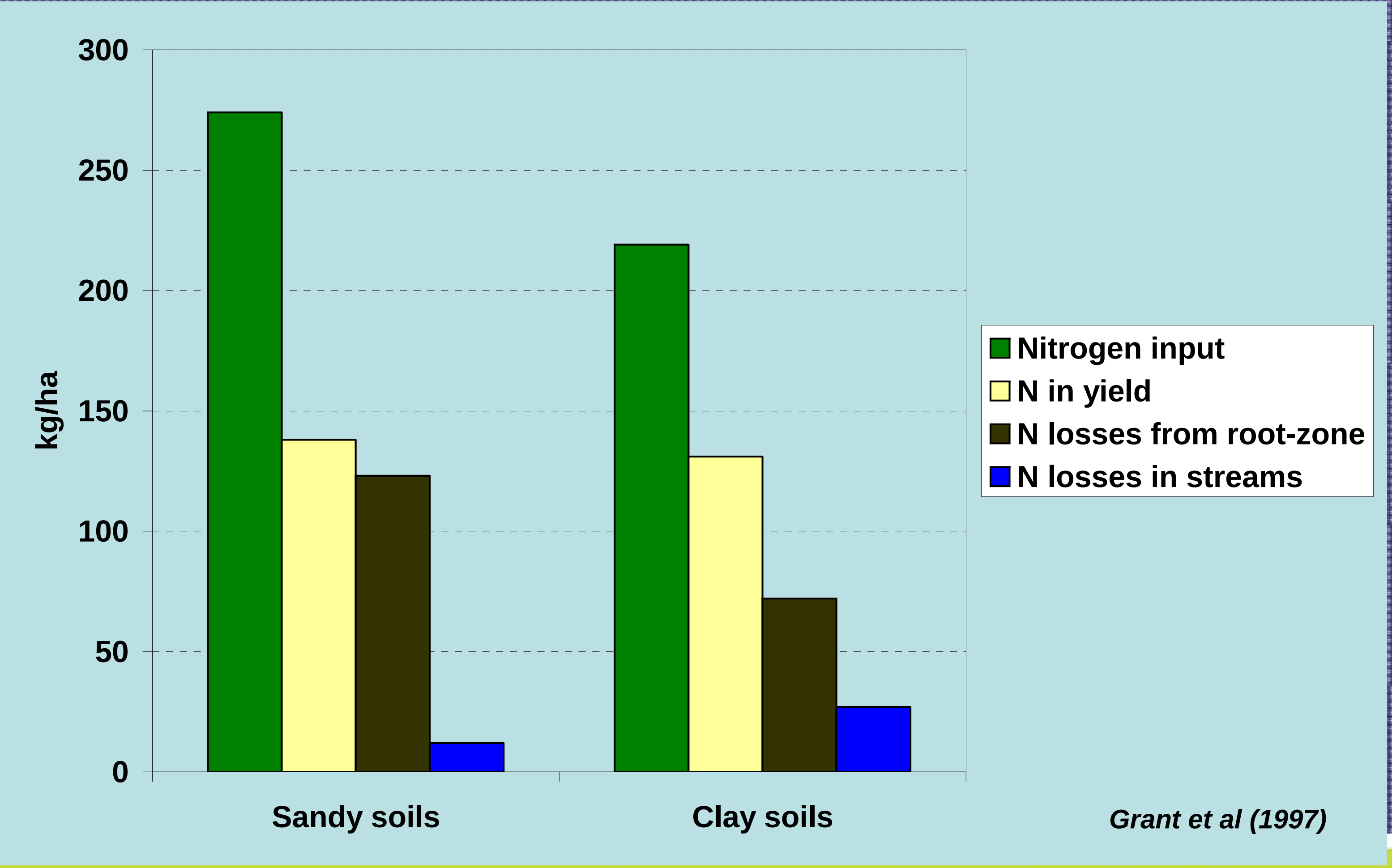
Retention from outlet of subbasins to river mouth in Daugava R with the MESAW statistcial model (Stålnacke, 2003)



Mean nitrate concentrations at the outlet of the tile drains and at main channel in outlet of two agricultural stream in Estonia and Latvia (Stålnacke et al., 1999)

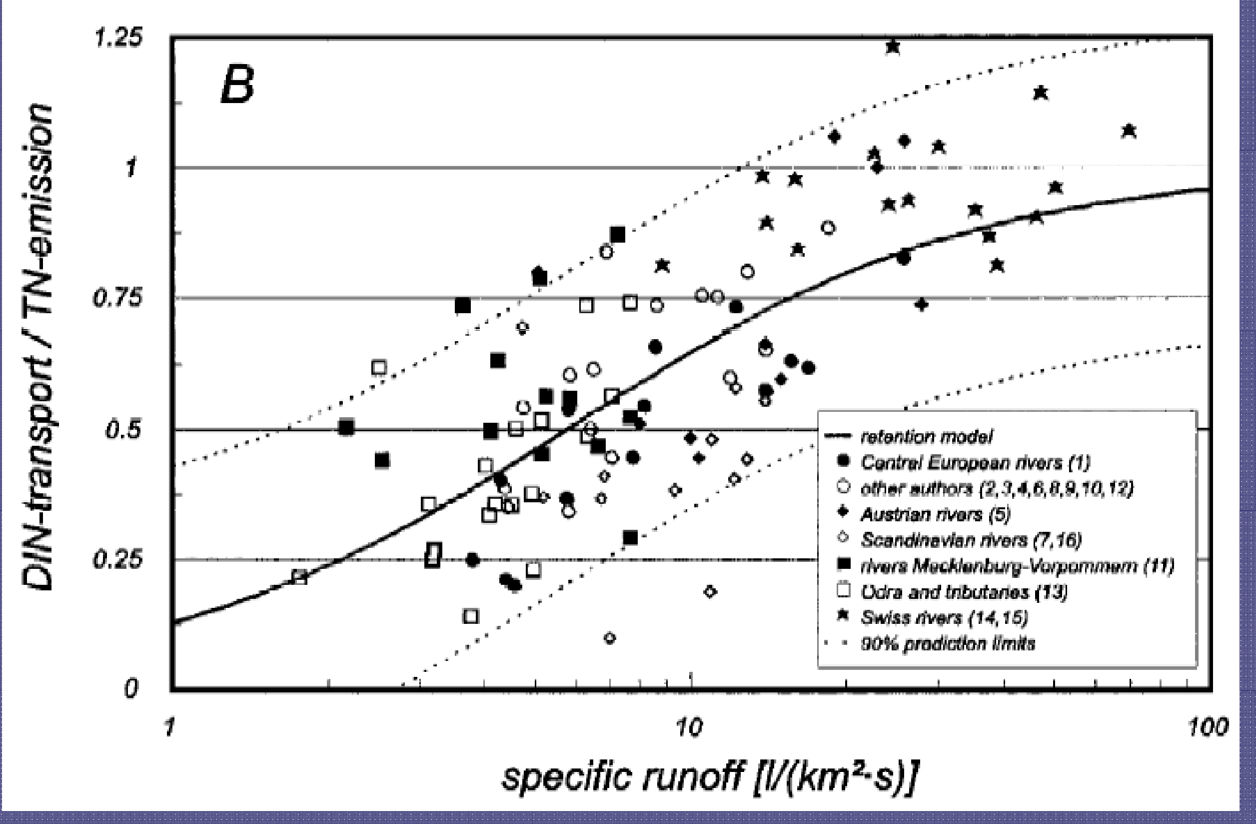


Pathways of nitrogen in Denmark (Grant et al., 1997)

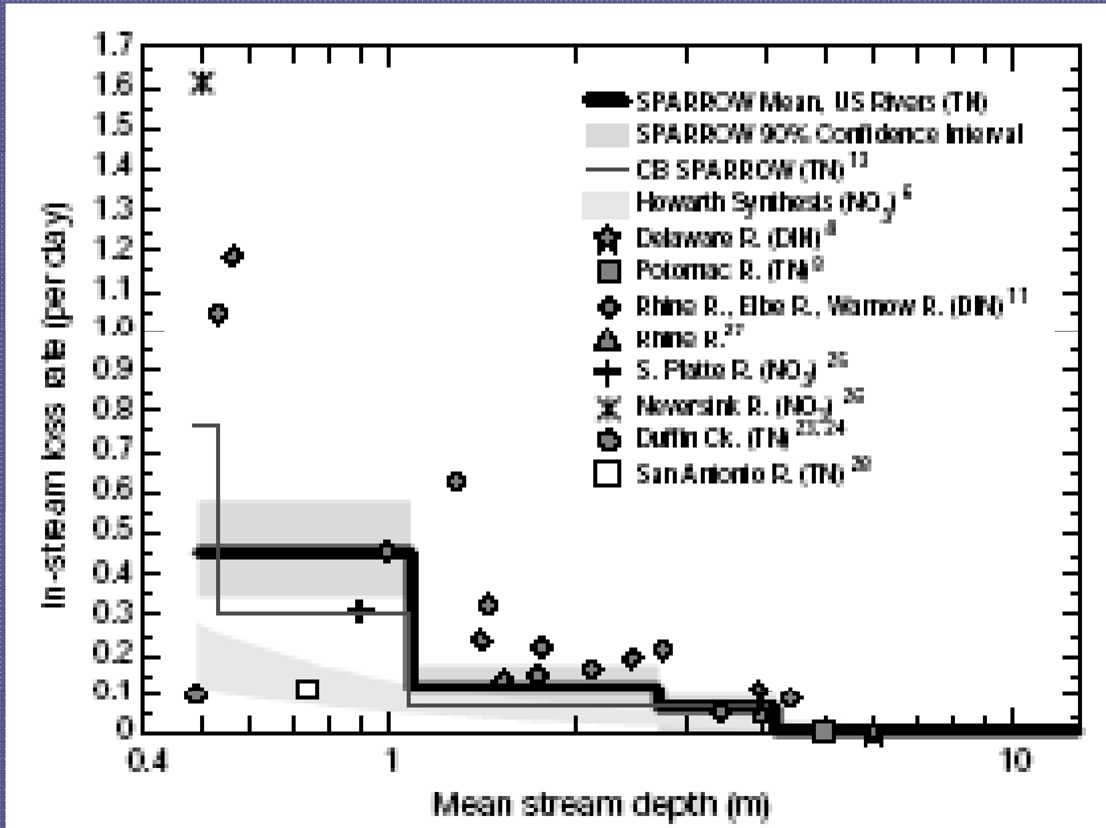


Retention as a function of hydrology

(Behrendt and Opitz, 2000)

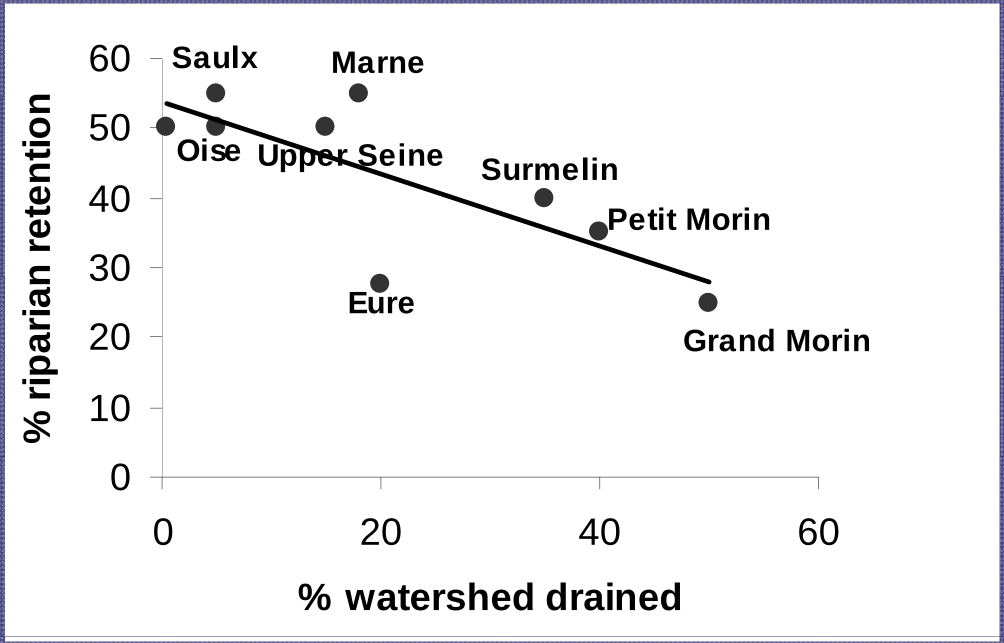


Retention as a function of stream depth (Alexander et al, 2000)

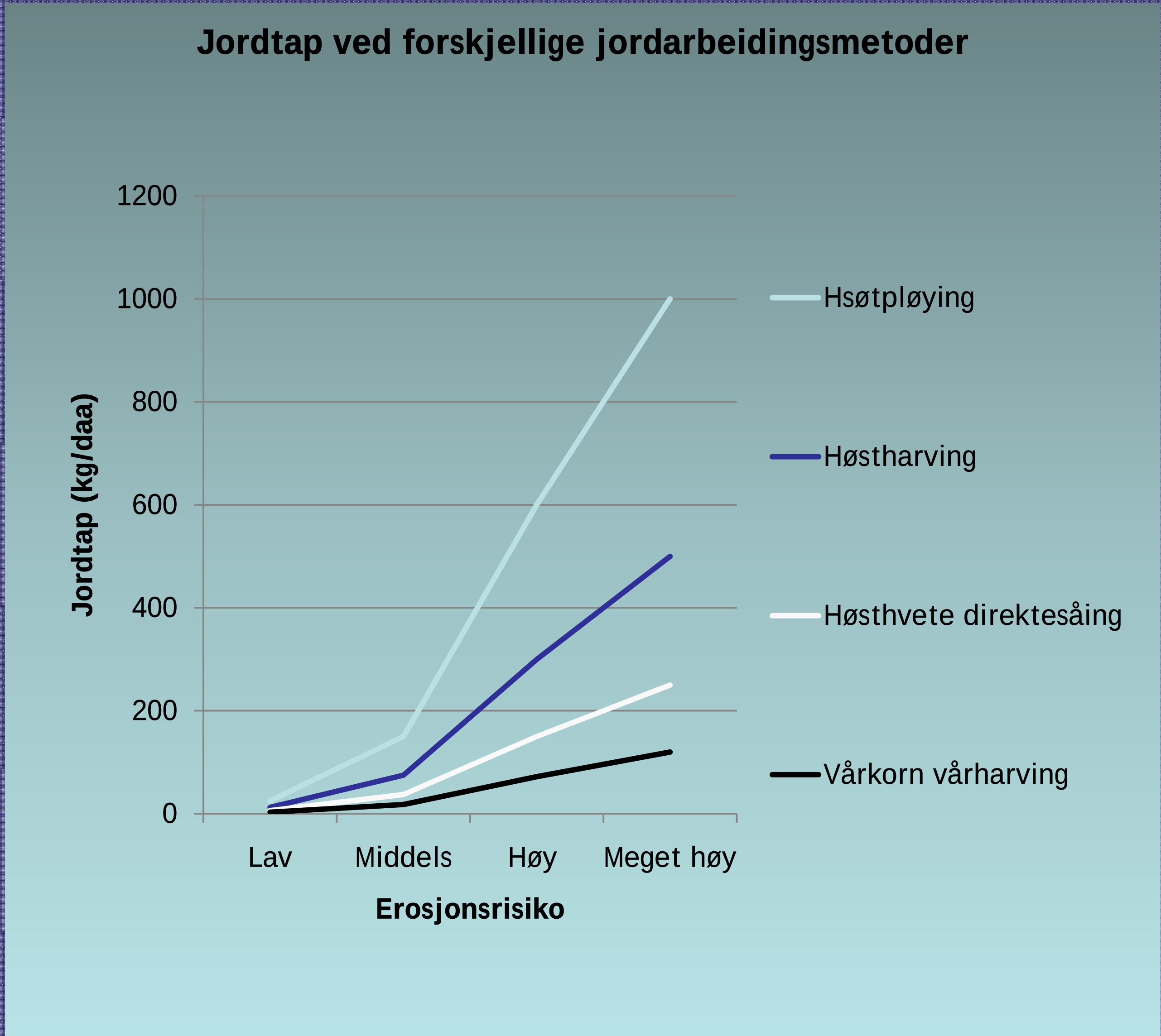


Artificial drainage reduces the general riparian nitrate retention

(Garnier and Billen, 1999)

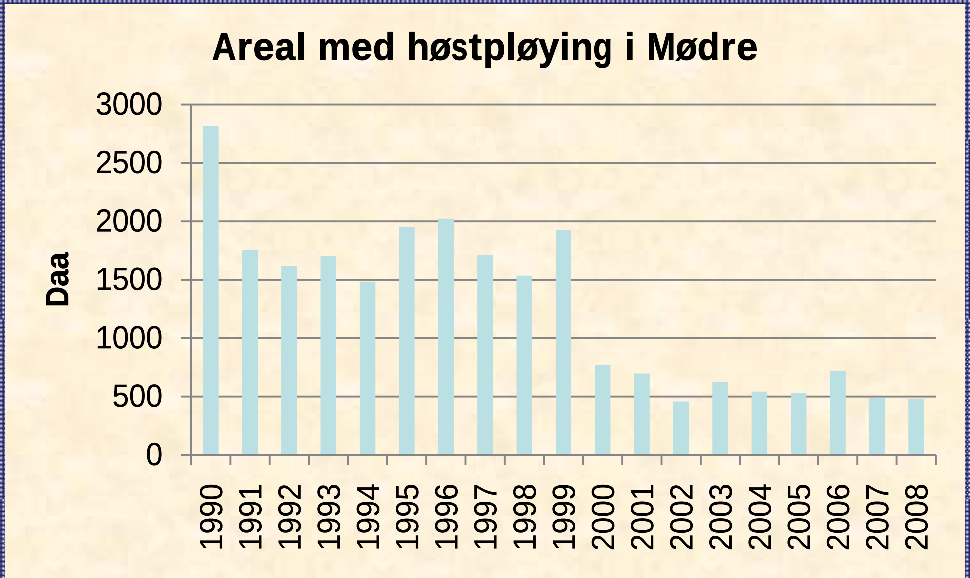


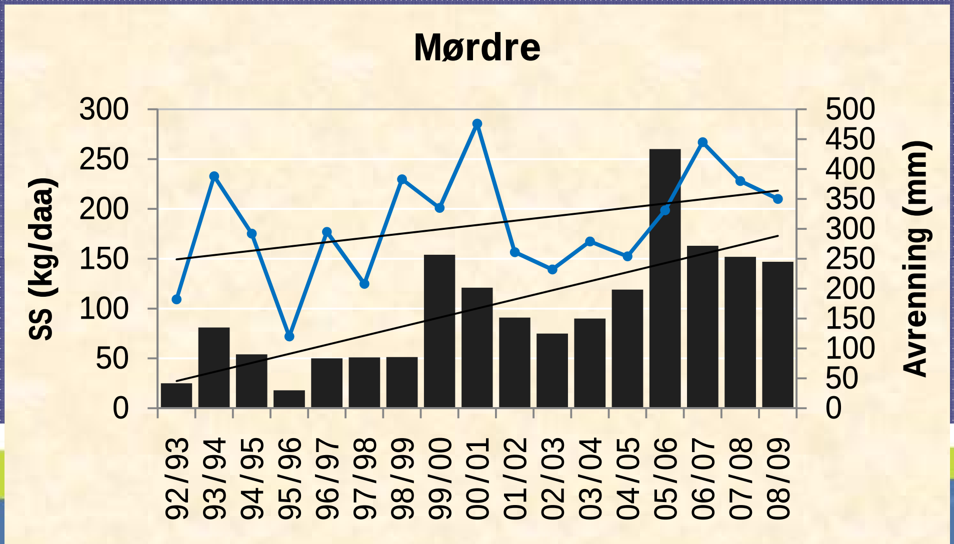
Part 4. How to identify the most efficient mitigation measures?

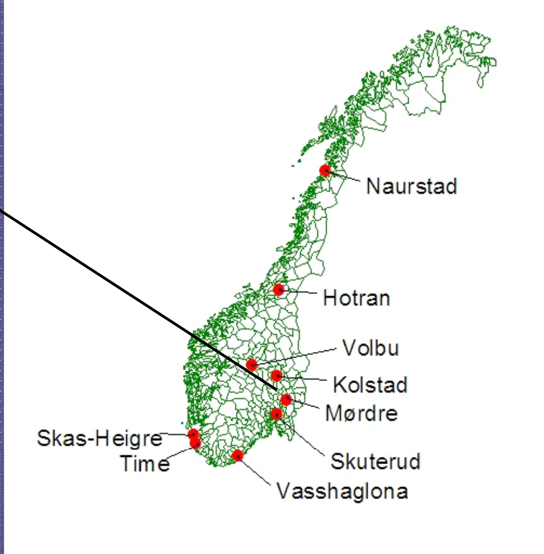

Jordtap ved forskjellige jordarbeidingsmetoder
1200
1000
800
600
400
200
0
Jordtap (kg/daa)
Lav
Middels
Høy
Meget høy
Erosjonsrisiko
Hsøtpløying
Høstharving
Høsthvete direktesåing
Vårkorn vårharving

Fokus i Norge på reduksjon av høstpløying

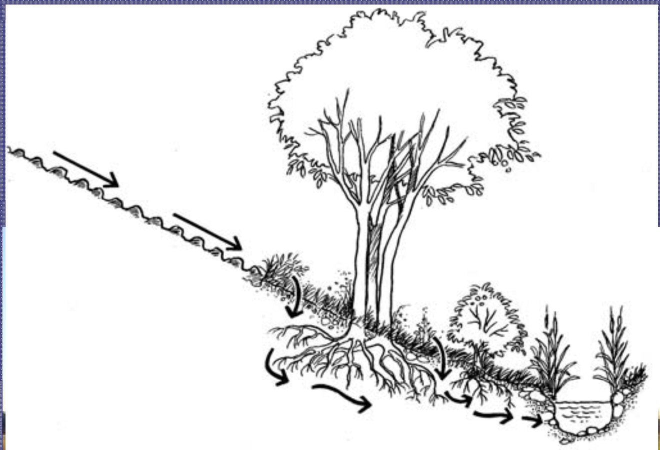
Program for Jord- og vannovervåking i landbruket (JOVA)

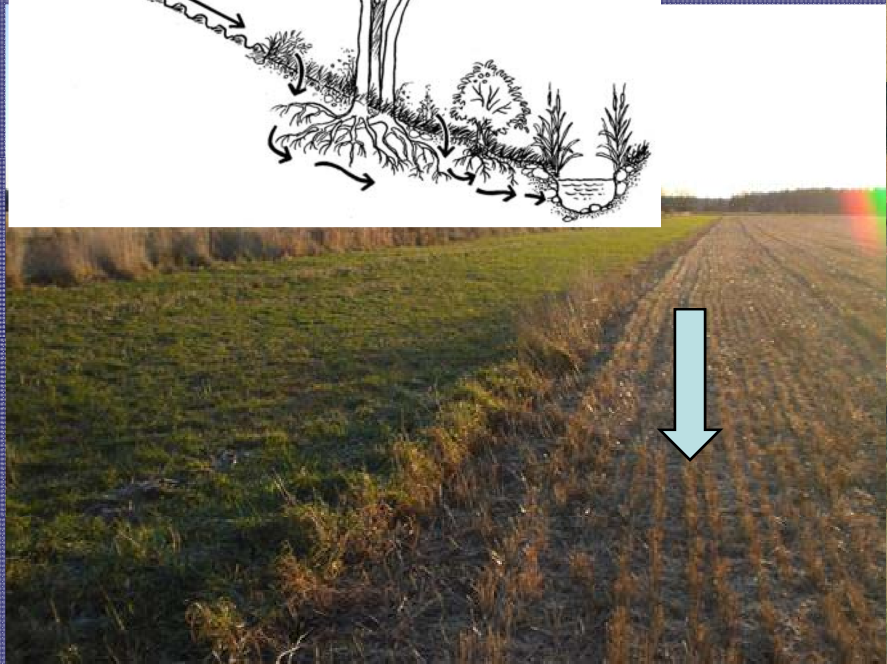






Vegetasjonssoner: Terrengformer og effekter





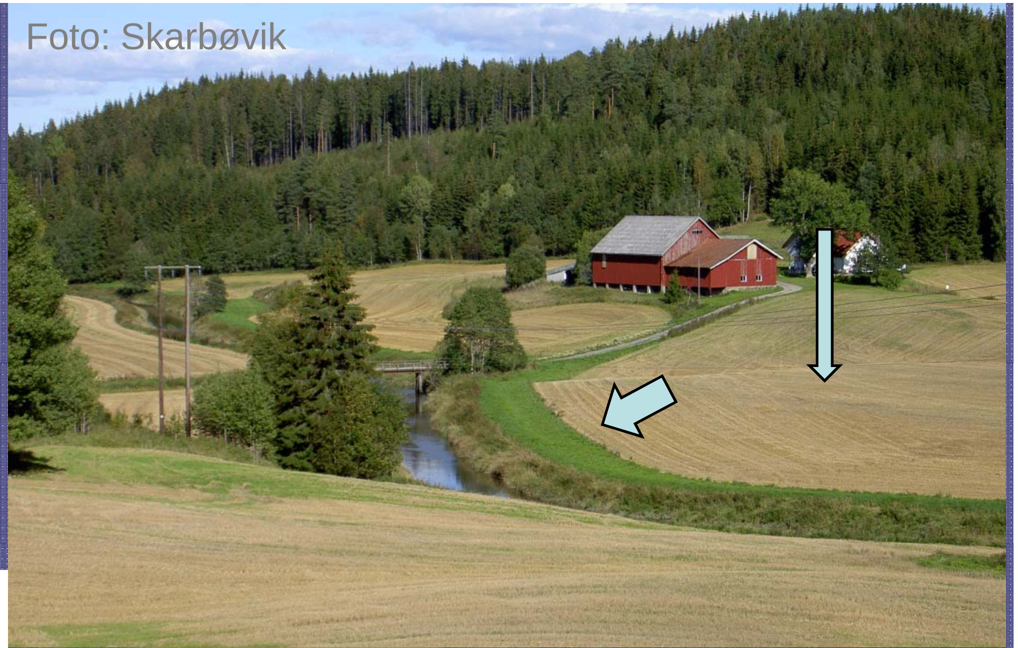


Foto: Skarbøvik

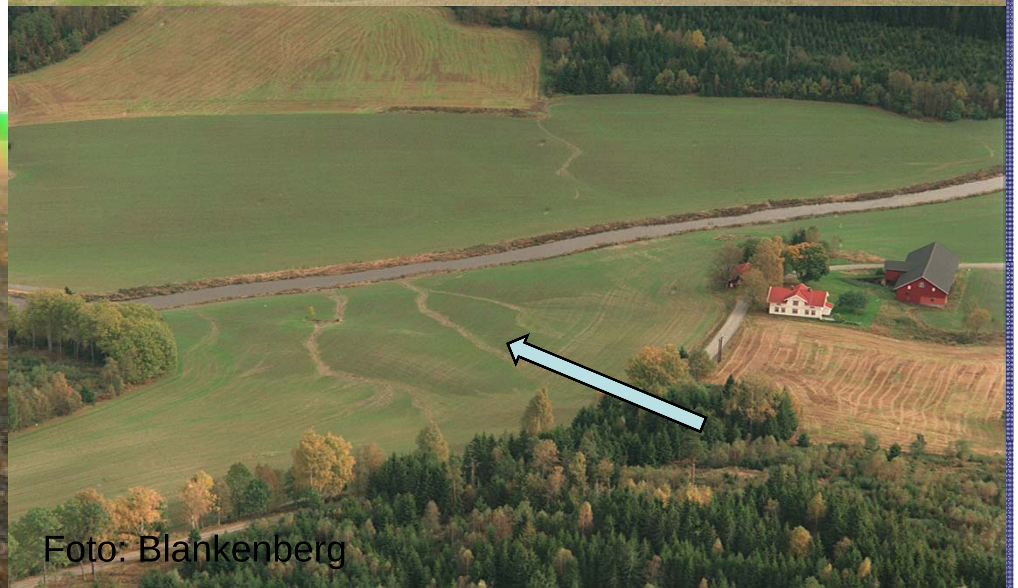
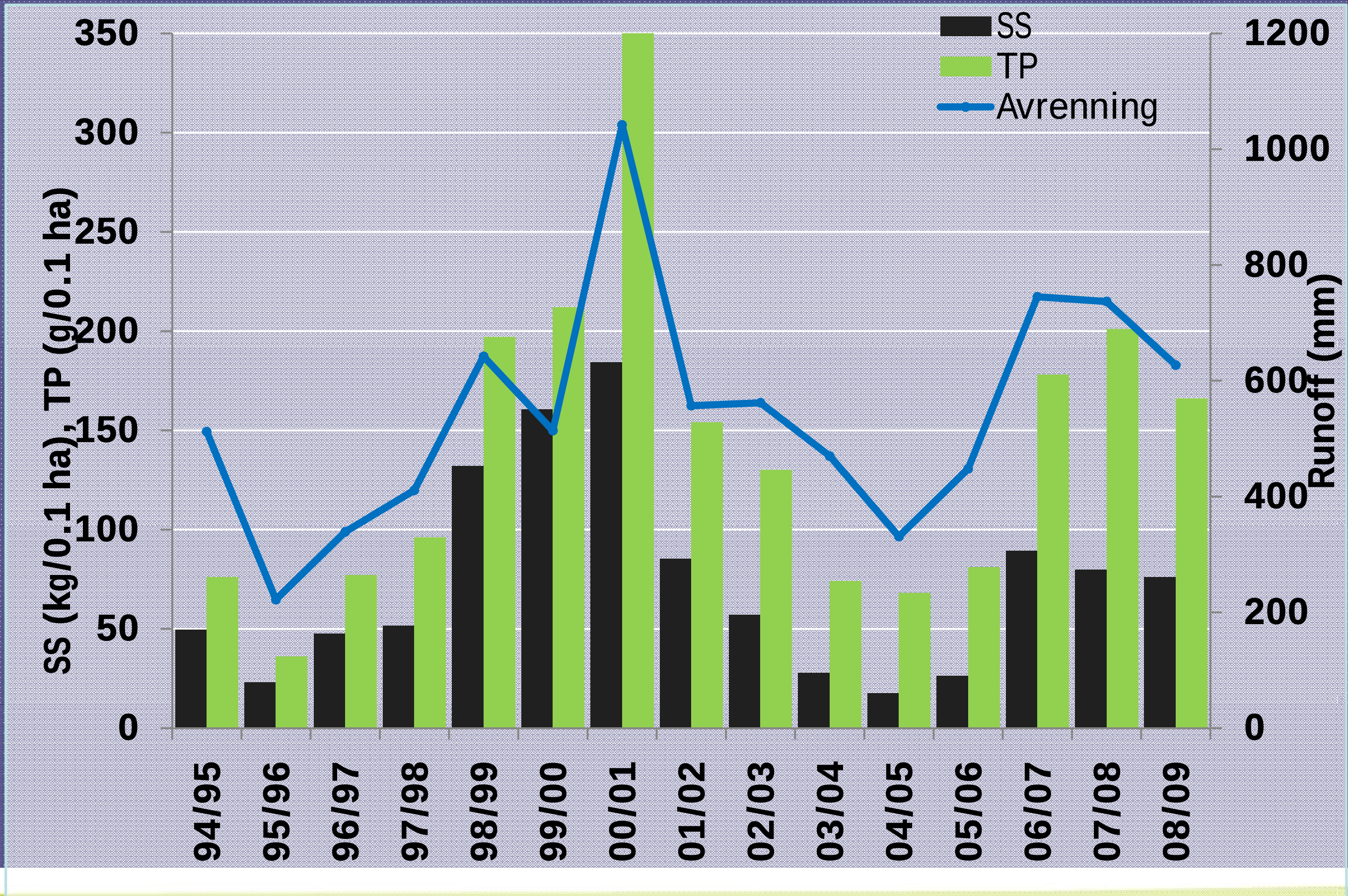


Foto: Blankenberg

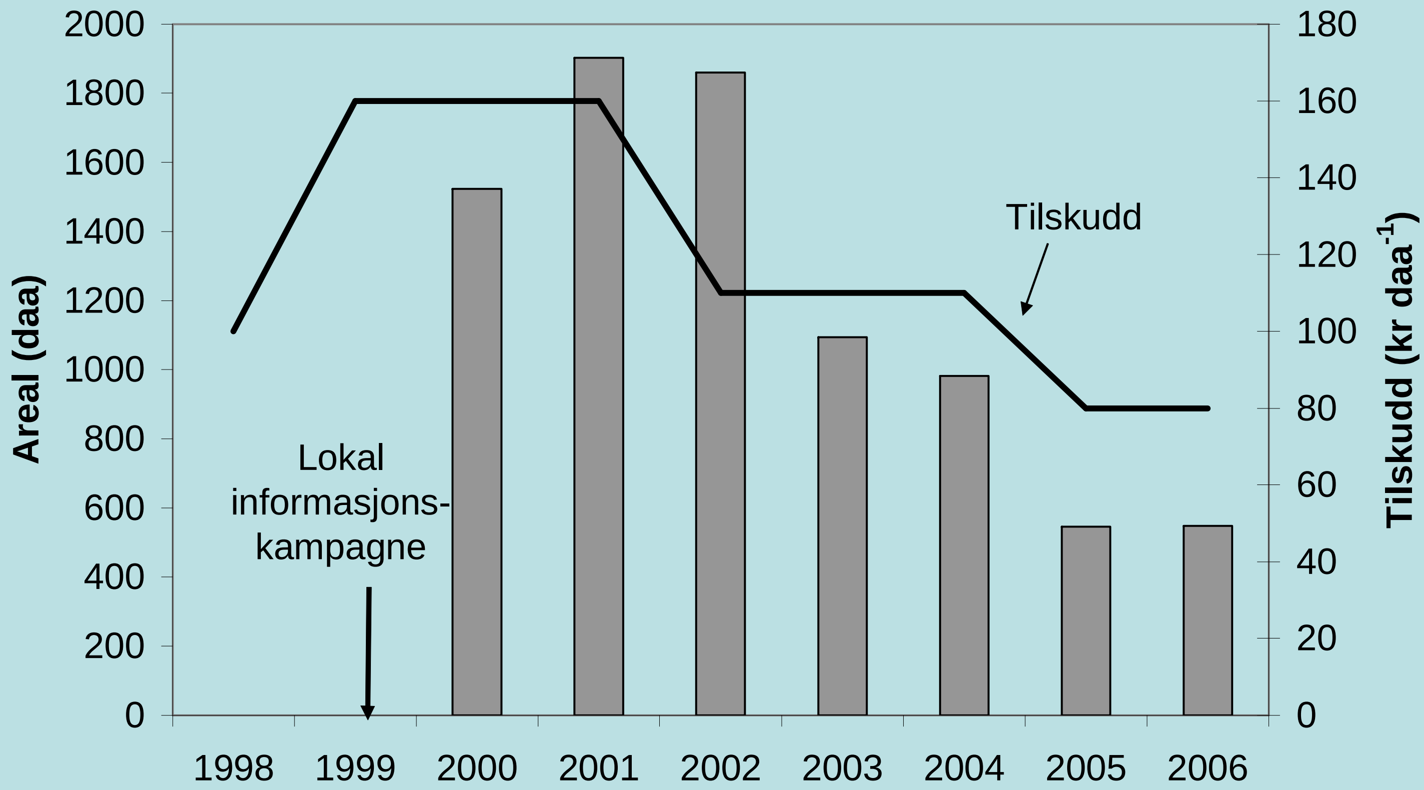
Konstruerad våtmark (2001) i Skuterud

	Yearly retention(%)					
	03/04	04/05	05/06	06/07	07/08	08/09
TP	16	18	33	15	3	10
SS	45	48	62	19	21	17

Fosfor og partikler i Skuterud (JOVA, 2009)



Effekt av tilskudd og rådgiving: Fangvekstarealet i Mørdre følger tilskuddet



Part 5. Sammendrag

- Næringsstofftap viser stor variasjon over kort tid og stor romlig variasjon
- Faktorer som har betydning for variasjonen omfatter hydrometeorologi, geologi, og jordbruksdrift
- Det er stor forskjell i effekt av tiltak på ulike skala, på grunn av bl.a. retensjon
- Målretting av tiltak

Takk for oppmerksomheten!