

Trends in the magnitude and frequency of high flows in Wallonia

5th symposium on the hydrological modelling of the Meuse basin

13/09/2018

Agenda

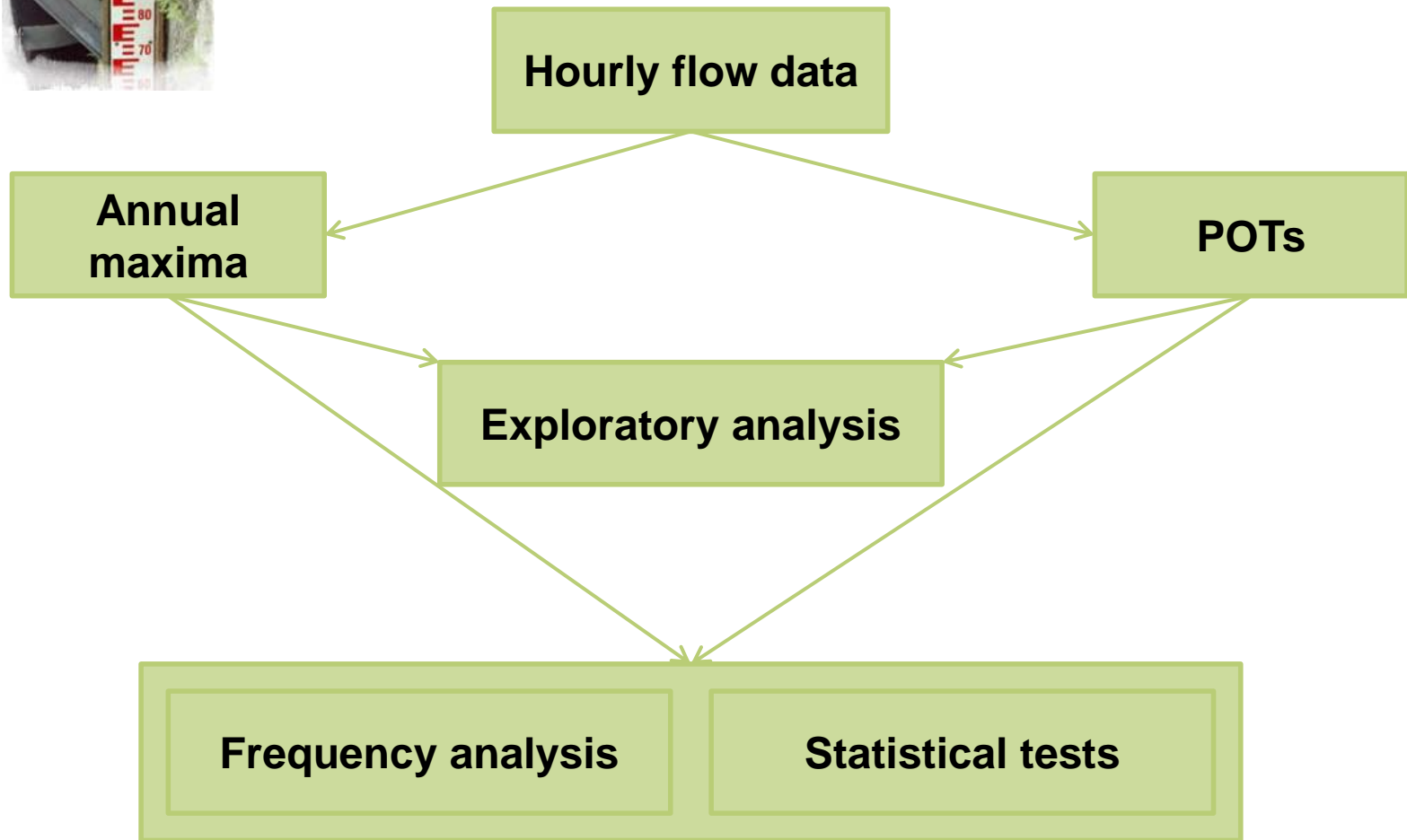
- Introduction
- Methodology
- Results
 - Trends
 - Analysis
- Conclusion and further work

Introduction

- Stationarity = assumption in many hydrological analyses
- Many studies all over the world showing non-stationarity
- In Wallonia, some changes observed but no study to confirm them
- Objective of this study = detecting and analysing changes in high flows in Wallonia

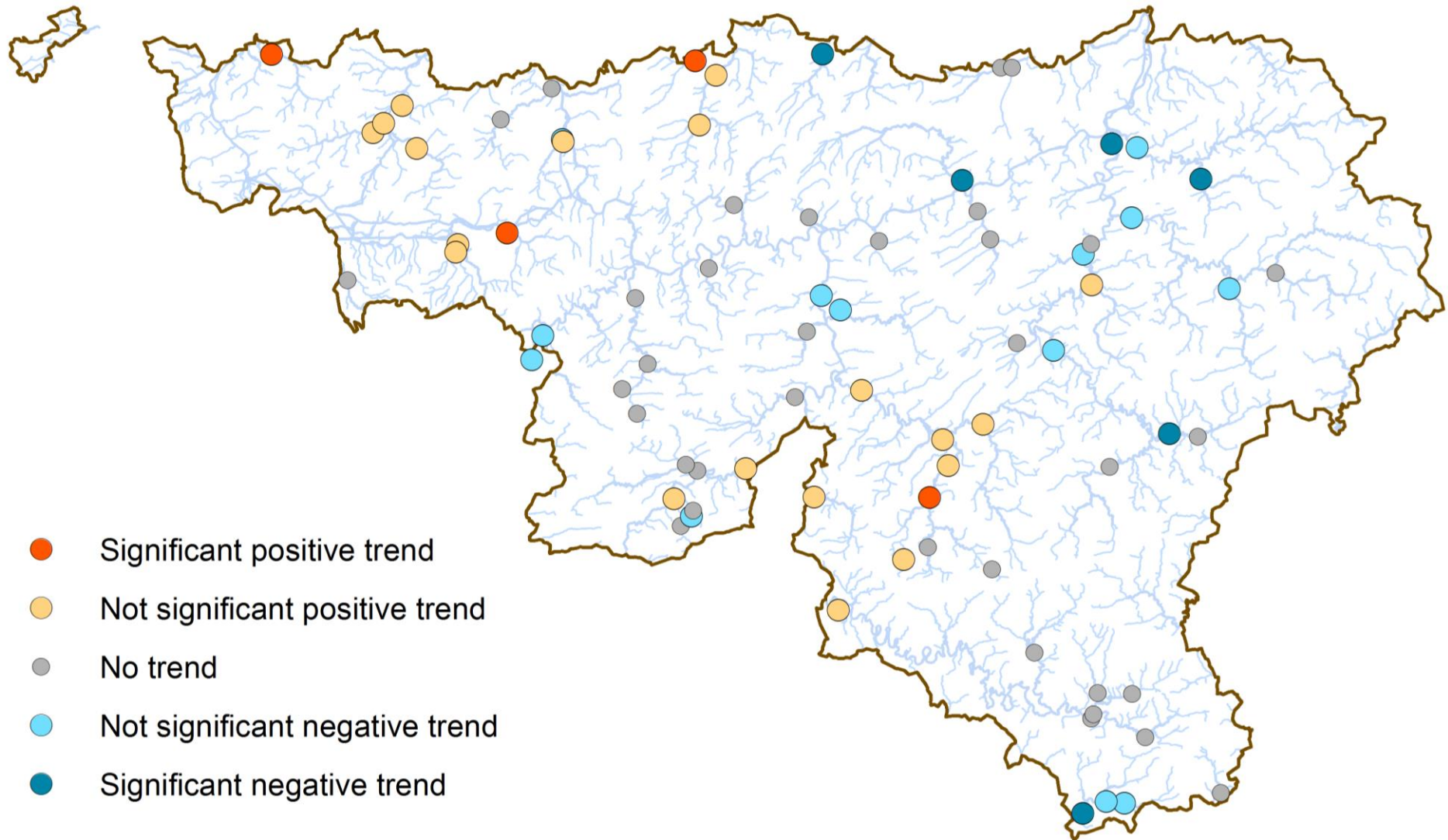


Methodology

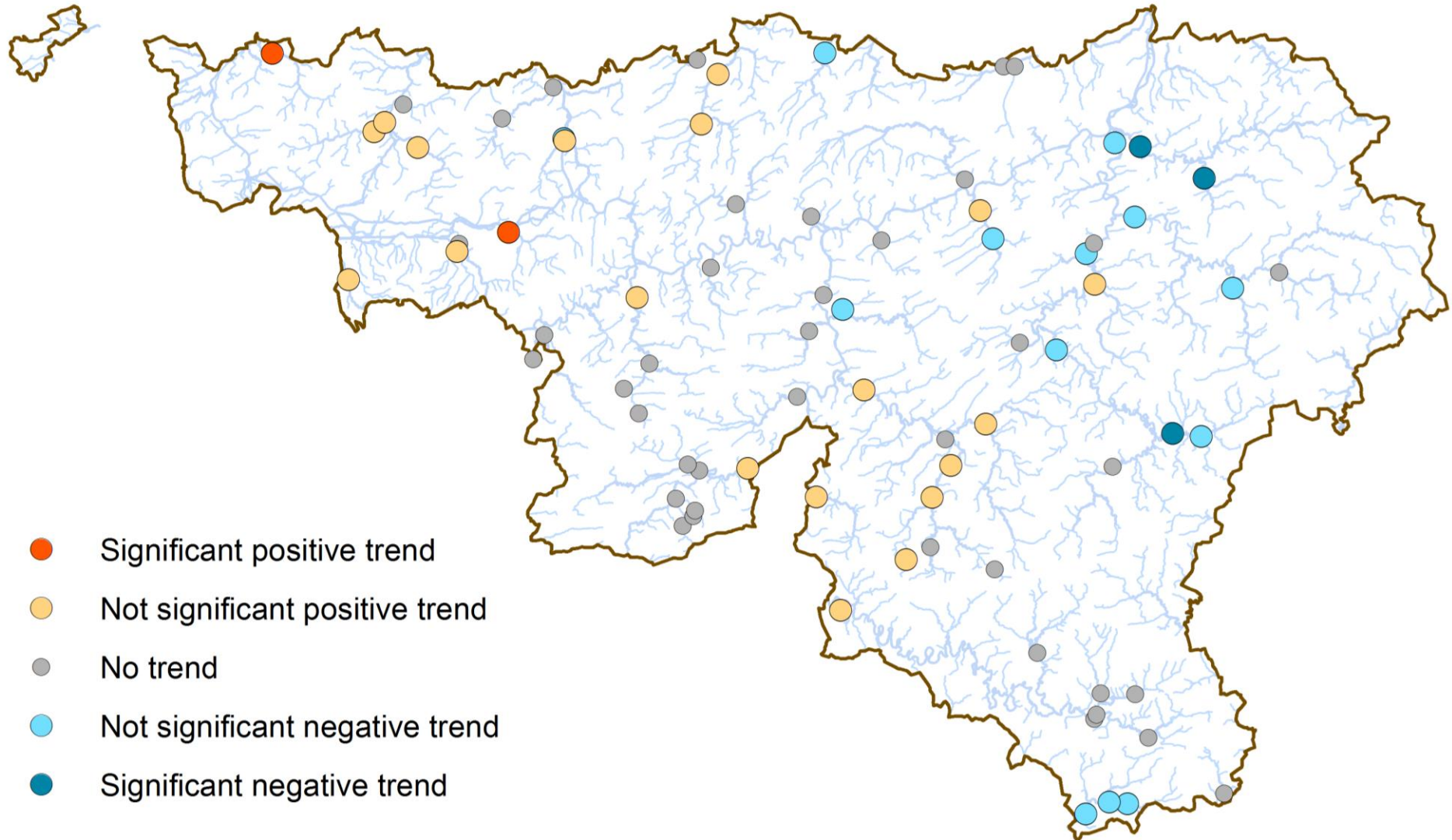


Results

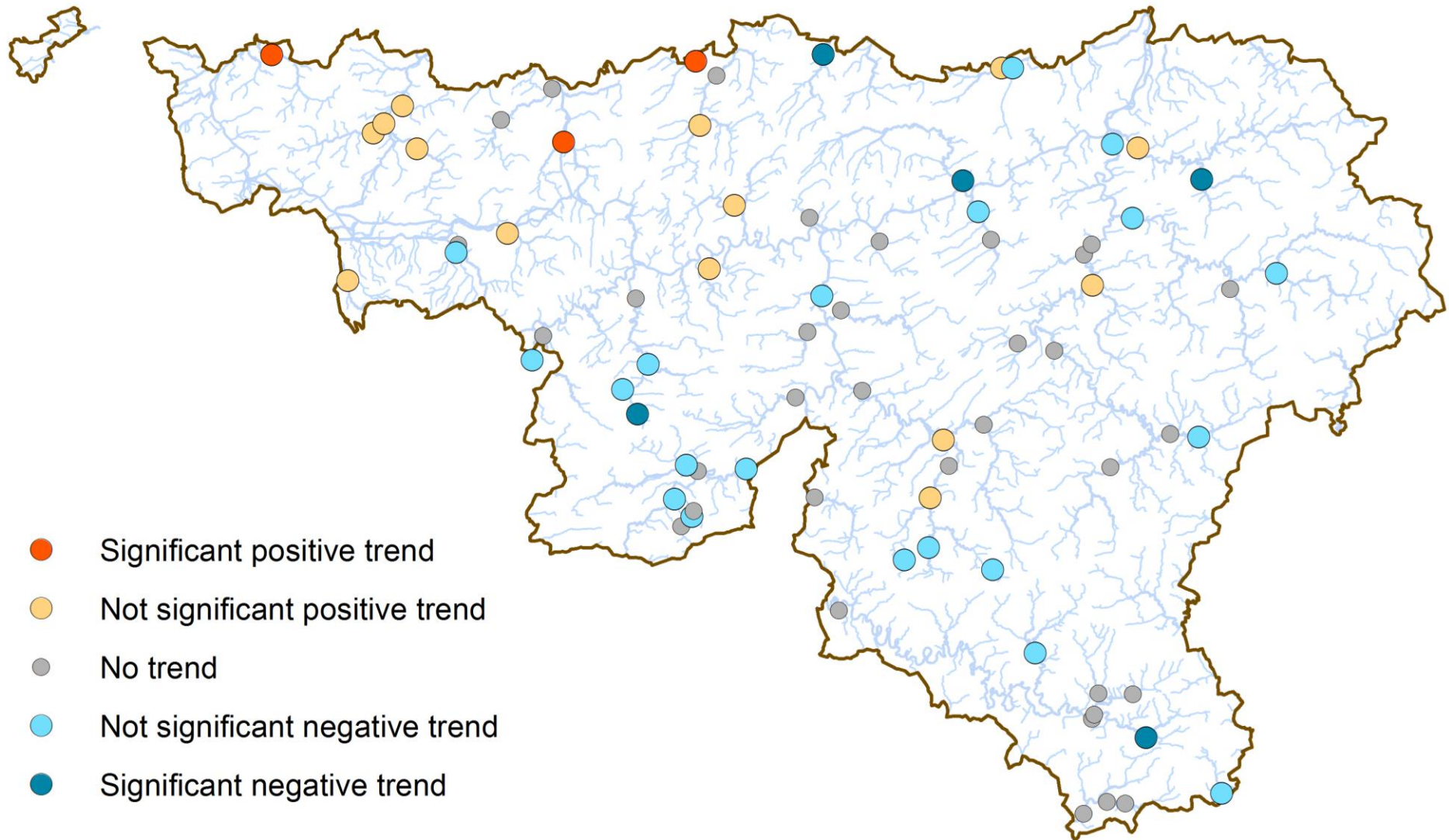
Results – Magnitude of annual maxima



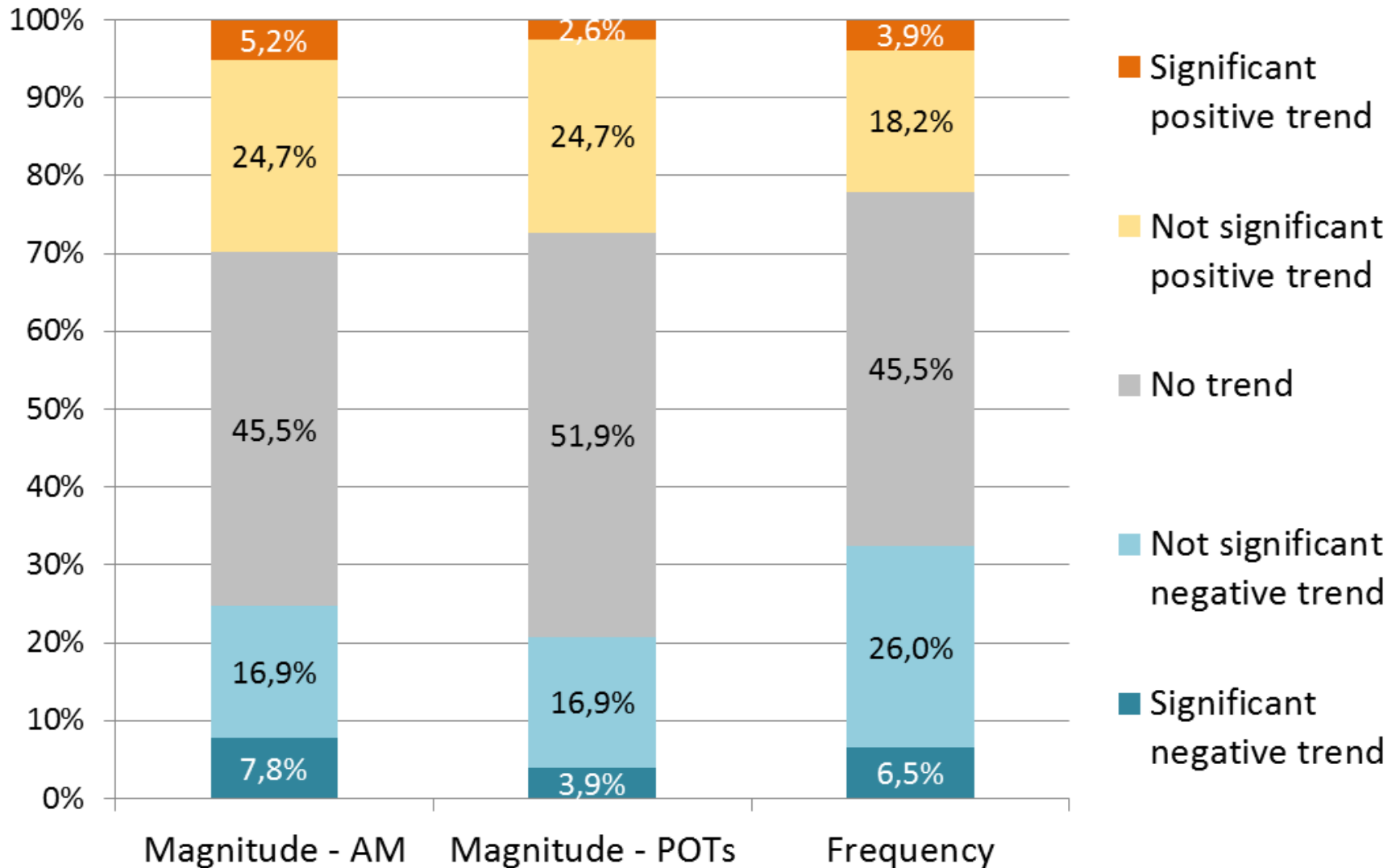
Results – Magnitude of POTs



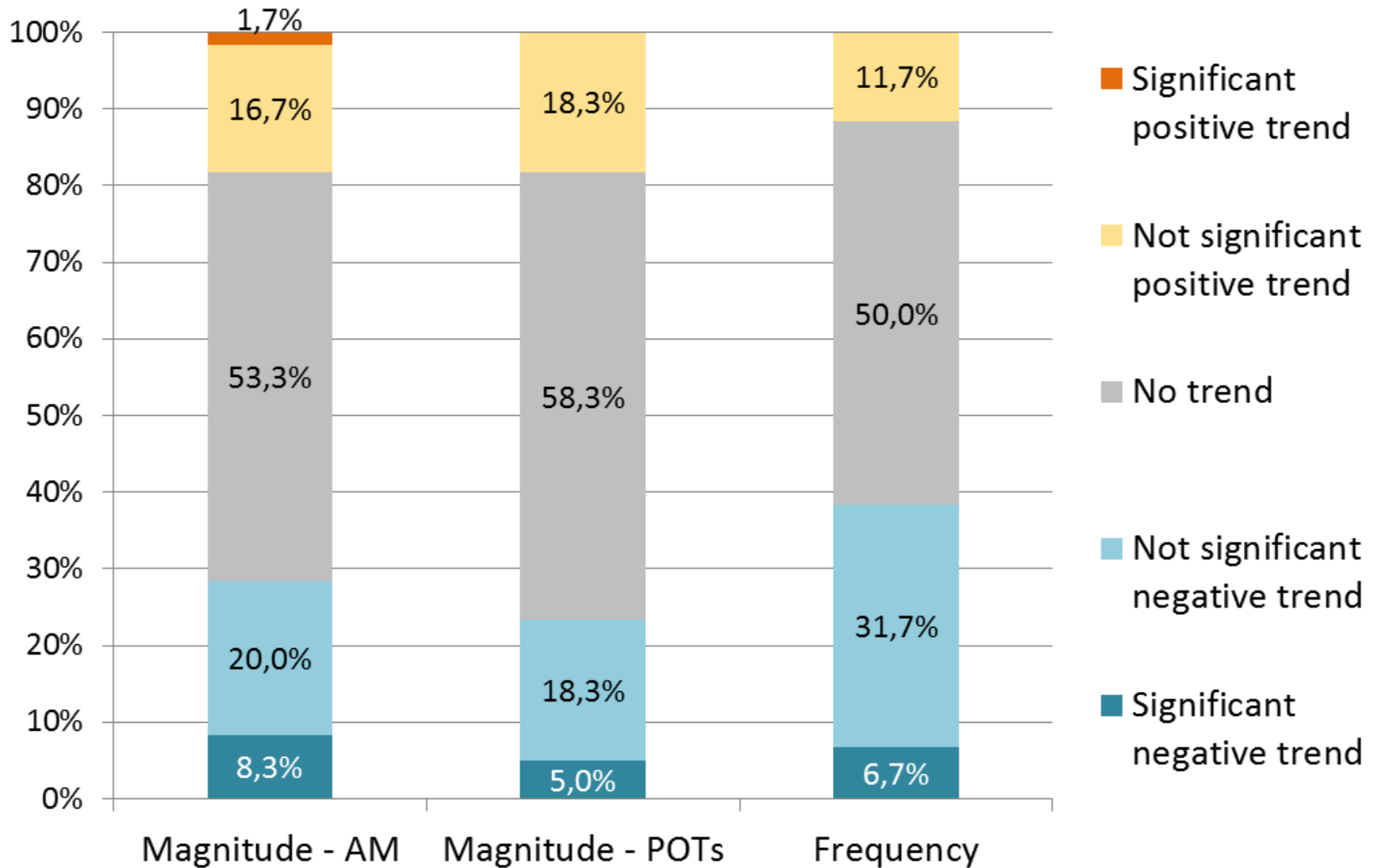
Results – Frequency (mean number of POTs/year)



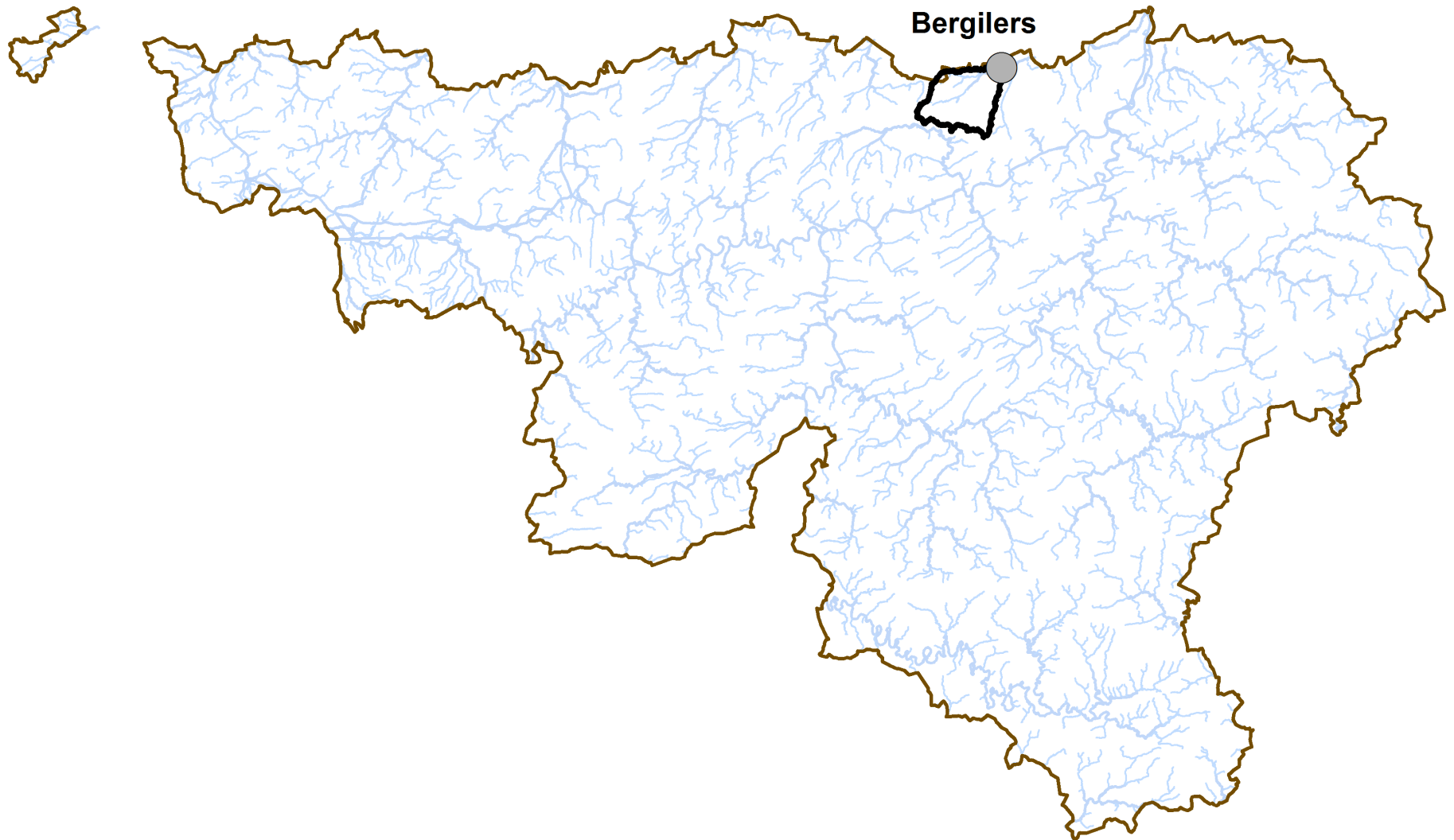
Results



Results - Meuse



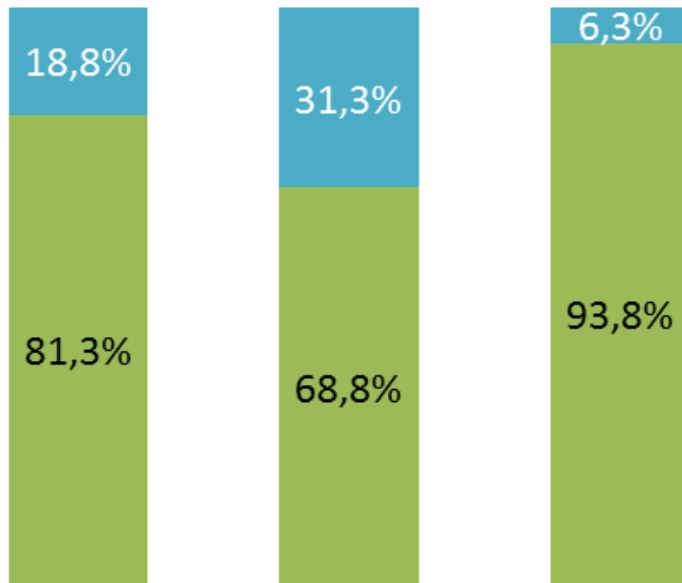
Results - Seasonality



Results - Seasonality

Annual maxima

■ April-Sept ■ Oct-March



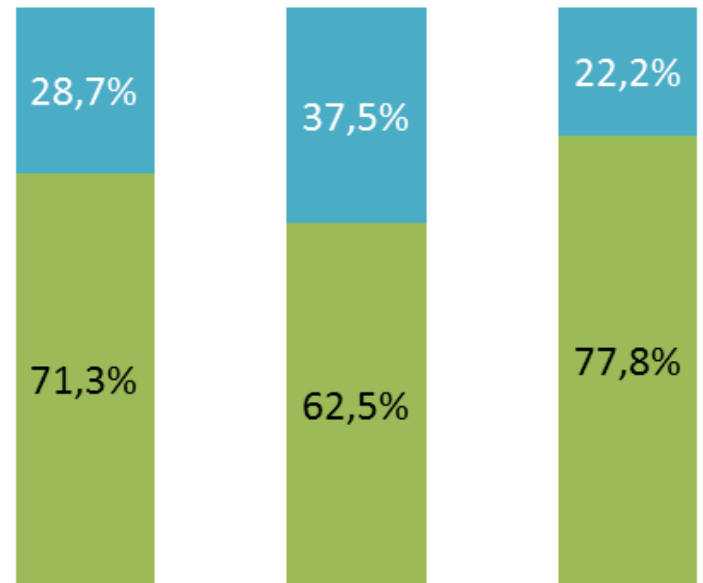
Whole
record
period

1986-2001

2002-2017

POTs

■ April-Sept ■ Oct-March



Whole
record
period

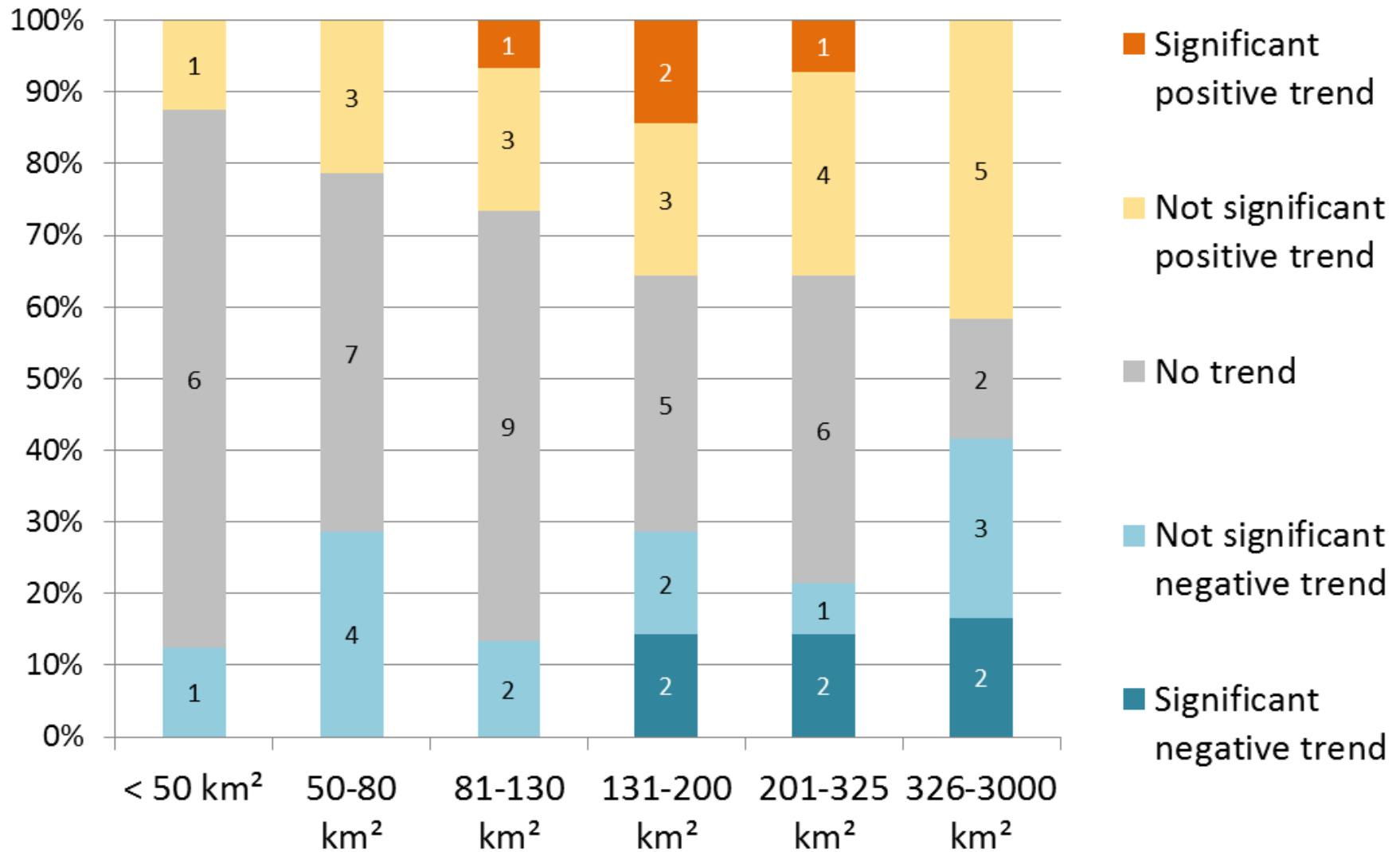
1986-2001

2002-2017

Trend analysis

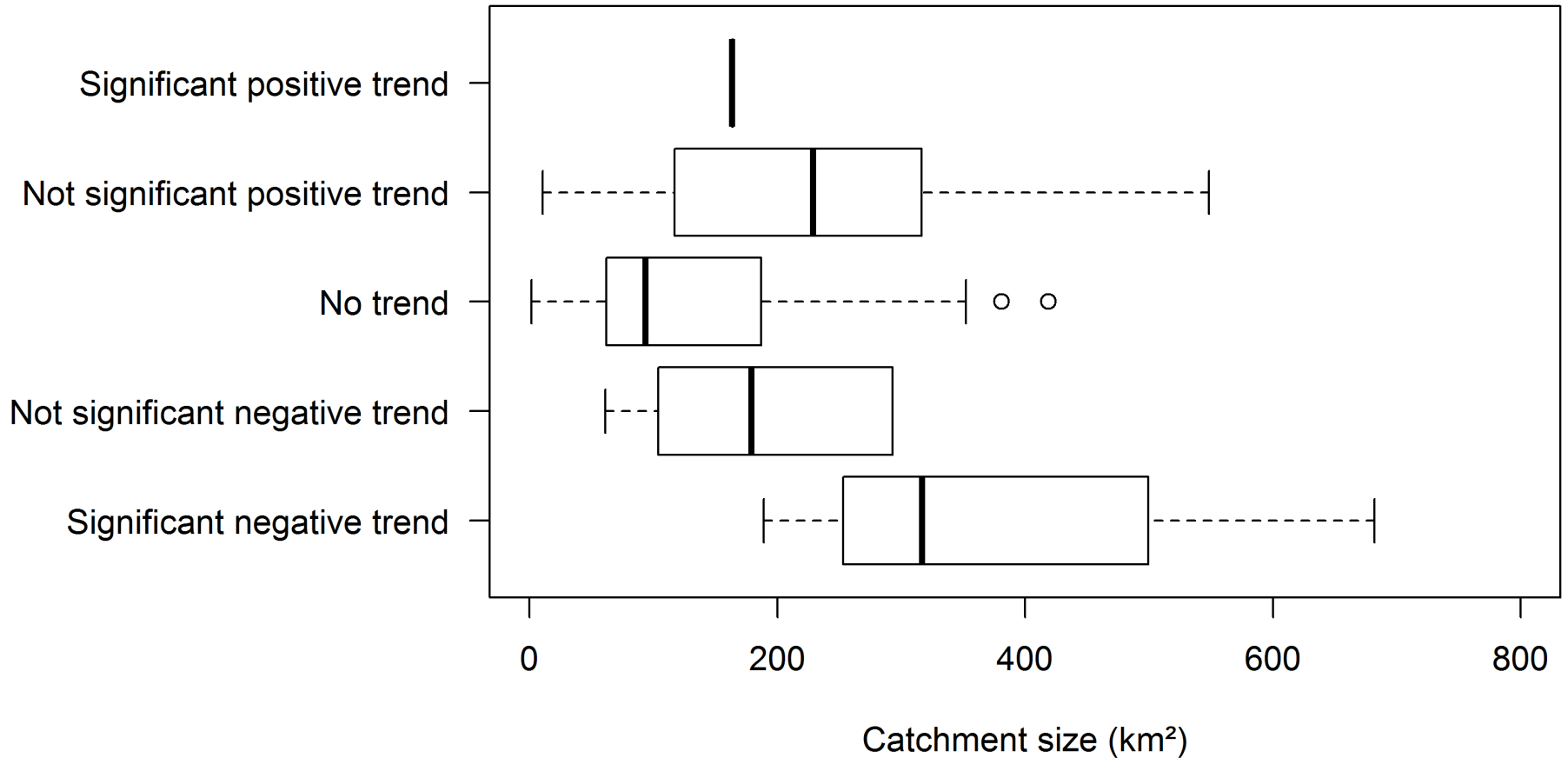
Catchment size

Magnitude - Annual maxima



Catchment size

Magnitude - POTs

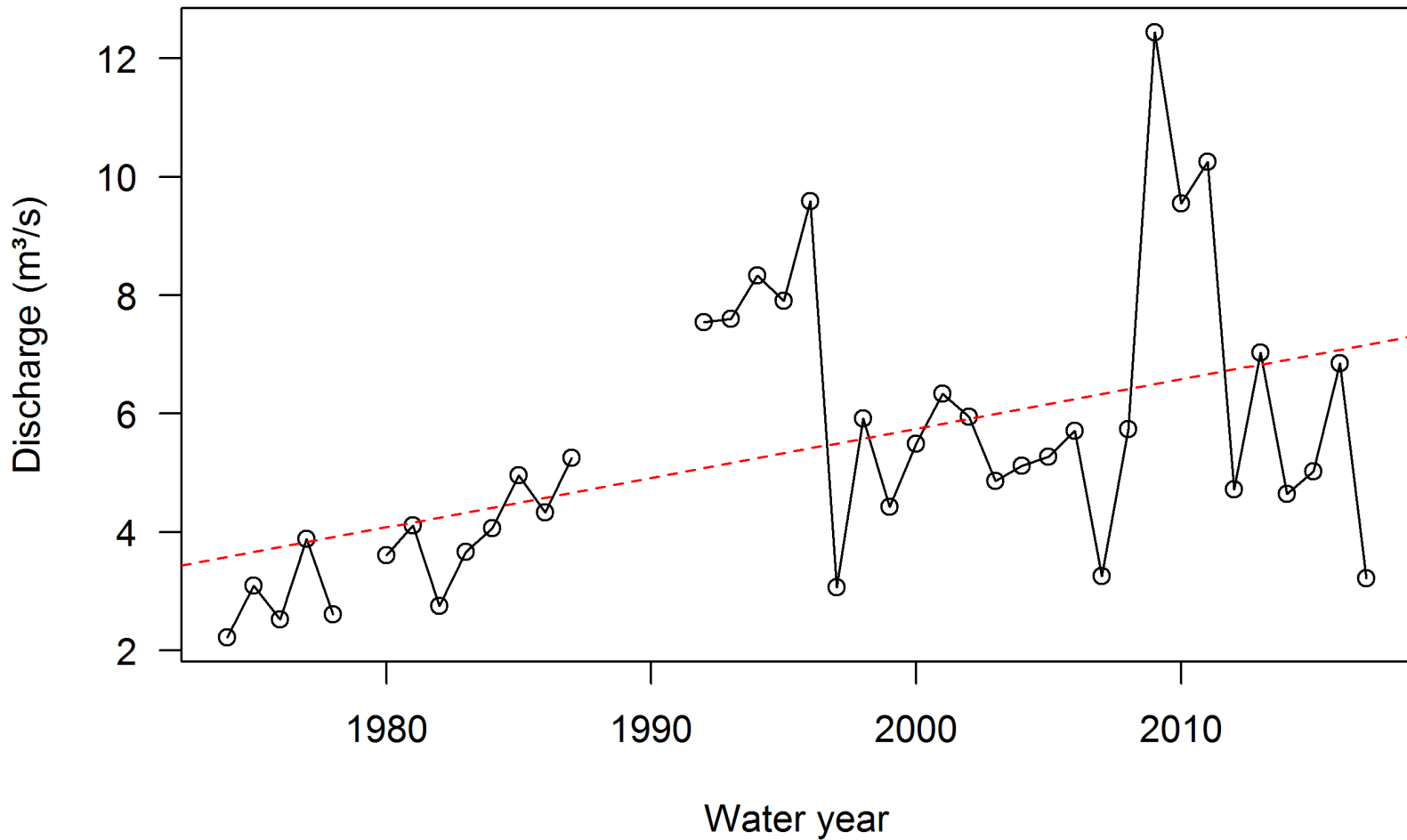


Urbanisation



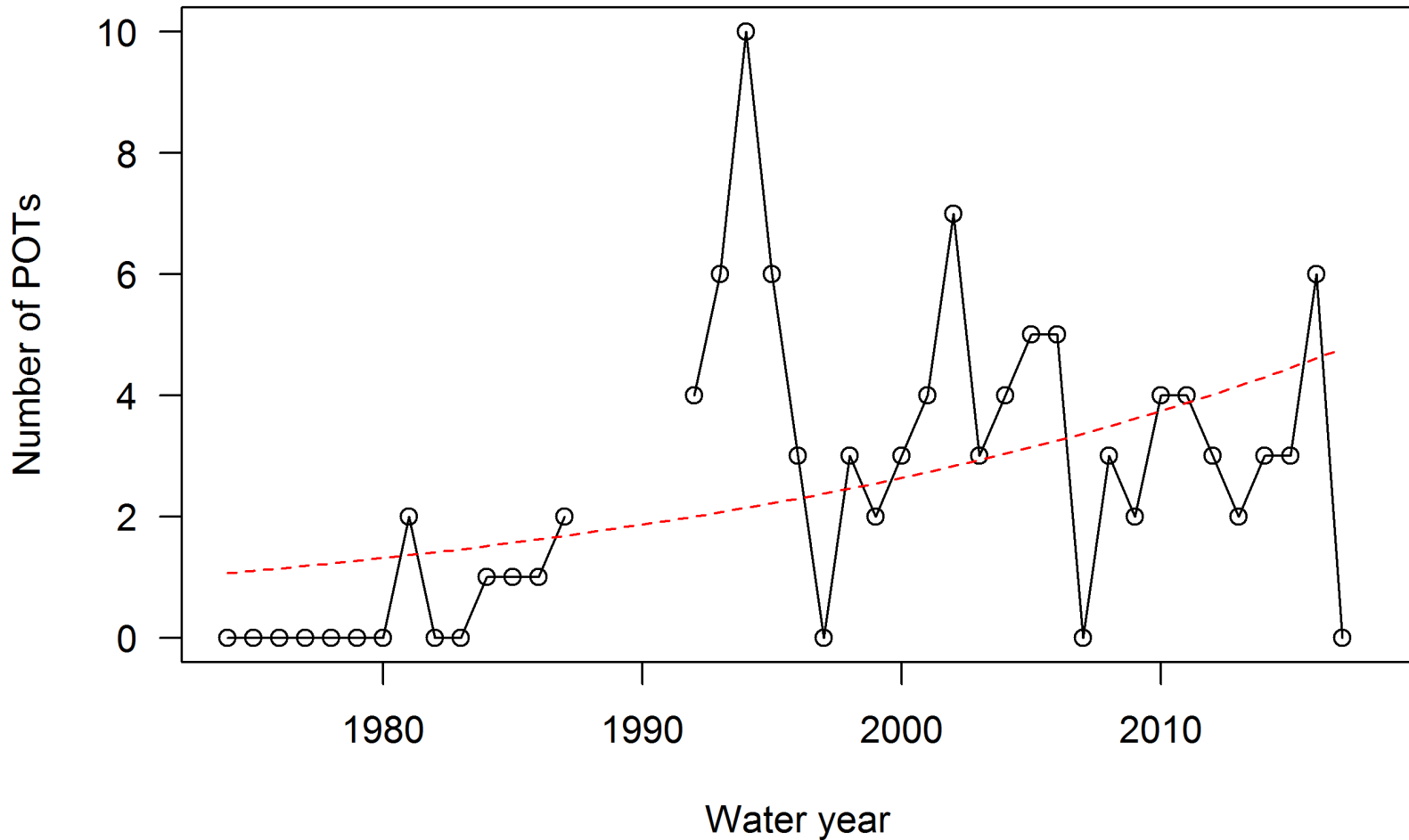
Urbanisation

River Lasne at Rosières : Annual maximum flows

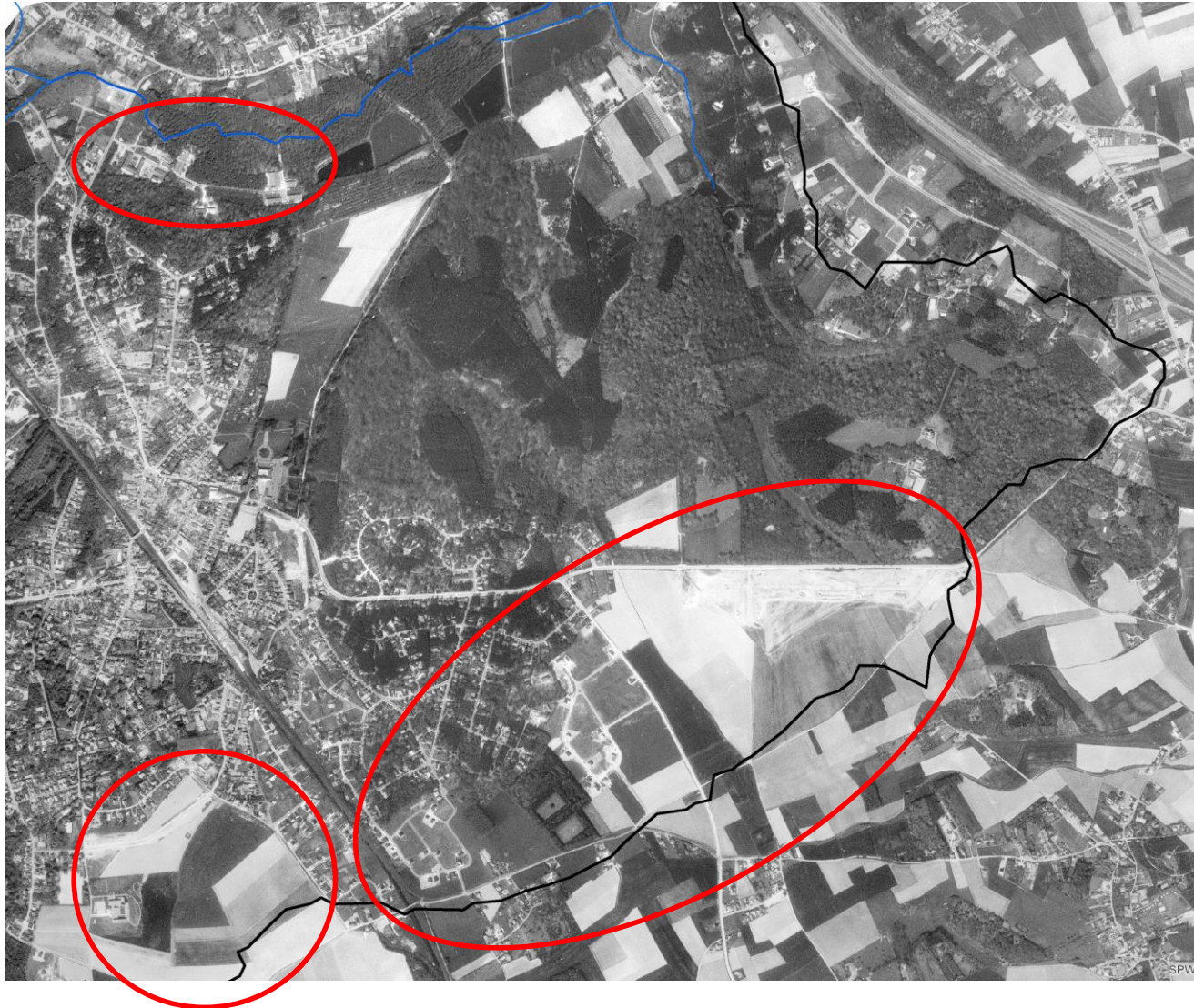


Urbanisation

River Lasne at Rosières : Mean number of POTs/year



Urbanisation



1971

Urbanisation



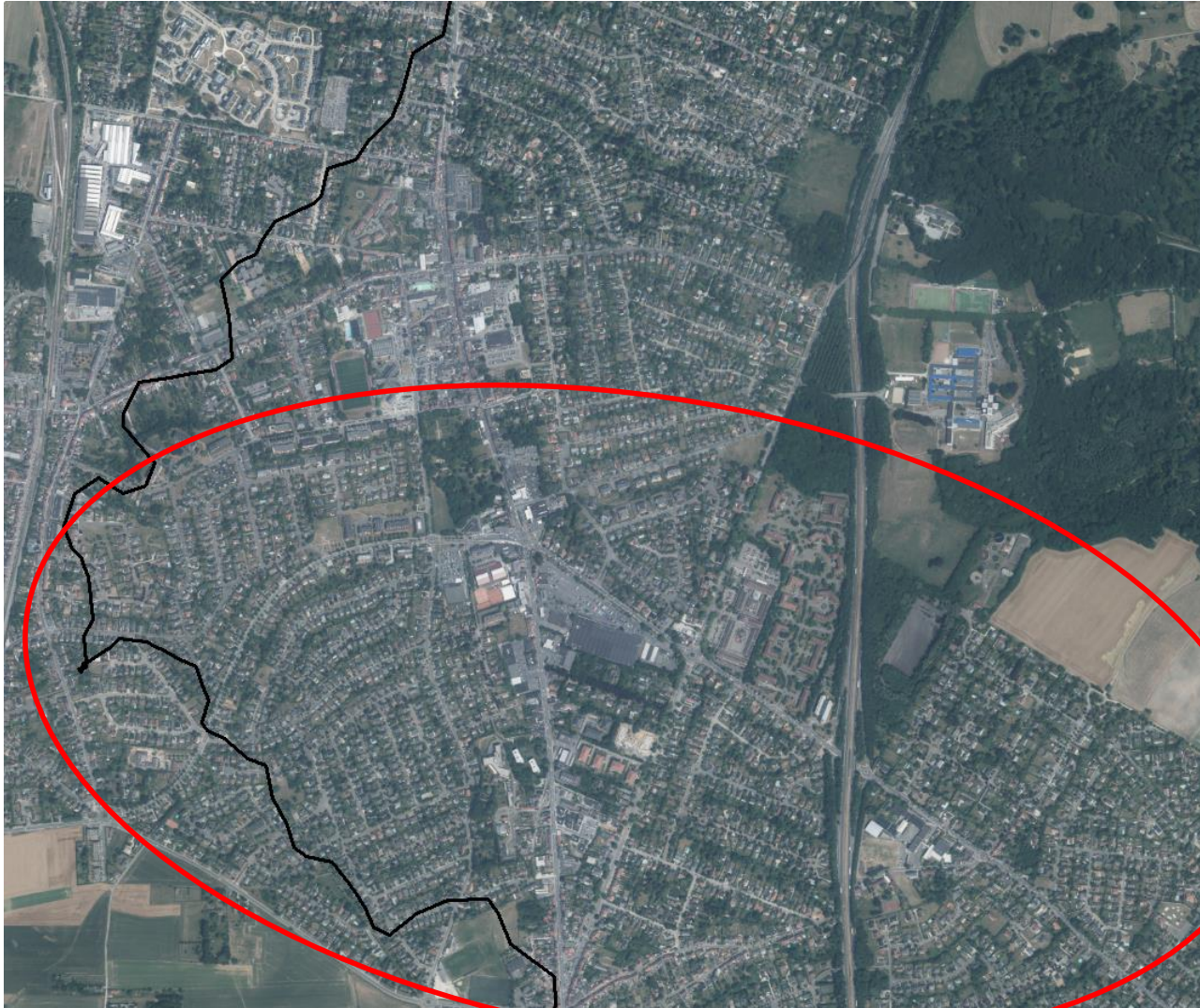
2017

Urbanisation



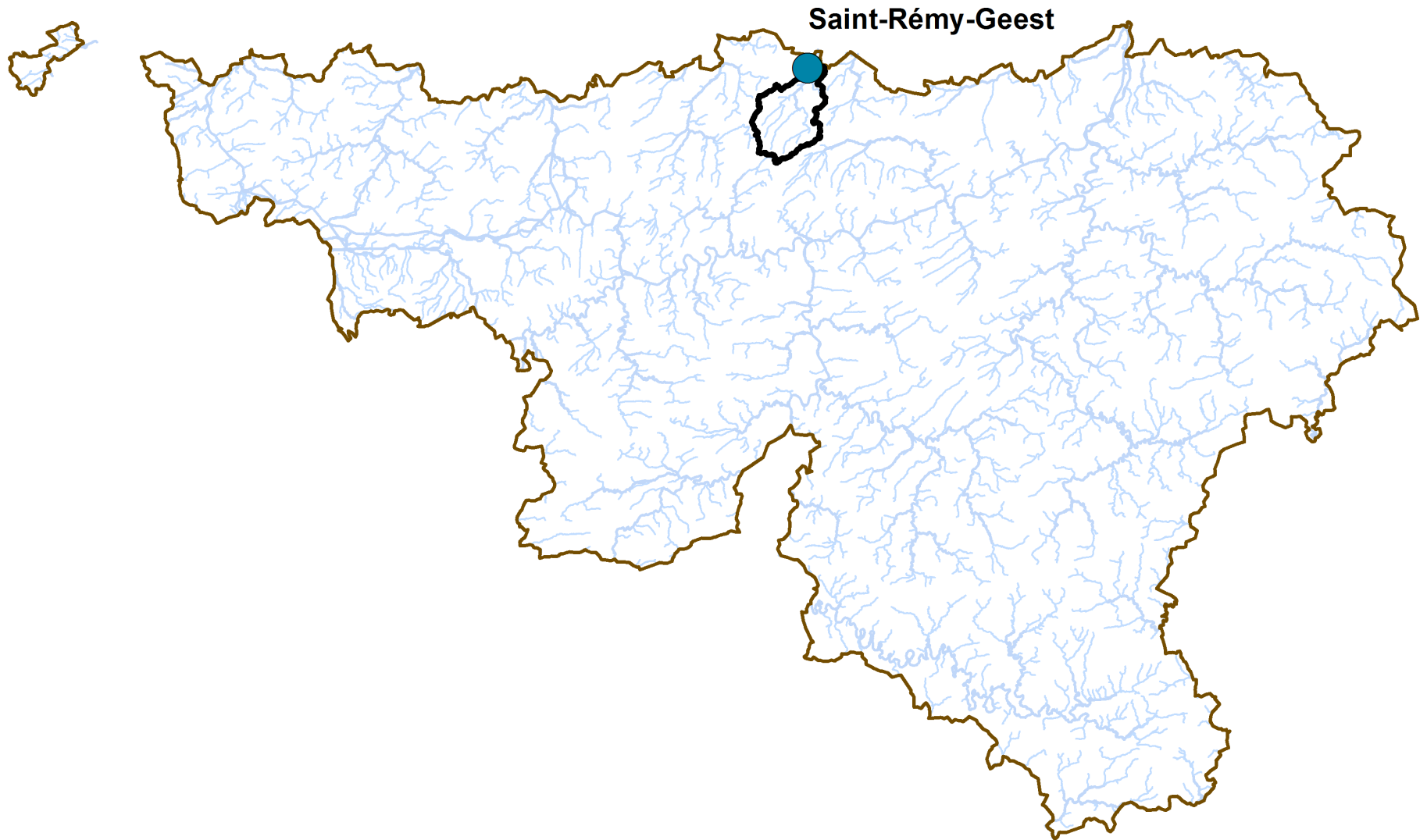
1971

Urbanisation



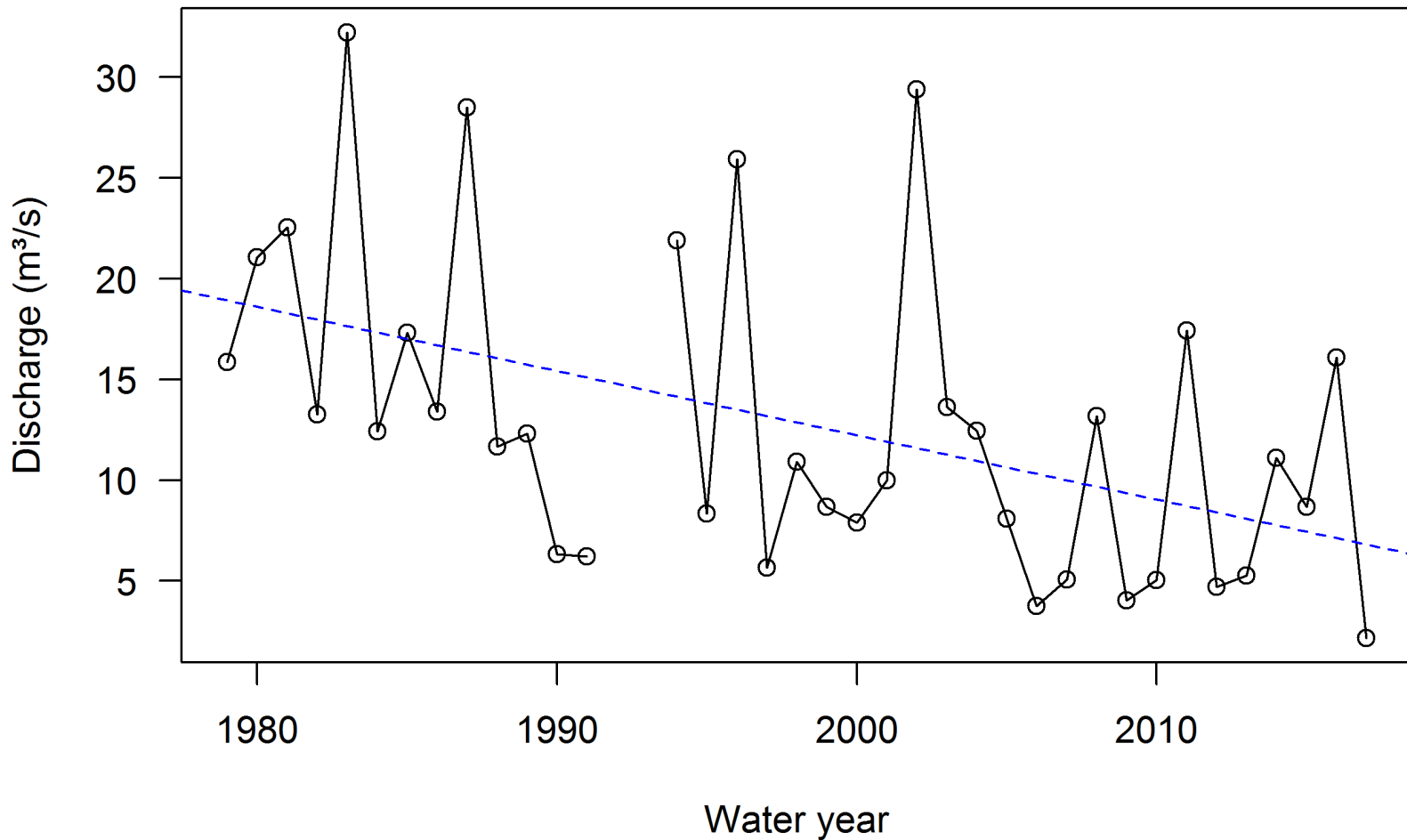
2017

Water transfers



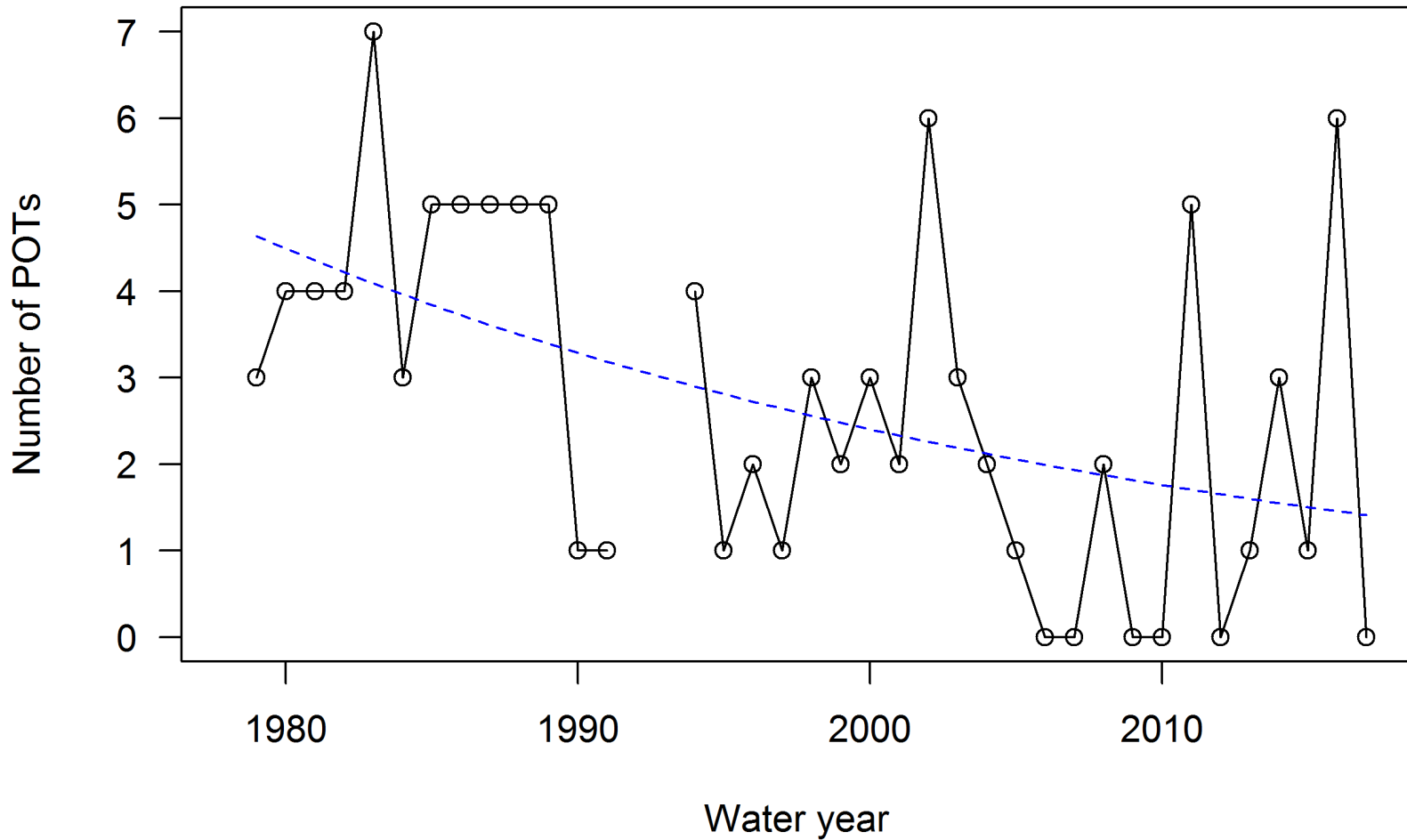
Water transfers

River Grande Gette at Saint-Rémy-Geest : Annual maximum flows

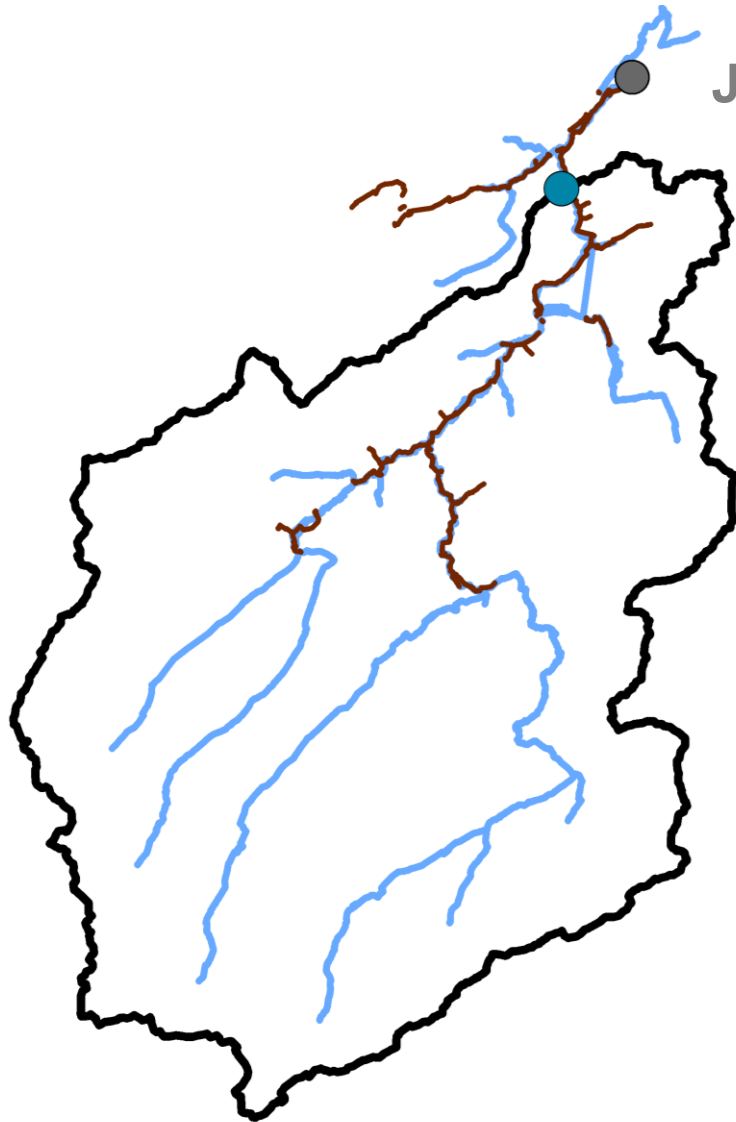


Water transfers

River Grande Gette at Saint-Rémy-Geest : Mean number of POTs/year



Water transfers



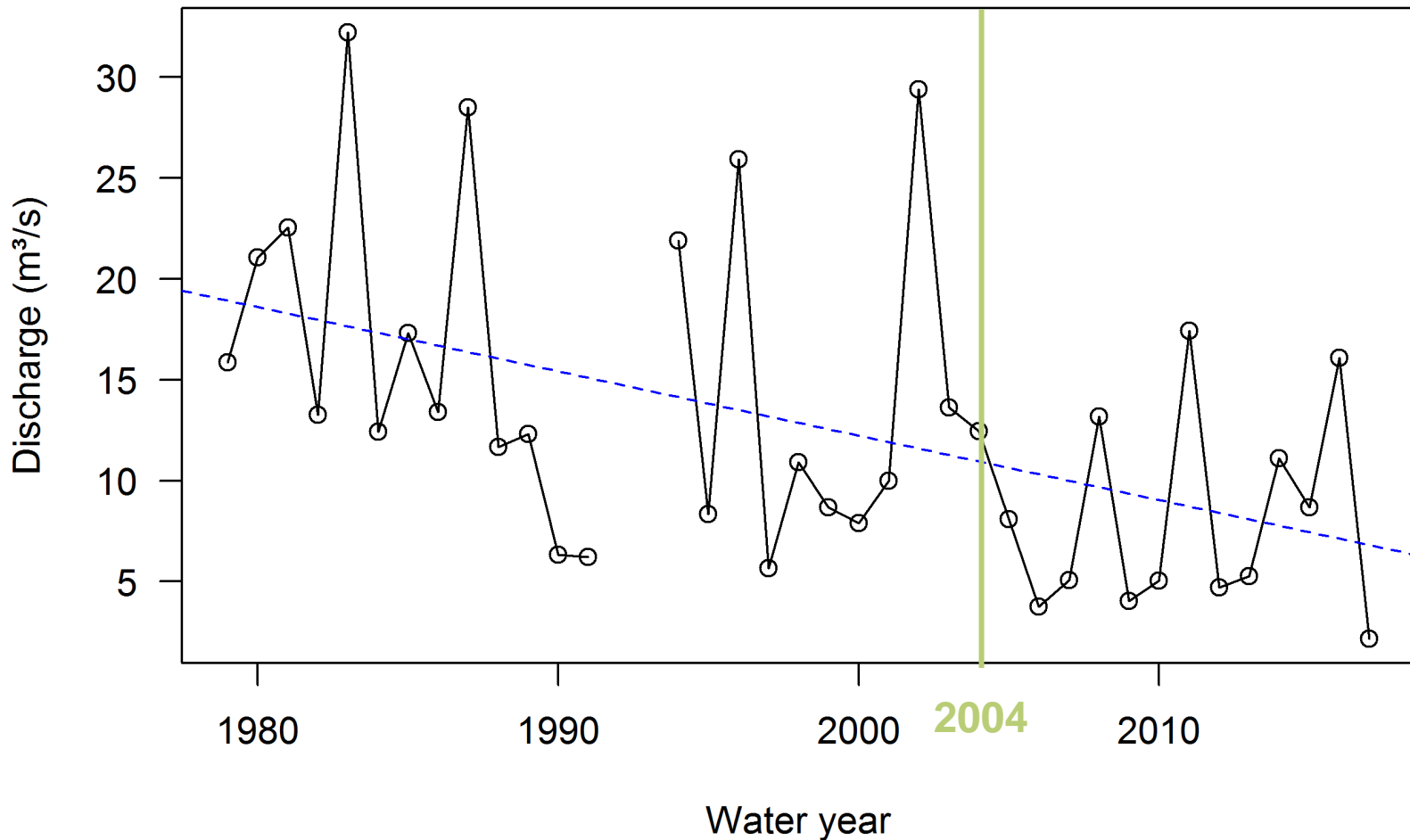
Jodoigne sewage treatment works

Saint-Remy-Geest gauging station

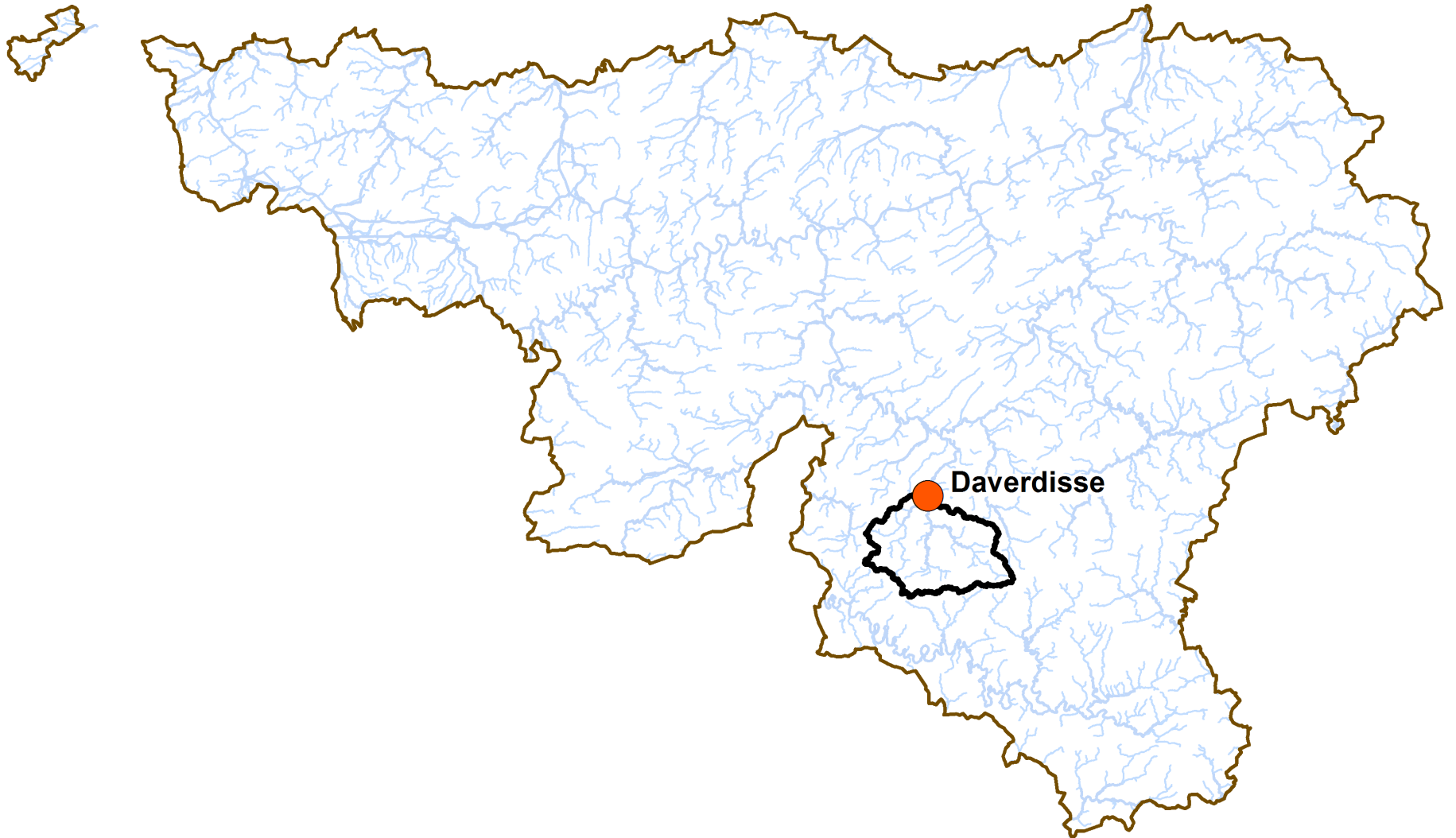
Sewerage network
connected to Jodoigne STW

Water transfers

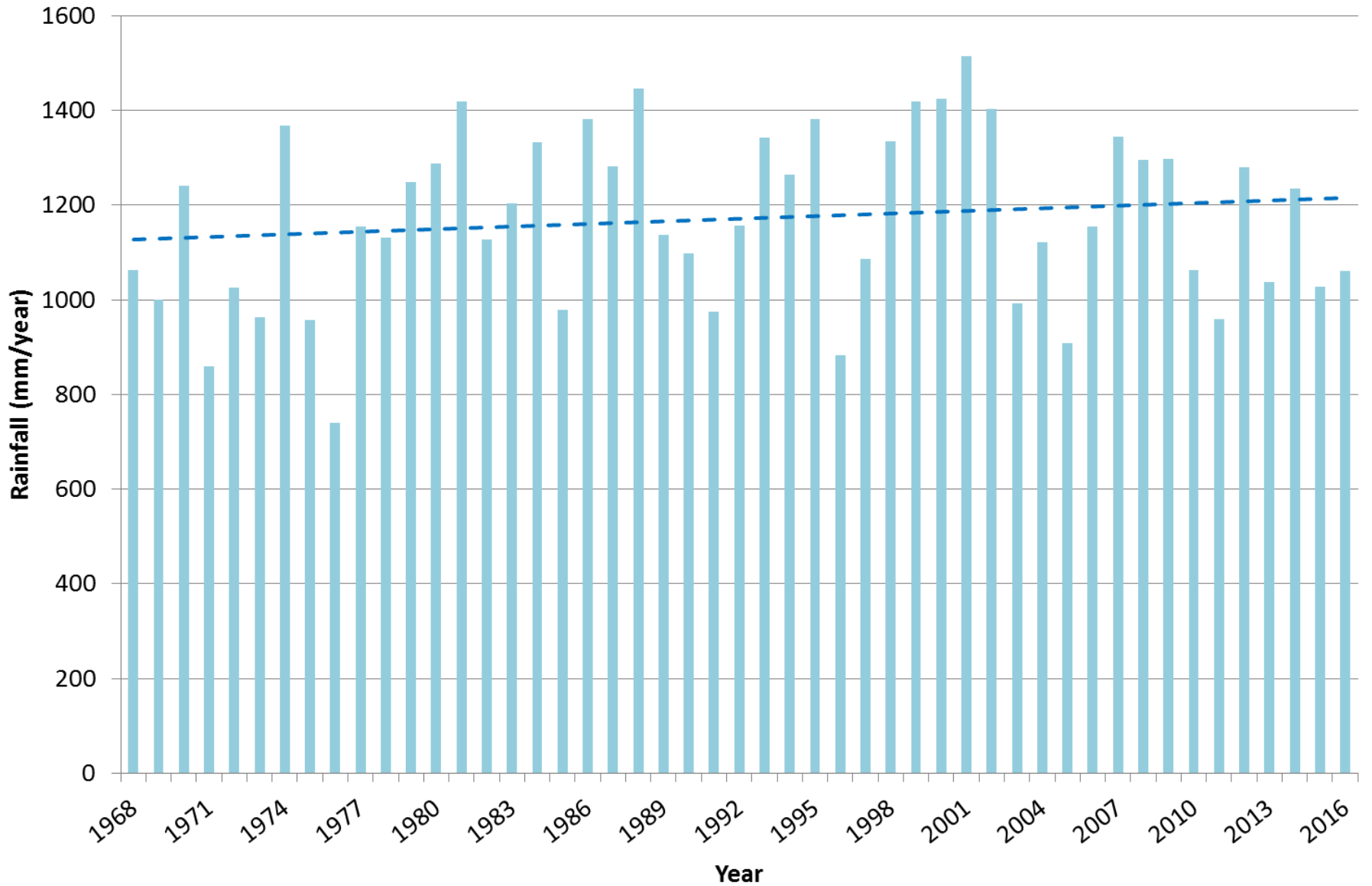
River Grande Gette at Saint-Rémy-Geest : Annual maximum flows



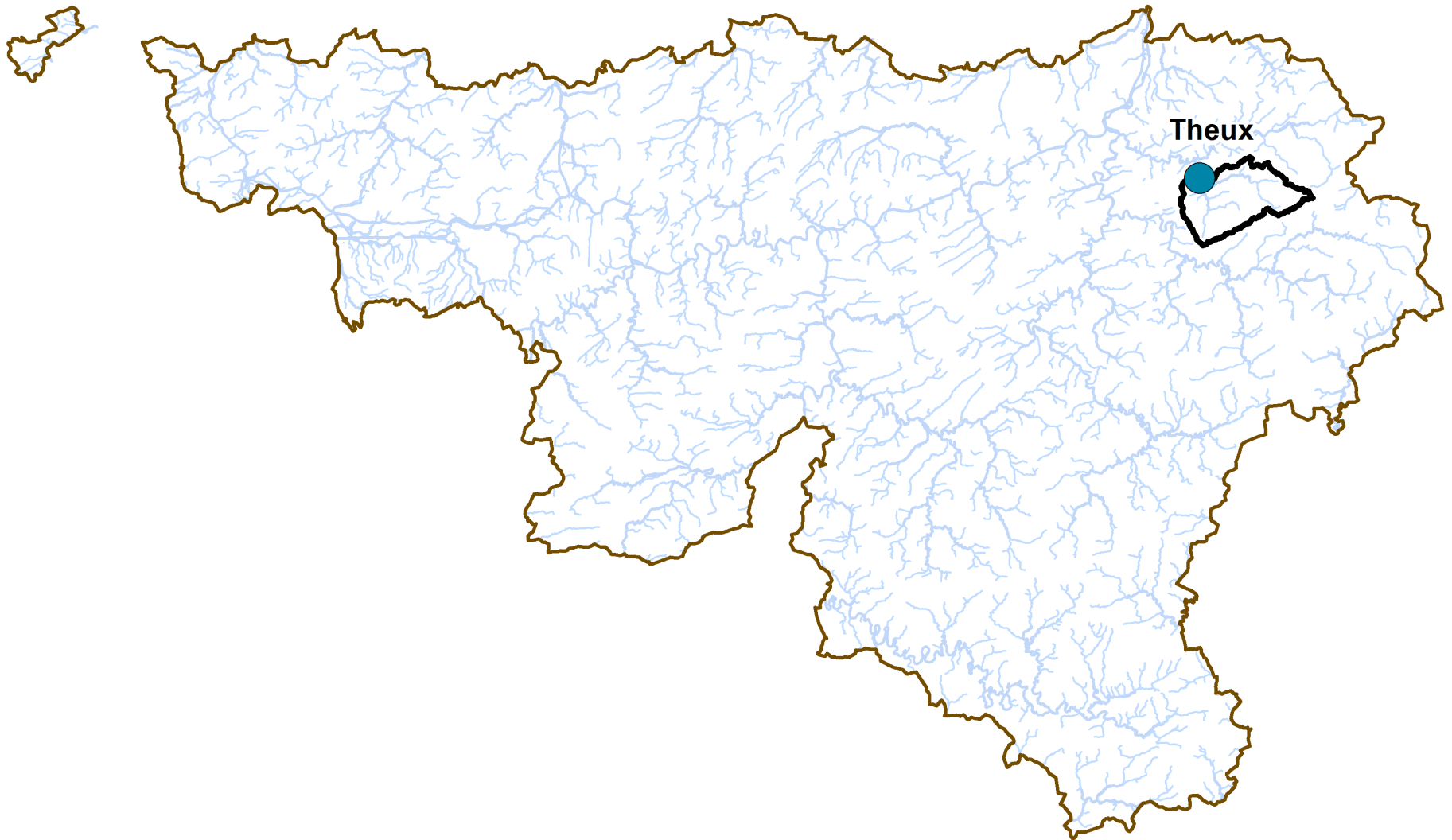
Rainfall



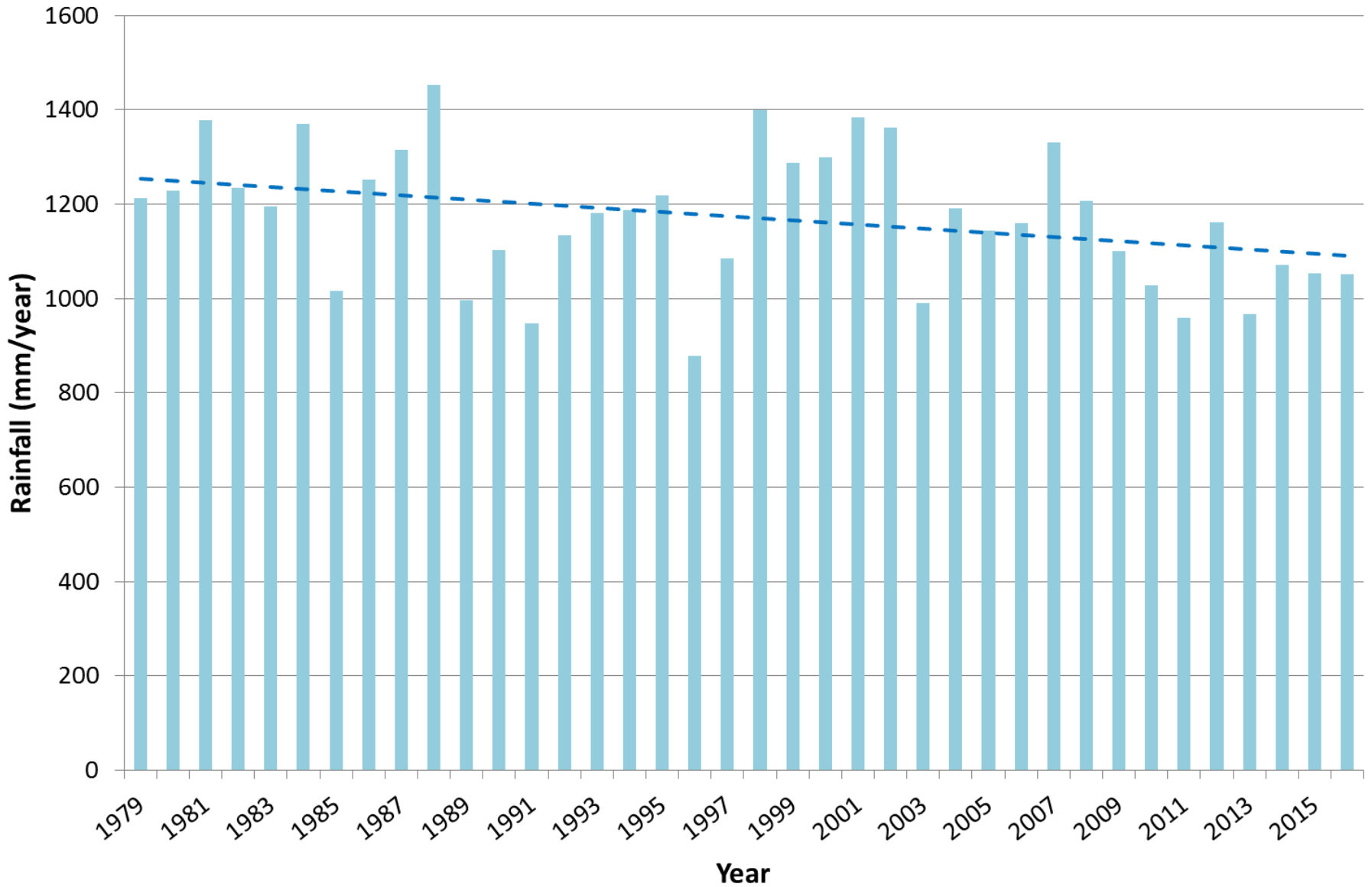
Rainfall



Rainfall



Rainfall



Conclusion and further work

- Changes have occurred ... but only at some sites
- More changes in the Scheldt than in the Meuse catchment
- Effect of catchment size
- Influence of urbanisation, sewerage network, rainfall
- Next steps:
 - More detailed analysis of the responsible factors
 - Non-stationary frequency analysis



Thank you for your attention!

Any questions?

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