



- questions

## Session 2. 11:30-12:50

Practical mitigation approaches (diffuse pollution and ecology)

**Limiting soil erosion**

*Tom Sampson (Environmental Focus Farm)*

*Bill Jeffrey (SAC)*

**River Management**

*Marshall Halliday (Esk Rivers Trust)*

**Managing Loch sediment**

*Bryan Spears (CEH)*

**Loch Management and ecology**

*Sandy Forgan (RLDA)*

*Mark Moore (SNH)*

## Session 3. 13:50-14:30

### Characterisation and evidence of change

#### Impacts of land management on water quality

*Marc Stutter*

#### Groundwater nitrate and timescales of change

*Sarah Dunn (MLURI)*

## Session 3. 14:30- 15:45

towards effective policy - evidence, interpretation and participation

Catchment planning and management: evidence of good practice

*Keith Marshall/Susan Cooksley (MLURI)*

Structured discussion on the following questions:

- 1. How do you think the condition of the catchment has changed in recent years? What evidence do you have for this?*
- 2. How should we gather evidence in future?*
- 3. How would you like to see the Lunan project develop?*

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Andy Vinten, Marc Stutter, Nikki Baggaley (MLURI),  
Eric Hayward, Bill Jeffrey, Robert Ritchie (SAC)



The aftermath of row crops such as potatoes and vegetables can be a major source of soil erosion, especially in wet autumns, when opportunities for post-harvest grubbing are limited

MLURI and SAC have been working on the design of filter fences to trap sediment from soil erosion with one of the farmers in the Lunan catchment.



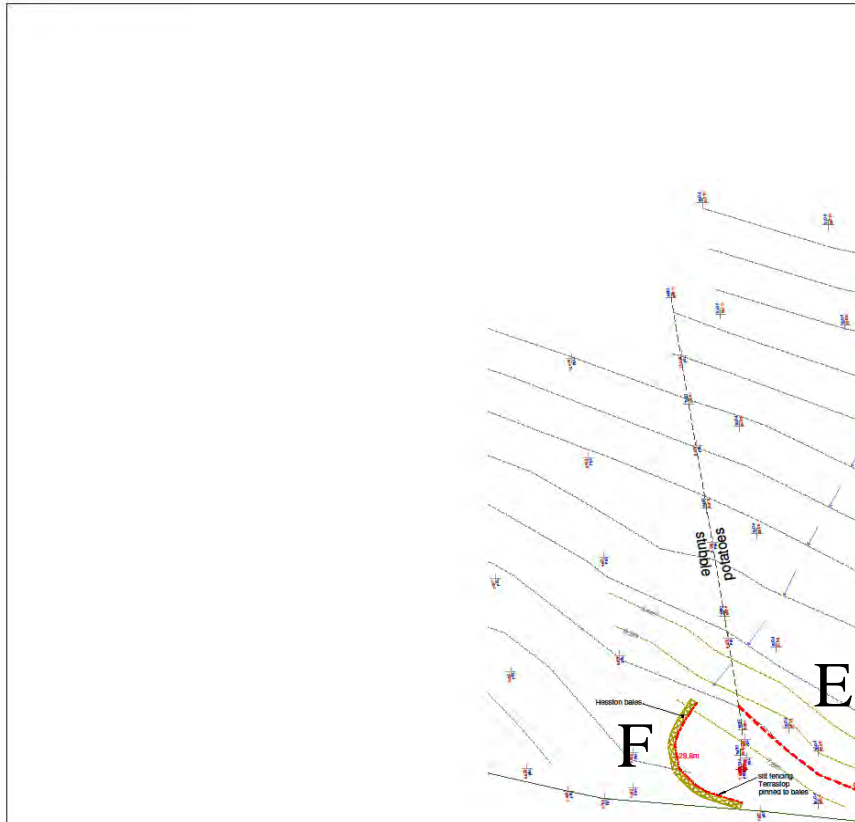
**Terrastop™ Premium** is a special, high quality, permeable, technical filter fabric that can be installed as an entrenched vertical entrapment fence, and is designed to intercept and detain run-off, trapping harmful silt through settlement and filtration before it leaves the site.

Although the benefits of silt fences have yet to be widely utilised in Britain, the concept is not new. Silt fences have been used extensively in other countries for many years, and their proven performance (Intercepting up to 86% of suspended solids [Horner et al. 1990]) has made them a standard Best Management Practice on a diverse range construction projects.



Terrastop™ are designed to have catchment areas around 300 m<sup>2</sup> per m length of fence, which is restrictive for use in agricultural fields. therefore we have experimented with both Terrastop™ and a much coarser, stiff **monofilament plastic netting** (pore space about 3mm), which we have used in combination with the finer netting.





A.

D C B

The fences was installed on 22<sup>nd</sup> -25<sup>th</sup> October with *high country fencing* contractor, Adam Cooper.

**Filter A .** Installed with fine mesh filter extending into the field to pick up connections with surface drainage rills and deliver them to the field margin.

**Filter B.** Installed with coarse mesh filter

**Filter C.** Installed with fine mesh filter in a J shape to ensure overtopping occurred into the field margin

**Filter D.** Installed with coarse mesh filter

**Filter E.** used a central run of fine mesh filter, bounded on each side by coarse filter. At the easterly end of the fine filter, constructed a diversion so that water escaping at the boundary between fine and coarse filter would be initially diverted into the field margin, rather than into the line of the existing major edge-of-field rill.

**Filter F.** A coarse filter fence was constructed across the major edge-of -field rill, at the Western corner of the field, which was connected to the U shaped filter built in the stubble area of the adjacent field.



Filter fence A, showing diversion of flow and sediment into buffer strip which runs downslope for ca.200m) .

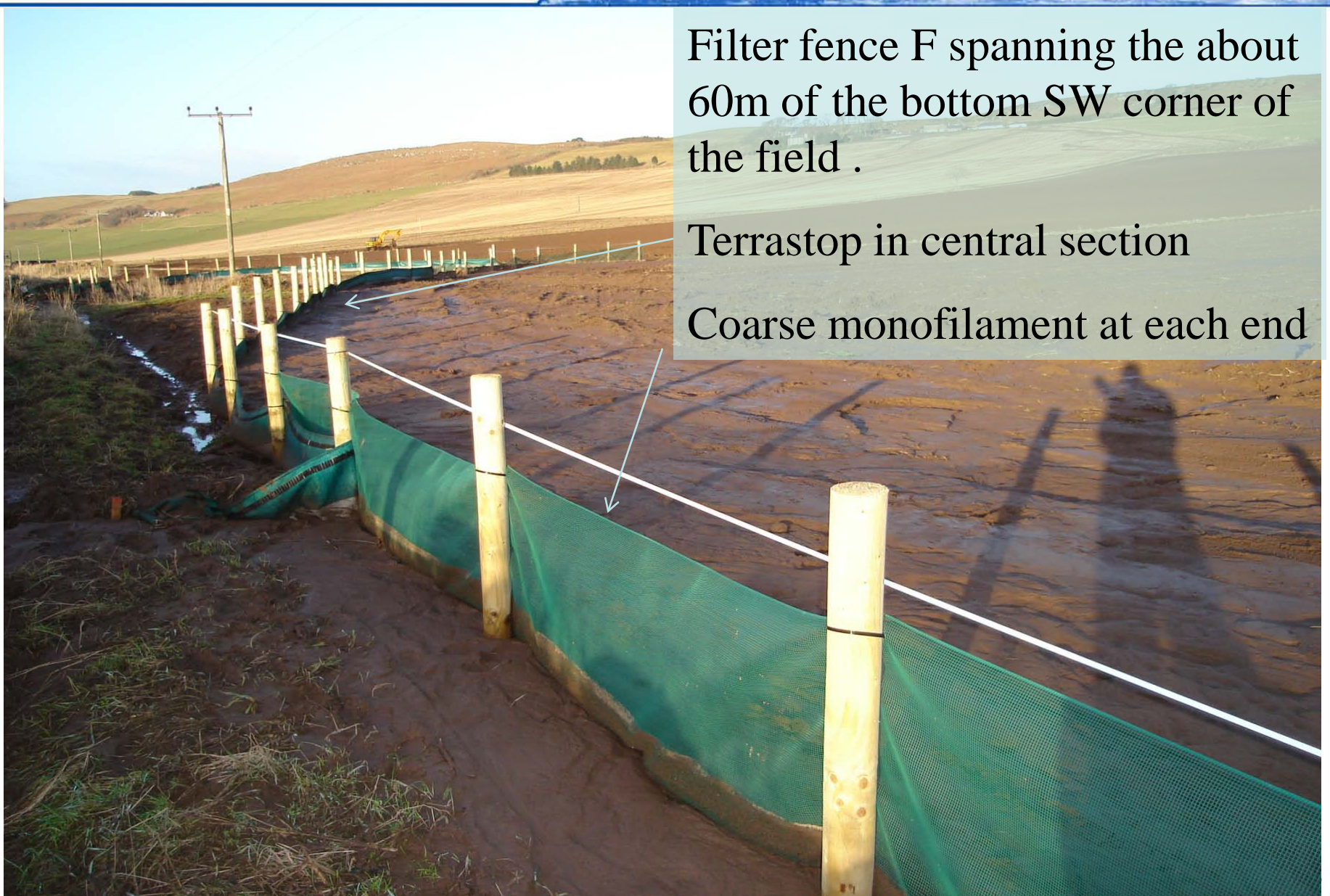






Filter fences B (furthest away, coarse filter),  
C (fine filter) and D (nearest, coarse filter)





Filter fence F spanning the about 60m of the bottom SW corner of the field .

Terrastop in central section

Coarse monofilament at each end



## Filter F

### Across edge-of-field rill







About 40 tonnes of sediment had accumulated in filter E by 1 Feb





Note the natural filter mat forming on the coarse filter, which helps the water to spread along the contour and deposit its sediment load







Ponding in Filter fence F led to cutting down to a stone drain

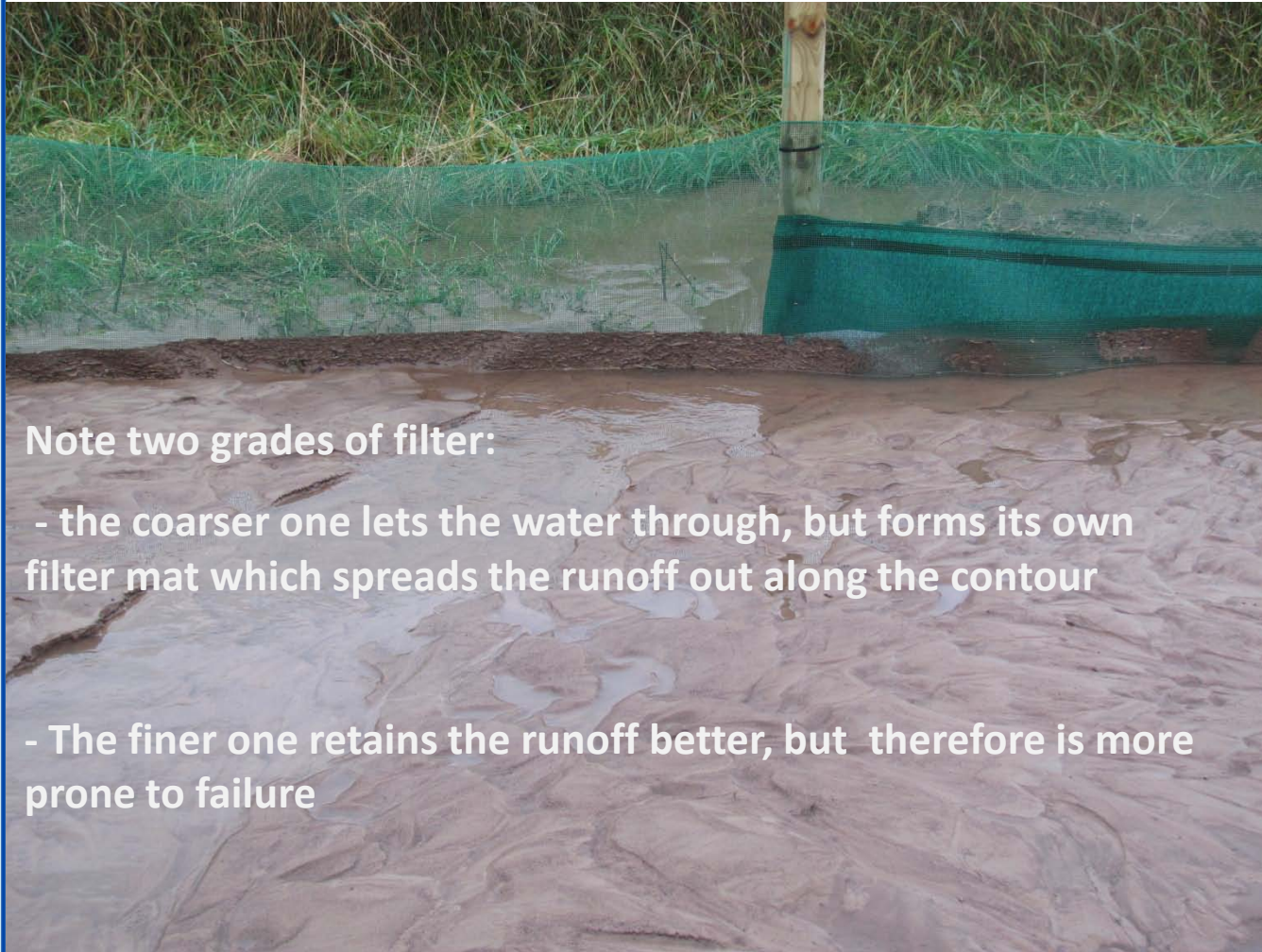
Nov 2010

Filter fence E collapsed under the weight of sediment. Needs repair.

Feb 2011





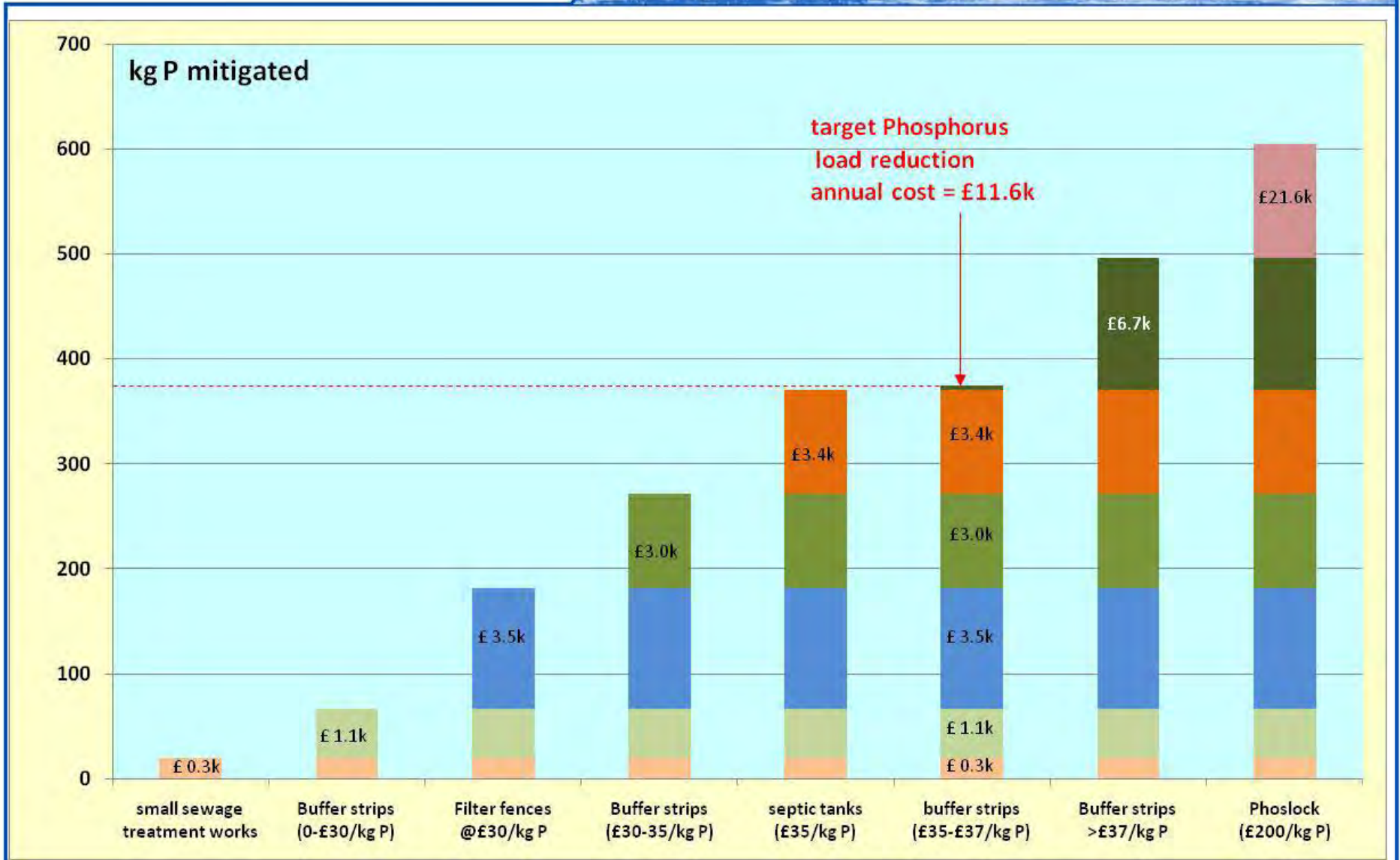


Note two grades of filter:

- the coarser one lets the water through, but forms its own filter mat which spreads the runoff out along the contour
- The finer one retains the runoff better, but therefore is more prone to failure

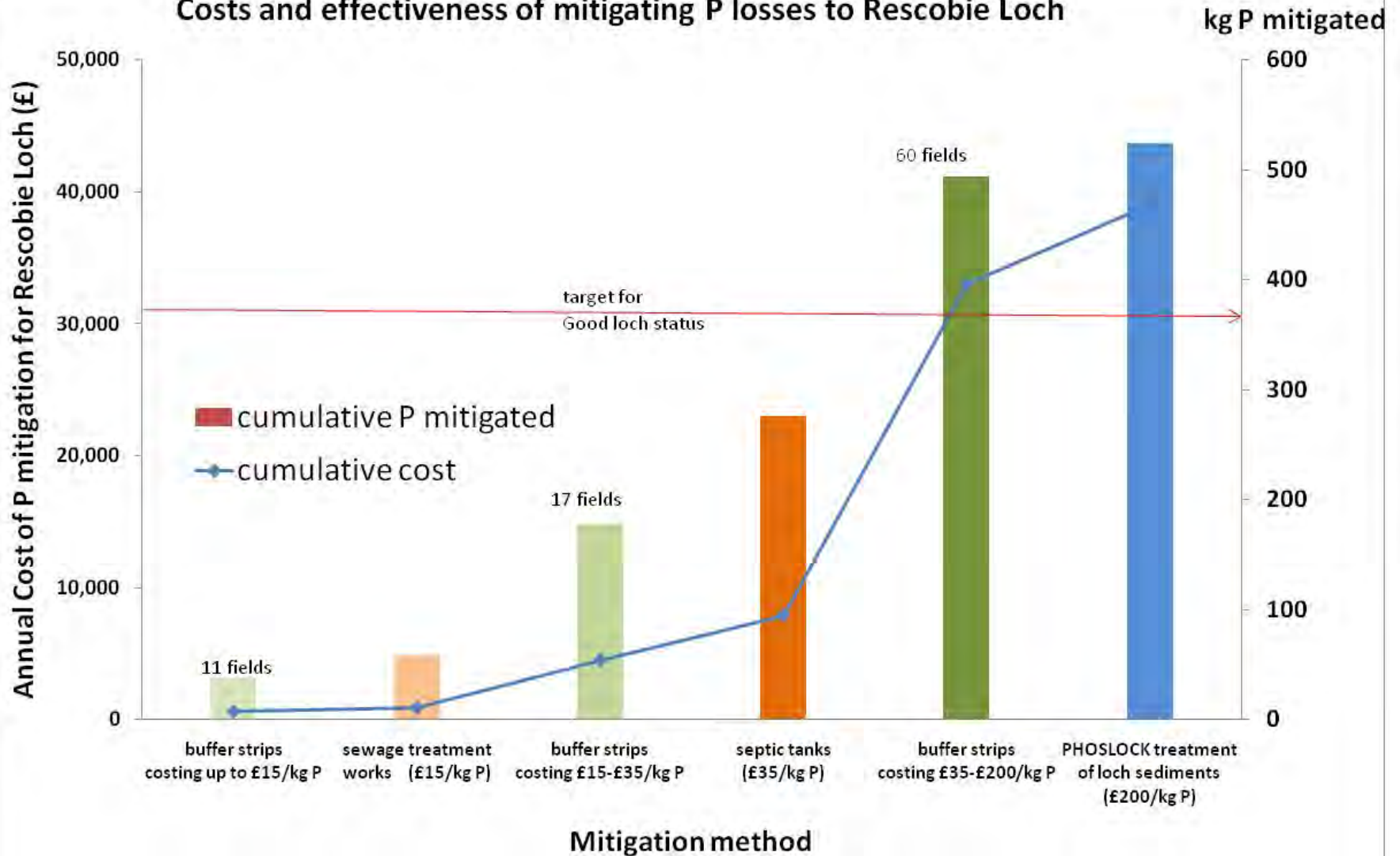
>40 tonnes of  
soil retained  
from 19ha field

Estimated cost:effectiveness    £30 per kg P trapped

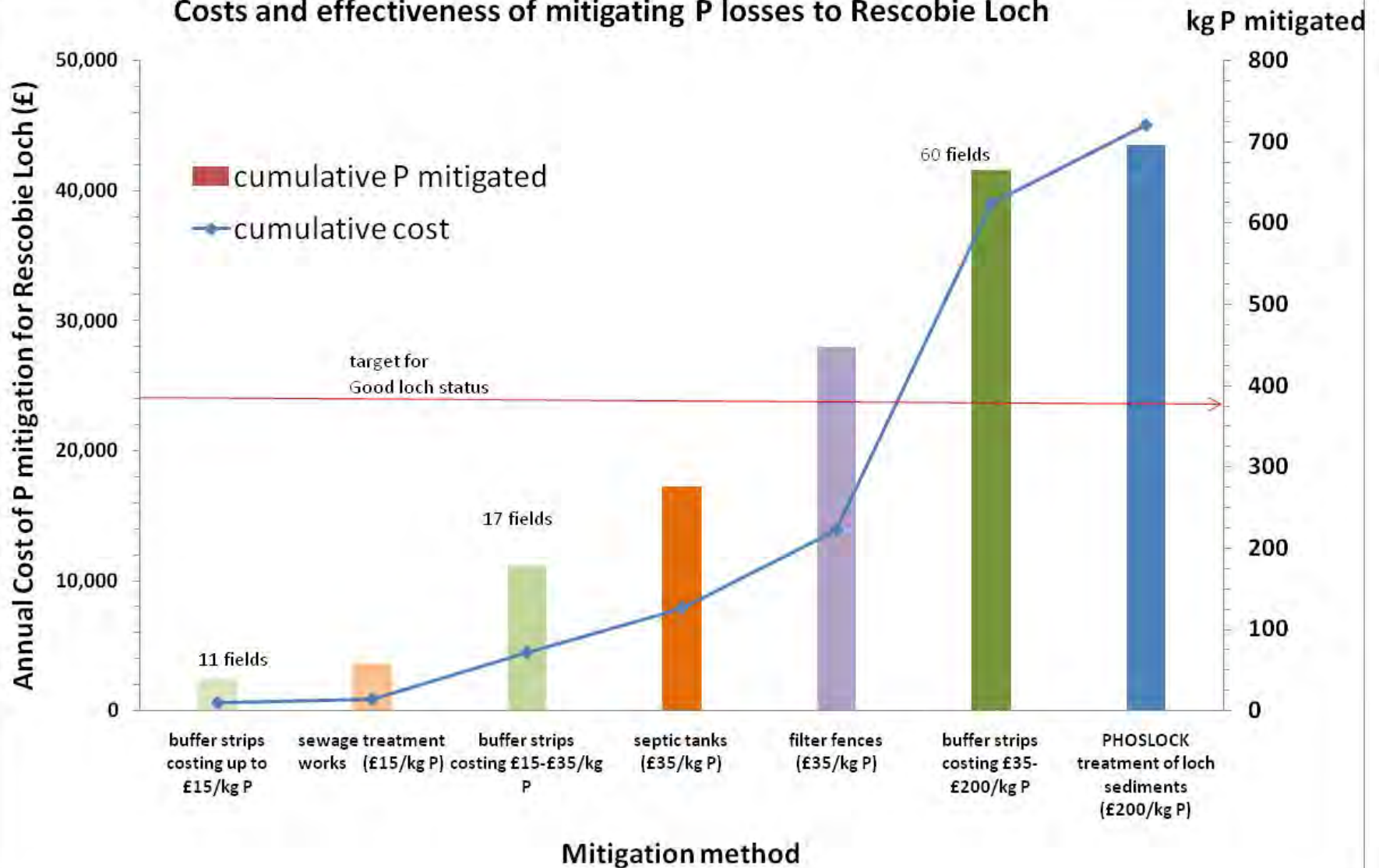




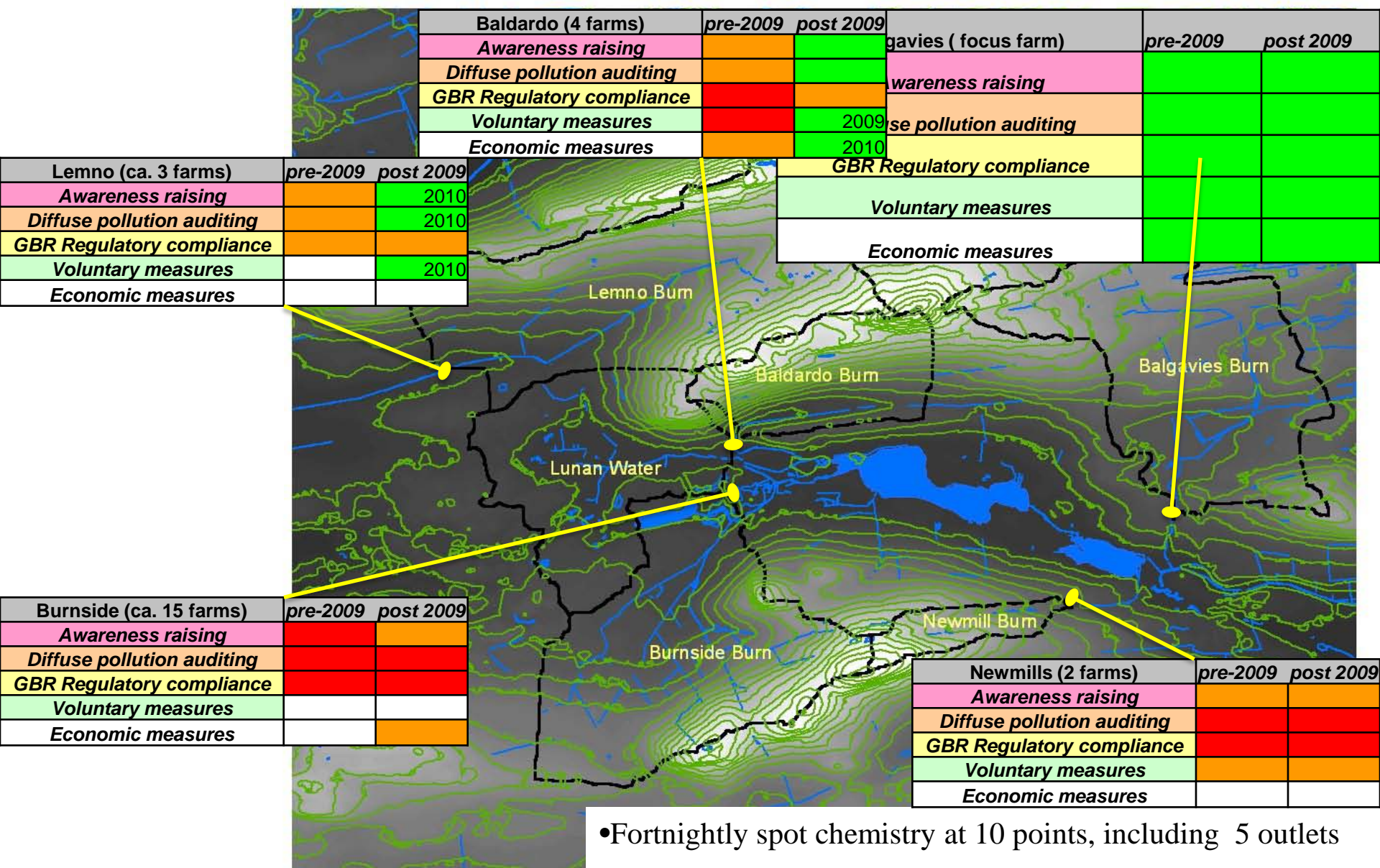
Costs and effectiveness of mitigating P losses to Rescobie Loch



Costs and effectiveness of mitigating P losses to Rescobie Loch







- Fortnightly spot chemistry at 10 points, including 5 outlets
- Continuous turbidity ,water level and discharge
- Event sampling at 3 outlets

## Monitored sub-catchments (2007-present)

## ■ Regulatory Measures: Controlled Activities Regulations (2008), NVZ regulations

3 tiers:

- General Binding Rules eg GBR20 – cultivation of land – no cultivation within 2m of watercourse
- Registration eg septic tank soakaways <15 person equivalents
- Licensing eg disposal to land of waste sheep dip

## • Voluntary measures: eg. in codes of good practice

- 4 Point Plan – information for livestock farmers to reduce pollution
- Prevention of Environmental Pollution from Agricultural Activity Code
- Scottish Best Management Practices (BMP) Manual - on web
- Diffuse Pollution audits
- Constructed Wetlands Manual
- Farm soils plan
- Forests and Water Guidelines
- Septic Tank Guide
- Voluntary Initiative on pesticides
- Rural SUDS

## • Economic Measures

- Scottish Rural Development Plan (competitive funding) eg. 6m grass buffers
- Land Managers Options (guaranteed funds) eg winter stubbles, beetle banks
- SEPA River Restoration Fund – eg. re-meandering of rivers
- WREN Biodiversity Action fund



# Scottish diffuse pollution management strategy

– key principles (the answers?)

- 1) **A catchment approach is required.**
- 2) **A sound evidence base is required to assess sources and transport of diffuse pollution, accurately target measures and get stakeholder buy-in**
- 3) One-to-one advice and farm visits are essential to identify hotspots, target measures and cost-effectively change management practices.
- 4) Partnership approaches and stakeholder involvement/lead are helpful in delivering environmental improvements.
- 5) A combination of regulatory, economic and voluntary measures should be applied.

<i>Questions</i>	Societal values	Policy instruments			Governance
	Ecological standards	Voluntary	Economic	Regulatory	Catchment management
Effective ?					
Cost:effective ?					
Beneficial ?					
Equitable?					
Inclusive ?					
Integrated?					
Efficient ?					



# Approach to DP mitigation in Scotland

Priority Catchment

Selection by screening pressures and impacts against WFD and other legal requirements (SEPA)

**National approach** – A national campaign of raising awareness, guidance, training and SEARS inspections in relation to the impacts of diffuse pollution, the Diffuse Pollution Regulations and other measures.

**Priority Catchment Approach** - a catchment management type approach where a sequential approach of awareness raising, evidence gathering, farm visits to identify hotspots, target measures and deliver one to one advice will be implemented.

Diffuse pollution monitored priority catchments to

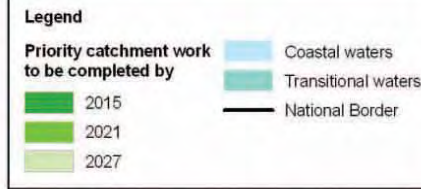
demonstrate pollution sources, pathways and impacts, and to inform on cost-effectiveness of measures

and monitoring (MLURI, SAC, SEPA)

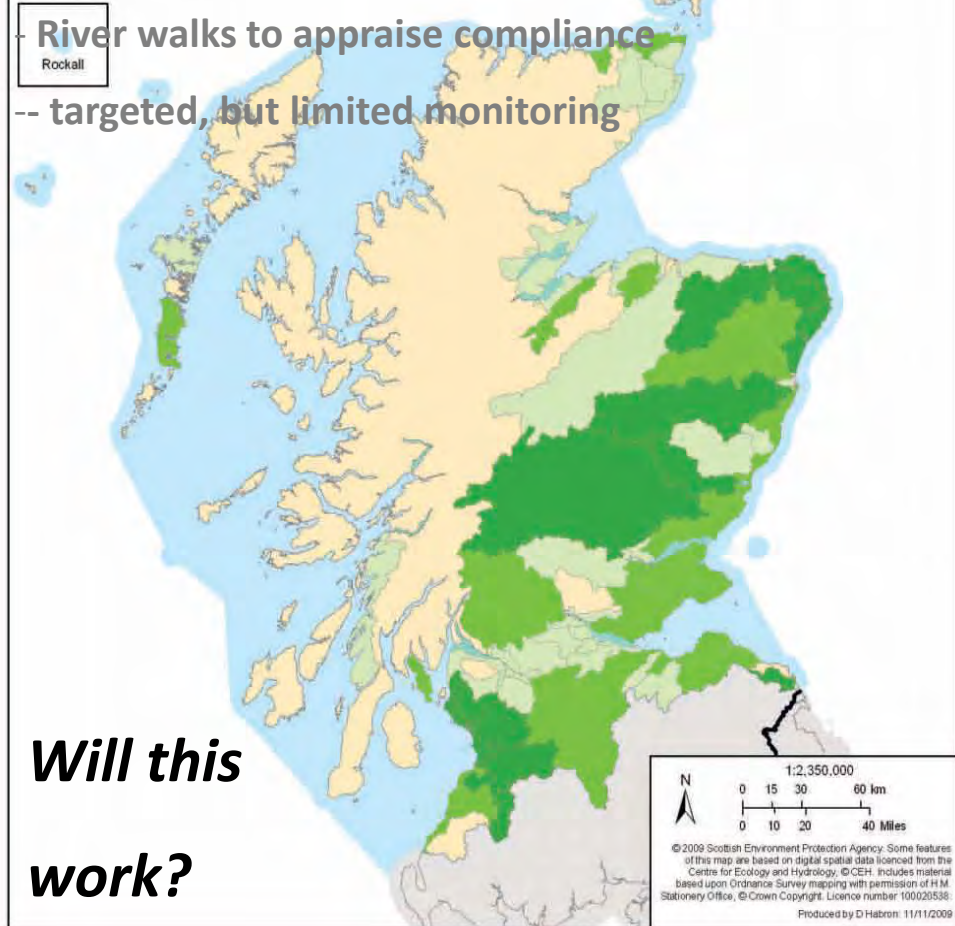
SEPA's national regulatory baseline of good practice is supported by a targeted catchment approach....

### 14 Priority catchments:

- |                      |                      |
|----------------------|----------------------|
| River Ayr            | Eye Water            |
| River Doon           | River Tay            |
| River Irvine         | River South Esk      |
| River Garnock        | River Dee (Grampian) |
| North Ayrshire Coast | River Ugie           |
| Galloway Coastal     | River Deveron        |
| Stewartry Coastal    | Buchan Coastal       |



- Characterisation
- Catchment officers
- Awareness raising
- Many have specific catchment plans
- River walks to appraise compliance
- targeted, but limited monitoring



**Will this work?**





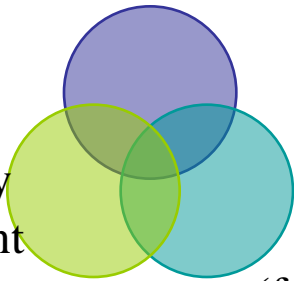
***491 breaches of GBRs over 400km of streams***



# Scottish Diffuse pollution monitored catchments – established 2006

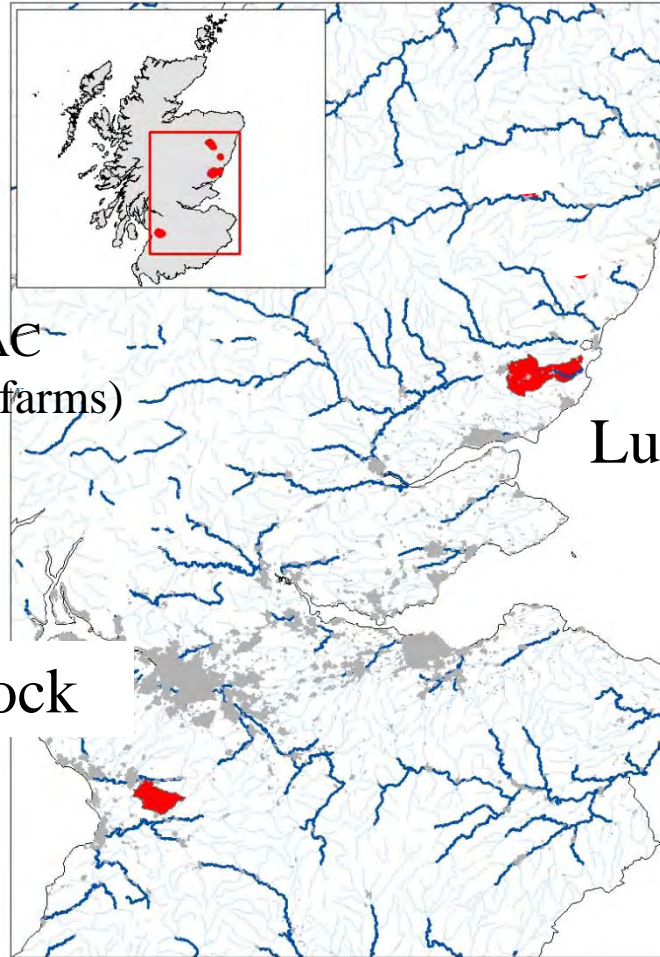
Partnership approach

SEPA (measures)



Macaulay  
(catchment  
research)

SAC  
(focus farms)



Lunan

Cessnock

Typical dairy and  
mixed arable catchments

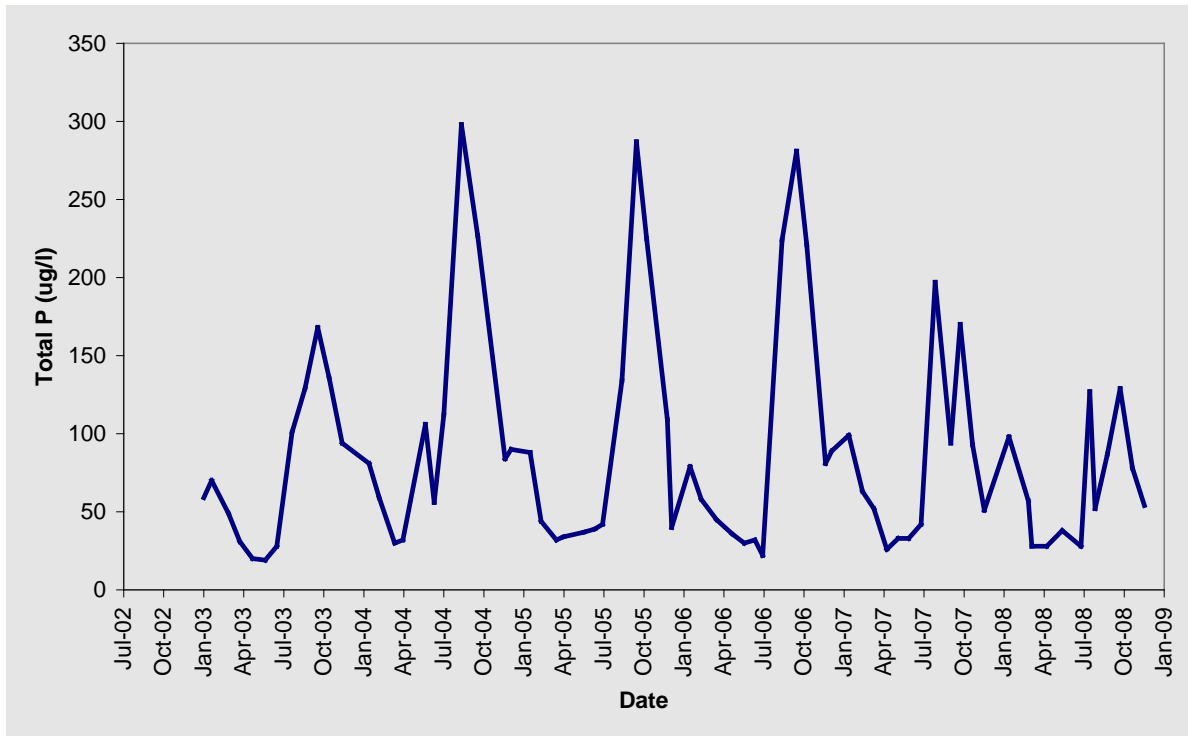




<b>Main Characteristics</b>
<b>Geology:</b> groundwater bodies in old Red Sandstone and glacial sands and gravels
<b>Topography:</b> Maximum elevation = 251m (Turin Hill); undulating hills.
<b>Soils:</b> Mainly freely draining brown earth and podsol soils; some alluvial soils.
<b>Catchment area:</b> 134 km <sup>2</sup>
<b>Average Rainfall =</b> 771 mm
<b>Standing waters:</b> Two eutrophic lochs designated as a SSSI covering 1.78 km <sup>2</sup> Rescobie is a popular fishery (area 59ha, mean depth 3.3m) Balgavies is a Scottish Wildlife Trust reserve (area 18ha, mean depth 3m) These both fail the WFD standards for Good Ecological Status
<b>Running Waters:</b> Lunan Water flows into Rescobie (along with Burnside Burn and Baldardo Burn) drains the Lochs. Vinny Water and Gighty Water feed into Lunan Water at Friockheim and Boysack respectively.
<b>Ecology:</b> Restenneth Moss (an SSSI), is a 0.35 km <sup>2</sup> lowland mesotrophic basin mire. Vegetation includes sedge swamp, Phragmites fen, willow carr, wet birchwood and floating Sphagnum moss mire.
<b>Land use:</b> Intensive arable farming (79% cereals, 12% potatoes) across most of the catchment
<b>Sewerage:</b> Four public STWs (Craichie, Letham, Friockheim, Inverkeilor). Lunan Head drains outwith the catchment but can contribute during periods of overflow. Significant numbers (ca 800) of houses not on main sewerage
<b>Other pressures:</b> Landfill, Abstraction, Quarrying

# Impacts of diffuse pollution in Lunan Catchment

- Rescobie and Balgavies Lochs have poor/moderate Ecological and chemical

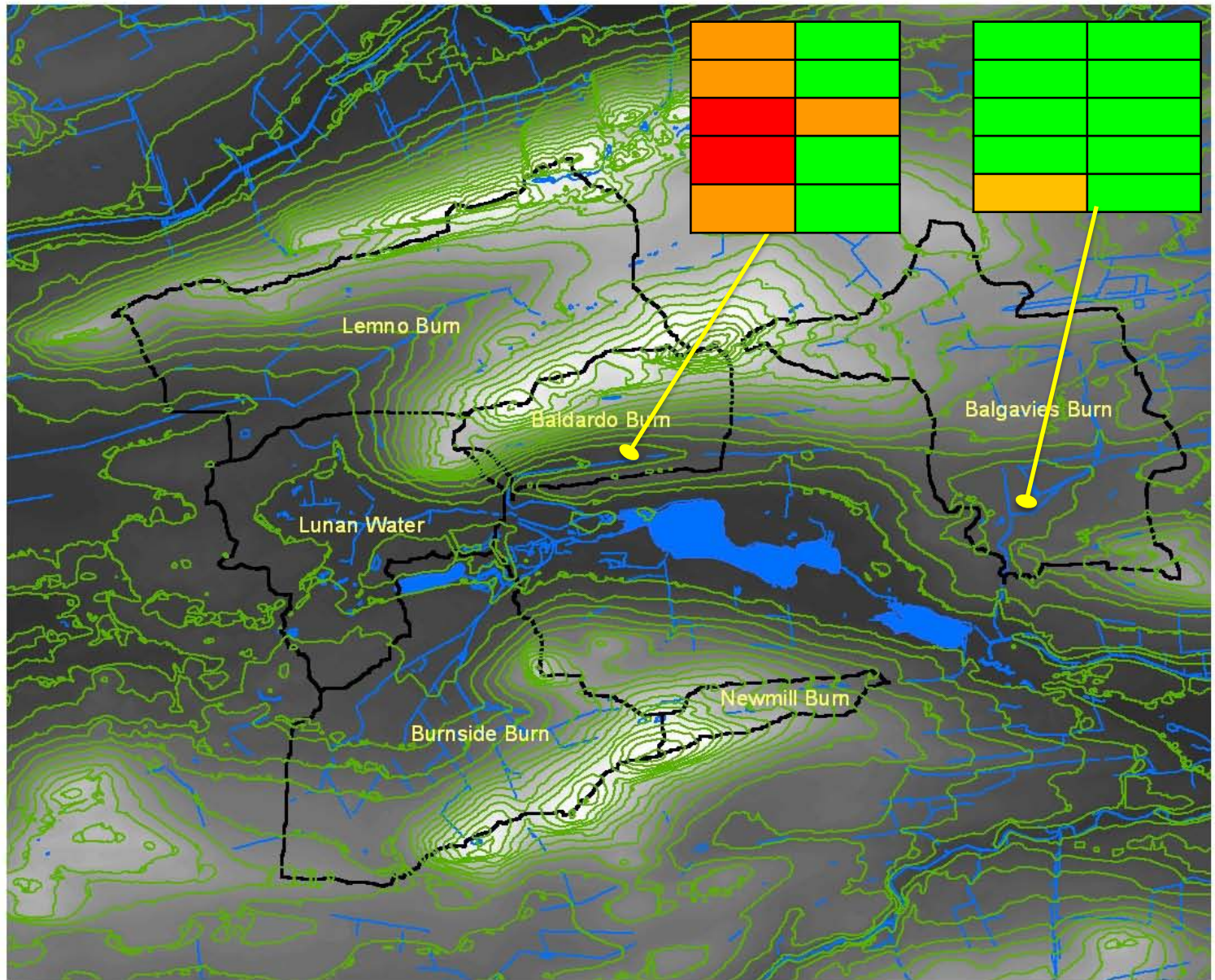


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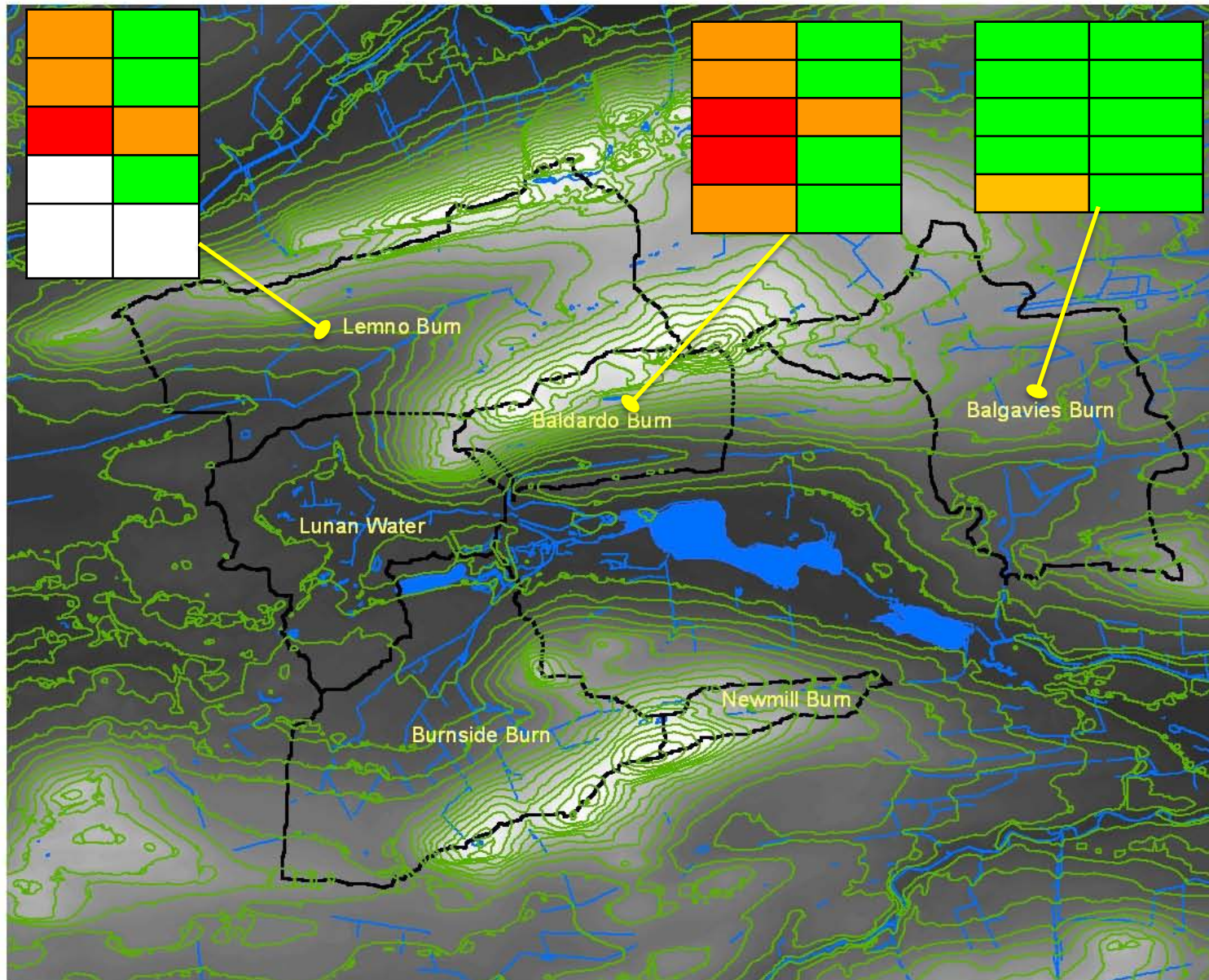


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Main impacts in Lunan catchment:

Loch eutrophication

Groundwater nitrate levels

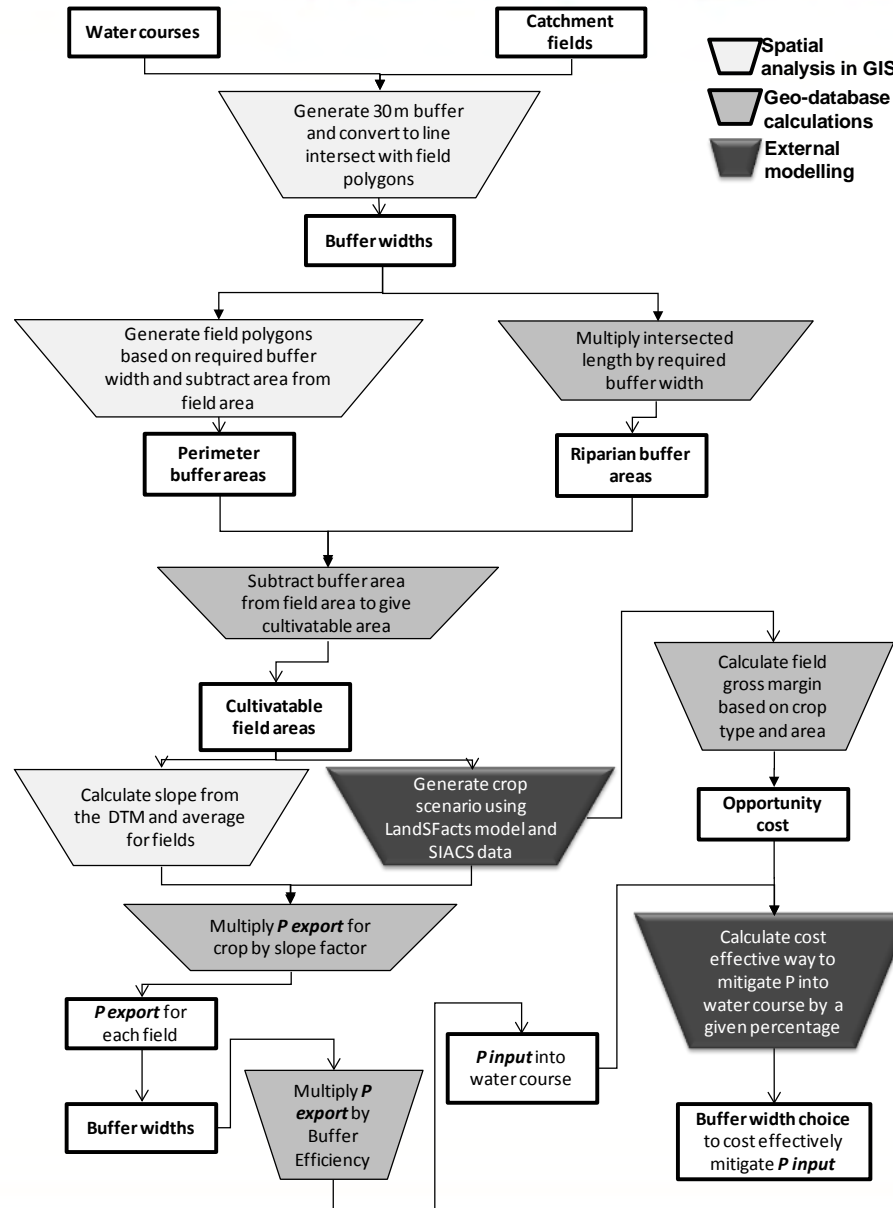
Stream ecology

Stream morphology



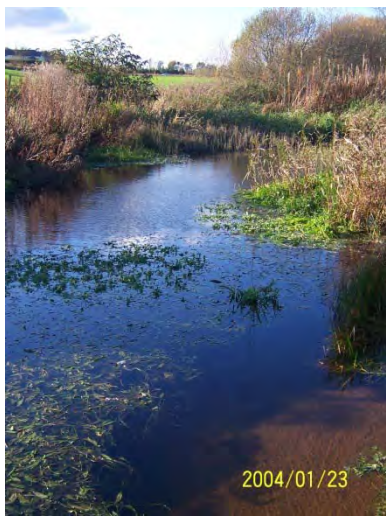
1. To assess what constitutes effective and proportionate mitigation of diffuse pollution.
2. To promote uptake of appropriate measures to control diffuse pollution through an Environmental Focus Farm, and other focus groups

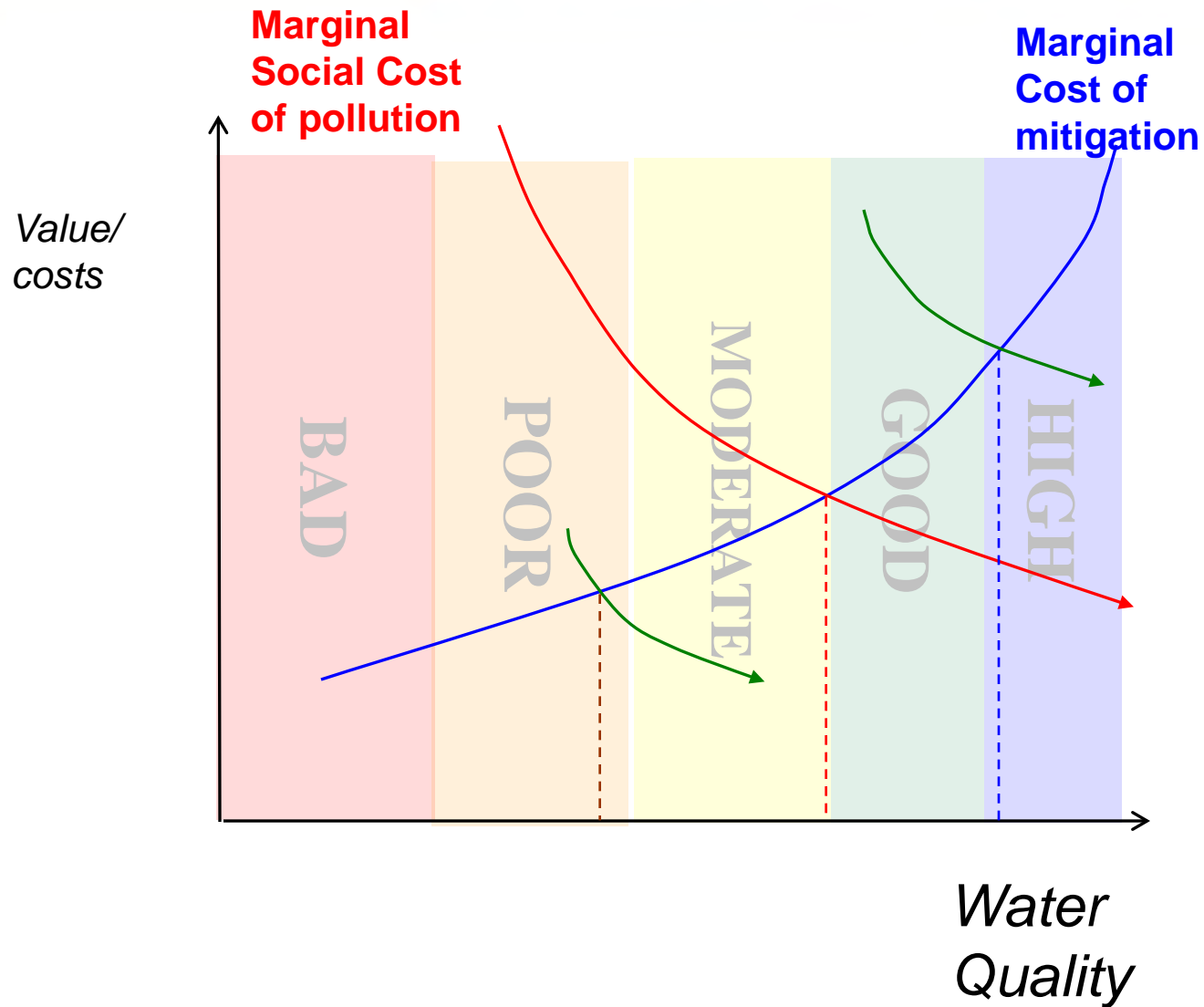






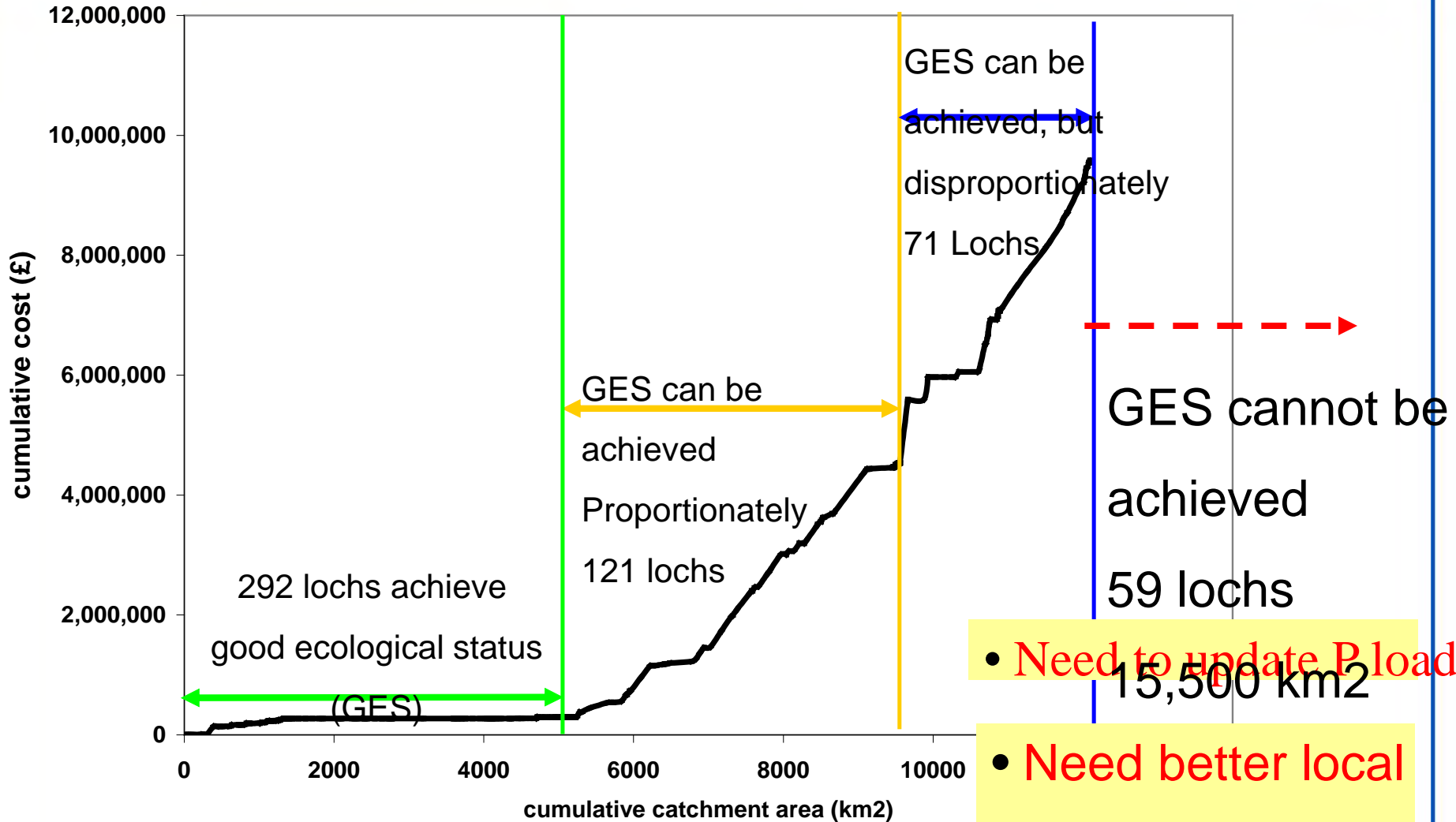
Quality  
E3







Disproportionality analysis national scale



• Need to update Pload  
15,500 km²

• Need better local characterisation of catchments

and effectiveness

# Enhancing Water Quality

## PROGRAMME 3

