Democratic and Member Support
Chief Executive's Department
Plymouth City Council
Ballard House
Plymouth PL1 3BJ

Please ask for Democratic Advisor
T 01752 668000
E democraticsupport@plymouth.gov.uk
www.plymouth.gov.uk/democracy
Published 28/02/24

SELECT COMMITTEE REVIEW – WATER QUALITY - PRESENTATIONS

Members:
Councillor Bingley, Chair
Councillor Tuffin, Vice Chair
Councillors McLay, Penrose, Raynsford, Reilly and Tofan.

You can watch any of our webcast meetings on YouTube. For further information on webcasting, attending Council meetings and how to engage in the democratic process please follow this link – Get Involved

Tracey Lee
Chief Executive

Select Committee Review

4a Issues and Challenges **(Pages 1 - 16)**

The Committee will hear from Plymouth City Council officers, the Environment Agency, South West Water and Tamar Catchment.

4b Impact and Opportunities **(Pages 17 - 40)**

The Committee will hear from the University of Plymouth, National Marine Park CEO and community representatives.

Water Quality Select Committee
Plymouth City Council

Importance:

- *Britain's Ocean City – One of Europe's most vibrant waterfront cities, where an outstanding quality of life is enjoyed by everyone*
- UK's first National Marine Park – Significant designations
- 3 designated Bathing Waters

Responsibility:

- Support Bathing Water – signage + short term pollution advice.
- Partnership nature delivery – NMP, TECF, MPA
- Shell Fisheries – Monitoring
- Flood risk – delivery
- Highways maintenance

Water Quality Select Committee

PLYMOUTH CITY COUNCIL

Challenges

- Sewage Network
- Urban and Agricultural run-off
- Microplastics
- Changing weather patterns
- ‘Bathing Season’
- Behaviours
- Complexity of Solutions

Water Quality Select Committee

Opportunities

- Partnership collaboration.
- Community involvement in solution design and delivery.
- Innovation – NBS.
- Alignment of investment.
- Multi-benefits – Flooding and Water Quality, nature, access, wellbeing.
- Additional benefits – skills, jobs GVA.

Water Quality – Select Committee Opportunities for Improvements

Our purpose is to meet the future water management challenges jointly and collaboratively. This includes a commitment to;

- further develop a shared understanding of the challenges faced in Plymouth.
- identify further synergies and partnership opportunities between our planned investment programmes and wider working.
- work together to identify more holistic solutions with greater impact and with a focus on developing a 'Green First' approach.
- enabling greater levels of community engagement, understanding and community codesign of solutions to water management.
- deliver investments and programmes in a more integrated way to maximise the benefits (including wider social, environmental and economic benefits) and mitigate risk.
- identify and address critical gaps – for example resource gaps through shared bids or developing innovative financial models for investment gaps; and
- jointly explore wider opportunities and levers that can support our shared ambition e.g. with other key city partners and national stakeholders.

South West Water

Plymouth City Council Select Committee Water Quality

Alan Burrows, Director of External Liaison

Mark Worsfold, Director of Asset Management

22 February 2024

© Pennon Group plc 2022

Overview of South West Water

2 million customers & serving up to **9 million** people during tourist season

19,000km of pipe network – enough to reach Australia

£300m a year investment in our region and improving our infrastructure

2,500 employees creating new green jobs, upskilling 500 apprenticeships and

Net Zero Commitment by 2030 investing in renewables across the South West

Water quality outcomes

Nurturing healthy rivers and seas

- reduce our impact on rivers by 2025, by one third and put forward plans to target zero harm by 2030
- reduce spills from storm overflows to an average of 20 per year by 2025
- maintain our excellent bathing water quality standards, all year round, so that everyone can enjoy our 860 miles of coastline
- deliver zero serious pollutions by 2025, and target a year on year reduction in all pollutions

Pollutions, storm overflows and water quality

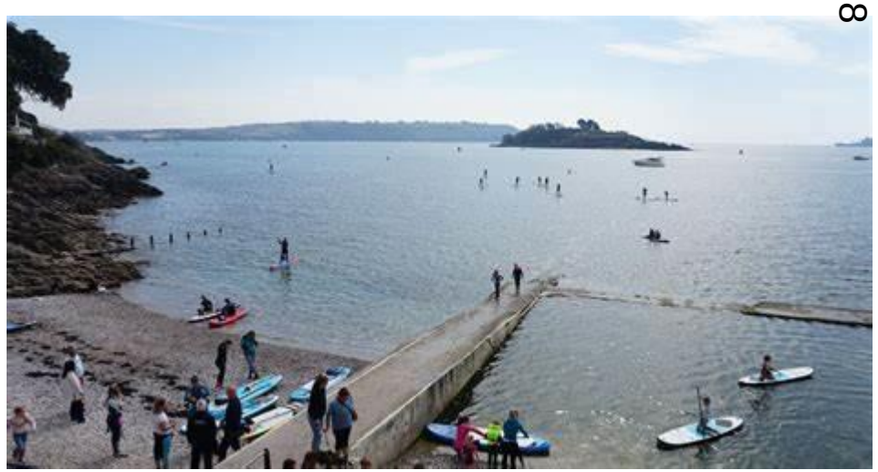
Progress to date:

Pollutions

- Pollution incidents have reduce from 225 / 23 (2020), 151 / 13 (2021) and 108 / 10 (2022).
- South West Water had the 2nd lowest number of pollutions across the whole water industry sector in 2022. We do expect an “uptick” in 2023 due to the wetter than average weather.
- Serious pollutions have reduced from 3 / 1 (2020), 8 / 0 (2021) and 2 / 1 (2022). There were no serious pollution incidents in Plymouth area in 2023 and 12 x Cat 3 (minor) incidents (tbc).
- All sewage treatment work in Plymouth achieved their permits standards in 2023.

Storm overflows

- We have 100% monitoring of all storm overflows, ahead of the government target.
- There are 126 storm overflow in Plymouth City Councils area.
- Based on 2023 data (to be validated), 56 storm overflows already achieve spills of 10 or less with 74 achieving 20 spills or less.
- We plan to publish the 2023 Annual Return by 31 March 2024 following the EA’s audit.
- We publish in “near real time” storm overflow activations for bathing beaches (Waterfit Live).
- We plan to publish in “near real time” for all 1342 storm overflows ahead of Govt targets.
- We are focussing on storm overflows near bathing and shellfish waters as a priority.
- Our Storm Overflow Action Plan (SOAP) will show when we plan to improve each storm overflow.



Bathing water quality

- There are 3 bathing waters in Plymouth – Plymouth Hoe (East), Plymouth Hoe (West), Firestone Bay.
- All three achieved ‘Excellent’ in 2023.

River water quality

- South West Region RBMP provides the detailed analysis on causes and is owned by the EA.
- Overall South West Water operations currently contribute c.12% towards the reasons for not achieving good ecological status. This can change over time.
- Main catchments include: Lower Tamar (Estuary), River Plym (Estuary)

Water quality interventions

Monitoring
- Installation of c.20,000 sewer level monitors by 2025.
- AI solutions to enable real time operational impact analysis.

Planning
- Reduce run off and remove the automatic right to connect; legislation to mandate nature based solutions for drainage (SuDS)

Up Stream Thinking
- Bring together partners to help manage, protect and enhance our catchment areas
- Working collaboratively in our catchments, active in 80% of our region, working with 1,700 farmers, around 91,000 hectares have already been restored

Love your Loo & Think Sink
- Address what goes into our network, backing the ban on single use plastic wet wipes
- Over 200,000 wet wipes find their way into our sewage network each day.
- We removed over 450 tonnes of unflushables such as wet wipes, sanitary products and cotton pads from pumping stations.
- Every year, tens of thousands of litres of waste fat, cooking oil and grease are poured down sinks by people who don't realise the problems this could cause.

Misconnections
- Extensions to existing domestic properties e.g new toilets, sinks, showers.

YOUR WATER YOUR SAY

Challenges we now face

- Fivefold increase for heavy rainfall events
- 17% increase in extremely wet days
- Increasing risk of flooding

- Reservoir levels lower
- River abstraction reduced equivalent to supplying 250,000 people
- Raw water quality impacted

- Large coastal population
- 1/5 of our treatment works at risk
- 100's kilometers of network

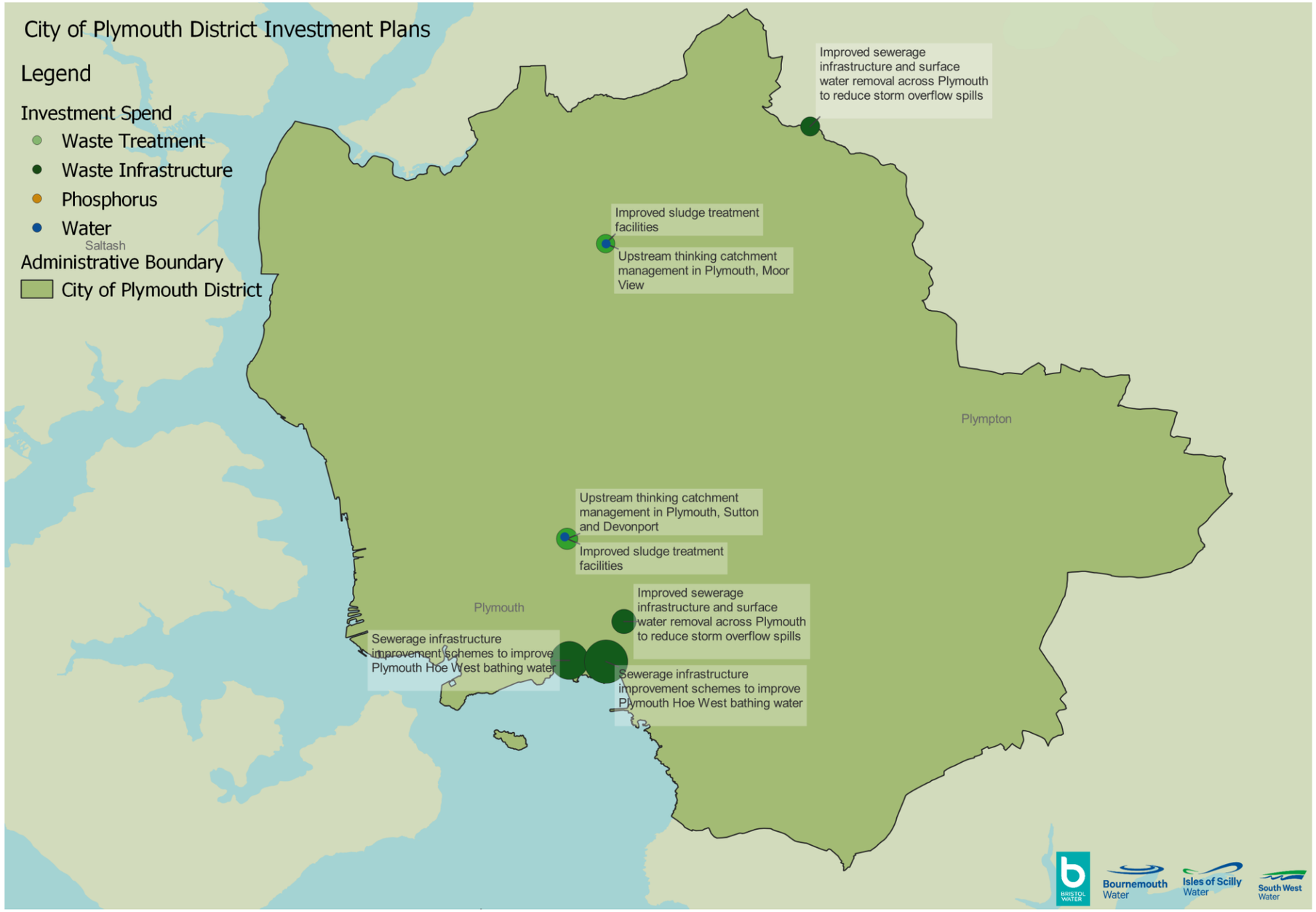
- Another half a million residents by 2050
- 10 million tourists visit the region every year

Water – interventions and investment

What happens in the Tamar Catchment upstream of Plymouth can heavily influence water quality in the Plymouth Marine Park

We can't look at Plymouth City in isolation.

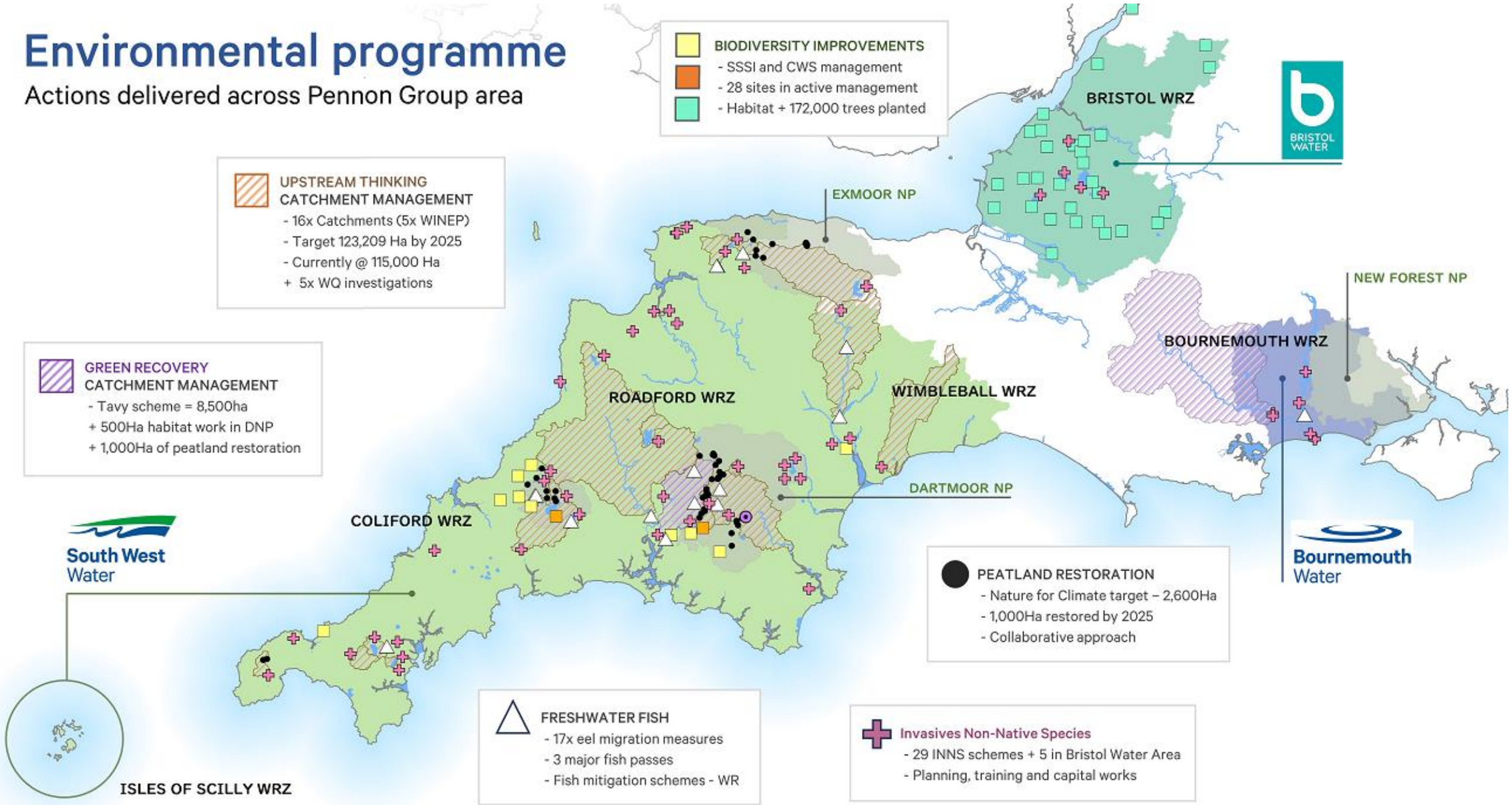
Water – interventions and investment



What happens in the Tamar Catchment upstream of Plymouth can heavily influence water quality in the Plymouth Marine Park

We can't look at Plymouth City in isolation.

Water - natural based solutions



Protecting and maintaining existing water supplies and infrastructure (Water Resource Management Plan (WRMP)

- WRMP looks 25 years ahead and sets out how the future demand for water from customers, communities, businesses, and all other stakeholders will be met whilst also meeting the needs of the environment.
- The consultation on our revised draft plan has closed and we have been reviewing the feedback.
- We received 17 responses in total.
- Our statement of response will be submitted to Defra before Christmas, explaining the changes we will make in response to the feedback received. We will update the plan in the new year.

Our response

- In the rdWRMP these were our best value objectives. Microsoft PowerPoint - Customer Summary v2 (southwestwater.co.uk) (page 8)
  - Protect and enhance the environment.
  - Ensure resilient water supply.
  - Deliver wider societal benefit.
  - Ensure affordability for customers.
  - Optimize land use.

Protecting and maintaining existing water supplies and infrastructure (Plymouth City Council)

OUR BEST VALUE PLAN

Demand management will benefit all our water resource zones but the scale of activity and benefit varies across each zone. New supplies are considered for individual water resource zones using a range of future scenarios. The scenarios are used to create a plan that can be adapted if the future is different to our baseline forecasts.

ROADFORD WRZ

Our Roadford zone includes parts of north-east Cornwall and a large part of Devon, from Plymouth, the South Hams and Torbay in the south, to Bideford and Barnstaple in the north. The coastline, wooded valleys and moorland are extremely popular for tourists.

Our Roadford Reservoir is our largest impounding reservoir, and we operate it conjunctively with smaller reservoirs, river intakes and groundwater sources. These sources are also supplemented by bulk transfers between the neighbouring Colliford and Wimbleball zones.

The population is around 850,000 and is centred in Plymouth, Torbay, Newton Abbot, Okehampton, Torrington, Bideford, Barnstaple, Ilfracombe, Bude. We supply around 230 ML/d to this zone.

Dartmoor National Park lies at the heart of this zone and can be seen from all over the region. It also includes the Western corner of Exmoor National Park and the South Devon, North Devon and Tamar Valley Areas of Outstanding Natural Beauty.

The landscape provides habitat for numerous protected species such as the Marsh Fritillary and 3 out of the five Devon colonies of Southern Damselfly.

KEY CHALLENGES

To further protect the environment, we have to reduce the amount of water we are taking from rivers, especially the River Dart. To provide a sustainable abstraction regime and meet our Environmental Destination we must reduce the volume we abstract in this zone by 28 ML/d.

HOW OUR PLAN WILL BENEFIT ROADFORD WRZ

We are aiming to reduce leakage and overall demand so that there is less pressure on our resources. In our Roadford zone we will invest in additional raw water transfer capacity in 2035/36 to offset an Environmental Destination abstraction reduction of 16.99 ML/d on the River Dart.

Population served:

C. 866,470

Population centres

Plymouth, Torbay, Newton Abbot, Okehampton, Torrington, Bideford, Barnstaple, Ilfracombe, Bude

This page is intentionally left blank

Microplastics

- What they are
- Impacts
- Sources
- Pathways in the environment
- Solutions

Prof. Richard Thompson OBE FRS

@ProfRThompson

UNIVERSITY OF PLYMOUTH

2004

Microplastics are a Plymouth discovery !

BREVIA

Lost at Sea: Where Is All the Plastic?

Richard C. Thompson,[1]* Ylva Olsen,[1] Richard P. Mitchell,[1] Anthony Davis,[1] Steven J. Rowland,[1] Anthony W. G. John,[2] Daniel McGonigle,[2] Andrea E. Russell[2]

Millions of metric tons of plastic are produced annually. Countless large items of plastic debris are accumulating in marine habitats worldwide and may persist for centuries (*1*–*4*). Here we show that microscopic plastic fragments and fibers (Fig. 1A) are also widespread in the oceans and have accumulated in the pelagic zone and sedimentary habitats. The fragments appear to have resulted from degradation of larger items. Plastics of this size are ingested by marine organisms, but the environmental consequences of this contamination are still unknown.

Over the past 40 years, large items of plastic debris have frequently been recorded in habitats from the poles to the equator (*1*–*4*). Smaller fragments, probably also plastic, have been reported (*5*) but have received far less attention. Most plastics are resistant to biodegradation, but will break down gradually through mechanical action (*6*). Many "biodegradable" plastics are composites with materials such as starch that biodegrade, leaving behind numerous, nondegradable, plastic fragments (*6*). Some cleaning agents also contain abrasive plastic fragments (*2*). Hence, there is considerable potential for large-scale accumulation of microscopic plastic debris.

To quantify the abundance of microplastics, we collected sediment from beaches and from estuarine and subtidal sediments around Plymouth, UK (Fig. 1B). Less dense particles were separated by flotation. Those that differed in appearance, and rope, suggesting that the fragments resulted from the breakdown of larger items.

To assess the extent of contamination, a further 17 beaches were examined (Fig. 1B). Similar fibers were found, demonstrating that microscopic plastics are common in sedimentary habitats. To assess long-term trends in abundance, we examined plankton samples collected regularly since the 1960s along routes between Aberdeen and the Shetlands (315 km) and from Sule Skerry to Ice-

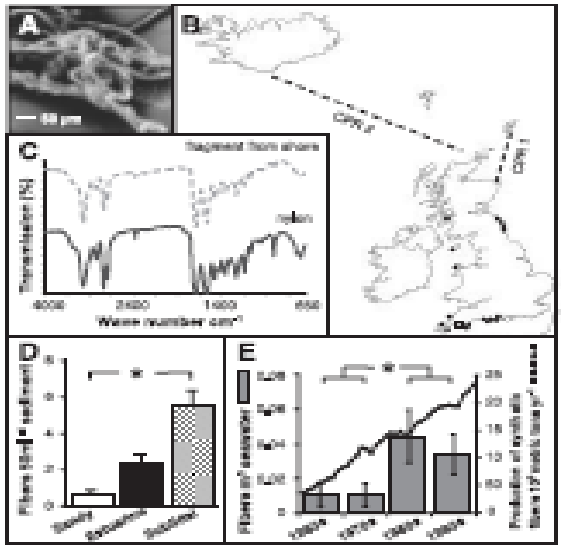


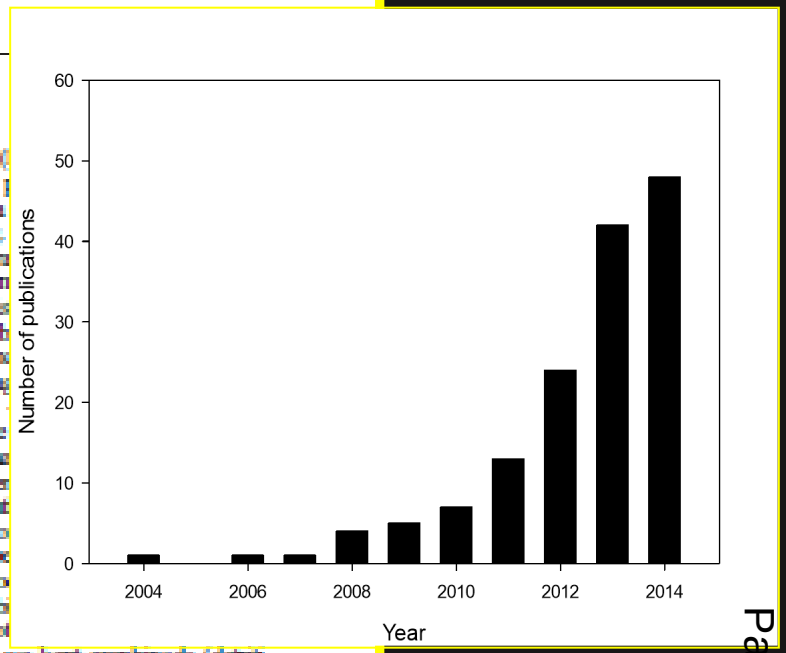
Fig. 1. (A) One of numerous fragments found among marine

land (850 km) (*7*) (
archived among the p
the 1960s, but with a
dance over time (Fig.
of polymer in the wa
suggesting that polym
factor influencing dis
It was only possib
differed in appearan
plankton. Some frag
most were fibrous,
brightly colored. We
represent only a sma
scopic plastic in the en
now needed to quant
terial present. The co
nation are yet to be
items can cause suffo
disrupt digestion in b
To determine the pot
tics to be ingested, we kept amphipods (detritivores), lugworms (deposit feeders), and barnacles (filter feeders) in aquaria with small quantities of microscopic plastics. All three species ingested plastics within a few days (*7*) (fig. S1).

Our findings demonstrate the broad spatial extent and accumulation of this type of contamination. Given the rapid increase in plastic production (Fig. 1E), the longevity of plastic, and the disposable nature of plastic items (*2*, *3*), this contamination is likely to increase. There is the potential for plastics to adsorb, release, and transport chemicals (*3*, *4*). However, it remains to be shown whether toxic substances can pass from plastics to the food chain. More work is needed to establish whether there are any environmental consequences of this debris.

References and Notes

1. P. G. Ryan, C. L. Moloney, *Nature* **361**, 23 (1993).
2. M. R. Gregory, P. G. Ryan, in *Marine Debris*, J. M. Coe, D. B. Rogers, Eds. (Springer, Berlin, 1996), pp. 49–70.
3. J. G. B. Derraik, *Mar. Pollut. Bull.* **44**, 842 (2002).
4. E. J. Carpenter, S. J. Anderson, G. R. Harvey, H. P. Miklas, B. P. Bradford, *Science* **178**, 749 (1972).
5. J. B. Colton, F. D. Knapp, B. R. Burns, *Science* **185**, 491 (1974).
6. P. P. Klemchuck, *Polym. Degrad. Stab.* **27**, 183 (1990).
7. Materials and methods are available as supporting



Thompson *et al.* 2004

Microplastics

Plastic fragments
less than 5mm

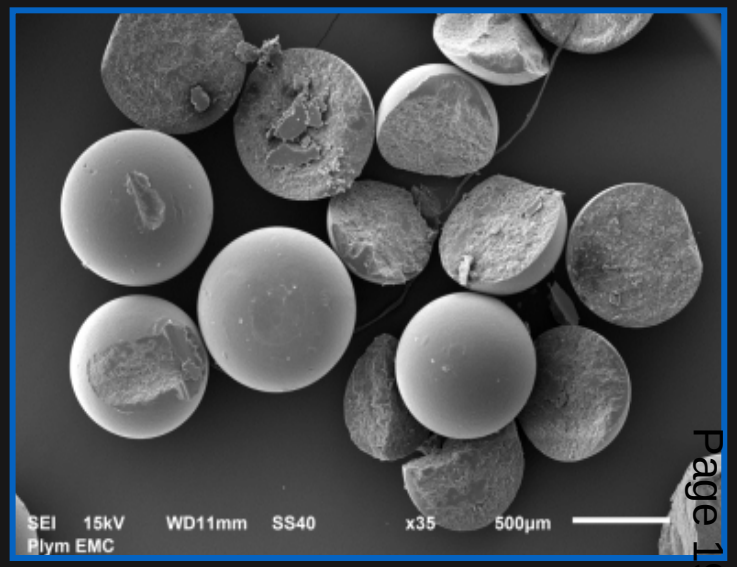
variable in size, shape, polymer and chemical composition and origin

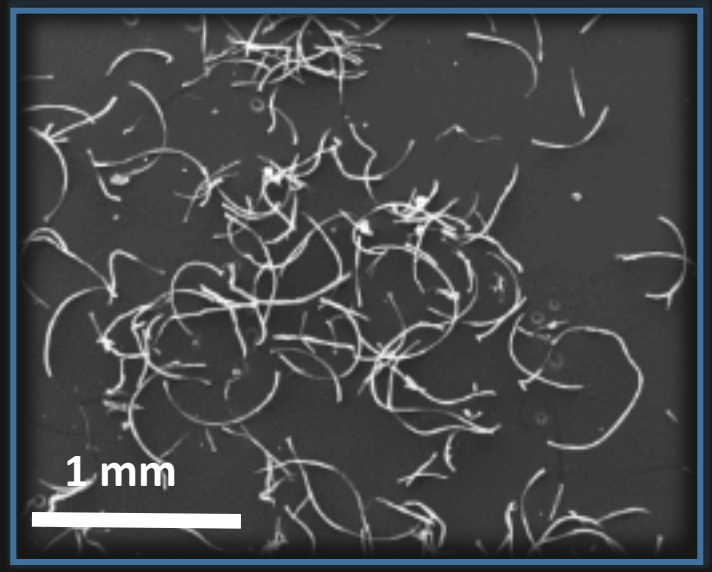
No single intervention
Local – national – global

Actions on larger items will reduce the microplastics of tomorrow

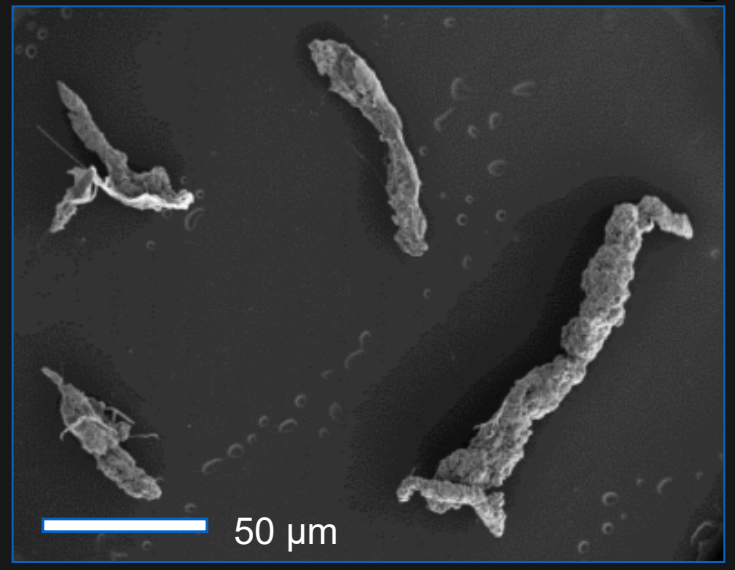
Plastic fragments from River Tamar

microbeads
from shower gel





Microfiber from clothing

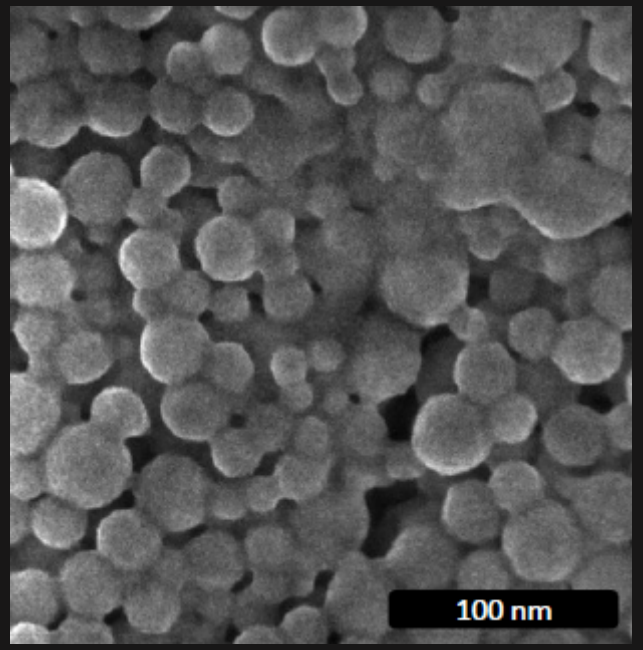


Tyre wear particles

Types of debris

Mega

Micro

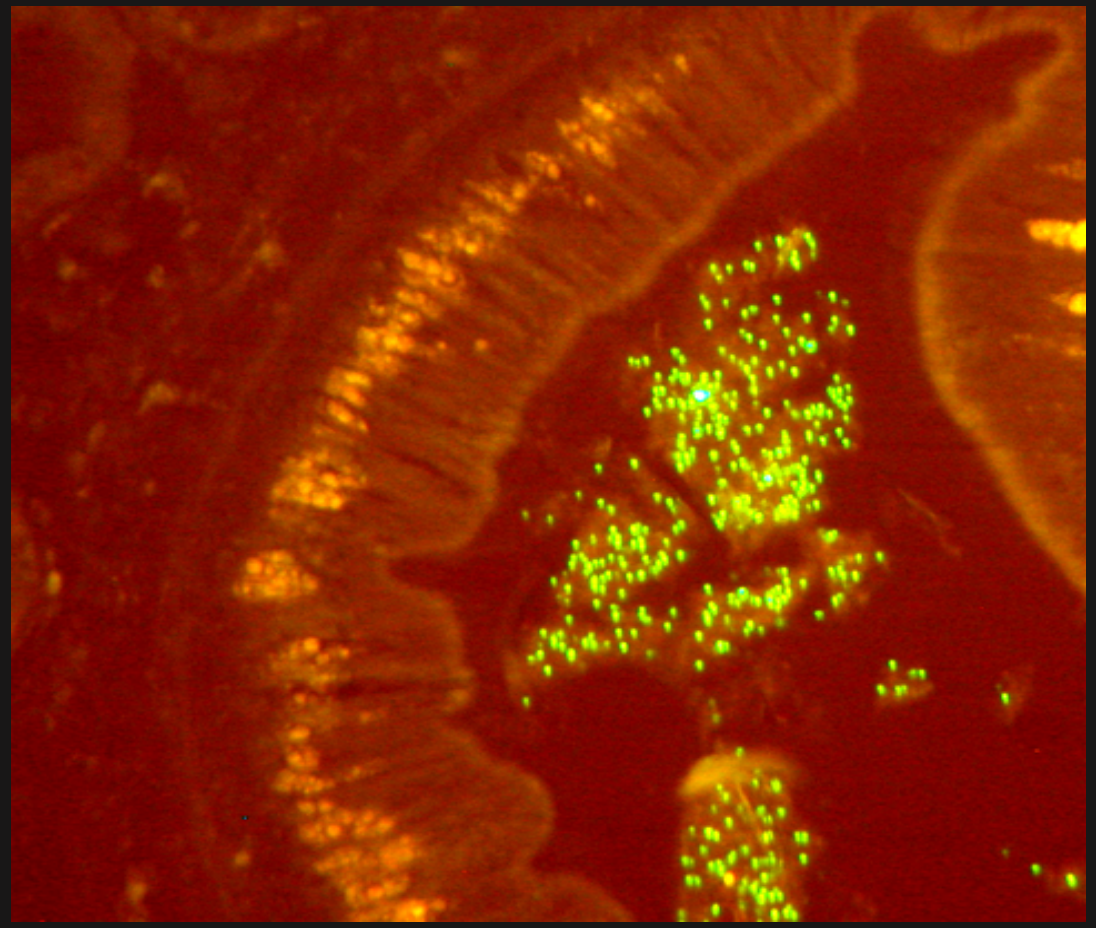


Nano ?

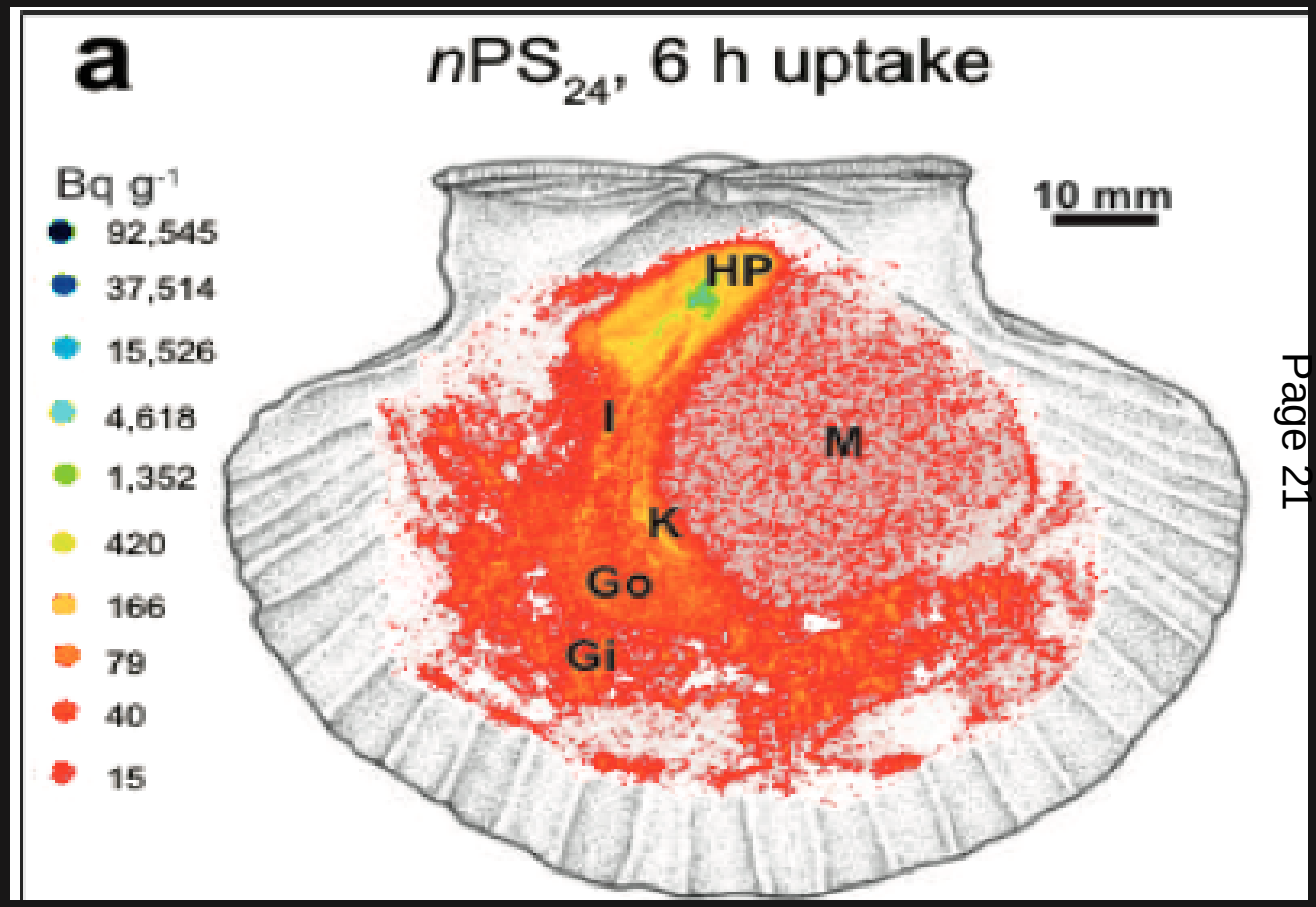
Large and rare

Small and ubiquitous

Microplastic is retained in organisms



M.A. Browne *et al*. 2008

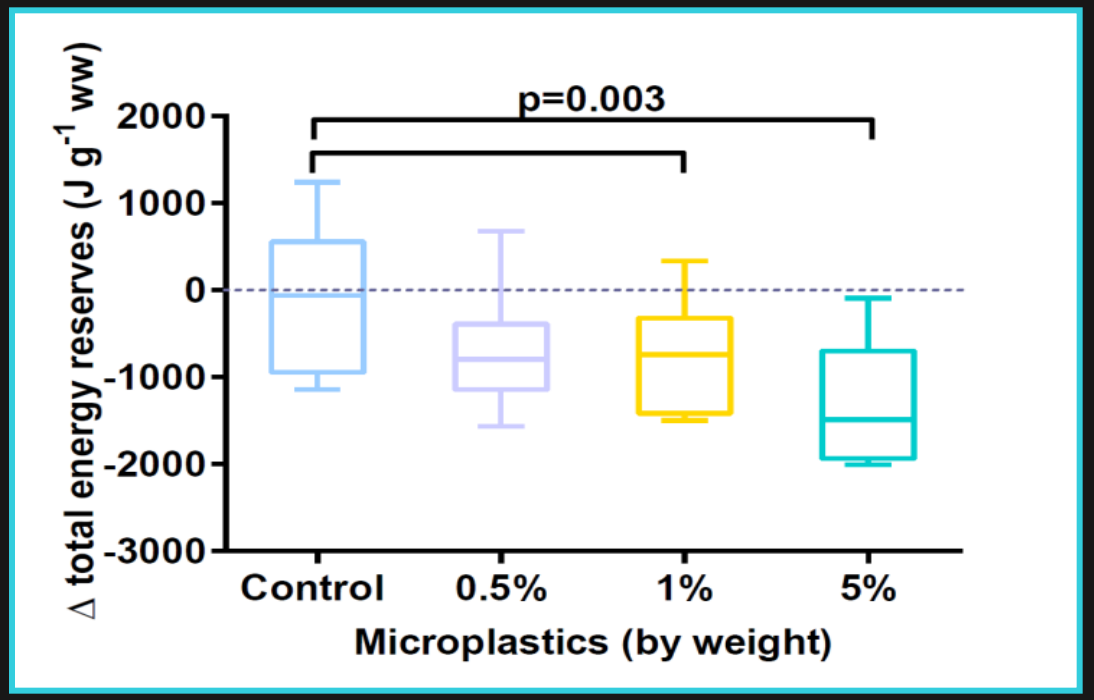


Al Sid Cheik *et al*. 2018

Physical effects (independent of any chemical effects)

1% PVC significantly reduced energy reserves by 30%

5% PVC significantly reduced energy reserves by 50%



Wright *et al.* 2013

Solutions - plastics as materials are not the problem

Reduce

Re-use

Redesign

Recycle

Reduce - Design failure and policy intervention (a ban)

Napper & Thompson, 2015

Cosmetic microbeads – single container had 3 million particles !

Now prohibited in multiple countries

Was the issue avoidable – by better design 50 yrs ago,
or at some time since?

Microfibres - best addressed by upstream measures to redesign

Microfibres from textiles

Capture - washing machine

Capture - wastewater treatment

Prevent / minimise better design

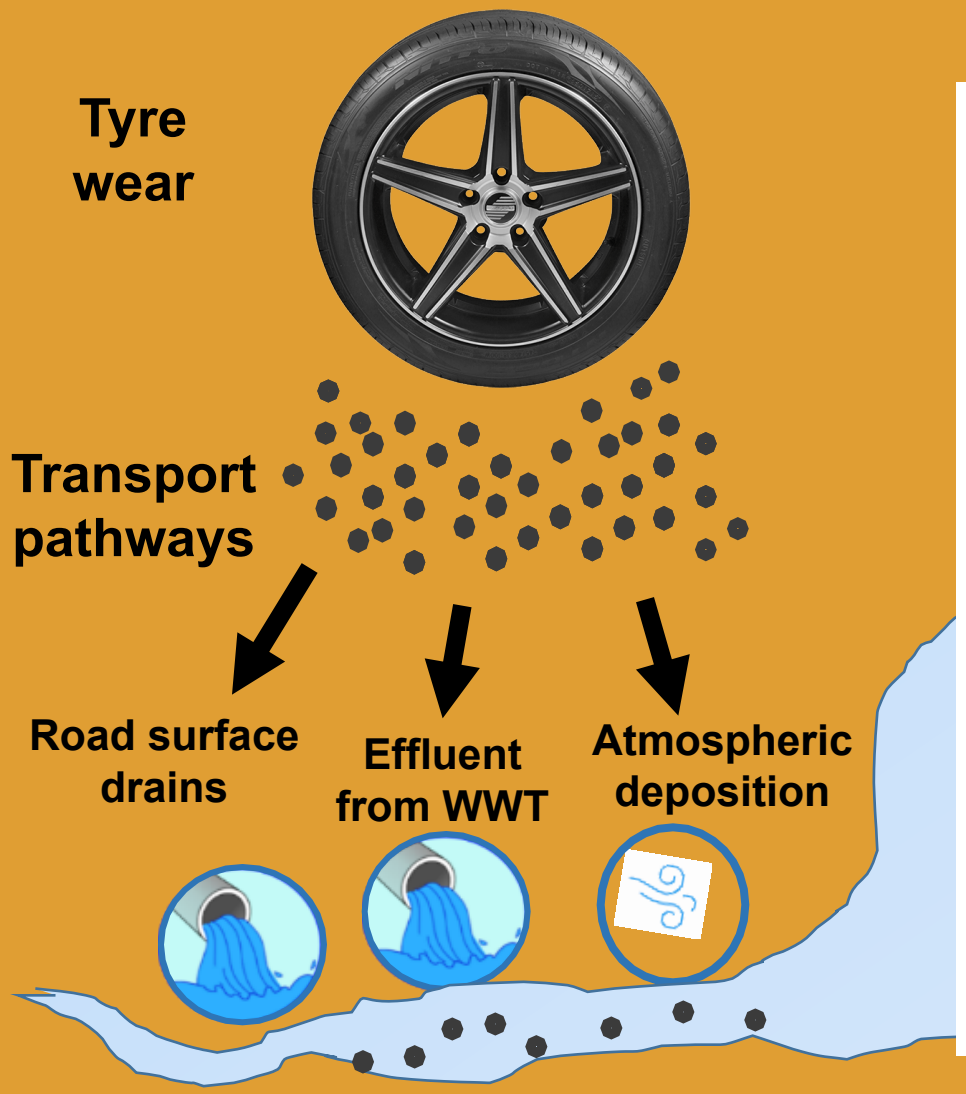
National level policy (downstream)

International measures (upstream)

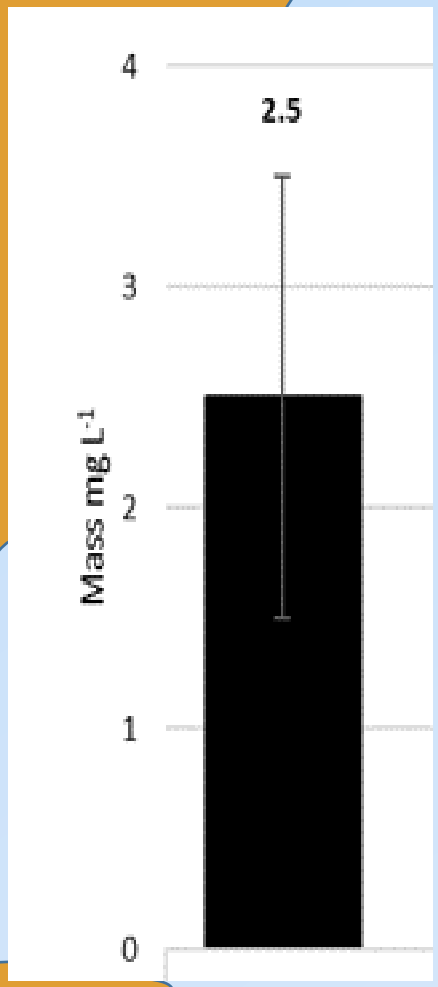
Napper & Thompson, 2016; Napper, et al. 2020; Kelly, et al. 2019, De Falco, et al. 2020

Once in a planet opportunity for international level action !

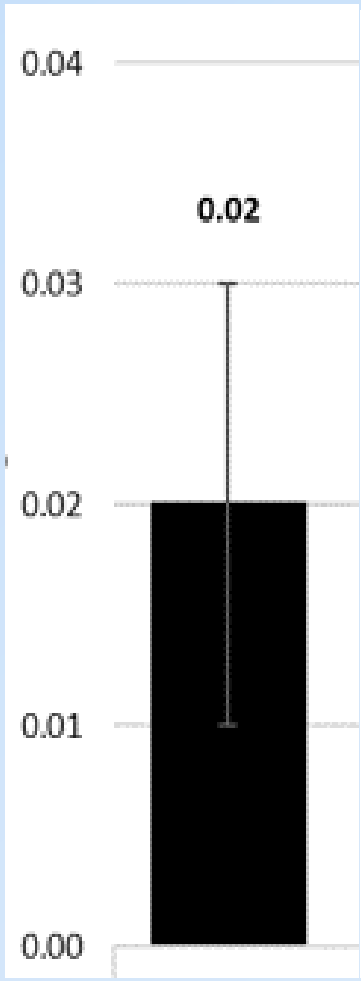
Science essential to inform action !



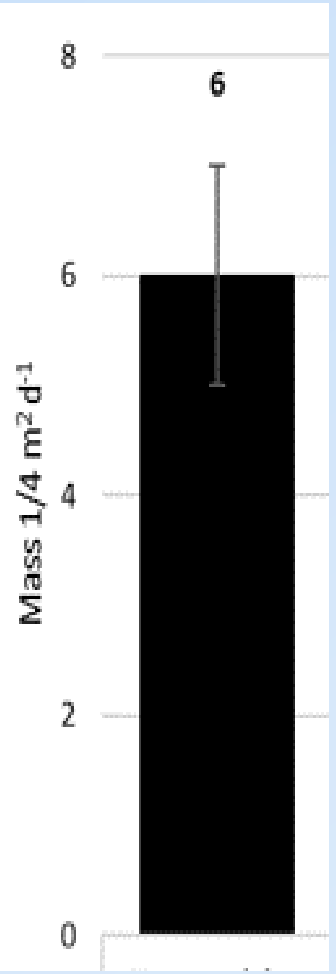
Parker Jurd *et al.* 2019



a) Road surface drain

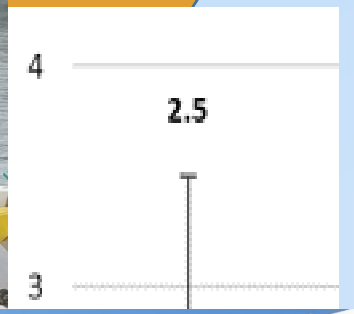


b) WWT effluent



c) Atmospheric deposition

Interventions - Tyre design, vehicle maintenance or driver behaviour?



Interventions - Tyre design, vehicle maintenance or driver behaviour?

Redesign -Biodegradable Agri-Plastic

'pre-exposed soil' deployments

3 months soil surface

Soil burial

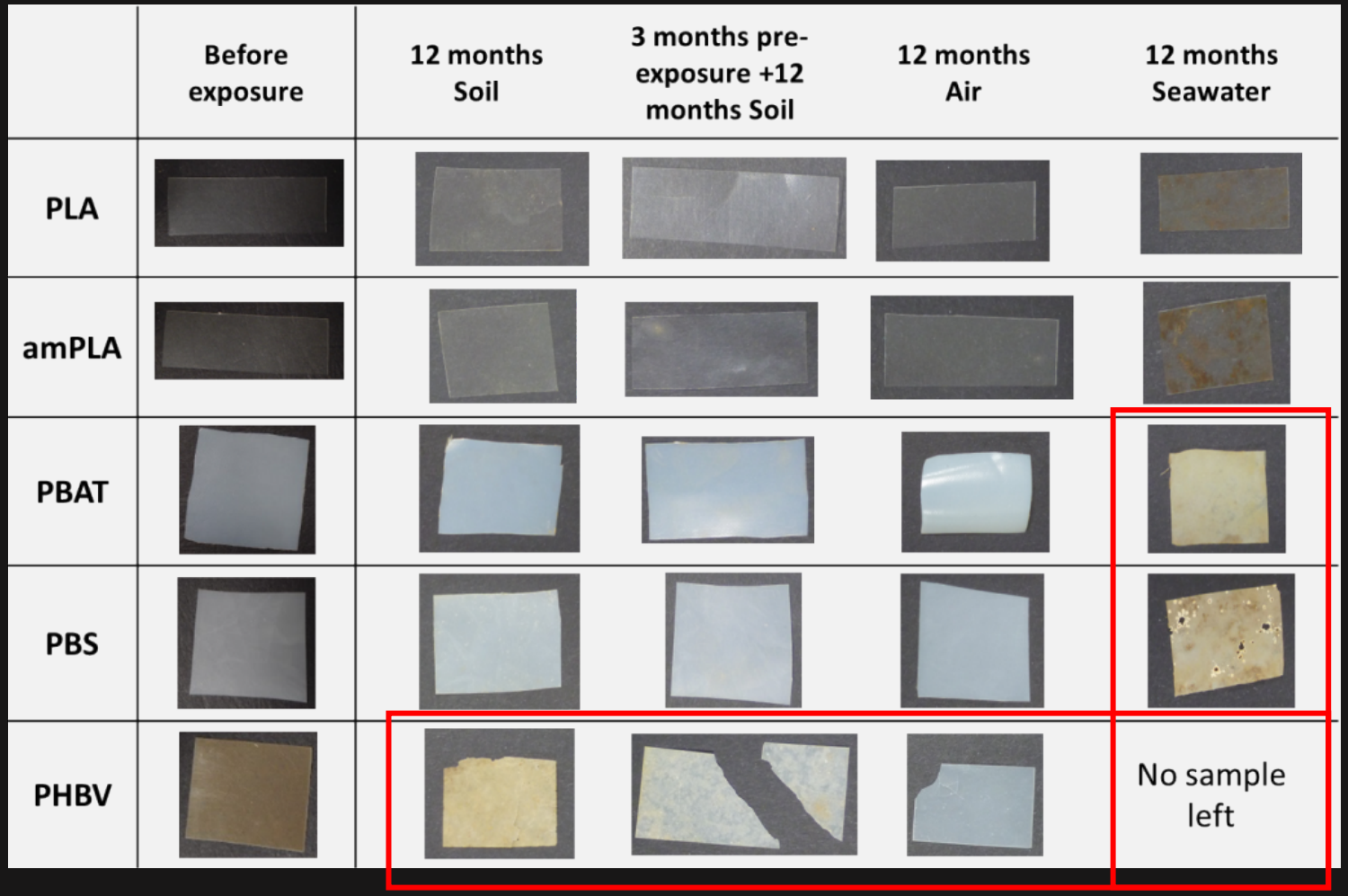
'soil' deployments

+

'marine' deployments

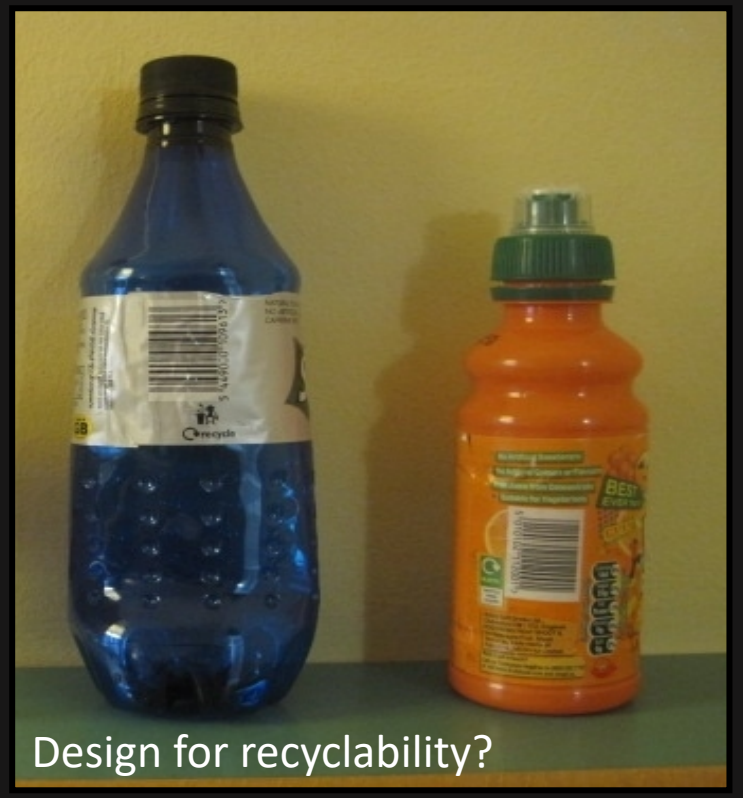
'air' deployments

Redesign -Biodegradable Agri-Plastic - Results after 12 months



- **Visual degradation** observed in all environments for **PHBV** after 12 months exposure.
- **PHBV** exposed to **marine** environment completely disappeared in **less than 12 months.**
- **Limited** to no visual degradation for **PLA, PBAT and PBS** polymers after 12 months exposure.

Recycling requires dedicated waste streams and appropriate design



Who bears the cost (producer, society) ?

Collection is essential to recycling

Who bears the cost (producer, society) ?

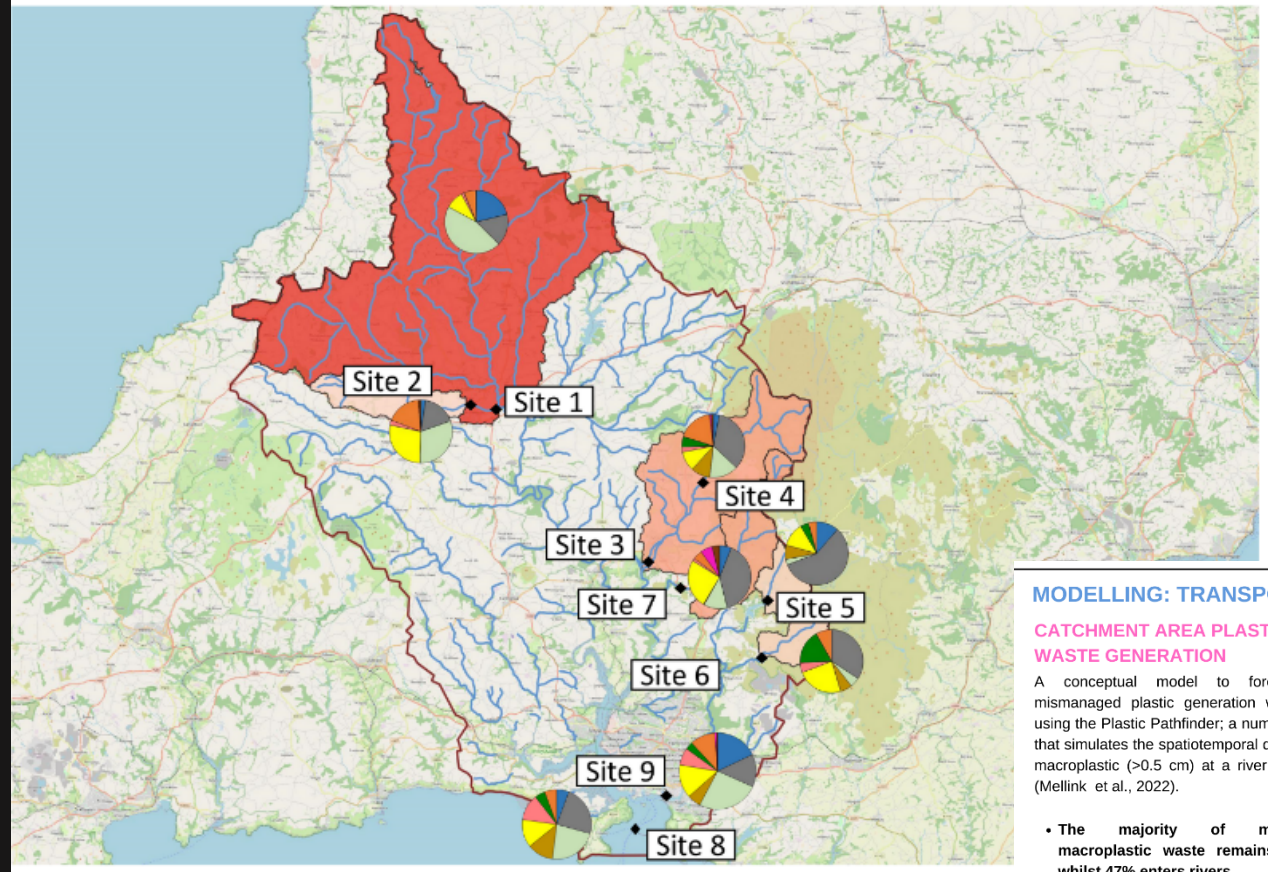
Focus on upstream interventions (following waste hierarchy)

Parker-Jurd et al. 2022

Monitoring - Tamar as model catchment?

SAMPLING CAMPAIGN RESULTS

Microplastic average concentration and polymer types in the Tamar catchment area



4 SAMPLING CAMPAIGNS
7 SAMPLING POINTS IN RIVER CATCHMENTS
2 SAMPLING POINTS IN MARINE AREAS

GRAPHIC AND MAP LEGENDS

Polymer types

- POLYETHYLENE (PE)
- POLYESTER (PES)
- POLYPROPYLENE (PP)
- POLYSTYRENE (PS)
- POLYAMIDE (PA)
- POLYURETHANE (PU)
- POLYVINYL CHLORIDE (PVC)
- ACRYLIC POLYMER (AP)

MP concentrations (MP/m³)

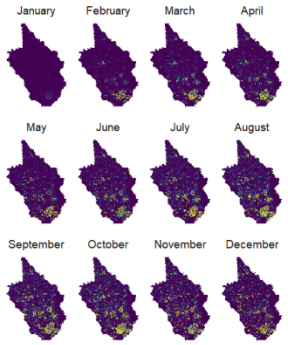
- not collected
- not detected
- < 0.1
- 0.1 - 0.5
- 0.5 - 1
- 1 - 2.5
- 2.5 - 5

MODELLING: TRANSPORT OF MACROPLASTICS

CATCHMENT AREA PLASTIC WASTE GENERATION

A conceptual model to forecast daily mismanaged plastic generation was created using the Plastic Pathfinder; a numerical model that simulates the spatiotemporal distribution of macroplastic (>0.5 cm) at a river basin scale (Mellink et al., 2022).

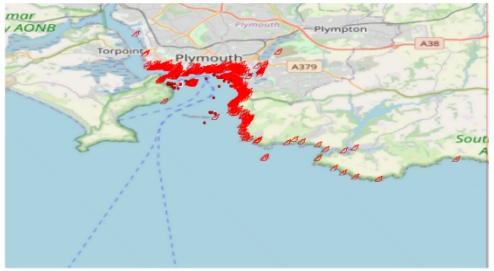
- **The majority of mismanaged macroplastic waste remains on land, whilst 47% enters rivers**
- **Rivers are the largest sink of**



*MPW = mismanaged plastic waste

MOVEMENT OF PLASTICS AT SEA

Actimar-produced microplastics trajectories map and identified potential accumulation areas at sea



- **Particle dispersion modelling in Plymouth Sound shows particles moving east, with 93% particles stranded, 5% particles still active, and 1.4% particles that have moved outside of the modellled area, after one week**
- **Dispersion model at sea, with south west wind direction.**
- **Available at: https://ppp.actimar.fr/ppp/map**

Interreg France (Channel Manche) England
European Regional Development Fund

PREVENTING PLASTIC POLLUTION

UNIVERSITY OF PLYMOUTH

Queen Mary University of London

Actimar

LABOCEA

Microplastic debris in the environment

- Symptoms of outdated business models for production use and disposal coupled with ‘’*solutions*’’ that have NOT been fully evaluated.
- Evidence of impacts on economy, wildlife, services
- Impacts not coupled to societal benefits
- Solutions exist – but no single solution
- Focus on design for life and end of life
- Synergistic benefits (resource efficiency / waste reduction)
- Harness current interest - focus on product design and waste management
- Together - industry, policy and public - we can solve this challenge
- UN Treaty – needs reliable independent evidence to prioritise actions

Richard Thompson – Thank you @ProfRThompson

defra
Department for Environment Food and Rural Affairs

The Leverhulme Trust

GCRF
Global Challenges Research Fund

Interreg France (Channel Manche) England
European Regional Development Fund

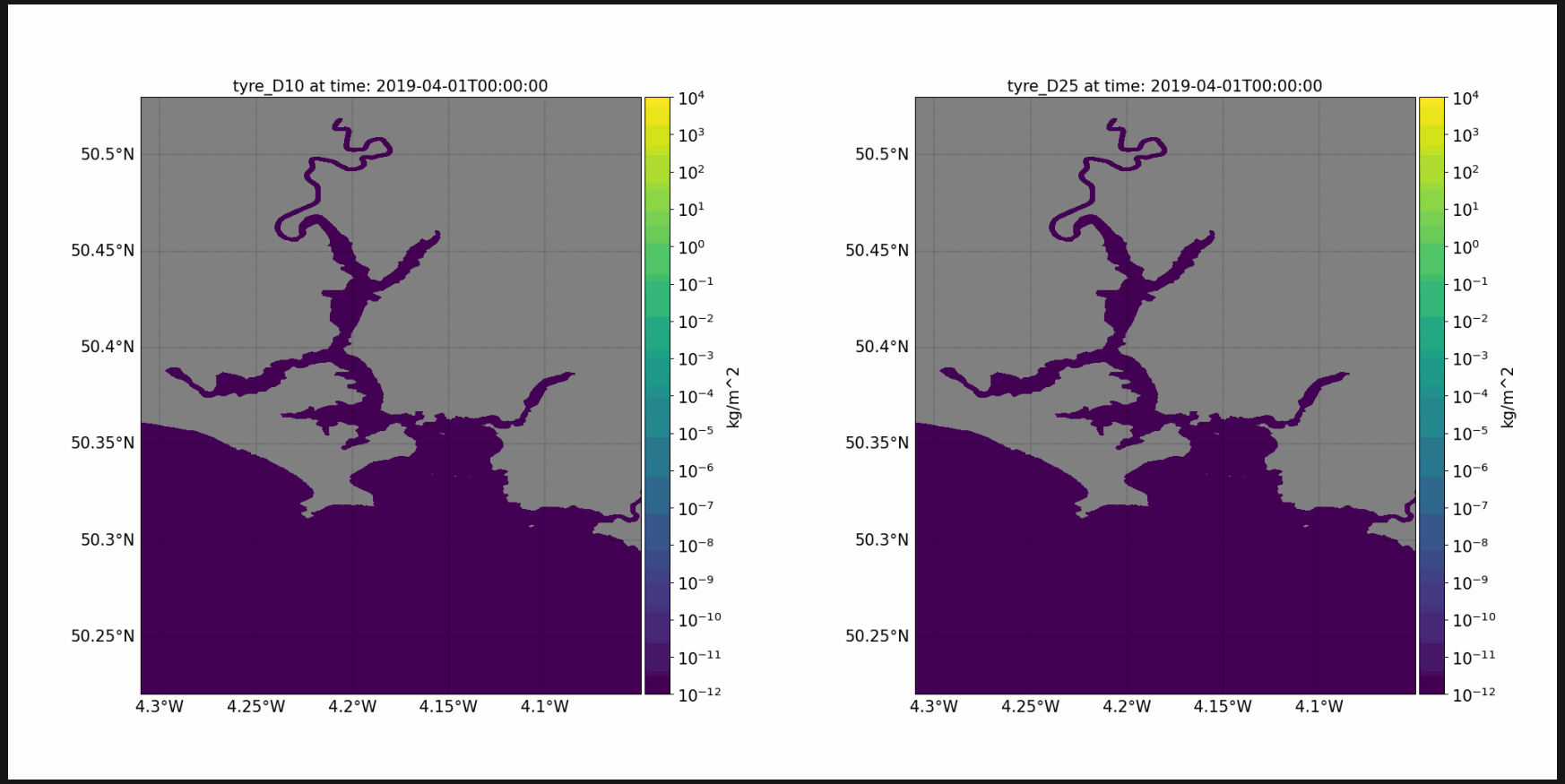
PREVENTING PLASTIC POLLUTION

UK Research and Innovation

national highways

UNIVERSITY OF PLYMOUTH

Preliminary results: suspended particles



Tyre class 1

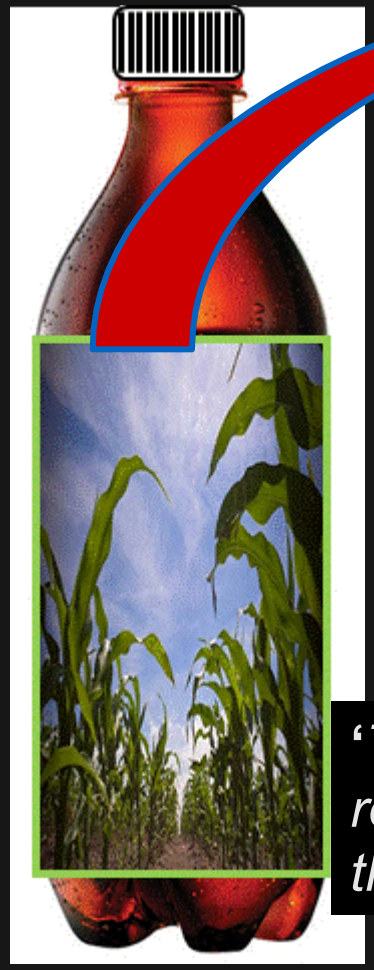
Imperative to design products for life in service & end of life – need appropriate standards and labelling

Napper & Thompson, 2019

We urgently need evidence – which solutions work and the trade offs among them

Potentially conflicting drivers

Will bioplastics reduce litter / waste?



‘*This new packaging is fully recyclable, and is said to reduce carbon emissions by as much as 25% over the product lifecycle*.’

Resource IN

Waste OUT

This page is intentionally left blank