BEACHWISE FORUM

23rd November 2023

Environment Agency

2023 Bathing Season

- **Warning the Public**
  - **2455 Pollution Risk Warning**
  - **16 Pollution Events.**
- **We completed 15 investigations at our priority waters.**

- **74 additional monitoring sites**
- **2453 statutory samples taken**
- **Contrasting weather from 2022**

Environment Agency

Ilfracombe Hele

2019	2020	2021	2022
Good	Un-classified	Good	Good

What's the problem?

Agriculture%	Sewage %	Other %
60	20	20

Since 2021 the EA has noted several elevated results at both the beach and the stream

⬇

We commissioned over nine freshwater monitoring points to determine the sources of pollution

⬇

The EA completed several walkovers to identified sources, we followed up on reported Environment Incidents of a business

⬇

Completed a dye trace survey of the café and toilets, no issue found

⬇

Three walkovers including sampling were able to a short stretch of contamination between Primrose Cottage and the main road culvert

⬇

We have a water quality monitor in hele mill which will look to establish a relationship between time of day and reaction after rainfall..

Ilfracombe Hele

Environment Agency

A small steam or drainage field that enters the Hele stream near the main road culvert was examined by our monitoring officers. Although the stream was stocked with sheep, they were unlikely to impact the bathing water.

⬇

Follow up the report of cattle poaching in the Hag brook

⬇

Our Environment officer visited a farm in the upper catchment, advice was given around cattle poaching, and removing waste from site.
follow up by an agriculture inspection officer

⬇

Taw catchment is a Defra priority catchment part of Agriculture Regulatory Taskforce.

Ilfracombe Hele

Environment Agency

In 2022 SWW completed WINEP BW investigation. A detailed understanding on asset performance and what is needed to achieve a confidence compliance.

This year we carried out a dye trace survey of three sewer lines that cross the Hele Stream. No leaks or misconnections found

SWW carried out its own investigation of the network, maintenance check of the culvert; CCTV of rising main; Dye Trace of Pump station. No issues

EA visited the caravan park; the park recently unblocked it sewer lines. No issues.

We had additional Microbial Source Tracking analysis completed on elevated stream sampling. Demonstrated a mixture of Ruminant of Human.

Ilfracombe Hele

Environment Agency

Actions going forward……

Further inspection of Hag Brook	Agriculture inspection	Proactive Misconnection work
Sample results show varied results.	Farming rules for water	SWW looking at property level.

Review Sonde Data	Request Further MST
Compare and Contrast	Detailed evidence of sources of pollution

Environment Agency

Swanpool

2019	2022	2021	2022
Excellent	Un-classified	Excellent	Good

What's the problem?		
Agriculture %	Sewage %	Other %
5	20	75

Deterioration in classification, due to several elevated sample results.

⬇

The beach is fed by the Swanpool lagoon which is fed by Bickland Stream. The area behind the BW is Urban.

⬇

We increased the monitoring around the bathing water and requested MST.

⬇

MST demonstrates that the stream shows the predominant sources is Human with some canine whereas the BW seabird is the predominant source with canine and small amounts of human.

Swanpool

Environment Agency

SWANPOOL STREAM ABOVE SWANPOOL

SWANPOOL STREAM AT BEACH. END OF CULVERT

SWANPOOL STREAM - OUTFLOW FROM SWAN POOL AT SWANPOOL BEACH

SWANPOOL BEACH SAMPLING SITE

Environment Agency

Swanpool is very urban catchment with a long history of misconnection in the stream.

⬇

Our teams have been working actively in the catchment, there are several community groups that report misconnection to the EA& SWW.

⬇

Yellow Campaign to reduce misuse of surface water drains

⬇

Three SWW storm overflows in the area. Detailed review of data. Only one link to the BW

⬇

Need further evidence of attenuation times of Swan Pool, but evidence so far suggests there is consistent bacterial pollution entering Swan Pool from Bickland Stream but the outflow from Swan Pool and stream at the beach does not reflect this in our monitoring.

Swanpool

Environment Agency

Actions going forward……

Continue Additional Monitoring	Review 2023 spill data	Proactive Misconnection work
Bickland stream, outflow from Swanpool & BW stream	Contrast against elevated bathing water results	Continue to work with community group

Citizen Science	Further Catchment Walkover	Work with stakeholders
Sharing of knowledge	Identify further issues	Increase awareness of retention times

Environment Agency

Why is it designated status important?

Why have we seen an increase in bathing water quality?

Environment Agency

Water Industry National Environment Programme (WINEP)

- **5 year statutory programme which is part of the Water Company Business Plan (usually around 5-20%)**
- **Environment Enhancements in line with Directive and Policy.**

- **Key Words**

Planning for WINEP: Price Review → PR24

Delivery of the WINEP: Asset Management Programme→ AMP7

PR24 – WINEP- AMP8

Environment Agency

Planning Class and Delivering improvements

- Example:

Dawlish Town

Face value: Good Planning Class: Poor

Environment
Agency

Planning Class and Delivering improvements

- Example:

Poor Planning Class

SWW have a statutory duty to either:

Investigation (INV driver)

Or

Improvement (IMP driver)

Environment Agency

AMP 1 — 1990
- £507.96 million
- Marine 'Clean Sweep' to remove untreated discharges
- Before 1990, 90% of DCIS sewage discharged untreated.
- New STWs built to replace untreated discharges, e.g. at Combe Martin, Salcombe, Teignmouth/Shaldon, Bude, St Ives/ Penzance, Par and Fowey to improve bathing waters

AMP 2 — 1995
- £320.57 million
- 'Marine Clean Sweep' continues
- More new STWs built
- 20 crude outfalls eliminated by transfer to Plymouth Central STW
- Better UV treatment at STWs e.g. Ilfracombe, St Agnes, Looe for bathing waters
- Crediton our first P removal scheme

AMP 3 — 2000
- £350.87 million
- Focus on rivers & shellfish waters
- 100 continuous & 240 intermittent discharges improved
- Many sanitary schemes to meet river quality objectives
- 25 STW schemes for shellfish waters e.g. Wadebridge (Camel), Falmouth, Totnes (Dart), Countess Wear (Exe)

AMP 4 — 2005
- £102.03 million
- Investigations time!
- Shellfish, bathing waters, nutrient, groundwater, investigations
- More Habitats Directive nutrient (P & N) schemes for SACs: Camel, Axe, Fal/Helford
- 80 intermittent and 20 continuous discharges improved to meet UWWTD requirements

AMP 5 — 2010
- £64 million
- Broader programme – includes WR
- Abstraction licence reductions to protect salmon for Dartmoor SAC, screening of intakes
- Start of Upstream Thinking (WR)
- Water quality investigations for drinking water sources
- Investigation of chemicals in sewage
- BW & SFW still feature prominently

AMP 6 — 2015
- £59 million
- Fisheries & Biodiversity join in!
- Eels, INNS & bat (!) investigations
- SSSI land management schemes
- Drinking water catchment schemes
- WQ & WR investigations & schemes
- EDM for 400 intermittent discharges

AMP 7 — 2020
- £169 million
- Fish passes & screen, INNS, MCZs, investigation of ways to reduce flood risk for SWW assets, habitat creation
- WR options appraisal for Otter groundwater abstractions, fish bank releases, gravel augmentation
- Drinking water catchment schemes & NFM
- Large WQ programme includes Isles of Scilly
- Chemical investigations for plastics & flame retardants
- Bathing Water Ambition Investigation

What has AMP done for us?

£1.4 billion over 30 years (with a further £169M for AMP7 to deliver in the next 5 years)

£127,854 per day for 30 years Invested in the water environment of Devon, Cornwall and Isles of Scilly

Looking forward

Bathing Water Investigation
- Feasibility of sampling all year

Agriculture Regulatory Taskforce
- Officers in our priority areas

Bathing Water Polygon Review
- Reflect bathing numbers

Review of storm overflows and impact
- Data review

Citizen Science Engagement
- CaSTCo

Questions?

Microbiology labs in the Environment and Sustainability Institute, Penryn

Exeter Medical School's antimicrobial resistance (AMR) Research Unit

Research programme on AMR in natural and farmed environments

University *of* Exeter

Interdisciplinary research encompassing:

- Evidence synthesis
- Studies of human behaviour and health
- Microbial ecology
- Landscape ecology
- Fundamental evolution
- Big data analysis and environmental intelligence

EVOLUTION

The role of pollution and climate change in the rise of antimicrobial resistance

Stanton et al., 2020.

We are investigating the selective effects of:

- Antibiotics
- Plant protection products
- Non-antibiotic pharmaceuticals
- Microplastics
- Temperature
- Biocides

Selection for antibiotic resistance within wastewater influent (A) and effluent (B) (Hayes *et al.*, 2022)

ECOLOGY

Land-based processes contributing AMR bacteria to bathing waters

We combine large landscape-scale datasets with metagenomic analyses to understand the processes introducing AMR bacteria to bathing waters, where humans are exposed to waterborne microorganisms

The abundance and diversity of antibiotic resistance genes present in *E. coli* isolated from bathing waters (Leonard et al. in prep)

EPIDEMIOLOGY

Human exposure to AMR in the environment and transmission

We work to understand the role the environment plays in the transmission of AMR to humans from environmental sources

Results of an evidence map displaying research effort into exposure and transmission of AMR from environmental sources (Stanton, Leonard, Bethel, Gaze, Garside, 2022)

University
of Exeter

Dr Anne Leonard
Lecturer

Particular interests and specialisms:

- Human exposure risk assessments
- Epidemiology
- Evidence synthesis
- Environmental intelligence (data sciences, geostatistics, artificial intelligence)
- Sustainable solutions to environment and health challenges

Antimicrobials

- Chemicals that kill or prevent the growth of microorganisms
- Produced and disseminated on a large scale
  - Antibiotics → Bacteria
  - Antifungals → Fungi
  - Etc
- Widespread use to prevent or treat infections caused by **microorganisms**

Fungal colony

Bacteria inhibited

Bacteria

University
of Exeter

Antimicrobial resistance (AMR)

- Survival and growth of microorganisms in the presence of substances to which they were once susceptible

- A natural phenomenon, accelerated by the use of substances that kill or inhibit microorganisms

- Genetically determined → inheritable (parent-offspring) but *also transmissible* (inter-species spread)

AMR is a 'silent pandemic'

- Bacterial pathogens are the second leading cause of death globally (Ikuta et al 2022)

  - (7.7 million each year or 1 in 8 deaths….compare to ~6 million deaths from COVID over 2 years)

- Nearly 5 million deaths in 2019 were associated with antibiotic resistant bacterial infections (Murray et al 2022)

- Fewer novel antimicrobials being brough to market to treat increasingly drug-resistant infections

- If current trends continue >10 million deaths each year globally due to AMR by 2050 (O'Neill et al 2016)

IF NOT TACKLED, RISING AMR COULD HAVE A DEVASTATING IMPACT

By 2050, the death toll could be a staggering
one person every three seconds
if AMR is not tackled now.

POOR INFECTION CONTROL CONTRIBUTES TO INCREASED RESISTANCE AND LOSS OF LIFE

Research on river and coastal bathing waters and water users

Important results of previous research:

- Coastal bathers are at greater risk of experiencing symptoms of illness compared to non-bathers, and at risk of exposure to and colonisation by clinically important antibiotic resistant bacteria
- Diverse sources of AMR: landcover type, proximity&size of wastewater treatment types, and prevailing weather are associated with higher levels of AMR in rivers

Amos et al 2015 Validated predictive modelling of the environmental resistome

Surfers ingest large volumes of water when they surf, → infected/colonised by pathogens/AMR bacteria

University of Exeter

Current research on river and coastal bathing waters

NERC industrial innovation & IDSAI – novel methods for modelling E. coli metagenomes in coastal bathing waters

River network

Livestock population

Antibiotic prescribing (primary health care)

Human population

Precipitation

Landcover

Data Science and Artificial Intelligence approaches are being used to leverage large environmental datasets and unravel complex patterns of antimicrobial resistance in the environment

University *of* Exeter
Institute for Data Science and Artificial Intelligence

Natural Environment Research Council

Projects on river and coastal bathing waters and water users

- Jono Warren (MbyRes)- landscape scale factors influencing the abundance of phenotypically resistant *E. coli* in coastal bathing waters
  - Environmental data collection across 10 coastal bathing waters + associated streams/rivers + Ilkley bathing water
  - Analysis of local environmental processes (e.g. prescribing, microbial source tracking, etc.)

  - Estimate water users' exposure to AMR *E. coli*

E. coli colonies (blue) growing on agar with antibiotics added.
Isolated from a coastal bathing water sample

Projects on river and coastal bathing waters and water users

- Elitsa Penkova (NERC GW4+ DTP PhD) – AMR in rivers and risks to water users
  - Systematic review on the evidence of AMR transmission & prevalence in freshwaters
  - Environmental data collection
  - Epidemiological surveys of river water users

EPIDEMIOLOGICAL SURVEY
Are river swimmers more likely to carry AMR bacteria?

SWIMMERS (n=150)

NON-SWIMMERS (n=150)

If resistant bacteria survive ingestion, they could colonise the gut (Leonard *et al.* 2018 *Environ Inf*)

Projects on bacterial fate in aquatic environments

- Nina Baskerville (SuMMeR PhD) – fate of sewage- and livestock-associated pathogens through the catchment

  - Impact of UV, temperature, salinity, nutrients on bacteria in terms of survival, acquisition of AMR genes

  - Predicting the abundance and survival of AMR bacteria in coastal waters under future climate change scenarios

Community response

Species response

Horizontal gene transfer

Catchment scale modelling

Projects on bacterial fate in aquatic environments

- Cara Patel (MRF PhD) – elucidating the complex interplay between increasing temperature and pollution on natural microbial communities in aquatic environments

Microbial community exposed to experimental treatment (e.g. pollutant, or higher temperature,)

Measure changes in genes, or bacterial community composition

Complex microbial community

Control (Microbial community not exposed to experimental treatment)

Current research on river and coastal bathing waters

BlueAdapt   www.blueadapt.eu

£8m project across 8 European countries to understand how waterborne pathogens will change under future climate scenarios, and how we can adapt to these risks.

Understanding the risks → Case studies → Translating the evidence → Informing policy and innovation

Blue Adapt

Co-funded by the European Union

UK Research and Innovation

BlueAdapt work at University of Exeter

1) Lab-based experiments to understand how pathogens and AMR will change under future climate change scenarios

2) Evaluating the impact of real-tie alerts of water quality issues in bathing waters on water user behaviour and health

3) Health impact assessments to quantify future risks, and cost-benefit analyses of climate change adaptations

University of Exeter

Co-funded by the European Union

UK Research and Innovation

Summary

- Antimicrobial resistance poses a threat to human health, well-being and prosperity

- Preventing infections will reduce the burden on antimicrobials

- Bathing waters are affected by pollution from diverse sources, and are places where people come into direct contact with waterborne pathogens and AMR.

- Portfolio covering a range of projects on bathing waters to:
  - Quantify how AMR gets into bathing waters
  - Understand what it means for human health in these environments
  - Identify factors and mechanisms that promote or prevent AMR spread in the environment
  - Effectively and sustainably manage risks and support decision-makers

Thanks for listening!
Any questions?

2023 Bathing Water Quality Predictions

Paul McNie – Waste Water Environment Manager

Jeminah Lotshwao - Graduate

23rd November 2023

2023 Bathing Water Quality Predictions: Assessment Process

- EA BWQ sample data extracted from Swimfo.
- 4 seasons; 2019 and 2021-2023.
- Dataset moderated by potential discounting under EA Pollution Risk Forecasting (PRF) process.
- Dataset analysed in accordance with Bathing Waters Regulations.
- Likely classification assigned to BW
- Final classifications TBC'd by Defra 01/12/2023

2023 Bathing Water Quality Predictions: Summary Statistics

Classification	2022 Compliance Actual (Defra)	2023 SWW Predicted Compliance
Poor	0	1
Sufficient	1	4
Good	27	22
Excellent	121	123
Un-assessed [1]	1	1
Total no. BWs	150	151 [2]
Total Classified	149	150
No Meeting Min Std	149	149
%Poor v Classified	0.0	0.7
%Sufficient v Classified	0.7	2.7
%Good v Classified	18.1	14.7
%Excellent v Classified	81.2	82.0
%Unclassified v Total	1.3	0.7
%Meeting Min Std v Classified	100.0	99.3

NB1: Watcombe
NB2: Plymouth Firestone designated

3

2023 Bathing Water Quality Predictions: Season Summary

- Stable compliance, despite a rather wetter than normal summer.
- 99.3% met the required minimum standard of 'sufficient' or better.
- One bathing water predicted to improve - 'good' to 'excellent'.
- Five bathing waters were predicted to deteriorate in class:
  - Four - 'good' to 'sufficient'
  - One - 'sufficient' to 'poor' – but no SWW assets associated
- Joint investigations with EA on those that dropped in class ongoing

Thank you for listening!

Any questions?

South West Water

Enhanced Bathing Water Monitoring Proposal

Paul McNie – Waste Water Environment Manager

23rd November 2023

Enhanced Bathing Water Monitoring Proposal

South West Water

Context:

- BW use is no longer seasonal

- Understanding of daily BWQ variability limited

- Public perception of risk is focussed on water industry

- Significance of catchment derived sources are not well understood

Enhanced Bathing Water Monitoring Proposal

South West Water

Proposal:

- Daily sampling of BWs and associated catchment sources

- Sampling for one full year (H&S permitting)

- Up to 50 BW locations

- Microbiological analysis (IE & *Ec*)

- Parallel rapid bacti trial (10% of samples)

- Complimentary onsite and/or lab parameters

- BW usage and sampling observations recorded

- Detailed analysis and interpretation

Enhanced Bathing Water Monitoring Proposal

South West Water

Key Considerations:

- Securing funding approval

- Delivering laboratory and sampling capacity

- Working in partnership with stakeholders on scope and extent

- Maximising benefit from data and observations

- Health & Safety

Enhanced Bathing Water Monitoring Proposal

South West Water

Potential Benefits:

- Improved understanding of BWQ variability in season

- Winter BWQ better qualified

- Understanding in-season & out of season BW usage

- Qualifying sampling limitations

- Improved understanding of CSO discharges and catchment effects

- Enhancing modelling, investigations and prediction tools

- Risk source identification and remediation

- Improved compliance

Lynmouth BWQ October 2023 (Ec (cfu/100ml))

Lynmouth BWQ October 2023 (IE (cfu/100ml))

Thank you for listening!

Any questions?

Now more than ever people are asking for information about beaches and rivers so that they can make decisions about when to go in the water.. The RNLI welcome any move towards improving both water quality and transparency around what's happening at our beaches.

Steve Instance, RNLI Water Safety Lead

Westcountry Rivers Trust fully support South West Water's move towards greater transparency about the operation of sewage assets. We already collect lots of data on the health of our rivers through our Citizen Science investigation campaign, but without data on the sources of potential pollution it is hard to show the cause, whether it be sewage, agriculture or other industries.

Dr Laurence Couldrick, CEO of Westcountry Rivers Trust

Cornwall Council is pleased to support the launch of SWW's WaterFit Live initiative, which demonstrates a greater transparency with the sharing of information about storm overflows.We encourage their commitment.

Bryan Skinner, Head of Transport, Environment and Maritime Infrastructure, Cornwall Council

Everyone, locals and visitors, expect to be well informed, especially now we live in a digital world, so that we can make our own decisions. Therefore the increased transparency created through WaterFit Live is welcomed, it will invite discussions based on fact, not rumours

Malcolm Brown, Interim Chair, Visit Cornwall

Website usage Since launch
19th March

WaterFit live

Most visited beach pages

Top 10 viewed beach profiles

Beach	
Exmouth	
Harlyn Bay	
Budleigh Salterton	
Sidmouth Town	
Mothecombe	
Plymouth Hoe West	
Plymouth Hoe East	
Lyme Regis	
Lynmouth	
Readymoney Cove	

Sessions ■ Views

WaterFit device usage

- desktop
- mobile
- tablet

35.1%

63.2%

WaterFit live

Beach map

- Bathing water status
- Zoom function
- Search by beach name

Overflow location map

- Shows EDM activation status

- 4 possible activation states (traffic light system)

- Reports near real-time data – not validated.

Overflow activation map

- Near real-time activation data for all of our storm overflows

- 4 possible activation states (traffic light system)

- Reports near real time data – not validated.

Overflow activation map

- Zoom into an area.

- Click on an individual overflow for activation information

- Click on a parasol for bathing water level information

Beach page

Bathing water level information

- 3 years spill data
- Bathing Water classification
- Beach descriptor
- Investment information
- Historic bacti counts

Overflow activations map

- Zoom into an area.

- Click on an individual overflow for activation information

- Traffic light system to indication activation status

Any questions?

www.southwestwater.co.uk/waterfitlive

making space
for sand

Building Community Resilience on a Dynamic Coast by Making Space for Sand

Also referred to as MS4S

Department for Environment Food & Rural Affairs

Environment Agency

Flood and coastal resilience innovation programme

Part of the
Flood and coastal resilience innovation fund

What is FCRIP?

We will drive innovation in flood and coastal resilience and climate adaptation. We're investing £150 million to develop, test and implement practical and innovative resilience actions in 25 local areas.

Nature based solutions	Integrated water management	Property flood resilience
Enhanced flood warning	Community infrastructure	Local emergency response
Asset monitoring	SME disruption minimising	Community and voluntary action

Legend:
- Coastal
- Catchment
- Groundwater
- Community
- Technology
- SuDS

The "Alliance"

MS4S is a collaborative project made possible through the efforts of a number of partners.

Project Aims & Objectives

Objectives:

- The sustainable use of the coastal fringe that considers the longer-term social, economic and environmental implications of sea level rise and coastal change.

- **Geomorphological:** The better understanding of coastal change in response to rising sea levels and storm events.

- **Ecological:** The maintenance of healthy, biodiverse coastal dune systems that are more able to naturally respond to sea level rise and coastal change.

- **Community/Societal:** More informed, empowered, prepared and resilient coastal communities in relation to the impacts of sea level rise and coastal flooding.

Where is it being delivered?

Data, data, data

- **Lots of data will be collected on coastal sediments and coastal ecology**
- **This data will be used to develop models on coastal change.**

2050s

Informed, engaged, empowered

Syril Karn: Andor. S1. Ep2

making space
for sand

Thank you

If you have any questions or comments

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