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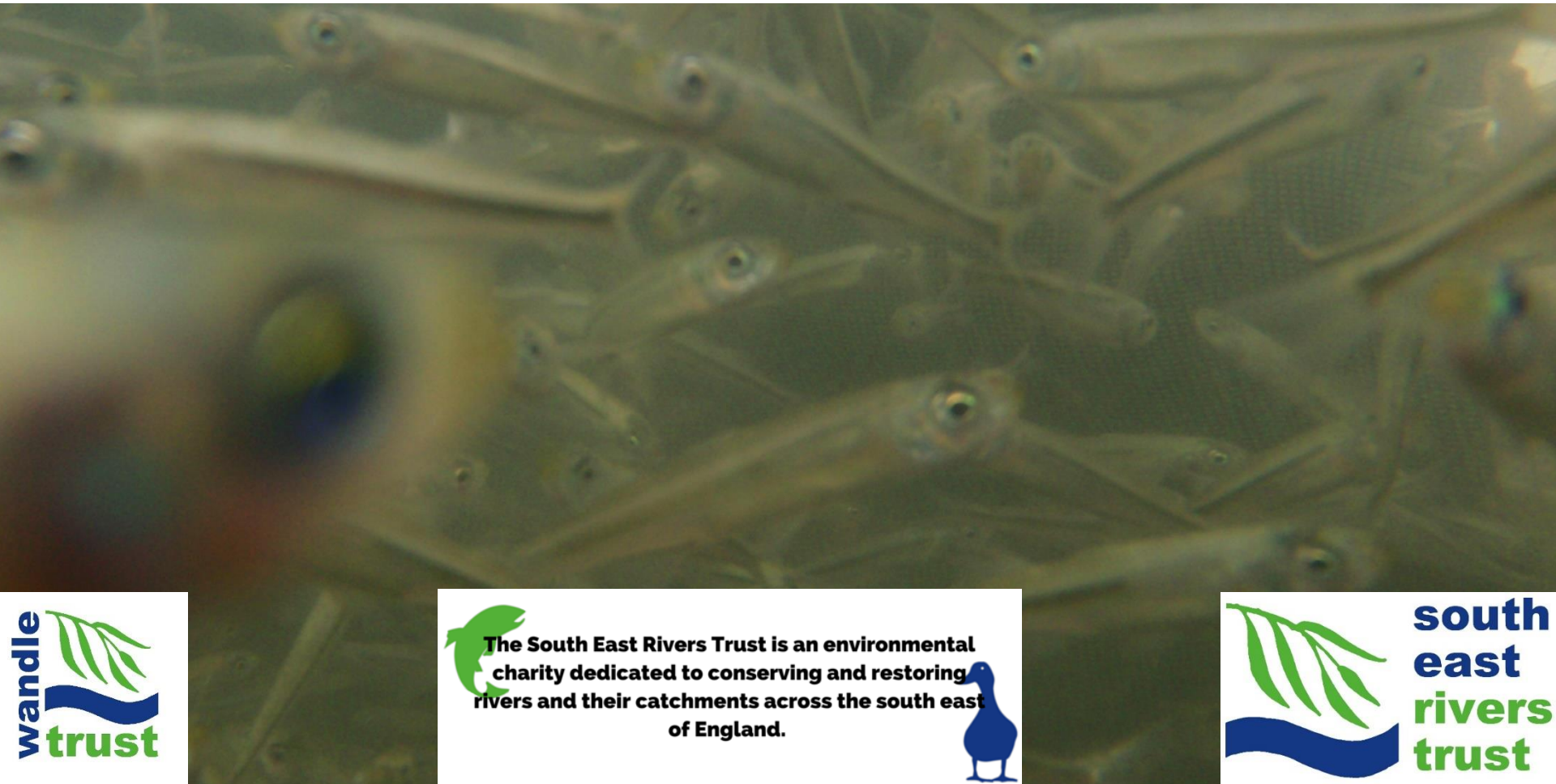
Chalk streams in Kent and Catchment Management

Dr Chris Gardner, Head of Science and Partnerships, South East Rivers Trust



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The South East Rivers Trust is an environmental charity dedicated to conserving and restoring rivers and their catchments across the south east of England.

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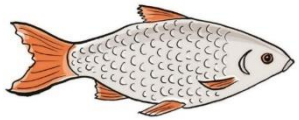
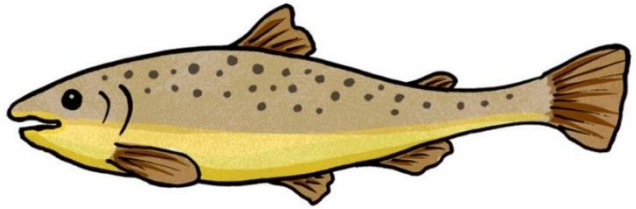
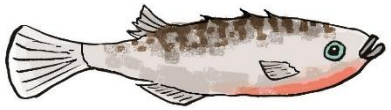
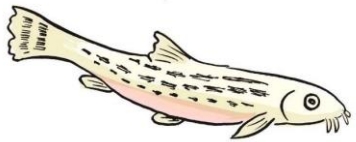
Structure of talk:

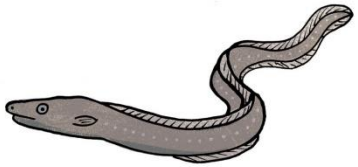




- Dr Chris Gardner;
- South East Rivers Trust (SERT);
- Catchment Based Approach (CaBA) and Catchment Partnerships in Kent;
- State of Rivers in the South East;
- Types of Rivers and Chalk Streams (Kent Biodiversity Strategy priority habitat);
- Where are our Chalk Streams? – 2022 mapping project;
- Threats to Chalk Streams?
- The Solutions: Examples of actions / enhancement schemes on Chalk Streams.







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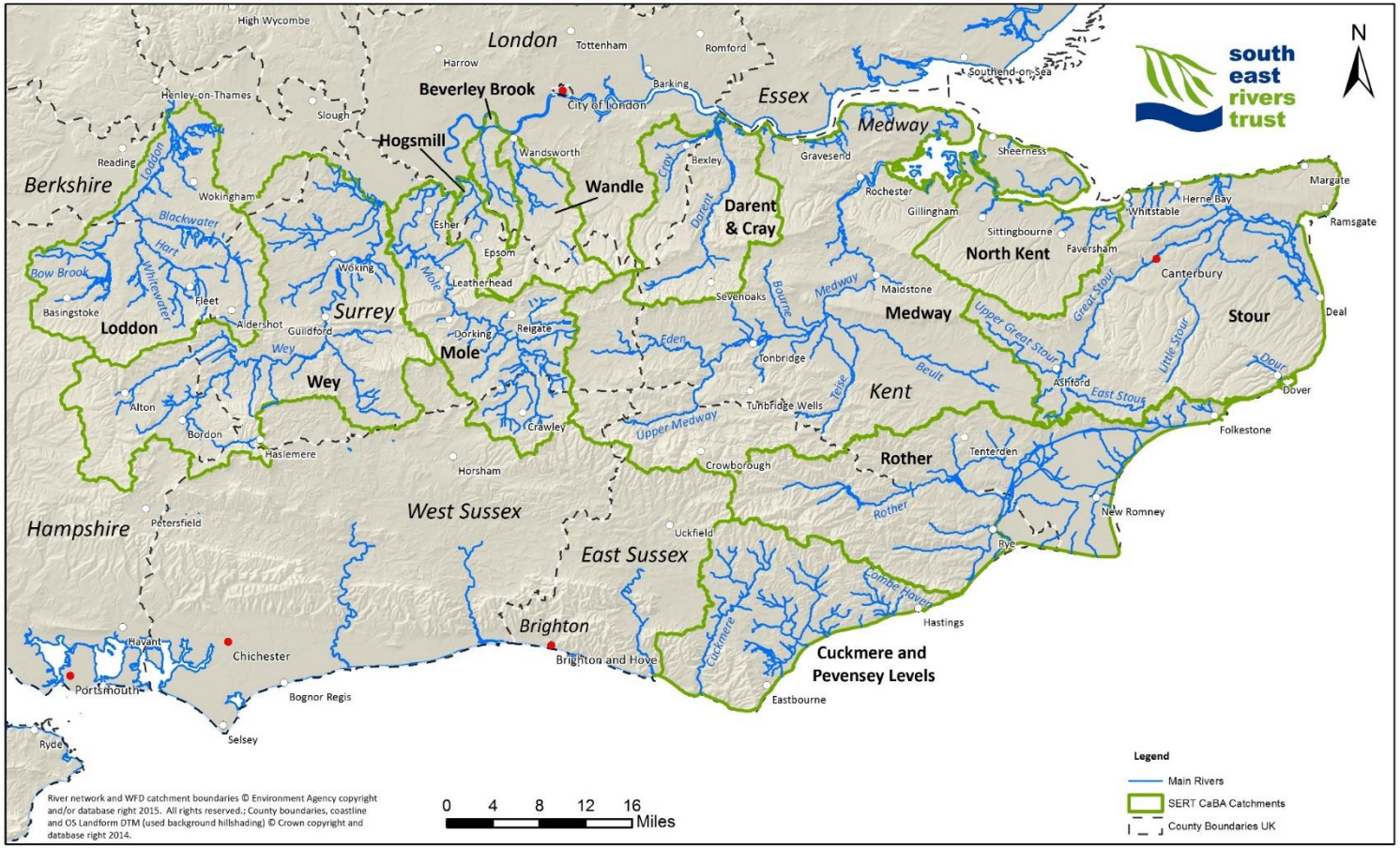
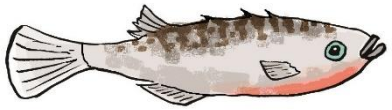


- **Our mission** is for the rivers in the South East Rivers Trust area to achieve ‘Good Ecological Status’;
- Grown out of the Wandle Trust into SERT 2015, currently growing into our new patch;
- 30 full time staff, 2 part time. Tripled in size over last 18 months.

Host the Catchment Based Approach (CaBA) in 11/12 catchments and deliver our four pillars:

- Education;
- Engagement;
- Ecological Improvement;
- Effective partnership and facilitation.



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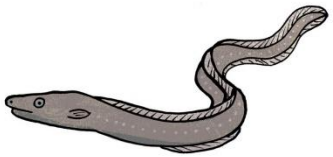
Catchment Based Approach
Partnerships for Action



Catchment Based Approach (CaBA): Background

Brings key stakeholders together, to agree and deliver the strategic priorities for the catchment, bringing more locally focused decision making.

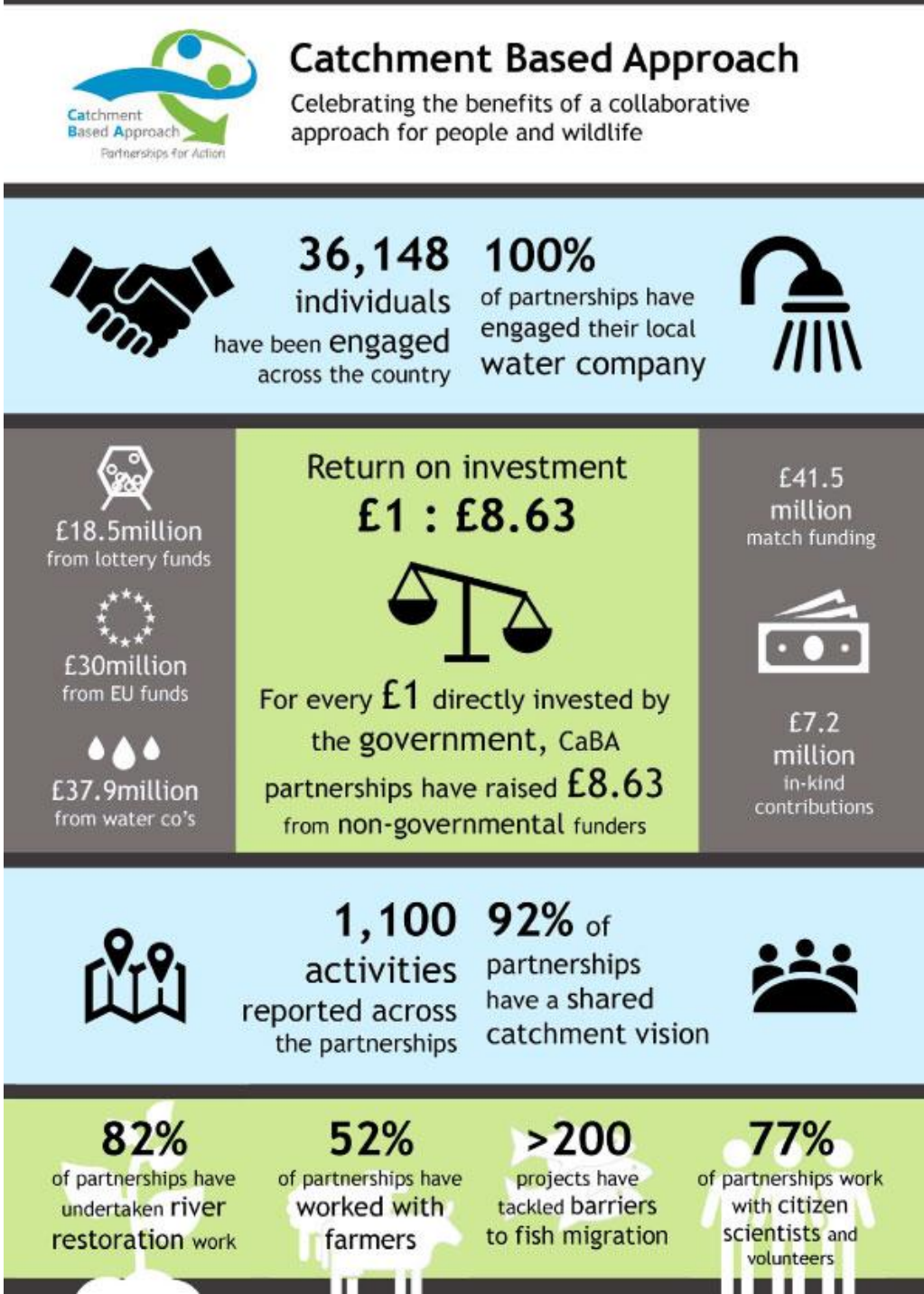
Aims:

Improve the environmental status of the aquatic environment, while also delivering for local communities;

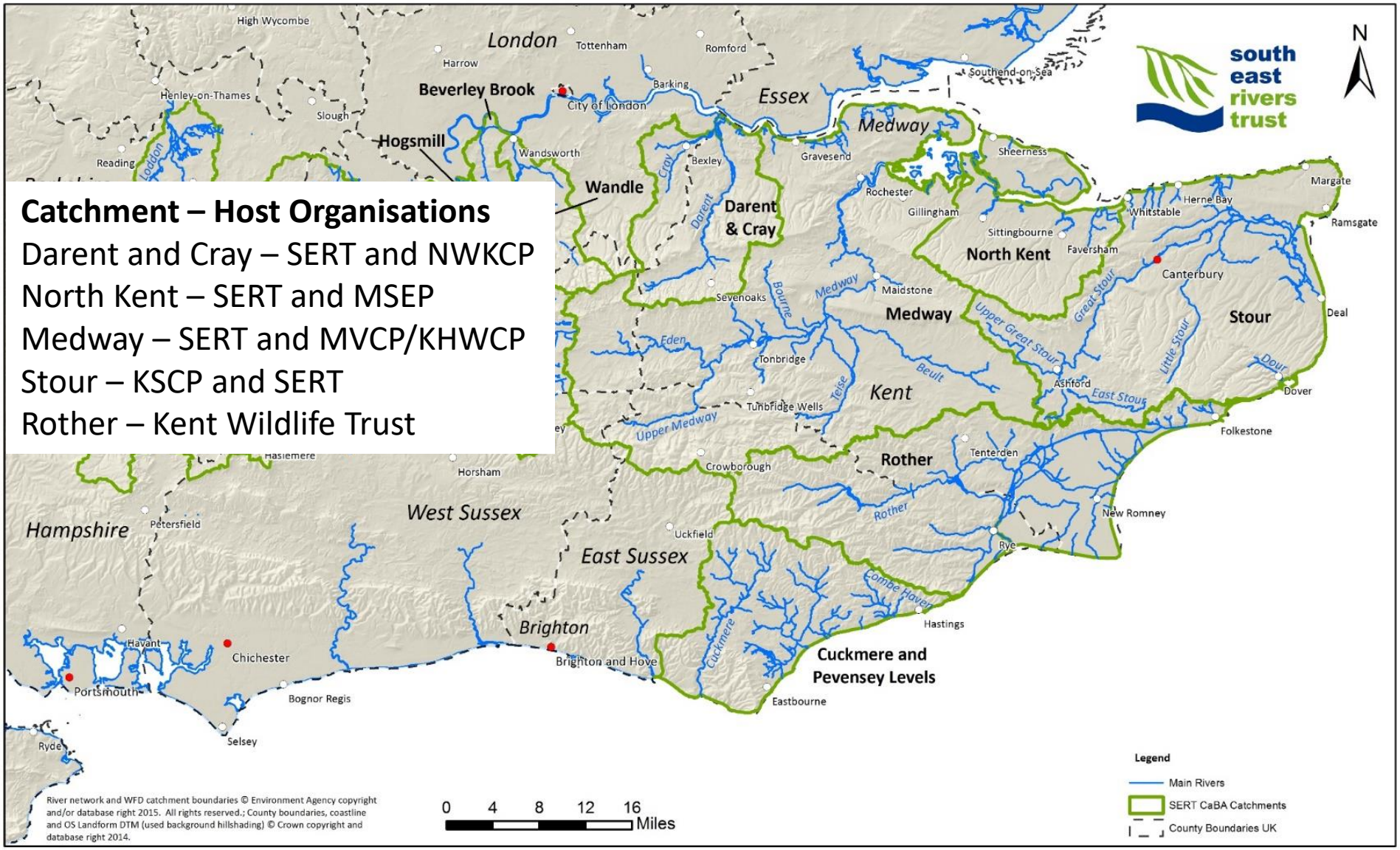
- Work in partnership to deliver multiple benefits, efficiencies and new funding opportunities;
- Raise awareness of the importance of healthy river environments with local stakeholders, businesses, communities and wider society.

Objectives:

- To deliver positive and sustained outcomes for the water environment by promoting a better understanding of the environment at a local level; and
- To encourage local collaboration and more transparent decision-making when both planning and delivering activities to improve the water environment (Defra, 2013).



Catchment Partnerships in Kent



Water Framework Directive classifications

'…hand over our planet to the next generation in a better condition than when we inherited it'
(A Green Future: Our 25-year Plan to Improve the Environment, 2018).

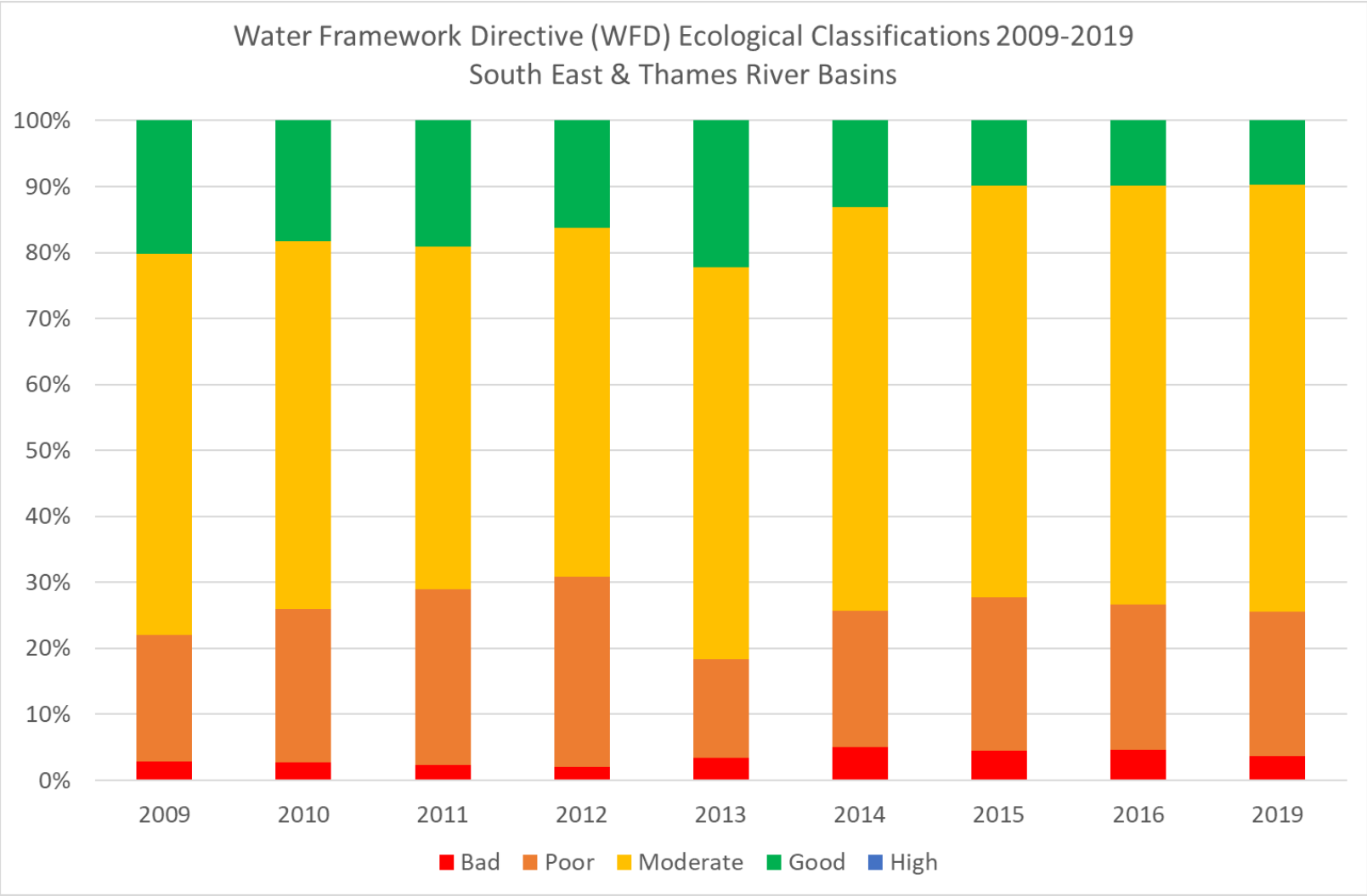


Figure 1. Water Framework Directive (WFD) classifications 2009-2016 for Waterbodies (WBs [n=780]) in the Thames and South East River Basin Districts (2009-2012 cycle 1 WBs, 2013-2016 cycle 2 WBs).

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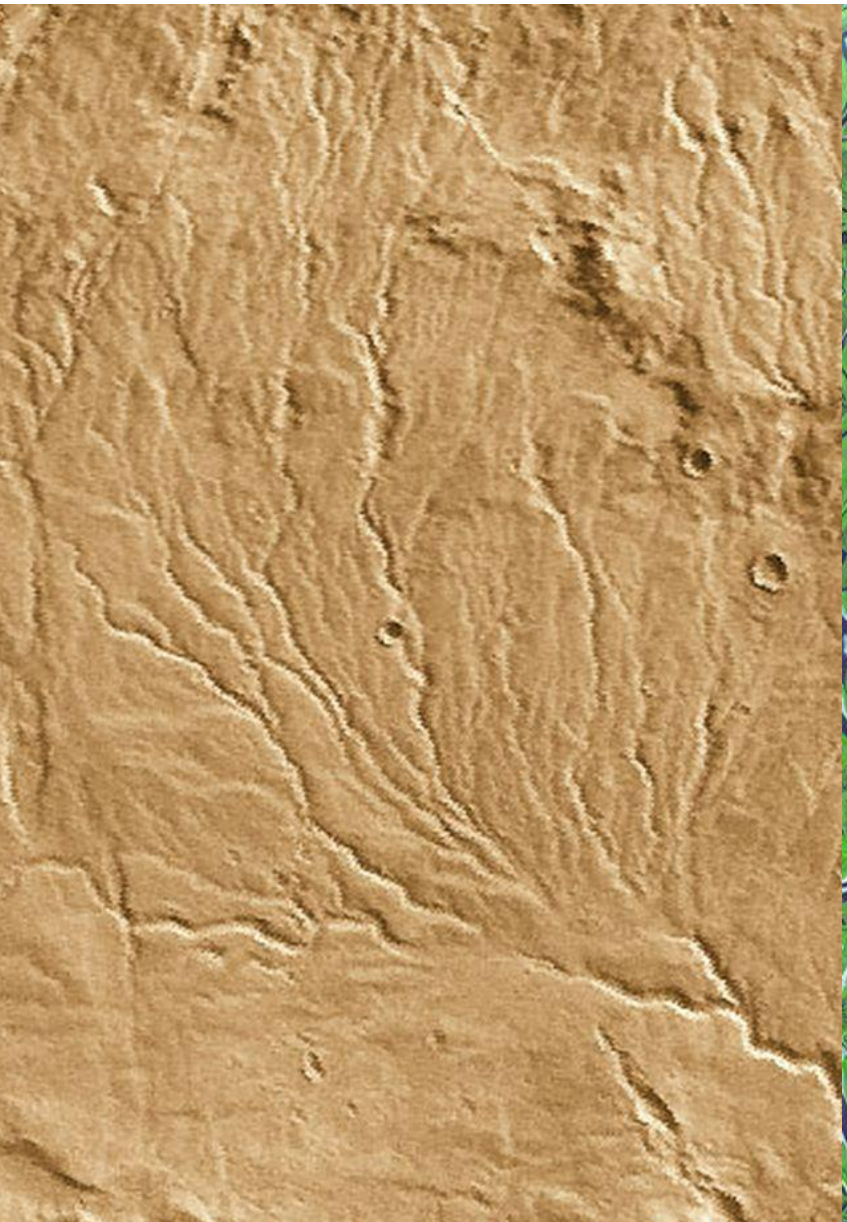
What are Rivers? Water flowing across an erodible surface – laws of physics.
But… the type and gradient of substrate and amount of water are unique to each river, creating a unique habitat.



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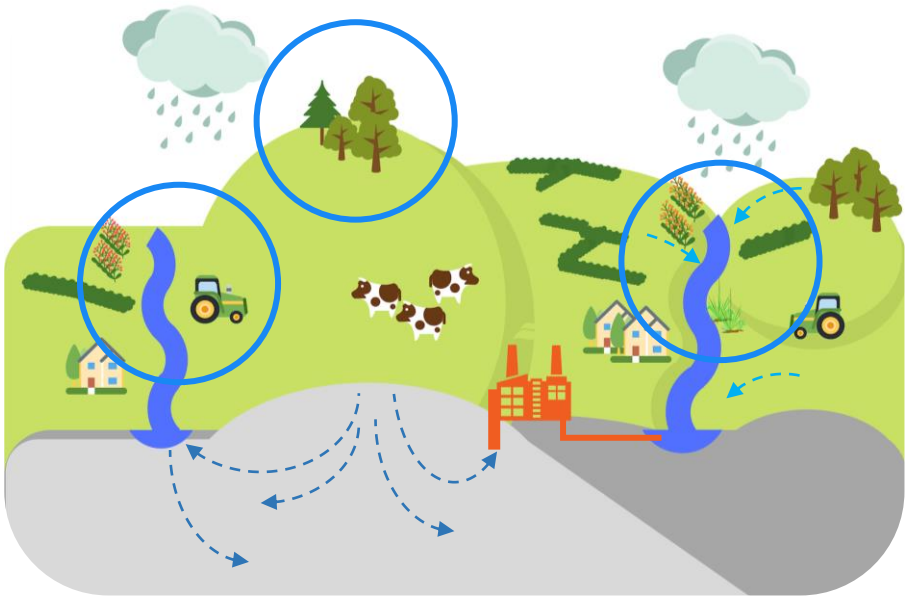
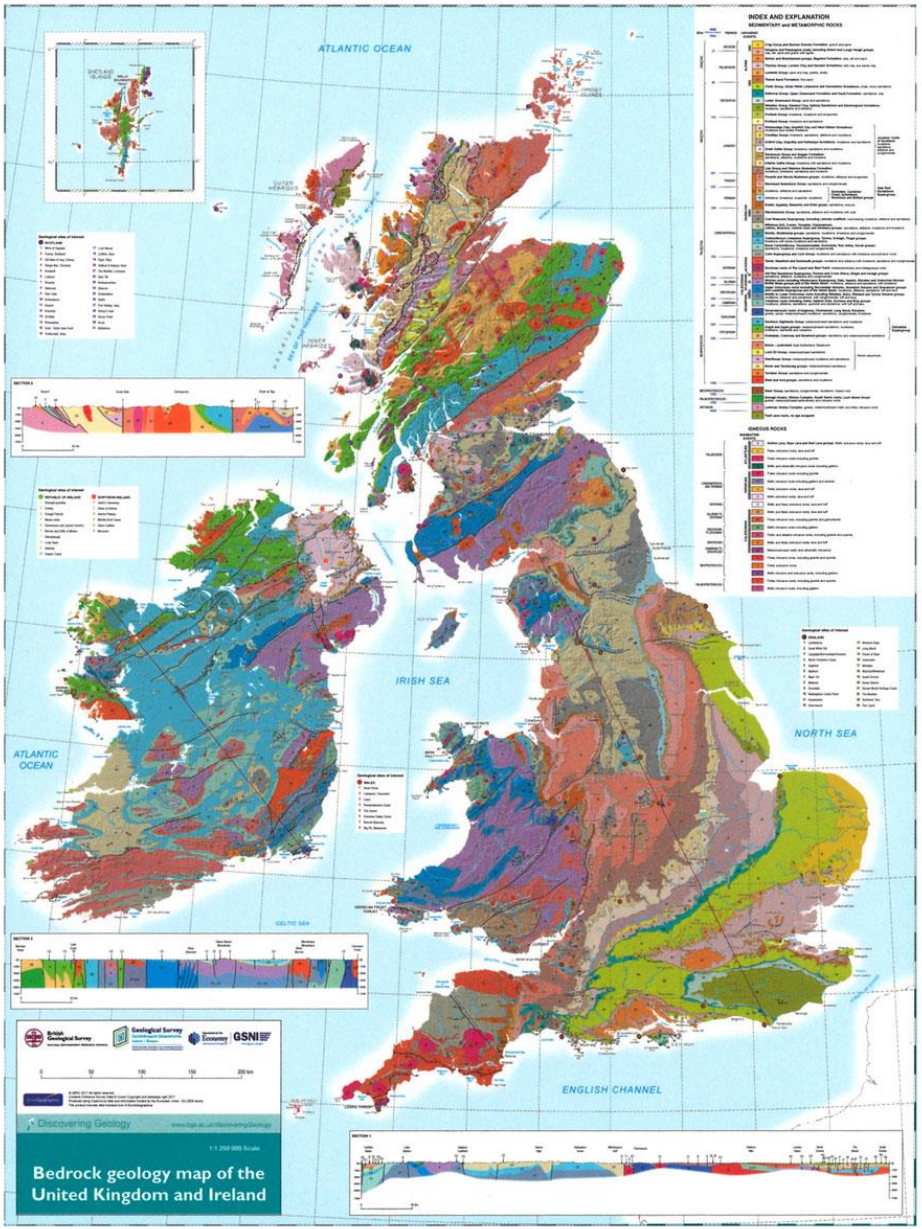
The nature of a river is dictated by the geology of it's catchment

For example:
Chalk landscape: thin soils, ground is highly permeable, rainfall soaks into the ground, little surface run-off, rivers are fed by groundwater springs resulting in a consistent flow regime (low energy peaks), water has been filtered by the rock and is of a very high quality.

Clay landscape: heavy soils, ground is largely impermeable, rainfall runs-off picking up impurities impacting water quality, during rainfall flow can be highly variable with high peaks (high energy peaks) and during dry periods river flow is very low.





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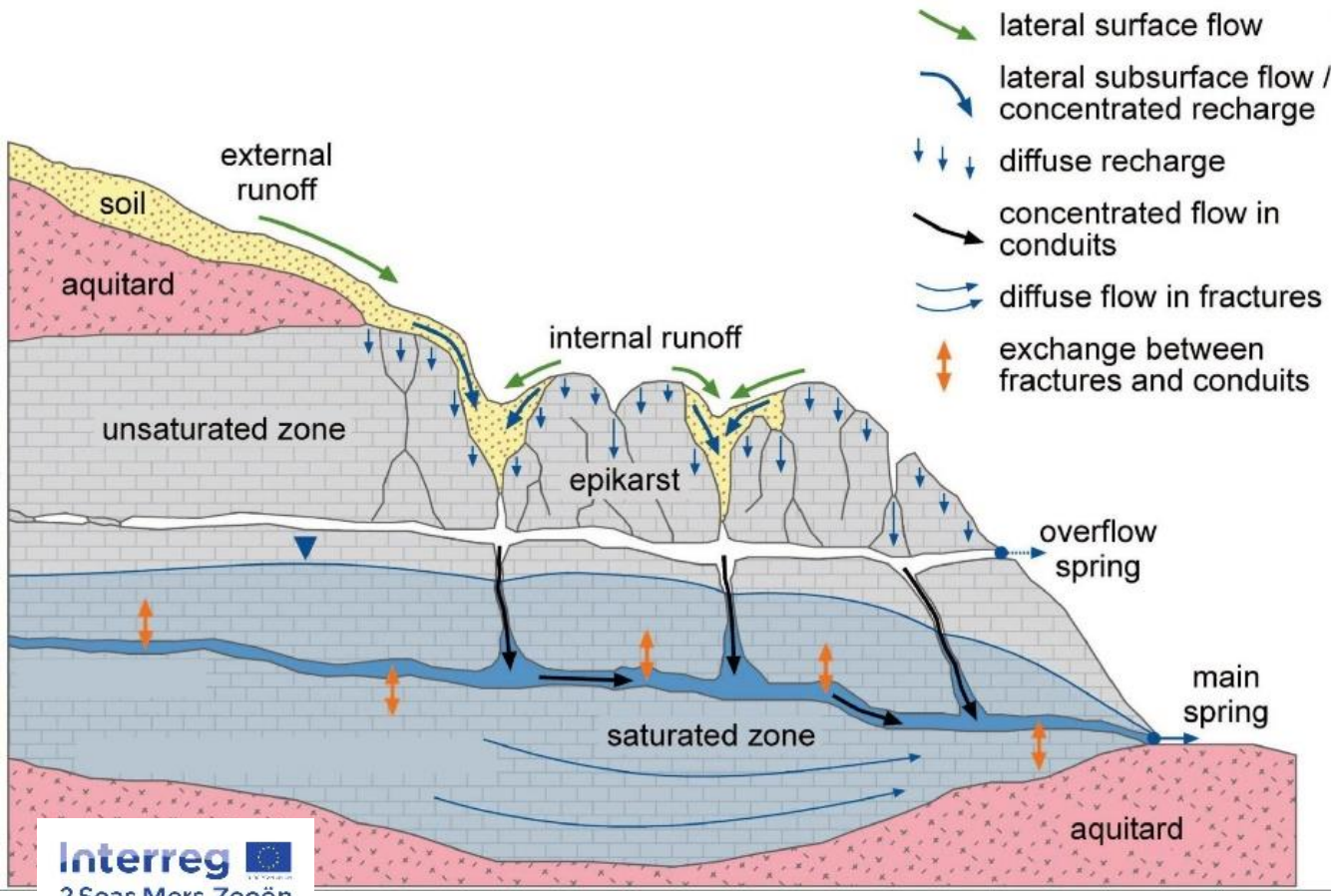
Chalk aquifers and rivers they feed

- Flow can be matrix and through fissures/fractures;
- Amount of water in aquifer determines amount in the river;
- Water filtered by rocks;
- In a natural situation main springs run 12 months of the year, overflow springs form seasonal ‘winterbourne’ headwaters.



Interreg 2 Seas Mers Zeeën PROWATER

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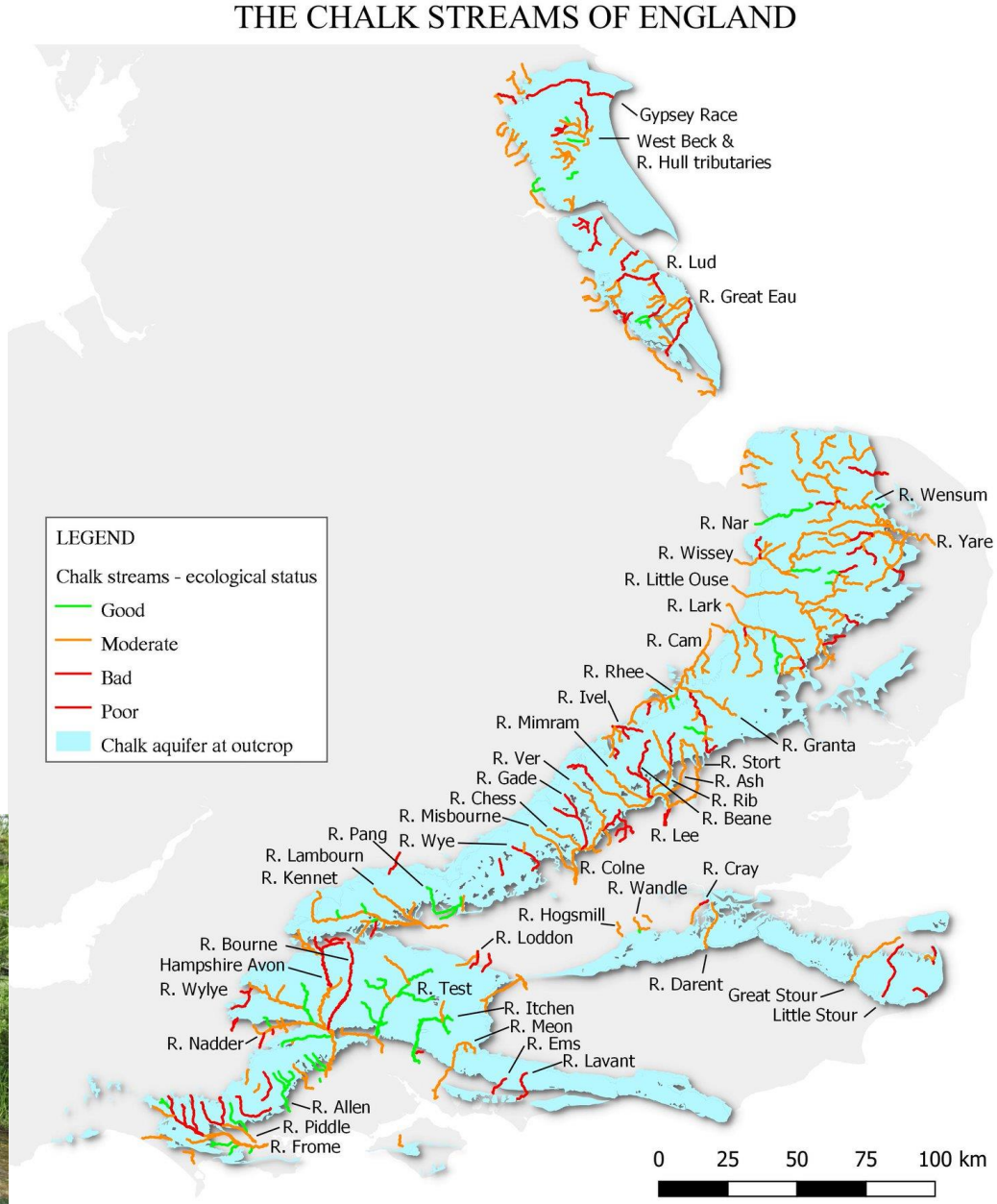
Chalk streams

A globally rare habitat. There are only about 250 chalk streams in the world, and most of them are in England.

Unique chalk stream characteristics:
1. Stable flow regime;
2. Stable temperature regime;
3. Low energy (small flood peaks);
4. Low sediment inputs (due to groundwater rather than surface run-off).

Which has made them very productive environments, rich in aquatic ecology that has adapted and evolved to this character.



List of chalk streams from: WWF-UK, 2014: The State of England's Chalk Streams. http://assets.wwf.org.uk/downloads/wwf_chalkstreamreport_final_lr.pdf

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Aquatic organisms have adapted accordingly

For example:
Salmon and trout recolonised our rivers and chalk streams after the last ice age 10,000 – 12,000 years ago. Since then that have been effectively isolated in these environments and have become genetically distinct.

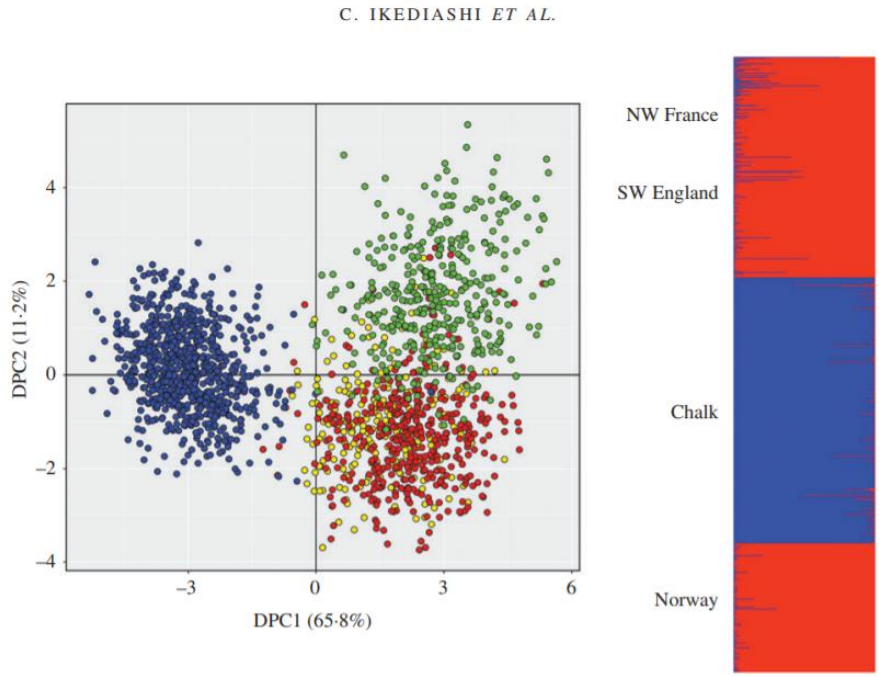

FIG. 2. Structure plot and discriminant analysis of principal components (DAPC) of chalk-stream *Salmo salar* compared with non-chalk *S. salar* from neighbouring regions of north-west (NW) France, south-west (SW) England, and Norway (sampled rivers for these regions can be found in Tables I and II). The most likely number of genetic units (k) is shown for the Structure plot ($k = 2$), which distinguishes the chalk-stream *S. salar* genotypes as unique compared with non-chalk genotypes. DAPC also distinguishes the chalk stream *S. salar*, and also shows the genetic divergence between NW France–SW England and Norway. ●, chalk-stream salmon; ●, NW France; ●, SW England; ●, Norway.

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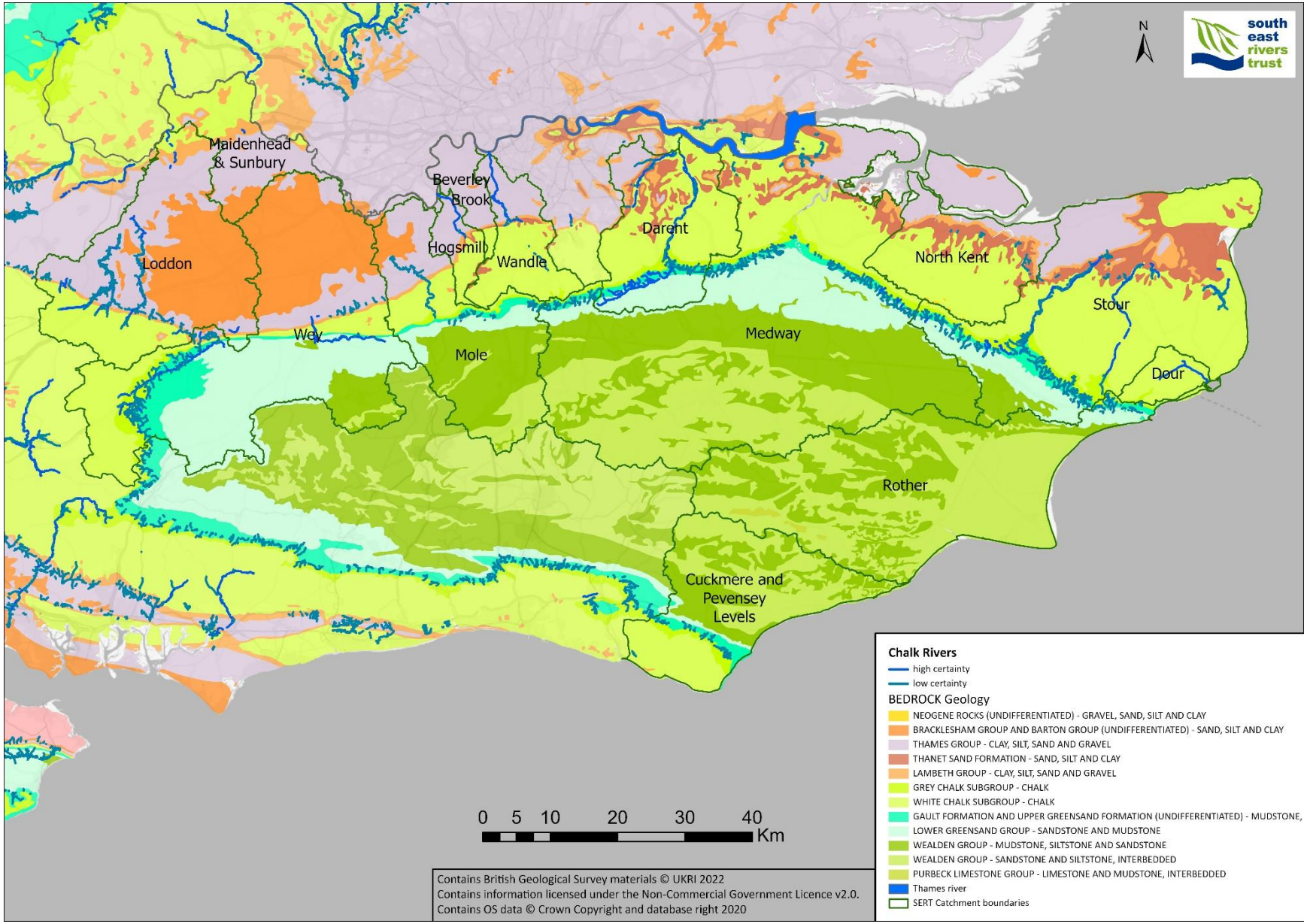
CaBA Chalk Stream Strategy – latest map (Apr. 22 - inc. high and low certainty chalk streams) – Catchment Partnership consultation 2022.



Threats to Chalk Streams and *Solutions*

- Water Quantity and Abstraction – *Abstraction reform and reductions (e.g. WRSE), Water Neutrality measures;*

- Water Quality –
  - Nutrients: STW Discharges and Diffuse Pollution – *NbS treatment wetlands, Nutrient Neutrality*;
  - Sediment: Diffuse Pollution – *land management / improved farming practices / change of use / NbS / addressing urban inputs*;

- Habitat Quality and Connectivity – *e.g.* Watermill legacy infrastructure barriers and impoundments – *River Restoration (see next few slides)*;

- Natural Processes arrested by river regulation – *River Restoration (see next few slides)*;

Are Our Chalk Streams Adequately Protected?

- Water and Nutrient Neutrality only being driven by internationally designated sites (*e.g.* Stodmarsh Nature Reserve SPA/SAC, Ramsar site, SSSI and NNR [Stour] and Arun Valley SPA/SAC and Ramsar site (Horsham]);

- But these issues are impacting all freshwater environments in the South East. Is the answer to designate more sites internationally? Or wider application of these principles outside of these areas by environmental regulators and Local Authorities?

- Why Neutrality? Should we aim to improve the situation and deliver a gain too?

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Example 1: Carshalton Arm, River Wandle 2010 – 2014.

- Multi-partner funded; CRF (DEFRA), EA, Thames Water, EU (Interreg IVA), Heritage Lottery Fund, Wild Trout Trust, probably others too! £363k
- Weir removal (7 low weirs).
- Hydrodynamic silt traps (Water quality, silt) addressing contaminated road run-off.
- Gravel introduction (habitat, geomorphology).
- Channel narrowing, marginal wetlands (habitat, hydromorphology).

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Butter Hill – Before Removal.
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Butter Hill – During Removal.

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Butter Hill – After Removal.
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Butter Hill (looking upstream) – Before Removal. After Removal.

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Butter Hill 2 – Before Partial Removal

After Partial Removal.

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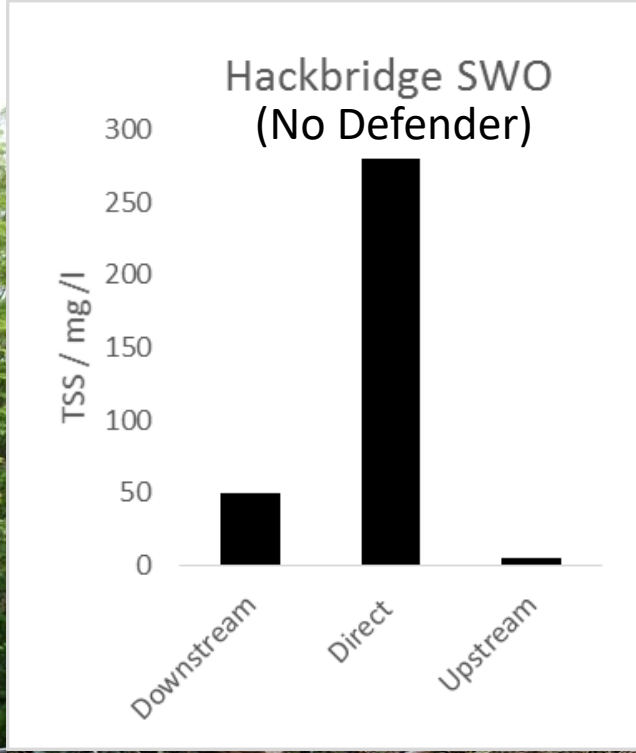

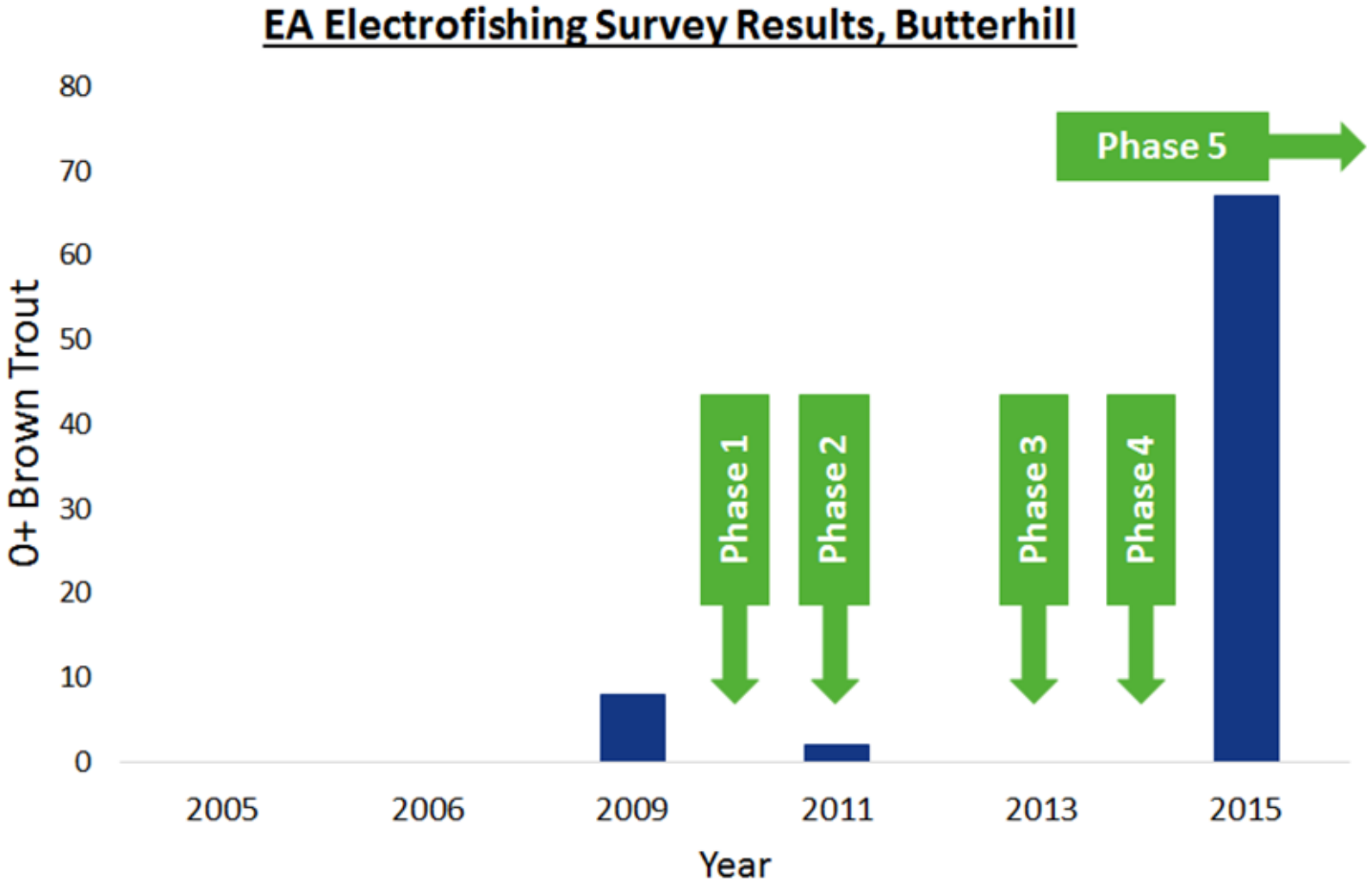

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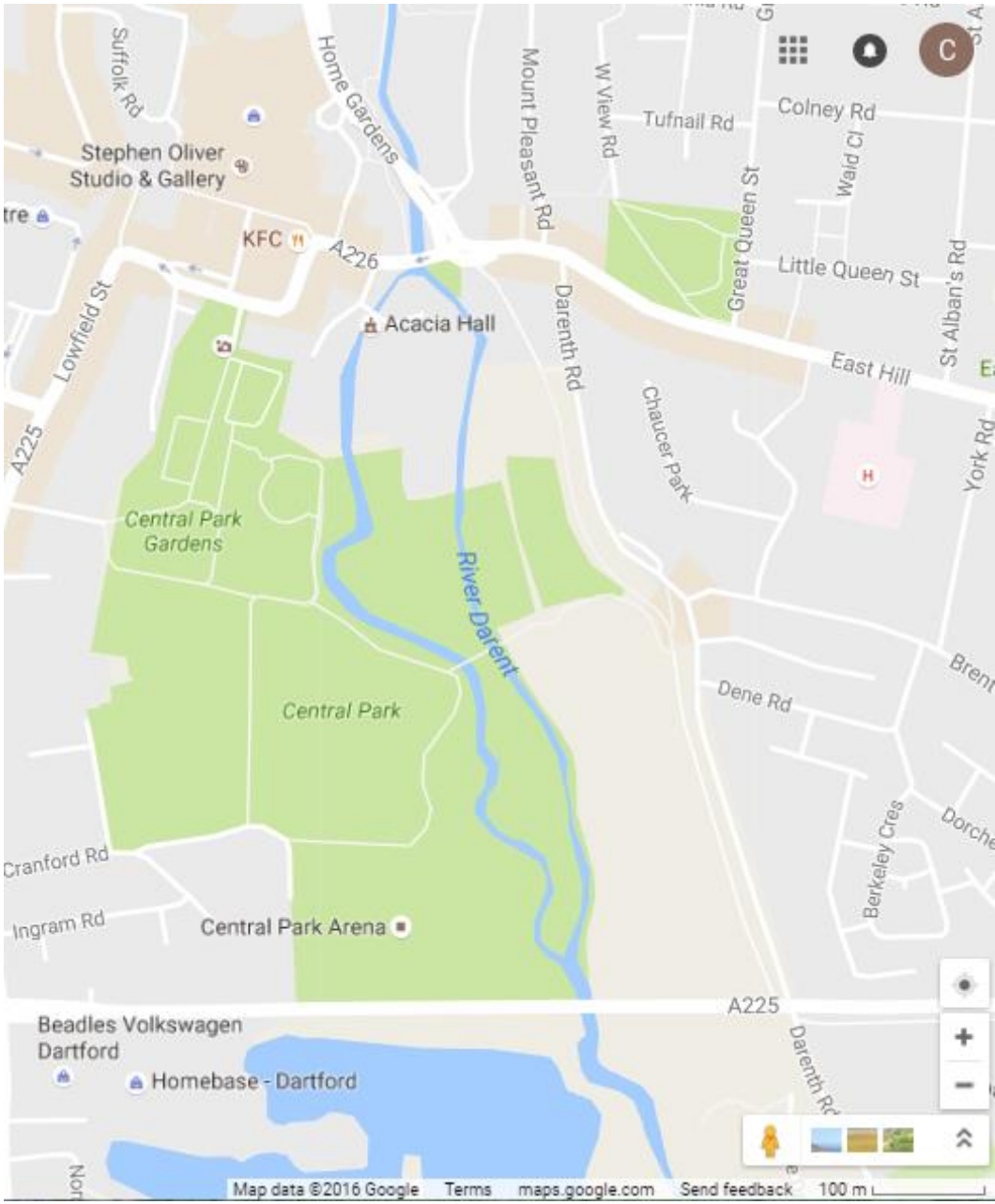
"*The Wandle Trust have absolutely transformed the fortunes of this previously degraded London chalkstream*" (WTT), which has lead to the Carshalton arm of the Wandle to be the first urban waterbody to be designated as 'Good Ecological Potential' under WFD, in the UK. And WINNER of UK River Prize 2016 (Urban).

Example 2: Acacia Hall, Dartford , River Darent 2020

- Multi-partner funded; Dartford BC, EA, Landfill Tax grant Veolia £250k
- Aim to remove a weir and improve habitat through a 700m reach of the chalk stream through a public park which was straight, impounded, over wide and uniform.
- Opportunity to return energy to the channel and re-meandered within old footprint by creating berms with deposited silt and addition of LWM.
- Fish refuge creation.



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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risk normally associated with the types of work detailed on this drawing, note the following risks and information.

* Please note that risks listed here are not exhaustive.

CONSTRUCTION

* Working in close proximity to deep water environments.
* Disturbing or striking existing utilities and services.

MAINTENANCE/CLEANING

* No unusual hazards/risks

DECOMMISSIONING/DEMOLITION

* No unusual hazards/risks

It is assumed that all works will be carried out by a competent contractor working.

LEGEND

Existing features
- Existing channel
- Tree
- Existing top of bank
- OS base map

Utilities and services
- Electricity line
- Water mains
- CCTV line

Design elements
- Regrade channel
- Regrade bank
- Large wood structure
- In-channel bench
- Flow control structure

Quality Project No. :	UK17-1029

Project Title

Acacia Hall - Central Park Restoration project

Drawing Title

DETAIL DESIGN
Plan Overview

Designed by HM		Scale @ A3	1:3,000
Drawn JI	Date 05/09/2019	British National Grid ORD SURV GB	
Checked MK	Date dd/mm/yy		
Approved HM	Date dd/mm/yy	Issued 01	Date dd/mm/yy

cbec eco engineering

Drawing Number

1

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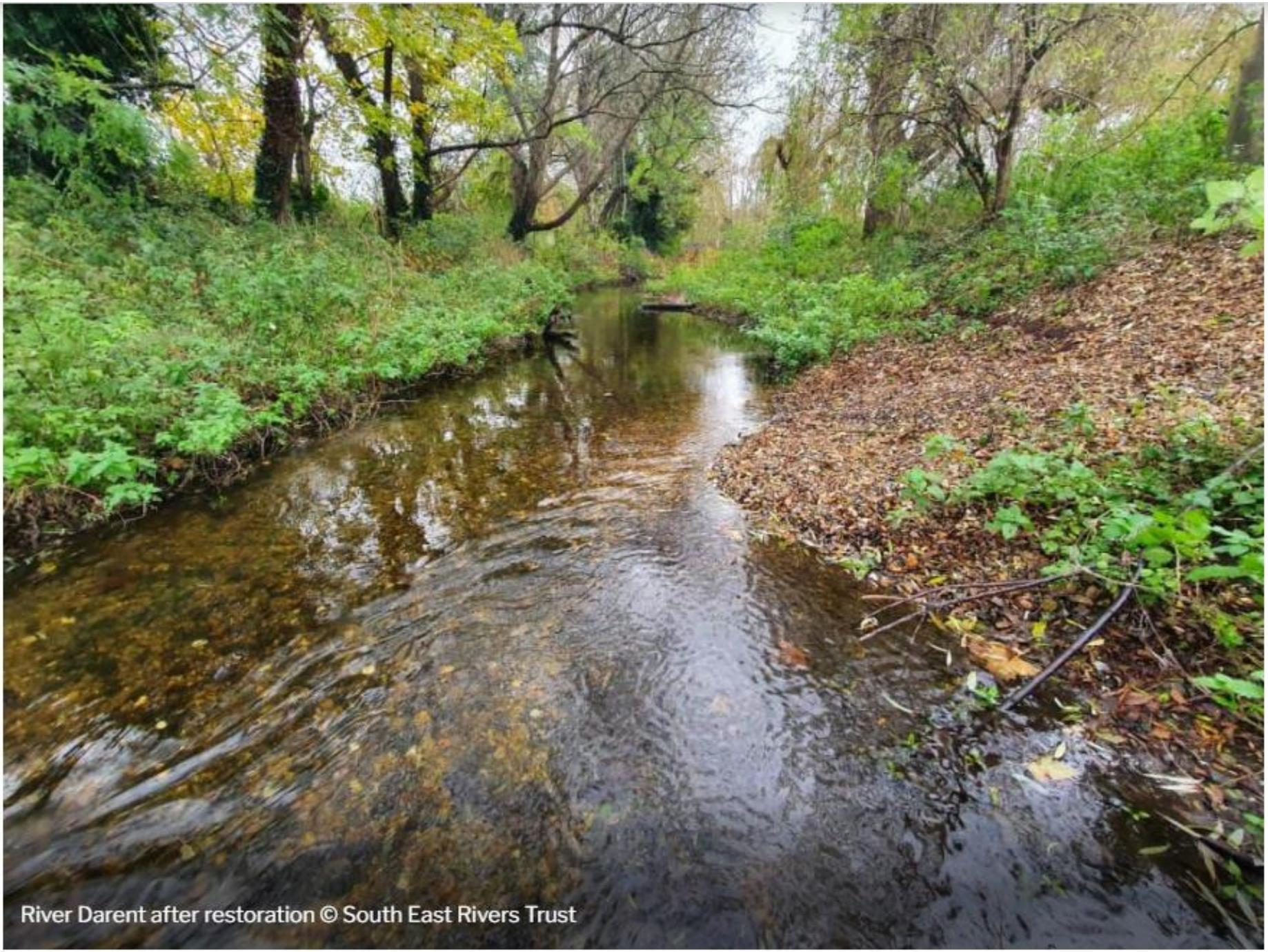

River Darent after restoration © South East Rivers Trust

Example 3: Weir Removals, Brasted, River Darent 2022; £20k.

- EA funded, WEIF grant £20k;
- Aim to remove 2 weirs and improve habitat connectivity for fish and remove impoundments (uniform degraded upstream habitats).

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