



# Soil Management the Key to Multiple Benefits

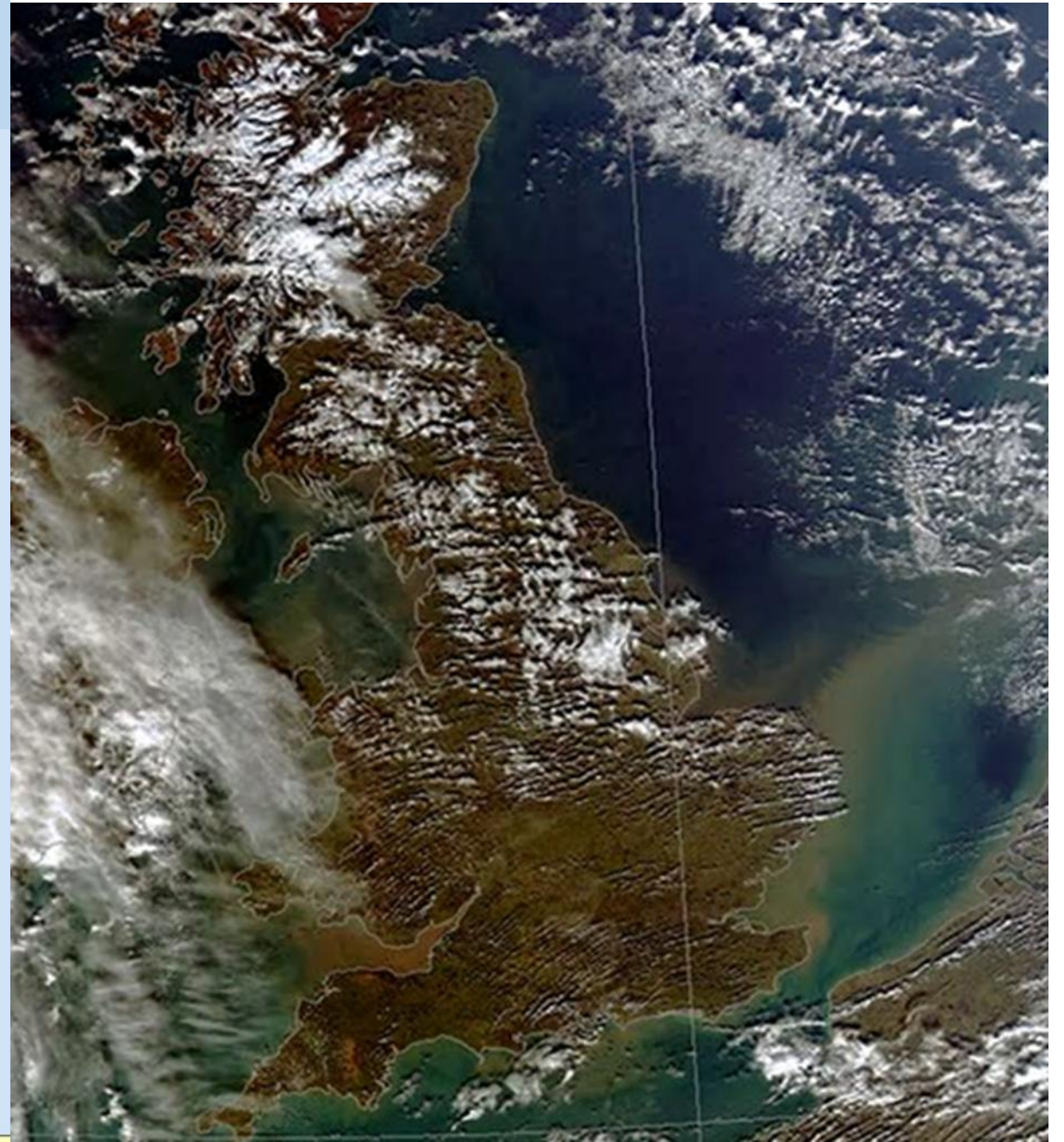
**Louise Webb**

**Senior Adviser**

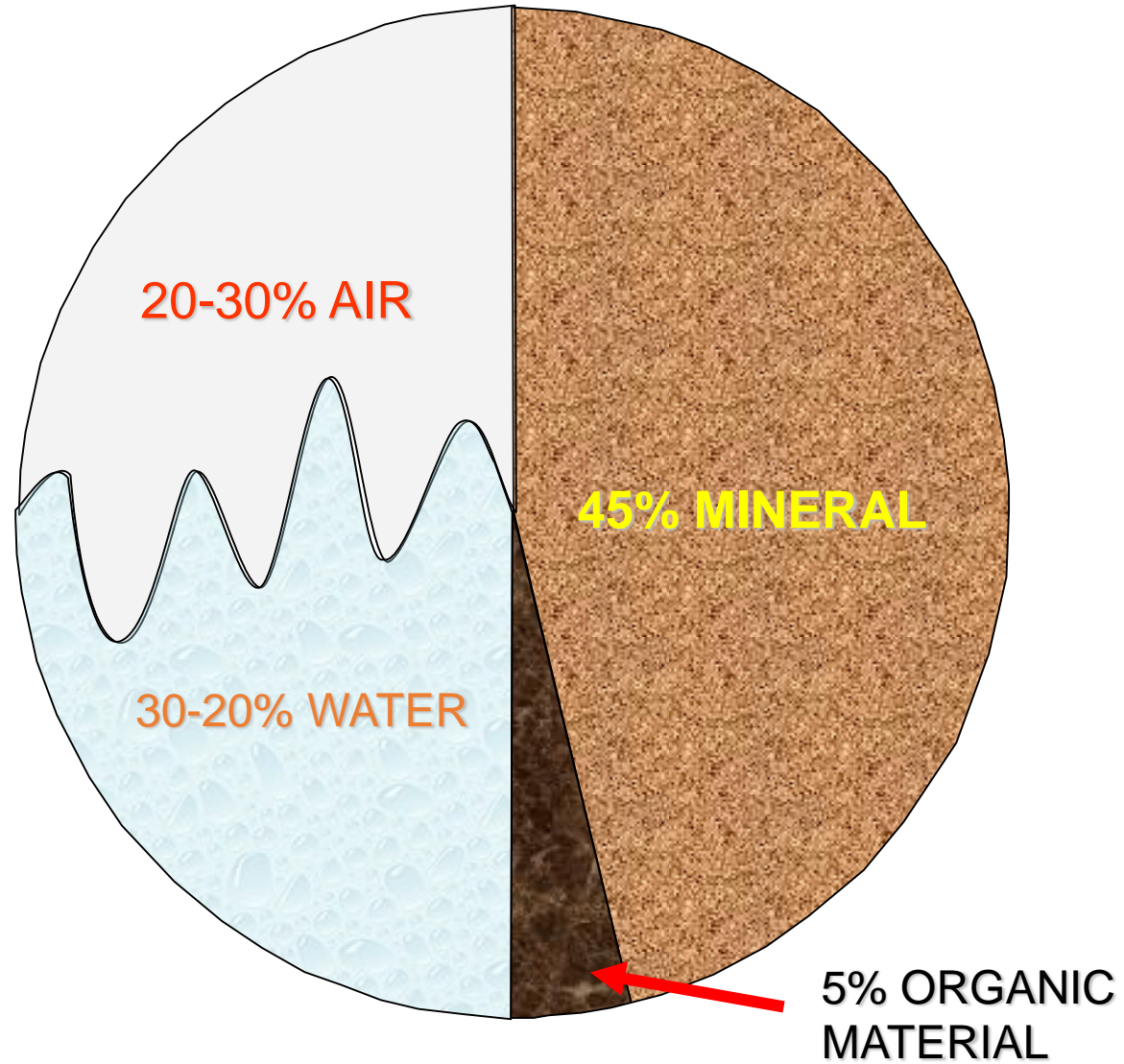
**Integrated Outcomes FCERM**



# Freely Draining soils...

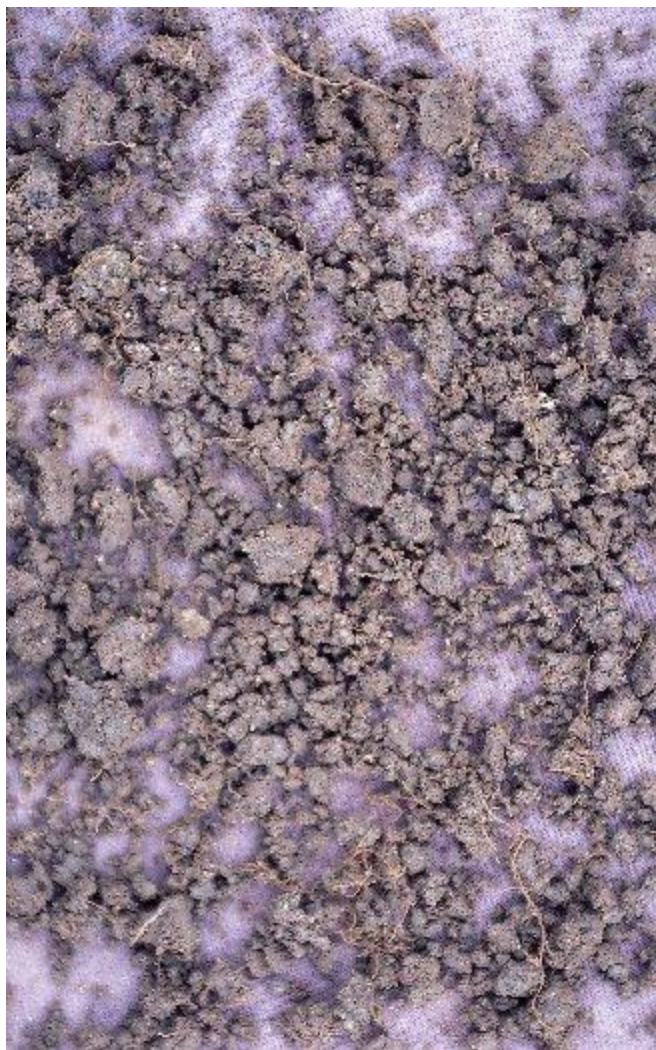


# Soil constituents





Granular structure



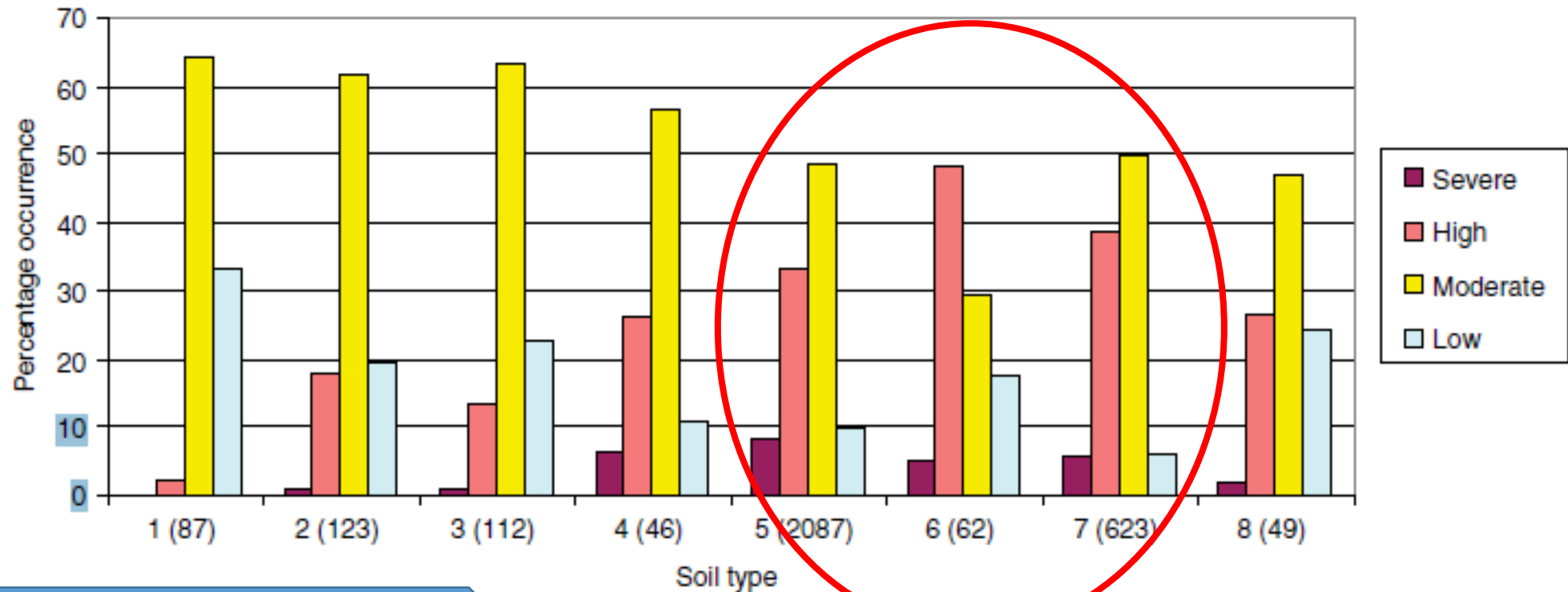
Platy structure





# Which soils are most susceptible to Compaction?

Figure 3 Degree of soil degradation under grassland and crops in SW England.



5 - Brown Earths,  
 6 - Brown sands  
 7 - Surface water gleys  
 8 - Groundwater gleys

(87) – No. of sites

Can management make a difference?

Figure 4 Degree of soil degradation for different soil types in SW England.

**East Devon Same soil type, same rainfall...  
Different management**





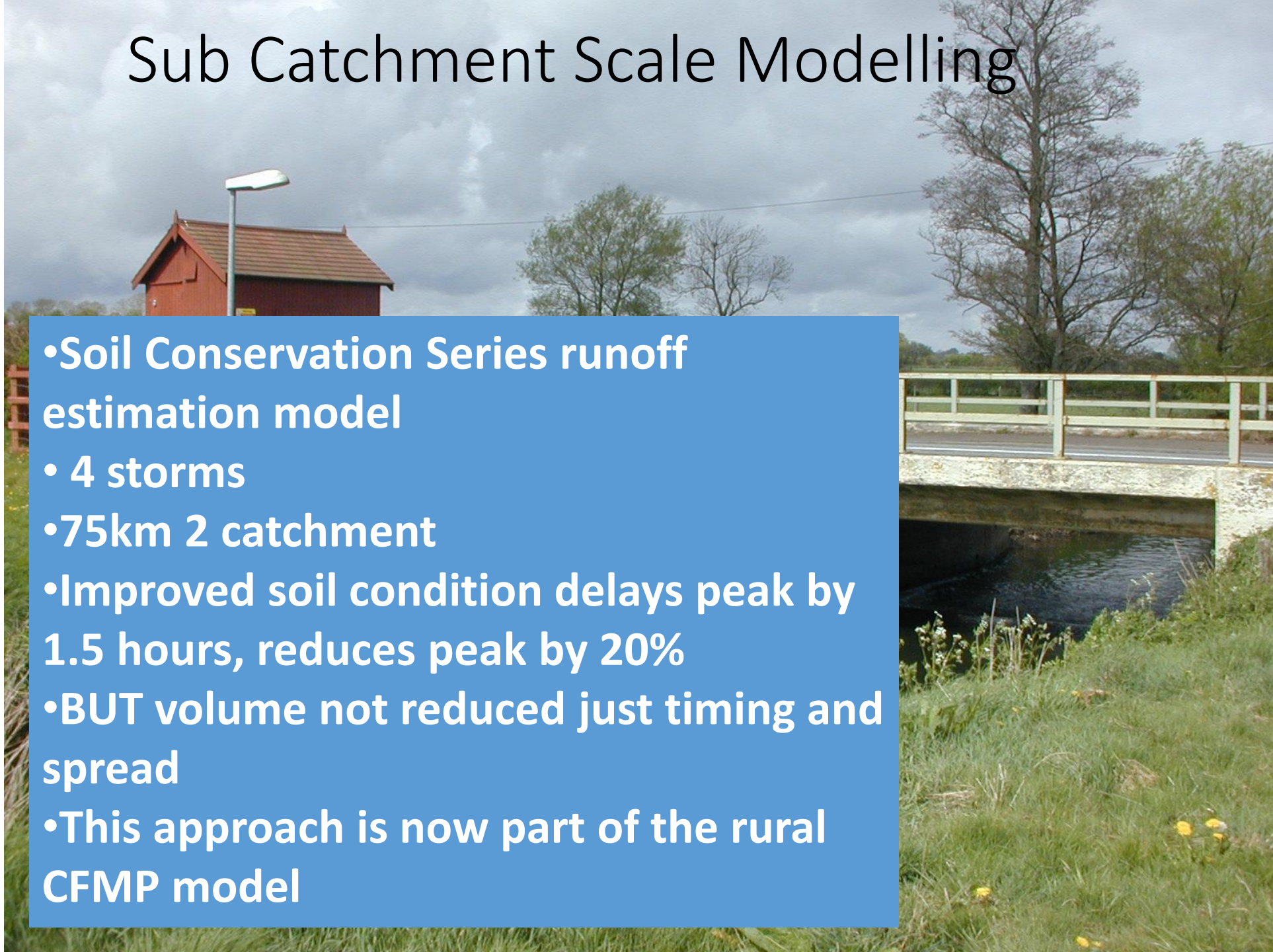
Management can make a difference... but how much?





# Sub Catchment Scale Modelling

- Soil Conservation Series runoff estimation model
- 4 storms
- 75km<sup>2</sup> catchment
- Improved soil condition delays peak by 1.5 hours, reduces peak by 20%
- BUT volume not reduced just timing and spread
- This approach is now part of the rural CFMP model





# Shallow compaction in grassland

**Runoff and infiltration in Devon showed 60% runoff on damaged grassland**

**Reduced to only 2 % on grassland with a stable soil structure**





# Grassland Subsoiling



Muddy flooding of A 39 reaches local news

Road drainage improvements not affordable..

Grassland subsoiling local field solved the problem

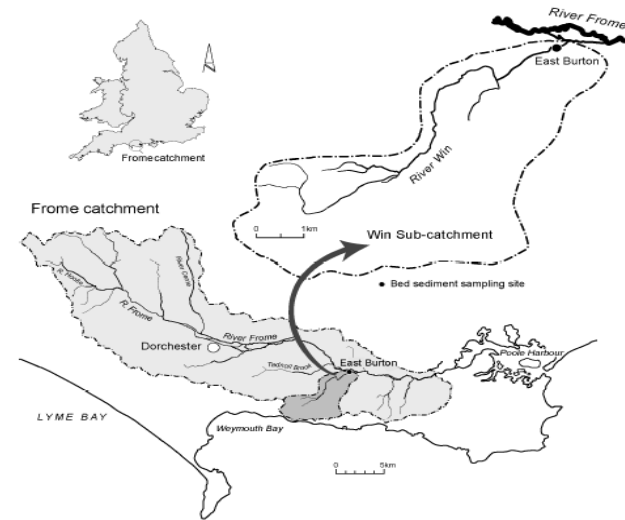


Drainage infrastructure can now cope!  
Area Highway Manager



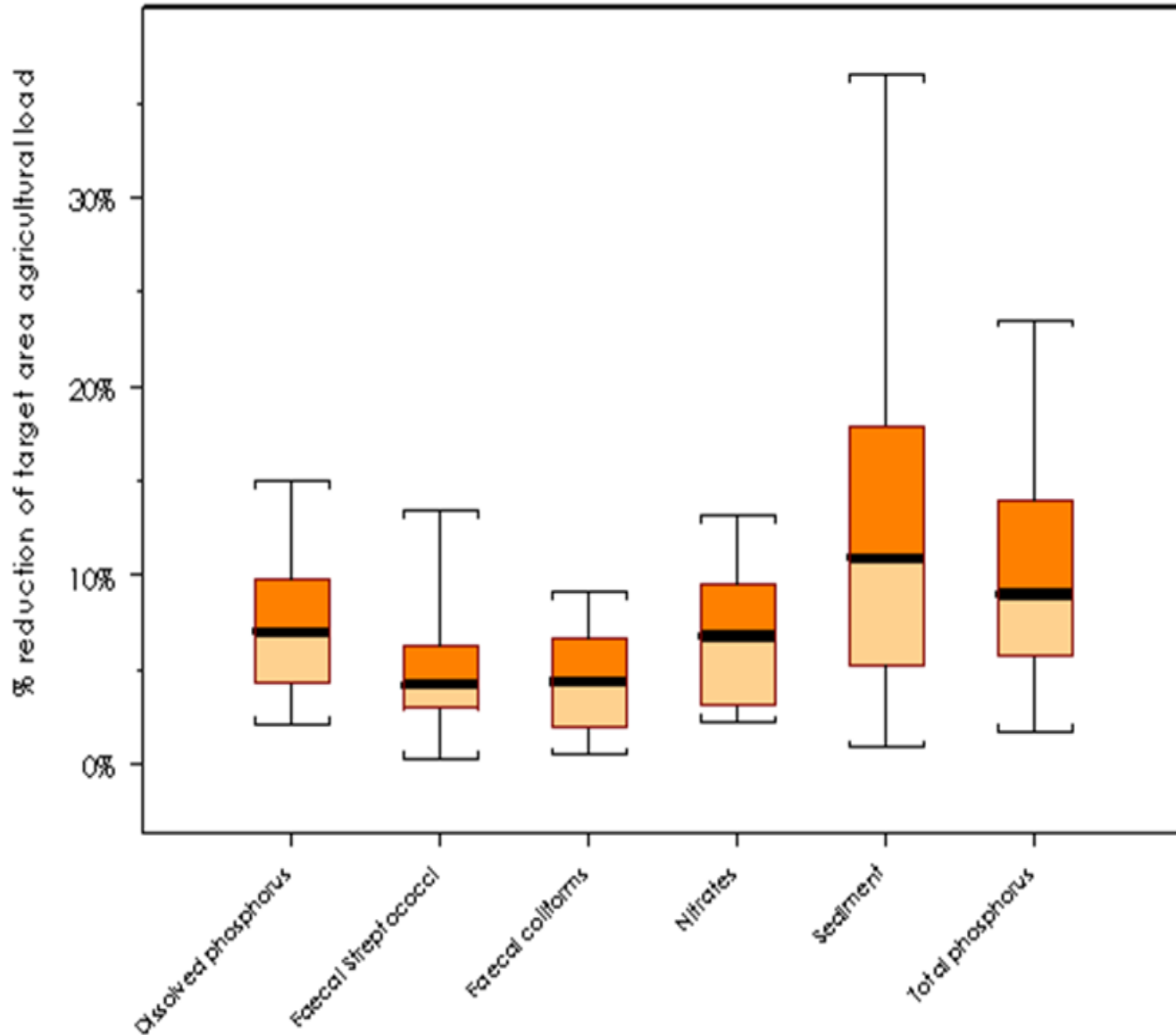
# Local Evidence using Sediment Fingerprinting

- Statistically significant shift in source of in-river sediments (River Win, Dorset Frome)
  - cultivated top-soils: 80% to 4%
  - pasture top-soils: 11% to 5%
  - roads: 8% to 1%
  - channel banks: 1% to 90%
- Associated with a 60% reduction in channel bed storage
- **With Thanks to Adrian Collins (ADAS)**



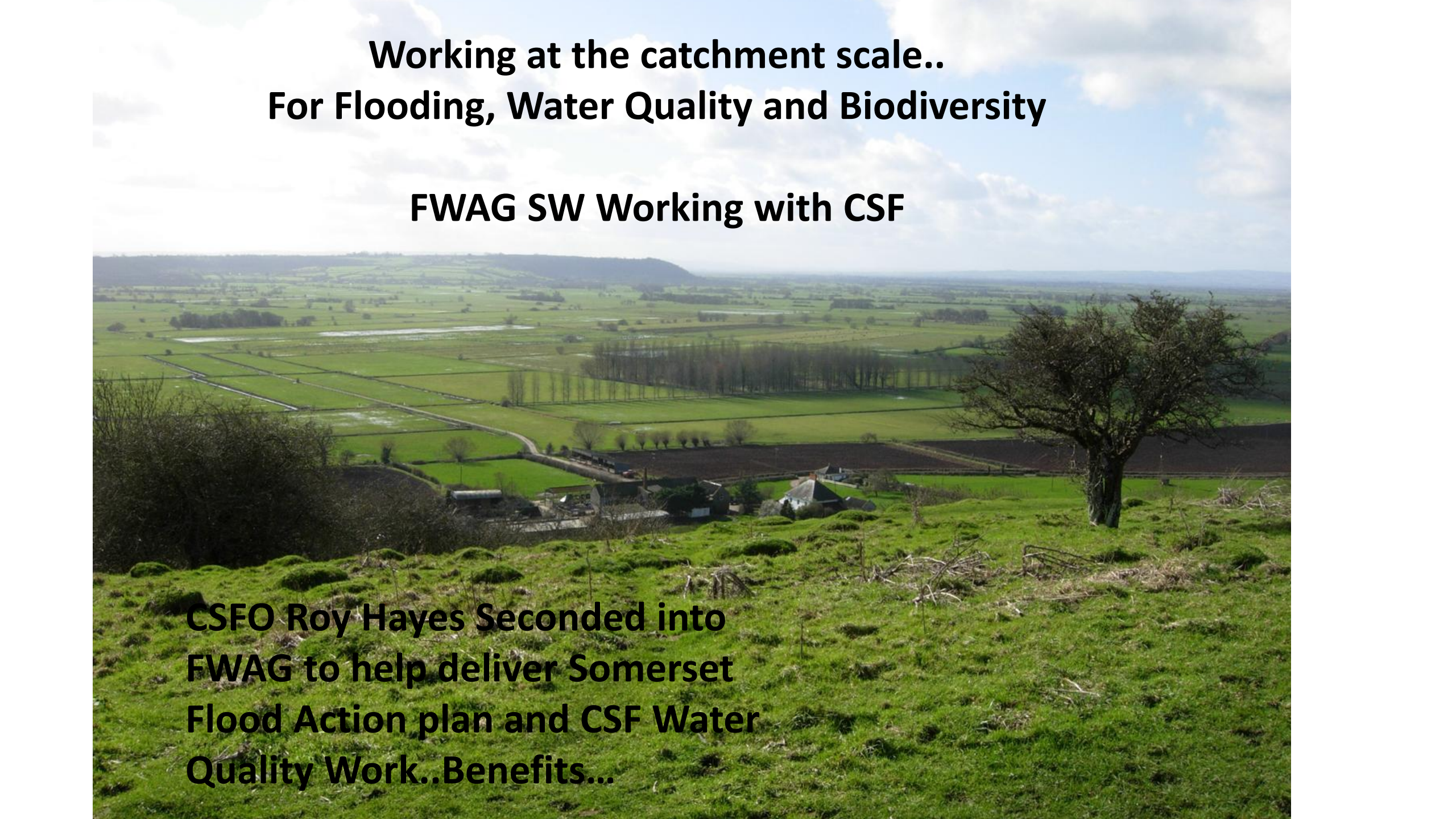


## And on Water Quality at Catchment Scale? - CSF Evaluation



- **Pesticides:** 25% lower than in 2006/07 despite increase in 2012/13
- **Modelling effect of actual CSF advice:**
  - **Sediment** average 12% and up to 36%
  - **Phosphate** ave 7% up to 23% load and 25% in river concentration reduction
  - **Ecology:** invertebrate improvements in water following CSF
    - **driven by sediment.**
    - first evidence of ecological benefits.



A wide landscape view of a rural valley. In the foreground, there is a grassy hillside with a large, leafless tree on the right. Below the hillside, a small settlement with several buildings is visible. The middle ground consists of a large, flat valley with green fields, some water bodies, and a line of trees. In the background, there are rolling hills under a blue sky with scattered white clouds.

**Working at the catchment scale..  
For Flooding, Water Quality and Biodiversity**

**FWAG SW Working with CSF**

**CSFO Roy Hayes Seconded into  
FWAG to help deliver Somerset  
Flood Action plan and CSF Water  
Quality Work..Benefits...**



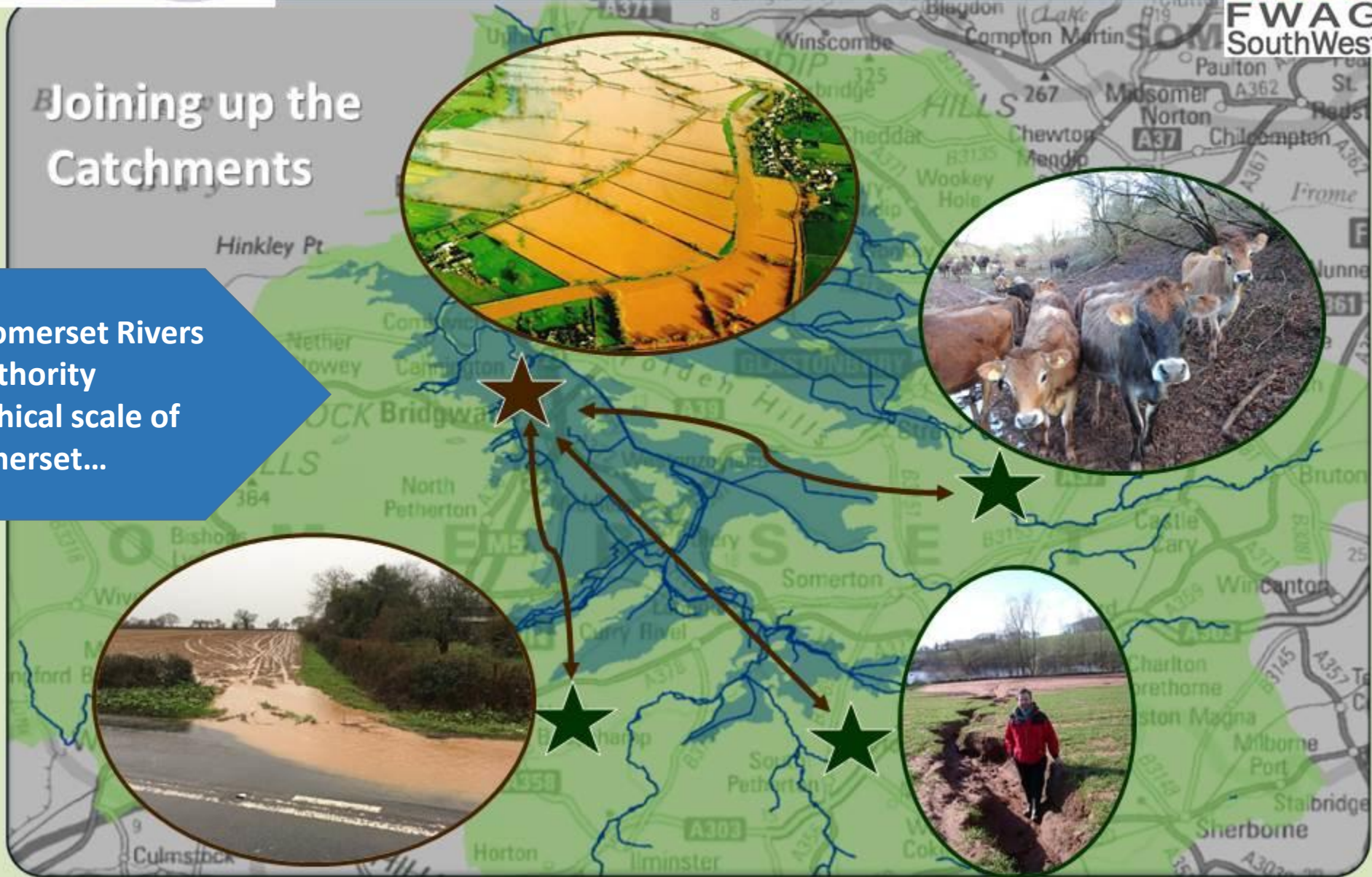


# Natural Flood Management



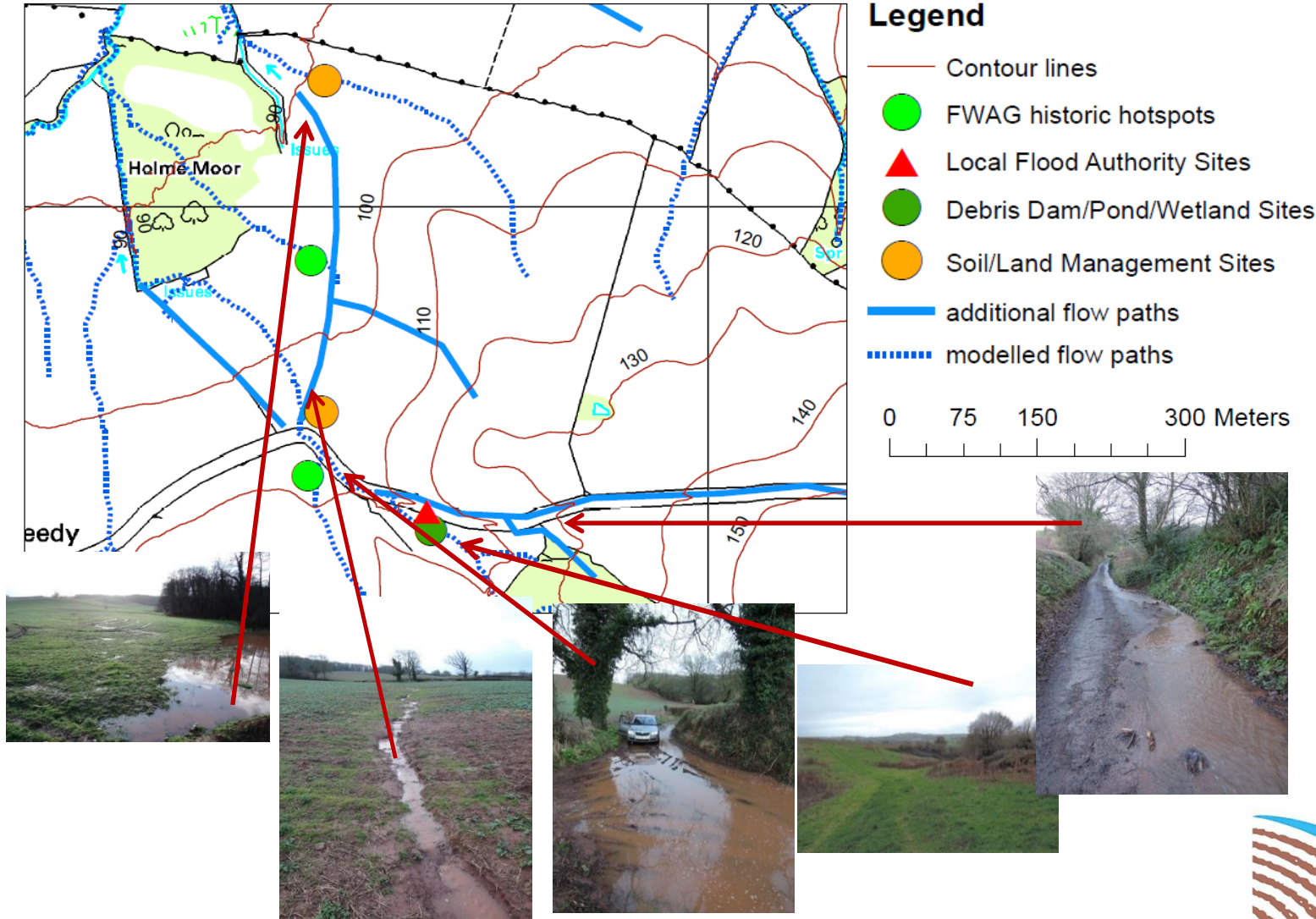
## Joining up the Catchments

Funding Somerset Rivers Authority  
Geographical scale of Somerset...





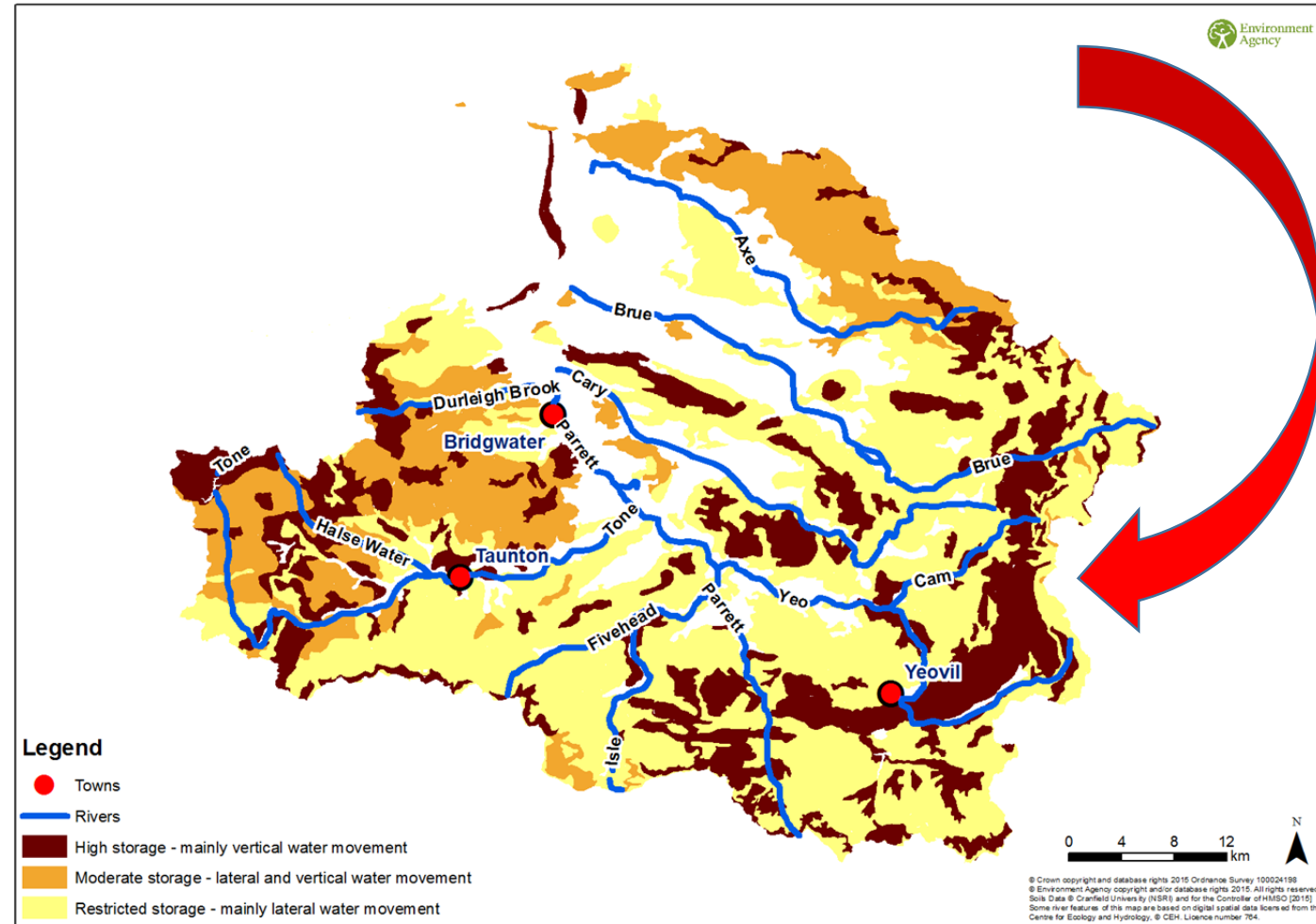
# Flowpath Mapping & Groundtruthing





# Soil Mapping & Management

- Soils grouped and classified according to their properties and hydrology
- Soil winter water storage potential
- 30% of land offers good storage potential
- Crop choice to lower WT in summer and prepare for wet weather?



**A clear solution  
for farmers**  
CATCHMENT SENSITIVE FARMING









# The Effect of a wet year on Machinery Working Days



**Key**

- Soil conditions likely to be suitable for trafficking
- Conditions unsuitable for trafficking
- Wet year: soil unsuitable for trafficking. Normal year: soil likely to be suitable for trafficking

N.B. dates are based on average conditions; you should always check the soil by digging a hole before trafficking



# Need to join up Policies





# Sources of Specialist Soils Advice



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**Inversion v non-inversion tillage**

26 July 2017

**Inversion and non-inversion tillage systems compared**



**A clear solution  
for farmers**  
CATCHMENT SENSITIVE FARMING





# SOILS

## AND NATURAL FLOOD MANAGEMENT

DEVON AND CORNWALL

Richard Smith EA



# Role of Regulation

Bude bathing waters, new to CSF March 2012

EA had promoted CSF in preparation for new CSFO

April 2013 CSF and Cleaner seas started linking up

99 grants £870k improvements in 2 years –value of EA baseline regulatory visits

Vital to underpin the voluntary approach with proportionate, targeted but visible regulation

This will also be important for the NFM Programme

Example from Williton catchment of recently ploughed permanent pasture adjacent to leaky dams....





## Not only about flooding ...

- Evidence clearly shows land management will have **local flood** risk benefits
- Land management will reduce sediment losses and transport
- Improve Water Quality, biodiversity
- Improve road safety
- Need robust regulatory baseline and support
- Reading University's NERC programme will build on this
- As plan catchment actions we need to consider the most appropriate measures across the landscape taking account of soil type and rainfall acceptance potential
- Paying the provider needs coherent mechanisms, linked up policies and effective geographical scale



**Thanks for listening!**

