



Natural
Environment
Research Council



Solving the Problem of Chemical Pollution in Yorkshire's Rivers





The state of England's Rivers

- One in ten freshwater and wetland species in England are threatened with extinction and two thirds of existing freshwater species are in decline
- Only 16% of England's surface water bodies having good ecological status
- All English rivers monitored for compliance with the Water Framework Directive (WFD) currently fail to meet the criteria for good chemical status
- Around 40% of English rivers are under pressure from pollution from rural activities, 36% from wastewater emissions and 3% from emissions from abandoned mines
- "rivers in England are in a mess. A 'chemical cocktail' of sewage, agricultural waste, and plastic is polluting the waters of many of the country's rivers"
- Of Yorkshire's 497 rivers, only 16% were assessed as 'good' ecological status in 2019. Lowland rivers particularly are in a poor state.

The Telegraph

Daily Mail

THE PRESS

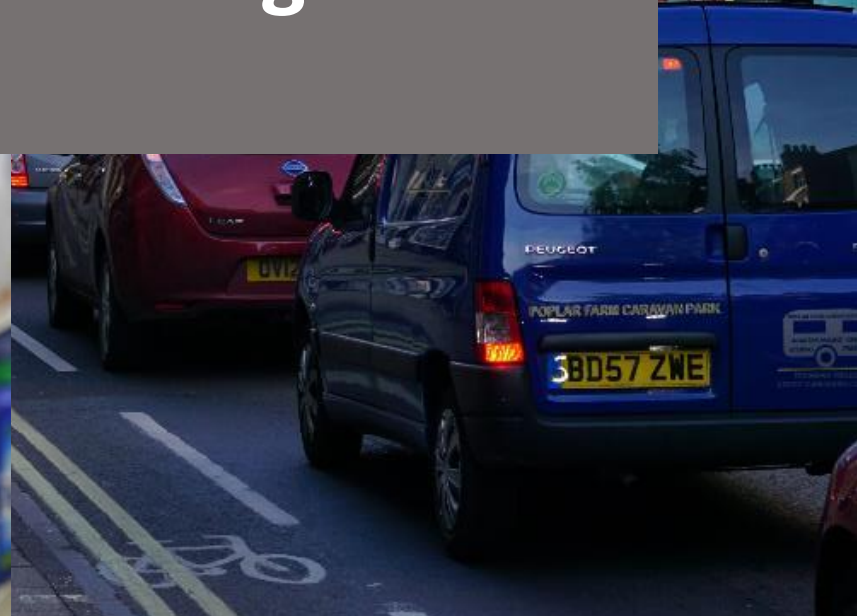
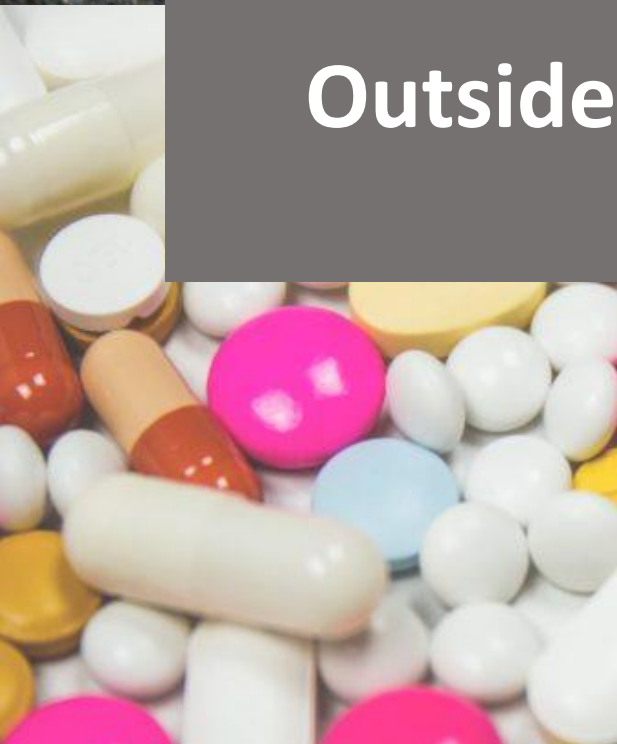
theguardian

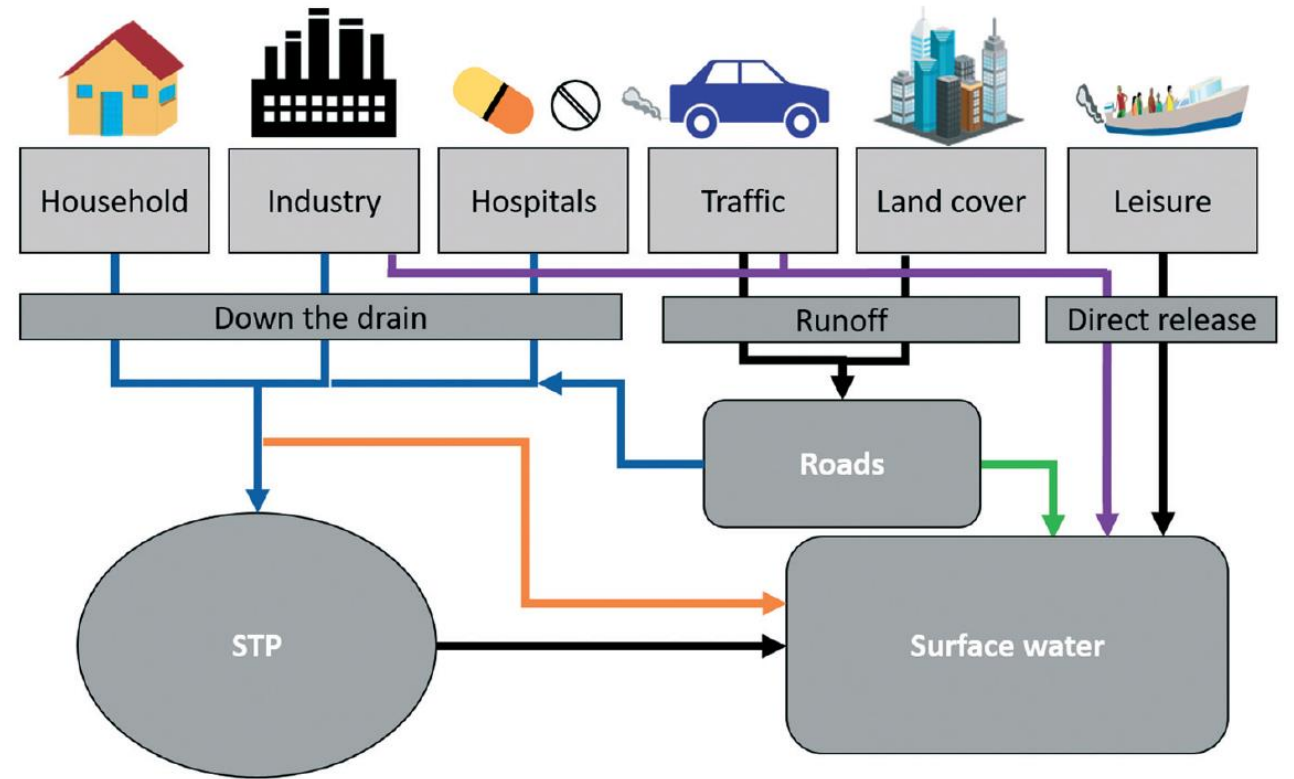
UK and Yorkshire Rivers in the News

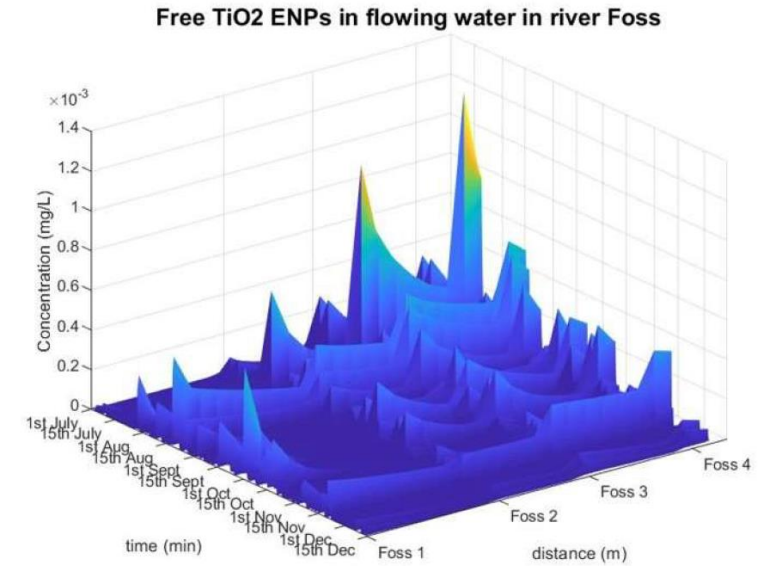
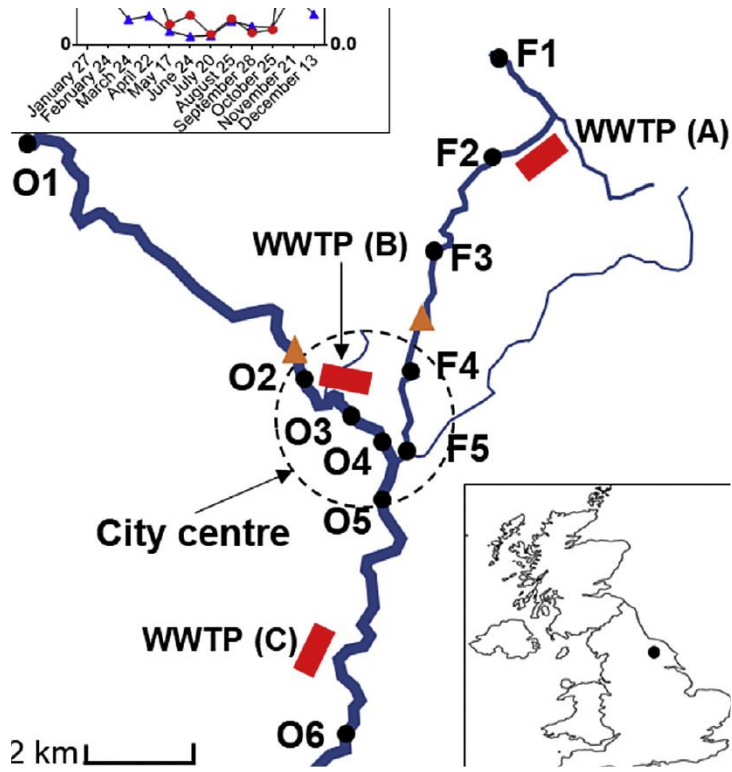
- 'No river in England is free from chemical pollution, government report finds'
- 'Shocking state of English rivers revealed as all of them fail pollution tests'
- 'Majority of England's rivers polluted with sewage'
- 'Water pollution is threatening to wipe out UK's life-saving leeches, experts warn'
- 'Raw Sewage dumped into English Waterways 800 times a day'
- 'Sewage has left my river devoid of fish, says lord'
- 'Anglers warning over river pollution in York'
- 'Fears of pollution as fish dead in Richmond and Northallerton rivers'



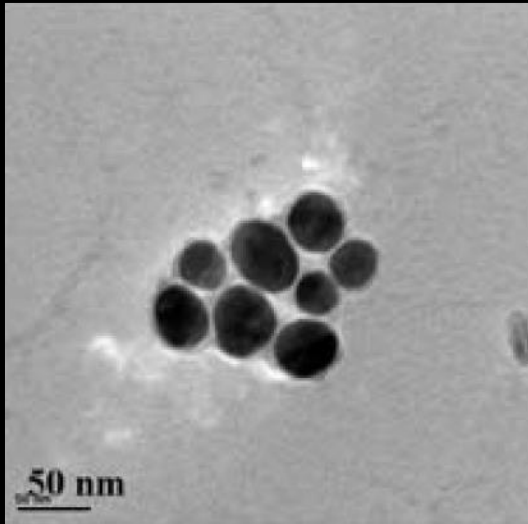
Over 4000 chemicals and chemical mixtures
used in typical UK households
Outside emissions from transport, buildings and
waste disposal







Understanding chemical pollution in Yorkshire's rivers

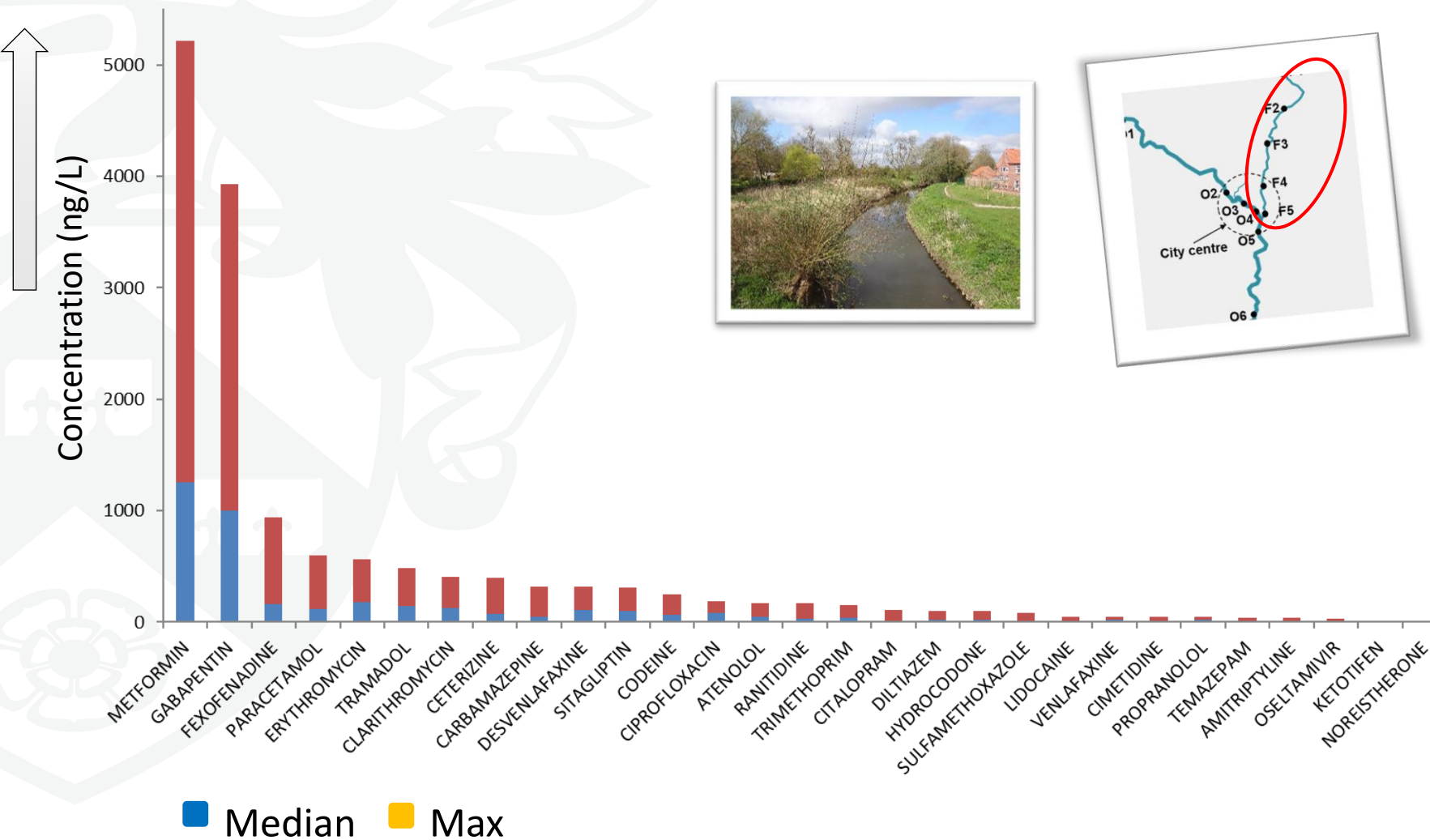








River Foss



National Parks study

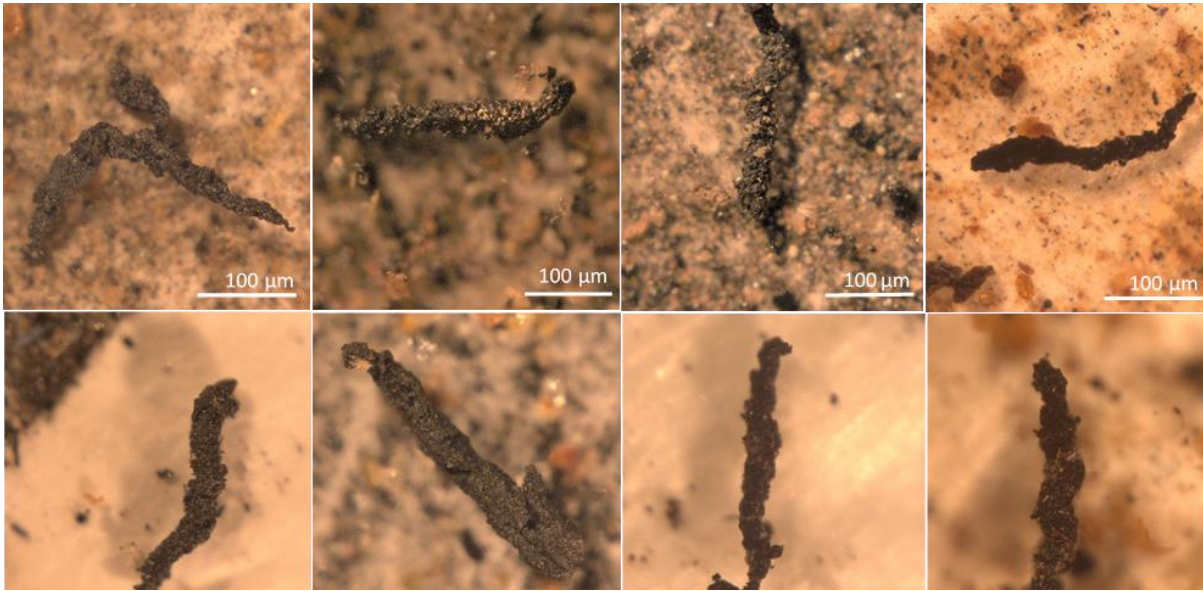
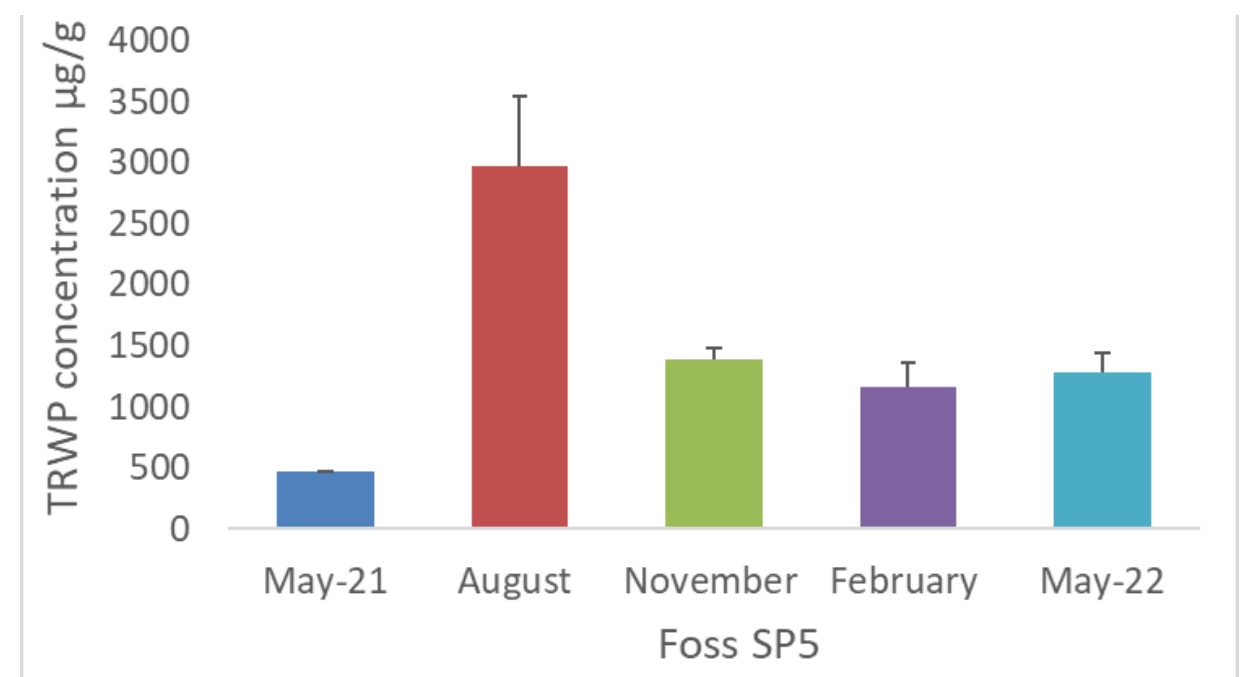
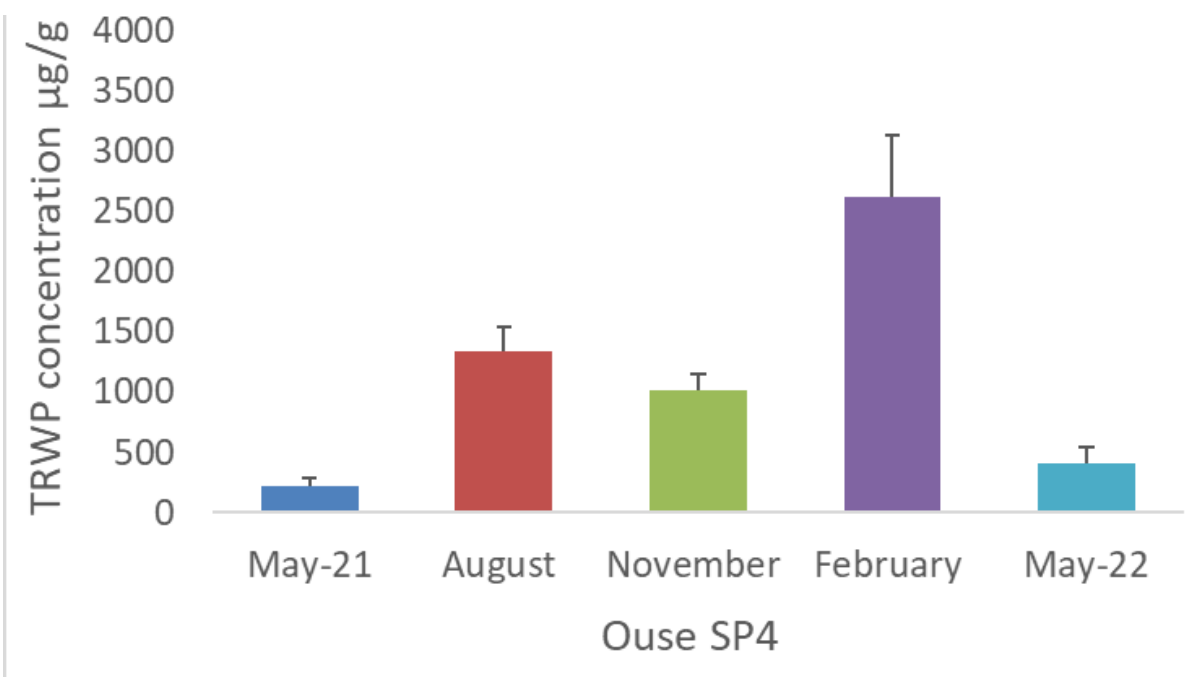
- Median total concentration of 254 ng/l in the Dales and a maximum of 666 ng/l
- Six pharmaceuticals detected





Tyre wear particles

- 37 – 73 particles produced per km of driving
- 42,000 – 84,000 tonnes of particles released in the and UK each year!
- Contain the tyre material and additives + metals and chemicals from combustion



Environment Agency Monitoring

- Automatic sampling of water at Linton on Ouse
- Samples analysed for around 2000 substances
- Mixture of chemicals detected including pharmaceuticals, veterinary medicines, combustion products, personal care products and general industrial chemicals
- Broader monitoring data available for WFD priority substances



What all of this is telling us

- Yorkshire's rivers are contaminated with a range of chemicals originating from a range of sources
- Pollution is widespread with patterns of pollution varying both temporally and spatially
- Using information on land use, hydrology and chemical use and behaviour across the region, it is possible to estimate exposure of some pollutants
- Concentrations of selected pollutants are at levels where, in the laboratory, effects have been demonstrated on aquatic organisms

But our work to date:

- Considers only a small fraction of chemicals in use in Yorkshire and assess these one-by-one
- Typically relies on results from standard ecotoxicological laboratory tests and uses arbitrary assessment factors
- Ignores the fact that catchment characteristics vary over space and time
- Largely ignores the effects of co-stressors
- Doesn't look to the future, even though we know that the built and natural environment is rapidly changing

ECOMIX: A new transformative catchment-based approach that:

- Assesses impacts of mixtures of chemicals and co-stressors on the structure and functioning of species assemblages at high spatial resolution
- Considers the current situation and looks to the future to account for the effects of global megatrends on chemical sources, fate processes, exposure and effects
- Allows us to target interventions where they are going to have maximum impact allowing us to benefit from the use of chemicals while protecting biodiversity

The ECOMIX Assessment Framework

