Innovative brash management to enhance water quality following peatland restoration and forestry operations.

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Brash


Aged needles


Aged brash


Fresh brash mat

Brash mat examples

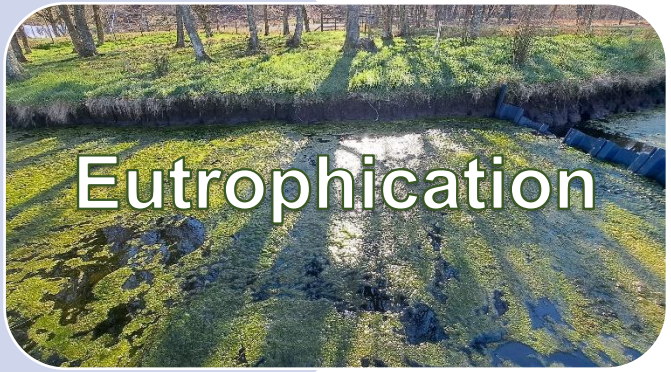
Creating a brash mat

Brash management

Brash mats left in situ

Brash bale going for biomass

Why manage brash?



Negative impacts of decomposing brash

Project aims

1. How can we best manage brash on forestry and peatland restoration sites?
2. Compare evolving techniques in felling and peatland restoration on water quality.
3. Can we repurpose brash? Creating a brash-based biochar water filter.

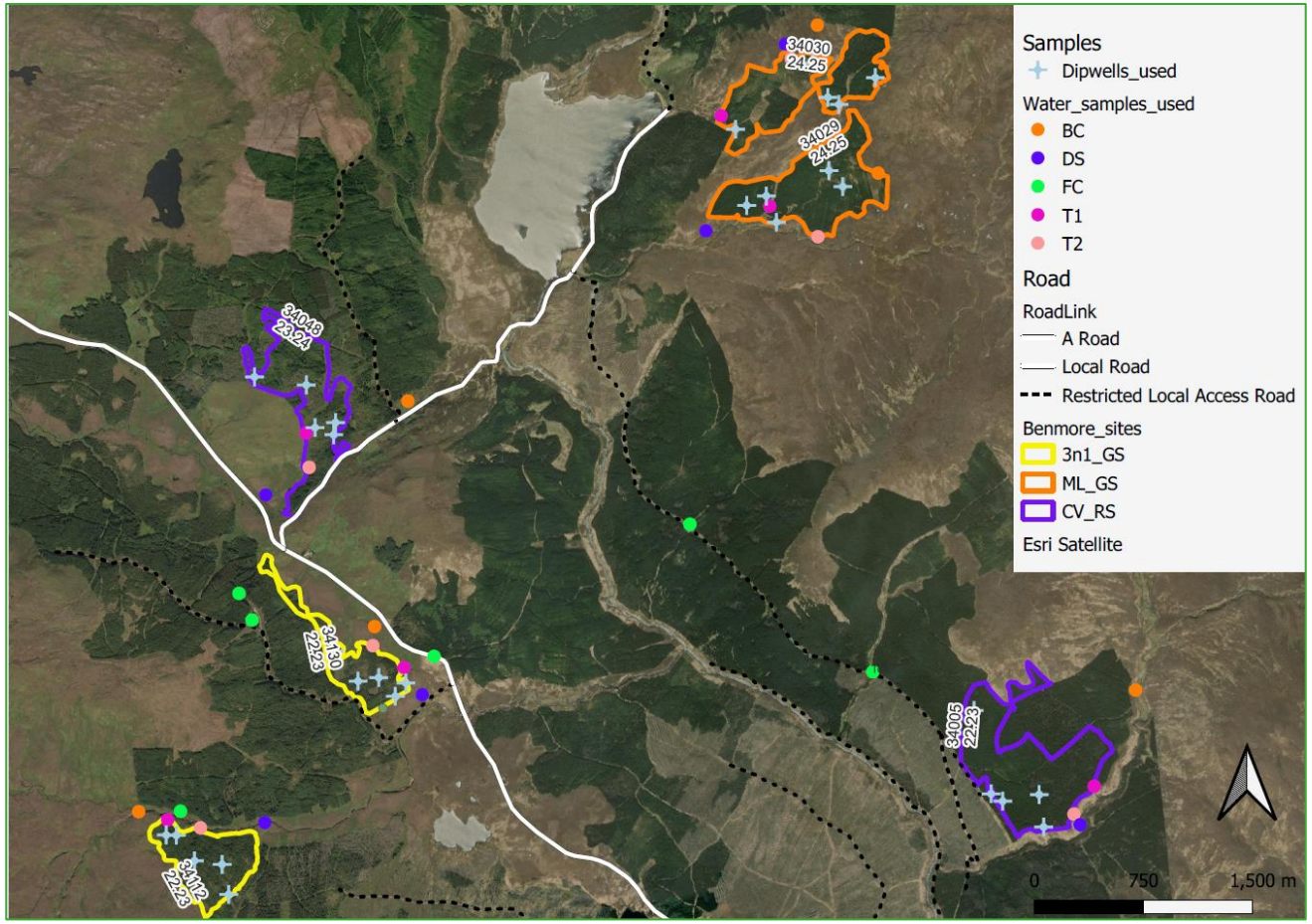
Benmore Forest

Forestry and Land Scotland

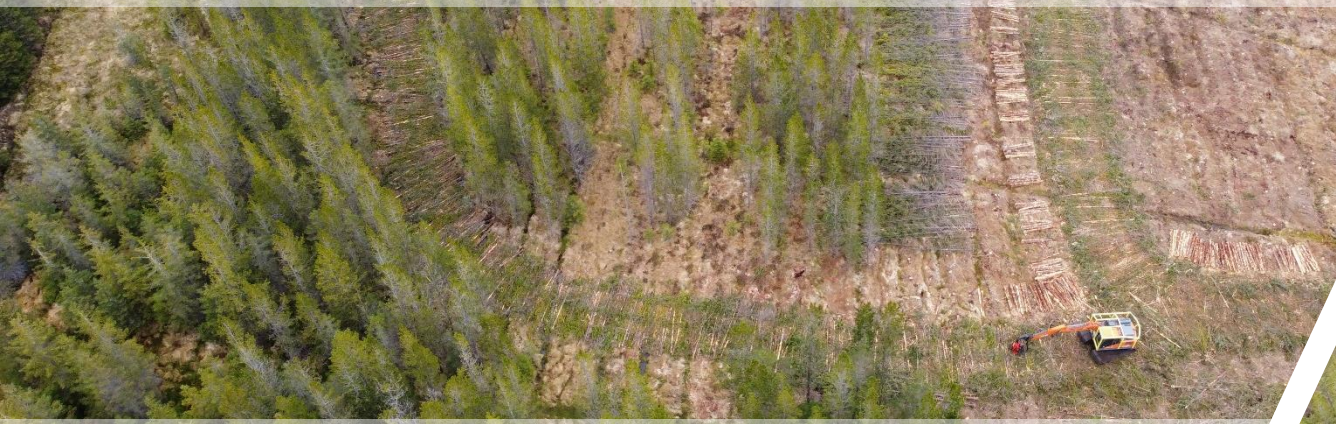
3 paired sites.

Management techniques:

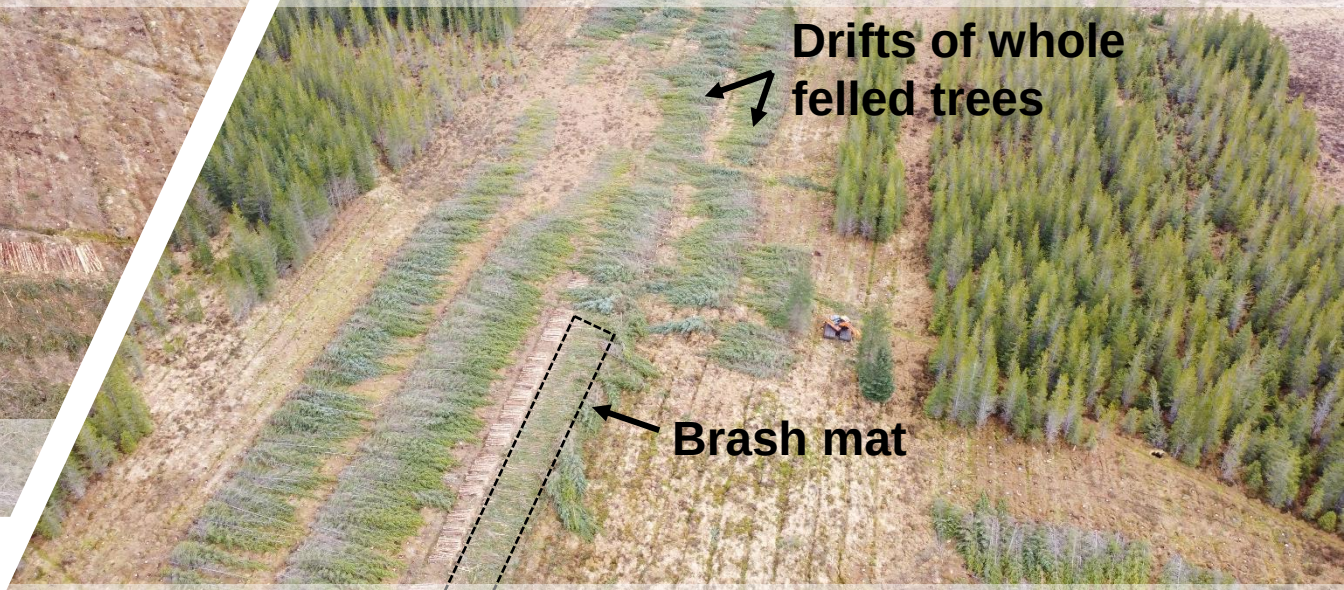
1. Mulching & ground smoothing.
2. Multiple drifts felled into one & ground smoothing.
3. Conventional harvesting.



Process of felling multiple drifts into one



1. Access route cut conventionally.



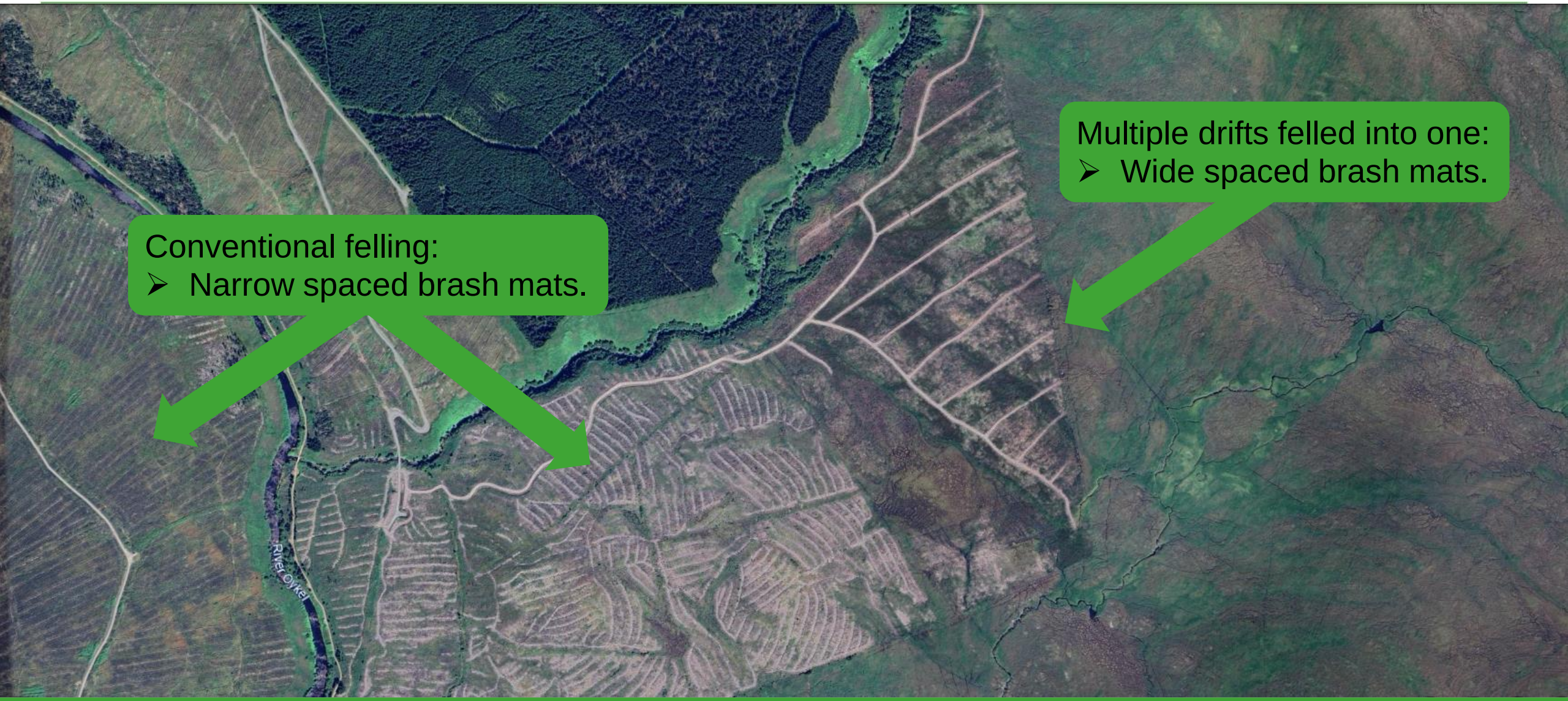
2. Excavator cuts whole trees with shears.

Results in…

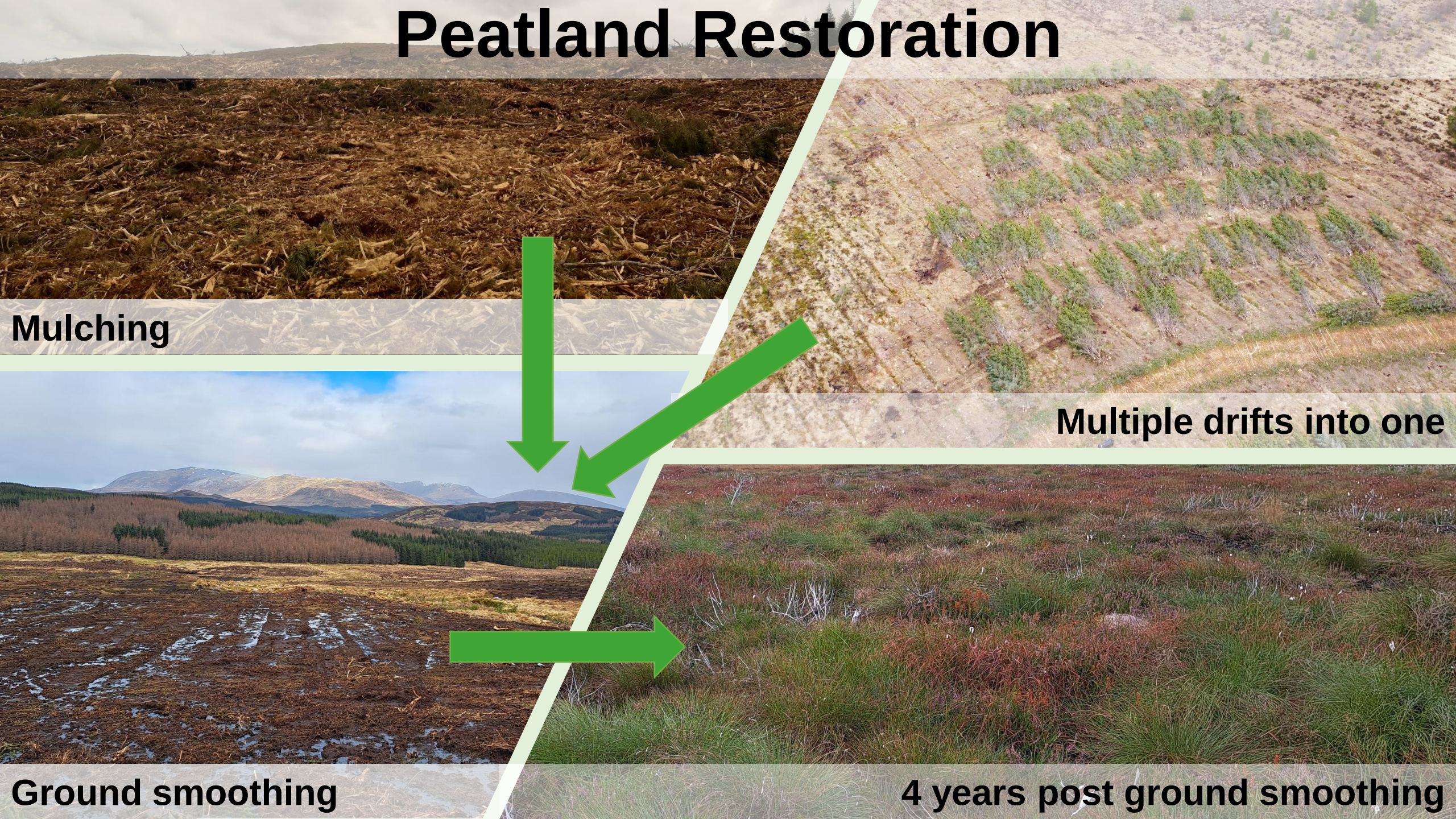
Low stumps, no visible damage.

Widely spaced brash mats.

Multiple-into-One vs Conventional



Peatland Restoration

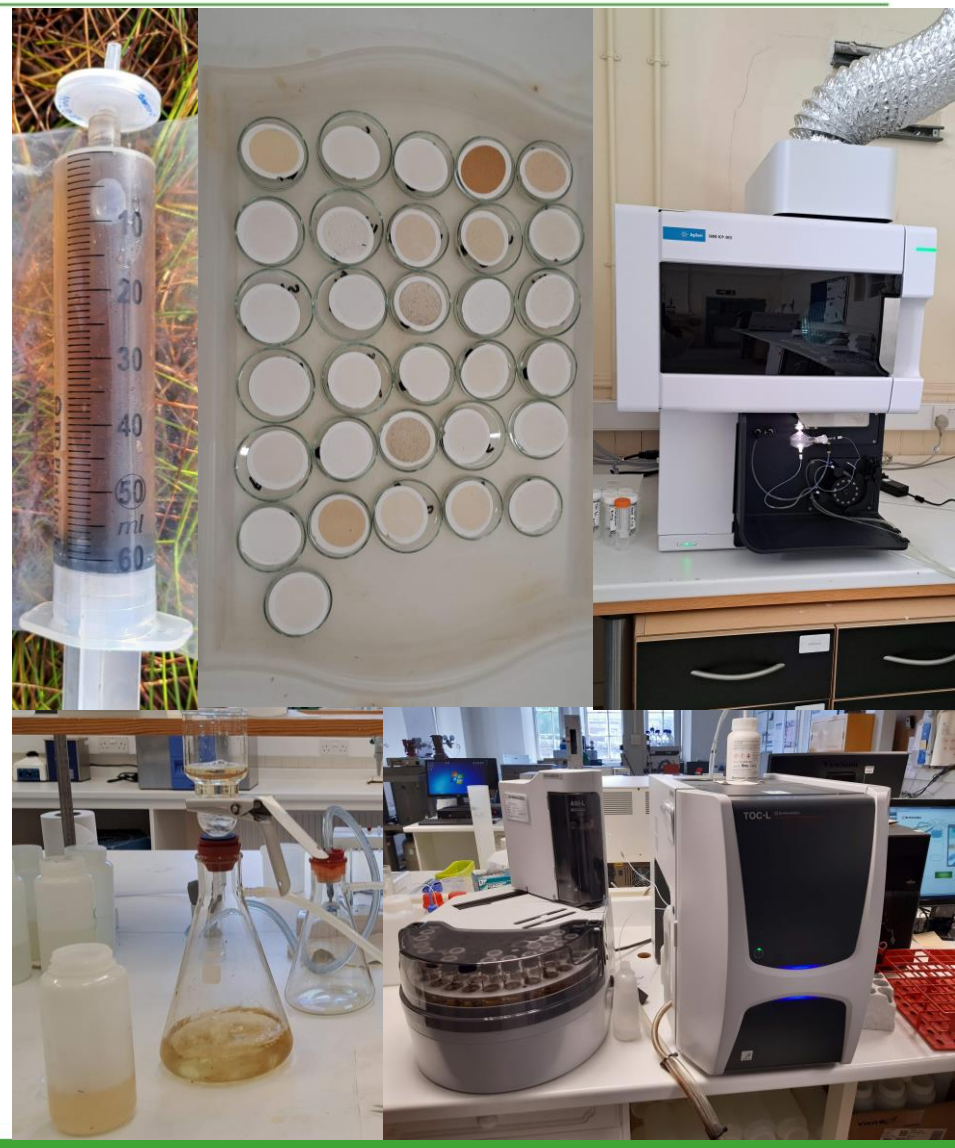


Variables measured

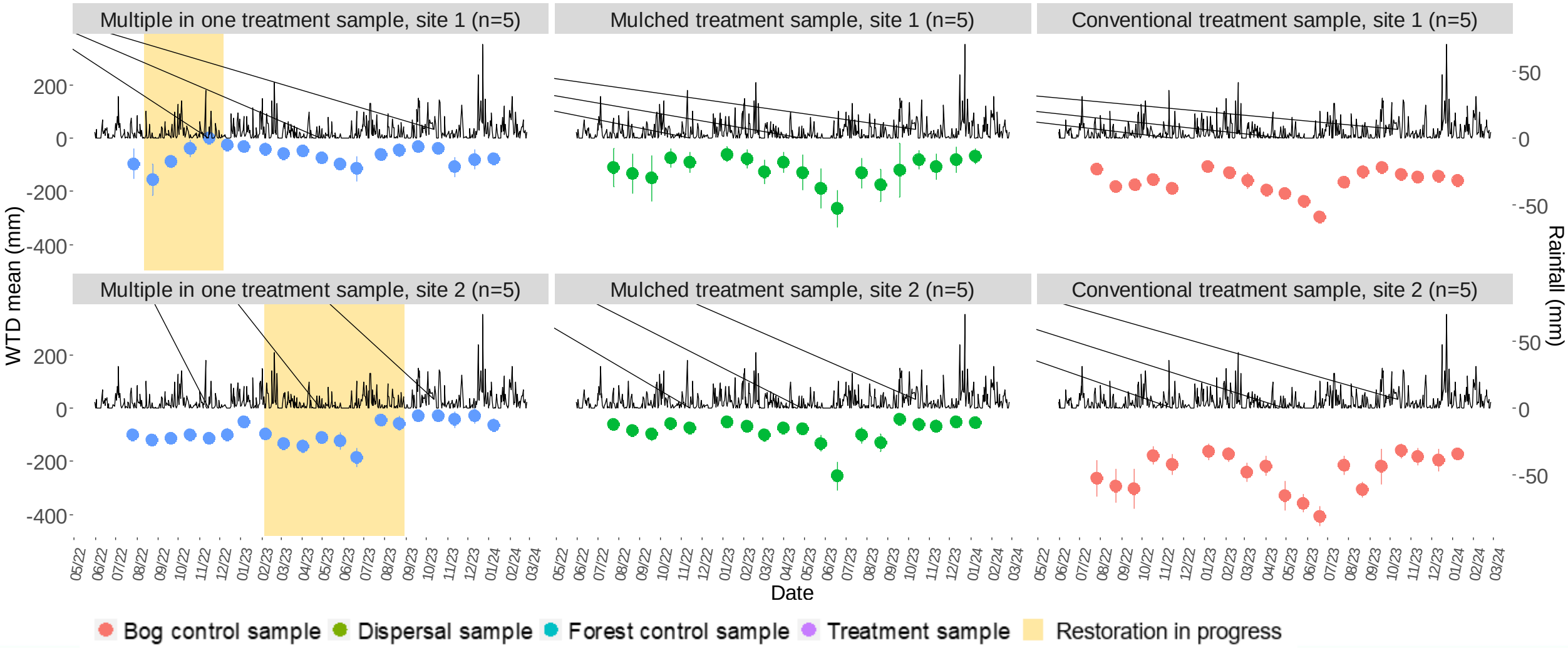
- Water table depth
- Vegetation change
- Nitrate & Nitrite
- Phosphate
- Ammonium
- Dissolved organic carbon
- DOC quality/age

  (UV-viz)

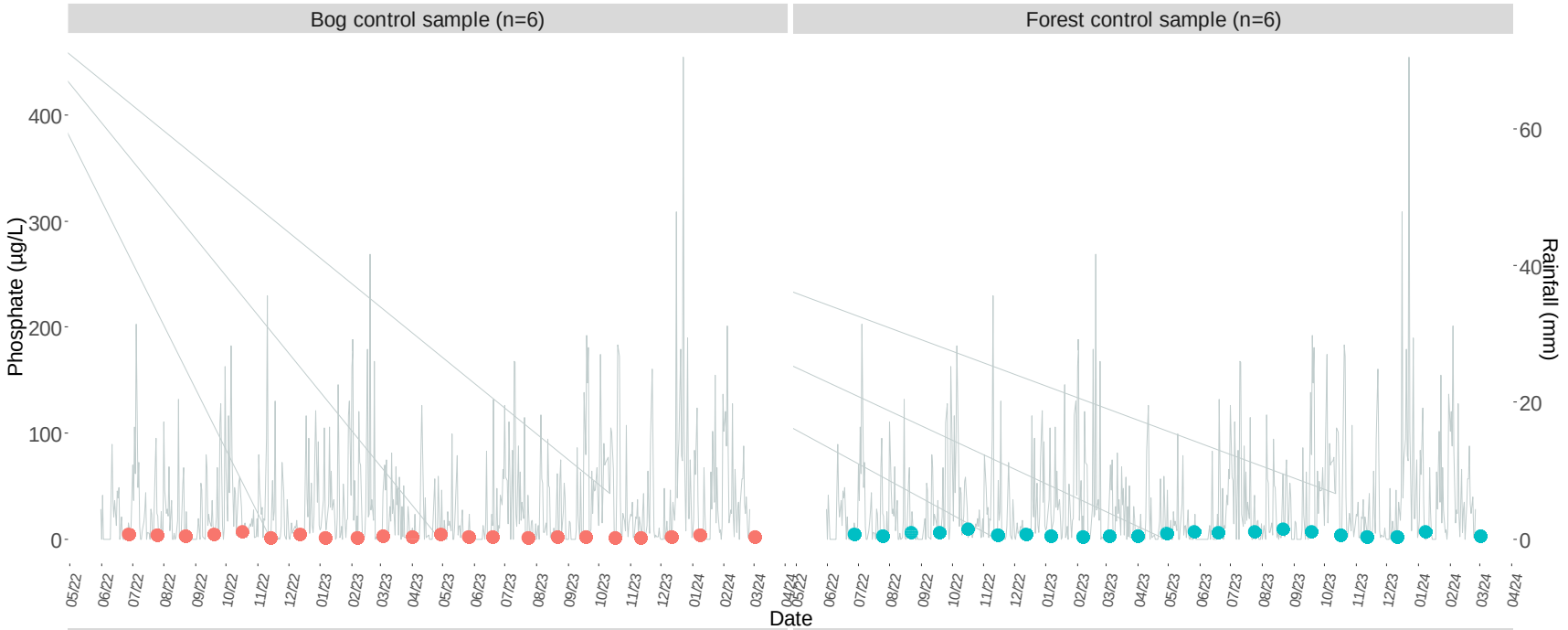
- pH
- Temperature
- Conductivity
- Turbidity
- Suspended solids
- Metals:
  - macro (Ca, K, Mg, Na, S)
  - trace elements (Al, Cu, Fe, Mn, Ni, Zn)

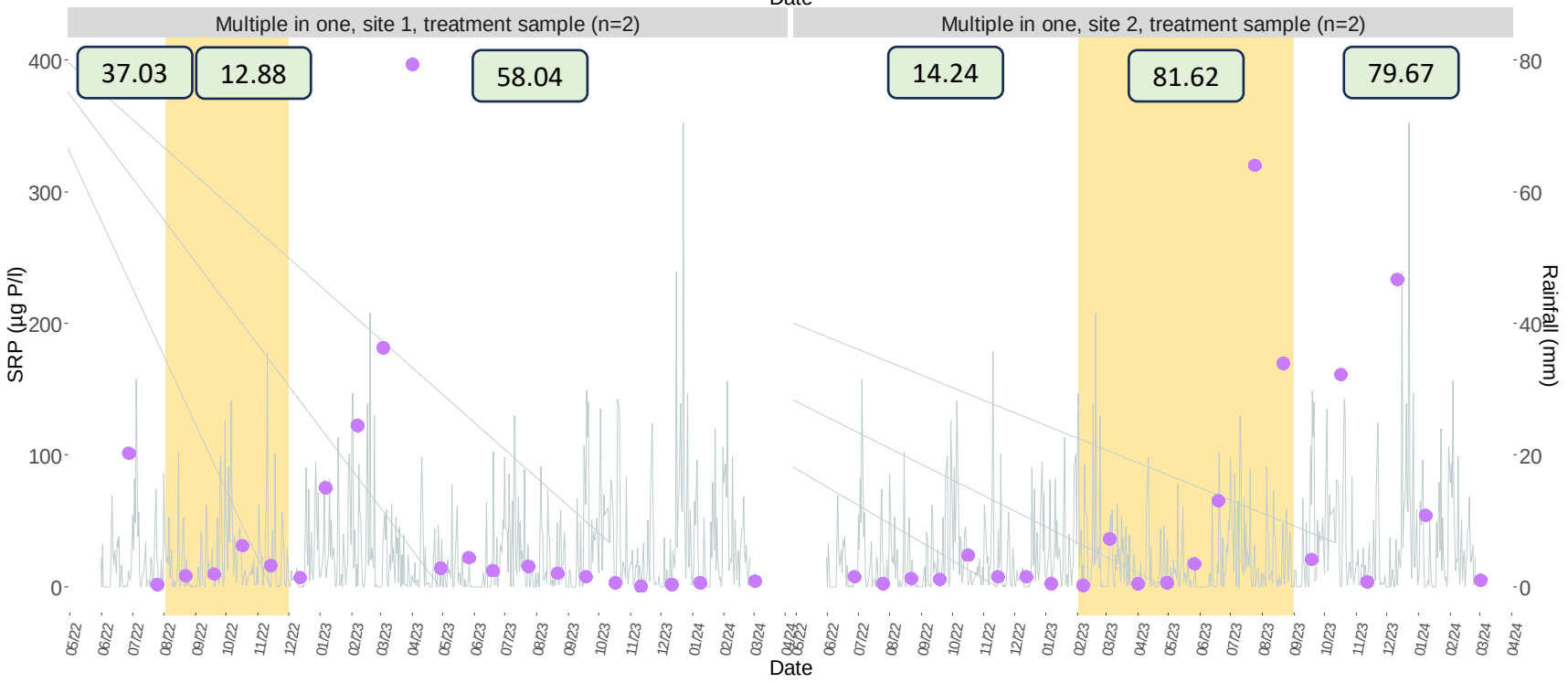


Water Table


Multiple in one treatment sample, site 1 (n=5)
Mulched treatment sample, site 1 (n=5)
Conventional treatment sample, site 1 (n=5)
Multiple in one treatment sample, site 2 (n=5)
Mulched treatment sample, site 2 (n=5)
Conventional treatment sample, site 2 (n=5)
WTD mean (mm)
Rainfall (mm)
200
0
-200
-400
50
0
-50
05/22
06/22
07/22
08/22
09/22
10/22
11/22
12/22
01/23
02/23
03/23
04/23
05/23
06/23
07/23
08/23
09/23
10/23
11/23
12/23
01/24
02/24
03/24
Date
Bog control sample
Dispersal sample
Forest control sample
Treatment sample
Restoration in progress

Phosphate

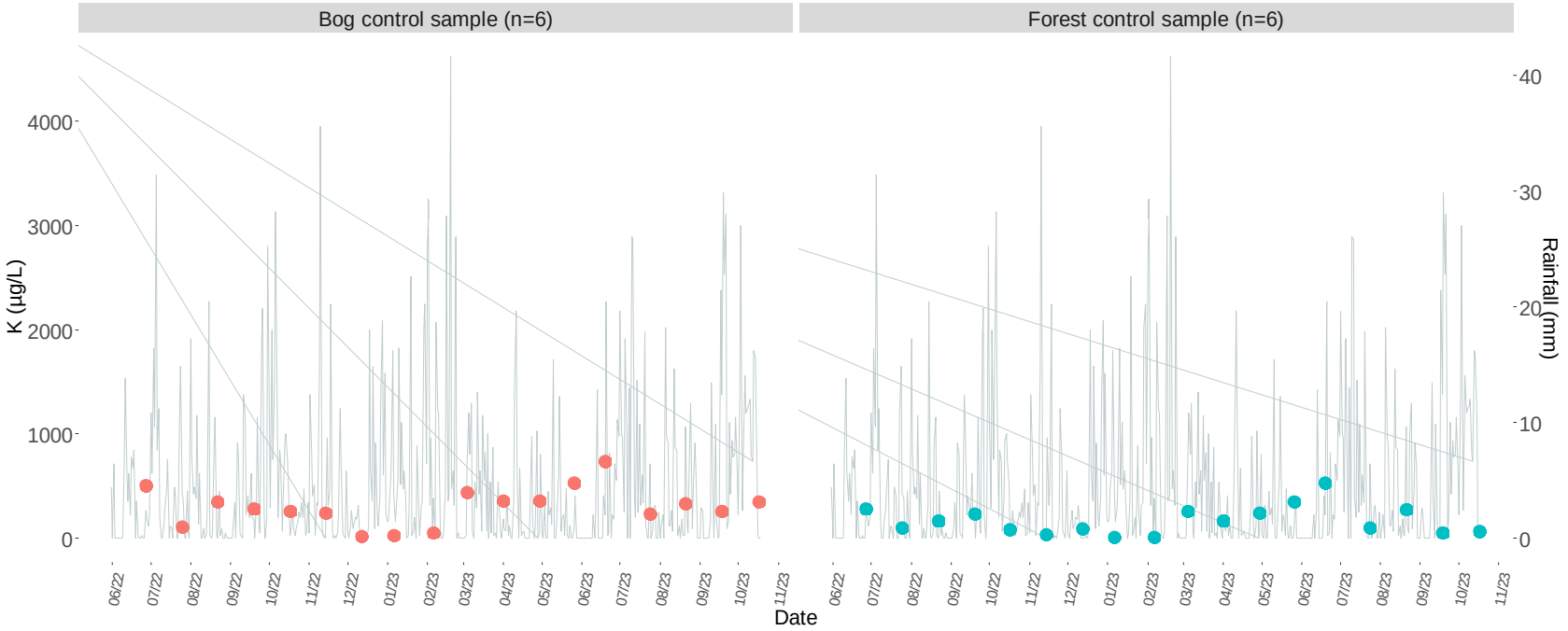


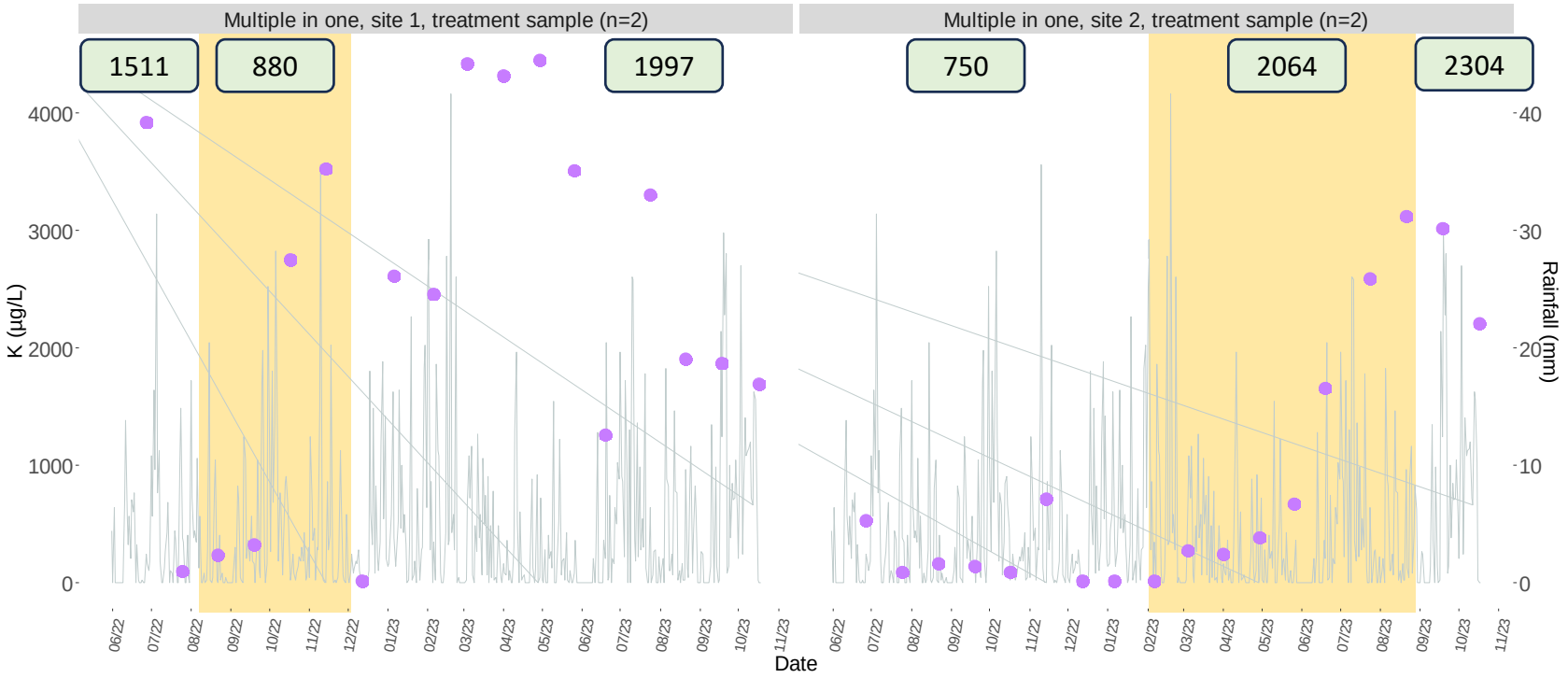


- Short term impact from treatment during and immediately after works.

Mean pre, during, post works
Bog control sample
Forest control sample
Treatment sample
Restoration in progress

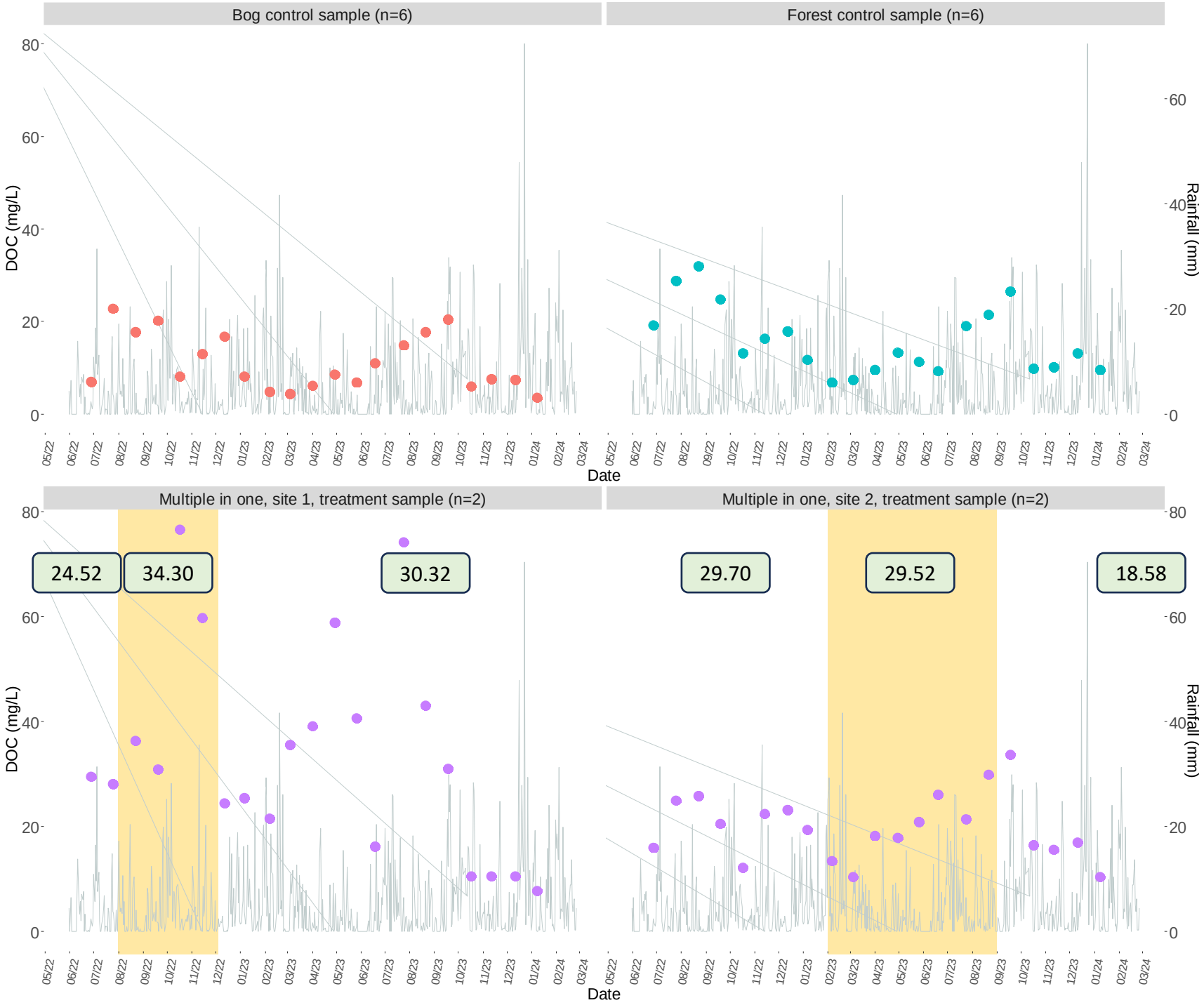
Potassium





- Sharp rise during works.
- Tails off over extended period.
- Exaggerated seasonality.

Mean pre, during, post works
Bog control sample
Forest control sample
Treatment sample
Restoration in progress



Dissolved Organic Carbon

- Seasonality across sites.
- Gradual increases with sharp drops in concentrations.

Mean pre, during, post works
Bog control sample
Forest control sample
Treatment sample
Restoration in progress

Summary

Water table depth
Seasonality across sites.
Good recovery of the Water table post works.

Potassium
Sharp rise during works which then would appear to tail off over an extended period.

Phosphate
Short term impact from treatment: during and immediately after the works.

Dissolved Organic Carbon
High seasonality across all sites.
Gradual increases with sharp drops in concentrations.

environmental research institute

Thank you

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UHI

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