

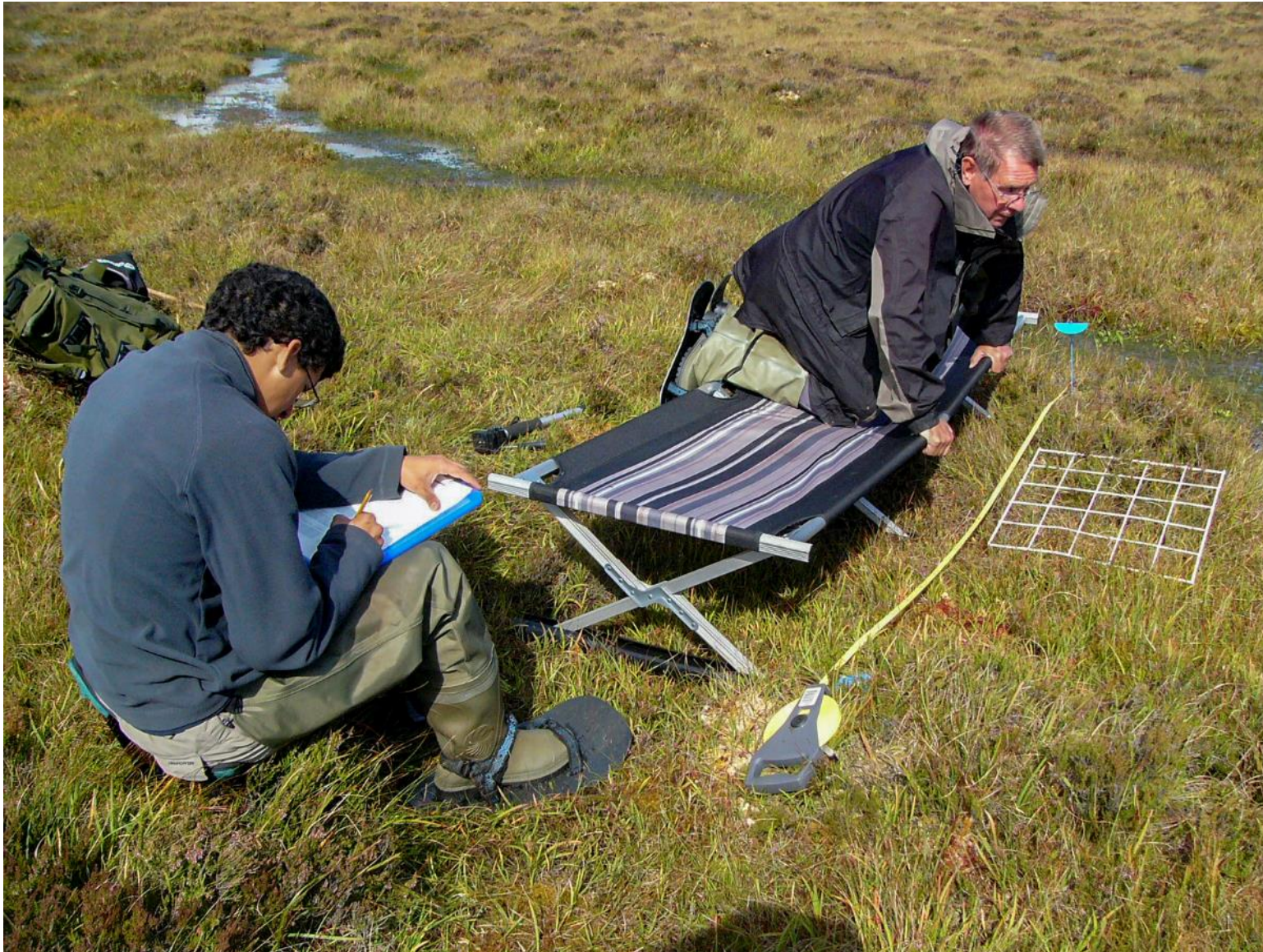
'Eyes on the Bog' and beyond...

Condition monitoring of peat bog ecosystems



Richard Lindsay
Sustainability Research Institute (SRI)

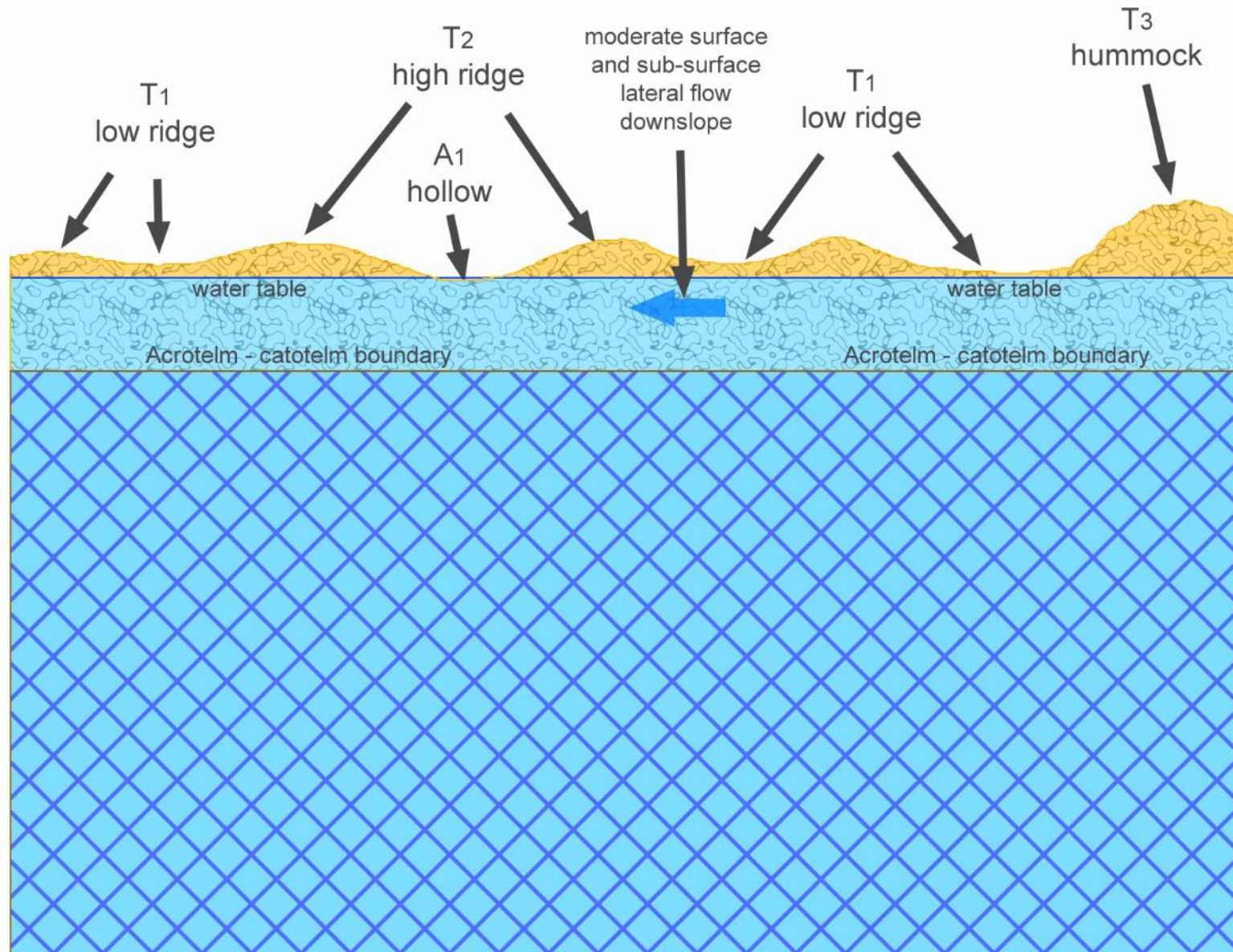
Are we monitoring the right things?



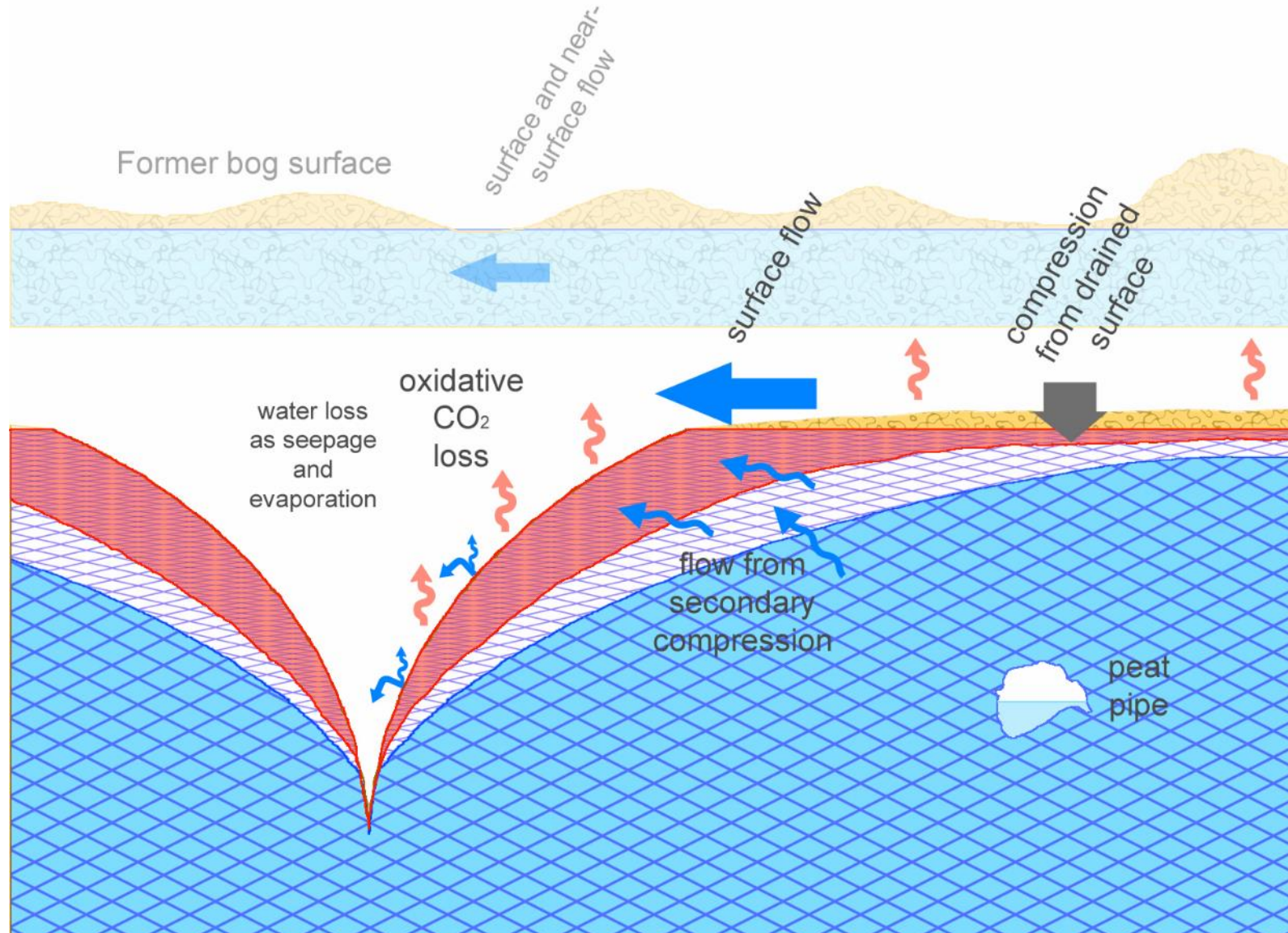
Are we monitoring the right things?



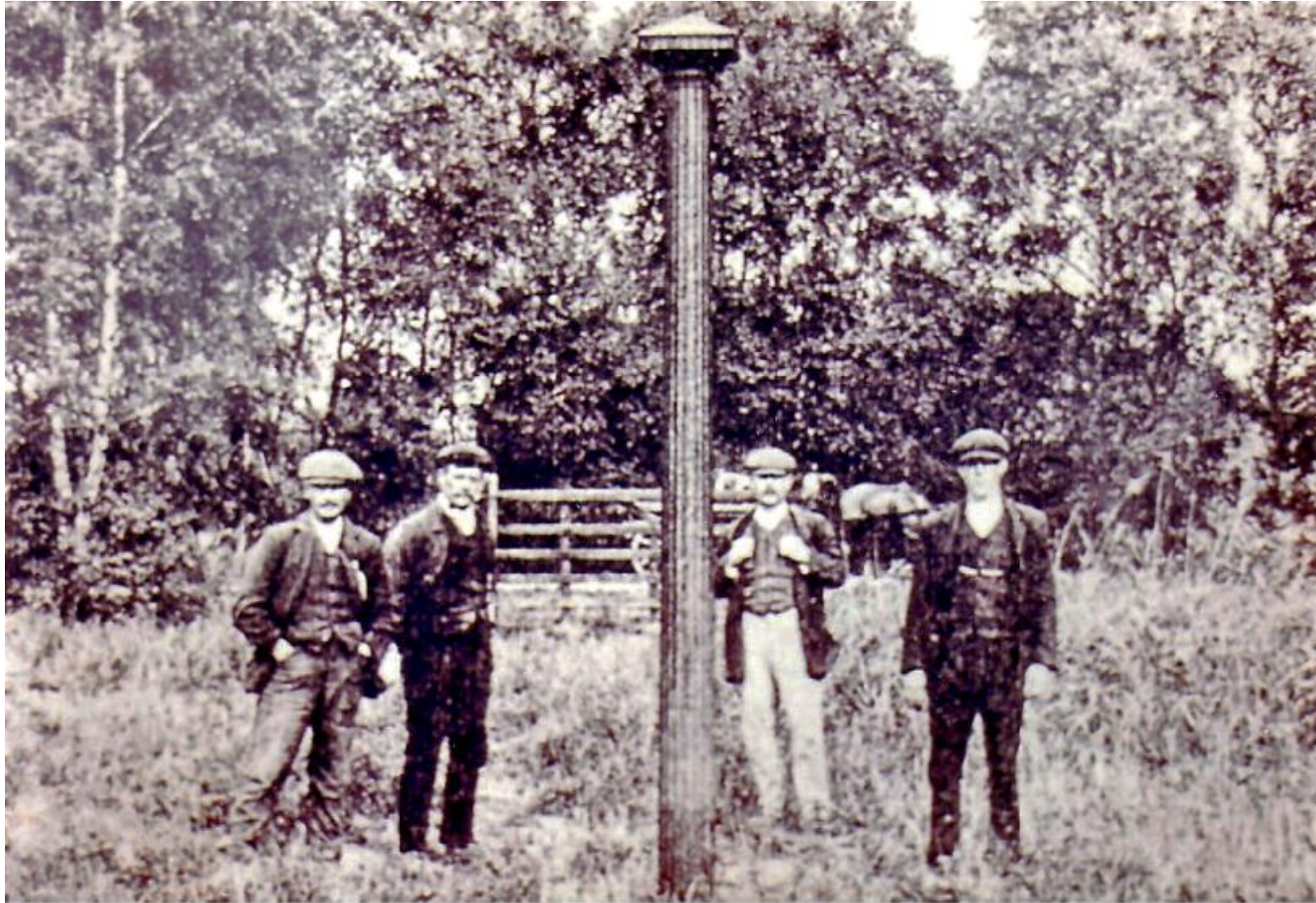
Are we monitoring the right things?



Are we monitoring the right things?



Are we monitoring the right things?

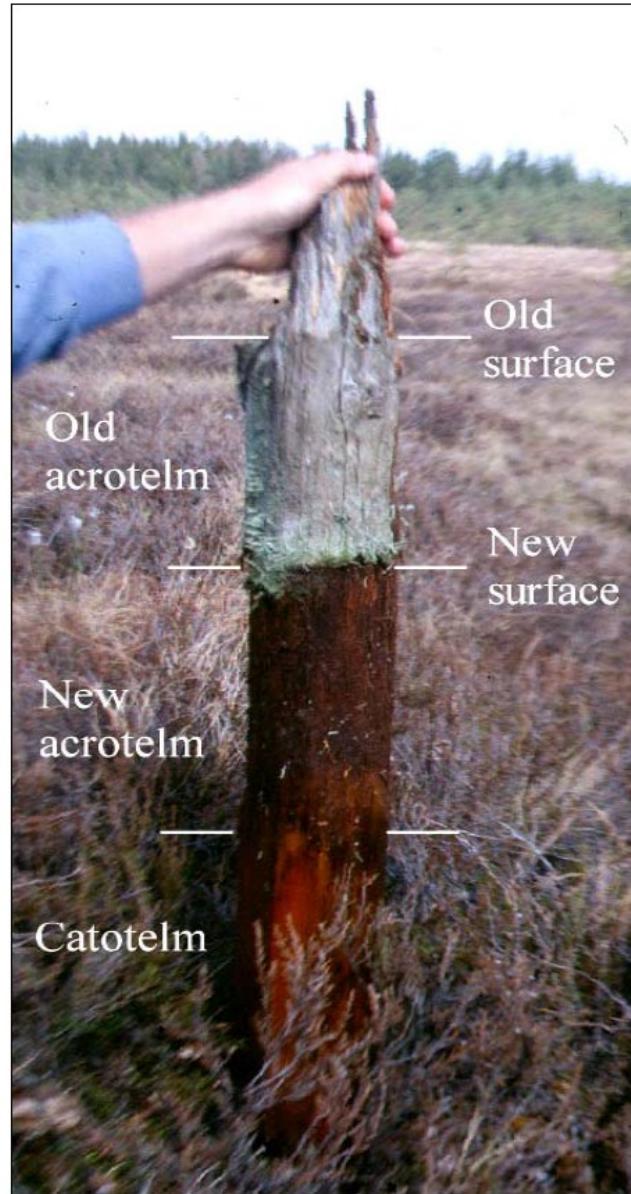


http://sawtry.ccan.co.uk/content/catalogue_item/holme-fen-post

Are we monitoring the right things?



Are we monitoring the right things?



Are we monitoring the right things?



Are we monitoring the right things?



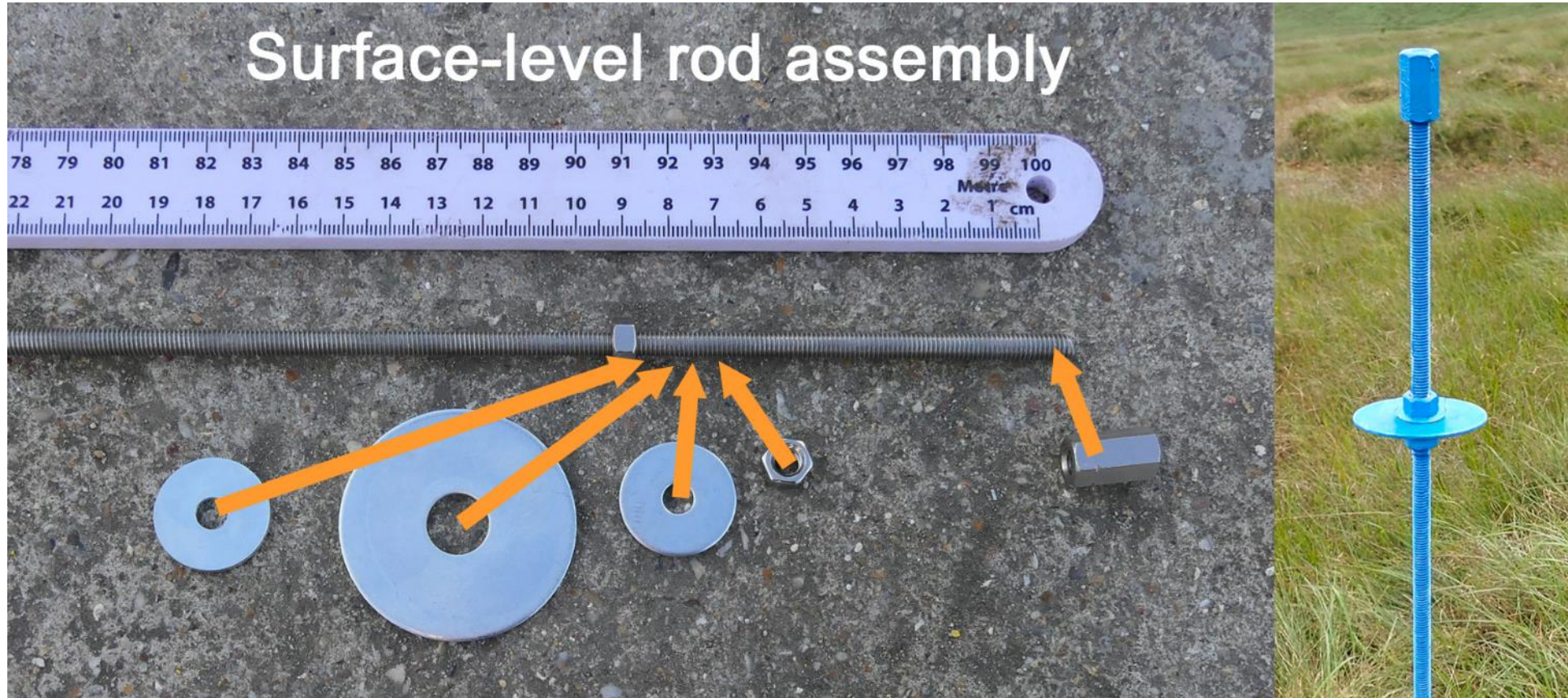


EYES ON THE BOG

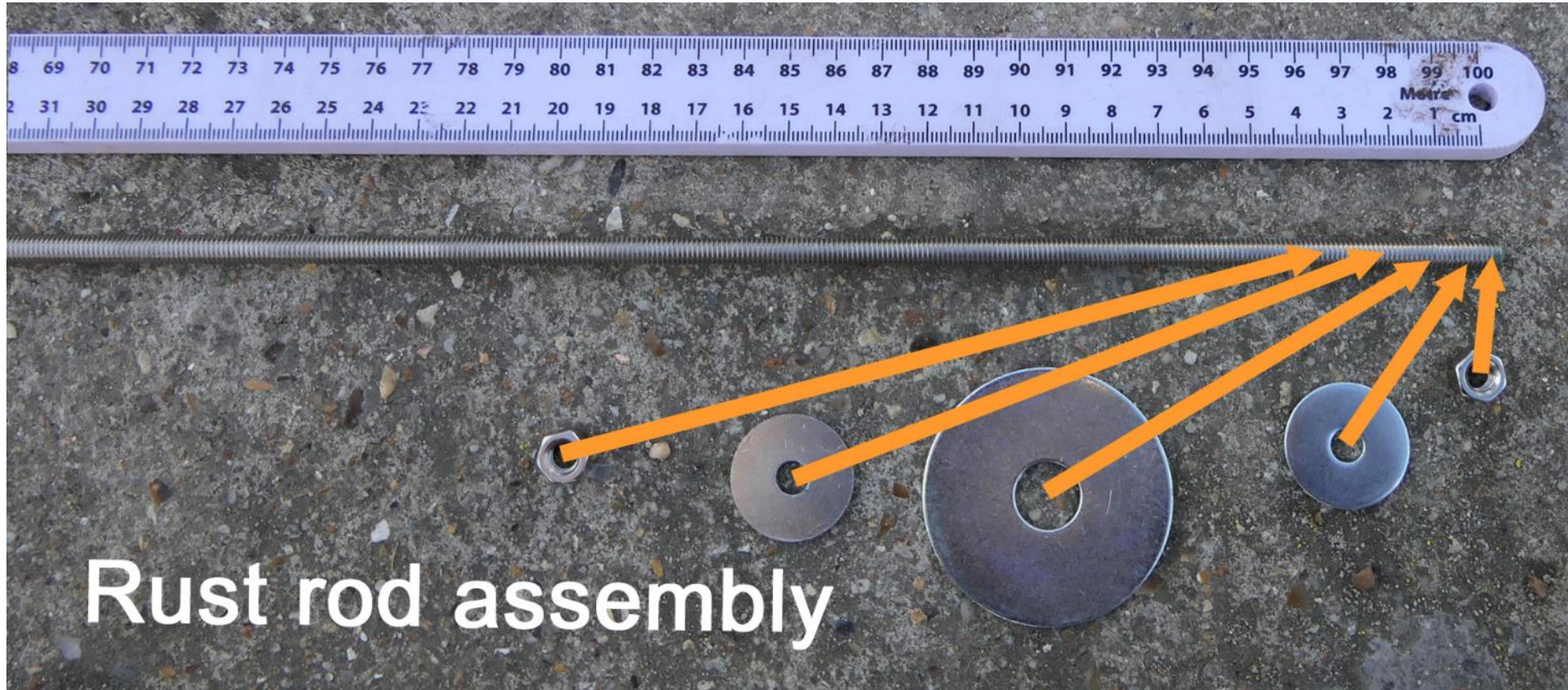
Long-term monitoring network for UK peatlands



Surface-level change: sequestration or subsidence



Water-table behaviour: general and worst-case indications



Vegetation:

General character



Vegetation: General character

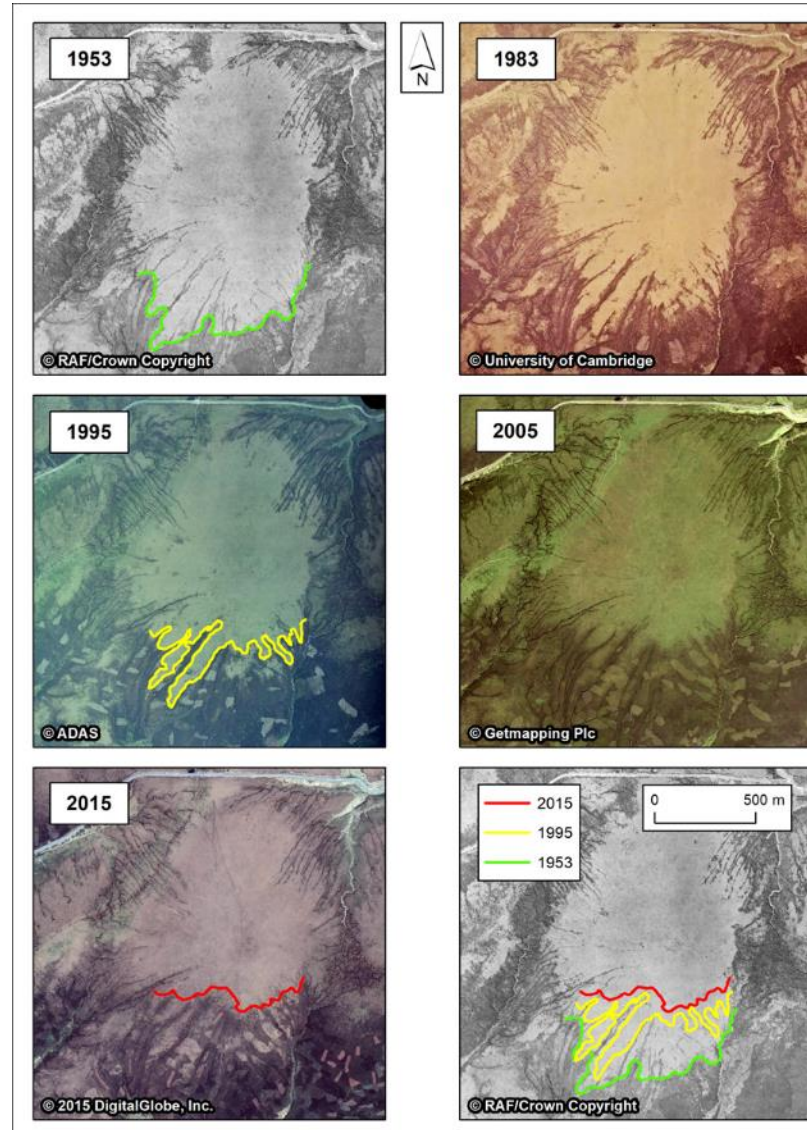


Vegetation: geotagged species records



Site condition:

'monitoring back' – identifying underlying trajectories



Beyond 'Eyes on the Bog'...

How soft is my bog?



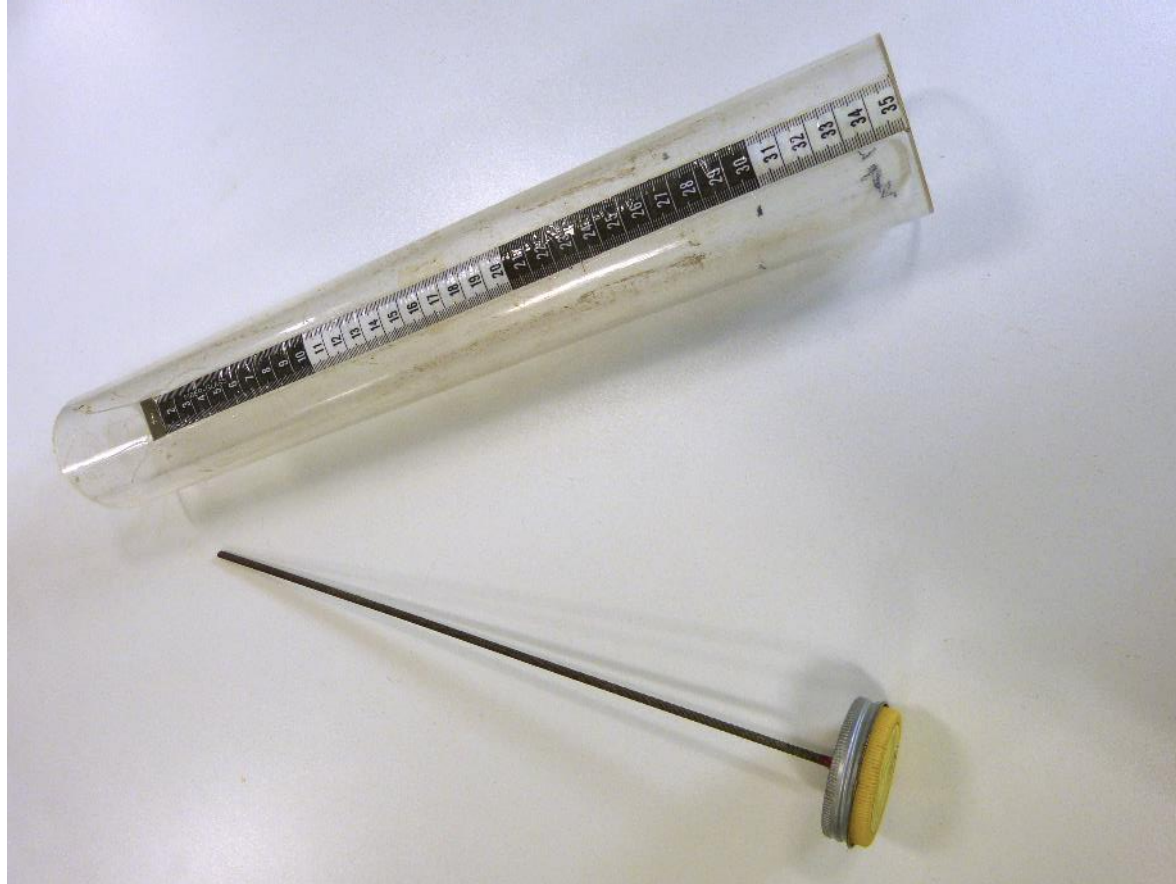
Some can be
visited dry-shod

While others are so soft
they require snowshoes



Beyond 'Eyes on the Bog'...

How soft is my bog?

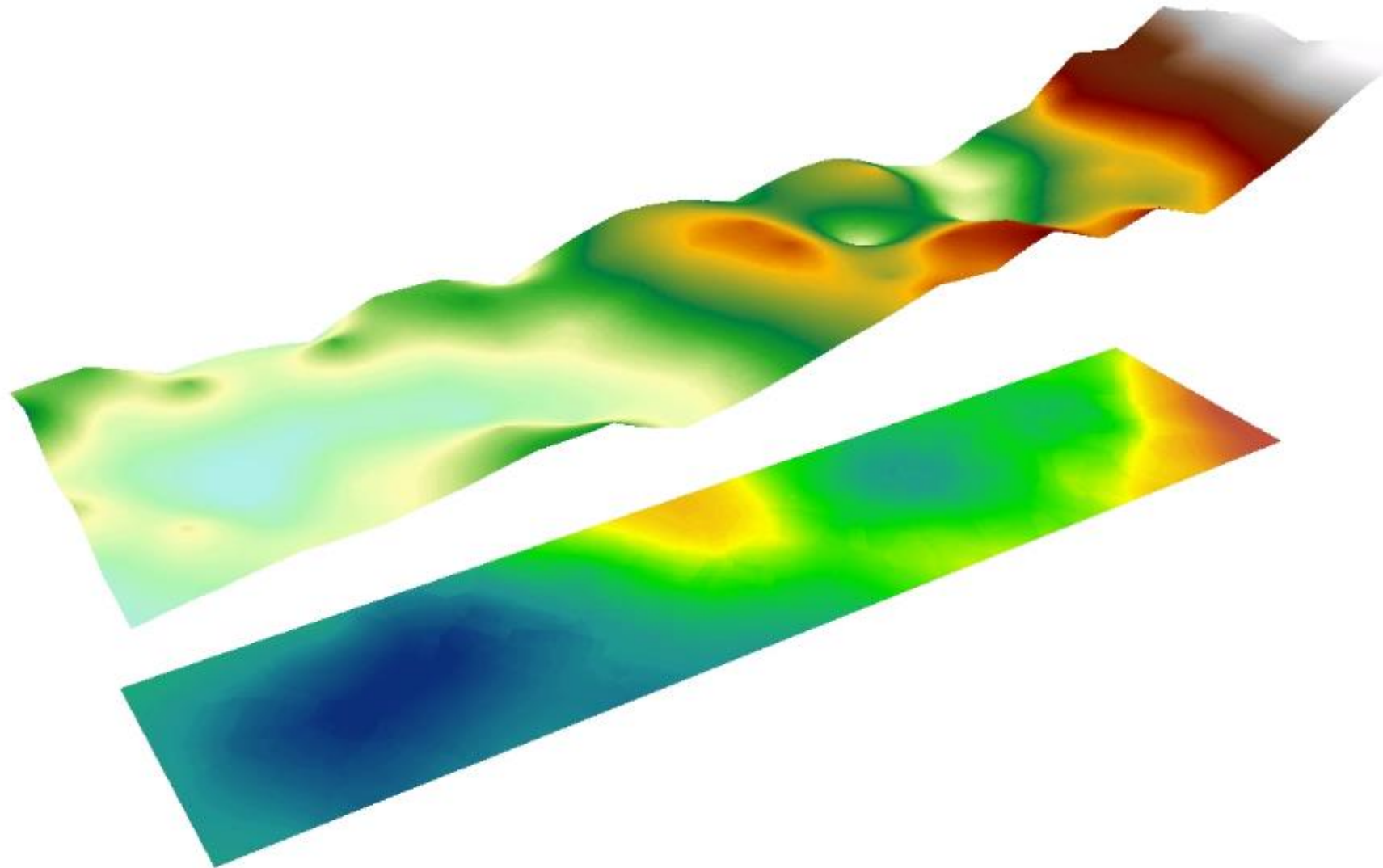


A simple peat bog penetrometer



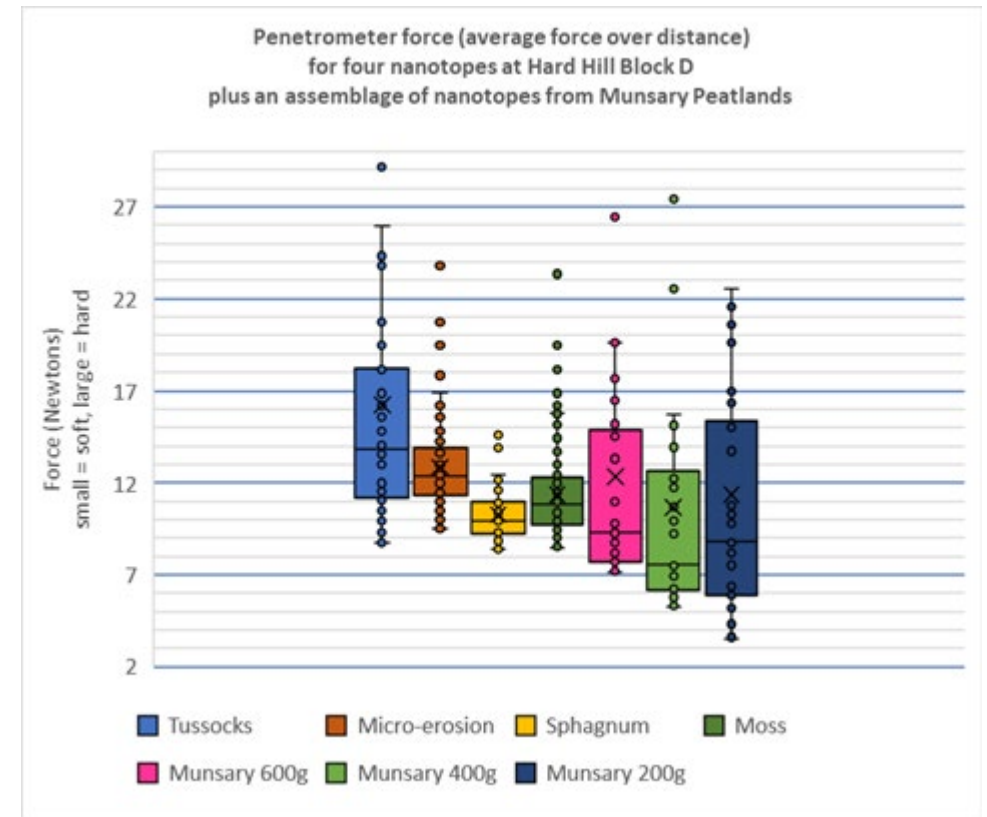
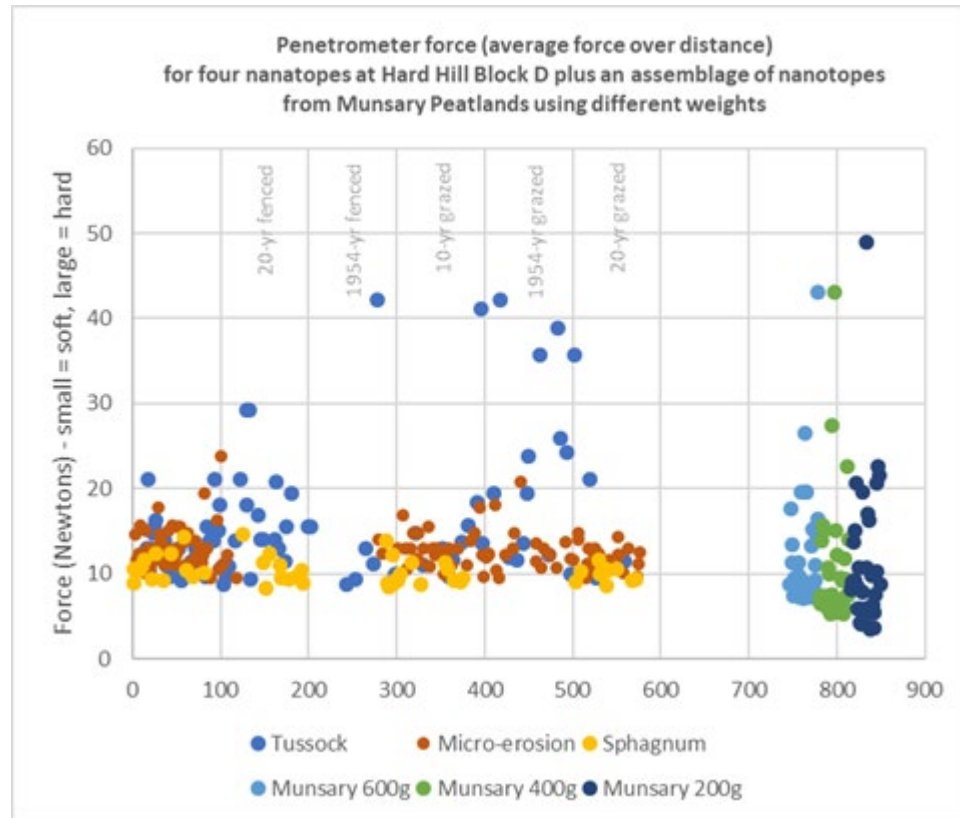
Beyond 'Eyes on the Bog'...

How soft is my bog?



Beyond 'Eyes on the Bog'...

How soft is my bog?



Beyond 'Eyes on the Bog'...

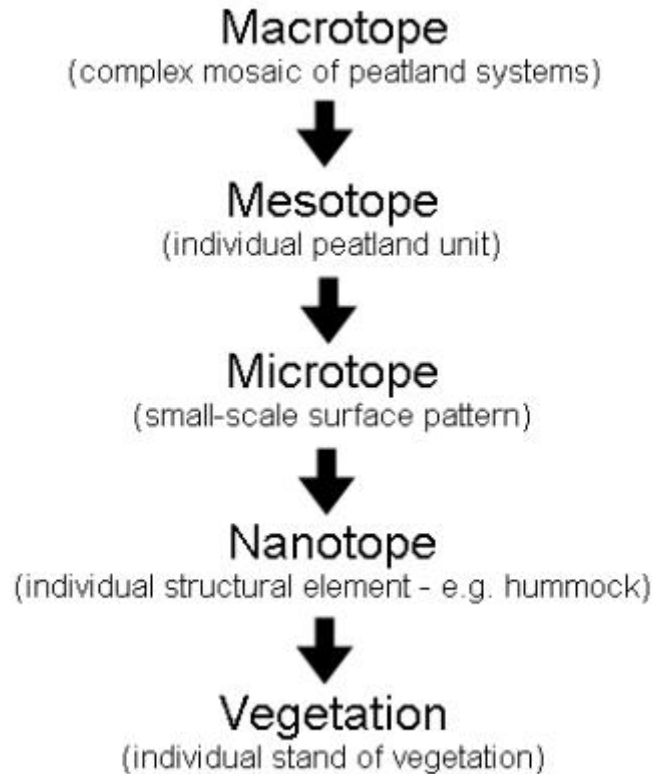


Microtopography: One of the defining features of most peatlands – but talking only of 'hummock-hollow' is unhelpful because not all elevated elements are hummocks and not all low-elevation features are hollows...

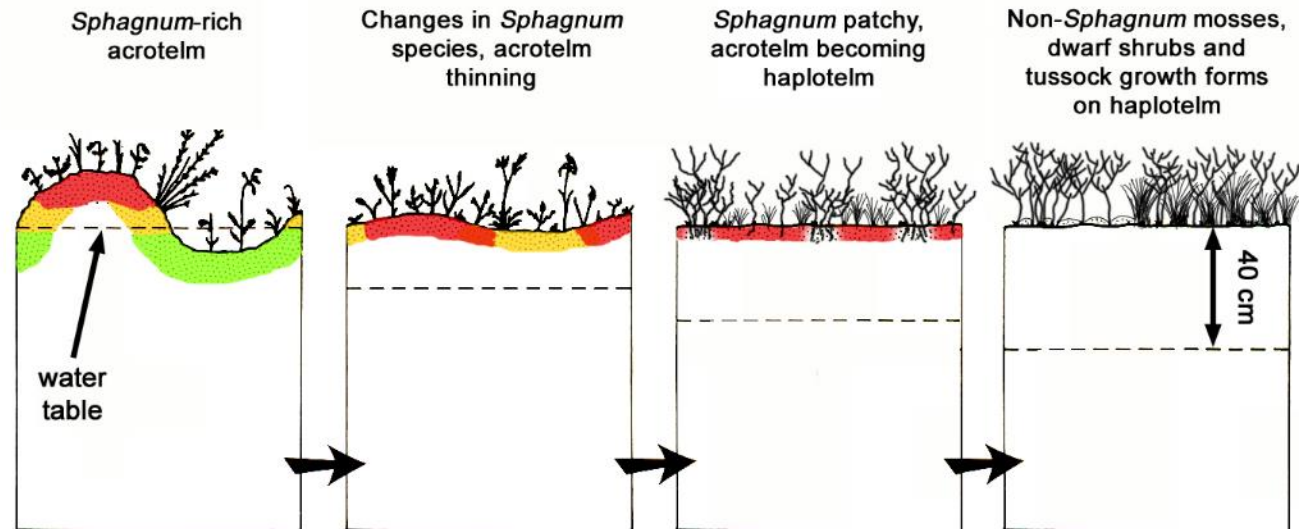
'Microtopography' provides ecosystem diversity and feedback stability: through adjustment of two components – one resisting water flow, the other permitting water flow. In some cases these may be 'hummocks' and 'hollows' but in others they may be hummock alternating with high ridge, or high ridge alternating with low ridge.



Beyond 'Eyes on the Bog'...



Responsiveness of microtopes: The microtope pattern is created by repeated structural elements, or 'nanotopes' – hummocks, hollows, ridges, pools – and these structural elements, together with their associated vegetation assemblages, change in response to environmental factors, offering a means of evaluating 'condition'.



Beyond 'Eyes on the Bog'...

Mire pattern no:..... Site:		Peat depth:		Date:		Recorder:		Primary (original) / Secondary (cut-over) surface (circle relevant condition)				
Zone (relation to w/t)	DFR (321) Freq.	Vegetation types Relatively 'active', likely to be favourable condition>> << Degraded, some recovery...>><<Degraded, Unfavourable.....>>									Extra veg types	
T5 (peat mound) (2 m+)		Sphagnum capillifolium/ dwarf shrubs	'Feather' mosses	Calluna/ Eriophorum	Bacomitrium							
T4 (hagg top) (1 m+)				Hypnoid mosses	Mixed dwarf shrub/Calluna/ hypnoid moss	Calluna/ moss cover	Bacomitrium	Dwarf shrubs/ no moss	Calluna/ no moss	Bare peat/dwarf shrubs/Cladonia		
T3 (hummock) (30 cm-1 m)		Sphagnum fuscum	Sphagnum papillosum	Sphagnum austriaci [spadicatum]	Sphagnum capillifolium	Sphagnum subrotens	Hypnoid /Poly- trichum mosses	Bacomitrium	Dwarf shrubs/ hypnoid mosses	Dwarf shrubs/ no moss		
Tk (tussock)		Schoenus nigricans				Eriophorum vaginatum		Molinia caerulea	Trichophorum cespitosum	Deschampsia flexuosa		
T2 (high ridge) (15 cm-30 cm)		Sphagnum/high- altitude shrubs	Sphagnum/Erica tetralix	Sphagnum magellanicum	Sphagnum/ Eriophorum	Sphagnum/ Calluna	Dwarf shrubs/ hypnoid mosses	Bare peat/ Trichophorum	Bare peat/ dwarf shrubs	Sphagnum compactum		
T1 (low ridge) (1 cm-15 cm)		Sphagnum papillosum	Sphagnum magellanicum	Sphagnum tenellum	Campylopus atrovirens				Bare peat/ dwarf shrubs	Bare peat/ Trichophorum		
T1/A1 (0 cm-5 cm)		Sphagnum pulchrum	Sphagnum tenellum	Aulacomnium palustre	Madhucium ossifragum			Sphagnum compactum		Bare peat/ Trichophorum		
A1 (Sph. hollow (-10 cm-0 cm)		Sphagnum cuspidatum	S. cuspidatum/ E. angustifolium	Sphagnum recurvum								
A2 ('mud- bottom' hollow) (-5 cm to -20 cm)		Wet/flooded bare peat	Flooded Molinia litter									
A3 (drought- sensitive pool) (-10 cm to -40 cm)		Sphagnum cuspidatum	Sphagnum auriculatum	Mesophyllum trifoliatum	Eriophorum angustifolium							
A4 (permanent pool) (-50 cm to -6 m)		Mesophyllum trifoliatum	Sphagnum auriculatum	Sphagnum cuspidatum								
E1 (recess gully)		Sphagnum papillosum	Sphagnum magellanicum	Sphagnum capillifolium	Sphagnum recurvum	Sphagnum tenellum	Eriophorum angustifolium		Juncus squarrosus			
E2 (eroding gully)										Eroding bare- peat gully		
Em (eros) (bare) (micro-erosion)										Bare peat		
Em (moss) (micro-erosion)							Hypnoid moss and some Sphagnum	Hypnoid moss	Campylopus - type moss			
Em (Sphagnum)						Sphagnum moss						

Beyond 'Eyes on the Bog'...

Mire pattern no:..... Site:		Peat depth:		Date:		Recorder:		Primary (original) / Secondary (cut-over) surface (circle relevant condition)				
Zone (relation to w/t)	DFR (321) Freq.	Vegetation types Relatively 'active', likely to be favourable condition>> << Degraded, some recovery...>><<Degraded, Unfavourable.....>>									Extra veg types	
T5 (peat mound) (2 m+)		Sphagnum capillifolium/ dwarf shrubs	'Feather' mosses	Calluna/ Eriophorum	Racomitrium							
T4 (hagg top) (1 m+)				Hypnoid mosses	Mixed dwarf shrub/Calluna/ hypnoid moss	Calluna/ moss cover	Racomitrium	Dwarf shrubs/ no moss	Calluna/ no moss	Bare peat/dwarf shrubs/Cladonia		
T3 (hummock) (30 cm-1 m)		Sphagnum fuscum	Sphagnum papillosum	Sphagnum austinii (spadicatum)	Sphagnum capillifolium	Sphagnum subtile	Hypnoid/Poly- trichum mosses	Racomitrium	Dwarf shrubs/ hypnoid mosses	Dwarf shrubs/ no moss		
Tk (tussock)		Schoenus nigricans				Eriophorum vaginatum		Molinia caerulea	Trichophorum cespitosum	Deschampsia flexuosa		
T2 (high ridge) (15 cm-30 cm)		Sphagnum/high- altitude shrubs	Sphagnum/Erica tetralix	Sphagnum magellanicum	Sphagnum/ Eriophorum	Sphagnum Calluna	Dwarf shrub hypnoid mosses	Bare peat/ Trichophorum	Bare peat/ dwarf shrubs	Sphagnum compactum		
T1 (low ridge) (1 cm-15 cm)		Sphagnum papillosum	Sphagnum magellanicum	Sphagnum tenellum	Campylopus atrovirens				Bare peat/ dwarf shrubs	Bare peat/ Trichophorum		
T1/A1 (0 cm-5 cm)		Sphagnum pulchrum	Sphagnum tenellum	Aulacomnium palustre	Madhucium ossifragum			Sphagnum compactum		Bare peat/ Trichophorum		
A1 (Sph. hollow (-10 cm-0 cm)		Sphagnum cuspidatum	S. cuspidatum/ E. angustifolium	Sphagnum recurvum								
A2 ('mud- bottom' hollow) (-5 cm to -20 cm)		Wet/flooded bare peat	Flooded Molinia litter									
A3 (drought- sensitive pool) (-10 cm to -40 cm)		Sphagnum cuspidatum	Sphagnum auriculatum	Meryanthes trifoliata	Eriophorum angustifolium							
A4 (permanent pool) (-50 cm to -6 m)		Meryanthes trifoliata	Sphagnum auriculatum	Sphagnum cuspidatum								
E1 (recess gully)		Sphagnum papillosum	Sphagnum magellanicum	Sphagnum capillifolium	Sphagnum recurvum	Sphagnum tenellum	Eriophorum angustifolium		Juncus squarrosus			
E2 (eroding gully)										Eroding bare- peat gully		
Em (bare) (micro-erosion)										<u>Bare peat</u>		
Em (moss) (micro-erosion)							Hypnoid moss and some Sphagnum	Hypnoid moss	Campylopus - type moss			
Em (Sphagnum)						Sphagnum moss						

Beyond 'Eyes on the Bog'...

Mire pattern no: _____ Site: _____		Peat depth: _____	Date: _____	Recorder: _____	Primary (original) / Secondary (cut-over) surface (circle relevant condition)						
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T5 (peat mound) (2 m+)		Sphagnum capillifolium/ dwarf shrubs	'Feather' mosses	Calluna/ Empetrum	Racomitrium						
T4 (haga top) (1 m+)				Sphagnum hypnoid mosses	Mixed dwarf shrub/Calluna/ hypnoid moss	Calluna/ moss cover	Racomitrium	Dwarf shrubs/ no moss	Calluna/ no moss	Bare peat/dwarf shrubs/Cladonia	
T3 (hummock) (30 cm-1 m)		Sphagnum fuscum	Sphagnum papillosum	Sphagnum austriaci	Sphagnum capillifolium	Sphagnum subnitens	<u>hypnoid/Poly- trichum</u> mosses	Racomitrium	Dwarf shrubs/ hypnoid, mosses	Dwarf shrubs/ no moss	
Tk (tussock)		Schoenus nigricans				Eriophorum vaginatum		Molinia caerulea	Trichophorum cespitosum	Deschampsia flexuosa	
T2 (high ridge) (15 cm-30 cm)		Sphagnum/high- altitude shrubs	Sphagnum/Erica tetralix	Sphagnum magellanicum	Sphagnum Eriophorum	Sphagnum Calluna	<u>Dwarf shrub/ hypnoid, mosses</u>	Bare peat/ Trichophorum	Bare peat/ dwarf shrubs	Sphagnum compactum	
T1 (low ridge) (1 cm-15 cm)		Sphagnum papillosum	Sphagnum magellanicum	Sphagnum religiosum	Campidopus atrovirens				Bare peat/ dwarf shrubs	Bare peat/ Trichophorum	
T1/A1 (0 cm-5 cm)		Sphagnum pulchrum	Sphagnum terrellum	Aulacomnium palustre	Nardhegium ossifragum			Sphagnum compactum		Bare peat/ Trichophorum	
A1 (Sph. hollow (-10 cm-0 cm)		Sphagnum cuspidatum	S. cuspidatum/ E. angustifolium	Sphagnum recurvum							
A2 ('mud- bottom' hollow) (-5 cm to -20 cm)		Wet/flooded bare peat	Flooded Molinia litter								
A3 (drought- sensitive pool) (-10 cm to -40 cm)		Sphagnum cuspidatum	Sphagnum auriculatum	Meryanthes trifoliata	Eriophorum angustifolium						
A4 (permanent pool) (-50 cm to -6 m)		Meryanthes trifoliata	Sphagnum auriculatum	Sphagnum cuspidatum							
E1 (reveg gully)		Sphagnum papillosum	Sphagnum magellanicum	Sphagnum capillifolium	Sphagnum recurvum	Sphagnum terrellum	Eriophorum angustifolium		Juncus squarrosus		
E2 (eroding gully)										Eroding bare- peat gully	
Em (bare) (micro-erosion)										<u>Bare peat</u>	
Em (moss) (micro-erosion)							<u>hypnoid moss</u> and some Sphagnum	hypnoid moss	Campidopus- type moss		
Em (Sphagnum)						Sphagnum moss					

Beyond 'Eyes on the Bog'...

Zone	DFR	Synusia
T5		
T4		
T3		Hypnum julae (F), Polytrichum commune (A), Calluna vulgaris (O), Eriophorum vaginatum (O)
Tk		Eriophorum vaginatum (D), Trichophorum cespitosum (O)
T2		Hypnum julae (D), Calluna vulgaris (A), Pleurozium schreberi (O), Erica tetralix (R), Dicranum scoparium (R), Eriophorum angustifolium (R)
T1		
T1/A1		
A1		
A2		
A3		
A4		
E1 (reveg)		
E2 (bare)		
Em bare		Bare peat (D), Carex panicea (R)
Em moss		
EM Sphag.		

Beyond 'Eyes on the Bog'...

In the field with Natural Resources Wales...

