The National Trust lake collection: balancing nature, landscape and heritage

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@fluitans

Outline

- National Trust lakes and what we know
- Ornamental lakes and unique challenges
- Understanding more about our ornamental lakes (habitat and species)

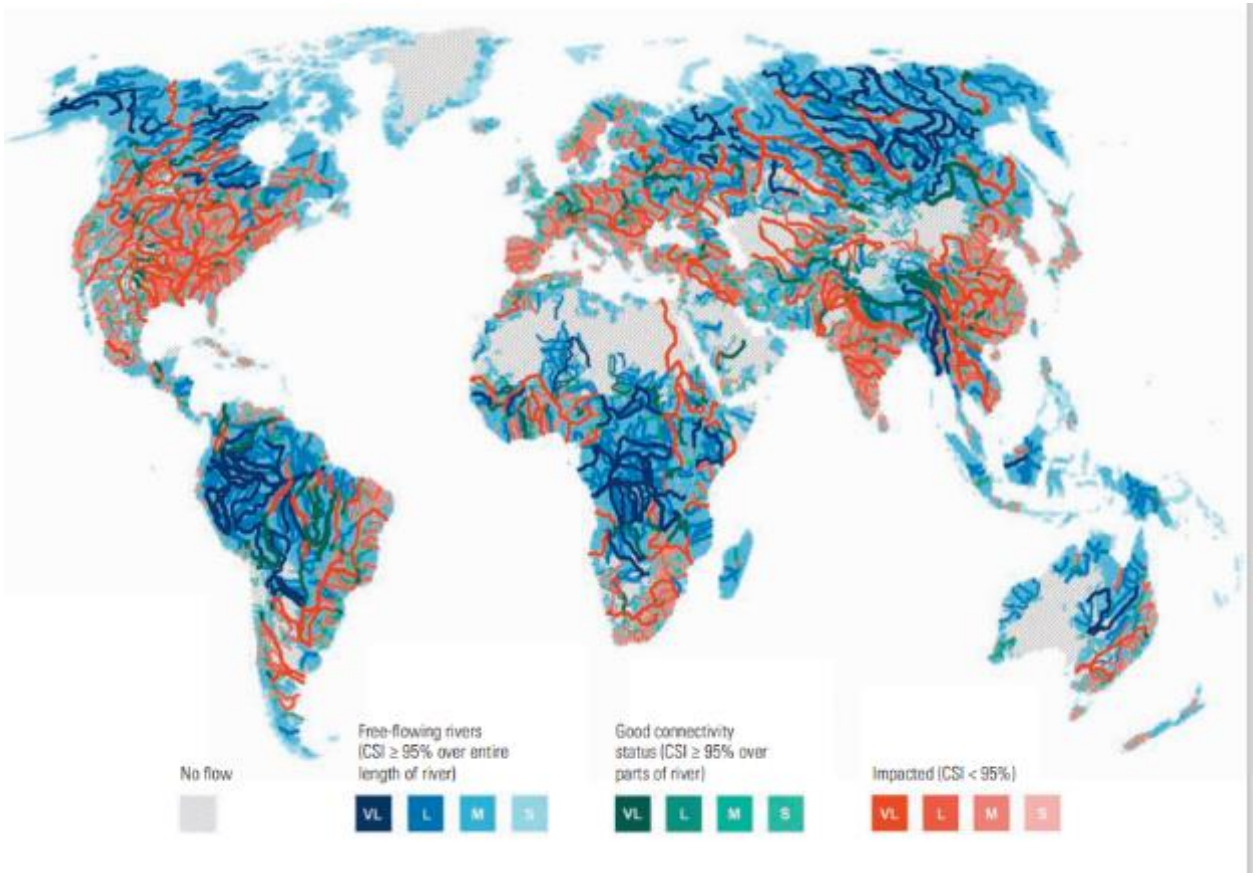
The National Trust

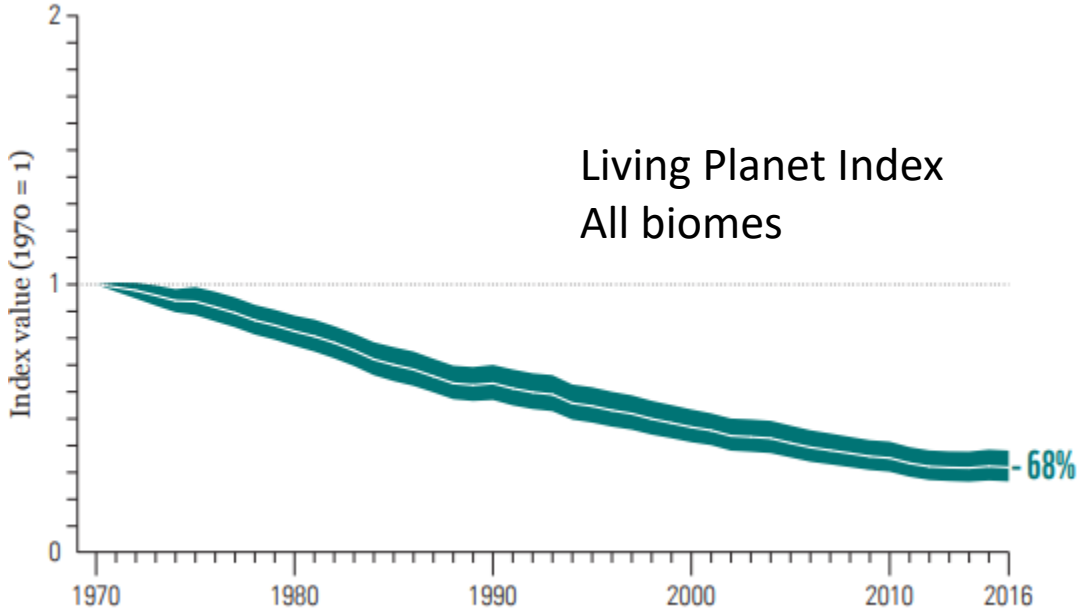
- Founded 1895 by three visionaries – *‘for the benefit of the nation’*
- 5.5 million members; 62,000 volunteers
- 4234 listed buildings (stately homes, castles, pubs, mills, dovecotes, lighthouses)
- 250,000ha. land; 775miles coastline
- 40% of land is protected as SSSI/ASSI

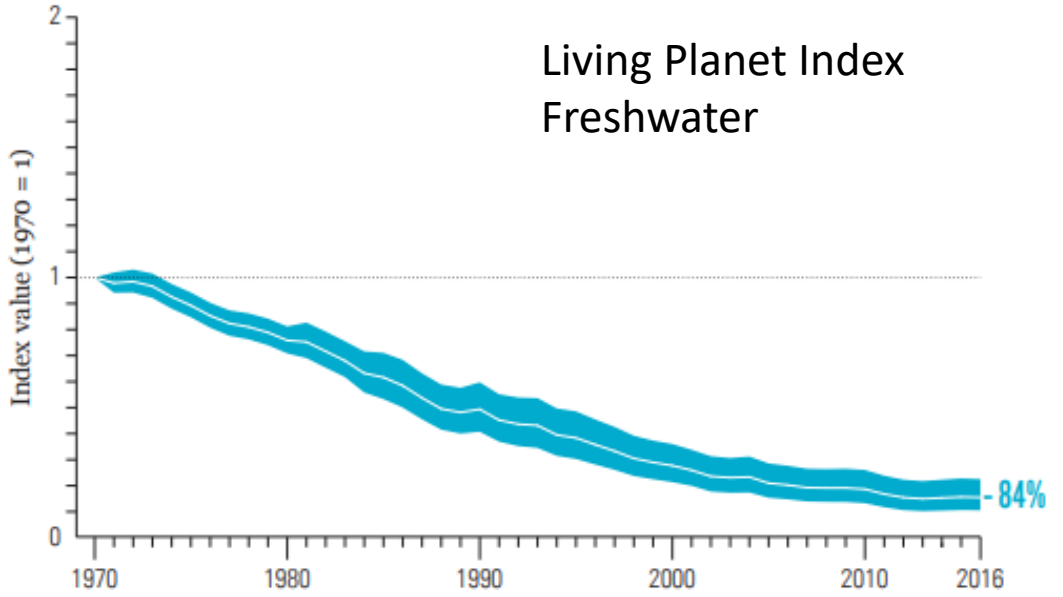
The wallpaper in the Chinese bedroom at Belton House, hung in about 1840

The National Trust looks after one of the most important collections of historic Chinese wallpapers in the world, on permanent display at 18 country houses.

Global state of freshwaters







NT's role in freshwater conservation

- Major landowner – catchment management and landscape scale solutions are within grasp (40% of E&W drains to NT boundary)
- The quality of our freshwaters reflects how well we manage our land and our infrastructure
- Custodians of some of the best remaining sites (River Test, Cumbrian Derwent, River Stour, Little Sea, Malham, Wicken, Snowdonian llyns, Lakeland tarns and lakes, pondscapes – Begwyns, Crom)
- Approx. 450 lakes of varying size (and quality)

UK Lake Types

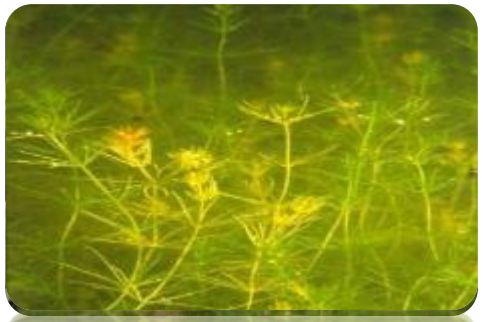
Dystrophic

Peatlands
Low nutrients, peat stained.
Sphagnum, bladderworts
Surrey Heaths, West Midlands

Oligotrophic

Lowland oligotrophic lakes (sandy plains lakes)

e.g. Little Sea, Purbeck



Mesotrophic

Marl lakes (limestone catchments and stonewort dominated)

e.g. Malham Tarn, Stackpole

(Naturally) Eutrophic

Drift deposits
Naturally high nutrients.
Diverse plants

Lowlands

Natural catchment fertility

NERC Innovation Internship with The National Trust

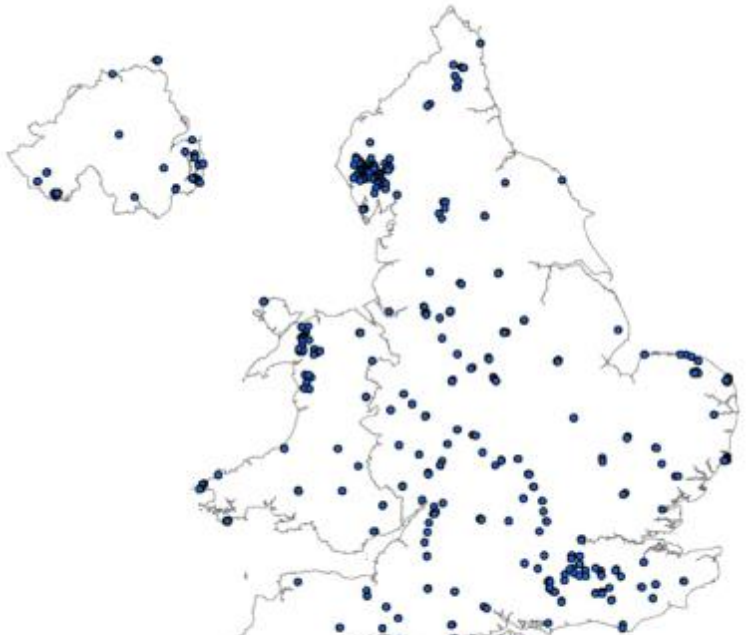
Kate Waters, Stewart Clarke, Linda May,
Stephen Maberly, Ian Winfield & Bryan Spears

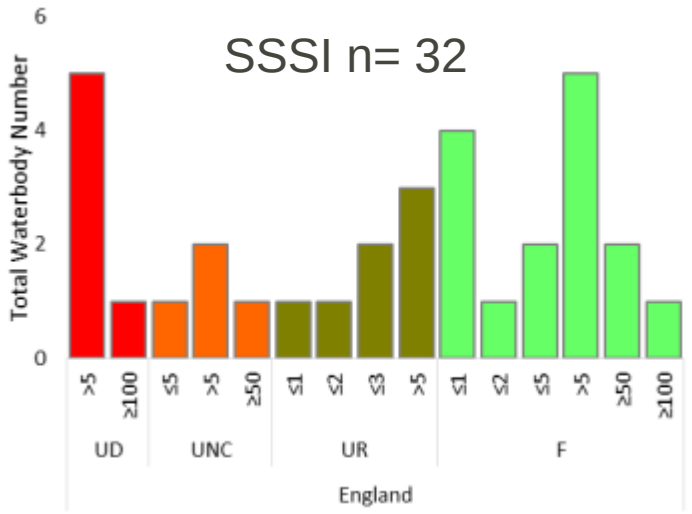
Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

THE NATIONAL TRUST

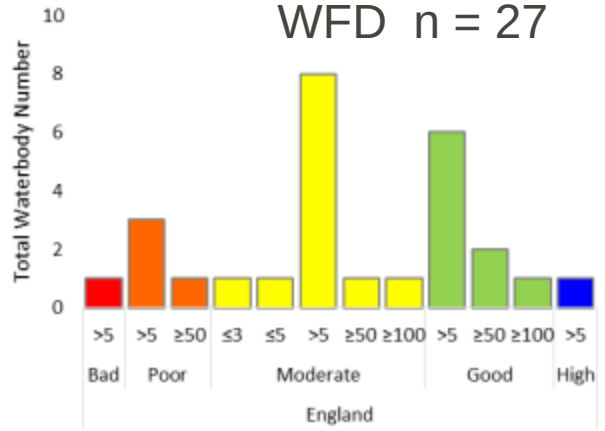
NERC SCIENCE OF THE ENVIRONMENT

NT Lakes & Ponds





	England	Wales	Northern Ireland	**Total**
Number in NT ownership	274	39	62	375
Number where NT is joint owner	13	10	4	27
Number next to NT-owned land	34	9	3	46
Total waterbody number	**321**	**58**	**69**	**448**
Total area (ha) of freshwater in NT ownership	1,501	146	87	1,733
Total area (ha) of freshwater where NT is joint owner	290	59	2	351
Total area (ha) of freshwater next to NT-owned land	2,590	77	50	2,717
Total area (ha) of freshwater	**4381**	**281**	**139**	**4801**



Spirit of Place – defining cultural value

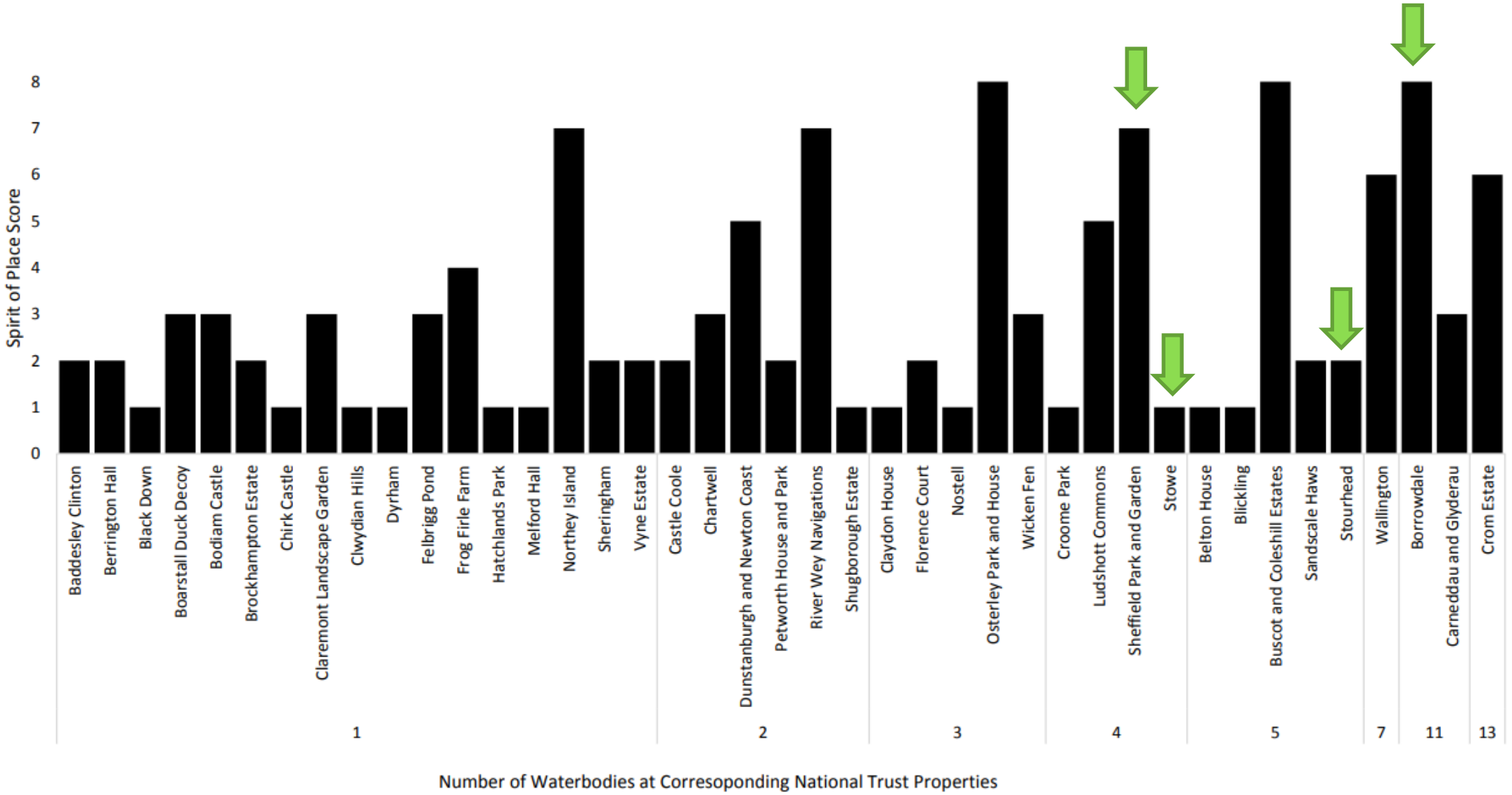
Spirit of Place is at the heart of how people feel about and experience our properties and why they are relevant. It captures what make a place special and ultimately why people should love that place.

No one forgets Borrowdale…
Derwentwater, Queen of the Lakes, *with its mysterious islands…*
In summer Borrowdale can feel cosy and tame: its rivers reduced to ankle deep sparkling pools, its ***lake*** *transformed from a raging, bay-scouring sea to a watery playground.*

Fountains Abbey and Studley Royal - one place, two ways of seeing its beauty. Each combines wood, stone and ***water*** *to realise two very different types of beauty that have delighted generations of visitors.*

Crom, in Upper Lough Erne… (r)emote, set among the islands and winding waters of the Lough... Crom`s gentle watery landscape, beautiful always in sun or rain because of its wide undulating greenness lies beneath a soft Irish sky. At Crom land and water are inseparable.

Assessing Spirit of Place statements



Ornamental lakes

’forming a piece of water’…‘the highest achievement of the improver’s skill…’

Practical Hints upon Landscape Gardening, Gilpin, (1832)

Challenges in the designed landscape

Water quantity
Artificial drainage networks (Petworth)
Leaks (Stowe ‘copper bottomed’ lake)
Large structures (Reservoirs Act compliance)
NT has 46 regulated reservoirs (39 are ‘high risk’)

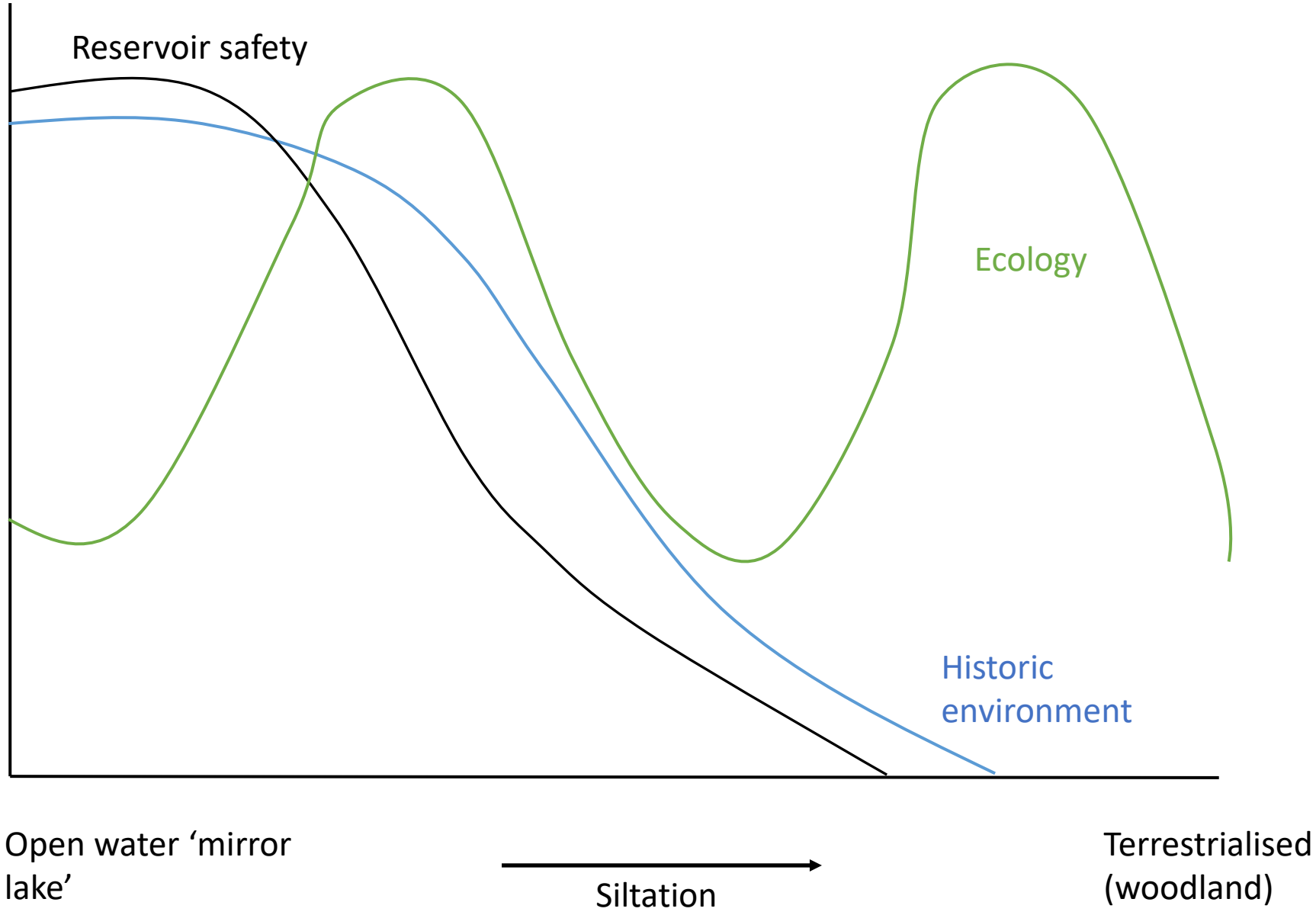
Water quality
‘On-line’ – effective silt and nutrient traps
Catchments which have experienced major land-use change
Unrealistic expectations (land-use and climate change)

Habitat structure
Clean ‘lines’ and pesky plants
Understanding ‘top-down’ and ‘bottom up’ mechanisms

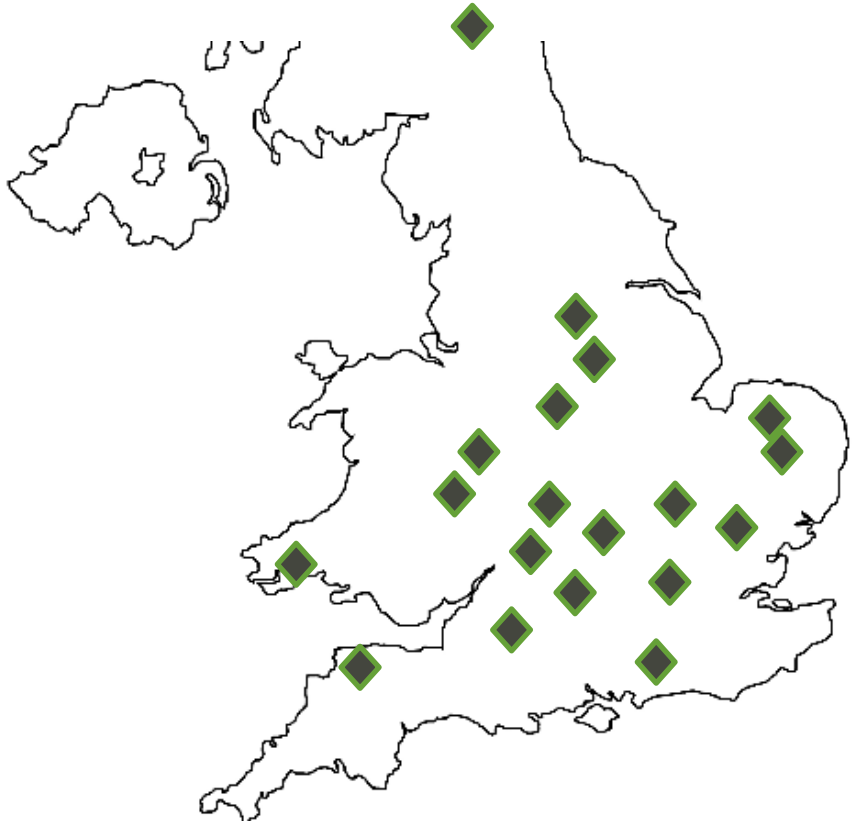
Arlington Court Lake – a dredging conundrum

- 1836-7 Lake created by damming River Yeo
- 1979 30,000 tons silt dredged and deposited on grassland
- 2001/02 Lake dredged (~ £200-300k?), disposal on floodplain
- Estimated that 10,000m^3 needs to removed every 10 years (~3000 truck loads)
- Regulated reservoir – low risk
- Designed landscape (Grade 2); SSSI for lichens

Arlington Court: River Yeo Catchment sediment sources, 17 Oct 2016


Reservoir safety
Ecology
Historic environment
Open water ‘mirror lake’
Siltation
Terrestrialised (woodland)

Assessing ornamental lakes using citizen science techniques

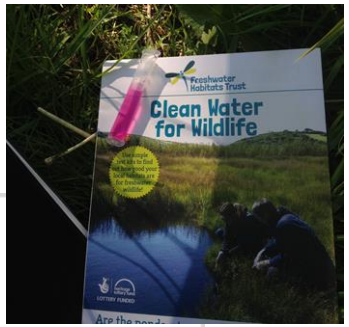


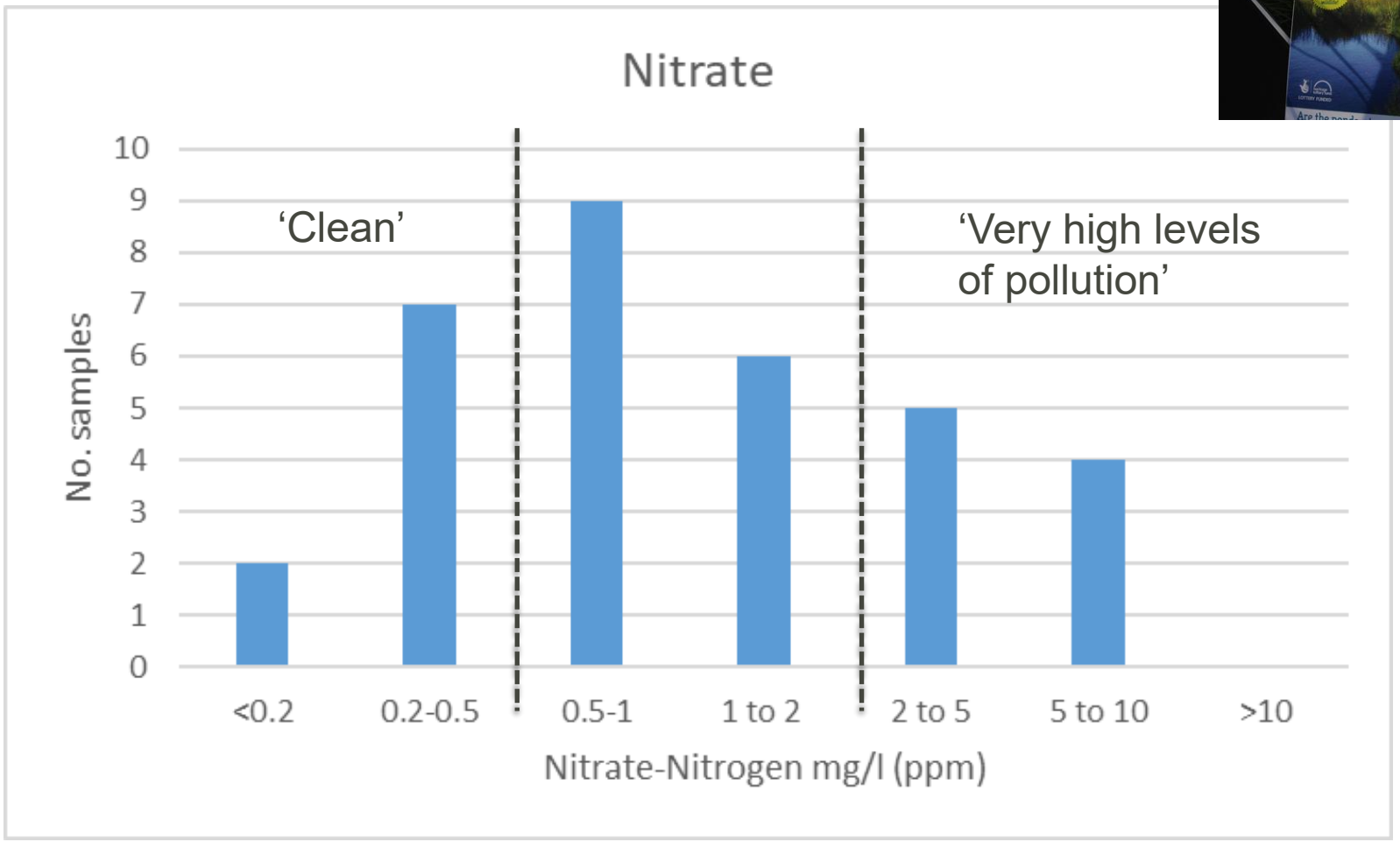
Applying lake Priority Habitat naturalness assessment, water quality test kits and eDNA (metabarcoding of fish communities) to 21 NT ornamental lakes

Simple techniques…

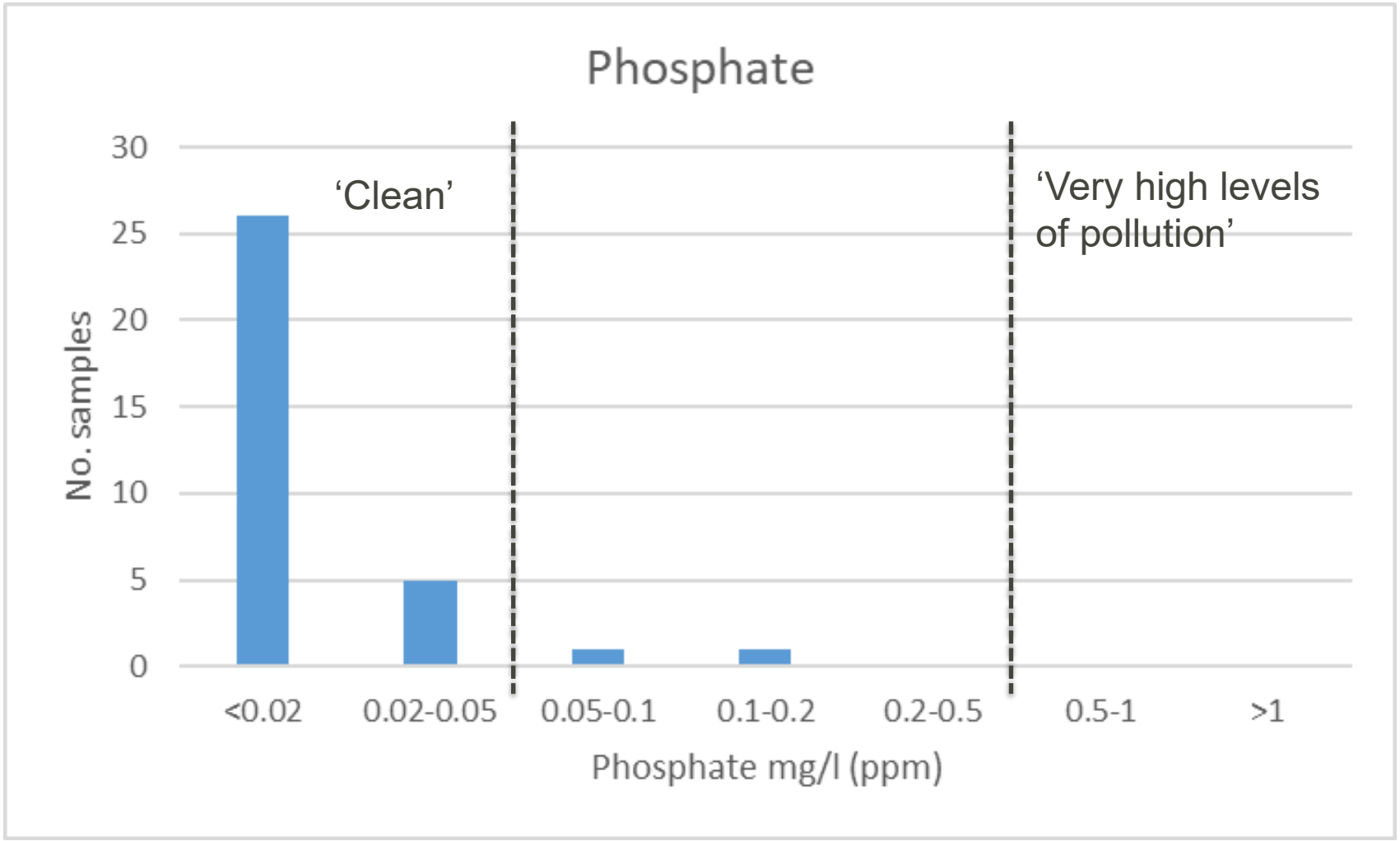
Sampling by me and various NT staff during winter 2019-20

Water quality – simple test kits

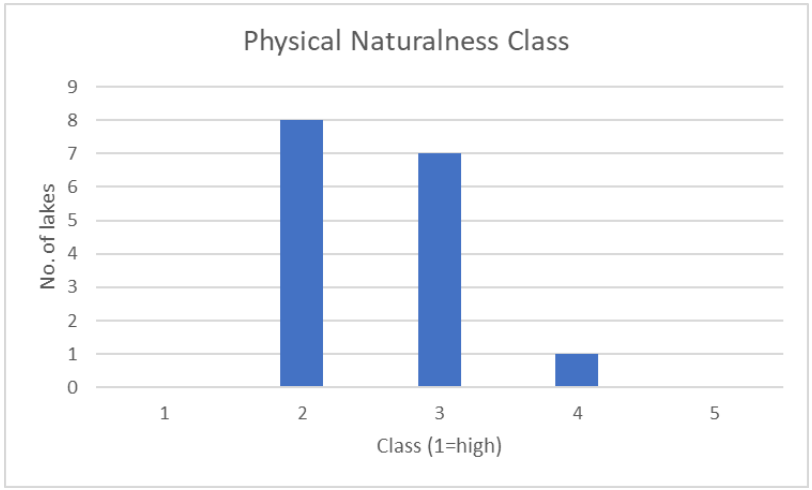


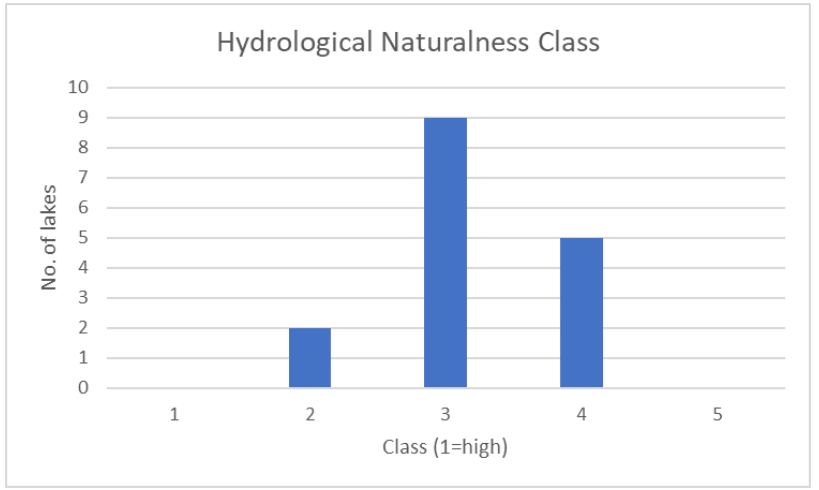


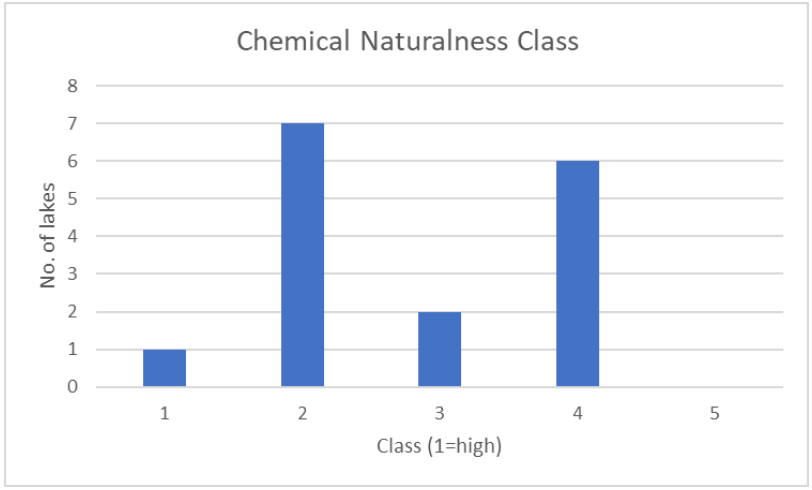
Water quality – simple test kits

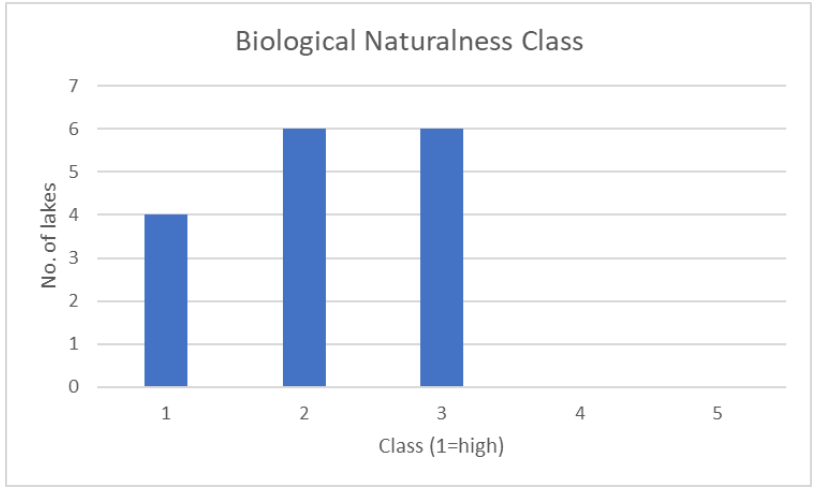


Lake naturalness classes

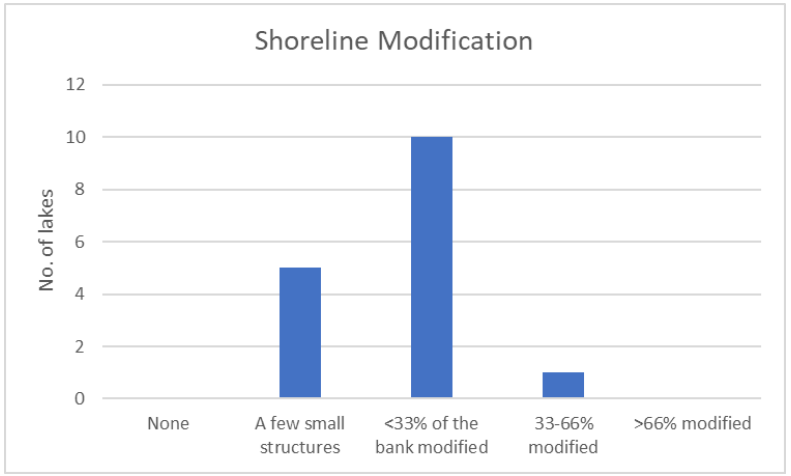


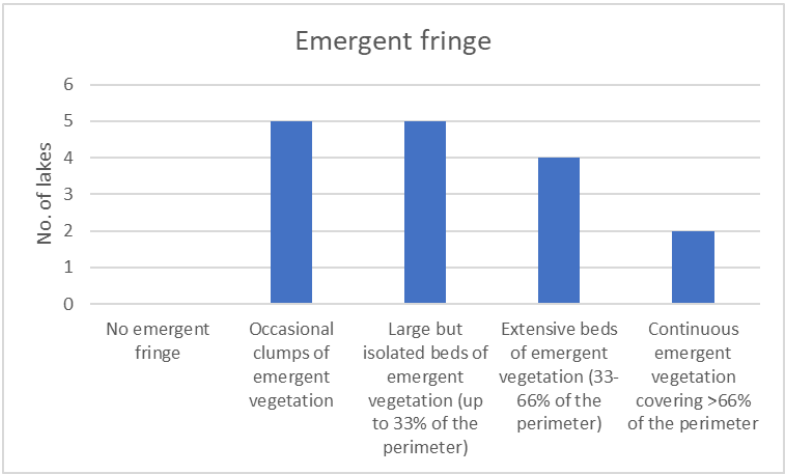


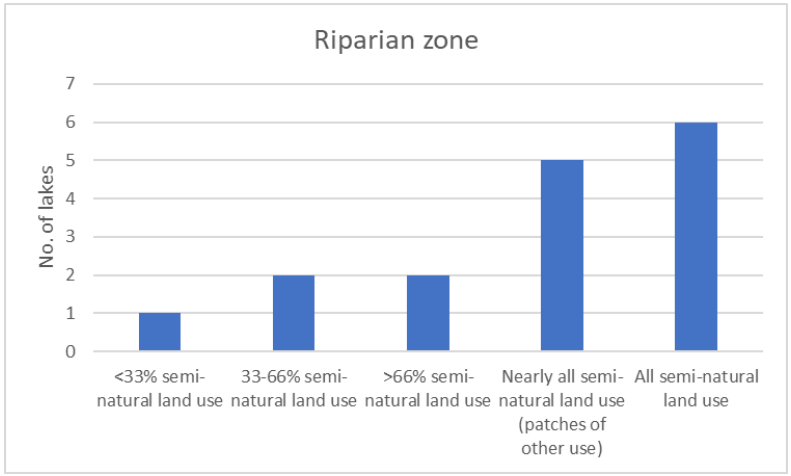


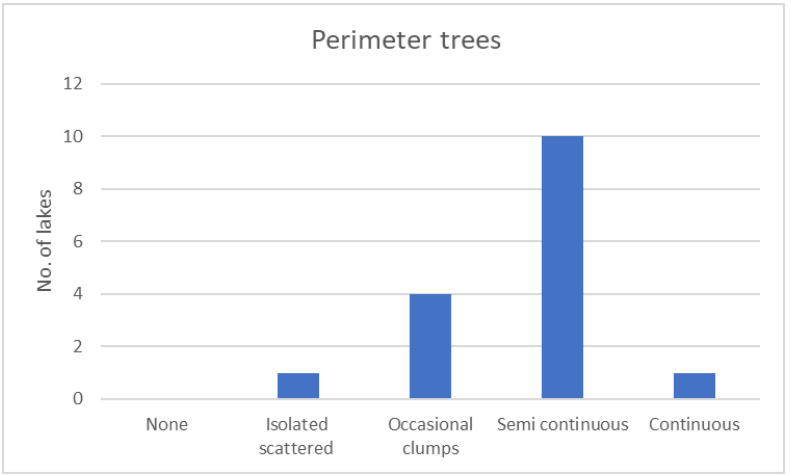


Lake habitat features

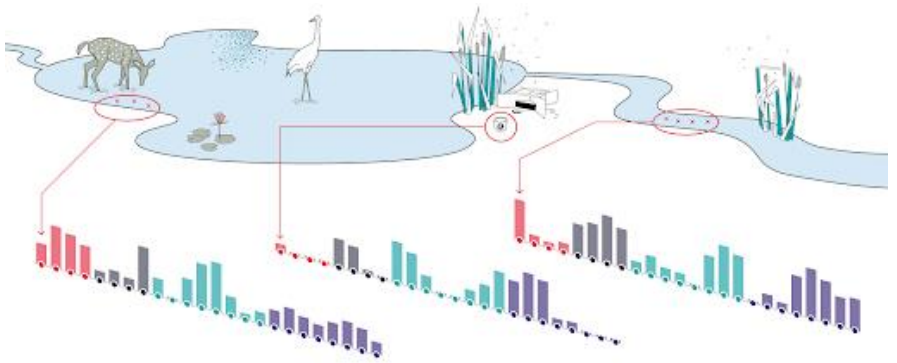


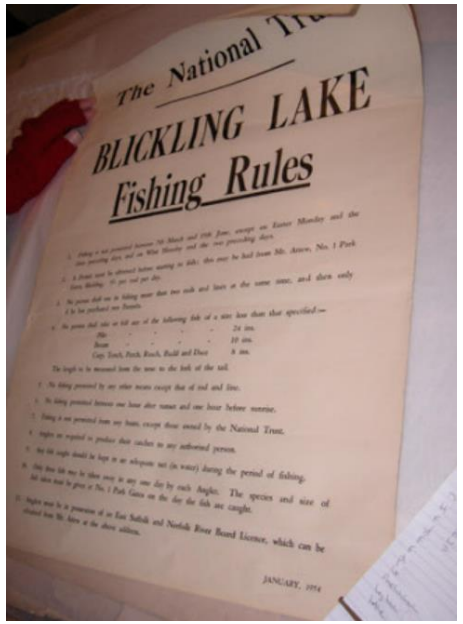






eDNA citizen science kits





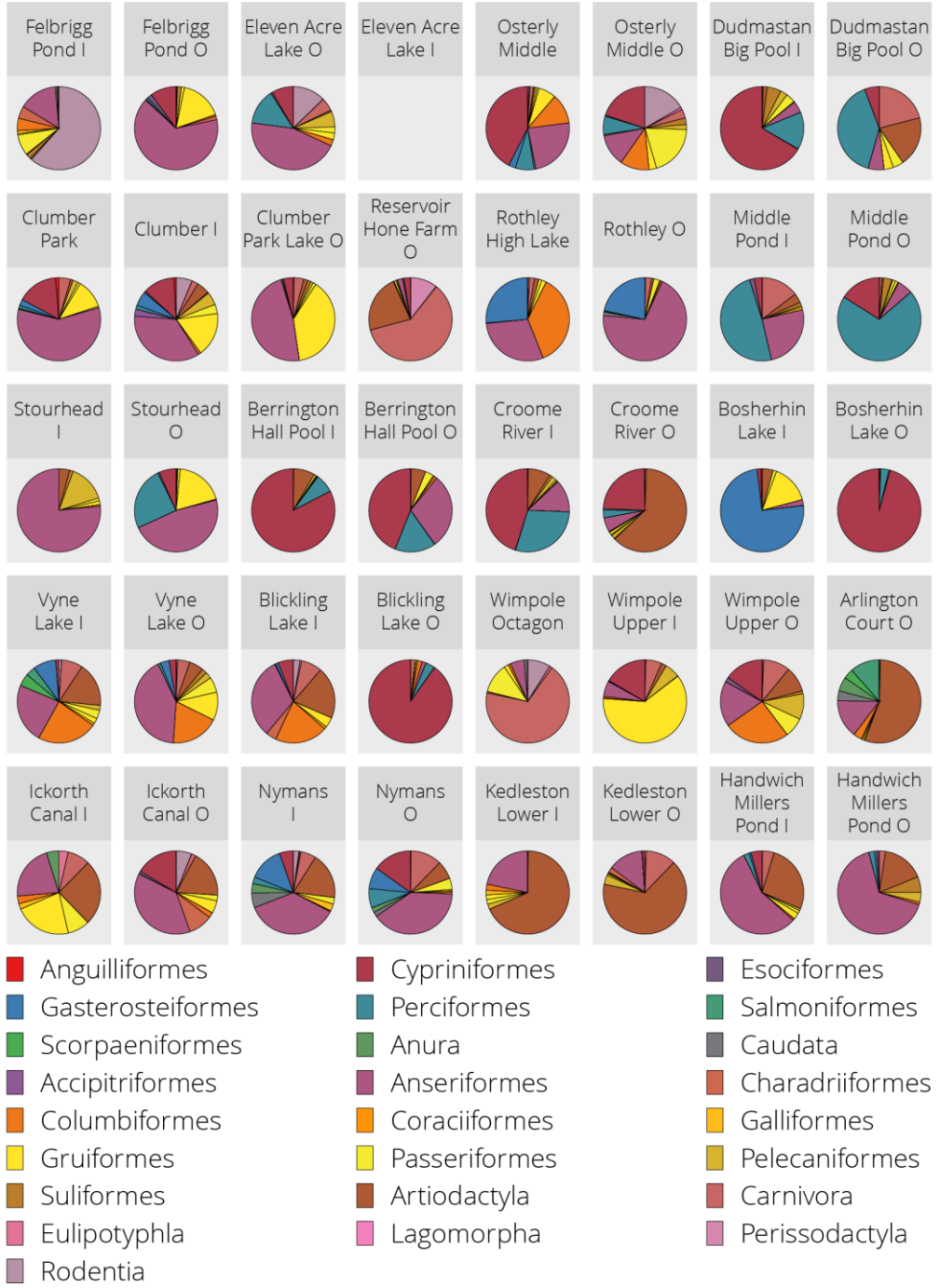
Headline eDNA results

14 fish species detected across the 21 lakes

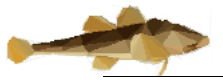
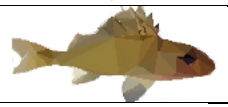
Highest fish richness = 12 species (Clumber); lowest = 0 species (Octagon Pond, Wimpole)

Mean (and median) species richness = 4

Other notable records (no. of lakes): toad (3); kingfisher (1); water rail (2); otter (3).



Species frequency by lake

Species	No. of lakes	
Pike	13	
Perch	13	
Rudd	13	
Roach	12	
3-spined stickleback	10	
Bream	4	
Carp	4	
Brown trout	3	
Bullhead	3	
Eel	3	
Gudgeon	3	
Chubb	1	
Ruffe	1	
Stone loach	1	
*Silver/bighead carp	13	Bait contamination?

Fish of NT lakes

(scaled by frequency)

Conclusions

- National Trust looks after a significant collection of lakes across England, Wales and Northern Ireland of natural and human made origin
- Ornamental lakes present a unique set of management challenges which are likely to be exacerbated by climate change
- Ornamental lakes appear to have considerable ecological value based on simple assessments of habitat structure and species present but are not immune to the nutrient issues facing all freshwaters
- There is more work to do to understand the status of NT lakes and address their management issues

Acknowledgements

Lakes Inventory work
Kate Waters, Bryan Spears and the team of UK CEH Edinburgh

Fish by eDNA work
A number of NT colleagues collected water samples for eDNA analysis without whom this work would not have been possible. Thanks to: Jo Hodgkins, Mark Roberts, Bethan Edmunds, Simon Barker, Andrew Perry

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