Loweswater Care Programme 2012-2015

DEFRA Catchment Restoration Fund Project

"Improving Water Quality in Loweswater"

Vikki Salas, West Cumbria Rivers Trust

Previous Loweswater projects:

- University College London (UCL) Study – 1999-2000
- Loweswater Improvement Group – 2002-2006 (Local farmers)
- CEH & Lancaster University Studies 2004 – 2006
- Loweswater Care Project (CEH & Lancaster Uni) 2007-2010

What we knew/didn't know 2012

Knew

- Concentration of phosphorous compounds (mainly phosphates) is the main factor controlling growth of algae (except diatoms) and cyanobacteria
- Reasonable understanding of sources of fresh phosphorous compounds entering the lake
- Good knowledge of trends in lake chemistry and biology over many years
- Good knowledge of detailed make-up of the algal community and cyanobacteria (blue-green algae) in the lake

Didn't know

- Contribution from lake sediments to lake P
- Contribution from waterfowl to lake P
- Detailed info on fertiliser P inputs to lake catchment
- Phosphorus discharged from lake in Dub Beck outflow
- The incidence and precise conditions under which blooms occur
- Species of algae in the blooms
- Lake and outflow concentrations of toxic compounds generated by cyanobacteria (when they die)

Project Objectives

- Reduce phosphorus inputs from land management practices (medium/long-term solution)
- Application of ultrasound to control algal growth in the lake (short-term solution)
- Quantify contribution of waterfowl to lake's P balance
- Estimation of P contribution from annual recycling of lake sediments
- Monitoring of the lake and tributaries
- Educational and community involvement

defra
Department for Environment Food and Rural Affairs

West Cumbria Rivers Trust
Caring for our Lakes and Rivers

Environment Agency

National Trust

A clear solution for farmers
CATCHMENT SENSITIVE FARMING

Reduced phosphorus inputs from land management practices

- Works programme 2013 -2015 to reduce P inputs to the lake
- Prioritised work programme – mainly all farm related projects, as was deemed to be higher priority and more feasible in the timescales
- £133,900 total direct spend, £53,490 extra input from landowner contributions
- Working alongside & complementing Catchment Sensitive Farming work & projects

Completed projects

- Slurry Store roof
- Livestock yard roof
- New bale pad
- Watercourse crossings
- Two new cattle housing facilities
- New sheep housing
- Dry muck midden
- Fencing of watercourses
- Fencing of lakeshore

New Cattle Housing – Mosser/Askill

- Issues with livestock and muck facilities at Askhill
- A more cost-effective solution to upgrading livestock facilities at Askhill was to build an entirely new facility at Mosser Heights
- Mosser Heights already had appropriate facilities for muck storage and reduction of runoff, in part, through work undertaken through CSF grants.
- Agreement that cattle will not be housed overwinter at Askhill for a minimum of 10 years.


Askhill - before

Mosser Heights – new facility

Fangs Brow Projects

- Two roofing projects to prevent 32 tanker loads of rainfall getting into the slurry store & dirty yard run-off onto the road
- Cattle housing project to remove cattle from two smaller housing facilities that both had issues with dirty water runoff (one next to a beck)

Slurry store before

Cattle housing facilities with runoff issues - before

Slurry store after – with roof and slatted system for cattle housing

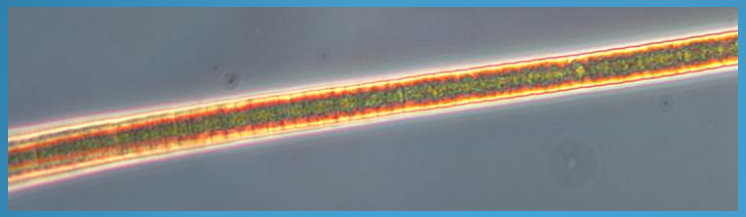
Benefits

- All cattle kept together on one farmstead with good systems for dirty water management
  - No moving around muck and bales between facilities
  - No run-off from the old facilities

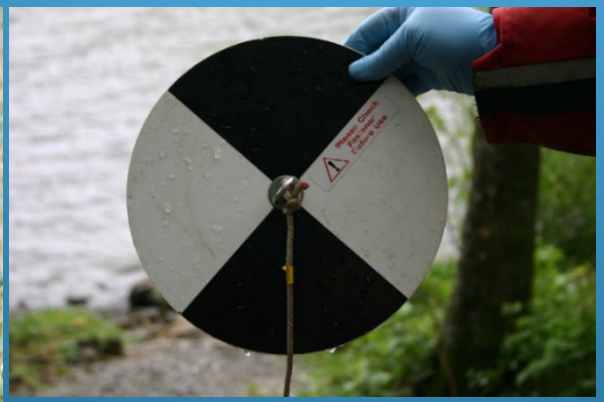
- No slurry being spread in winter time (when no uptake by grass) – 1/3 of the store was having to be spread in winter due to capacity issues

- All bales stored in one place away from watercourse

= Savings to farm business
= Less P input to the lake
Everyone happy ☺

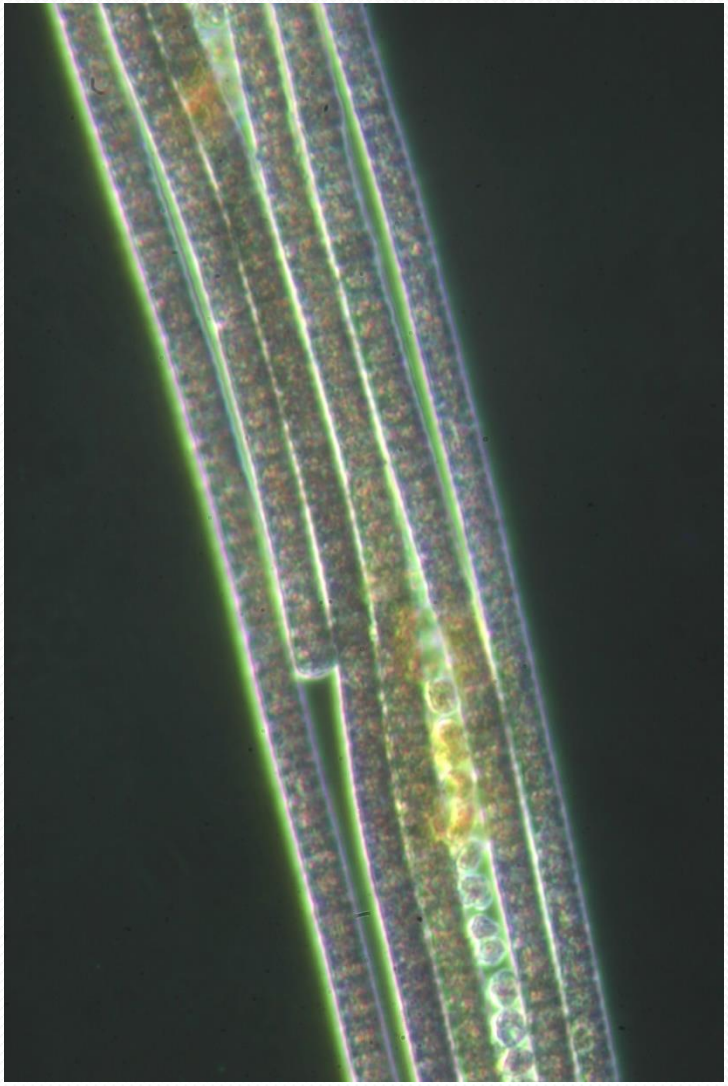


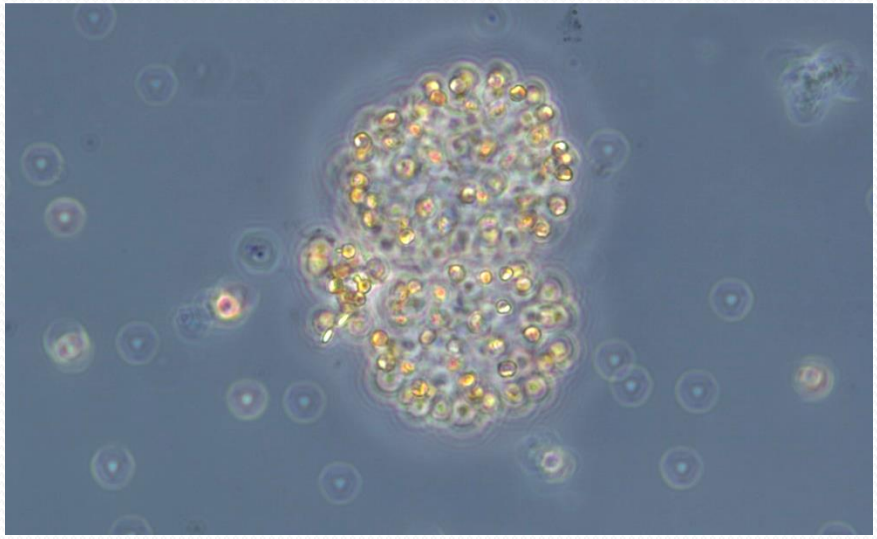
Loweswater Monitoring Programme



Cyanobacteria in Loweswater

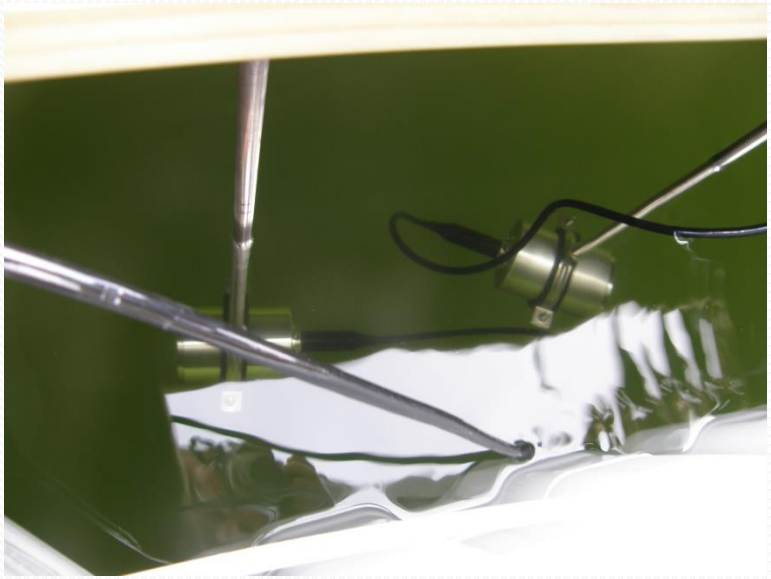
Filamentous *Planktothrix* and Colonial *Snowella* and *Woronichinia*



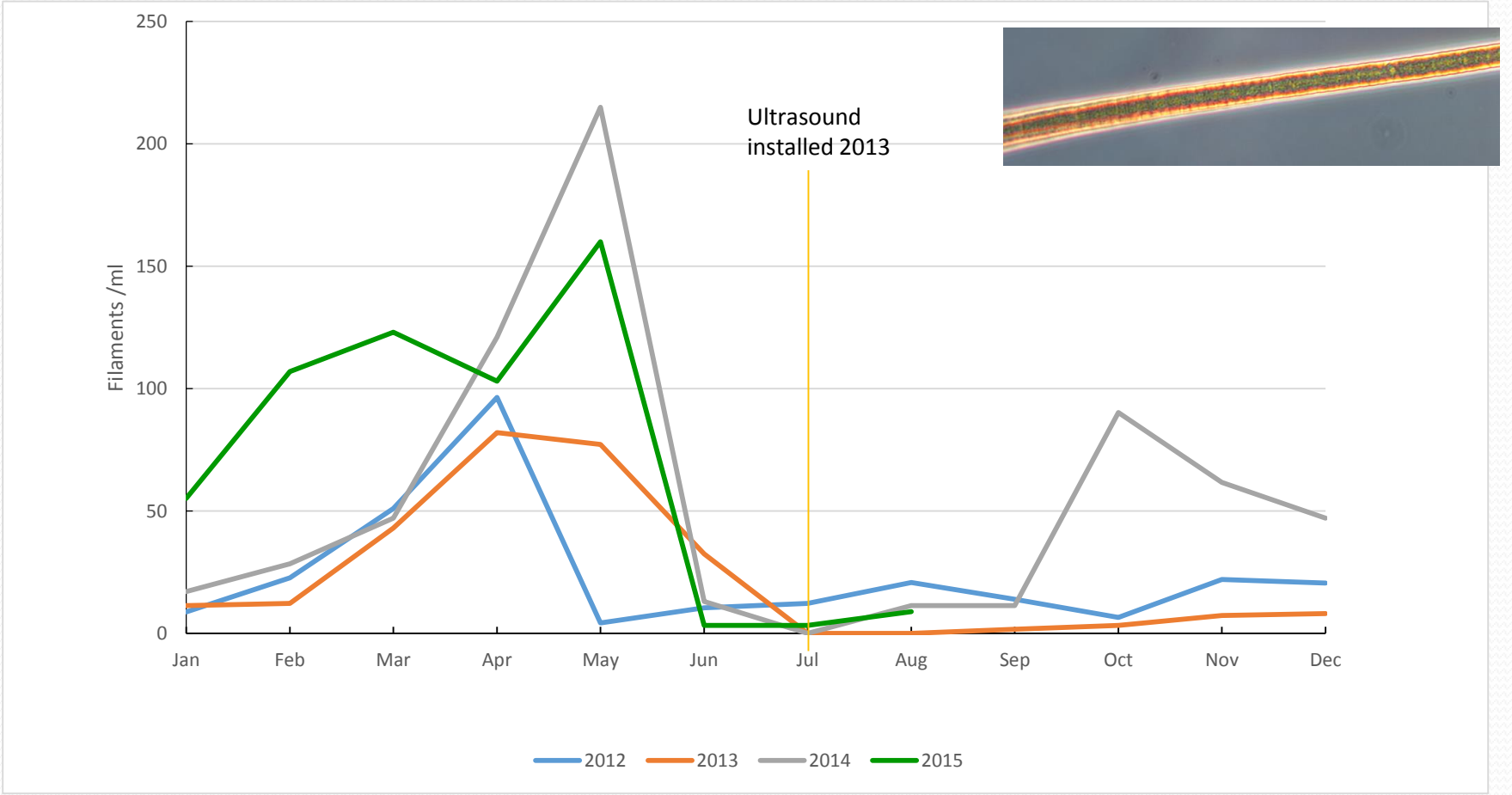


Application of ultrasound to control algal growth in the lake (short-term solution)

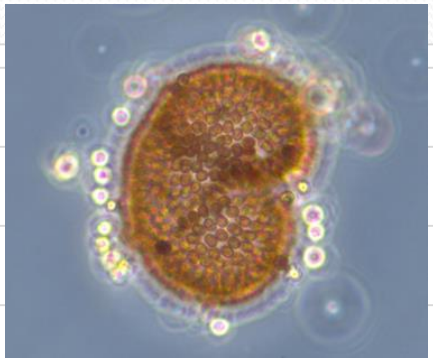
- Trial of the use of ultrasound to reduce algal levels in the short-term
- Two rafts with ultrasound kit and charging systems installed in June 2013



Planktothrix, Loweswater 2012-2015

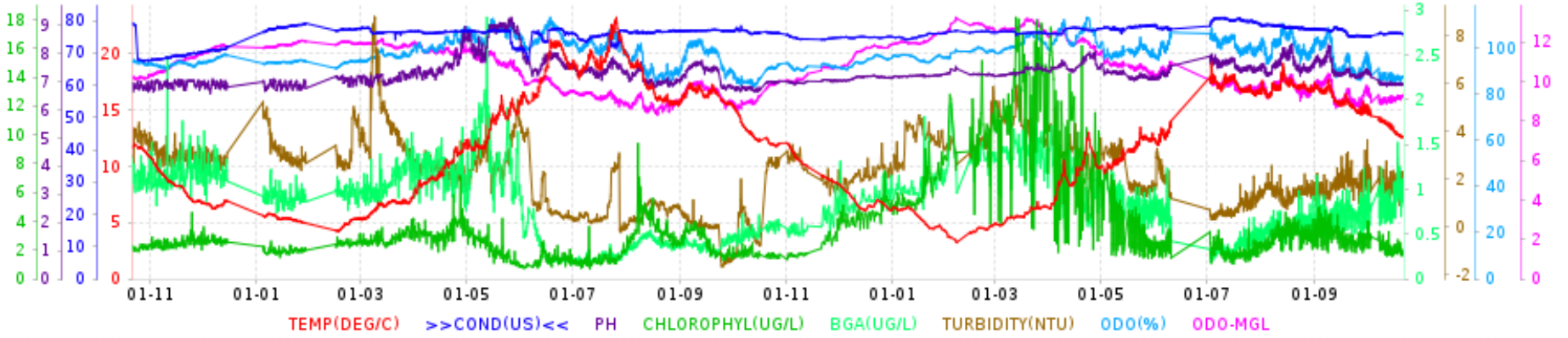


Woronichinia, Loweswater 2012-2015

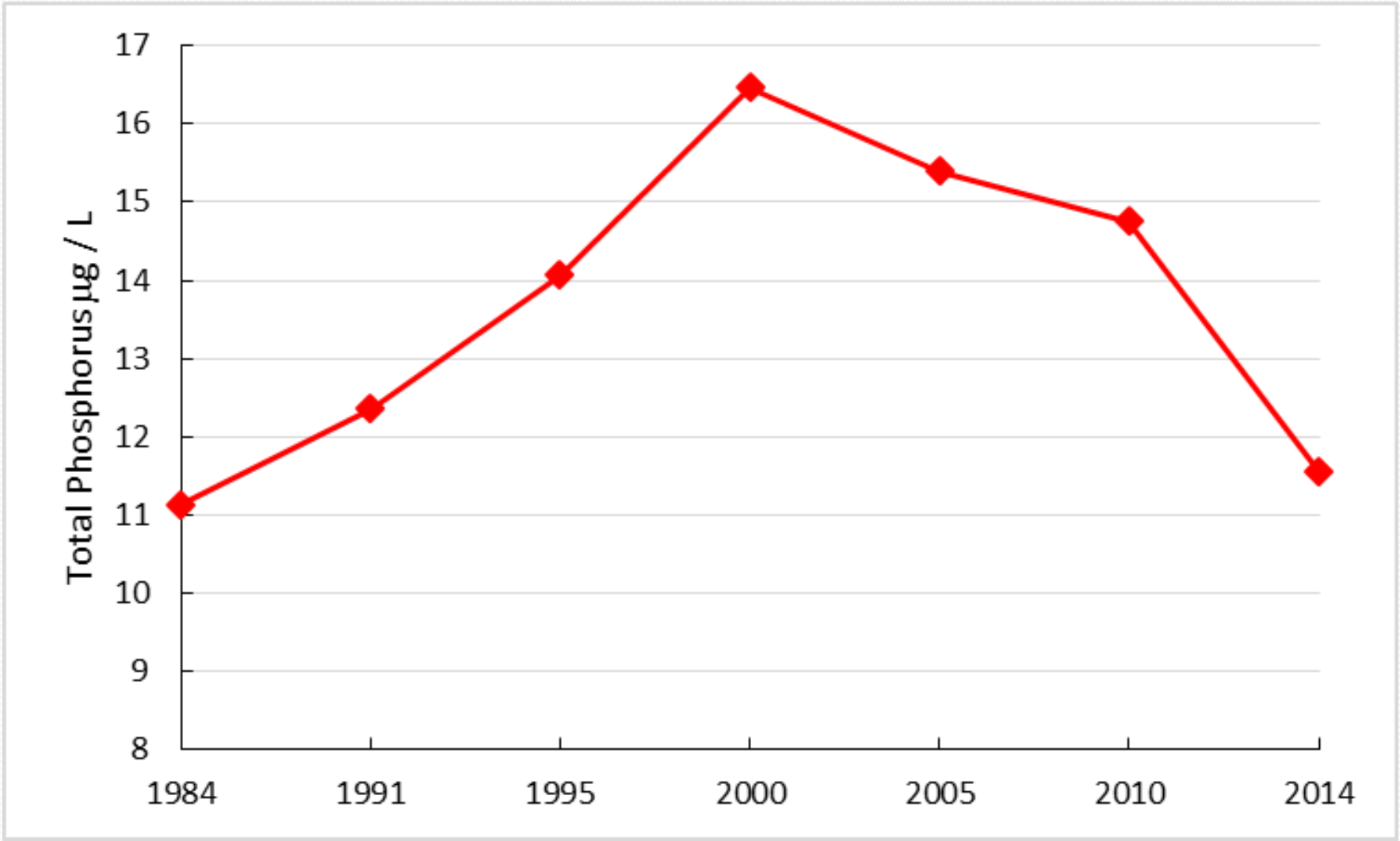



For Sale!

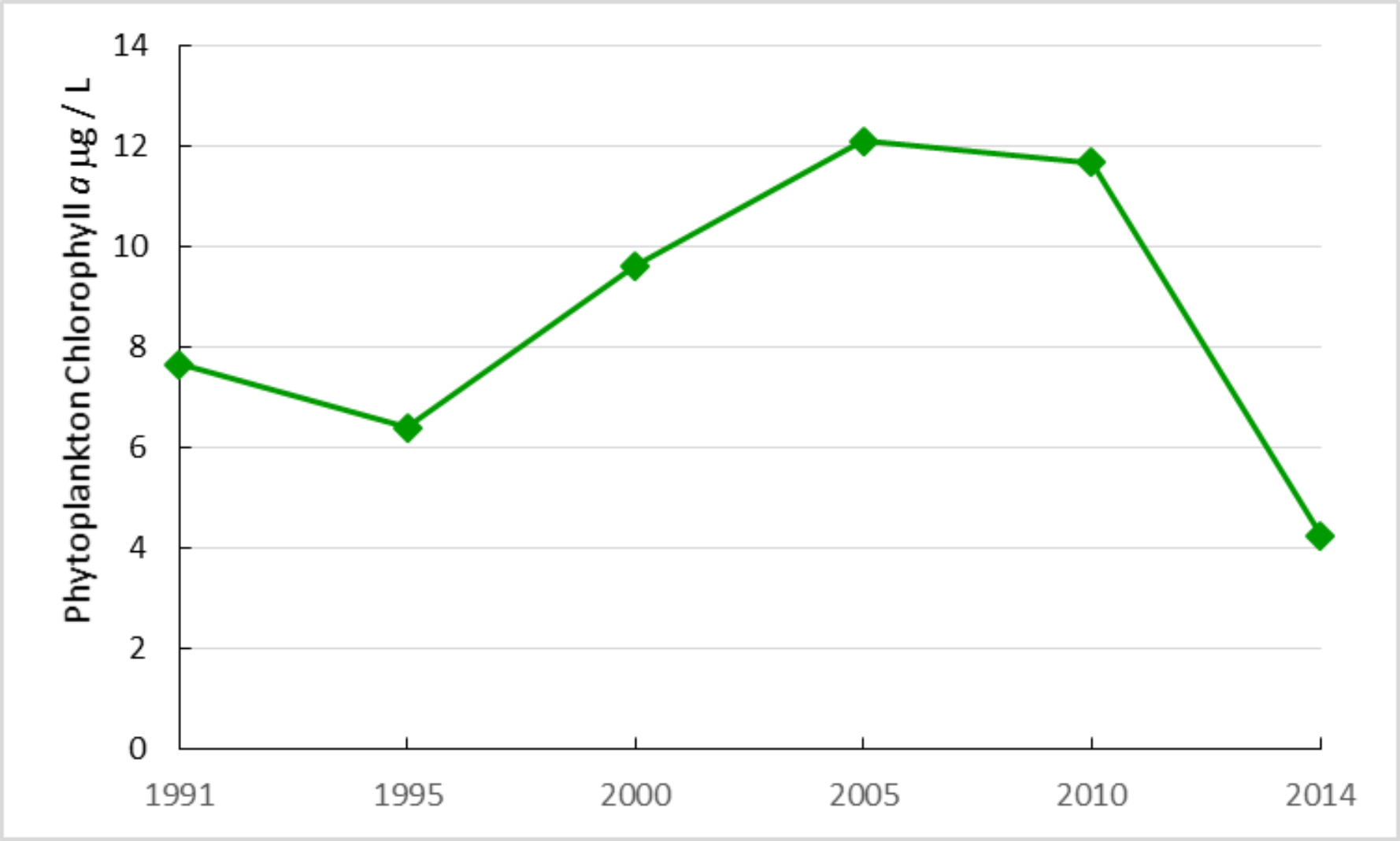
Sonde data – Oct 13 to Oct 15



Total Phosphorus: annual mean values for Loweswater -1984 to 2014



Chlorophyll *a:* annual mean values for Loweswater - 1991 to 2014

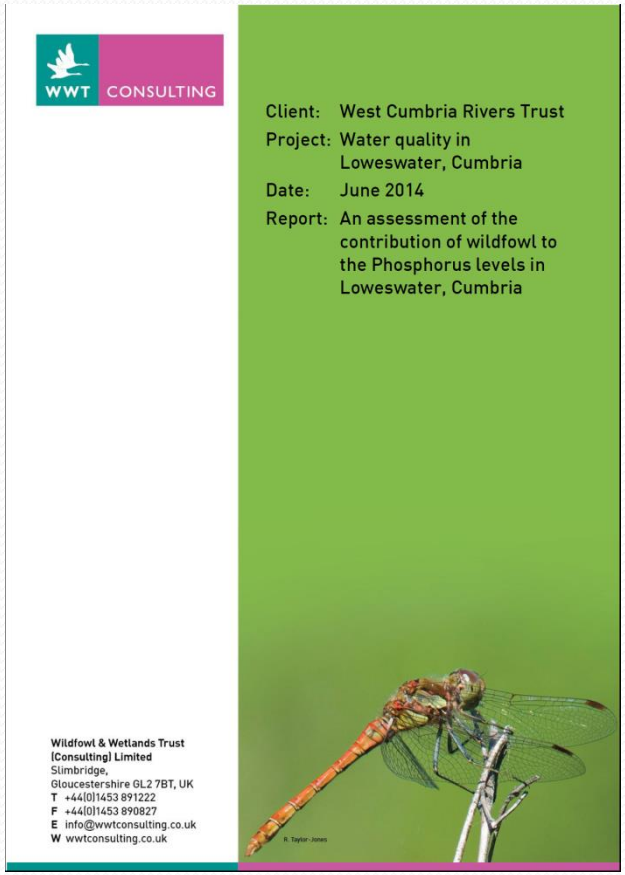


Estimation of P contribution from annual recycling of lake sediments

- Samples taken
  - October 2012, water samples at different depths when lake completely mixed
  - October 2012, cores and surface sediments
  - July 2013, water samples at different depths when lake stratified
  - monthly samples (EA) of Dub Beck inlet, lake and Dub Beck outlet chemistry
- Modelling completed in 2014 and sediments only estimated to be contributing **10% of the P load** to the lake (with 90% from the catchment)

Estimation of P contribution from waterfowl

- Study undertaken by Wildfowl & Wetlands Trust using BTO data between 1976-2010
- Waterfowl found to be contributing very little to the overall lake P input compared to other sources



Summary

- Greater confidence that P input is coming from catchment sources
- Fairly intense work programme to reduce catchment sources of P between 2013-2015
- Detailed monitoring will continue to be undertaken (funded through National Trust)
- What difference will all this make & over how long a timescale? – watch this space!