

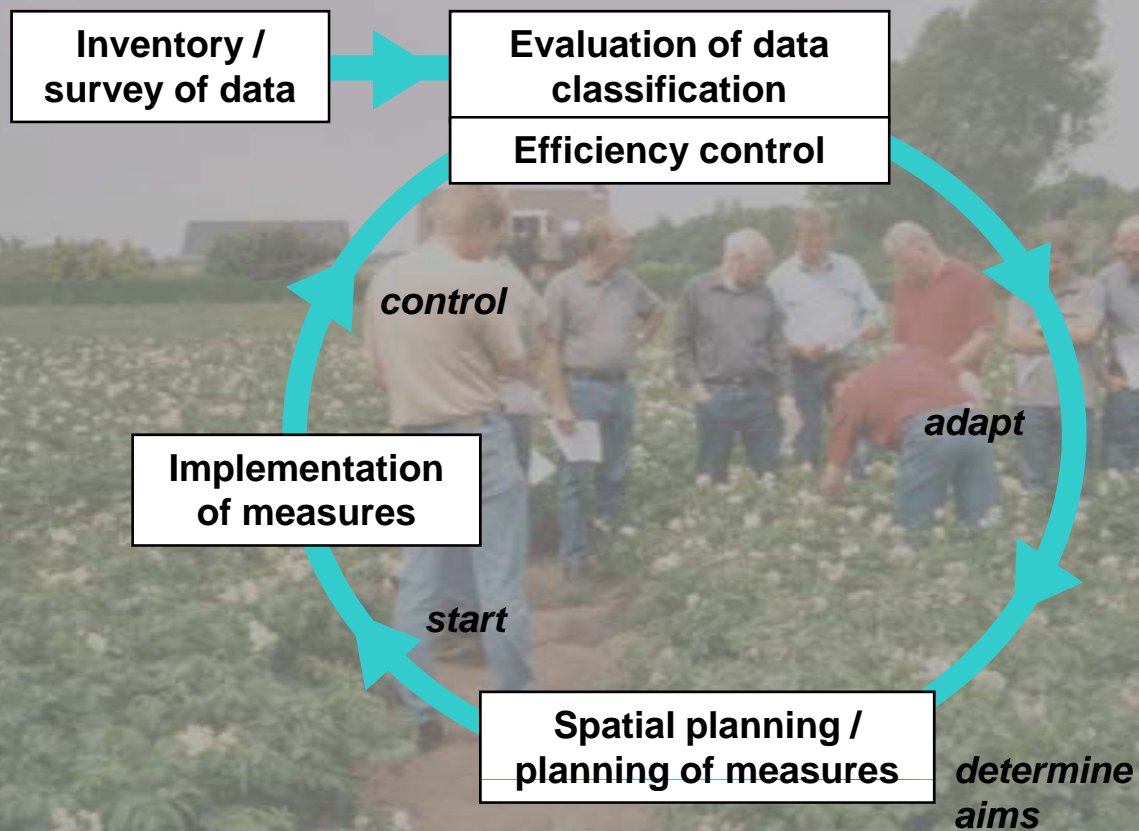
Protection of groundwater resources *(Drenthe (NL) and Aalborg (DK))*

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Contents

- Scheme of the water protection concept
- Experiences in Drenthe (the Netherlands)
- Experiences in Aalborg (Denmark)



Scheme of the water protection concept

NETHERLANDS



Drenthe

- Since 1983; restrictions within groundwater production fields

No longer agriculture “on top of” the production wells

- Since 1989; restrictions within groundwater protection zones

pesticides, most hazardous to groundwater quality are banned

use of manure, within strict limits; however no limits to chemical manure

- Since 2000; decreasing need for additional “pesticides policy” within groundwater protection zones

Pesticides “black list”, became smaller and smaller

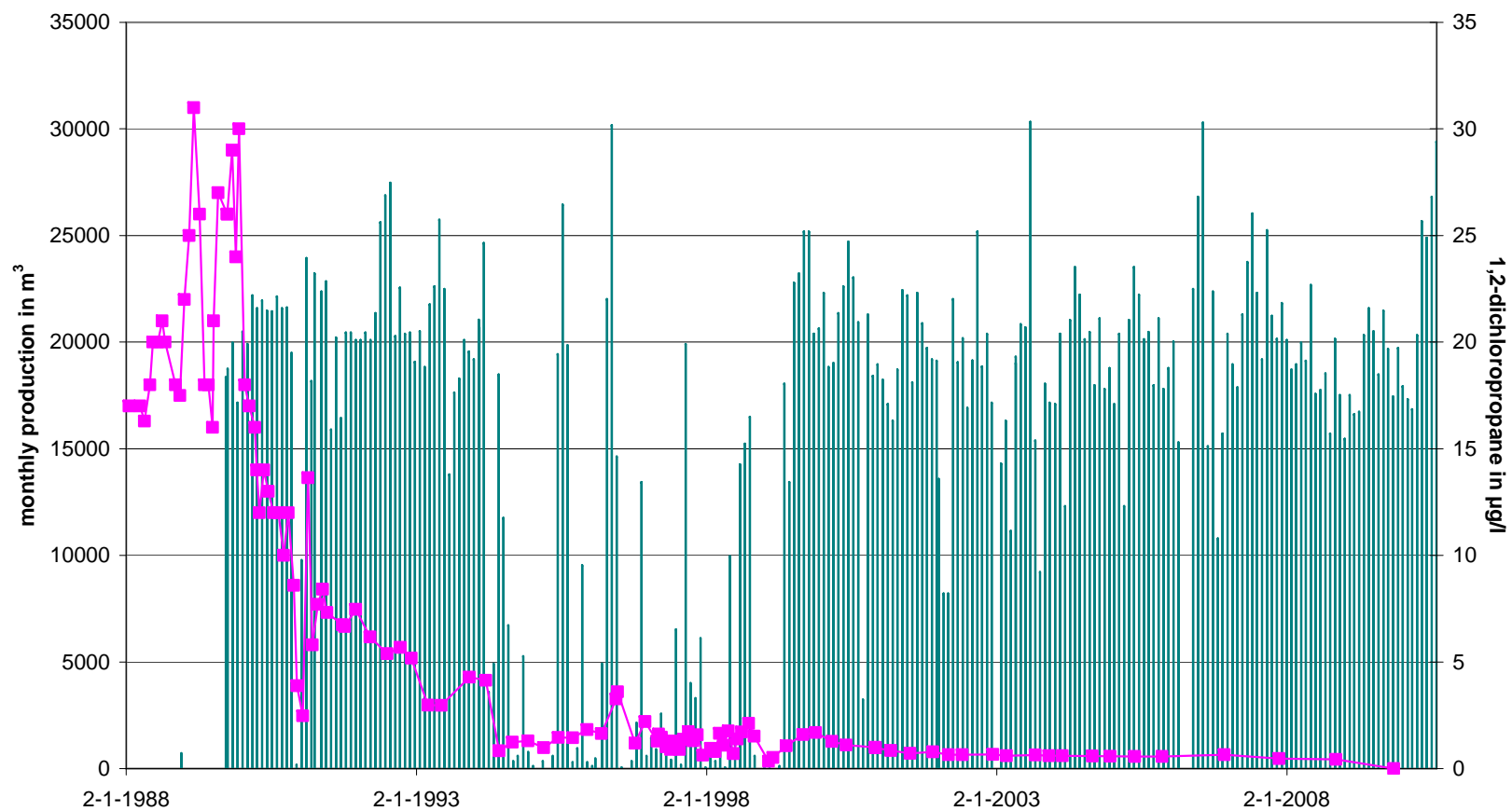
Since 2005, it started to become larger again; not because the pesticides became more hazardous, but because the manufacturers don’t apply for the “applicable within groundwater protection zones certificate” anymore (too expensive)

- Since April 1, 2004; need for additional “manure policy” within groundwater protection zones has vanished

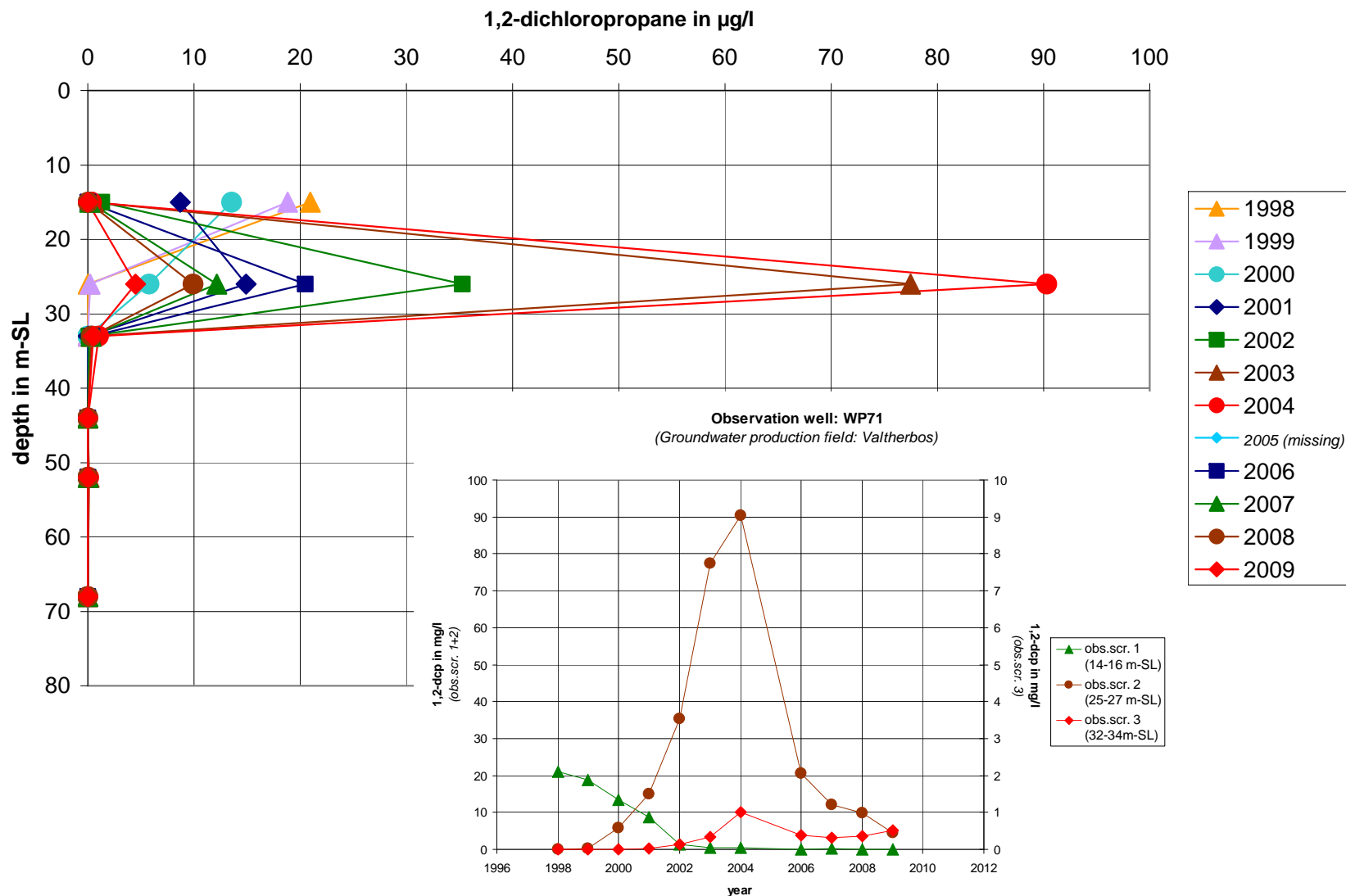
1,2-dichloropropane

- contamination of 1,3-dichloropropene (*pesticide to kill nematodes in potato fields*)
- applied since 1967 in potato growing
- contamination 20 – 25% until 1982
- contamination 5% (1983, 1984, 1985)
- contamination 0.5% (since 1986)
- on the pesticides “black list” since 1989

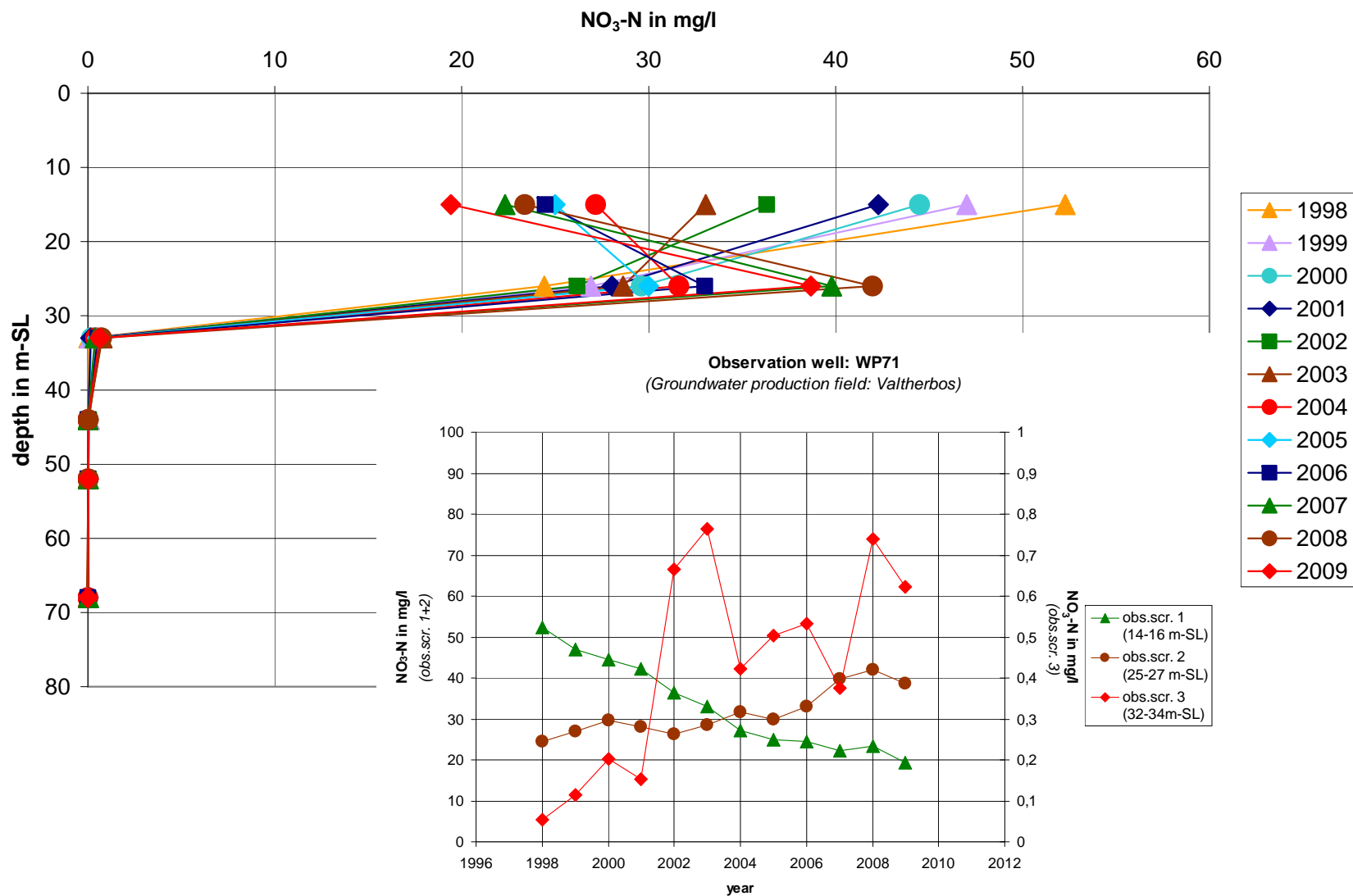
Production well NBPP34
(groundwater production field: Noordbargeres)



Observation well: WP71
(Groundwater production field: Valtherbos)



Observation well: WP71
(Groundwater production field: Valtherbos)



WMD policy

- Result/Reward-agreements
- Project WaterSense (www.projectwatersense.nl)

Project – WaterSense (1)

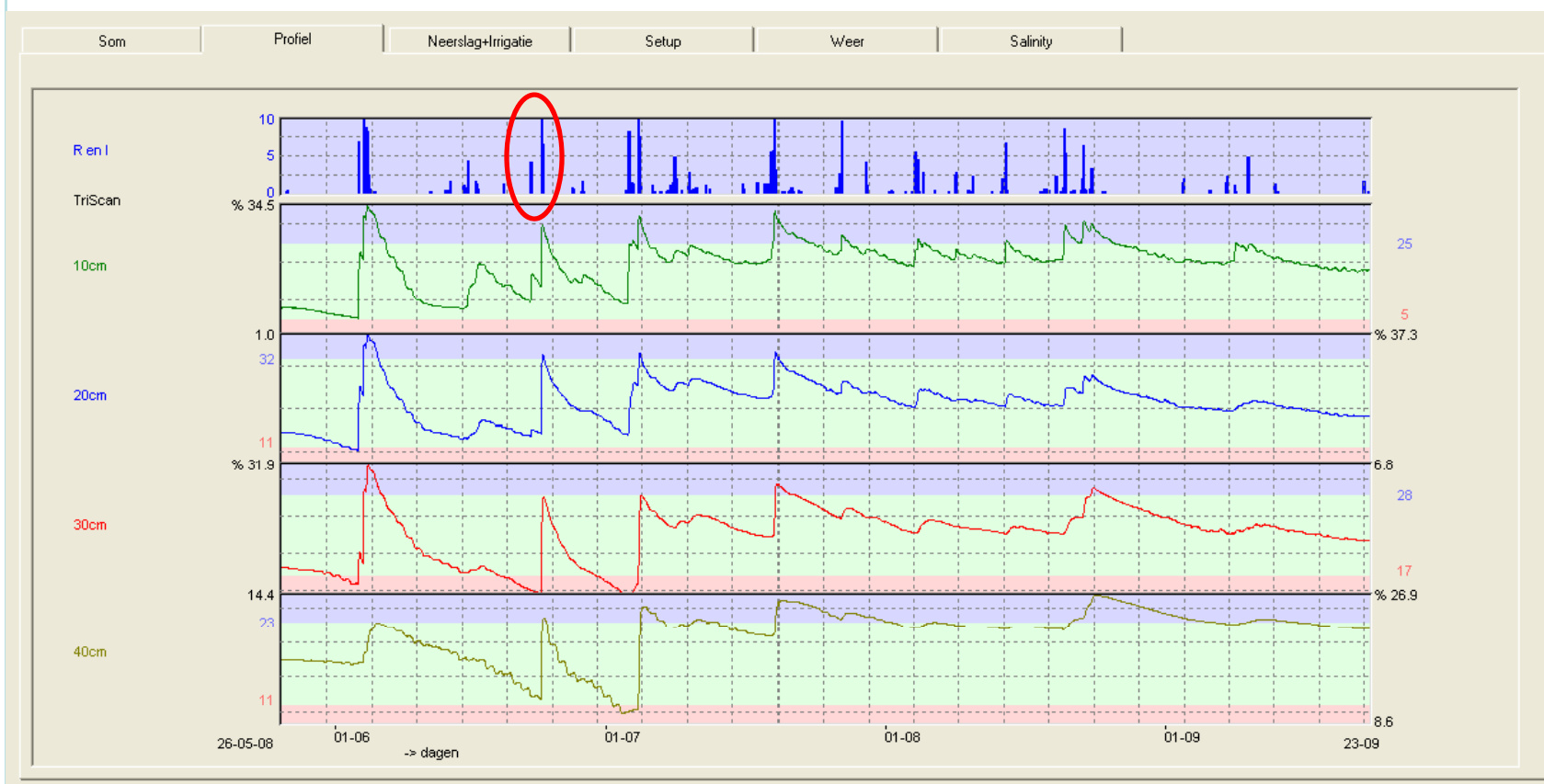
- Decision Supporting System
- Decreasing spilling of pesticides
- Lab on a chip?



Project – WaterSense (2)

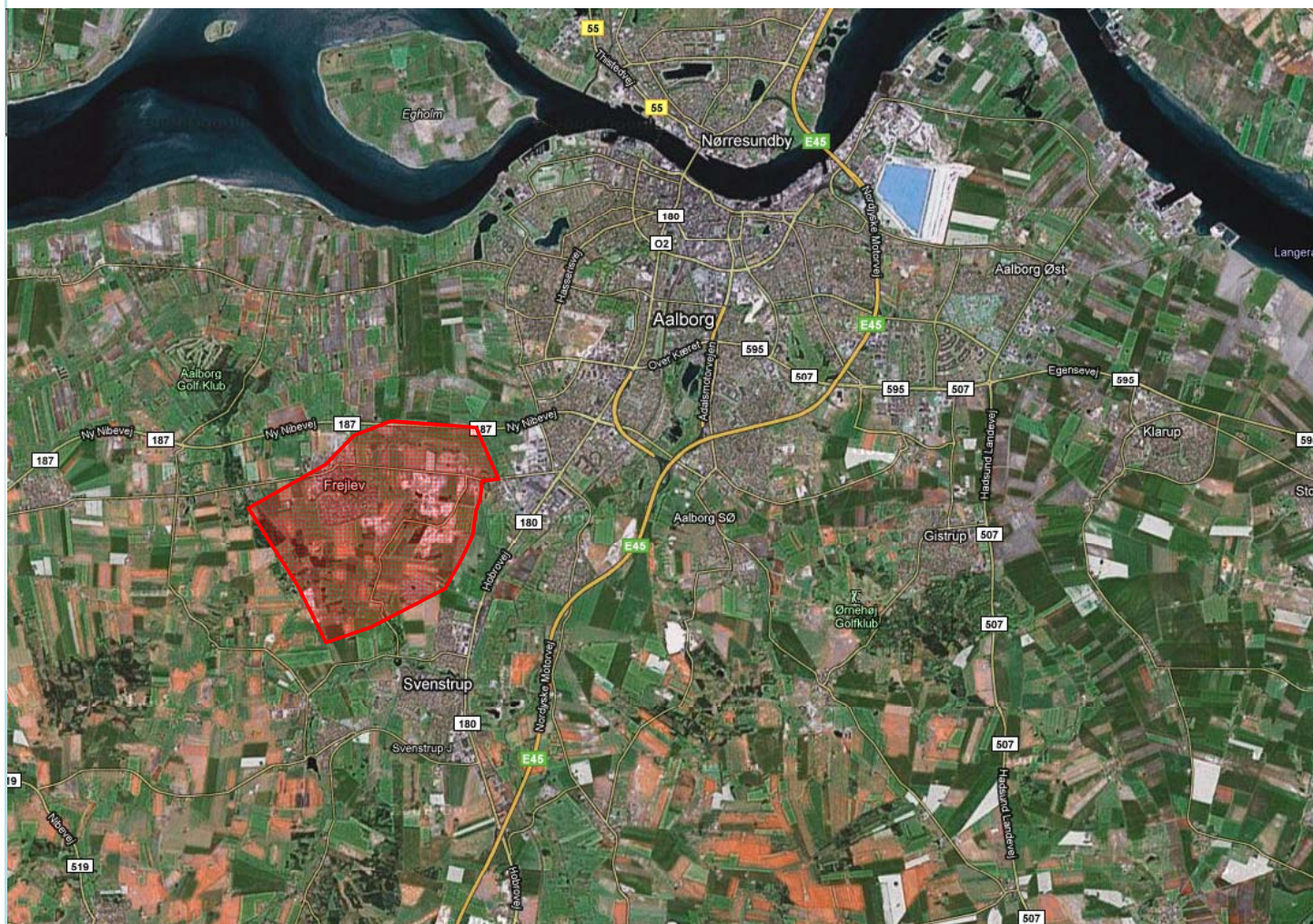
- Decreasing irrigation
- Decreasing loss of minerals
- Protecting groundwater

June 23 2009; 29.2 mm





Drastrup Project - Experiences in Aalborg, Denmark





City Council of Aalborg

- In 1987: decision to make a holistic land use plan for the catchment area of the Drastrup Waterworks
- Aims for the holistic planning:
 - *Drinking water from untreated, clean groundwater – also for future generations*
 - *Increase of forest area*
 - *Recreation in the city near landscape for everybody*
 - *Macroeconomic benefits*
 - *Increase in biodiversity*
 - *with full involvement of local citizens*



City Council of Aalborg

- Results 1987-2010

- *NO₃-N in the upper layers down to approximately 5 mg/l*
- *No use of pesticides anymore on approximately 800ha.*
- *Afforestation of approximately 700ha.*
- *Permanent natural grasslands on approximately 100ha.*
- *Approximately 20km of recreational footpaths*
- *Two towns pesticides-free towns*

- Remaining bottlenecks:

- *Circa 100ha of arable land*
- Legislation