ESF Project „*Establishment of interdisciplinary scientist group and modelling system for groundwater research*”

AGRICULTURAL IMPACT ON GROUNDWATER QUALITY IN SOUTH WEST LATVIA

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Project Nr. 2009/0212/1DP/1.1.1.2.0/09/APIA/VIAA/060

Investigation field

- The leaching of nitrogen and phosphorus compounds from agricultural areas has become one of the main problems in the World and Europe Union (EU) countries.

- Currently the impact of agriculture on water ecosystems has been discussed frequently according to scientific, economical and political reasons.

- Agricultural activities are the main source of diffuse nutrient loading in agricultural watersheds.

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Objective

- The objective of this study is to provide assessment of the differences of water quality between monitoring scales in three different diffuse source pollution monitoring stations Auce, Bērze and Mellupīte in southwest Latvia:
  - small catchment;
  - drainage field;
  - shallow groundwater.

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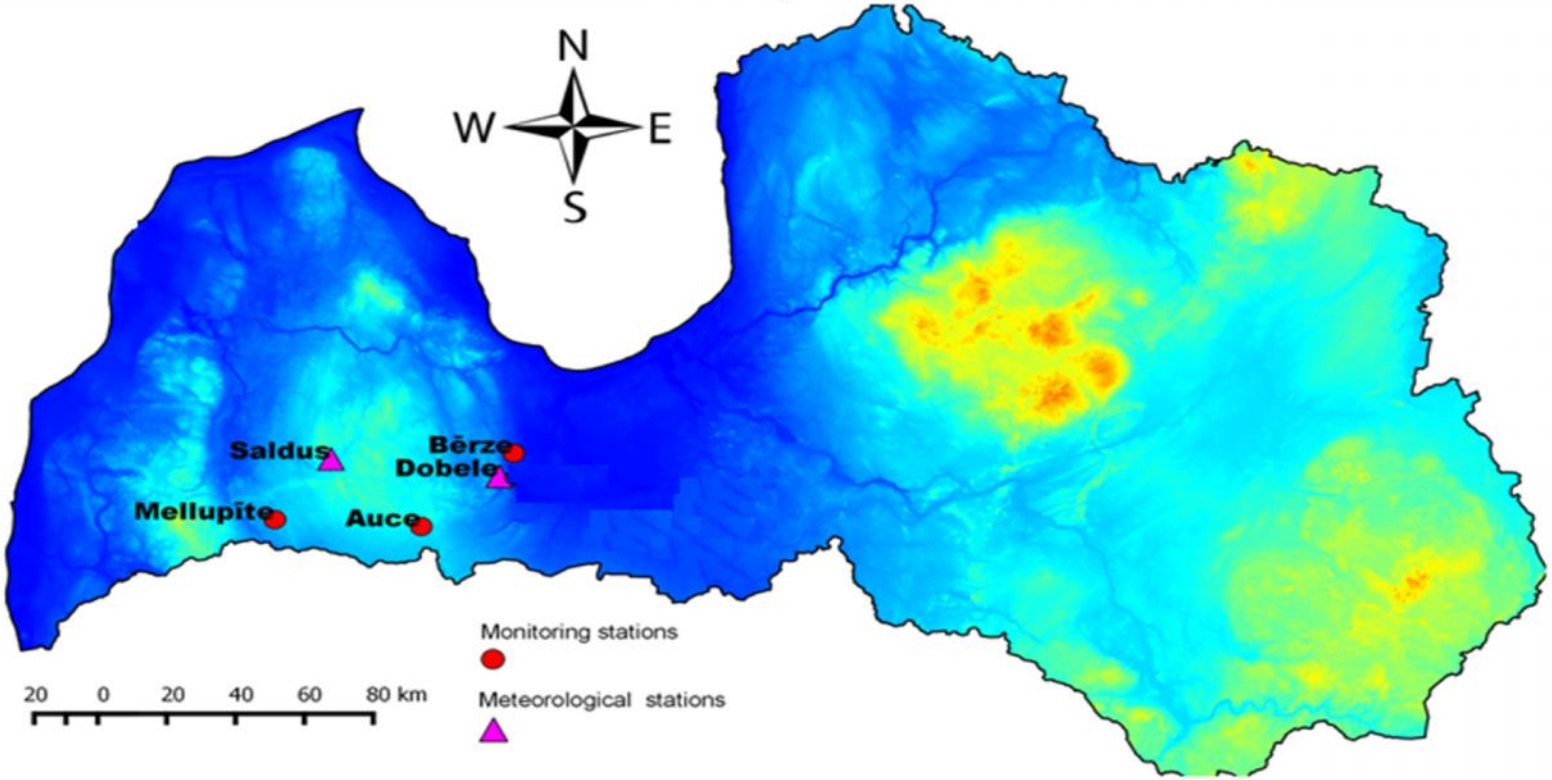
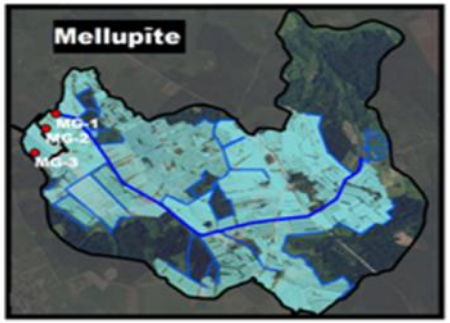
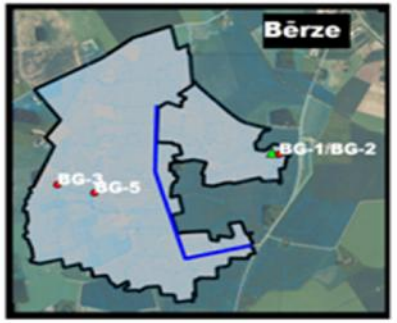
Study Area







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Materials and Methods

- Monitoring stations are located in south west part of Latvia and represent regions with different farming intensity.

- The study has been carried out in sandy loam and loamy sand till sediments in active agricultural lands.

- Results are based on long term water quality monitoring measurements in Auce, Bērze and Mellupīte monitoring stations from 1995 – 2011.

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Materials and Methods

- Water quality samples are taken monthly from the drainage field and small catchment in monitoring stations since 1995.

- Shallow groundwater quality is monitored once per 4 months from 2006 – 2011 in each monitoring station.

- Nitrogen (N_{tot}) and phosphorus (P_{tot}) are main components which analyzed and described in this study.

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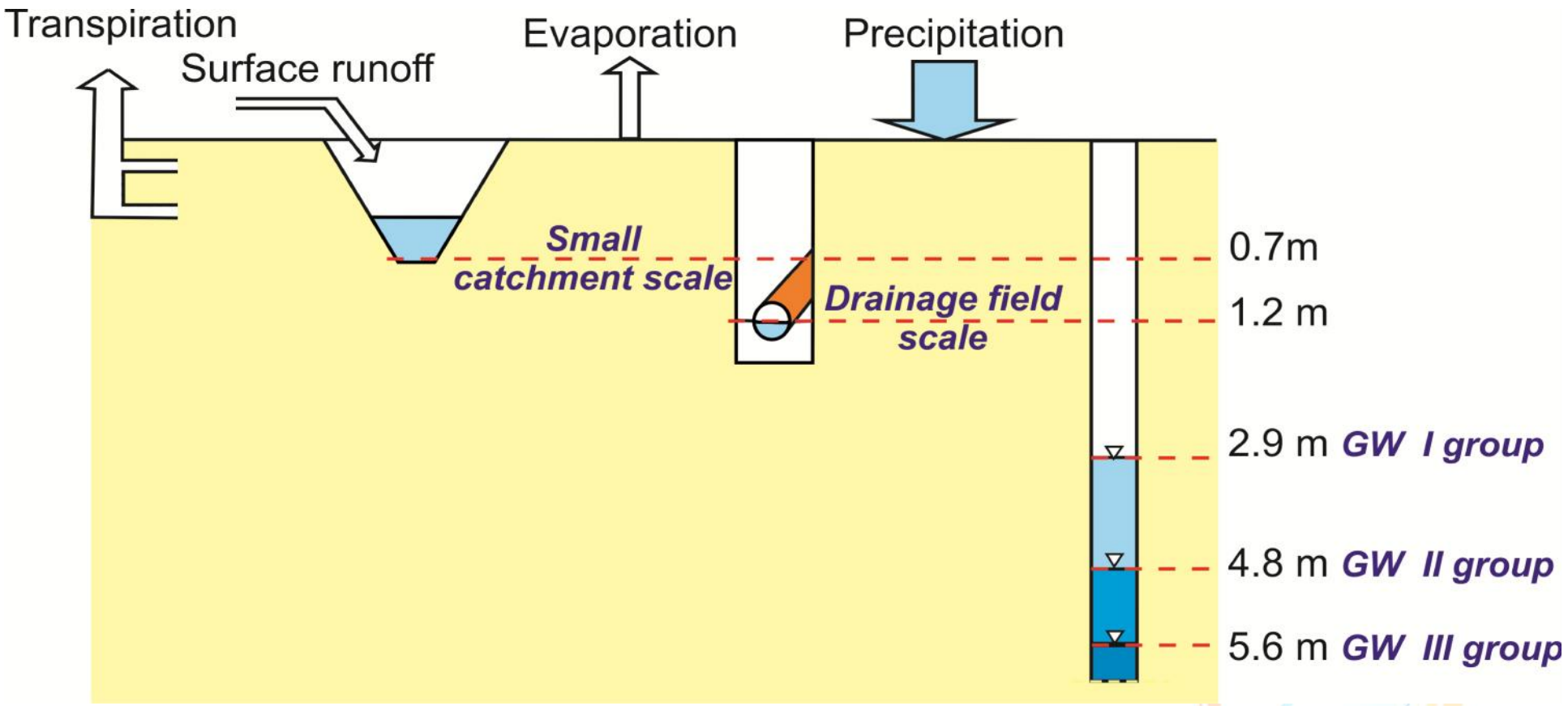
Materials and Methods



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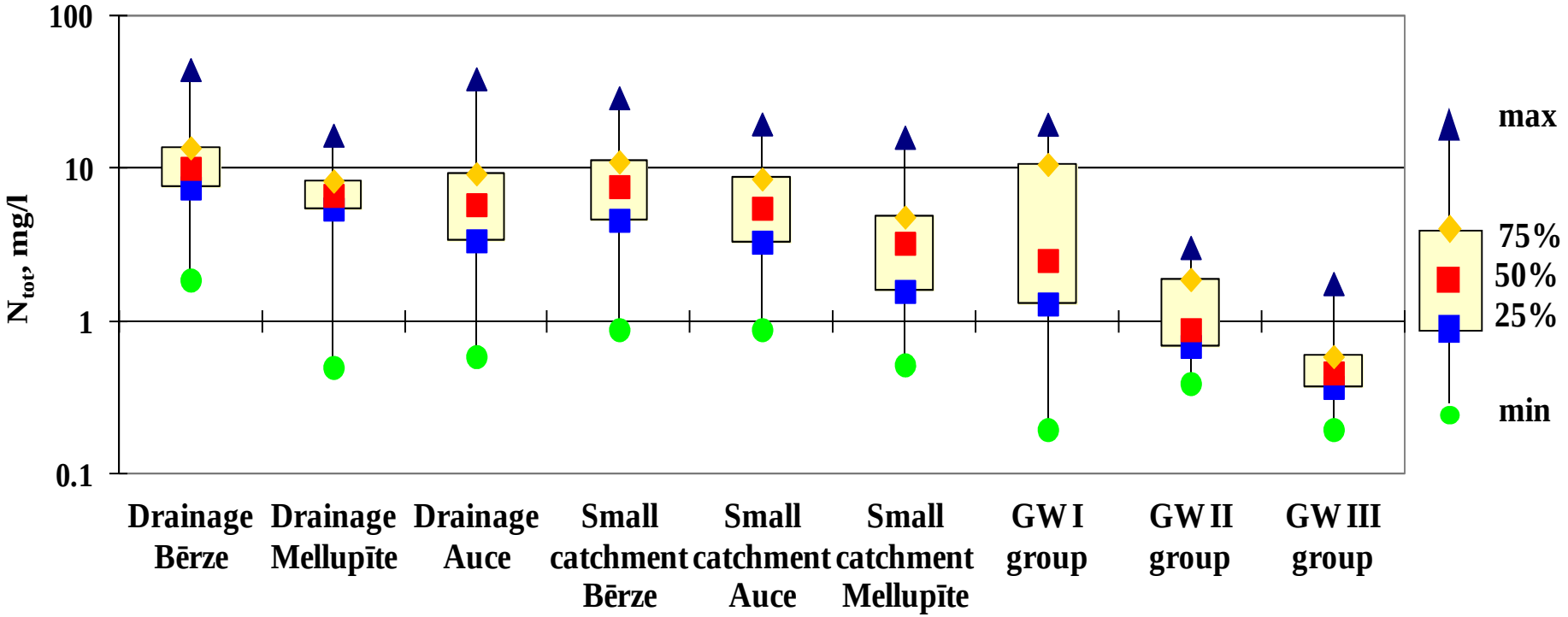
Results

N_{tot} concentrations: three scales



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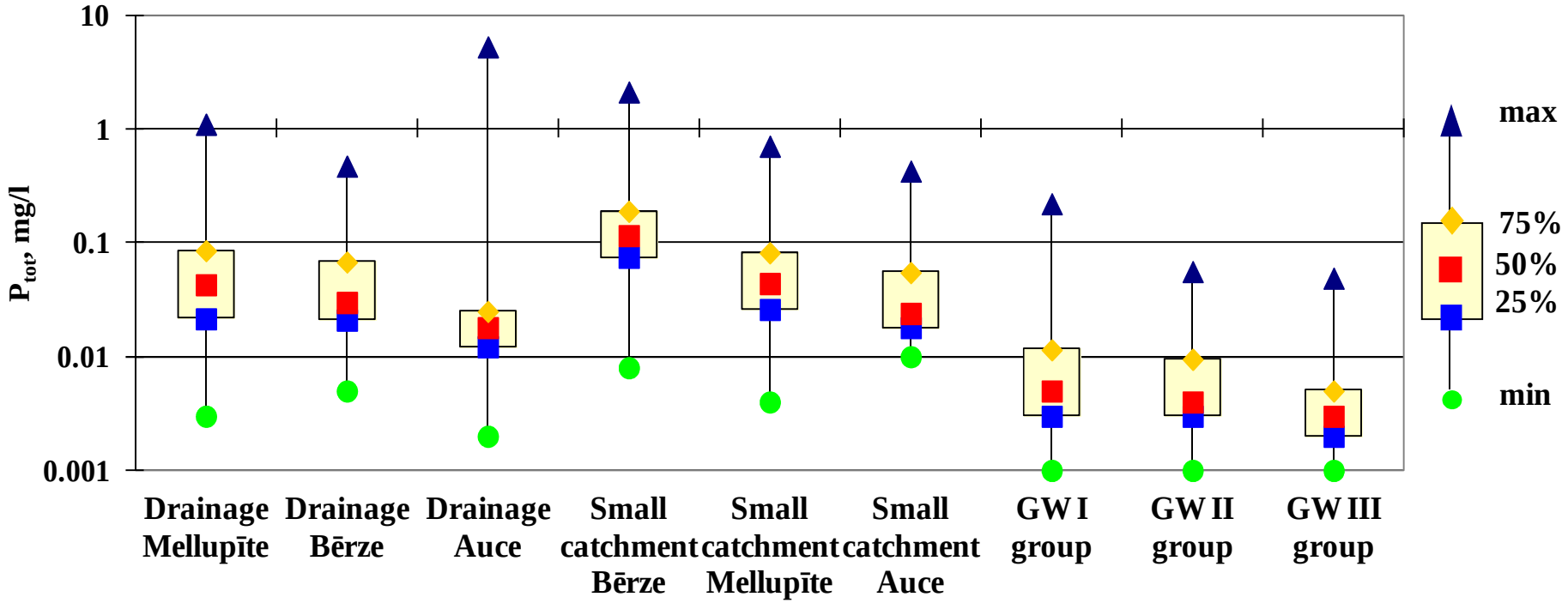
P_{tot} concentrations: three scales



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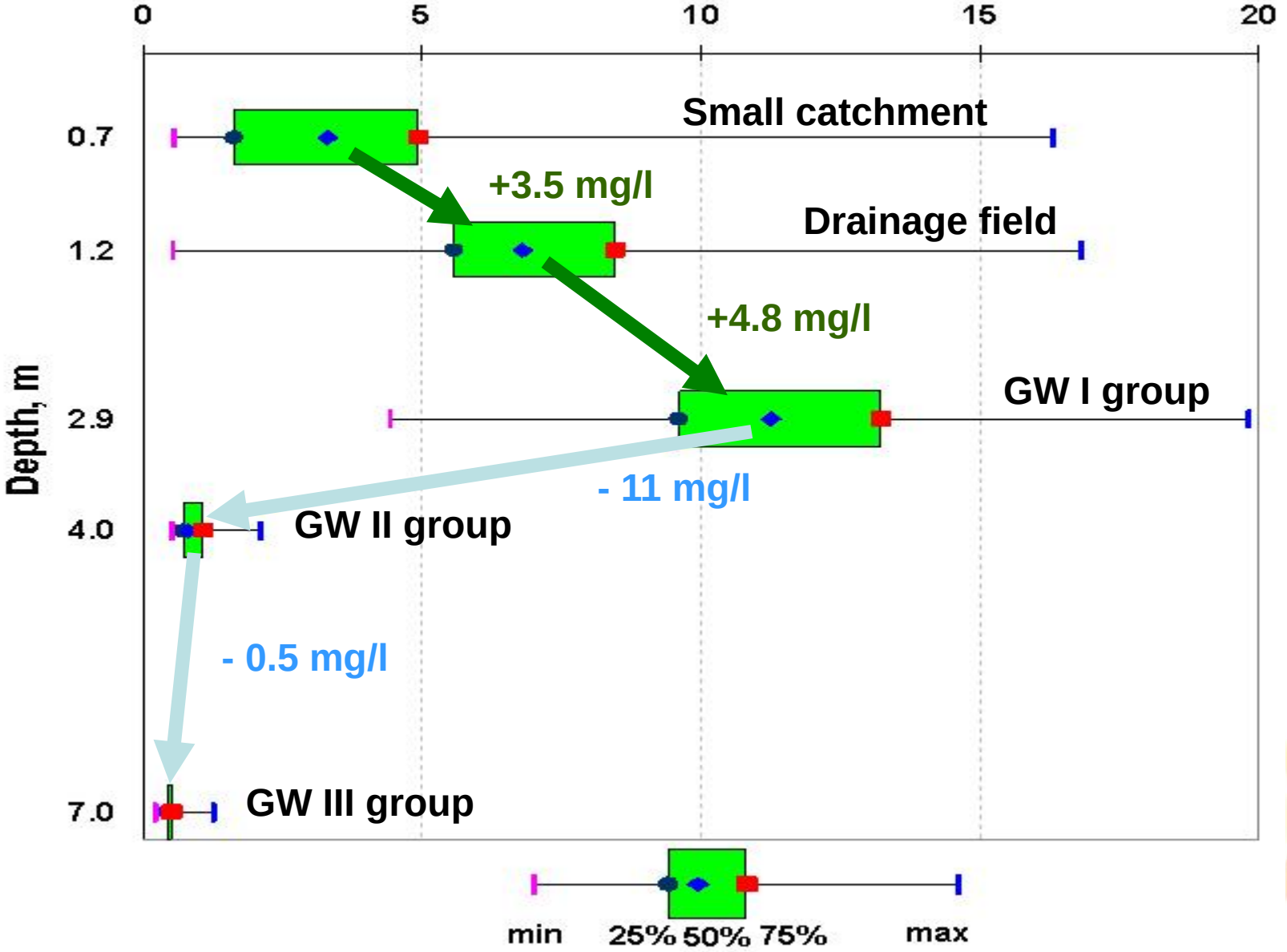
Monitoring station Mellupīte N_{tot} mg/l



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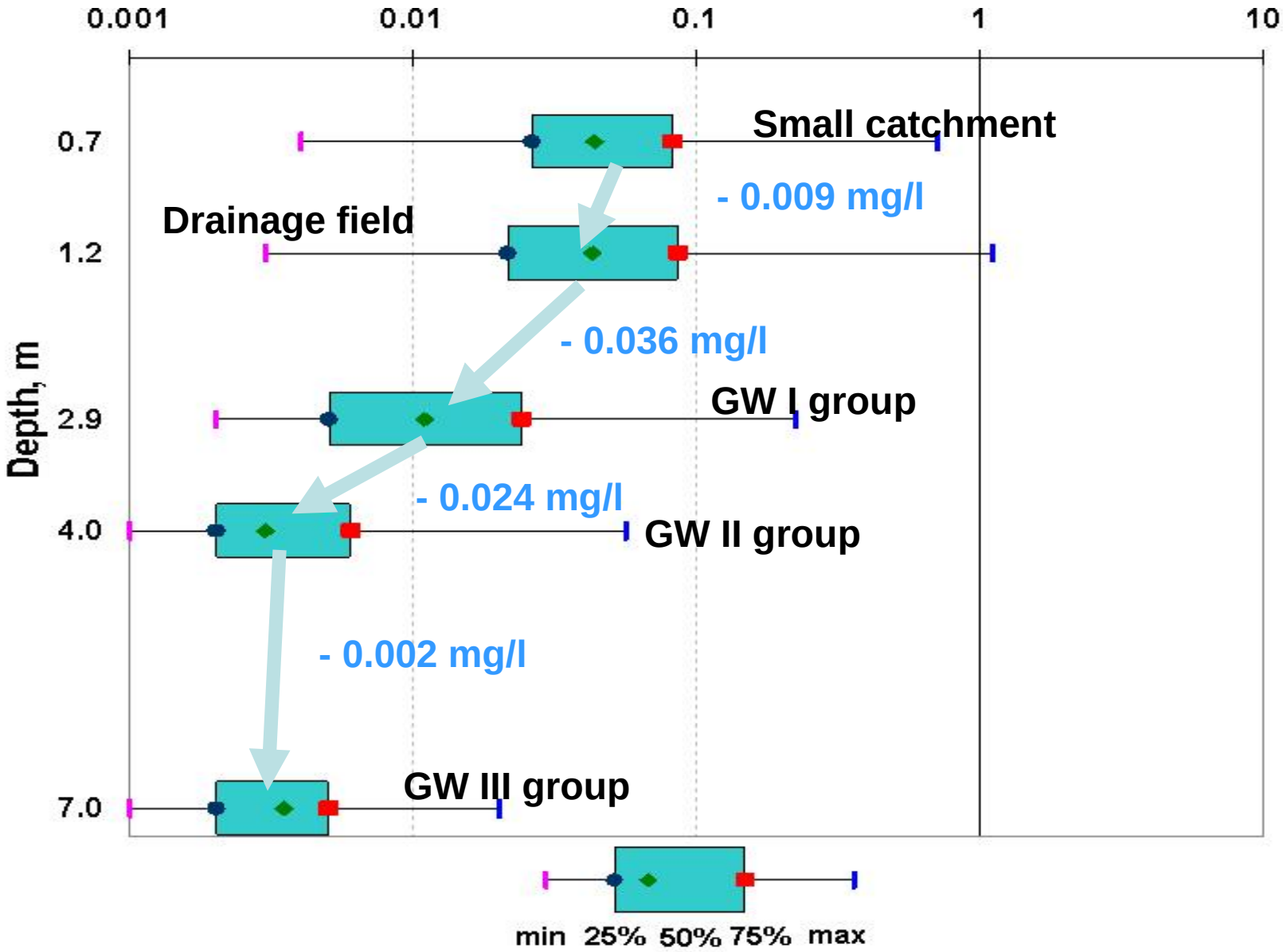
Monitoring station Mellupīte P_{tot} mg/l



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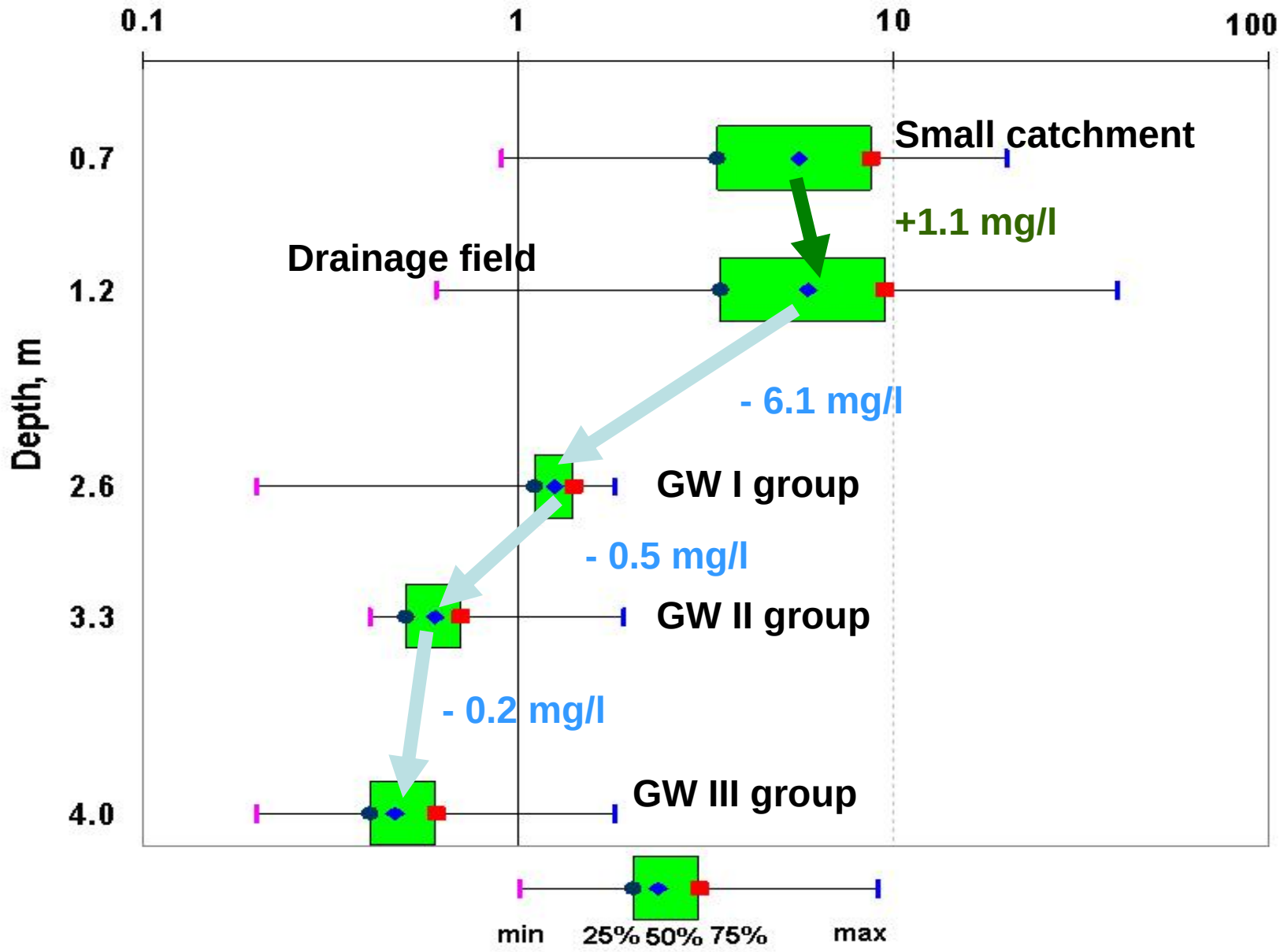
Monitoring station Auce N_{tot} mg/l



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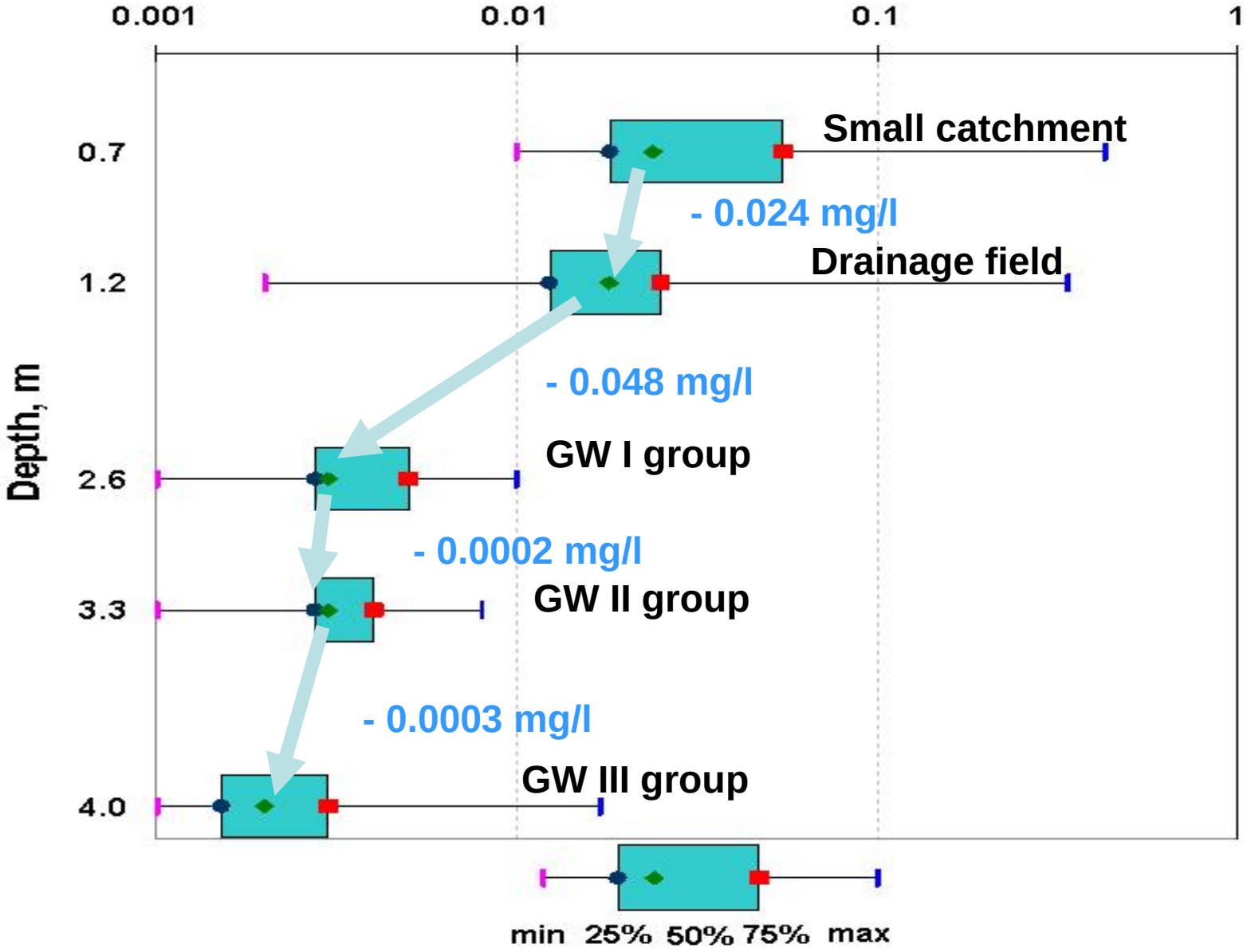
Monitoring station Auce P_{tot} mg/l



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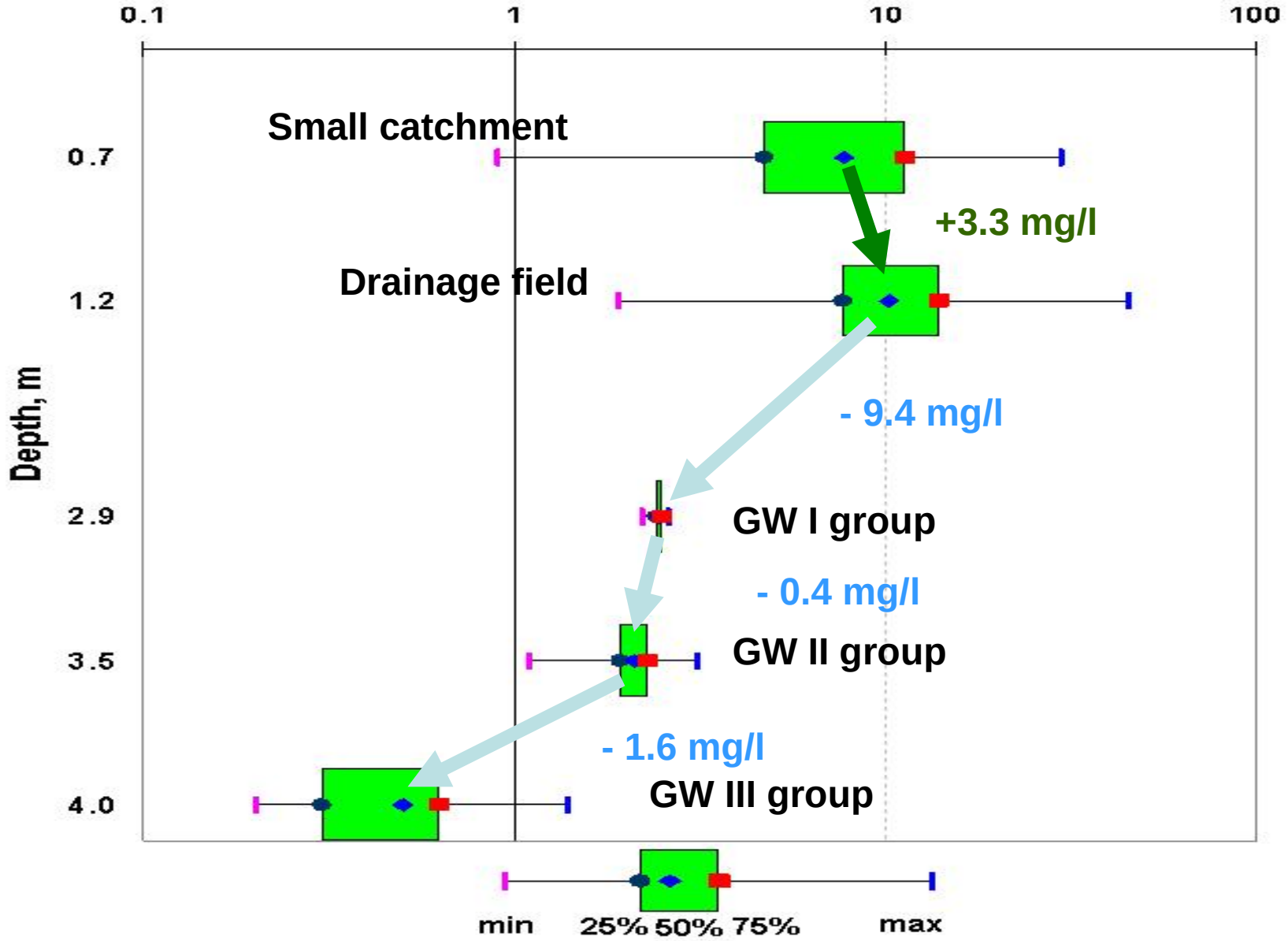
Monitoring station Bērze N_{tot} mg/l



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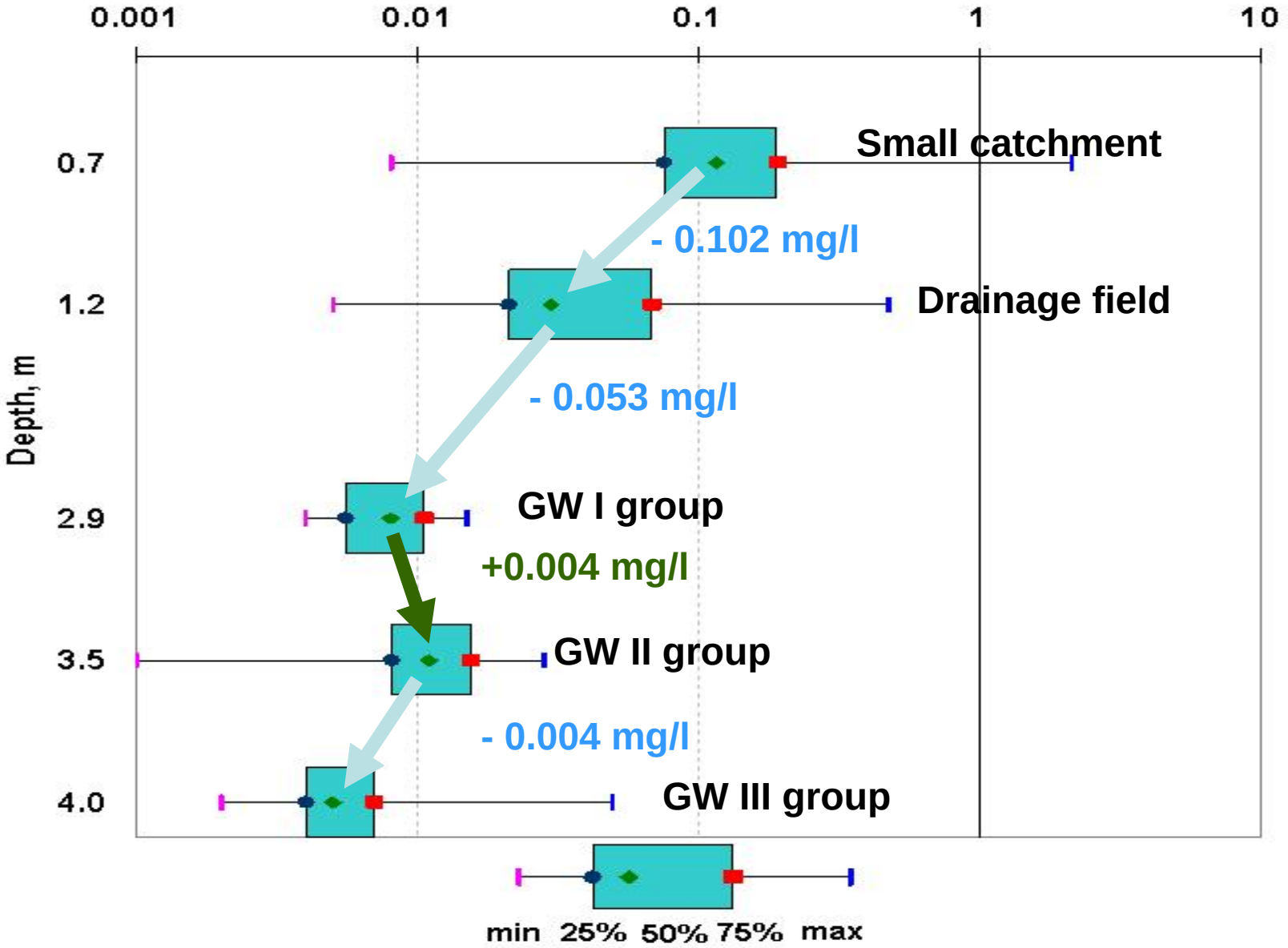
Monitoring station Bērze P_{tot} mg/l



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Conclusions

1. Average nitrogen (N_{tot}) concentrations in subsurface drainage water are higher than concentrations in small catchment and groundwater, but phosphorus (P_{tot}) concentrations are higher in small catchment scale.

2. Results confirm that distribution of nitrogen content decrease with depth from drainage field scale. Decrease caused by retention and dilution of nitrogen compounds.

3. Phosphorus (P_{tot}) decrease under small catchment scale and that reduction of concentration attributed to phosphorus immobility through the soil profile and increased transportation with surface runoff.

4. Comparison between drainage field, small catchment and groundwater offers a possibility to define percentage decrease of nitrogen and phosphorus in each monitoring site.

5. Water quality verification in three scales give assessment tool and opportunity to identify agricultural influence and pollution sources in agricultural watersheds.

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