

In-situ, sub-daily water quality monitoring

Building a Community of Practice

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(UFZ) and Sarah Halliday (Reading)**

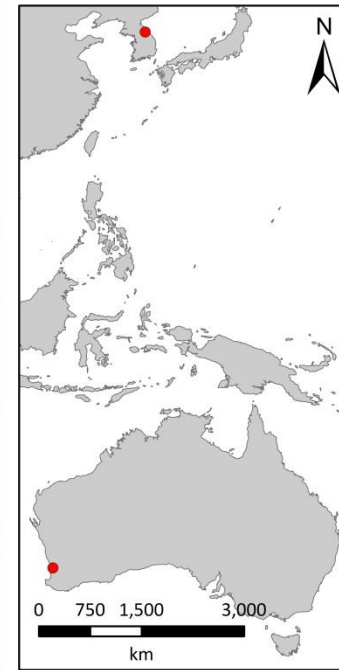
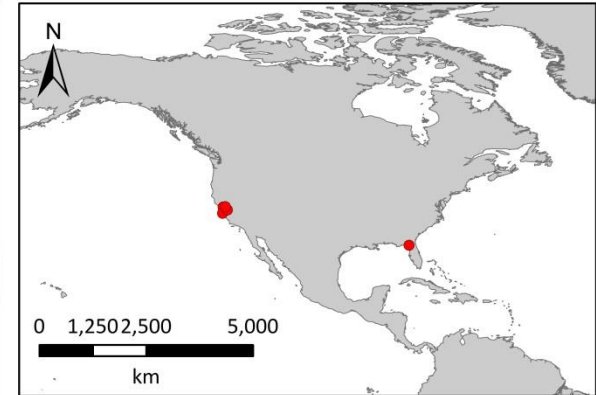
Introduction

- To initiate
 - A summary of where we are
 - Discussion of what to do next

Issues and policy questions

- Focus on nutrients (N, P), DOM, Chl-a
- Load estimation
- Source apportionment
- Event characterisation
 - Dynamics, flow pathways
- Retention and transport
- Processes across time scales
- Abiotic-biotic linkages
 - Dynamics
 - Ecosystem uptake/transformation rates
- Policy (e.g. WFD, Hamilton Harbour)

Where are we? Geography



Legend

- High Frequency Monitoring Locations

Where are we? Monitoring Technology

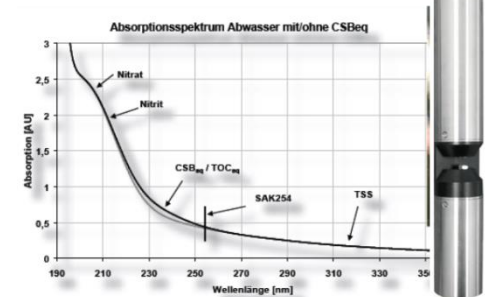
*Wet Chemistry
(e.g. Hach Lange
Phosphax Sigma)*



*Ion electrodes
(e.g. YSI Multi-
Parameter Sonde)*



Infrastructure



*UV Sensors
(e.g. Trios)*

Where are we? Data

- Different determinands
Different periods
- Different frequencies
- Different quality control
- Range of analysis methods
- How do we compare?

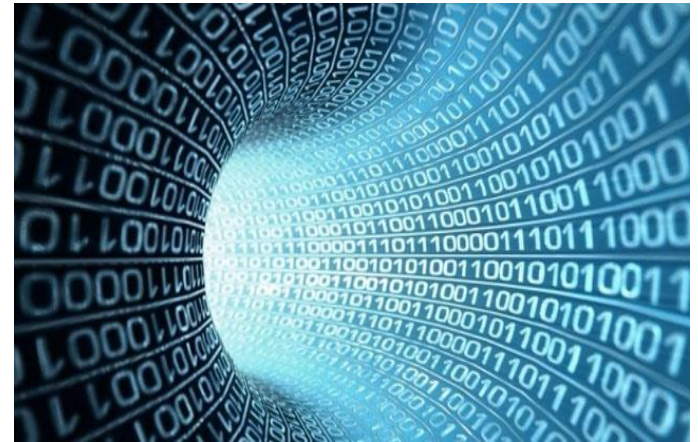
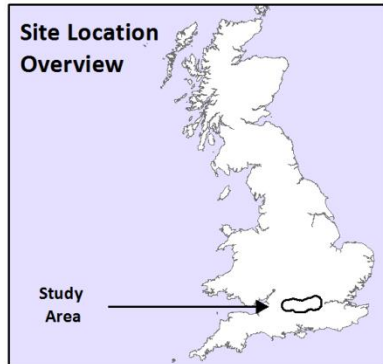


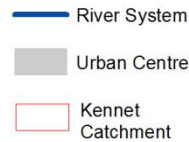
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Thames catchment – *in situ* monitoring



Legend

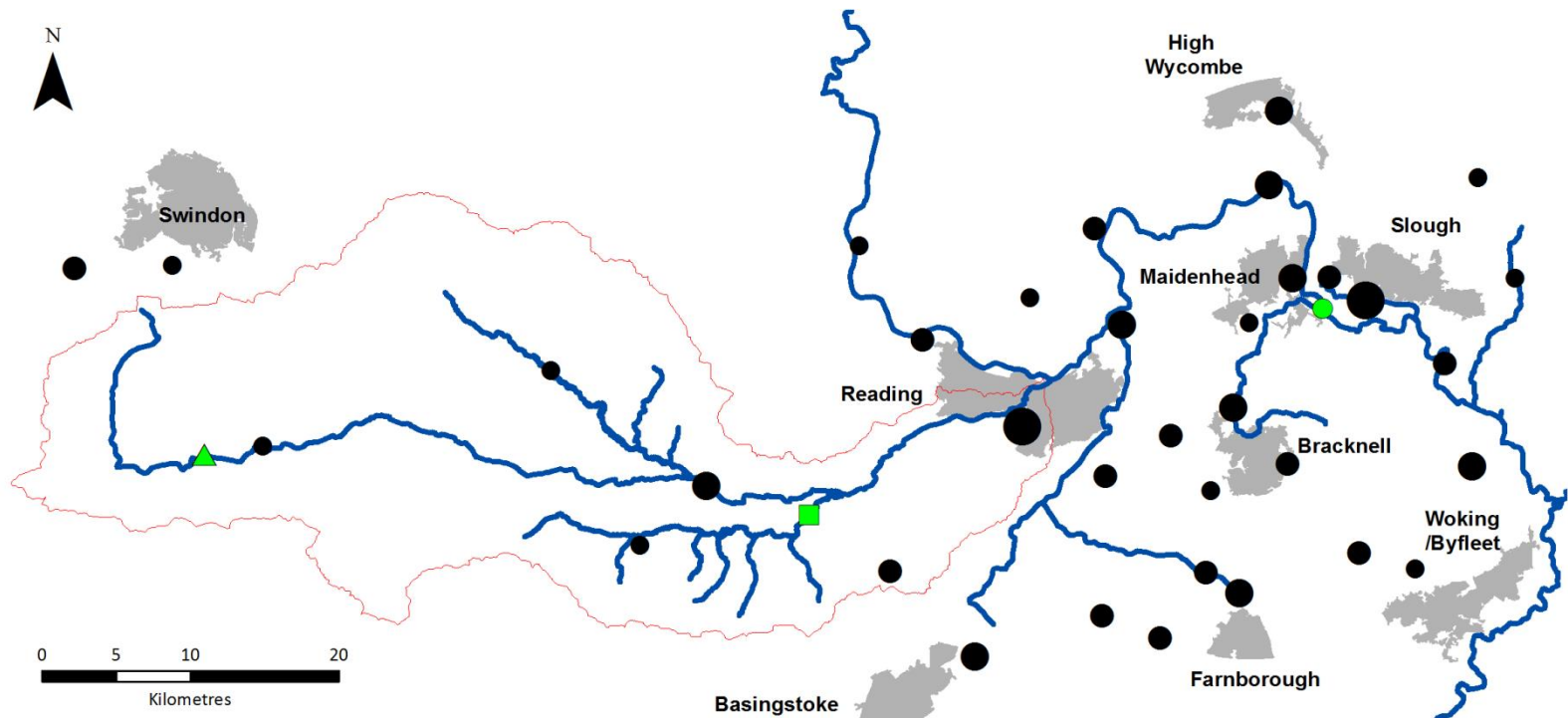
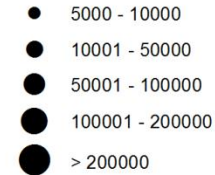


EPSRC Monitoring Stations

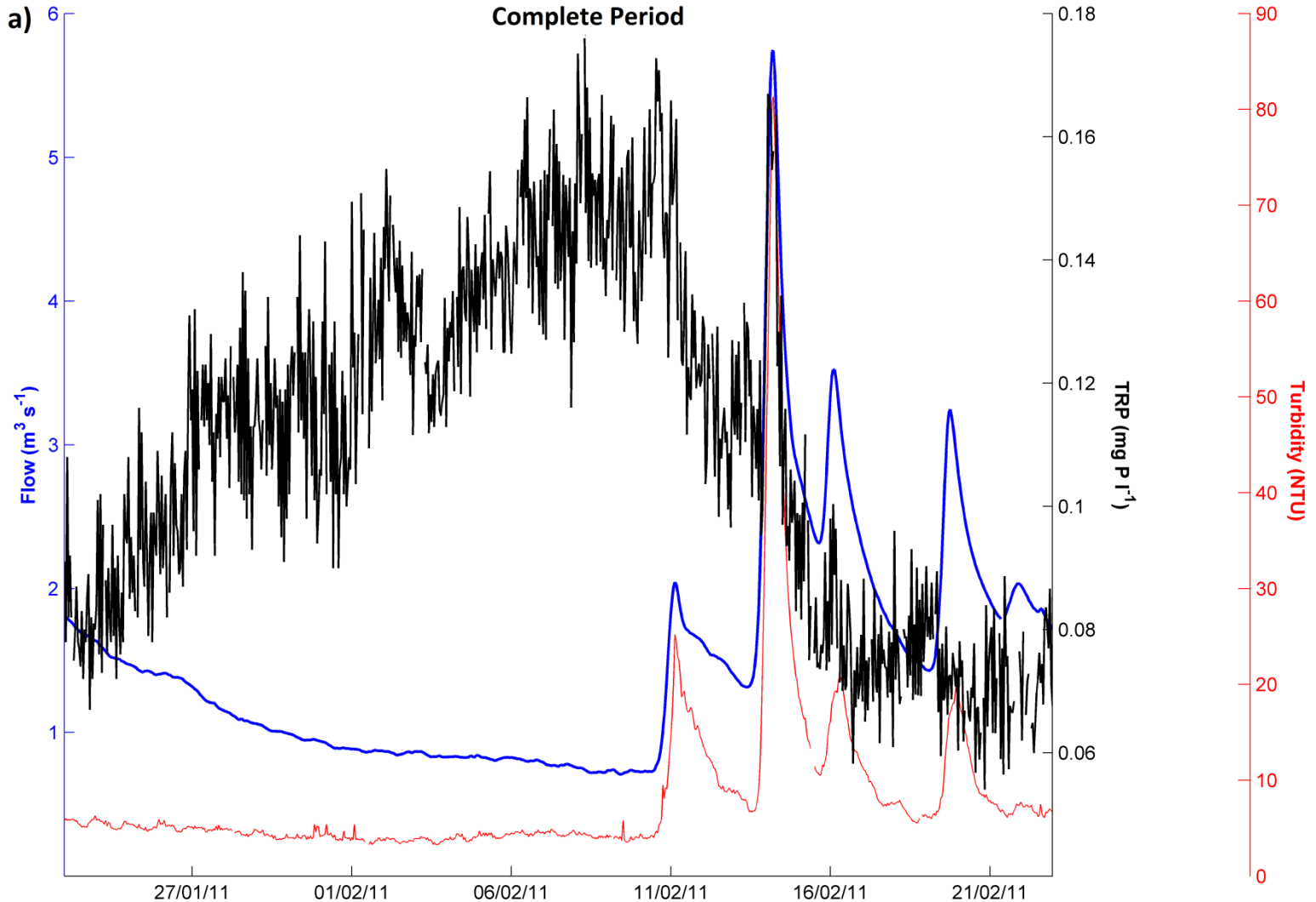


Major Sewage Treatment Works

Population Equivalent



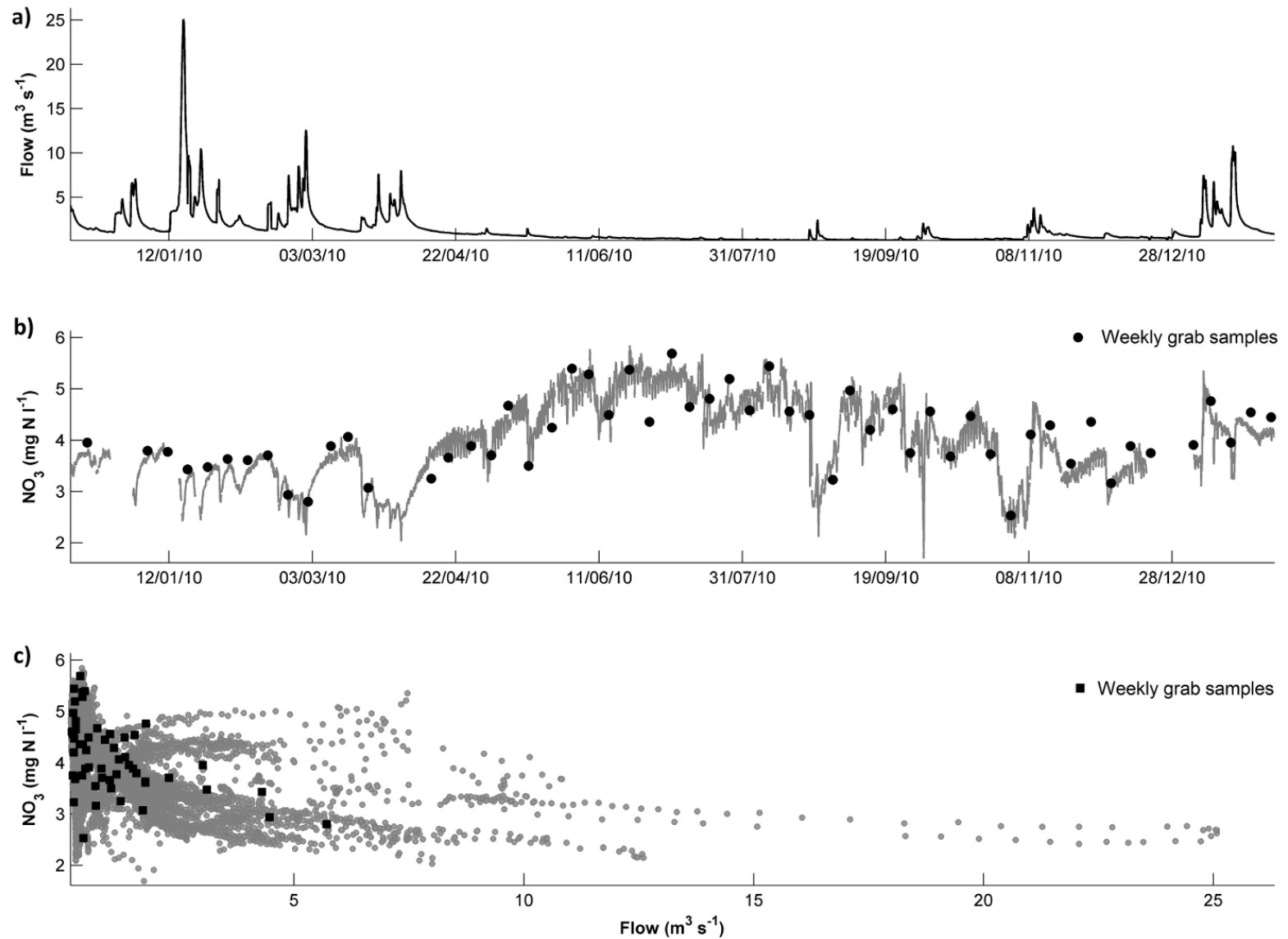
The River Enborne: antecedent conditions



The River Enborne: annual loads

	Load Estimate		Diff. from hourly load estimate	
	TRP (kg P y ⁻¹)	NO ₃ (kg N y ⁻¹)	TRP (%)	NO ₃ (%)
Hourly	3320	120000	--	--
7-hour	3320	121000	0.1%	0.7%
Daily	3300	120000	-0.9%	-0.1%
Weekly	4170	142000	26%	18%
Fortnightly	4300	139000	29%	15%
Monthly (11th)	3100	114000	-7%	-5%
Monthly (21st)	2000	76800	-39%	-36%

The River Enborne: loads



Opportunities....

Community of Practice

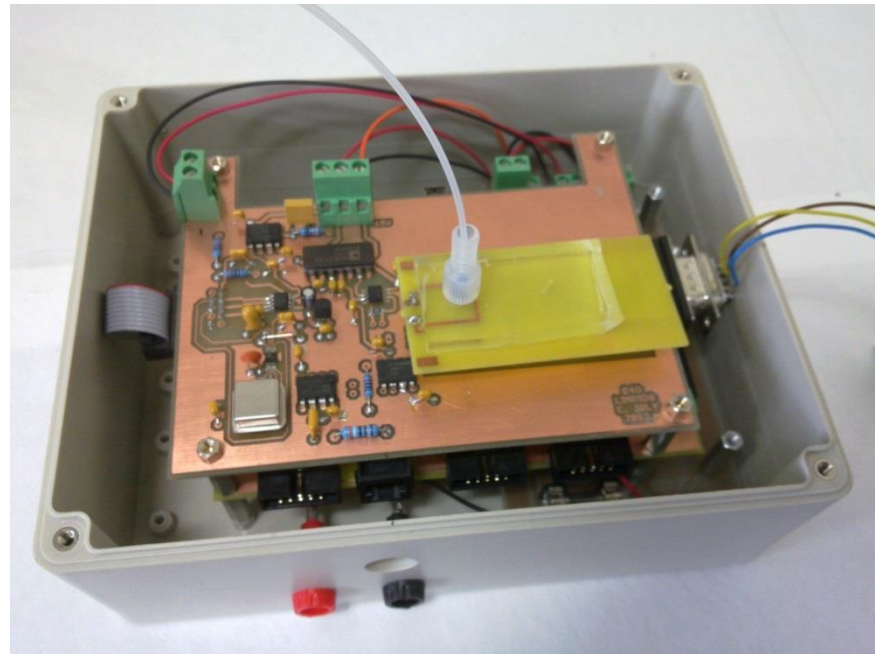
- Collate and analyse data to extend process understanding
- Share best practice on technology and analysis
- Spot errors and anomalies in data sets
- Open, flexible
- Communication method?

Is there a minimum dataset?

- To aid comparison
- Sub-daily, explanatory variables
 - Water and air temperature
 - Solar radiation
 - Precipitation
 - Turbidity, electric conductivity, pH-value
- Common methods?
 - Quality assurance\quality control
 - Measurement methods
- Use of proxies?

Are we missing other technologies?

- Measurement
- Infrastructure
- Data storage
- Data quality control and correction tools
- Data analysis



University of Hull: Detection chip and baseline suppression board

Review paper

- Worthwhile?
- Structure and content?

Proposal

- Need a good idea
- EU Marie Curie Training Network
- EU H2020
 - Lobby for inclusion in next work programme
 - Issue driven/applied
 - Small- to Medium-sized Enterprise
- Global
 - Issue driven

Ideas for comparative studies with available data sets

- Evaluation of diurnal data on seasonal variation of nitrogen uptake rates: Site comparison
- Evaluation of new regression based load calculation methods using high resolution nutrient and hydro-meteorological data: Site comparison

Ideas for comparative studies with available data sets

- Application of new statistical approaches on data analysis
- Understanding storm event response
- Characterising sources and pathways across a range of catchment types
- Understanding abiotic-biotic interactions
-

Topics

- Guidelines for WFD sampling and cost implications (not specified)
- Definition of proxies (Michael Rode)
- Instream processes (Matthew Cohen)
- Comparison of sensors (Daniel Graeber)
- Review paper (Andrew Wade, Michael Rode)
- Catchment process identification (Jan Fleckenstein)
- Confronting models with data (Jim Freer)

Other points

- Proposal
 - Michael, Andrew and Brian will evaluate the opportunities for common research proposals, e.g. within the Marie Curie call (Training networks)
- Next workshop
 - Will be organized by Brian Kronvang at Aarhus University in 2016