

ASSESSING LONG-TERM CHANGES IN VEGETATION



LUCY RIDDING

Quantifying long-term changes in vegetation

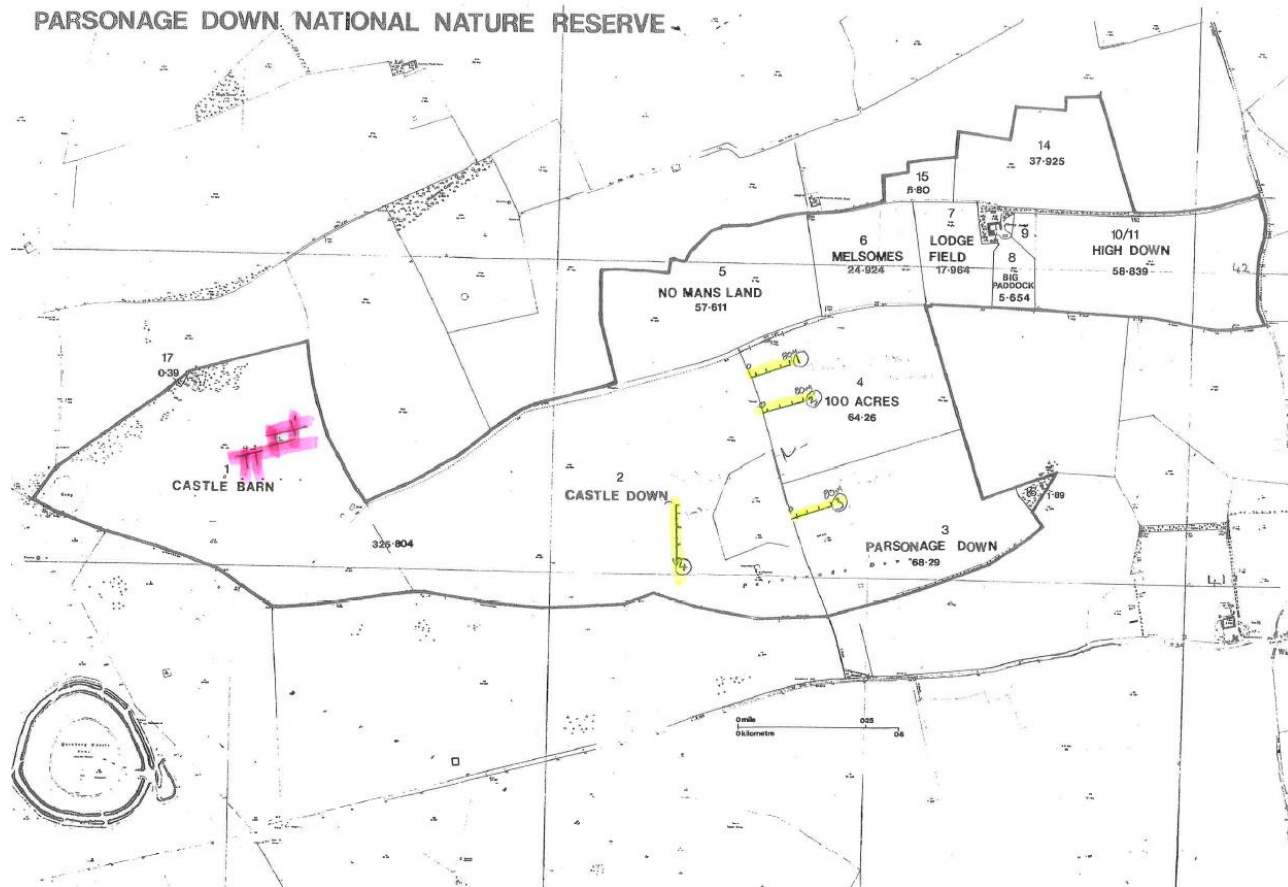
- Important for assessing drivers of change
- Archived biological records
- Comparable method and re-location
- Relatively little has been done on calcareous grassland



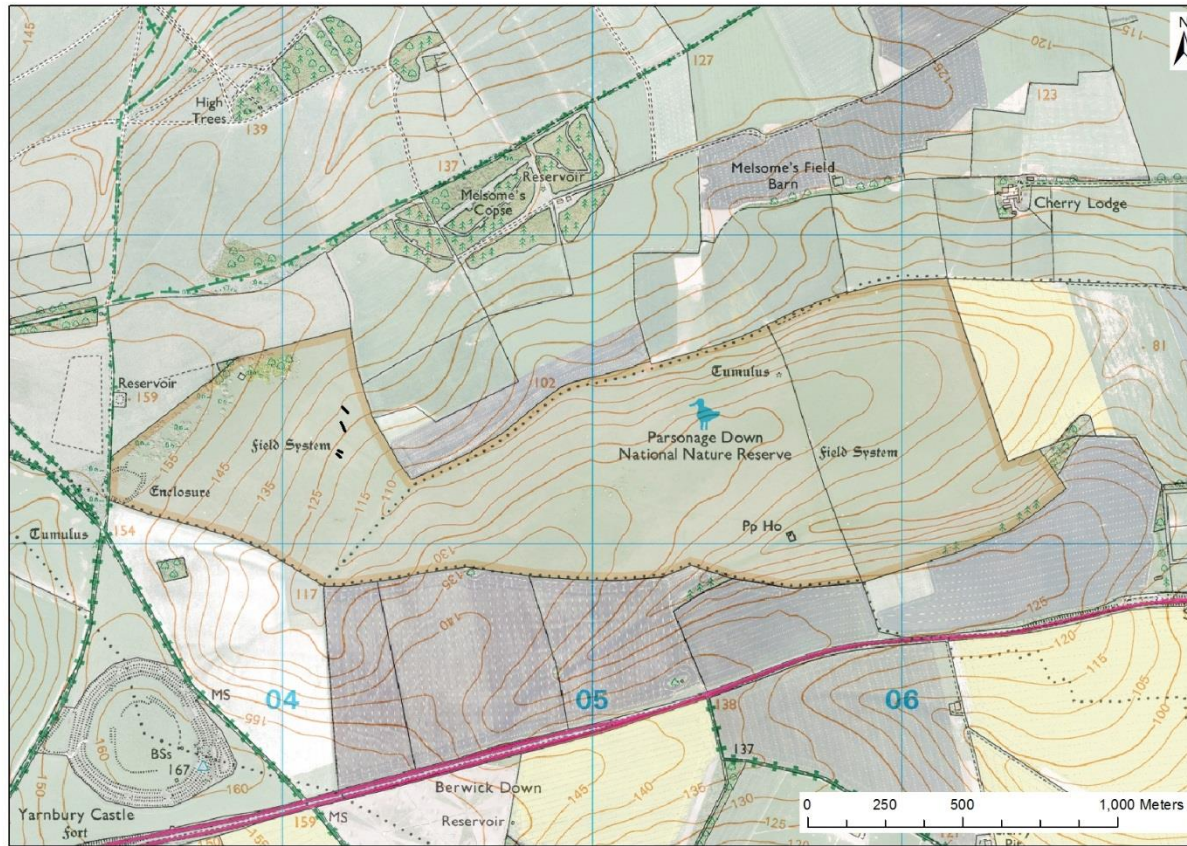
Photos: Peter Hawes

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

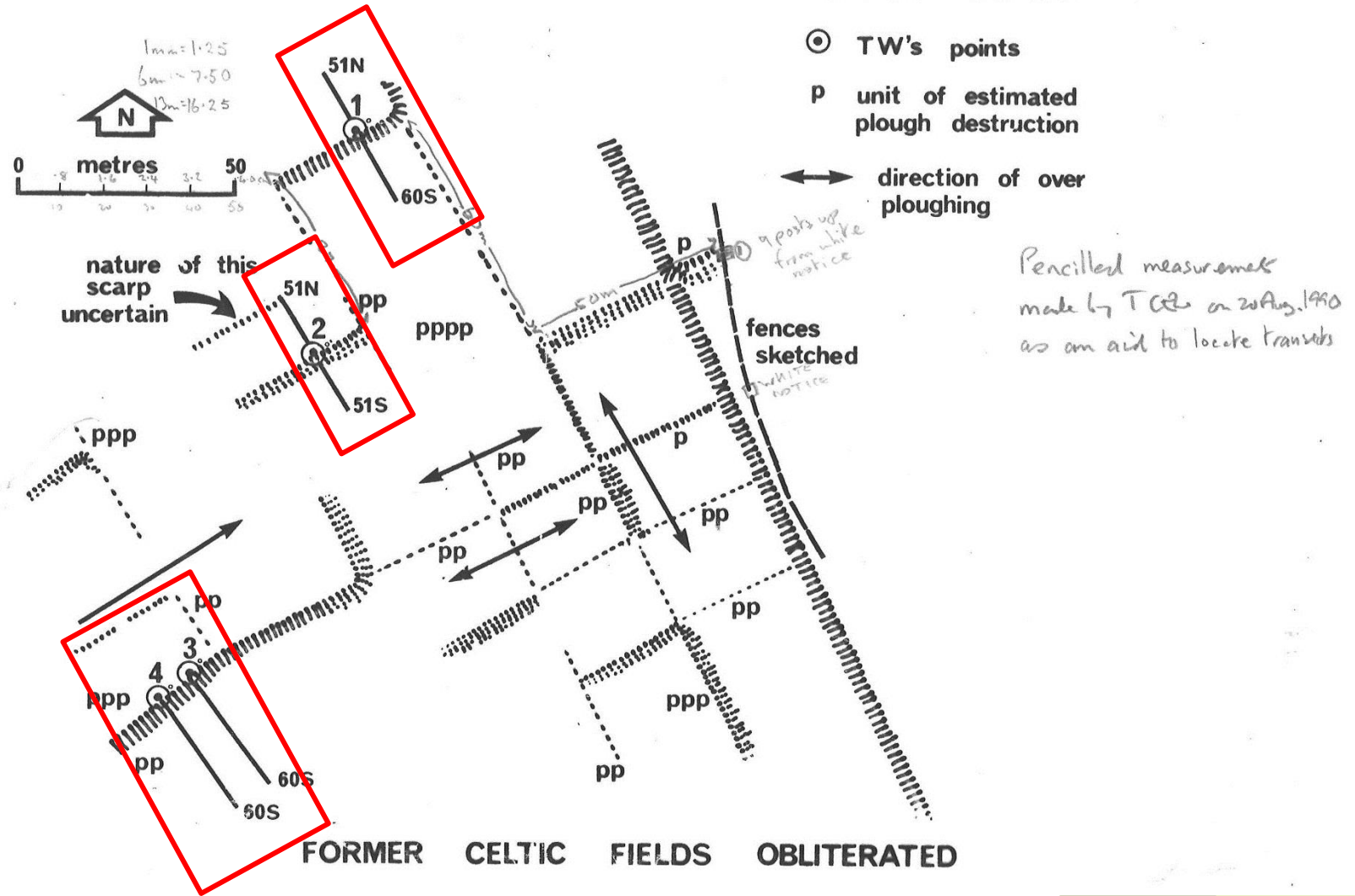


2016



Re-locating the transects

RCHM MAY 1970



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, Wilts. in 1970 & 1990

Leave out (Soils were collected from the same sites in both occasions & the same methods of chemical analysis used). Soils sampled May 1970 & August 1990

Transect No.	Position on Transect	Sample Depth (cm)	L.O.I. (%)		pH	Extractable						P %		N %	
			1970	1990		K	Ca	Mg	PO4-P			1970	1990	1970	1990
1	21S	0-5	26	27	7.5	16	18	1171	660	26	19	2.4	1.7	0.15	1.05
1	21S	5-10	23	20	7.5	11	11	1084	570	16	11	1.9	1.2	0.12	0.99
1	60S	0-5	27	26	7.6	16	19	1204	640	20	15	2.8	2.2	0.13	1.11
1	60S	5-10	23	20	7.5	14	12	1062	570	12	8.3	1.7	1.8	0.11	0.95
1	10N	0-5	24	28	7.5	19	44	1149	740	25	18	2.2	2.3	0.13	1.03
1	10N	5-10	23	23	7.6	14	18	1124	650	16	12	1.9	1.4	0.12	0.98
1	50N	0-5	25	27	7.5	30	17	1137	760	20	22	2.5	2.3	0.13	1.03
1	50N	5-10	22	23	7.6	12	11	1054	600	20	22	2.5	2.3	0.13	1.03
2	8S	0-5	29	30	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
2	8S	5-10	24	25	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
2	50S	0-5	27	27	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
2	50S	5-10	25	23	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
2	51N	0-5	28	32	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
2	51N	5-10	24	21	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
3	60S	0-10	24	23	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
3	7S	0-10	25	24	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
4	60S	0-5	30	27	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
4	60S	5-10	23	22	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
4	8S	0-5	26	28	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
4	8S	5-10	21	24	7.4	22	11	1054	600	20	22	2.5	2.3	0.13	1.03
Mean			24.95	24.95	7.4										
S.D.			2.35	3.30	0.1										
S.E.			0.525	0.732	0.0										
n=20			NS		P										
Porton Transect															
1	0-10	11.5	15	8.2											
2	"	16.1	19	8.1											
5	"	14.5	18	7.8											
7	"	12.0	15	8.2											
8	"	14.3	22	8.0											
9	"	26.1	23	7.8											
10	"	14.8	23	7.8											
11	"	16.6	26	7.7											
13	"	12.5	18	8.2											
Mean			15.37	19.89	7.97										
S.D.			4.387	3.92	0.50										
S.E.			1.00	0.78	0.12										

CHEMICAL DATA

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

March 1991

Project T07069j5

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

Transect No.	LOI %	pH	Extractable		Mg mg/100g	PO4-P mg/100g	P %	N %
			K mg/100g	Ca mg/100g				
21S 0-5cm	1	7.6	18	660	19	1.7	0.15	1.2
21S 5-10cm	1	7.8	11	590	11	1.2	0.14	0.99
60S 0-5cm	1	7.9	19	640	15	2.2	0.14	1.2
60S 5-10cm	1	7.6	12	570	8.3	2.3	0.12	1.0
10N 0-5cm	1	7.8	44	740	18	1.8	0.18	1.3
10N 5-10cm	1	7.7	18	650	12	2.3	0.16	1.1
50N 0-5cm	1	7.8	17	760	11	1.7	0.15	1.3
50N 5-10cm	1	7.7	25	790	26	3.9	0.17	1.1
8S 0-5cm	2	7.8	15	760	15	2.1	0.14	1.2
8S 5-10cm	2	7.9	13	730	12	1.6	0.13	1.0
50S 0-5cm	2	7.6	21	670	22	3.1	0.17	1.5
50S 5-10cm	2	7.9	10	800	10	1.4	0.14	1.1
51N 0-5cm	2	8.0	15	630	16	1.7	0.13	1.2
51N 5-10cm	2	7.8	18	640	18	1.9	0.16	1.3
60S 0-5cm	3	7.9	17	740	27	3.1	0.14	1.1
60S 5-10cm	3	8.0	15	750	15	2.1	0.12	1.2
7S 0-5cm	4	7.8	20	700	20	2.5	0.17	1.1
7S 5-10cm	4	7.7	16	830	14	2.0	0.16	1.1

Ammonium acetate pH9 ----->
Olsens

All results expressed on
a dry weight basis



Centre for
Ecology & Hydrology

NATURAL ENVIRONMENT RESEARCH COUNCIL

1077274-83/118

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

NERC

SCIENCE OF THE
ENVIRONMENT

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 WILTS 139										Grid Ref. 4104				16 5									
Slope 02										Veg. Ht. (cms.) 03	Geol. Gravelly		Month 5 Year 70 Aspect 15										
Slope 02										Veg. Ht. (cms.) 03	Geol. Gravelly		Altitude 25 No. Sp. 215										

SITE										Quad size	Status	Area	Owner	Recorder									
Pasomage Down Trans 1. 09S										20 cm ²			Half-way down Celtic Field Bank	T.W.									
County WILTS 139										Grid Ref. 4104	2415		16 5										
Slope 02										Veg. Ht. (cms.) 04	Geol. Chalk		Month 5 Year 70 Aspect 15										
Slope 02										Veg. Ht. (cms.) 04	Geol. Chalk		Altitude 25 No. Sp. 216										

Plant Species	Count	Plant Species	Count	Plant Species	Count	Plant Species	Count	Plant Species	Count
Agrostis stolonifera	29	Carex caryophylla	48	Chrysanthemum leuc	61	Hippocrepis comosa	13	Polygala vulgaris	32
Arrhenatherum elat	30	flacca	49	Cirsium acaulon	62	Hypericum perforat	14	Poterium sanguisorba	33
Brachypodium pinnat	31	humilis	50	arvense	63	Juniperus communis	15	Primula veris	34
sylvat	32			vulgare	64	Leontodon hispidus	16	Prunella vulgaris	35
Briza media	33			Clinopodium vulgare	65	taraxac	17	Ranunculus bulbosus	36
Cynosurus cristatus	34			Corylus avellana	66	Ligustrum vulgare	18	Rhamnus catharticus	37
Dactylis glomerata	35			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	Rubus frutic agg	40
ovina	38	Achillea millefolium	51	Daucus carota	70	Onobrychis viciifol	22	Scabiosa columbaria	41
rubra	39	Anemone pulsatilla	52	Euphrasia nemorosa	71	Ononis repens	23	Senecio integrifolius	42
Helictotrichon prat	40	Anthyllis vulneraria	53	Filipendula vulgaris	72	Origanum vulgare	24	jacobaea	43
pub	41	Asperula cynanchica	54	Fragaria vesca	73	Pastinaca sativa	25	Serratula tinctoria	44
Holcus lanatus	42	Betonica officinalis	55	Galium mollugo	74	Picris hieracioides	26	Succisa pratensis	45
Koeleria cristata	43	Campanula glomerata	56	verum	75	Phyteuma tenerum	27	Taraxacum laevigatum	46
Phleum bertolonii	44	rotundif	57			Pimpinella saxifrag	28	Taxus baccata	47
Sieglingia decumbens	45					Plantago lanceolata	29	Thelycrania sanguinea	48
Trisetum flavescens	46					media	30	Thesium humifusum	49
Zerna erecta	47					Polygala calcarea	31	Thymus drucei	50

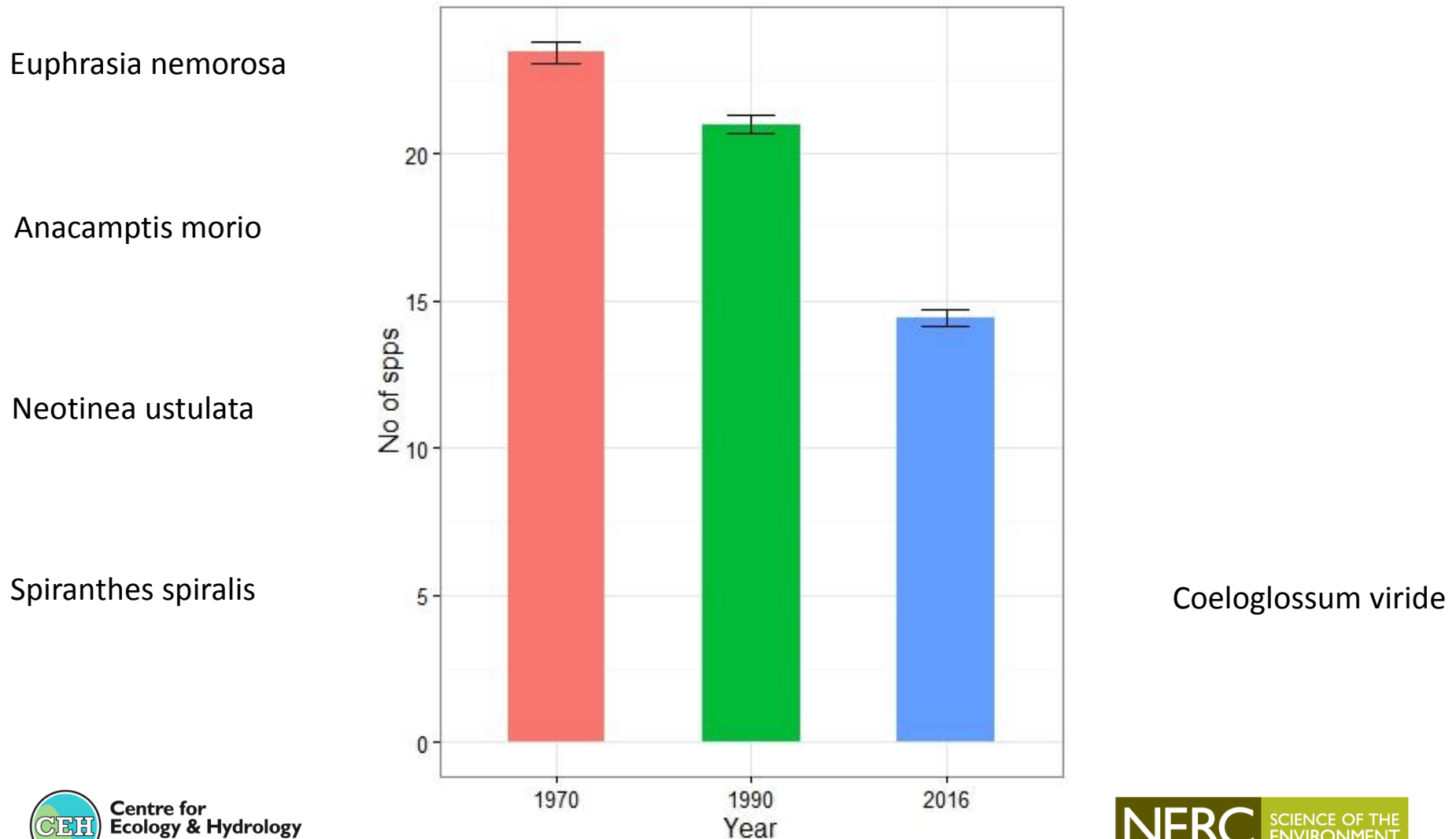
Zerna erecta = Bromopsis erecta

Helictotrochon pubescens = Avenula pubescens

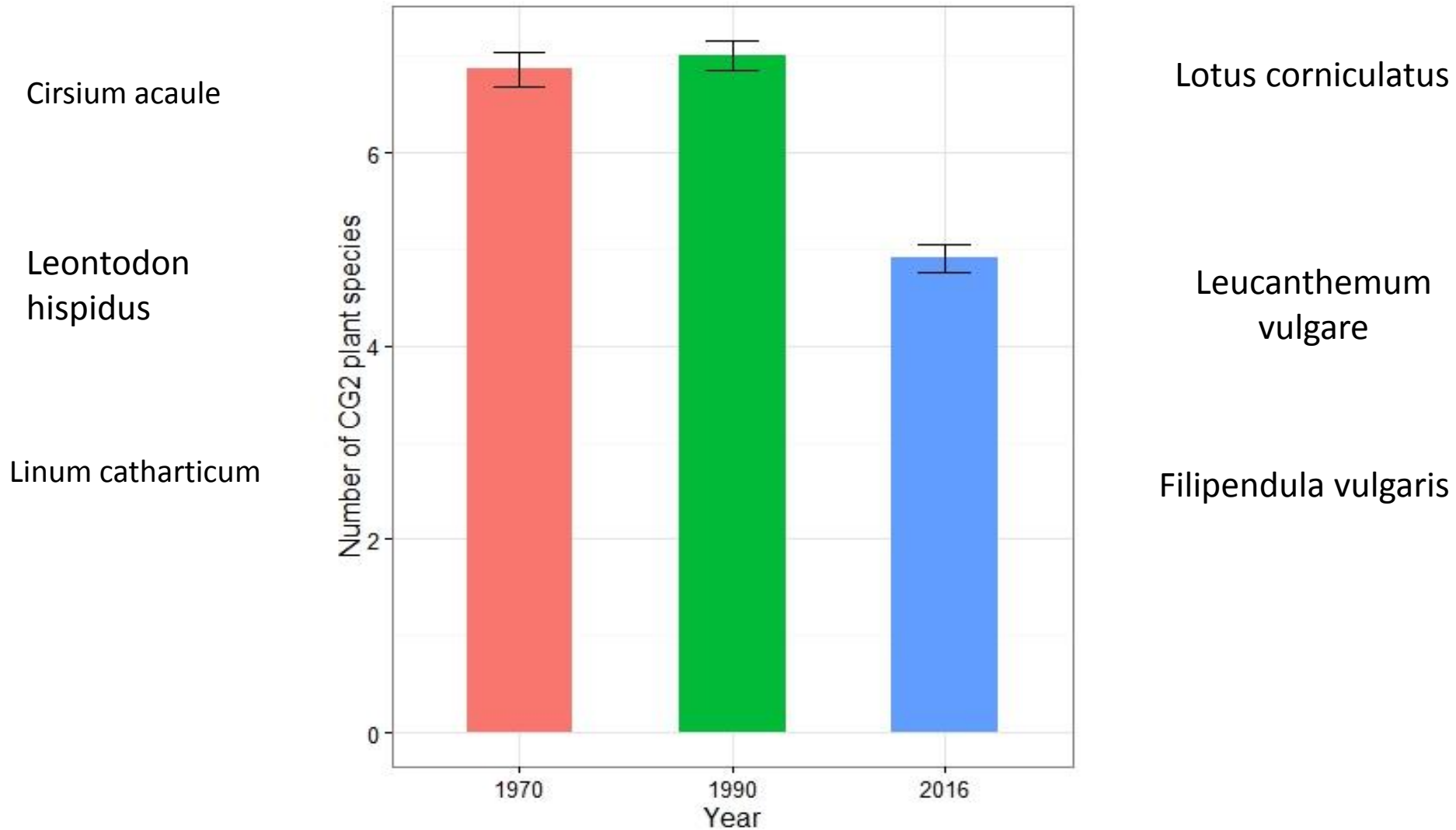
Leontodon autumnal = Scorzoneroideis autumnalis

Species richness

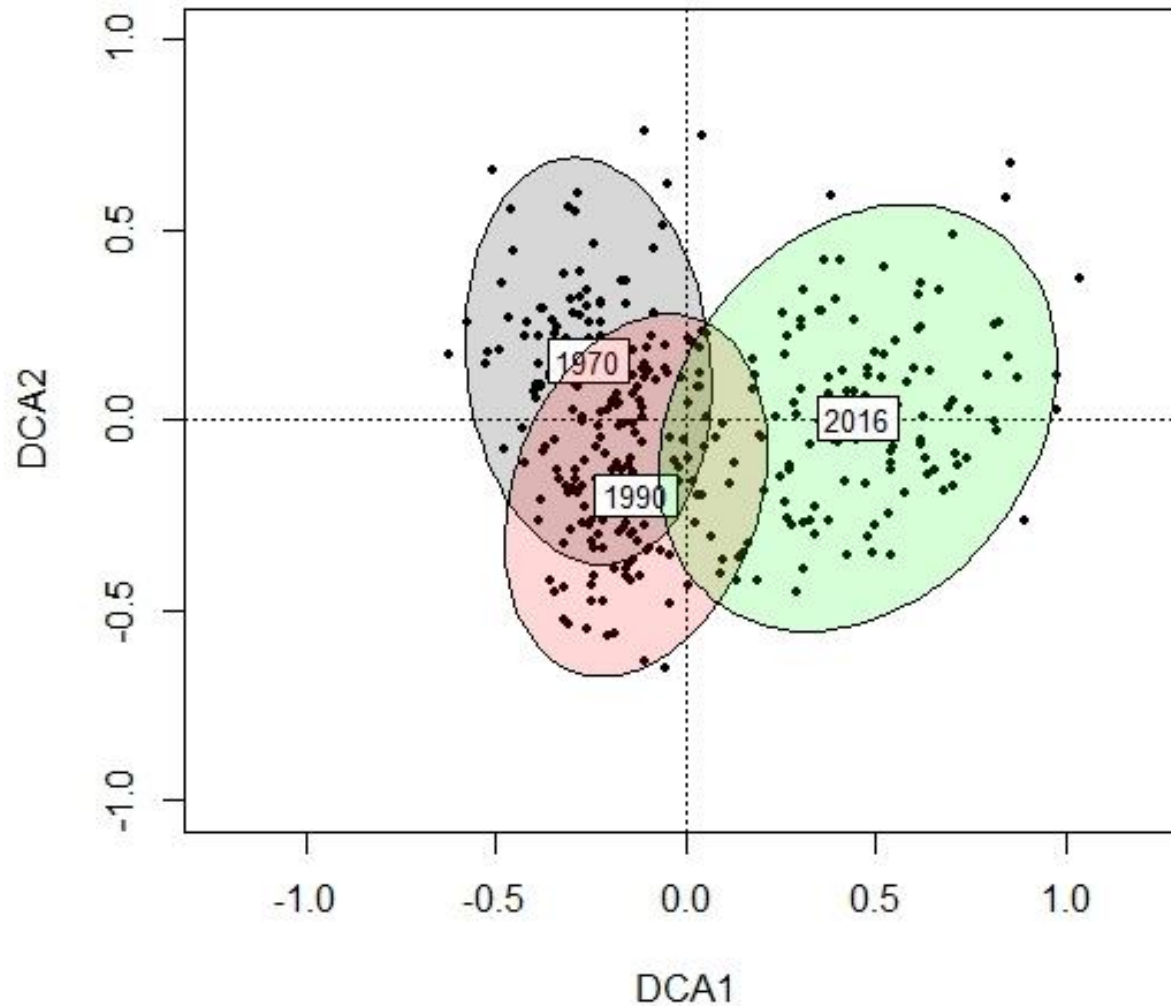
(Kruskal-Wallis $\chi^2 = 197.12$, $df = 2$, $p < 0.001$)



Positive indicator species for CG2



Species composition



Cerastium fontanum

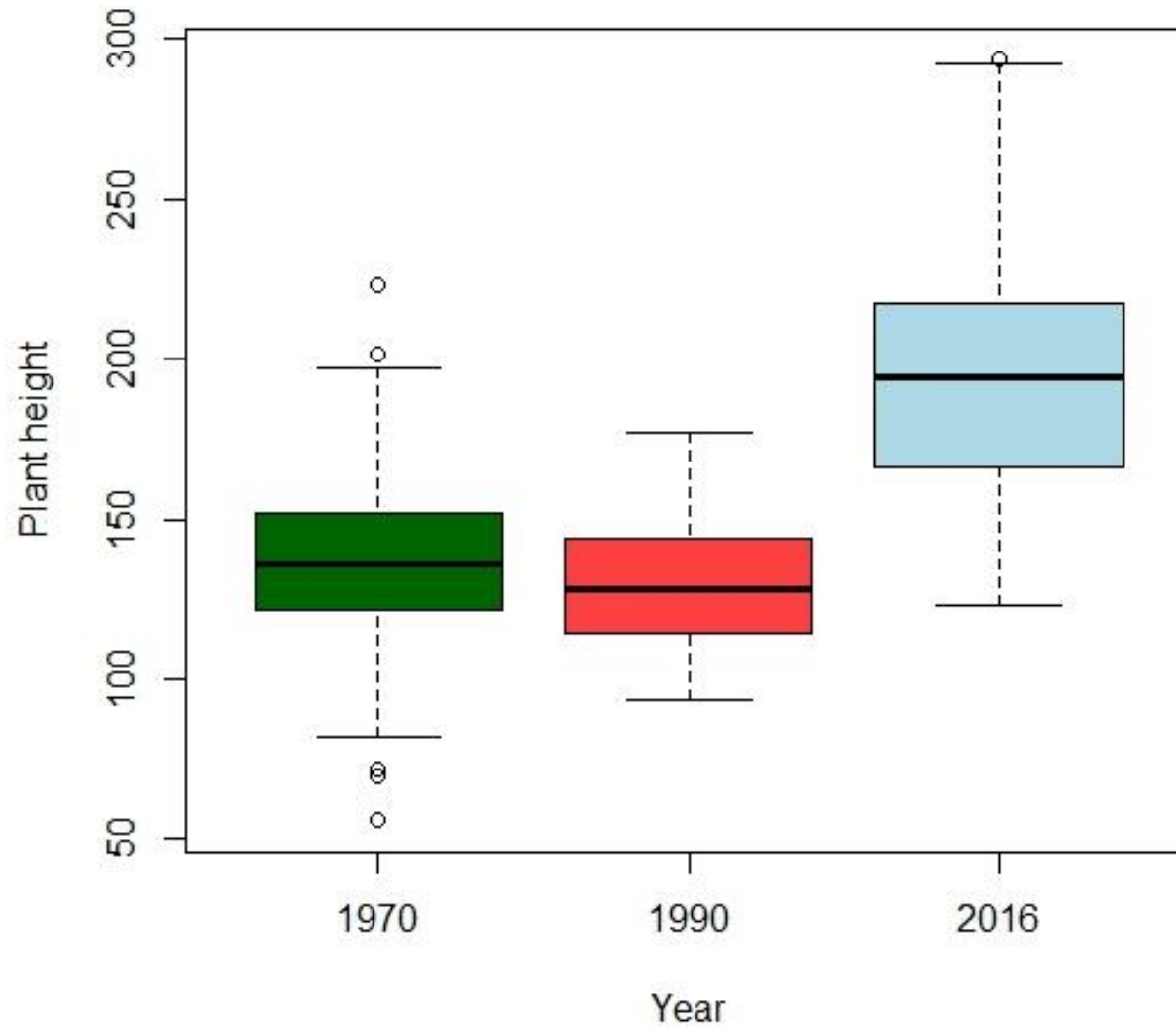
Bromopsis erecta

Lolium perenne

Ononis spinosa

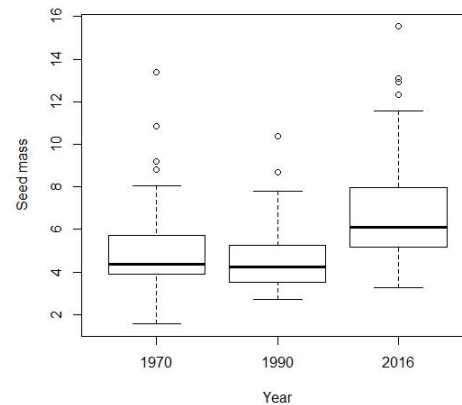
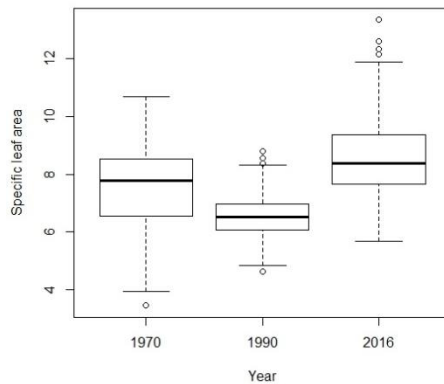
Species traits - Plant height

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



Future work

- Explore further traits
- Environmental factors
- Soil results



Acknowledgements

- Peter Hawes
- Robin Walls
- Roger Marris
- Julie Swain, Richard Osgood and Chris Maple
- Oli Pescott
- Richard Pywell
- Gloria Dos Santos Pereira



Thank you



Centre for
Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

NERC SCIENCE OF THE
ENVIRONMENT