

ASSESSING LONG-TERM CHANGES IN VEGETATION



LUCY RIDDING

Quantifying long-term changes in vegetation

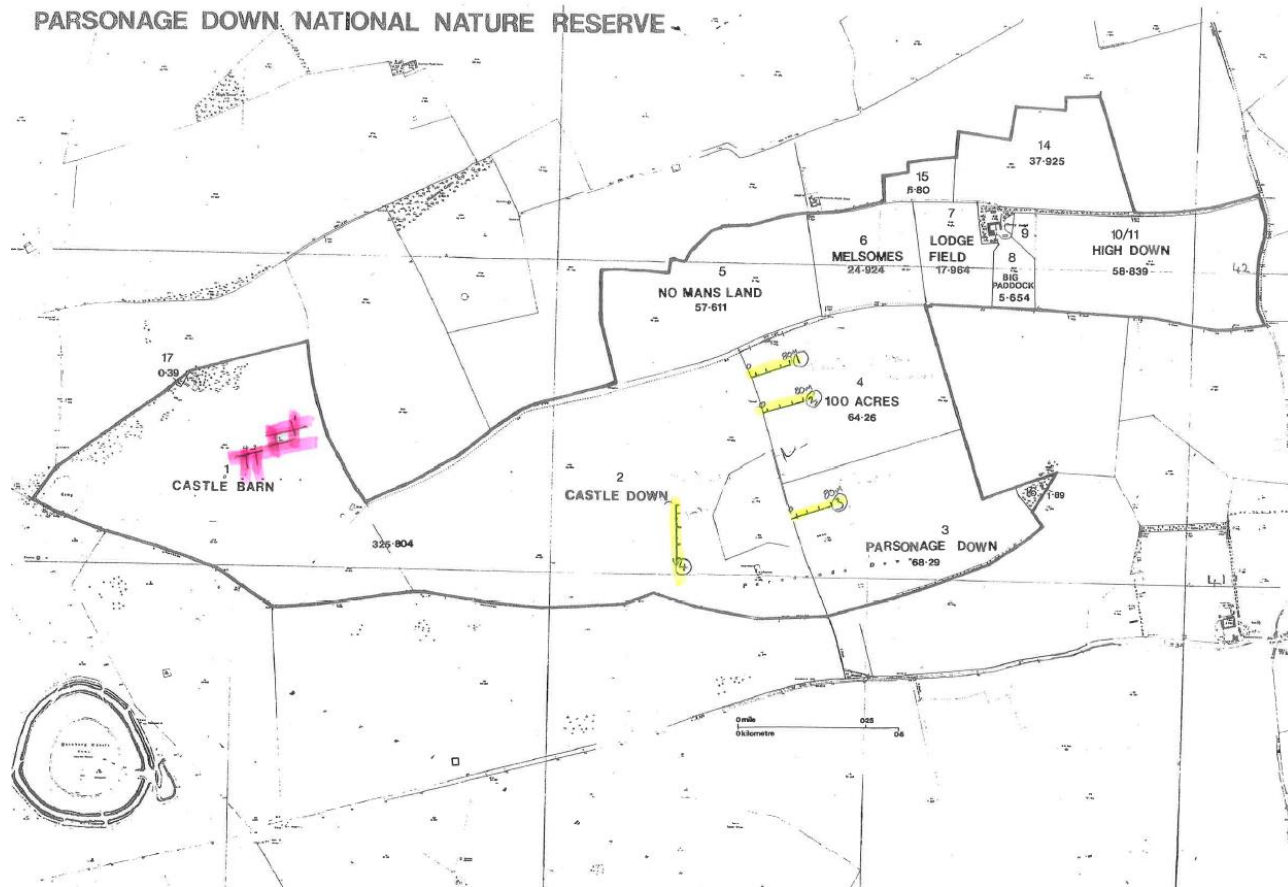
- Important for assessing drivers of change
- Archived biological records
- Comparable method and re-location
- Relatively little has been done on calcareous grassland



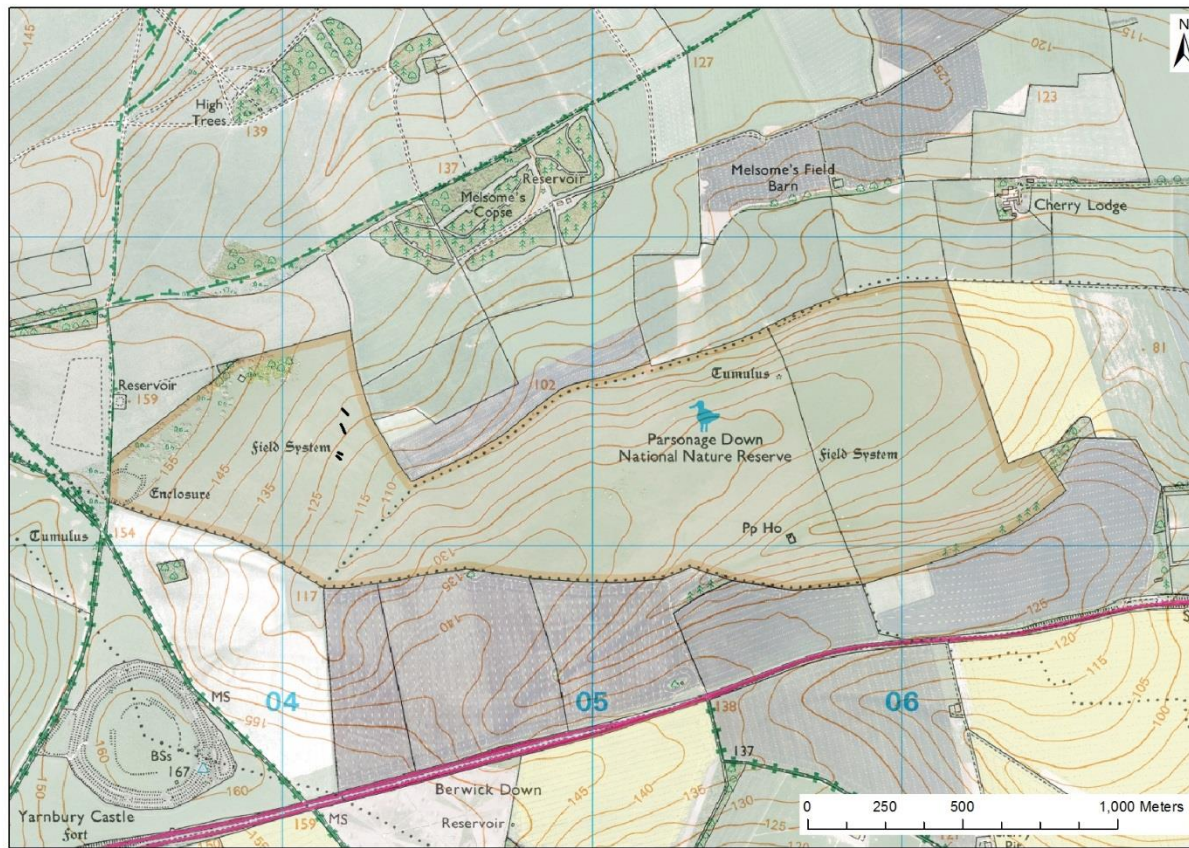
Photos: Peter Hawes

Terry Well's Survey – 1970 and 1990

- Examine the floristic composition of chalk grassland overlying Celtic field systems



Parsonage Down



- National Nature Reserve (in 1973) - 276 ha
- Maintained by grazing – no fertilisers are used
- CG2 grassland (*Festuca ovina* - *Avenula pratensis* grassland)

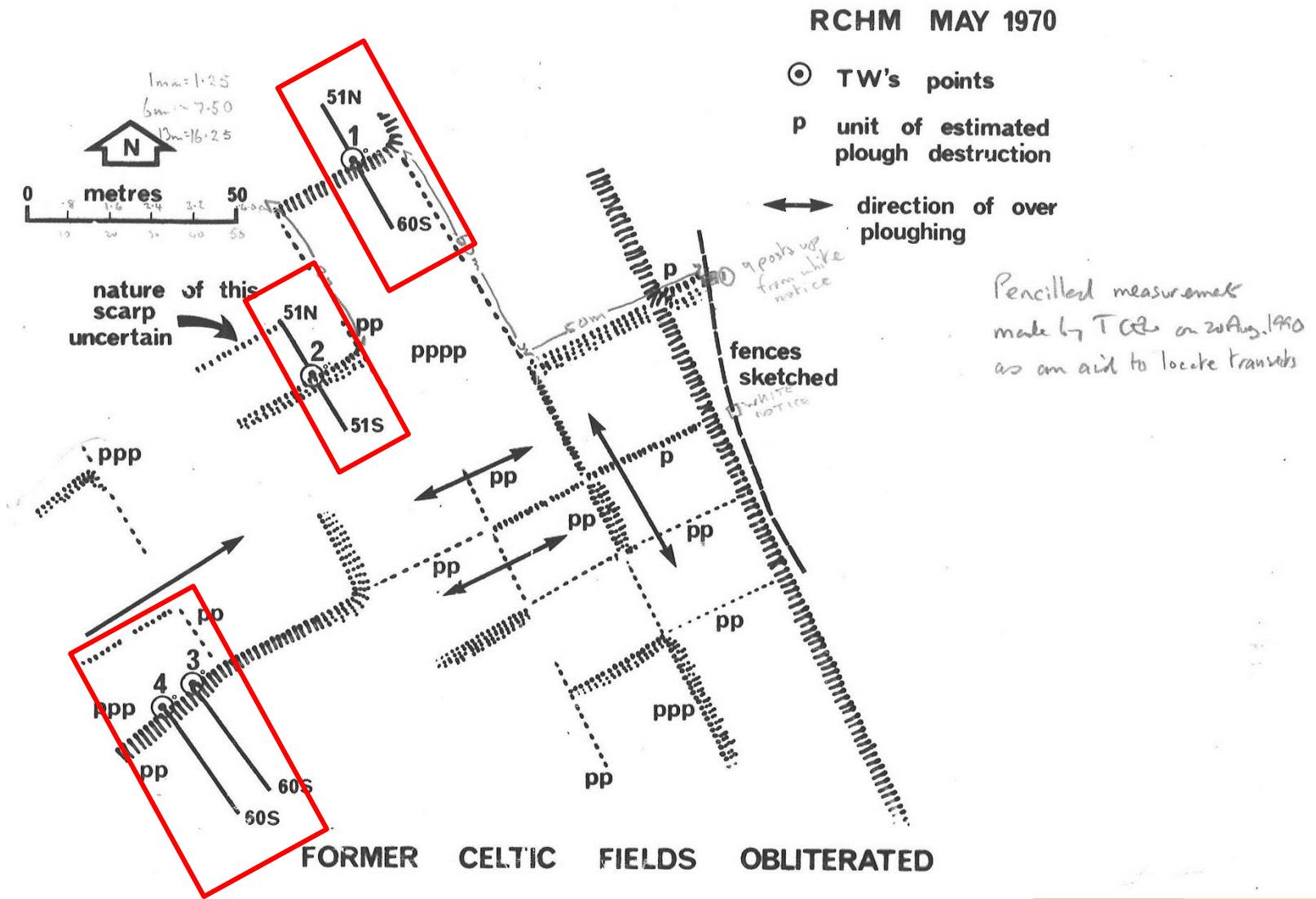
1970



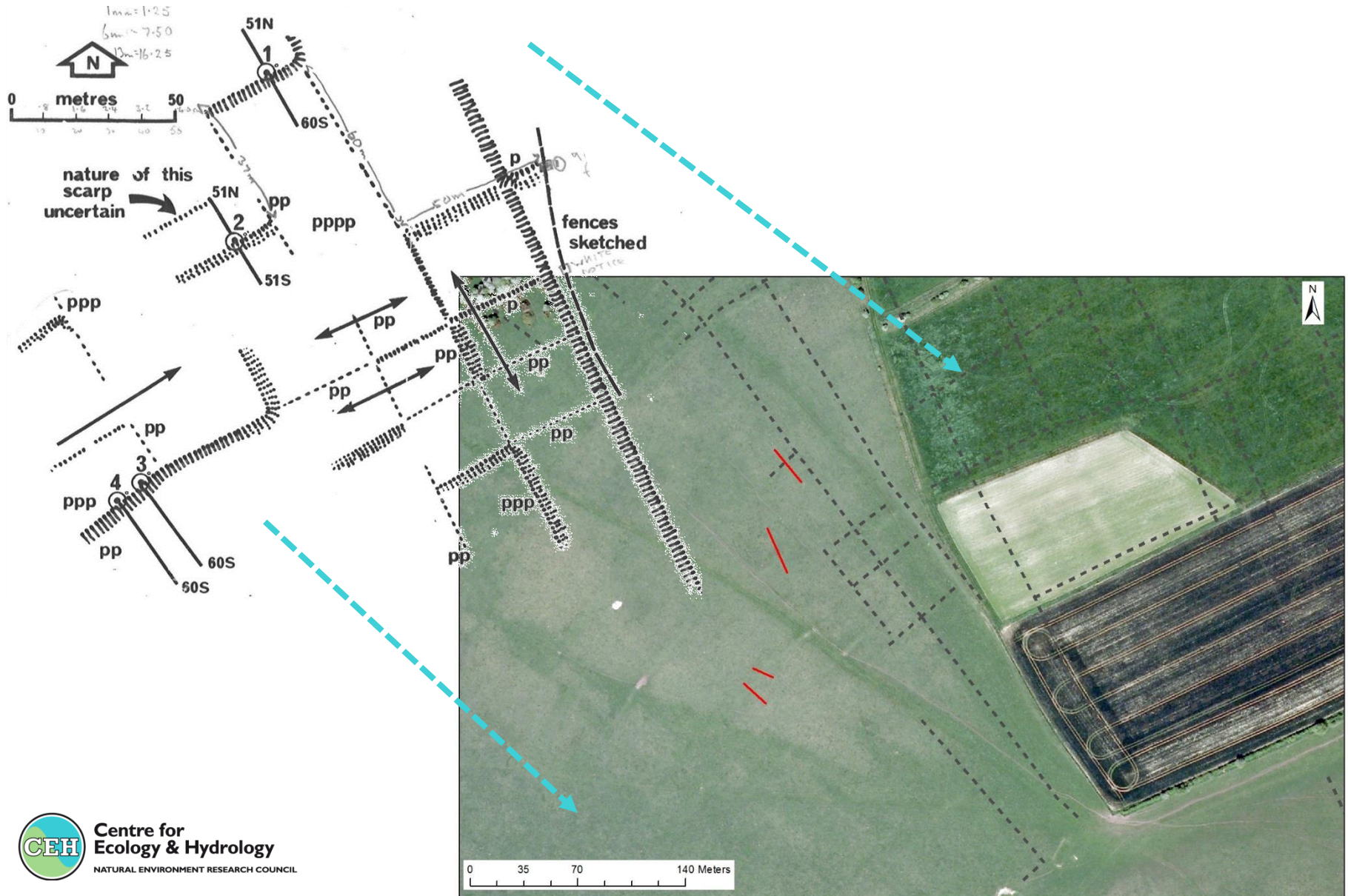
2016



Re-locating the transects



Re-locating the transects



Repeating the methods

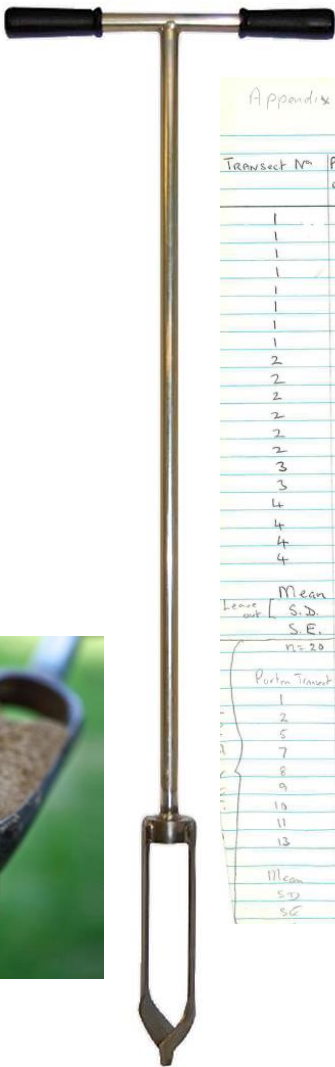


- 4 transects
- 20 cm quadrats at 3ft intervals
- Species cover recorded using the DOMIN scale



Transect	Length (ft)	No. of Quadrats	First Survey	Second Survey
1	111	38	18/05/1970	20/08/1990
2	102	35	19/05/1970	21/08/1990
3	60	21	21/05/1970	21/08/1990
4	60	21	22/05/1970	22/08/1990

Soil analysis



Appendix V The pH, loss-on-ignition and chemical composition of soils at Parsonage Down, Wilks, in 1970 & 1990. (Soils were collected from the same sites on both occasions & the same methods of chemical analysis used). Soils sampled May 1970 & Aug-1990

Transect No	Position on Transect	Sample Depth (cm)	LOI (%)		pH		Extractable				P %		N %					
			1970	1990	1970	1990	K	Ca	Mg	PO4-P	1970	1990	1970	1990				
1	21S	0-5	26	27	7.5	7.6	16	18	1171	660	20	19	2.4	1.7	0.15	0.15	1.05	1.00
1	21S	5-10	23	20	7.5	7.8	11	11	1684	590	16	11	1.9	1.2	0.10			
1	60S	0-5	27	26	7.6	7.9	16	19	1204	640	20	15						
1	60S	5-10	23	20	7.5	7.6	14	12	1200									
1	10N	0-5	24	28	7.5	7.0												
1	10N	5-10	22															
1	50N																	
1	50N																	
2	8S																	
2	8S																	
2	50S																	
2	50S																	
2	51N																	
2	51N																	
3	60S	0																
3	7S	0																
4	60S	0																
4	60S	5																
4	8S	0																
4	8S	5																

CHEMICAL DATA

M6456

March 1991
Project T07069j5

Soils, Parsonage Down, SU/042415
A study to compare soil analysis with samples taken in 1970.
August 1990

T.C.E.Wells
I.T.E.
Monks Wood

Transect No.	LOI %	pH	Extractable				P %	N %
			K mg/100g	Ca mg/100g	Mg mg/100g	PO4-P mg/100g		
21S 0-5cm	27	7.6	18	660	19	1.7	1.2	
21S 5-10cm	20	7.8	11	590	11	1.2	0.14	
60S 0-5cm	26	7.9	19	640	15	2.2	1.2	
60S 5-10cm	20	7.6	12	570	18	1.8	0.14	
10N 0-5cm	28	7.8	18	740	22	2.3	0.12	
10N 5-10cm	23	7.7	17	650	11	1.4	0.16	
50N 0-5cm	27	7.7	11	760	22	1.7	0.15	
50N 5-10cm	23	7.8	17	650	11	3.9	0.17	
8S 0-5cm	30	7.8	25	790	26	2.3	0.15	
8S 5-10cm	25	7.7	15	760	15	2.1	0.14	
50S 0-5cm	30	7.8	17	730	20	1.6	0.13	
50S 5-10cm	25	7.9	15	670	12	3.1	0.17	
51N 0-5cm	27	7.9	13	800	10	1.4	0.14	
51N 5-10cm	22	7.7	21	630	16	1.7	0.13	
60S 0-5cm	32	7.6	10	640	18	1.9	0.16	
60S 5-10cm	21	7.9	15	740	27	3.1	0.14	
8S 0-5cm	23	8.0	18	750	15	2.1	0.12	
8S 5-10cm	24	7.7	17	700	20	2.5	0.17	
51N 0-5cm	27	7.8	9.2	830	14	2.0	0.16	
51N 5-10cm	24	7.9	20	730				
60S 0-5cm	28	7.8	16					
60S 5-10cm	28	7.7						

All results expressed on a dry weight basis

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Institute of Terrestrial Ecology
Analytical Section
Merlewood Research Station
Grange-over-Sands Cumbria LA11 6JU

Digitalising record cards

SITE										Quad size	Status	Area	Owner	Recorder									
Pasomage Down Trans 1. 06'										20 cm ²			Top half of Celtic bank	T.W.									
County	1	3	9	Grid Ref.	3	4	1	0	4														
Slope	18	0	2	Veg. Ht. (cms.)	20	0	3	Geol.	Gravelly														
SITE										Quad size	Status	Area	Owner	Recorder									
Pasomage Down Trans 1. 09S										20cm ²			Half-way down Celtic Field Bank	T.W.									
County	1	3	9	Grid Ref.	3	4	1	0	4														
Slope	18	0	2	Veg. Ht. (cms.)	20	0	4	Geol.	Chalk														
Management										22	4	Gravelly chalk					23	6	2	4	0	2	6
										Altitude (ft.)	25						No. Sp.						
Agrostis stolonifera	29			Carex caryophylla	48	1				Chrysanthemum leuc	61	1	Hippocrepis comosa	13		Polygala vulgaris	32		Thymus pulegioides	51			
Arrhenatherum elat	30			flacca	49	3			Cirsium acaulon	62	✓	Hypericum perforat	14		Poterium sanguisorba	33		Trifolium pratense	52	1			
Brachypodium pinnat	31			humilis	50	2			arvense	63		Juniperus communis	15		Primula veris	34	✓	repens	53				
sylvat	32								vulgare	64		Leontodon hispidus	16	3	Prunella vulgaris	35		Veronica chamaedrys	54				
Briza media	33	2							clinopodium vulgare	65		taraxac	17		Ranunculus bulbosus	36	2	Viburnum lantana	55				
Cynosurus cristatus	34	✓							Corylus avellana	66		Ligustrum vulgare	18		Rhamnus catharticus	37		Viola hirta	56				
Dactylis glomerata	35	4							Crataegus monogyna	67		Linum catharticum	19		Rhinanthus minor	38							
Deschampsia caespit	36								Crepis capillaris	68		Lotus corniculatus	20		Rosa canina	39							
Festuca arundinacea	37								Dactylorhiza fuchsii	69		Medicago lupulina	21	4	Rubus fruticosus	40		Acrocladium cuspid	57				
ovina	38	4							Daucus carota	70		Onobrychis viciifol	22	3	Scabiosa columbaria	41	1	Camptothecium lutes	58				
rubra	39								Euphrasia nemorosa	71		Ononis repens	23		Senecio integrifolius	42		Campylopusium chrysop	59				
Helictotrichon prat	40	2							Filipendula vulgaris	72		Origanum vulgare	24		Thymus humifusum	49		Pseudoscleropus purum	65				
pub	41								Fragaria vesca	73		Pastinaca sativa	25		Thymus drucei	50		Rhytididelp squar	66				
Holcus lanatus	42								Galium mollugo	74		Picris hieracioides	26										
Koeleria cristata	43	3							verum	75	✓	Phyteuma tenerum	27										
Phleum bertolonii	44											Pimpinella saxifrag	28										
												Plantago lanceolata	29	3									
												media	30	2									
												✓ Polygala calcarea	31	✓									

Zerna erecta = Bromopsis erecta

Helictotrochon pubescens = Avenula pubescens

Leontodon autumnal = Scorzoneroideis autumnalis

Species richness

(Kruskal-Wallis $X^2 = 197.12$, $df = 2$, $p < 0.001$)



Neotinea ustulata



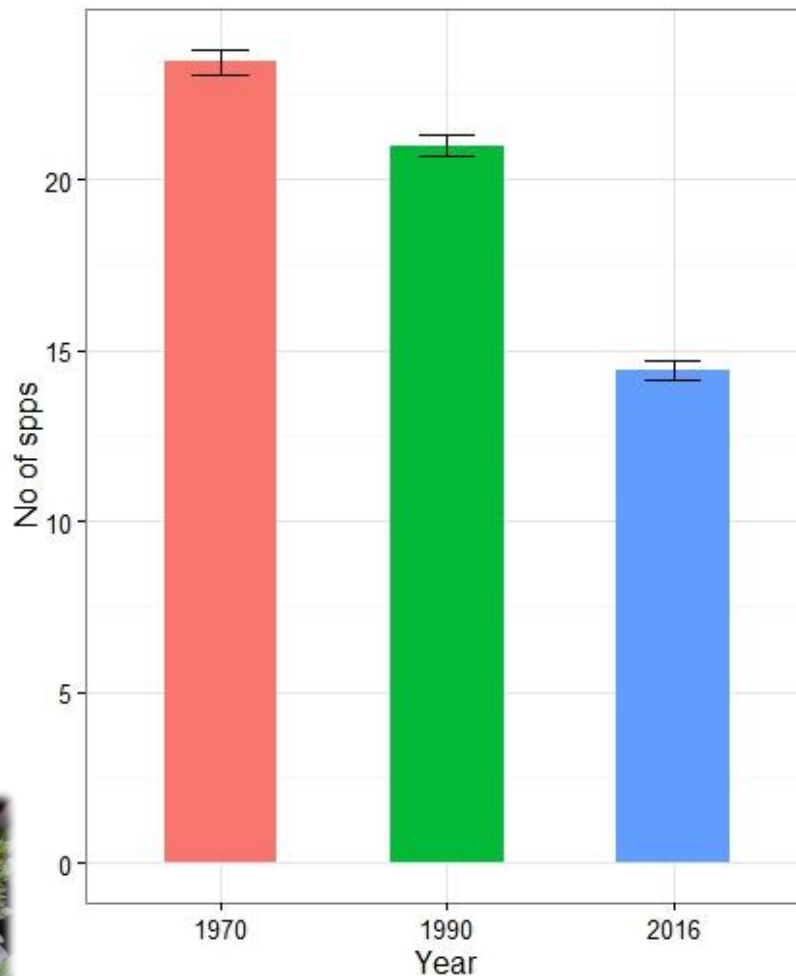
Anacamptis morio



Spiranthes spiralis



Euphrasia nemorosa



Coeloglossum viride

Positive indicator species for CG2



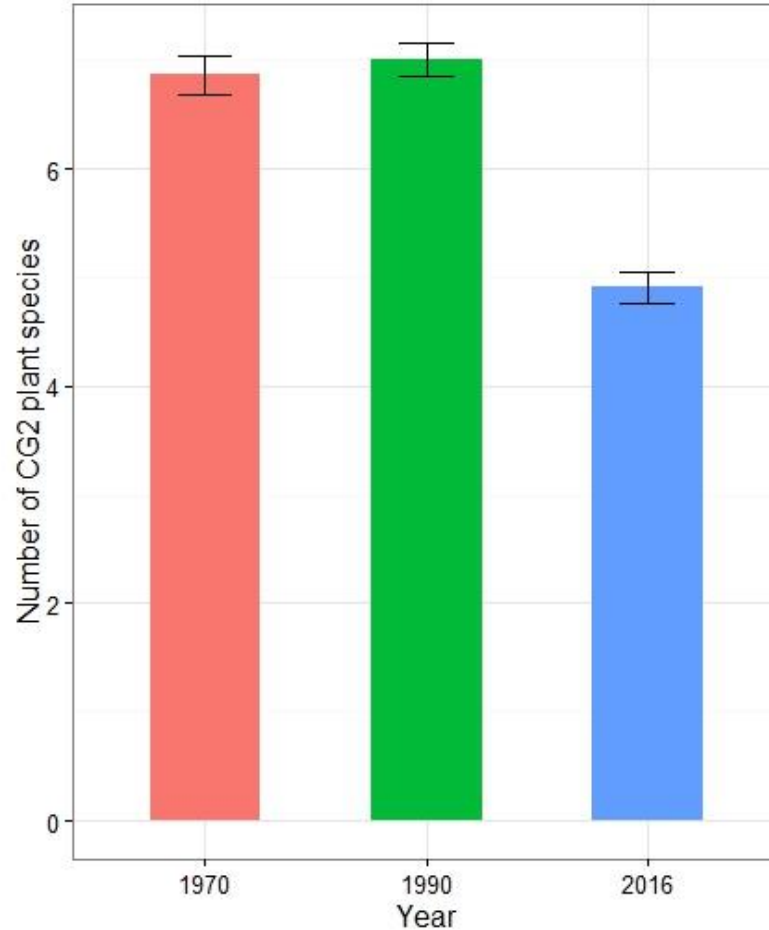
Cirsium acaule



Leontodon hispidus



Linum catharticum



Lotus corniculatus

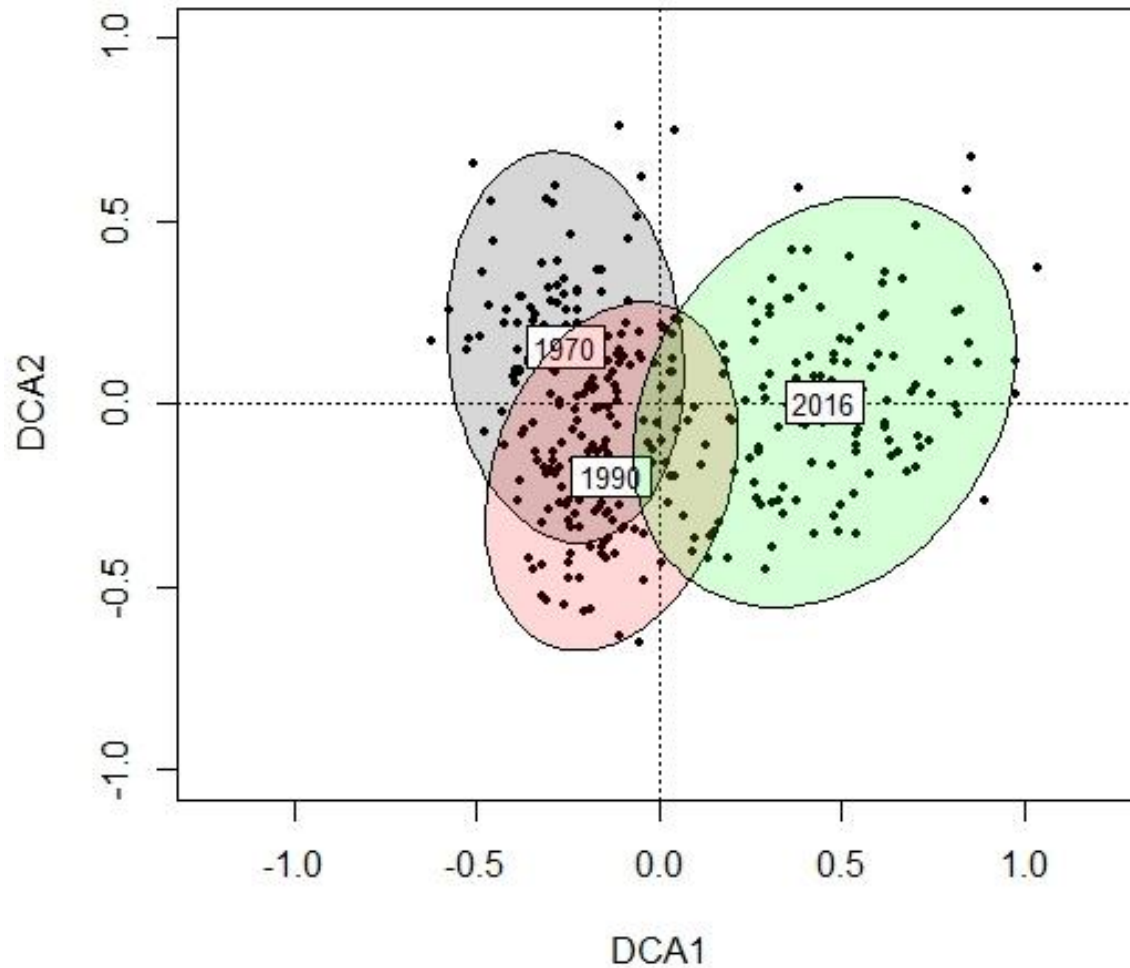


Leucanthemum vulgare



Filipendula vulgaris

Species composition



Bromopsis erecta



Cerastium fontanum



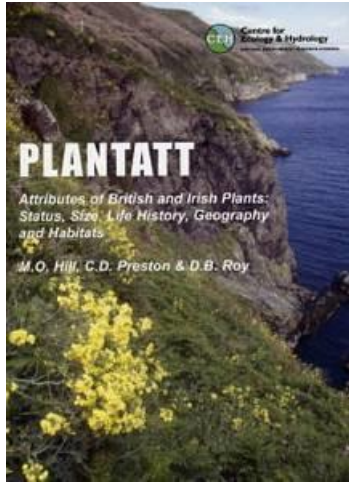
Lolium perenne



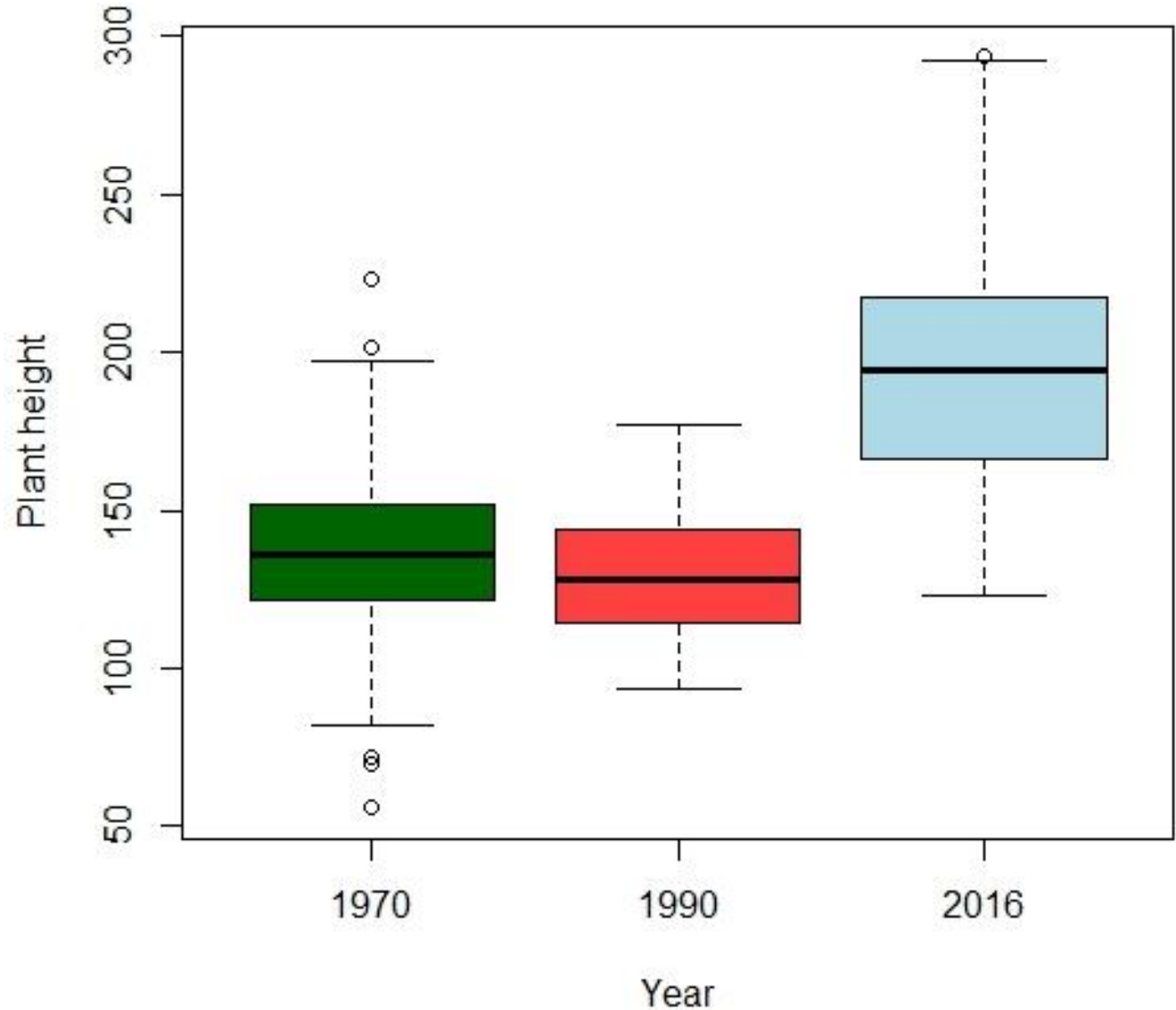
Ononis spinosa



Species traits - Plant height

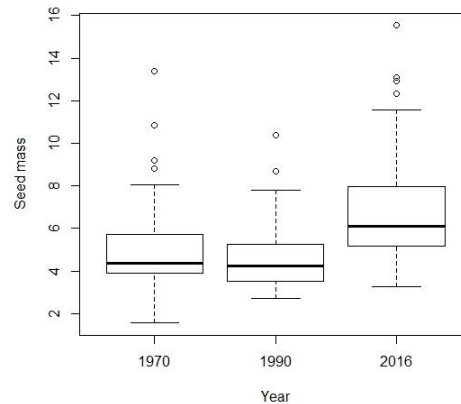
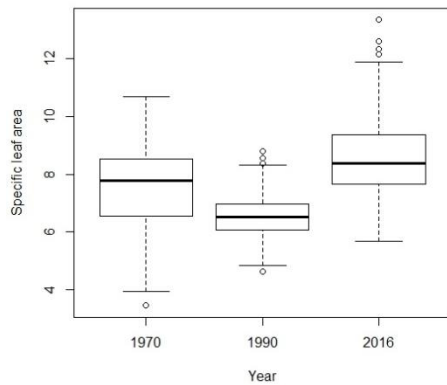


(Kruskal-Wallis $X^2 = 176.82$, $df = 2$, $p < 0.001$)



Future work

- Explore further traits
- Environmental factors
- Soil results



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Thank you



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