

Ratcliffe Re-visited: five decades of change in Scottish alpine ecosystems

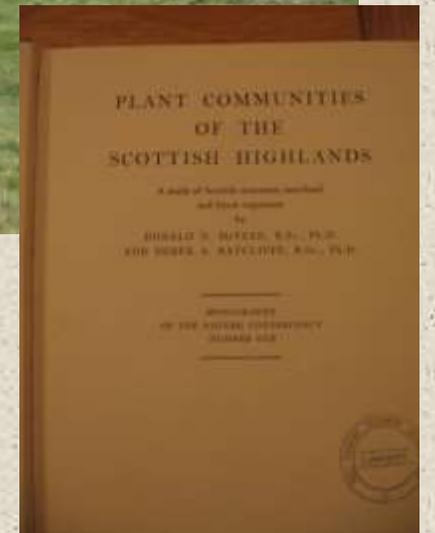
Dr Louise Ross

University of Aberdeen and The James Hutton Institute

with Sarah Woodin, Alison Hester, Des Thompson and John Birks



1955-1959: Plant
Communities of the
Scottish Highlands by
Donald McVean and
Derek Ratcliffe (and
Duncan Poore in
Breadalbane)



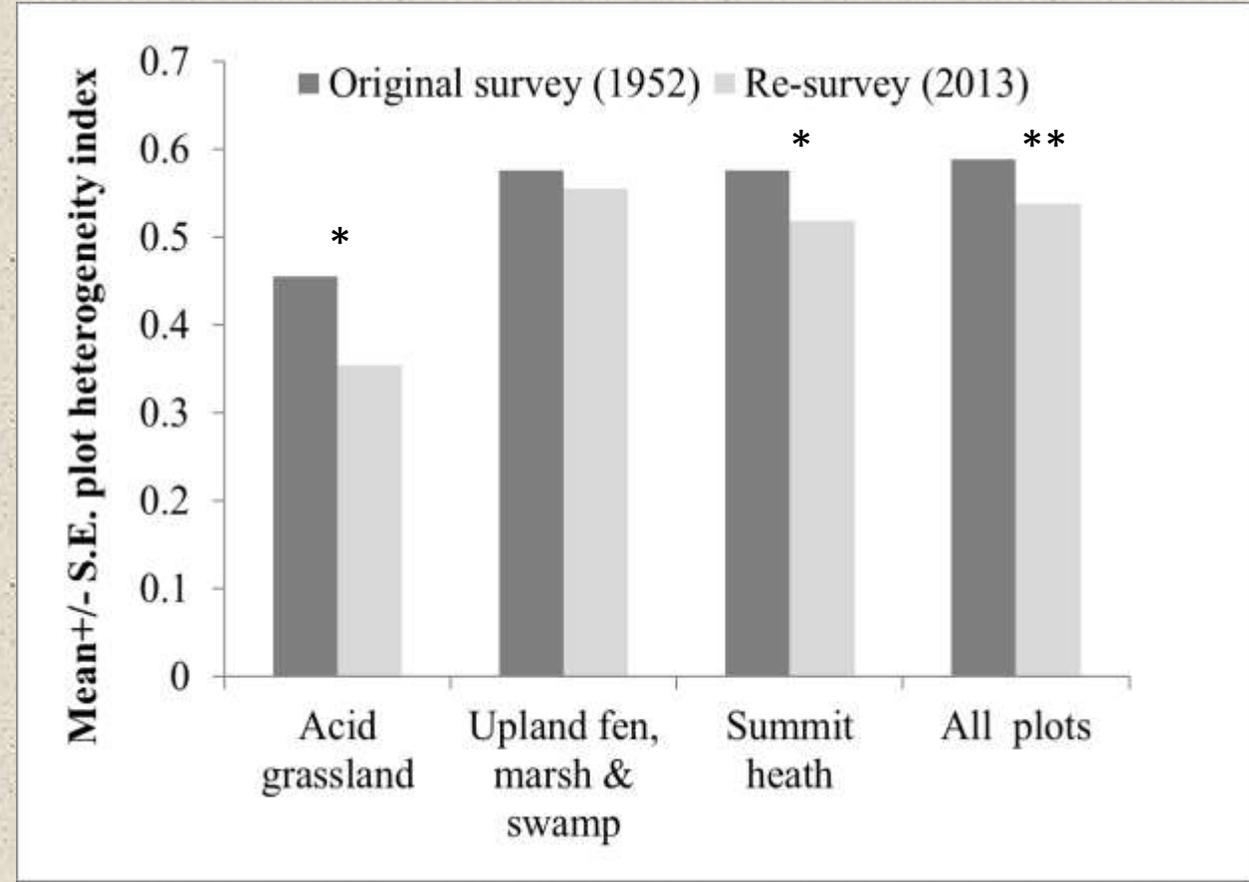
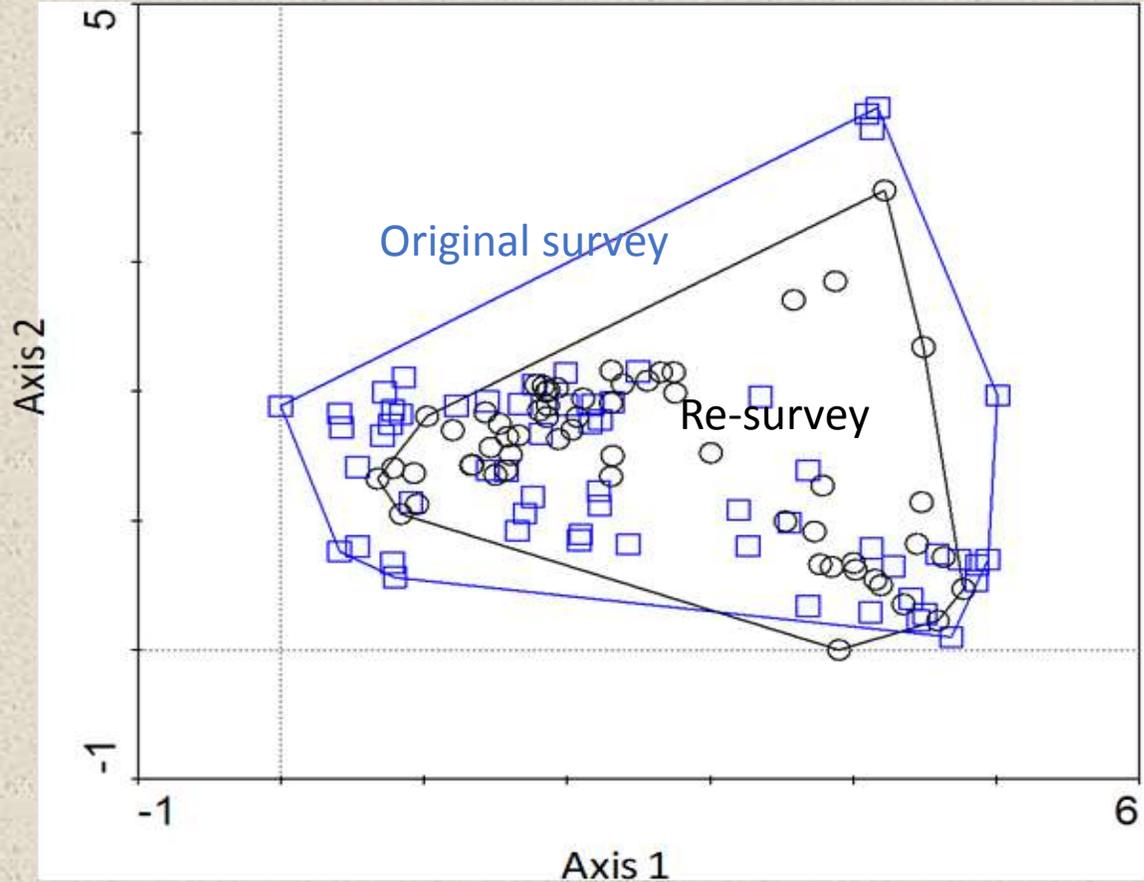
- 2007-2008:
NERC/SNH PhD
project (North-West
and Eastern Central
Highlands)

- 2013: SNH
commissioned
research (Ben
Lawers)



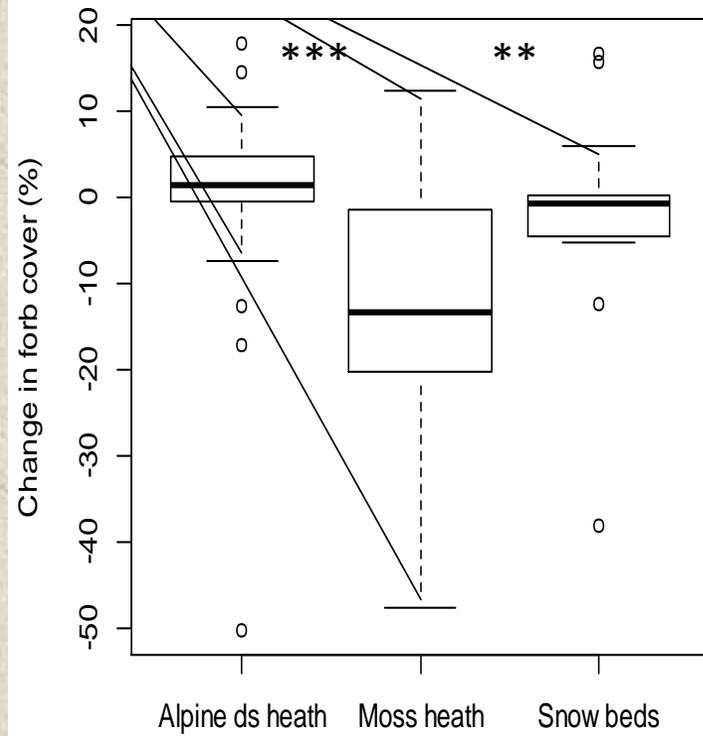
A - Ben Lawers	- NN 607 141	N - Strathcarron - Monar	- NH 058 451
B - Glen Coe - Black Mount - Ben Cruachan	- NN 251 523	O - Beinn Eighe - Torridon Group	- NG 951 587
C - Ben Nevis Range	- NN 172 967	P - Letterewe - Fisherfield Group	- NG 994 769
D - Ben Alder Group	- NN 494 709	Q - Fannich Forest	- NH 206 712
E - Creag Meagaidh	- NN 378 879	R - Beinn Dearg - Seana Bhraigh Group	- NH 262 840
F - Drumochter Hills	- NN 671 768	S - Ben Wyvis	- NH 465 688
G - Ben Vrackie - Ben A' Ghlo	- NN 954 867	T - Ben More Assynt - Inchnadamph	- NC 310 202
H - Clova - Caenlochan - Lochnagar	- NO 240 774	U - Reay Forest	- NC 286 394
I - Cairngorms	- NN 992 987	V - Ben Klibreck	- NC 601 308
J - Monadhliath	- NH 669 108	W - Ben Hope	- NC 480 506
K - Rum	- NM 365 989	X - Ben Loyal	- NC 581 488
L - Kintail - Glen Moriston	- NH 215 120	Y - Ben Griam More - Ben Griam Beag	- NC 616 381
M - Glen Affric - Glen Cannich	- NH 172 269	Z - Morven - Scarabens	- ND 008 282

Homogenisation

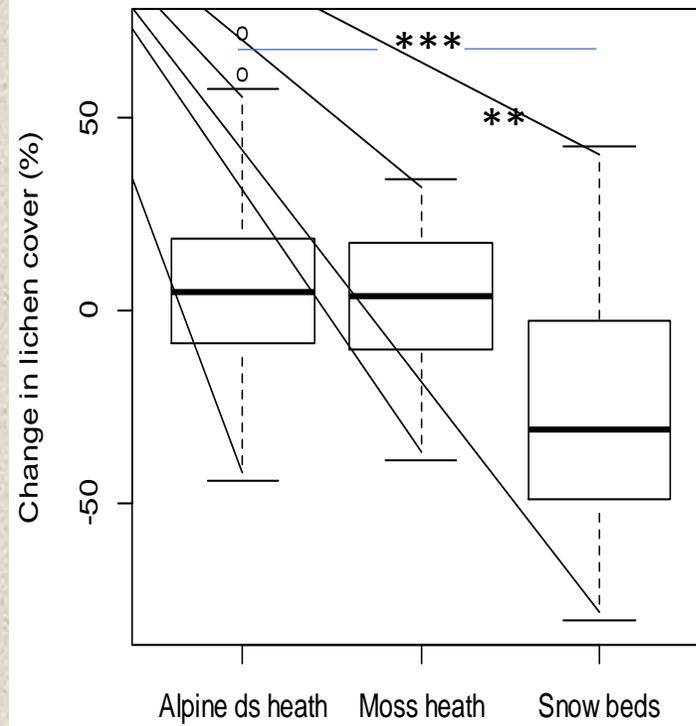


Plant groups

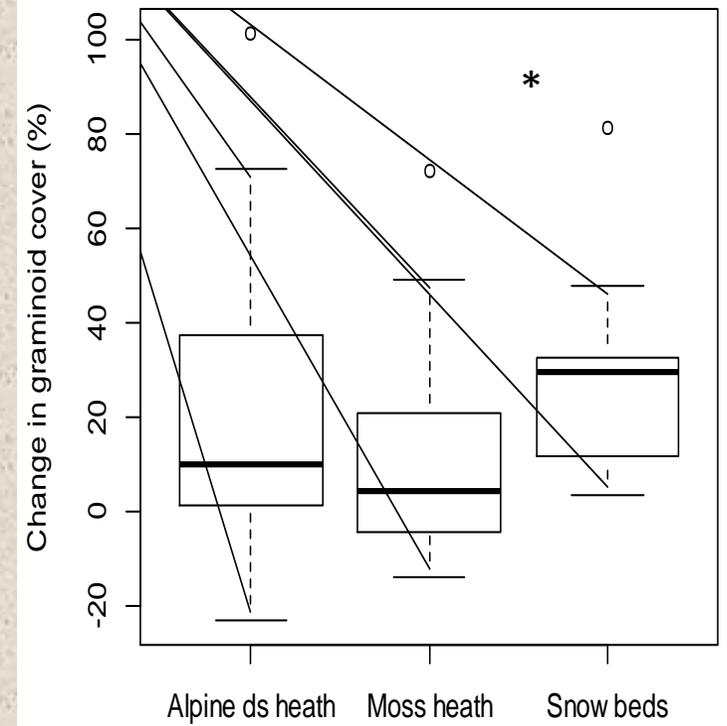
Forbs



Lichens



Graminoids



Climatic preferences

Winning Species

- **Temperate** distribution
- Preference for **higher** mean January and July **temperatures**
- Preference for **lower** mean annual **precipitation**

→ **Warmer and drier conditions**



Losing species

- **(Boreo) arctic-montane** distribution
- Preference for **lower** mean January and July **temperatures**
- Preference for **higher** mean annual **precipitation**

→ **Cooler and wetter conditions**

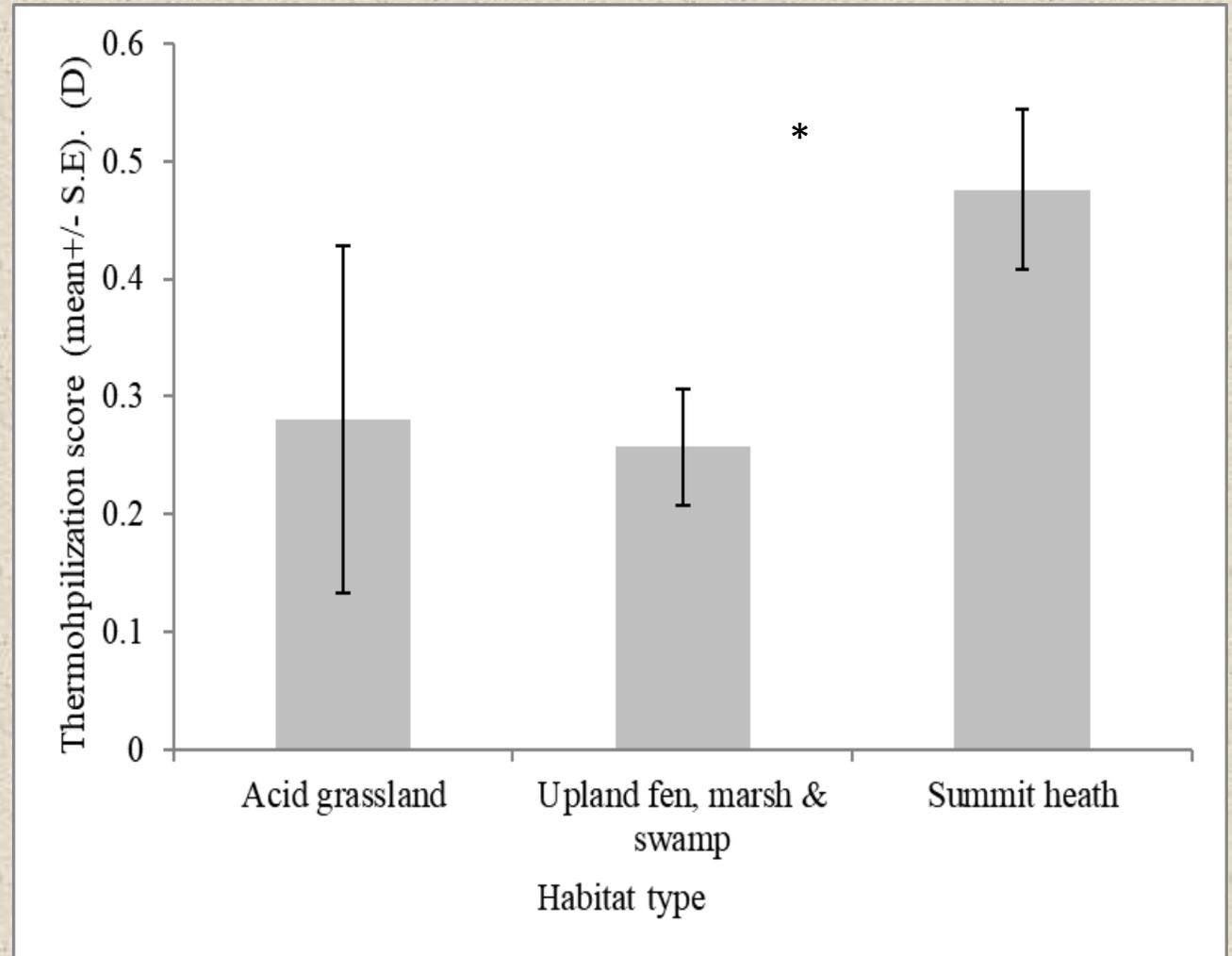


Ross, L.C., Woodin, S.J., Hester, A.J., Thompson, D.B.A. & Birks, H.J.B. (2012). Biotic homogenisation of upland vegetation: patterns and drivers at multiple scales over five decades. *Journal of Vegetation Science*, 23, 755-770.

Thermophilisation

“...the increase in warm-adapted species and the concurrent decline in cold-adapted species”

Gottfried et al. 2012
Nature Climate Change,
2, 111-115



Ross, L. (2015) Climate change impacts on the vegetation of Ben Lawers. Commissioned Report 879 to Scottish Natural Heritage.

Conclusions

- Homogenisation and thermophilisation are apparent in alpine vegetation
- Snowbeds are have undergone graminoid invasion at the expense of lichen cover
- Moss heaths have experienced substantial declines in forb cover
- Winning species tend to have a temperate distribution and preference for warmer, drier conditions...
- ...whereas many losing species have a (boreo) arctic-montane distribution and a preference for cooler, wetter conditions