S1 Appendix

Glastir Monitoring and Evaluation Programme

The Glastir Monitoring and Evaluation Programme (GMEP) has been designed to assess the outcomes of implementing the Welsh Government's Glastir agri-environment scheme. GMEP is a collaboration funded by the Welsh Government and the European Union. The GMEP programme is run by the NERC Centre for Ecology and Hydrology and is a collaboration between specialists from public research centres, universities, voluntary bodies, and consultancies. When active, GMEP was the largest and most in-depth monitoring programme measuring environmental state and change within the European Union (Emmett and the GMEP Team, 2014). It also represents a progressive step for national scale agri-environment schemes. GMEP follows a holistic ecosystem approach with a rolling annual survey conducted across areas both participating in and abstaining from Glastir. The results of the field survey were combined with national data and models to produce findings that inform stakeholders. Summaries of findings from Year 1 (2013) and Year 2 (2014) have been published and are accessible to the public (Emmett and the GMEP Team 2014; 2015).

Soil maps in Wales

The soils at each sampling point were assigned to soil type using the National Soil Map and Soil Classification (Cranfield University, 2004). This map and classification scheme is derived from Avery (1980) with revisions from Clayden and Hollis (1984). Soils were assigned to groups based on published soil maps and reconnaissance mapping of previously unsurveyed sites (for more detail see Cranfield University, 2004).

Generally, soils in Wales are known to map poorly, however, due to the high level of local heterogeneity.

Supplementary Tables

Table S1. UK soil groups listed with their complementary classification in the FAO World Reference Base Classification (WRB, 2006). Soils are listed in alphabetical order.

Major UK soil group	World Reference Base
Brown	Primarily Cambisols plus some Luvisols and Acrisols
Lithomorphic	Leptosols with some Regosols
Surface- and ground-water gleys	Primarily Gleysols, Planosols, and some Fluvisols/Luvisols
Podzolic	Podzols
Peat	Histosols
Man made	Anthrosols

Table S2. Description of Aggregate Vegetation Classes identified in this study. Adapted from Smart et al. (2003).

Aggregate Vegetation Class	Description
Crops/weeds	Communities on disturbed or cultivated land, including weedy, horticultural, and species-poor arable land.
Tall grassland/herb	Tall herbaceous communities common in field edges, "old field" communities, plus road- and stream-sides.
Fertile grassland	Improved or semi-improved grassland. Usually with high nutrient inputs and cut more than once a year.
Infertile Grassland	Semi-improved to unimproved, less productive grasslands, species-rich grasslands including wet or dry and acidic to basic variations.
Lowland wood	Dominated by trees and shrubs in neutral or basic lowlands, scrublands, and hedgerows.
Upland wood	Commonly acidic conifer plantations, scrubland and semi-natural broadleaved woods in the uplands.
Moorland grass/mosaic	Grass-dominated upland pasture, commonly with a long history of livestock grazing.
Heath/bog	Heather dominated, commonly upland landscapes, including dry heath and bogs.

Table S3. Mean values (± SE) of soil physical and chemical variables for each Aggregate Vegetation Class.

Soil variable	Crops/weeds	Tall grassland/herb	Fertile grassland	Infertile grassland	Lowland wood	Upland wood	Moorland grass/mosaic	Heath/bog
Total C (%)	3.51 ± (0.600)	4.42 ± (2.210)	4.88 ± (0.161)	5.99 ± (0.289)	5.60 ± (0.775)	17.25 ± (1.916)	21.25 ± (1.548)	41.33 ± (1.663)
Total N (%)	0.28 ± (0.037)	0.38 ± (0.171)	0.46 ± (0.013)	0.50 ± (0.017)	0.40 ± (0.046)	0.91 ± (0.084)	1.23 ± (0.076)	1.72 ± (0.074)
C:N ratio	13.66 ± (1.87)	10.96 ± (0.630)	10.49 ± (0.112)	11.73 ± (0.191)	13.80 ± (0.563)	17.13 ± (0.643)	16.39 ± (0.460)	24.50 ± (0.817)
pH (0.01 M CaCl$_2$)	5.10 ± (0.277)	5.30 ± (0.237)	5.17 ± (0.064)	4.73 ± (0.039)	4.38 ± (0.234)	3.51 ± (0.077)	3.69 ± (0.058)	3.25 ± (0.077)
Bulk density (g/cm^3)	1.11 ± (0.070)	1.02 ± (0.187)	0.87 ± (0.016)	0.80 ± (0.013)	0.72 ± (0.063)	0.43 ± (0.035)	0.37 ± (0.030)	0.17 ± (0.237)
Soil water repellency[a]	0.88 ± (0.334)	0.78 ± (0.398)	1.64 ± (0.072)	2.07 ± (0.055)	2.16 ± (0.226)	6.12 ± (0.312)	2.91 ± (0.098)	2.99 ± (0.096)
Volumetric water content (m^3/m^3)	0.25 ± (0.025)	0.37 ± (0.095)	0.35 ± (0.010)	0.35 ± (0.009)	0.22 ± (0.019)	0.36 ± (0.021)	0.49 ± (0.017)	0.61 ± (0.017)
Total P (mg/kg)	994.59 ± (115.564)	645.71 ± (75.786)	1234.98 ± (40.592)	1025.97 ± (40.592)	624.26 ± (64.522)	872.65 ± (48.002)	1034.41 ± (47.926)	934.51 ± (39.172)

[a] Soil water repellency was derived from median water drop penetration times (s) and log transformed.

Table S4. Mean abundances (± SD) of mesofauna groups in each Aggregate Vegetation Class.

Aggregate Vegetation Class	Total mesofauna	Total invertebrates	Oribatida	Mesostigmata	Other mites	Entomobryoidea	Poduroidea	Symphypleona
Crops/weeds	18.60 ± (43.21)	19.20 ± (43.11)	7.87 ± (21.86)	5.40 ± (7.44)	0.20 ± (0.56)	1.73 ± (4.91)	3.20 ± (9.46)	0.20 ± (0.77)
Tall grassland/herb	8.67 ± (6.66)	8.67 ± (6.66)	1.67 ± (2.08)	5.00 ± (5.00)	0.33 ± (0.58)	0.00 ± (0.00)	1.67 ± (1.53)	0.00 ± (0.00)
Fertile grassland	26.92 ± (29.49)	27.80 ± (30.07)	9.13 ± (19.92)	6.34 ± (7.64)	2.33 ± (5.32)	4.47 ± (9.57)	4.46 ± (5.84)	0.19 ± (0.56)
Infertile grassland	40.14 ± (37.99)	41.26 ± (38.68)	16.49 ± (22.86)	8.02 ± (10.46)	4.89 ± (11.73)	5.35 ± (10.61)	5.22 ± (8.45)	0.17 ± (0.63)
Lowland wood	60.92 ± (44.81)	61.84 ± (45.63)	33.12 ± (34.11)	5.76 ± (5.29)	1.88 ± (3.75)	11.04 ± (12.35)	8.20 ± (7.53)	0.92 ± (2.22)
Upland wood	47.95 ± (45.03)	49.35 ± (45.67)	24.15 ± (25.40)	5.55 ± (6.21)	2.17 ± (3.69)	9.85 ± (21.06)	5.92 ± (8.81)	0.32 ± (0.95)
Moorland grass/mosaic	41.95 ± (49.86)	42.55 ± (50.07)	26.76 ± (39.03)	2.89 ± (5.36)	3.29 ± (9.67)	4.44 ± (8.67)	4.52 ± (8.16)	0.06 ± (0.37)
Heath/bog	32.83 ± (49.32)	33.21 ± (49.69)	25.42 ± (40.45)	1.56 ± (2.92)	2.82 ± (8.65)	1.44 ± (3.13)	1.53 ± (3.04)	0.06 ± (037)

Table S5. Mean abundances (± SD) of mesofauna groups in each soil type.

Soil type	Total mesofauna	Total invertebrates	Oribatida	Mesostigmata	Other mites	Entomobryoidea	Poduroidea	Symphypleona
Lithomorphic	30.19 ± (30.03)	30.24 ± (30.00)	15.24 ± (17.32)	3.86 ± (7.14)	6.57 ± (13.68)	1.86 ± (3.90)	2.67 ± (3.01)	0.00 ± (0.00)
Brown	35.70 ± (34.06)	36.52 ± (34.68)	12.66 ± (18.64)	7.43 ± (8.79)	3.90 ± (11.06)	6.25 ± (10.19)	5.19 ± (7.01)	0.28 ± (0.98)
Podzolic	41.36 ± (45.13)	42.22 ± (45.80)	19.77 ± (29.34)	6.49 ± (9.49)	3.31 ± (8.81)	6.20 ± (15.44)	5.44 ± (8.94)	0.15 ± (0.61)
Surface-water gley	38.10 ± (45.40)	39.52 ± (45.94)	23.90 ± (37.04)	4.60 ± (7.33)	2.84 ± (5.91)	3.18 ± (5.66)	3.42 ± (5.22)	0.15 ± (0.59)
Ground-water gley	40.12 ± (45.98)	41.35 ± (45.75)	21.59 ± (38.29)	4.29 ± (5.64)	1.59 ± (3.28)	8.06 ± (20.37)	4.35 ± (7.88)	0.24 ± (0.56)
Peat	36.28 ± (47.64)	36.93 ± (47.89)	23.90 ± (33.80)	2.51 ± (4.36)	2.69 ± (6.81)	3.00 ± (7.62)	4.07 ± (9.43)	0.12 ± (0.45)

Table S6. Mean abundances (± SD) of mesofauna groups in each loss-on-ignition (LOI) class.

LOI class	Total mesofauna	Total invertebrates	Oribatida	Mesostigmata	Other mites	Entomobryoidea	Poduroidea	Symphypleona
Mineral	32.44 ± (32.85)	33.34 ± (33.25)	12.42 ± (19.61)	6.74 ± (8.68)	3.03 ± (7.64)	6.16 ± (11.12)	3.89 ± (5.52)	0.21 ± (0.73)
Humus-mineral	39.26 ± (38.84)	40.26 ± (39.43)	17.38 ± (24.43)	6.66 ± (8.92)	4.04 ± (10.44)	5.28 ± (9.98)	5.70 ± (8.33)	0.21 ± (0.83)
Organo-mineral	42.71 ± (51.08)	43.79 ± (52.12)	24.63 ± (29.67)	4.33 ± (6.98)	2.65 ± (5.40)	6.00 ± (15.84)	4.94 ± (11.29)	0.17 ± (0.52)
Organic	33.81 ± (46.00)	34.32 ± (46.19)	27.18 ± (41.23)	1.89 ± (3.62)	1.49 ± (4.41)	1.19 ± (2.41)	1.99 ± (3.63)	0.08 ± (0.39)

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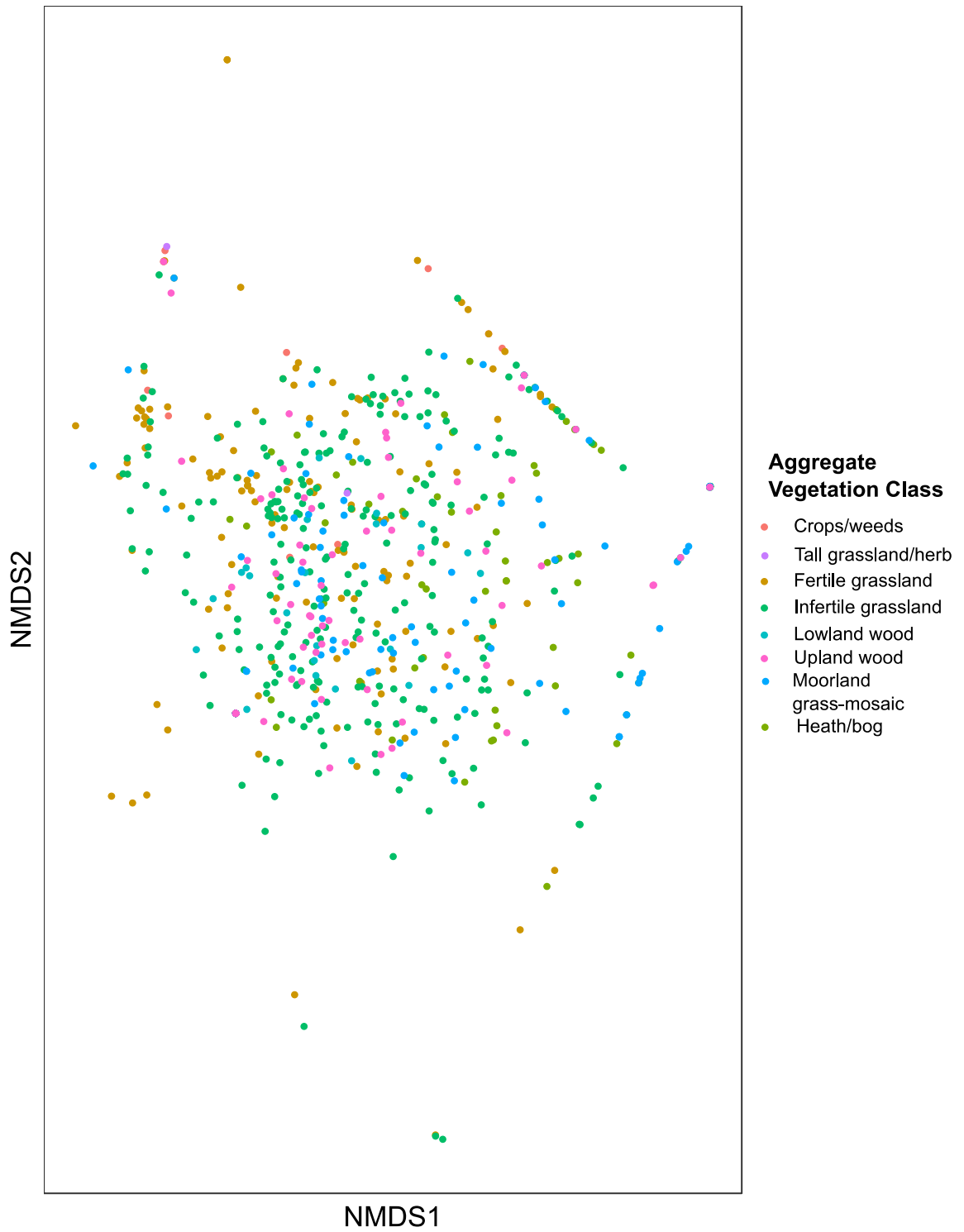
Supplementary Figures

Fig S1. Non-metric dimensional scaling of mesofauna communities (log + 1 transformed abundance) in each Aggregate Vegetation Class.