Monitoring of upland oligotrophic tarns in Cumbria



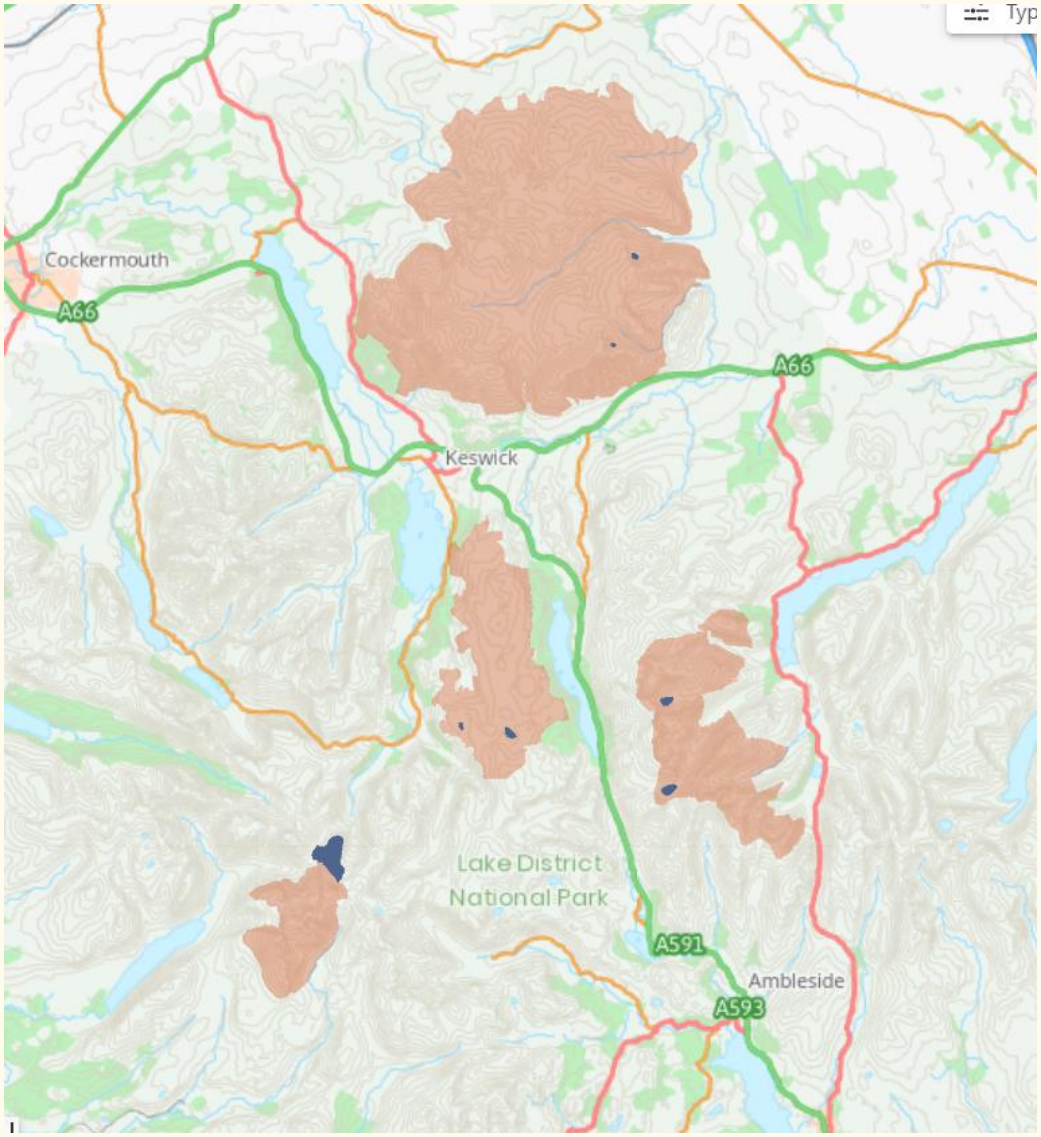
Karen Slater, Senior Freshwater Adviser, Cumbria Team

What will I cover?

- Introduction
- Why monitor?
- Common Standards Monitoring
- Results and discussion
  - *Special thanks to Asa White, Lauren Vickers and others at AECOM for completing this monitoring project for NE*



Introduction & why monitor?



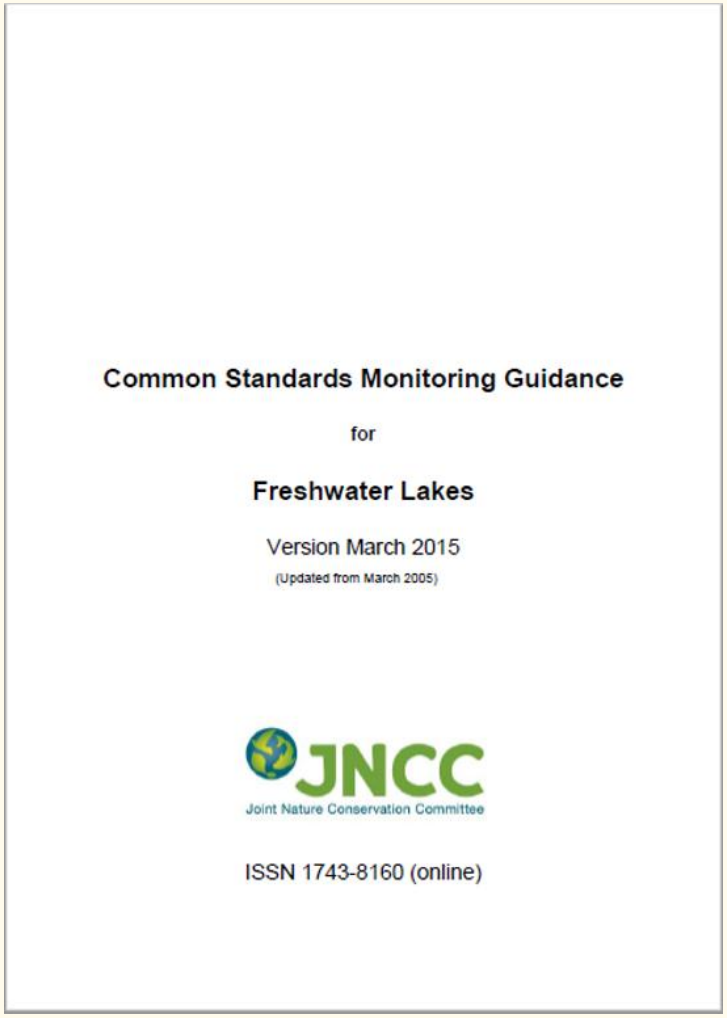
- Project to monitor upland oligotrophic tarns in Cumbria SSSIs
- Monitoring completed June 2025 to May 2026

- Inform management of sites and identify issues
- Progress towards meeting government targets - % of SSSI in Favourable condition by 2032
- Categories – Favourable – Unfavourable recovering – Unfavourable no change – Unfavourable declining - Destroyed

Common Standards Monitoring

Attribute

- Surace area – *no permanent change*
- Composition of macrophyte community
- Macrophyte community structure – *presence of characteristic zones of vegetation & maximum depth of colonisation*
- Water Quality:
    - Dissolved oxygen – HES (>9mg/L)
    - pH – 5.5-7
    - ANC - >40µea/L (annual mean)
    - Total phosphorus - 5µgP/L (annual mean)
    - Total Nitrogen – 0.77mg/L
    - Chlorophyll a - WFD HES
- Hydrology – *no deterioration in hydrological regime*
- Lake substrate – *maintenance of a natural and characteristic substrate*
- Lale shoreline – *near-natural planform in >95% of shoreline length*
- Sediment Load – *maintenance of natural sediment load*
- Connectivity – *maintain connectivity in a lake*
- Indicators of local distinctiveness
- Alien/locally absent species – *none present*



Composition & Structure of macrophyte community

The aims for any standing water feature are to maintain the following:

- a representative flora (i.e. a macrophyte community characteristic for the lake type
- populations of rare species supported by the lake
- species richness appropriate to the lake type
- a natural macrophyte assemblage



Photo – Naomi Lumsden

Composition & Structure of macrophyte community

For oligotrophic lakes:

- Presence of at least three characteristic *Littorelletea* species
- No loss of characteristic species
- Presence of characteristic species on at least 60% of vegetated sample points (boat and wader samples)
- No significant decline in the total frequency of occurrence of characteristic species and all sampling points

- Low cover values for filamentous algae in <20% of sampling points

Littorellatea flora:
Eriocaulon aquaticum
Isoetes echinospora
Isoetes lacustirs
Littorella uniflora
Lobelia dortmanna
Subularia aquatica

Other flora:
Apium inundatum
Baldellia ranunculoides
Elatine hexandra
Eleogiton fluitans
Luronium natuans
Pilularia globulifera
Spaganium anugustifoium
Utricularia spp.

What have we found for the upland tarns?

Macrophytes

	Red Tarn	Grisdale Tarn	Dock Tarn	Blea Tarn	Bowscale Tarn	Scales Tarn	Sprinkling Tarn	Styhead Tarn
Isoetes lacustirs			18		6	0	16	19	1
Littorella uniflora	Y		34	1	27	29		12	10
Lobelia dortmanna				13	29	22			8
Subularia aquatica				1	26			8	1
Callitriche hamulata		30		0	0			2	5
Eleogiton fluitans									7
Juncus bulbosus		3	0	2	2			8	30
Nitella flexilis agg		21	7						
Nuphar x spenneriana					6				
Spaganium anugustifoium			0	4	1			0	0
Percentage of vegetated sample points with characteristic species	89.4	100	46.9	98.1	96.7	84.2	77.5	97.2	
No loss of *Littorelletae* spp	N/A	Yes	Yes	Yes	No	Yes	Yes	Yes	
No loss of characteristic species	Yes	No	No	Yes	No	Yes	No	No	
No decline in total frequency of occurance of characterisitc species	Yes	Increase	Yes	Yes	Yes	Increase	No previous data	No previous data	

What have we found for the upland tarns?

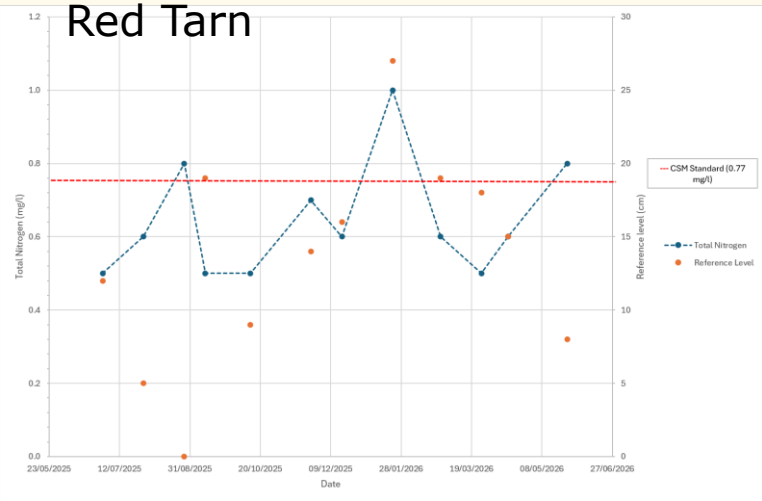
Water Quality

Determinand	Unit	Target	Red Tarn	Grisdale Tarn	Dock Tarn	Blea Tarn	Bowscale Tarn	Scales Tarn	Sprinkling Tarn	Styhead Tarn
pH	pH units	5.5-7.0	6.53	6.64	6.59	6.17	6.51	5.57	6.51	6.4
DO	mg/l	>7	9.91	8.51	8.88	8.55	9.28	8.28	8.82	9.17
TN	mg/l	<0.77	0.64	0.74	0.88	0.94	0.94	0.65	0.79	0.85
TP	µg/l	<5	3.1	2.8	4.8	5.31	1.93	1.06	4.63	2.78
Chlorophyll a	µg/l	<1	1.67	2.38	1.59	1.24	1.67	0.59	2.11	0.93
ANC	µeq/l	>40	290	303	338	272	325	176	270	262

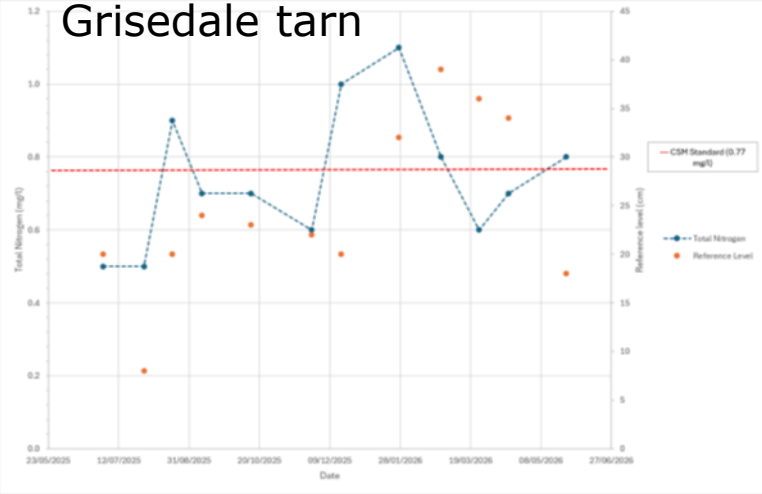
What have we found for the upland tarns?

Water Quality – TN June 2025 to May 2026

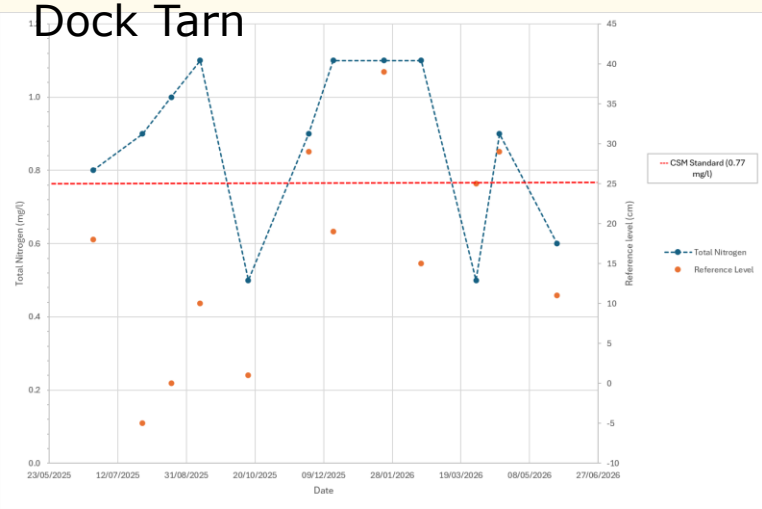
Red Tarn



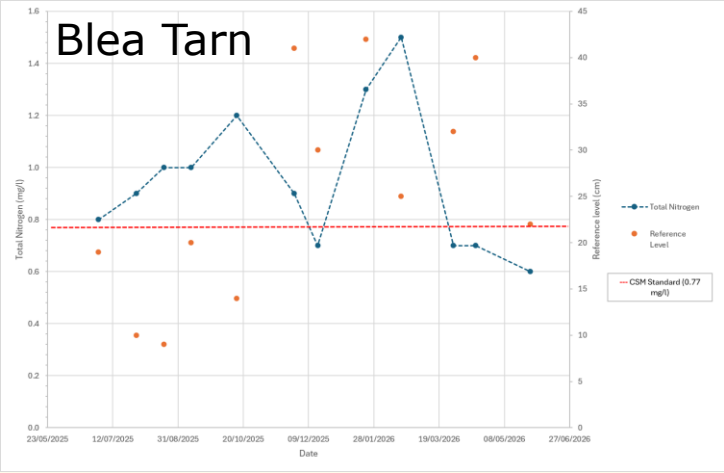
Grisedale tarn



Dock Tarn

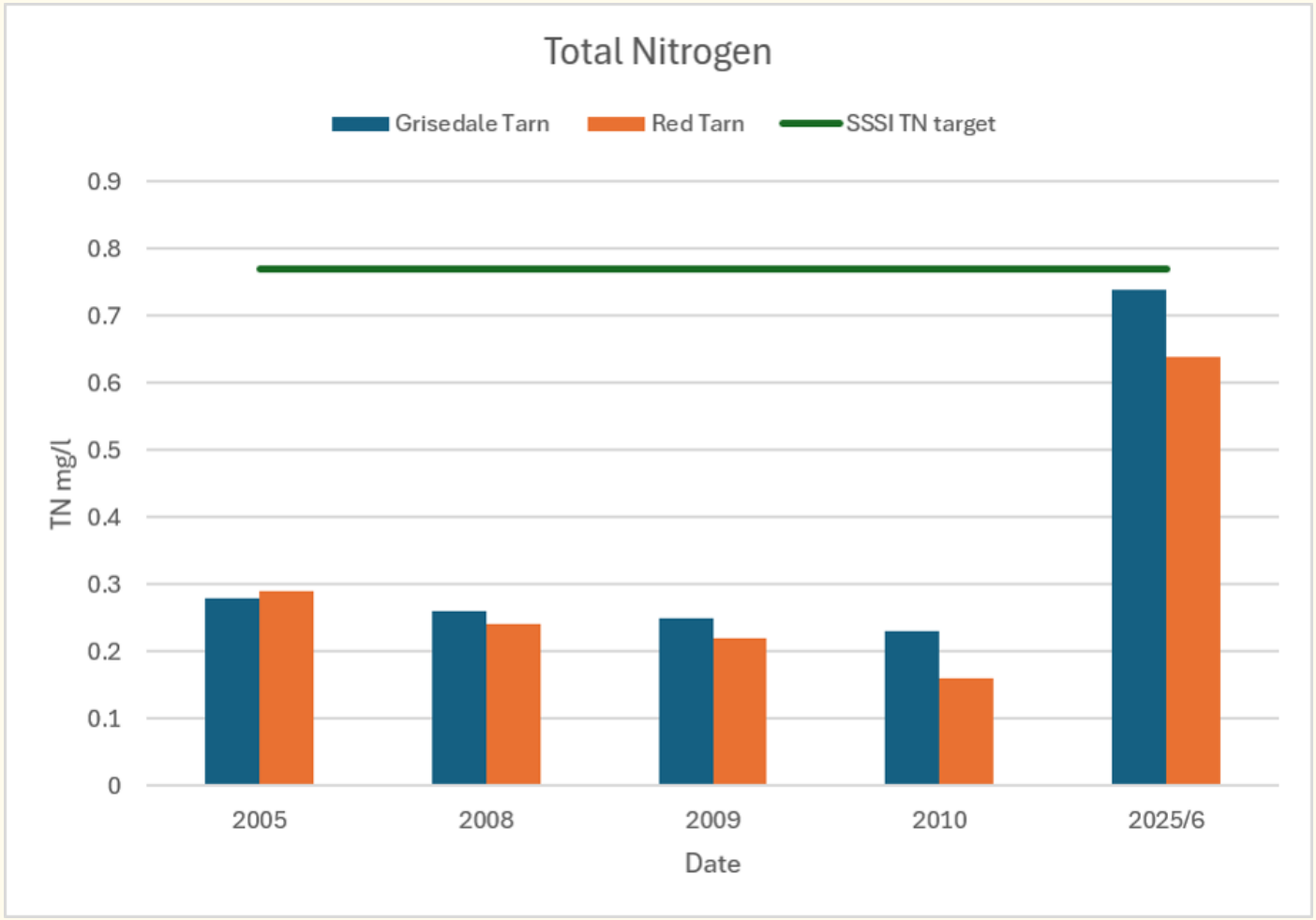


Blea Tarn



What have we found for the upland tarns?

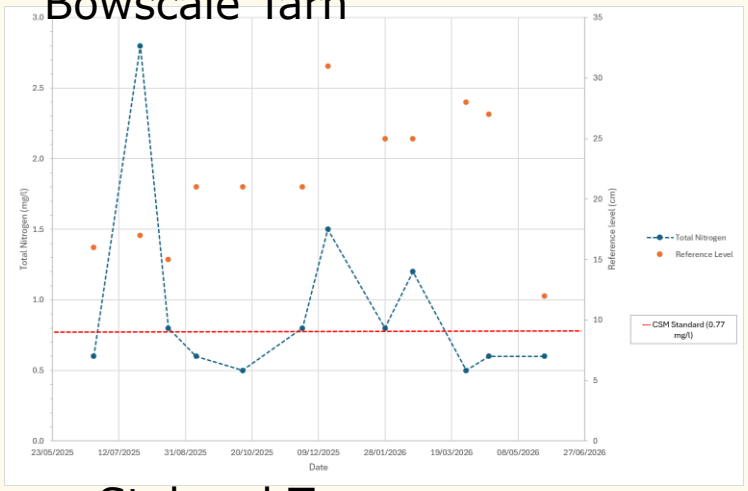
Water quality – TN – Grisdale Tarn and Red Tarn



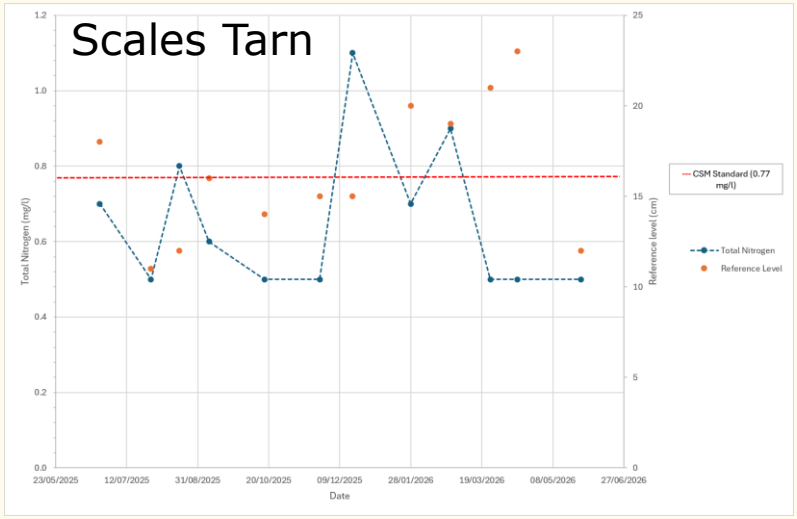
What have we found for the upland tarns?

Water Quality – TN June 2025 to May 2026

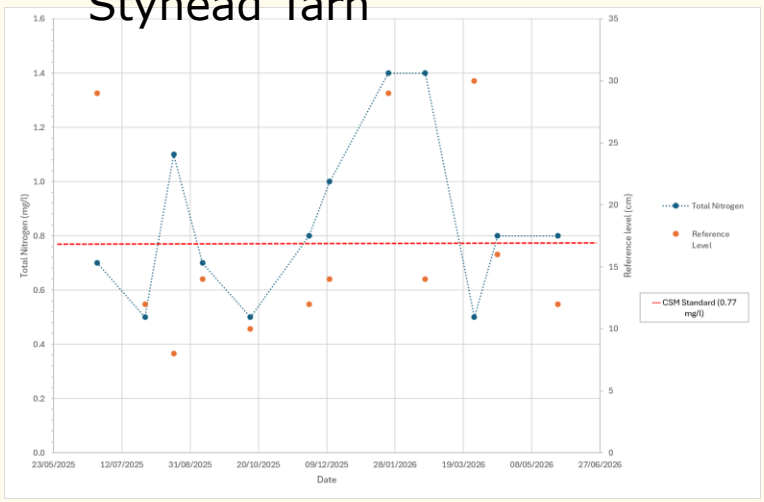
Bowscale Tarn



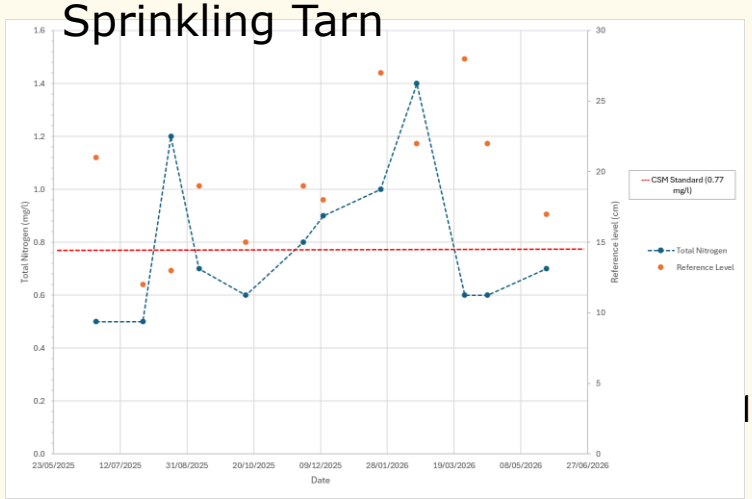
Scales Tarn



Styhead Tarn

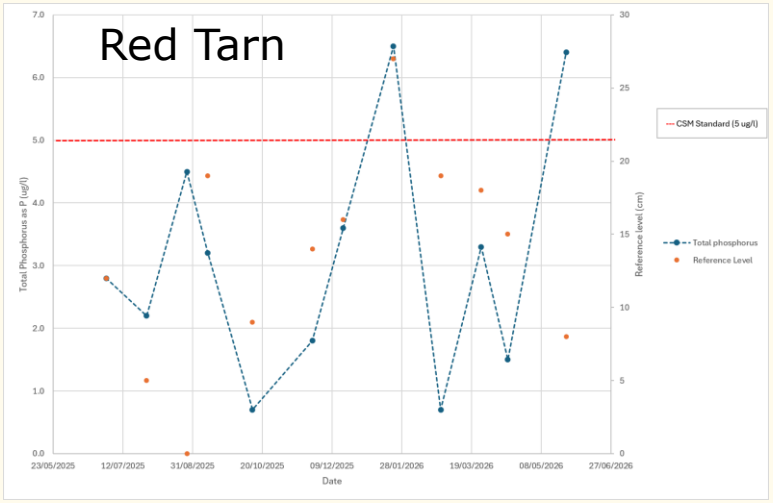


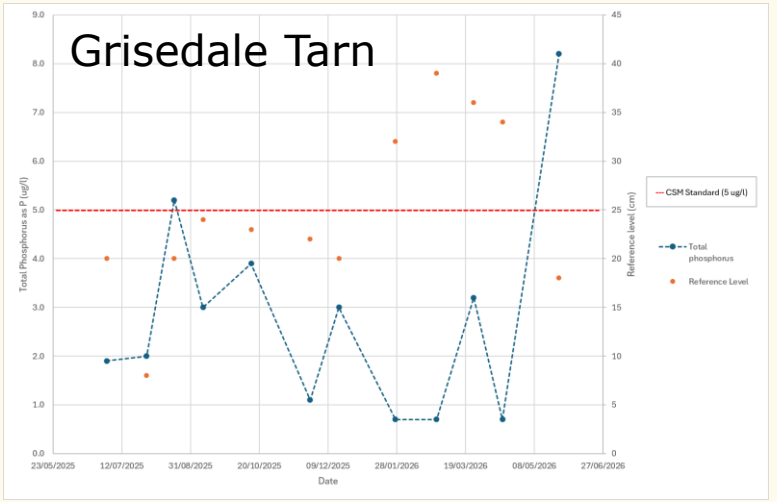
Sprinkling Tarn

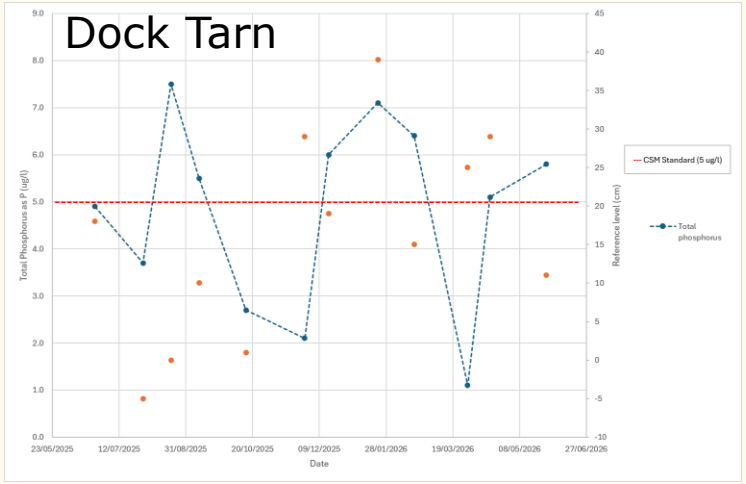


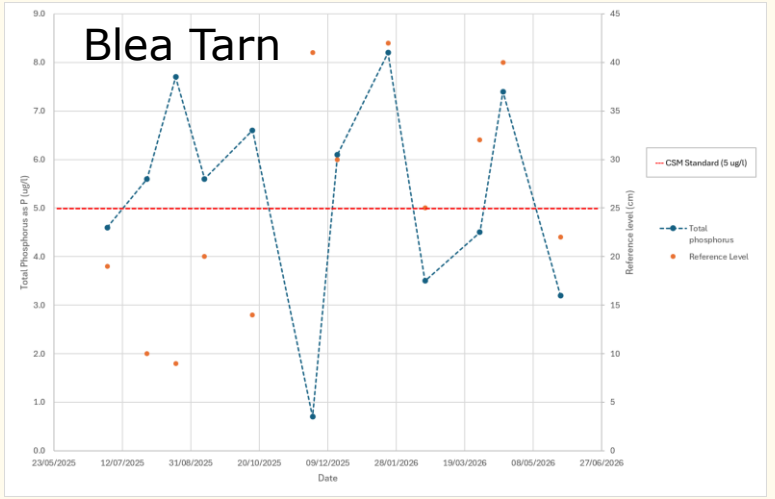
What have we found for the upland tarns?

Water Quality – TP June 2025 to May 2026



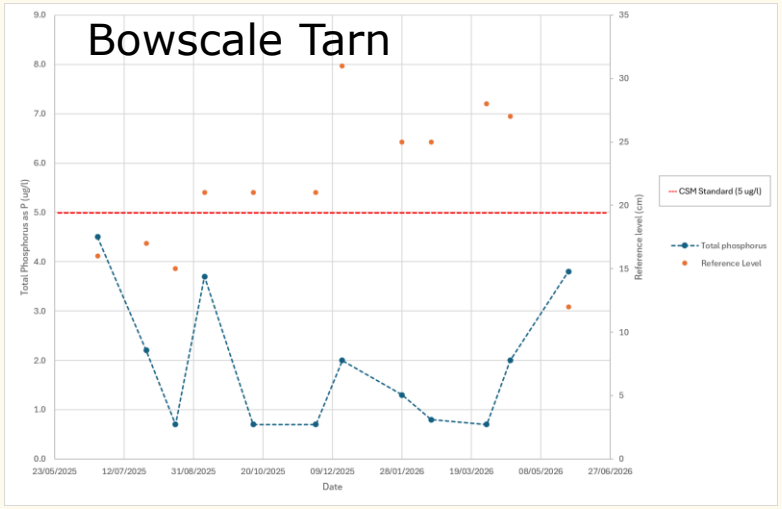


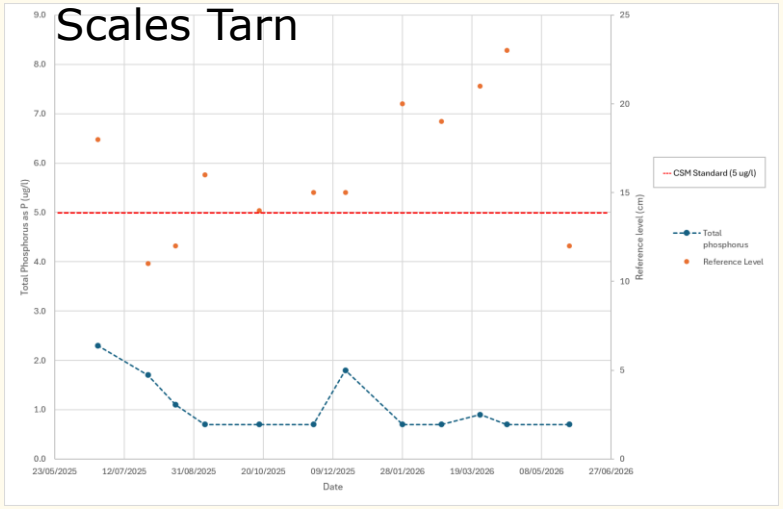


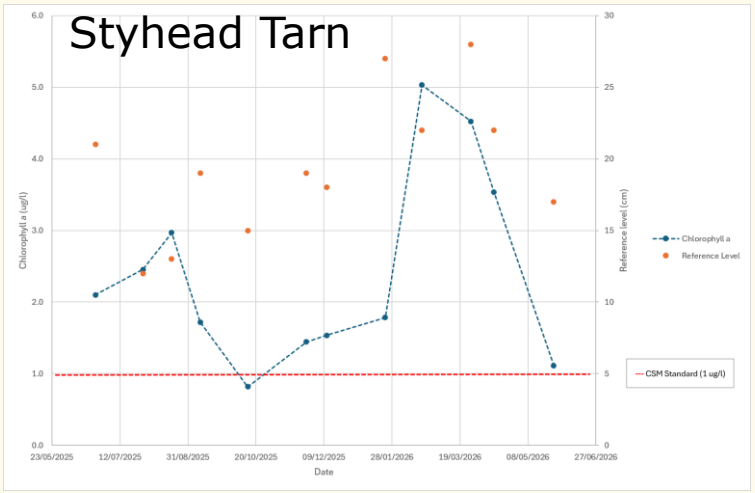


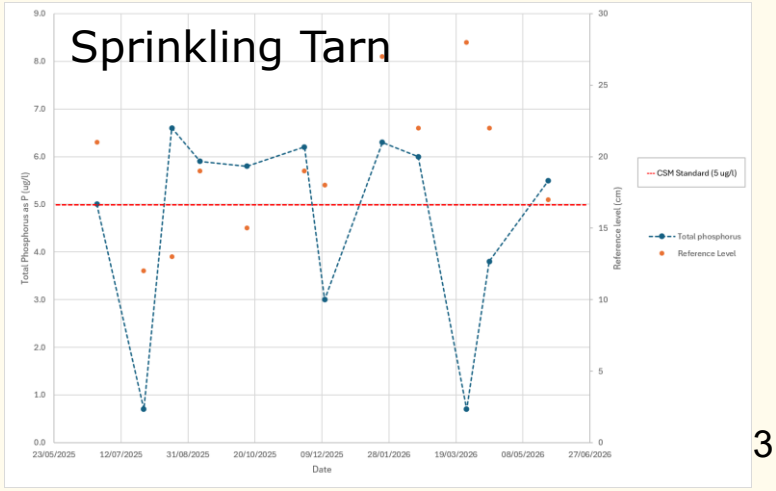
What have we found for the upland tarns?

Water Quality – TP June 2025 to May 2026



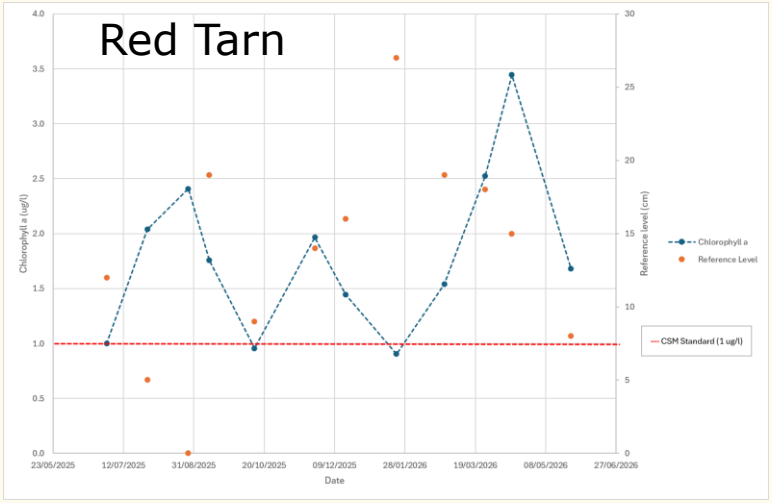


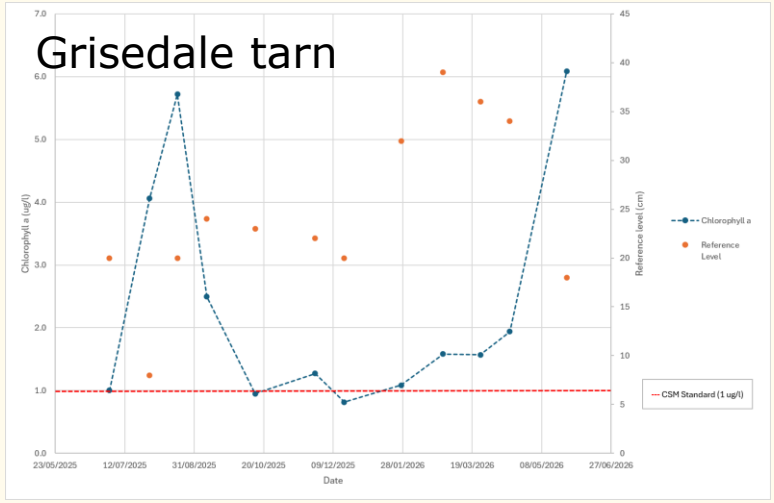


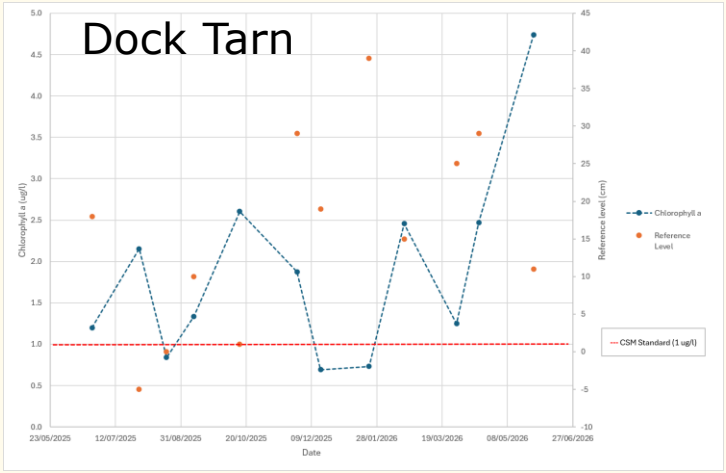


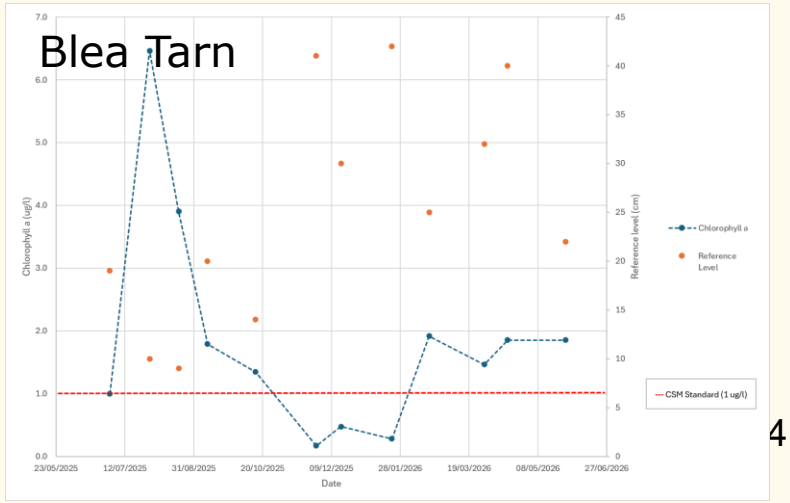
What have we found for the upland tarns?

Chlorophyll a June 2025 to May 2026



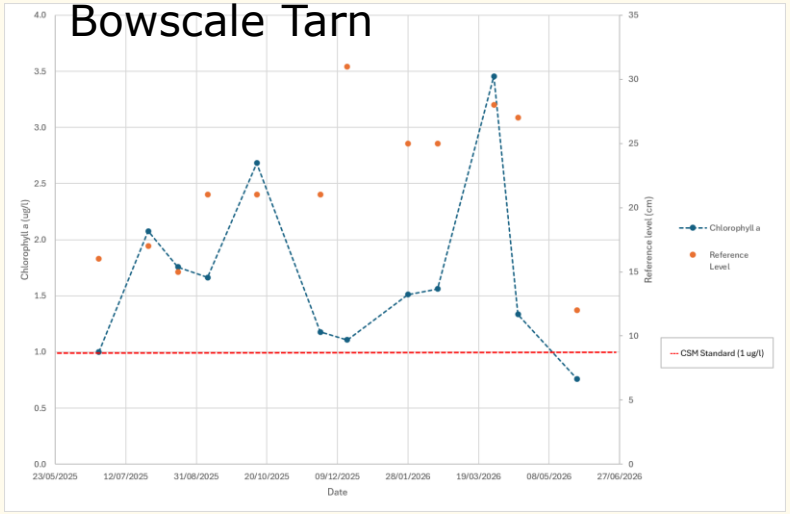


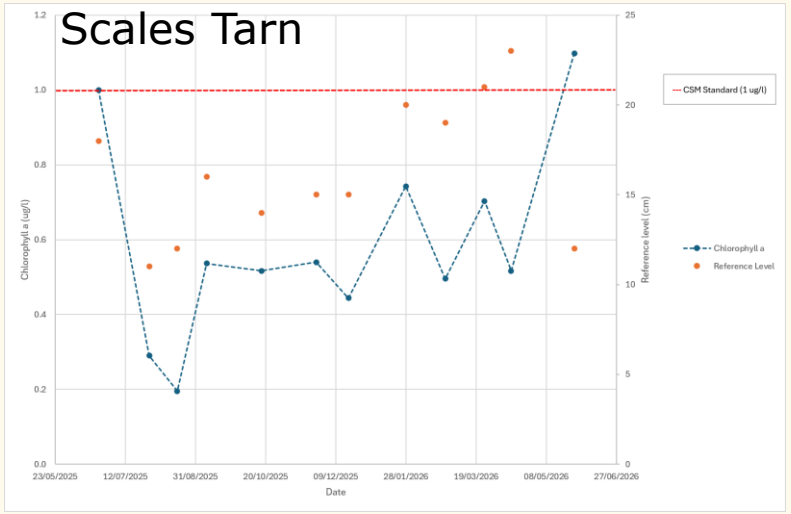


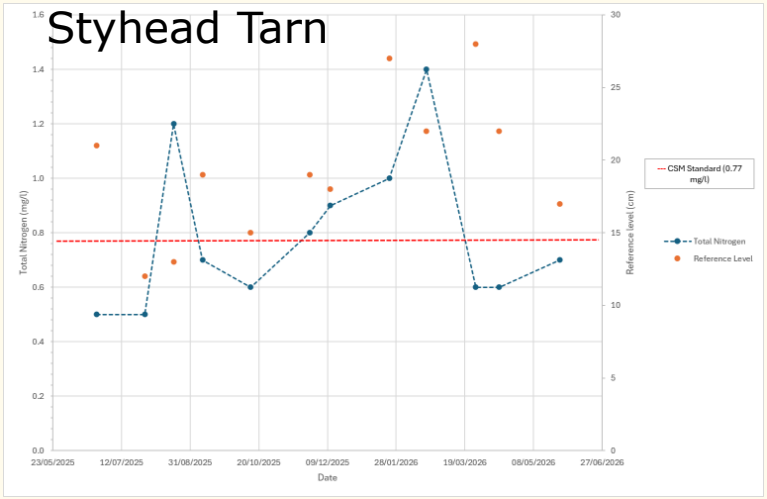


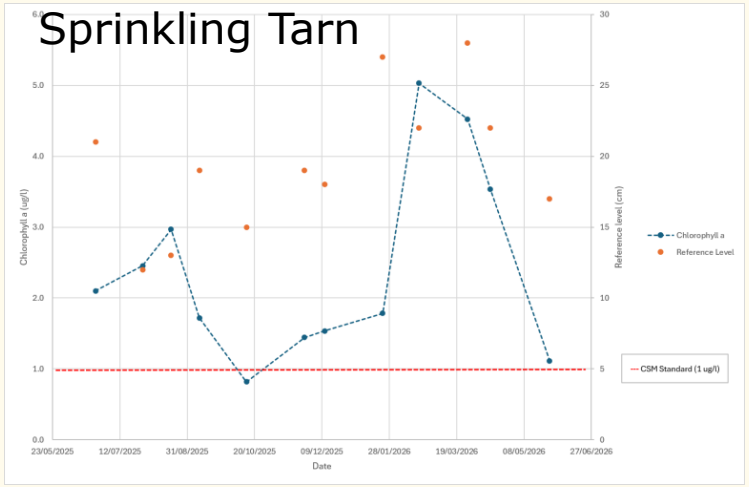
What have we found for the upland tarns?

Chlorophyll a June 2025 to May 2026









What have we found for the upland tarns?

- No alien species present
- Filamentous algae - Cover values below target levels
- Presence of characteristic zones of vegetation
- No deterioration in hydrological regime compared with baseline.
- Maintenance of natural and characteristic substrate
- Maintenance of a natural sediment load
- No loss of connectivity

All targets are met



BUT

Near-natural planform in >95% of shoreline length, near natural slope profile in >95% of the length of the shoreline.

Not being met for Red Tarn, Scales Tarn and Styhead Tarn



NATURAL ENGLAND