

A scoping tool for the prioritisation of restoration needs of blanket bogs in Scotland

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Matthews and others



Why?

- Ca. 1.7 million ha of peatland in Scotland, which is 22 % of the land area
- Scottish peatlands contain 1620 Mt of C (56% of total soil C)
- Much of this resource is eroding, drained, harvested or converted to other land uses (90% of raised bog, >50% of blanket bog)
- Only 6.6 % is under designation
- Target of 600,000 ha to be restored (UK Biodiversity Action plan)
- Restoration of such sites may have the potential to deliver up to 0.3 million t of C savings (RSPB figures)
- Peatland restoration in Scotland could offset the transport sector CO₂ emissions (IUCN figures)

Land Use Strategy for Scotland

- Mentions peatlands in Sections 2 and 3 in relation to:
- Ensuring SG's commitment to increase woodland cover is not at the expense of deep peat C stocks
- The impact of wind farm development on C stocks and sequestration potential on peatlands
- Responding to climate change by promoting sustainable management of peatlands (including restoration)

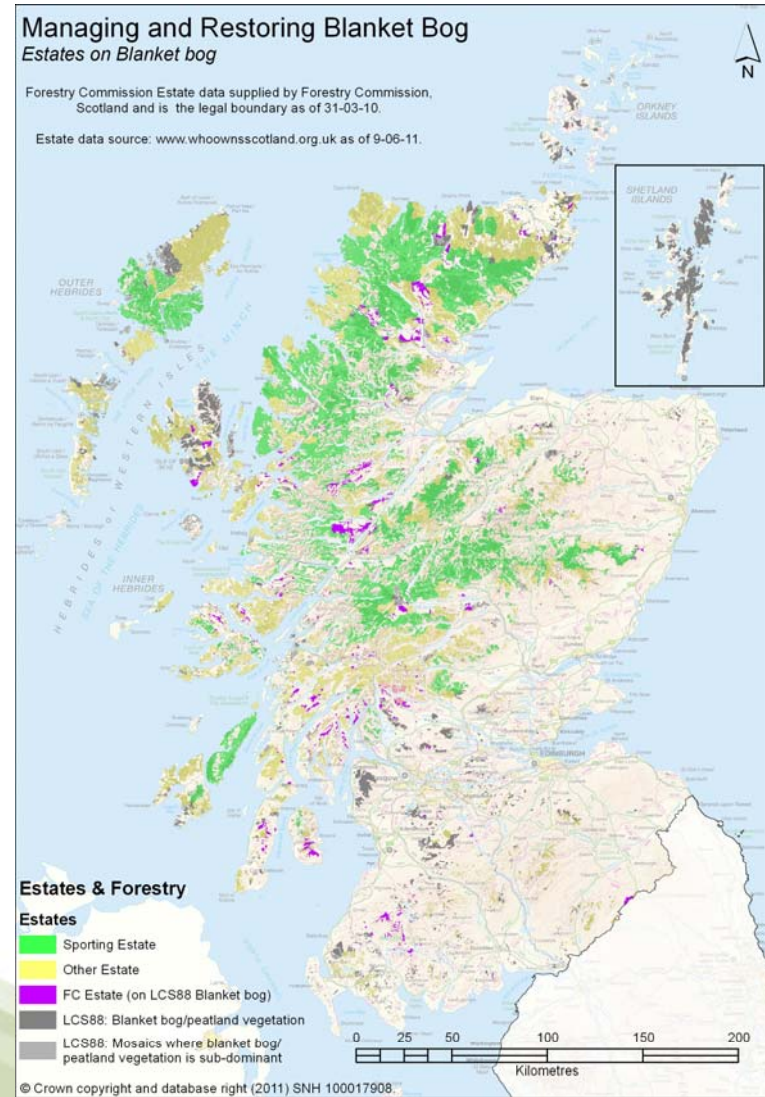
Proposed Deliverables at time of tender



- A spatially explicit map of areas recommended for altered peatland management (Year 1-2)
 - building on already existing spatial datasets for the peat resources in Scotland and ongoing work in WorkProgrammes and externally funded work that proposes a decision support tool for site appraisal
- Future projections for 50 years using climatic modelling (Years 2-5)
- Advisory capacity to SG and key stakeholders on best management options

Scoping potential restoration areas

- Builds on existing work in ECOSSE and a current scoping report for SNH
- Many of the existing pressures and current and potential future uses mapped already



‘Quick’ wins

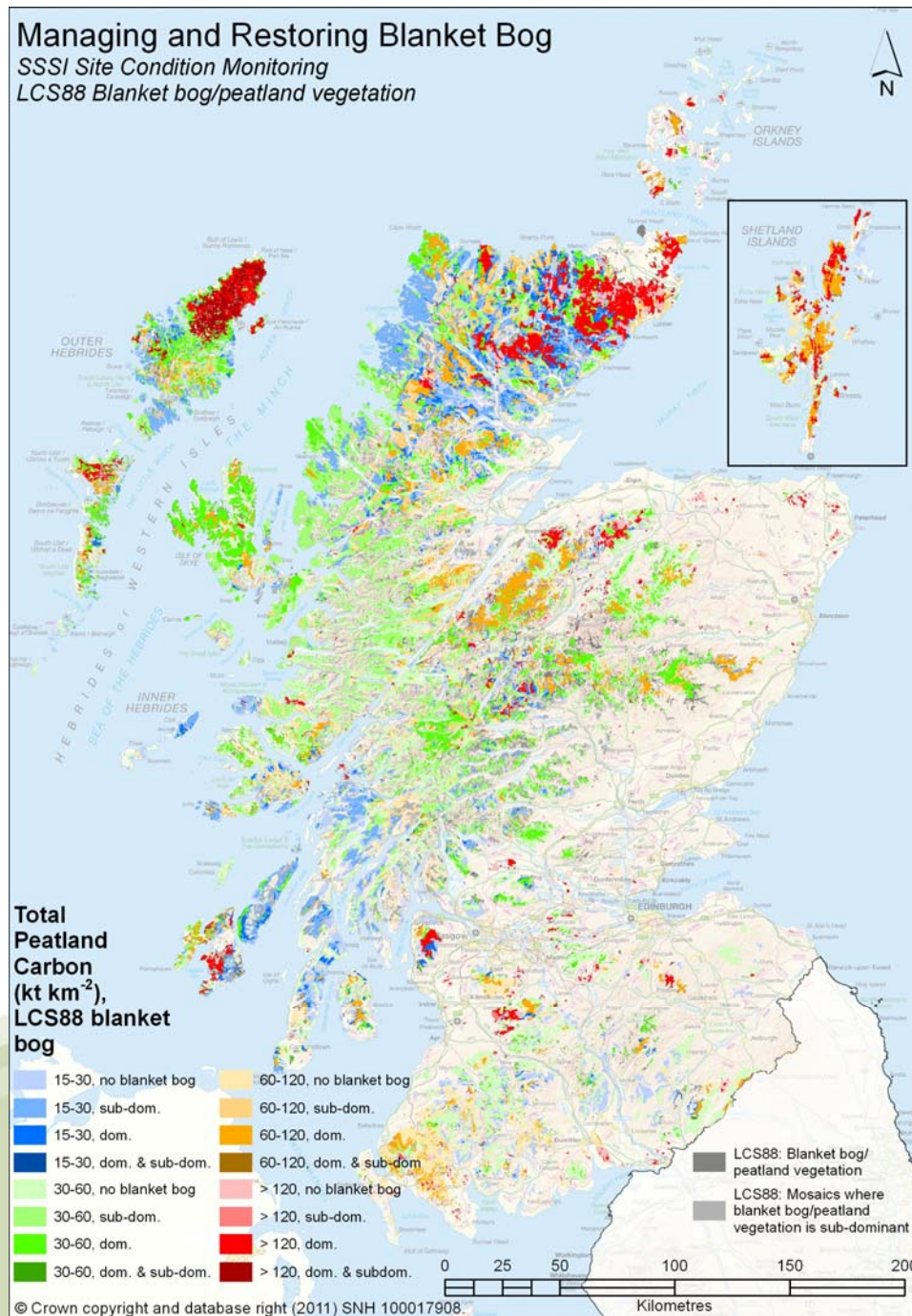
Year 1 opportunities that have been identified :

- Further development and road-testing of a framework decision support tool that classifies peatland areas for restoration suitability (developed for SNH)
- Improvements in peat condition mapping using object oriented detection via satellite imagery to advance both site selection tools as well as carbon exchange modelling exercises (including forward projections under future climatic conditions)

Managing and Restoring Blanket Bog

SSSI Site Condition Monitoring

LCS88 Blanket bog/peatland vegetation



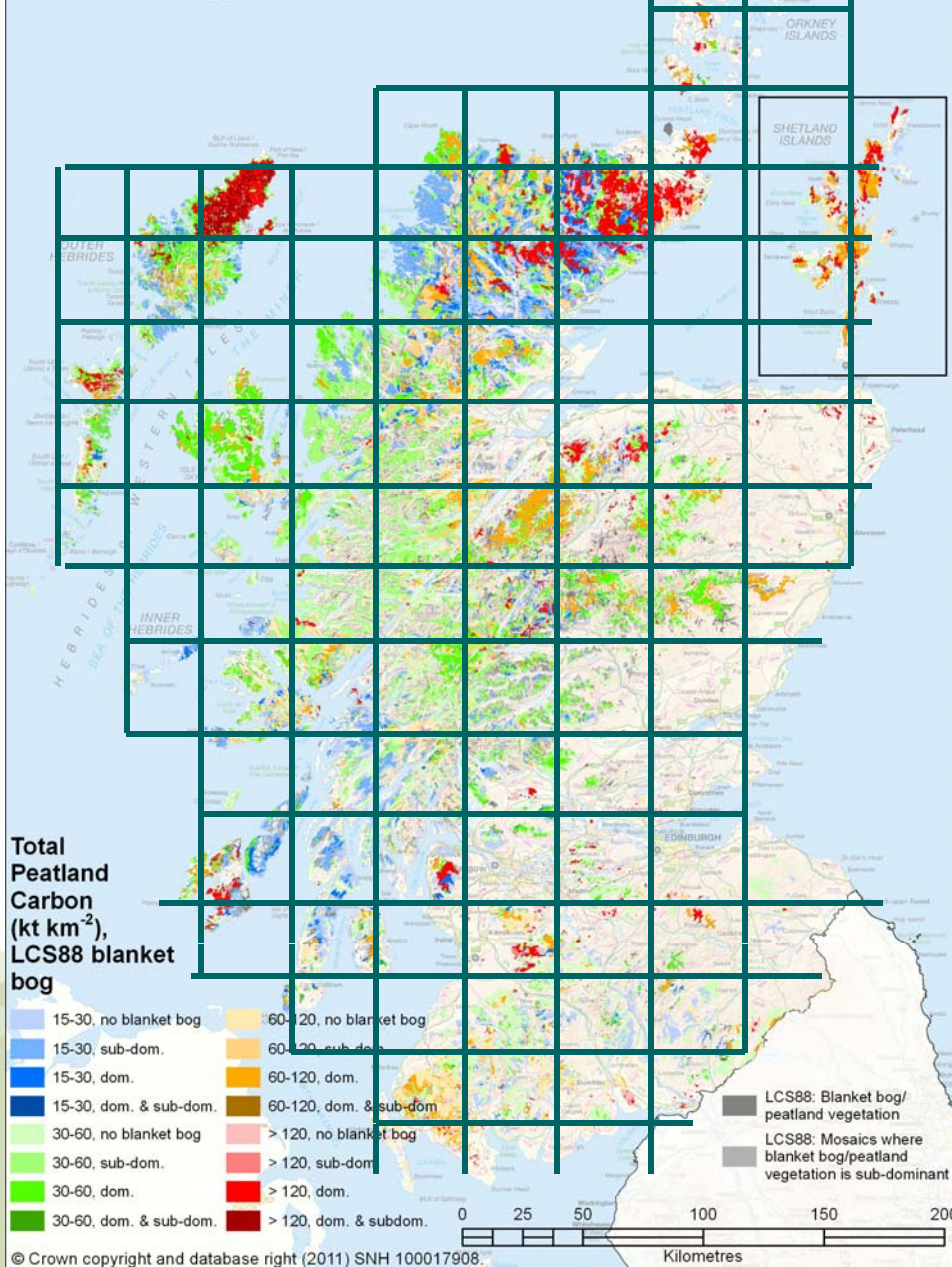
Peat C stocks



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- good maps available but not been used for decision support tools
- spatial grid application followed by scoring?

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Peat C stocks



- good maps available but not been used for decision support tools
- spatial grid application followed by scoring?
- what type of spatial grid? Local authority area boundaries, known peatland delineations?

Spatial decision support tools - examples

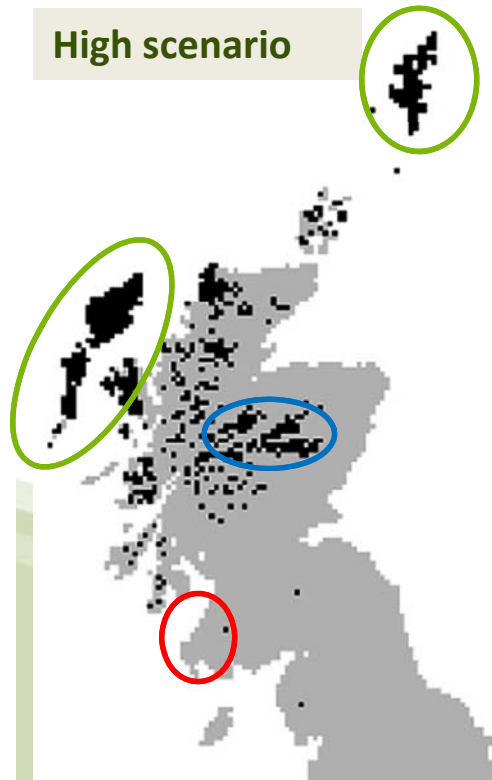
Potential for functional blanket bog to regenerate under present and future climate

- If area appears to be within the bioclimatic envelope for continuing likelihood for peatland formation under both the low and high UKCIP02 scenarios in 2080 = **HIGH**.
- If area appears to be within the bioclimatic envelope for continuing likelihood for peatland formation under the low but not or not entirely under the high scenarios = **MEDIUM**.
- If area appears not to be within the bioclimatic envelopes for continuing likelihood for peatland formation under the low and high scenarios = **LOW**.

Low scenario



High scenario



Caveats: Data that were used to run the bioclimatic envelope models have been based on current distribution of blanket bog (rather than known *active* blanket bogs) and the use of the now superseded UKCIP02 scenarios, which have been updated in UKCIP09.

Site selection criteria for restoration

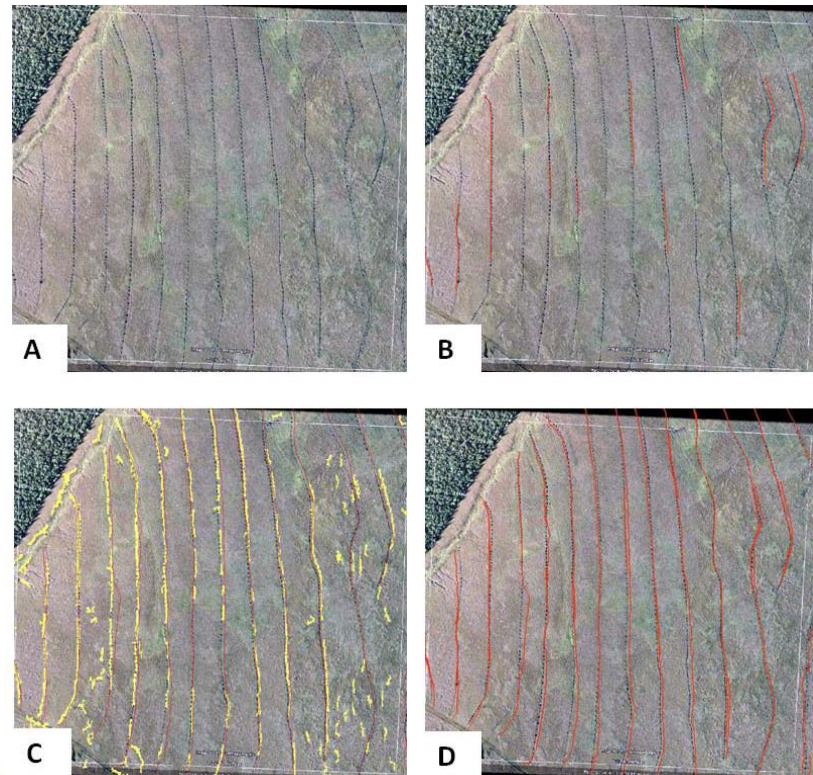


Site selection indicator	Mark out of 10 *	Weight of criterion	Sub-criterion weighting	Total score within criterion	Total site score
- Current type and condition of vegetation and other species assemblages		6.91	0.00	0.0	0
- Potential for functional blanket bog to regenerate under present and future climate		10.59	0.00		
- Potential to be biologically connected to surrounding landscapes and biodiversity		5.55	0.00		
- Conflicts with existing biodiversity from changes to other desired land uses		4.39	0.00		
- Level or rate of current physical degradation		9.40	0.00	0.0	
- Ease of access or potential access issues		2.58	0.00		
- Geophysical attributes: area/ altitude and variation within site		5.02	0.00		
- Peat type and depth		5.19	0.00		
- Is there a site designation in place		4.35	0.00	0.0	
- If non-designated, is monitoring in existence or are there existing historical data		3.10	0.00		
- If non-designated, are there existing management option limitations or requirements for consents		4.58	0.00		
- Sustainability of current and historic land use		2.23	0.00	0.0	
- Existing management and/or guarantees for the future		5.17	0.00		
- Timescale and deliverability of restoration efforts		4.02	0.00		
- Is the site managed as a hydrological unit		2.61	0.00		
- Conflicts in sources of income from current versus potential management		4.01	0.00	0.0	
- Availability/ /continuity of funding for restoration from SRDP and other sources		7.32	0.00		
- Would restoration offset other costs (e.g. water treatment costs) or create socio-economic benefits (e.g. rural jobs)		6.94	0.00		
- Potential for partnerships (e.g. private companies, conservation groups and local		6.03	0.00		

* (1-extremely poor; 10- excellent)

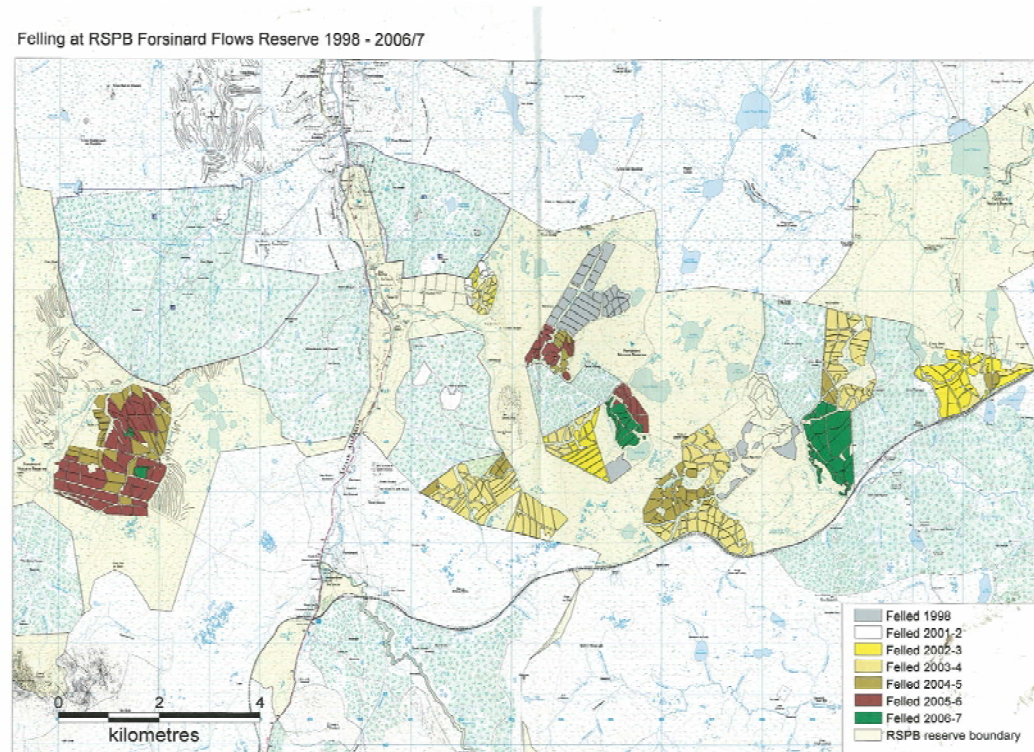
Specific example – drainage mapping

- Site hydrological condition is largely unknown for Scottish peatlands but is one of the major factors influencing decomposition rates and primary productivity, and hence net C sequestration rates
- Carbon balance modelling for potential sites could be much improved with hydrological information
- Drainage channels are relatively easy to pick up in satellite imagery with object-oriented GIS techniques, around 90% of Scotland's peatlands are covered by high quality images, and trials looked promising in terms of accuracy
- Propose to produce a map of peatland drains for Scotland's peatland resource in Year 1



Vegetation condition mapping

- At Forsinard, there has been a large scale EU Life project to restore plantation forestry back to bog
- We will be monitoring 10 chronosequences spanning 12 years post felling (inc controls) using kite or pole aerial photography
- Tests ongoing for image classification based on control open bog and a restored area (10 years since felling) where 100 m² quadrats are being photographed and ground-truthed against 10 m² quadrats

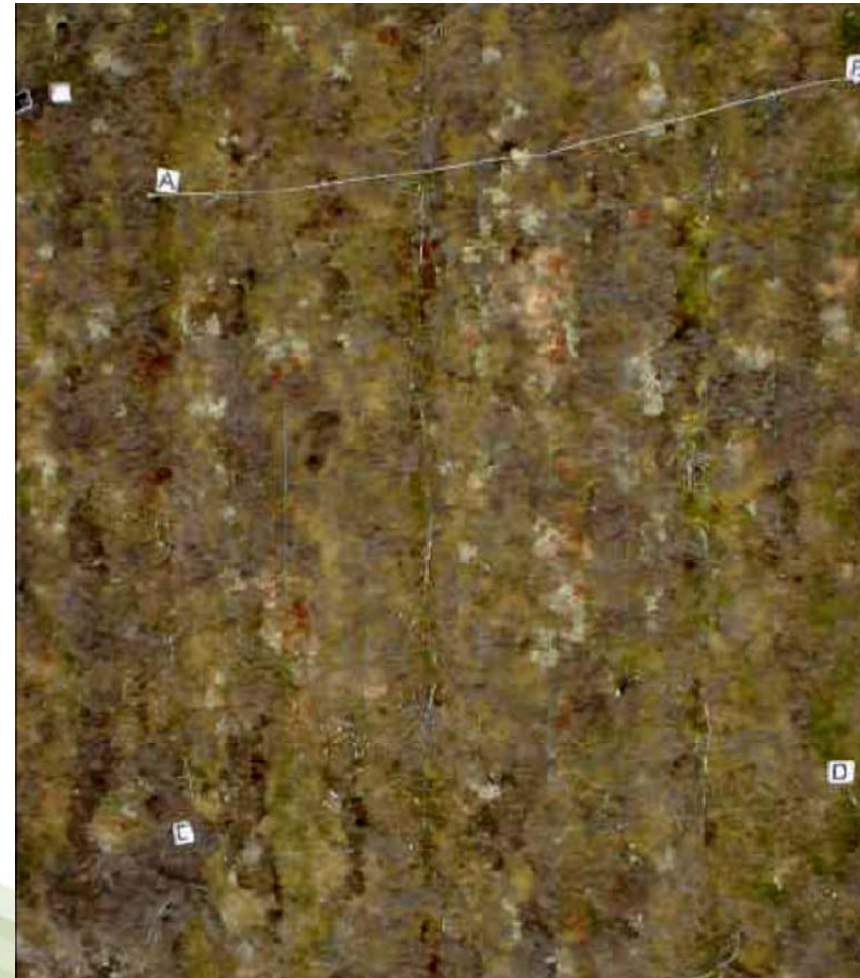
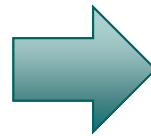


Automated image analysis - training

Plot: 13

Codes:

Sc – *S. capillifolium*, Sf – *S. fallax*, Cv – *Calluna vulgaris*, Cp – *Cladonia portentosa*, Ea – *Eriophorum angustifolium*, R – *Racomitrium*, W – wood



Staffing



- **Drainage mapping and implementation of site hydrological condition in modelling approaches (in principle)**
 - Matt Aitkenhead, David Donnelly, Sarah Dunn?, Julian Dawson, Allan Lilly, Marc Stutter (?)
- **Development & road testing of restoration site decision support tool**
 - Bedru Balana, Stephen Chapman, David Donnelly, Catherine Smart (or SERG equivalent)
- **Forward projections using climatic forecasting of the areas suitable for restoration. Year 1 scoping only!**
 - Alessandro Gimona/Laura Poggio, (Jack Lennon)
- **Advisory capacity to SG et al.**
 - Helaina Black, Stephen Chapman, Robin Matthews, Pete & Jo Smith