Identifying HNV farmland: how far can land cover take us?

Lessons from E Carmarthenshire pilot area

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Funding and collaborators

- DG Environment (through EFNCP work programme)
- CCW

- Rosie Carmichael
- Candace Browne
- Deborah Sazer

- Assistance from CCW, Environment Systems, WAG

Wales
Carmarthen
Saundersfoot
Llanelli
Caldey
Swansea
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2012 TerraMetrics
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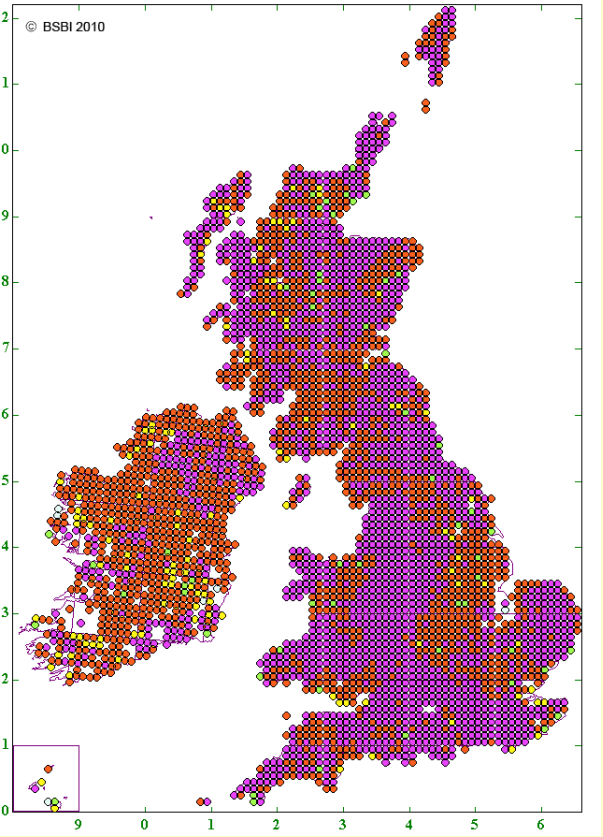
Google earth
51°52'32.26" N 4°29'30.78" W elev 88 m
Eye alt 116.77 km

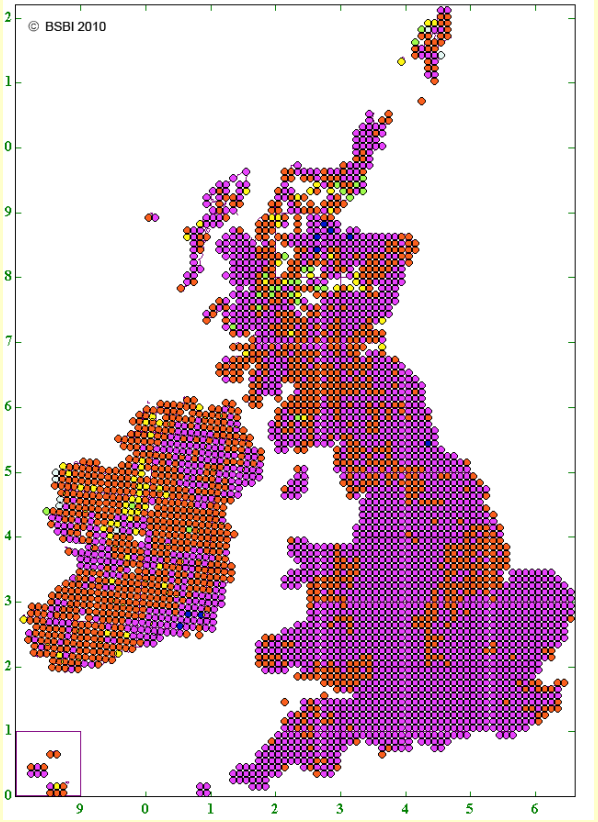
Glanamman
Cwmamman
Brynamman
Brynamman
Twyn
Lower Brynamman
Glanaman
Garnant
©2009 Google
Image © 2010 Bluesky, Infoterra Ltd & COWI A/S
© 2010 Tele Atlas
Imagery Date: Mar 5, 2006
51°48'56.85" N 3°54'18.50" W elev 724 ft
Eye alt 19869 ft

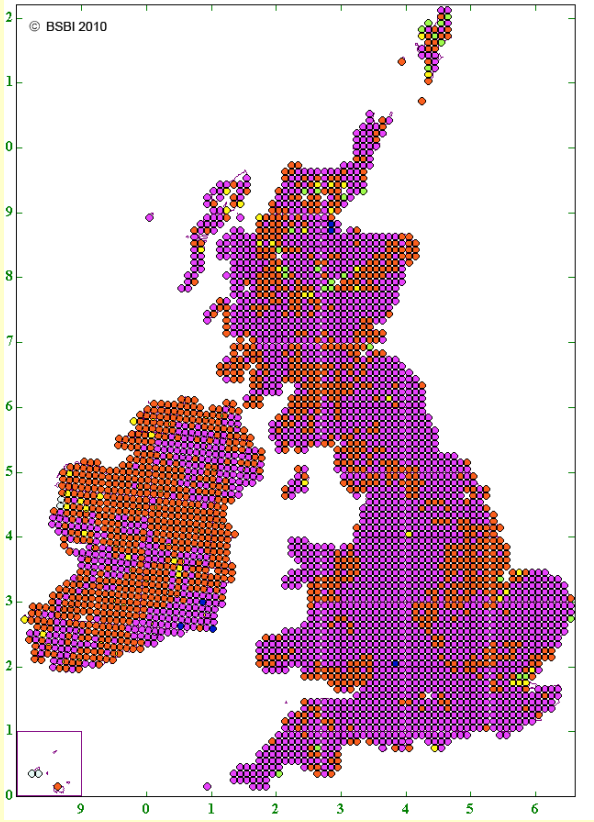
Capel Isaac
© 2011 Tele Atlas
Image © 2011 Bluesky, Infoterra Ltd & COWI A/S
Imagery Date: 1/1/2006
2005
51°55'30.24" N 4°00'58.37" W elev 160 m

Landcover or species approach?

- Biodiversity IS about species, but…
- Presence/absence can be misleading







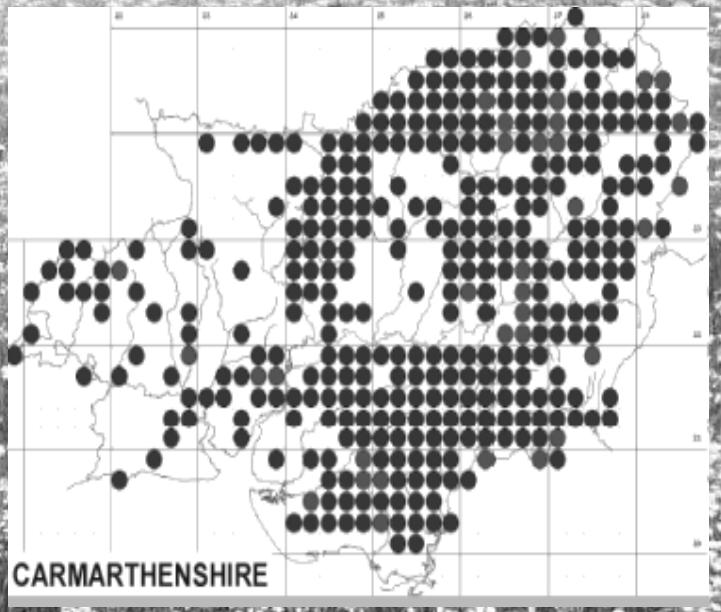
Marsh marigold

False oat-grass

Meadowsweet

Carum verticillatum

Pryce ,2004

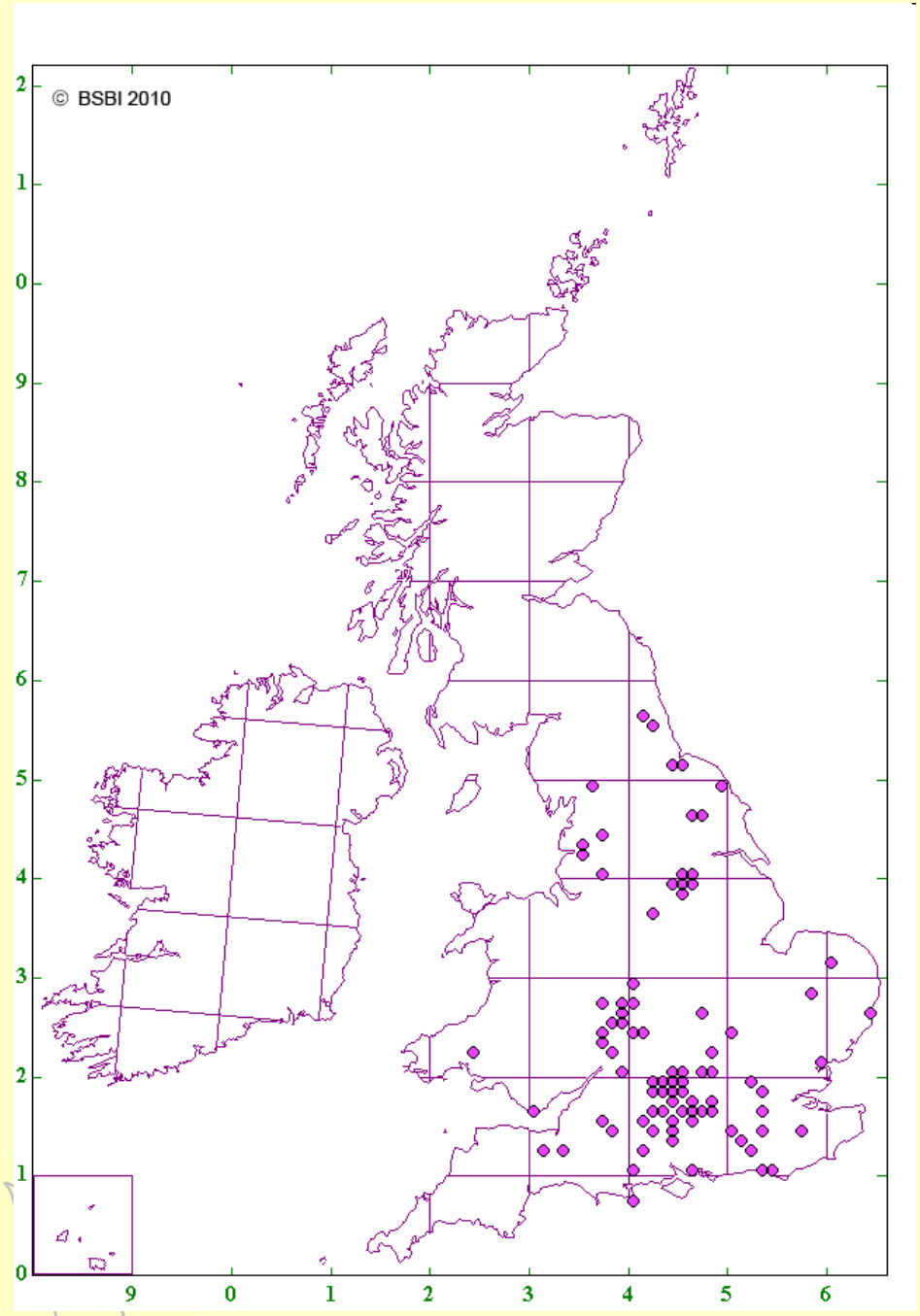


Use of species data

- Most species groups poorly mapped – and they make up MOST of biodiversity!
- Need to find “surrogate” – semi-natural vegetation?

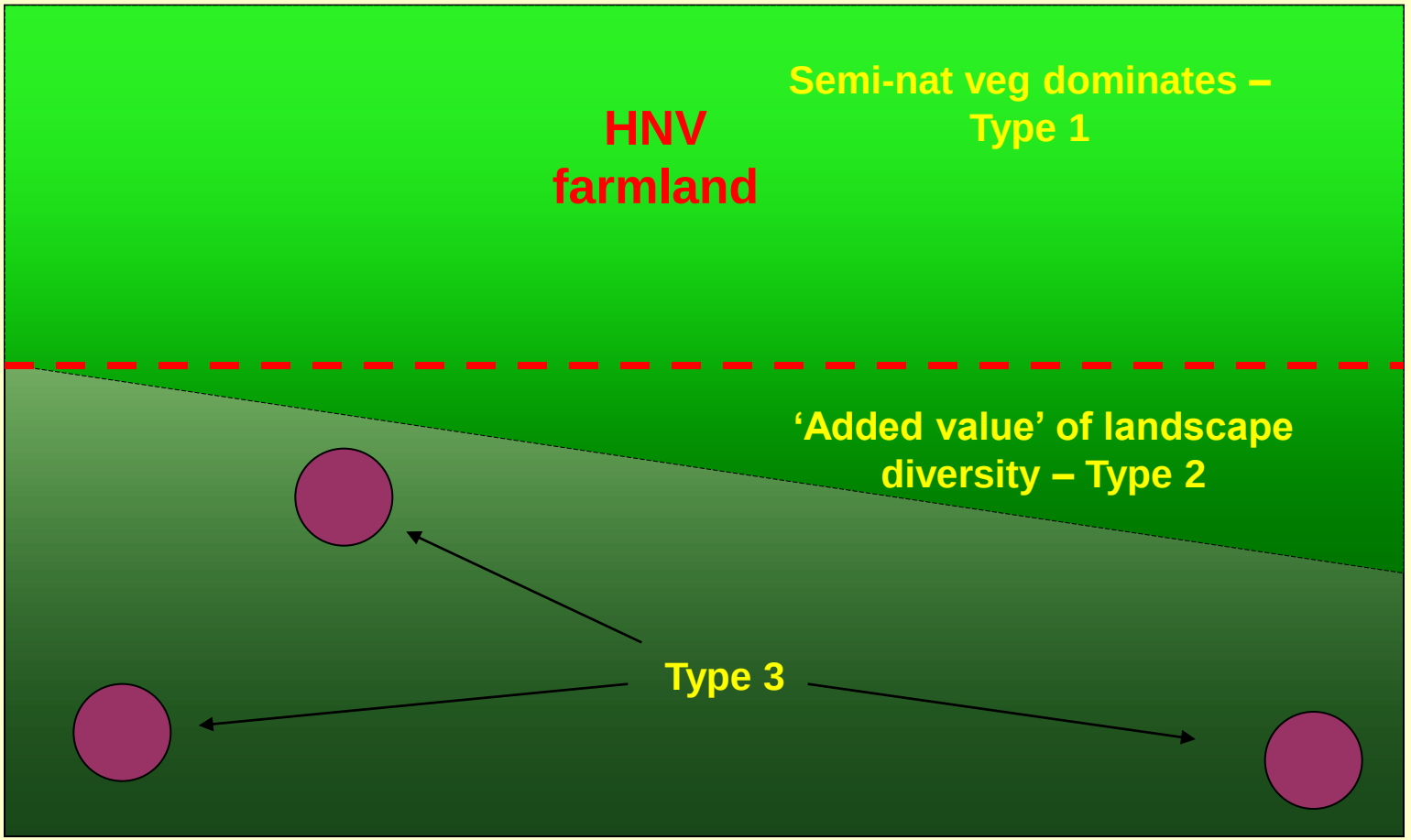
Underlying assumptions:

- Semi-natural vegetation means biodiversity
  - We don't need all the species data to prove the relationship for every field
  - We don't KNOW much about most of biodiversity (invertebrates, fungi, micro-organisms….) anyway
- Few species have a weak relationship to semi-natural vegetation (e.g. some birds) – for these we do need distribution data
- Same with very rare species (or fall into 'all animals are dogs' error….)



Corn buttercup

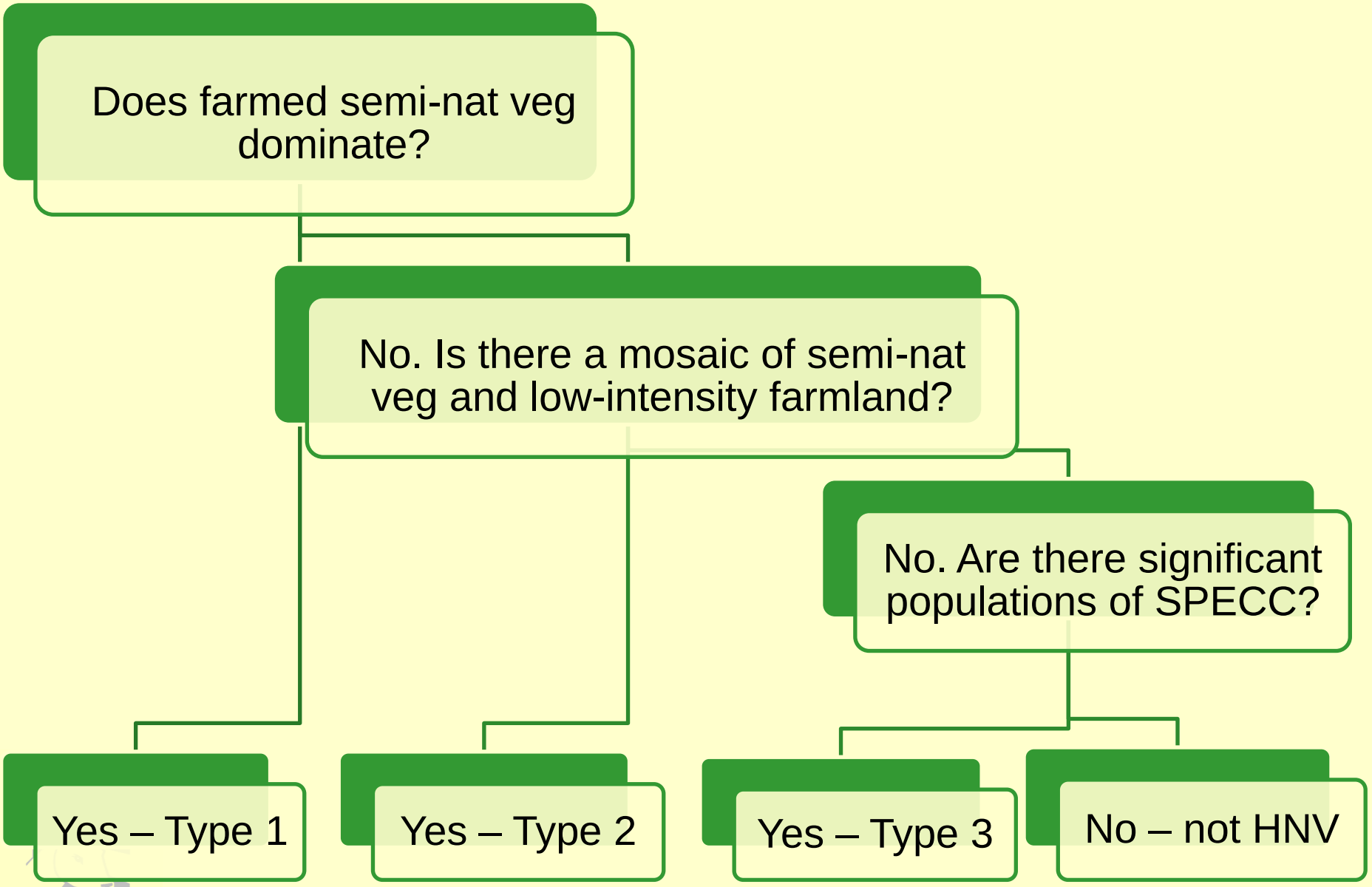
Semi-natural vegetation is central



% semi-natural vegetation

Landscape diversity

Decision tree

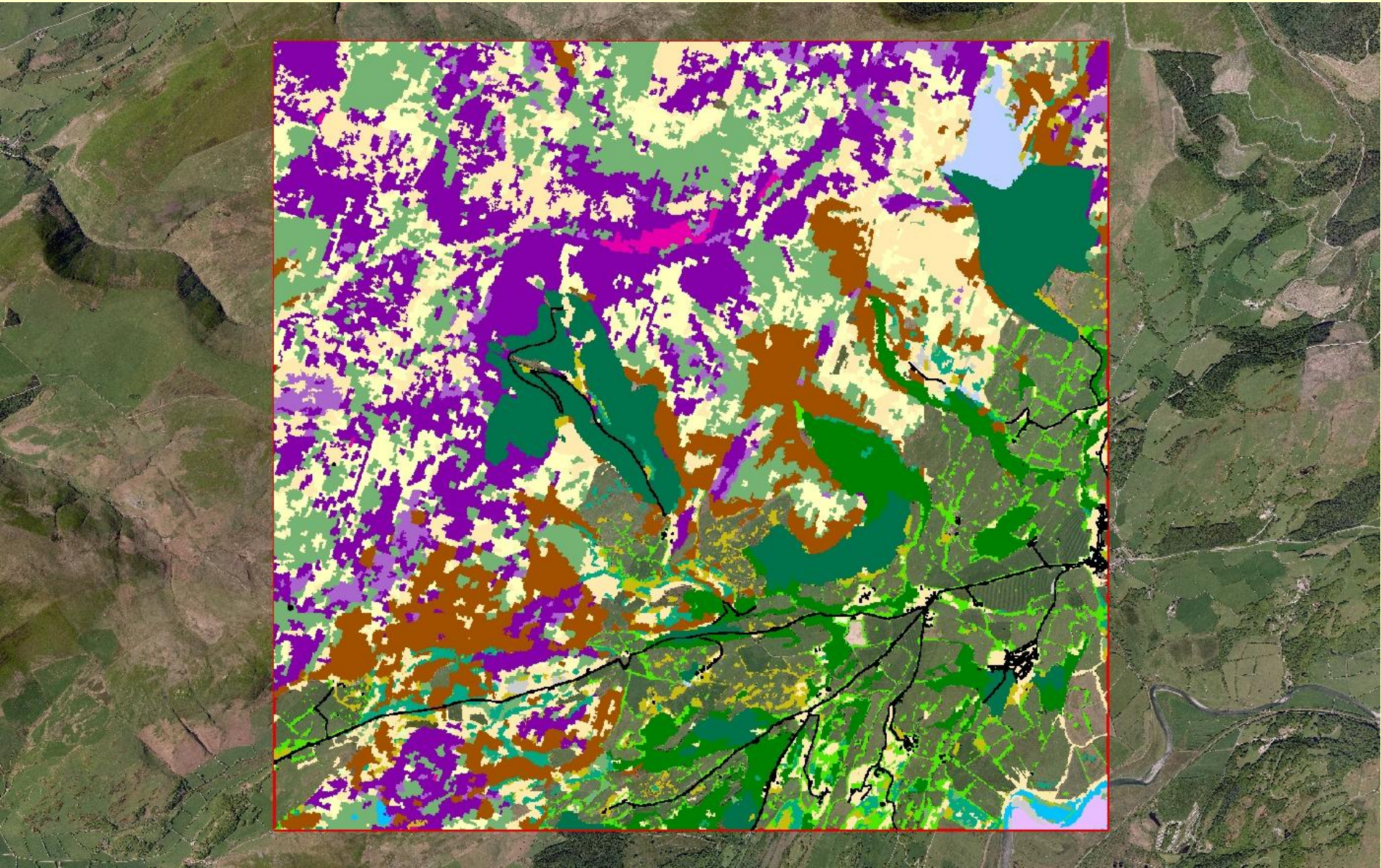


So can landcover data provide the answers? Habitat Inventory of Wales (HIW)

- Remote sensing at high resolution
- Does it accurately identify semi-natural veg at a field scale?
- Is this all farmland? What kind of farms?
- What landscape diversity data is available? How do we use it ***critically***?

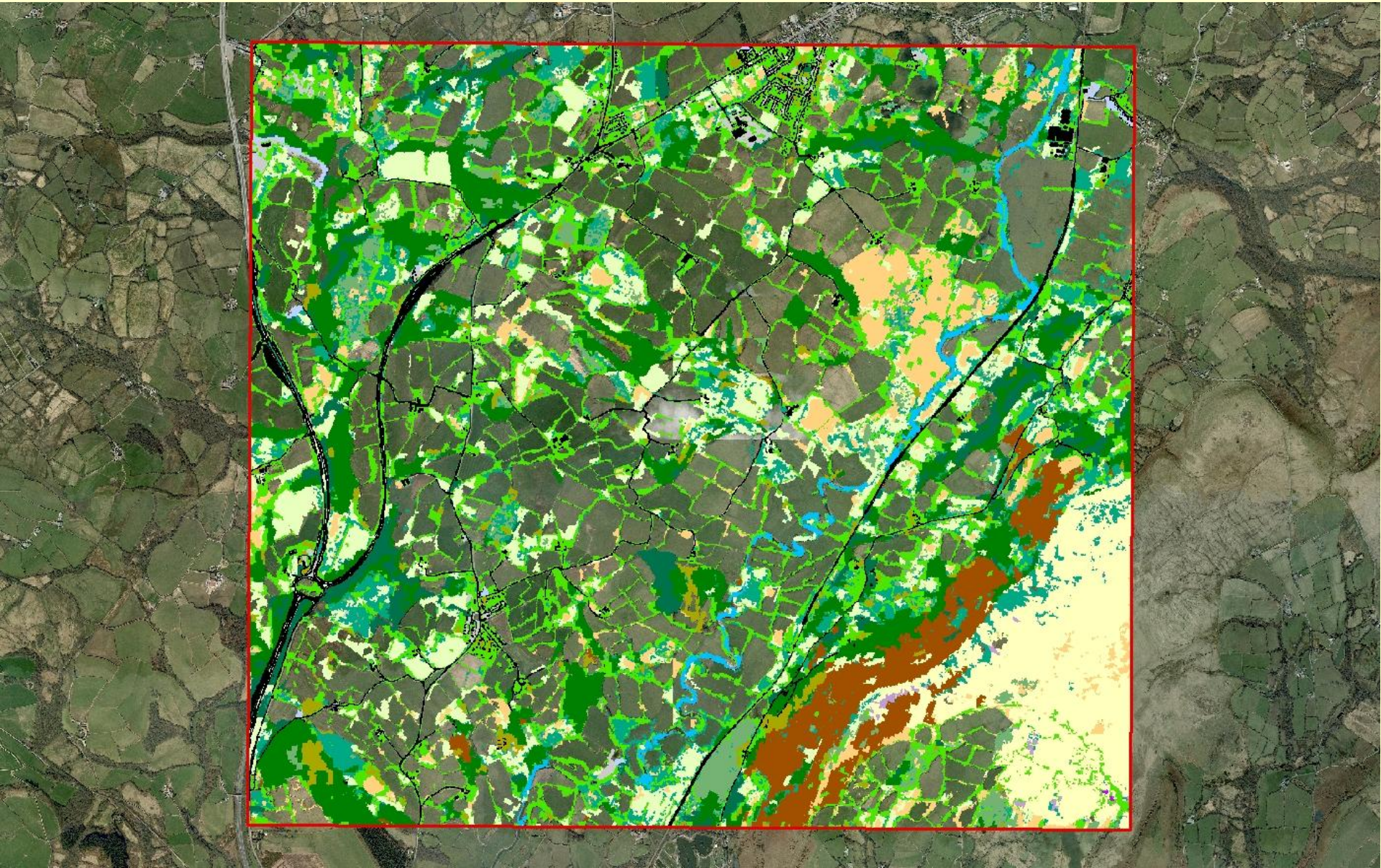
Habitat Inventory of Wales – upland example

Habitat Inventory of Wales – upland example

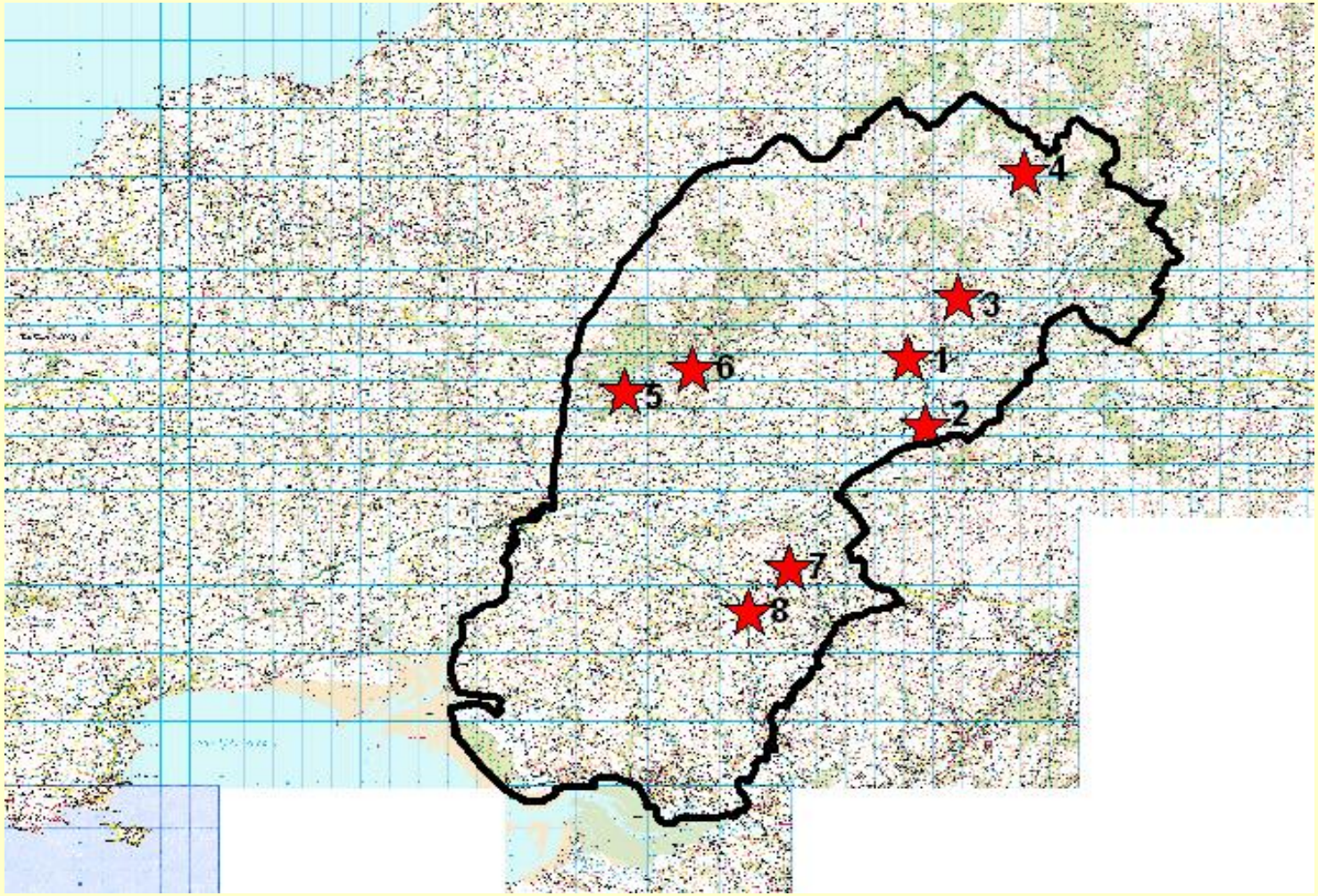


Habitat Inventory of Wales – lowland example

Habitat Inventory of Wales – lowland example



Field testing the Habitat Inventory of Wales – test areas



Correctly shown as marshy grassland

Shown as improved & fen/flush. It is marshy grassland with *Succisa pratensis*

Southern ½ is semi-improved with less scrub than shown

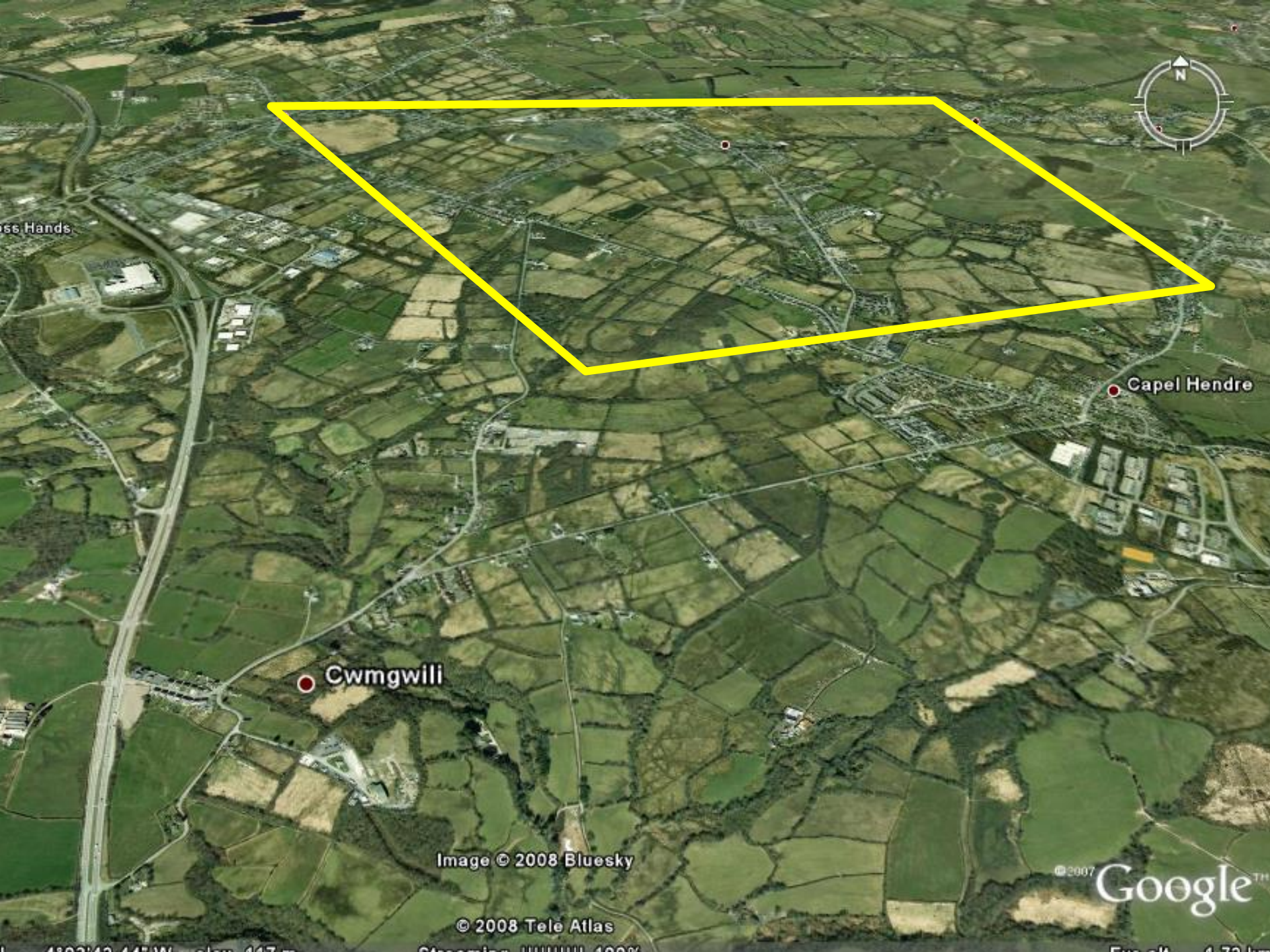
Woodland edge shadow hides most of field, which only appears as a line of pixels

Overall results

- For SNV/non-SNV, HIW had high accuracy, consistently slightly underestimating SNV
- Errors within SNV class
- Hedges/woodland
- Closely-cropped and rank grassland difficult
- Integration with on-farm data a possibility?

Sample	Size of sample	Area of HNV identified by HIW (ha)	Area of HNV identified from 2009 aerial photos and fields survey (ha)	Area of HNV missed by HIW (ha)	% HNV correctly identified as an HNV habitat by HIW	% HNV not identified by HIW
Llansadwrn	1km^2	6.8	8.1	1.2	84%	16%
Porthyrhyd	2km^2	8.0	9.3	1.3	86%	14%
Gwenffrwd	2km^2	132.5	133.6	1.1	99%	1%
Llanllawddog	2km^2	0.3	2.2*	1.9	14%	86%
Llystyn Brechfa	(whole farm)	6.0	7.0	1.0	86%	14%
Dolau, Felindre	2km^2	0.0	4.2	4.2	0%	100%
Carmel	-	46.2	54.0	7.8	85%	15%
Mynydd Mawr	-	160.2	160.2	0.0	100%	0%

Need to identify semi-natural ***farmland***, to know how much there is, to monitor and support.


N
Capel Hendre
Cwmgwili
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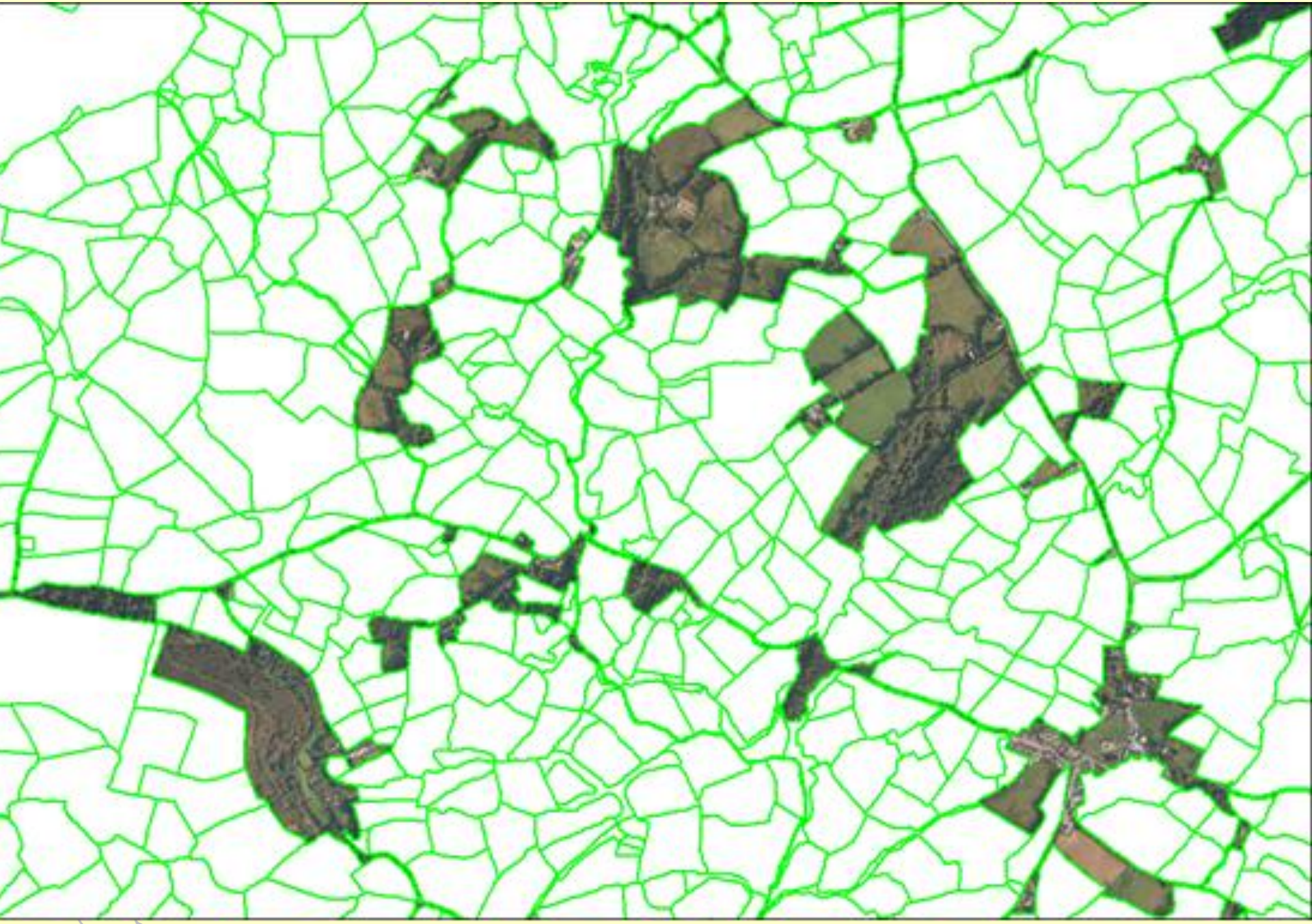
LPIS (Land Parcel Identification System) is the obvious tool, but it doesn't capture all farmland (in widest sense)….



LPIS is a key tool for identifying and targeting particular types of farmland for policy purposes

- LPIS uses accurate mapping, regularly updated and controlled, and with orthophotos
- LPIS intimately linked to delivery of CAP and cross-compliance etc
- Some countries are putting complete inventories of semi-natural grassland onto LPIS
- and using LPIS for HNV identification

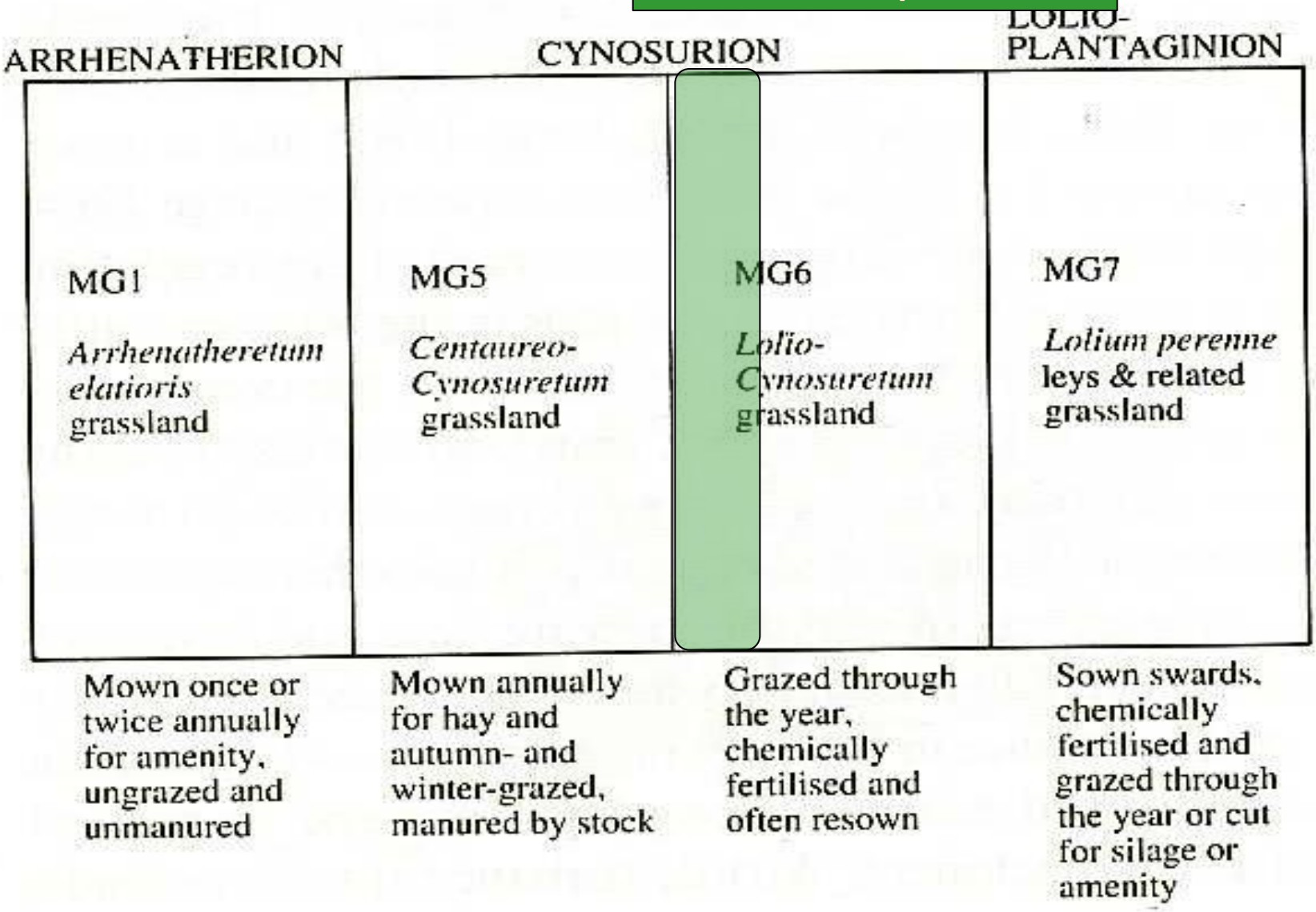
Wales LPIS classes – need modernising

- Plenty of arable detail, very little for grasslands

Semi-natural Vegetation codes	Arable Codes	Feature Codes (Ineligible for SPS)
GR2 Permanent grassland > 5 yrs.	BA1/3 Barley	ZZ90 Bracken
HE3/HE7 Heathlands	MC1 Cereals Mixed fodder	ZZ93 Ponds, Rivers and Streams
OR1 Orchards	FA1 Fallow	ZZ96 Scrub
GW1/BW1/WS1 Woodland	OA1/3 Oats	ZZ98 Individual trees, stumps
SC2 Streamside corridors	SW3 Swedes	
RE3 Reed beds	TU1 Turnips	
	WH1 Wheat	
	WB1/WB2 Wild bird Cover	

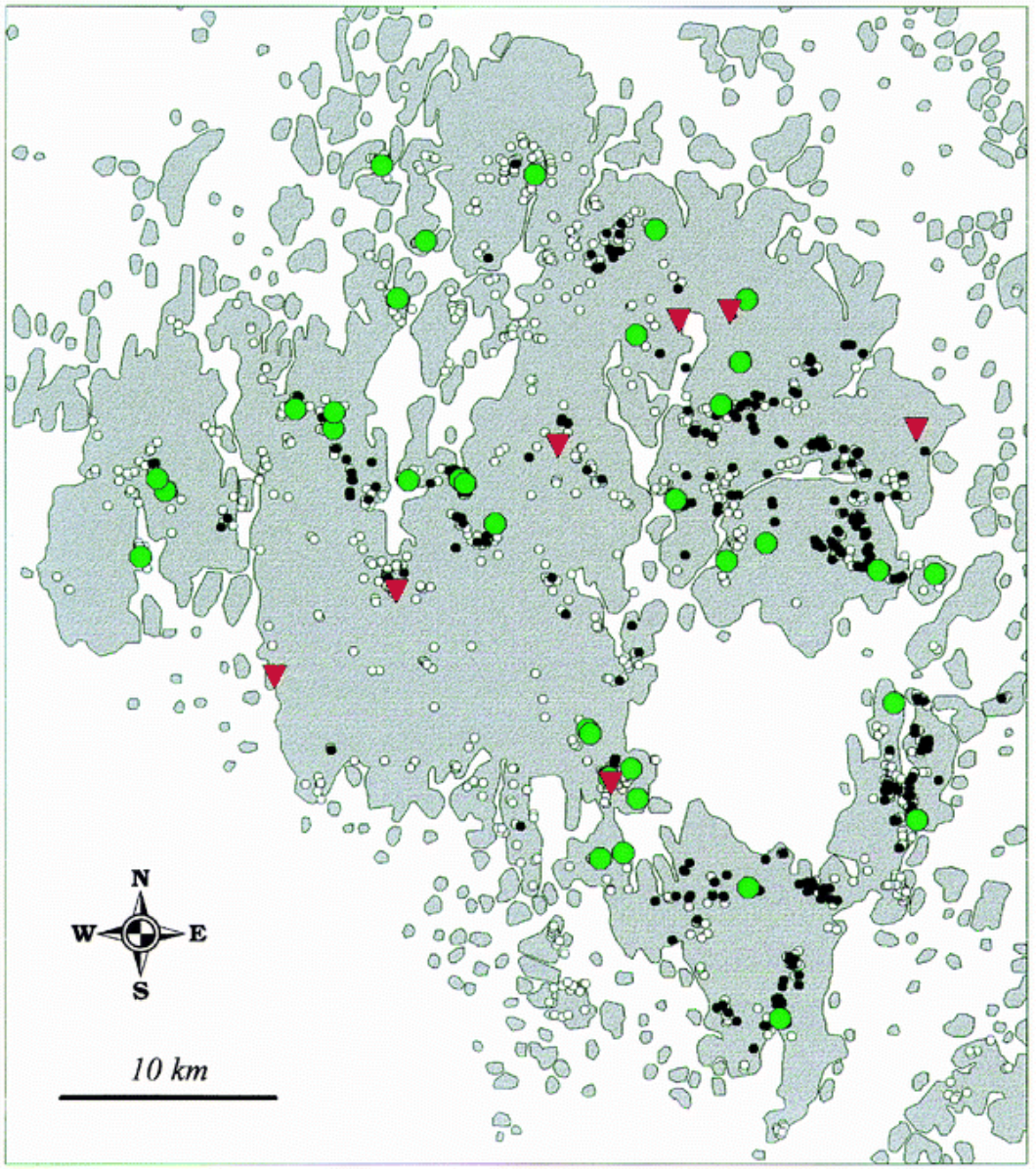
Figure 6. Mesotrophic pastures and meadows in relation to treatment.

"Semi-improved"



fruiting season. At both Carreg Cennen and Waun-las a clear distinction can be made (from mycological data) between MG6 grassland which has been heavily fertilised or improved in some way and the same grassland type which has been less modified. This distinction is a dramatic one and can be easily observed at Carreg Cennen. The path leading up to the castle is flanked on both sides by MG6 grassland. The steep grassland to the right of the path is extremely rich mycologically, while on the left the more improved MG6 displayed no fungal fruiting whatsoever.

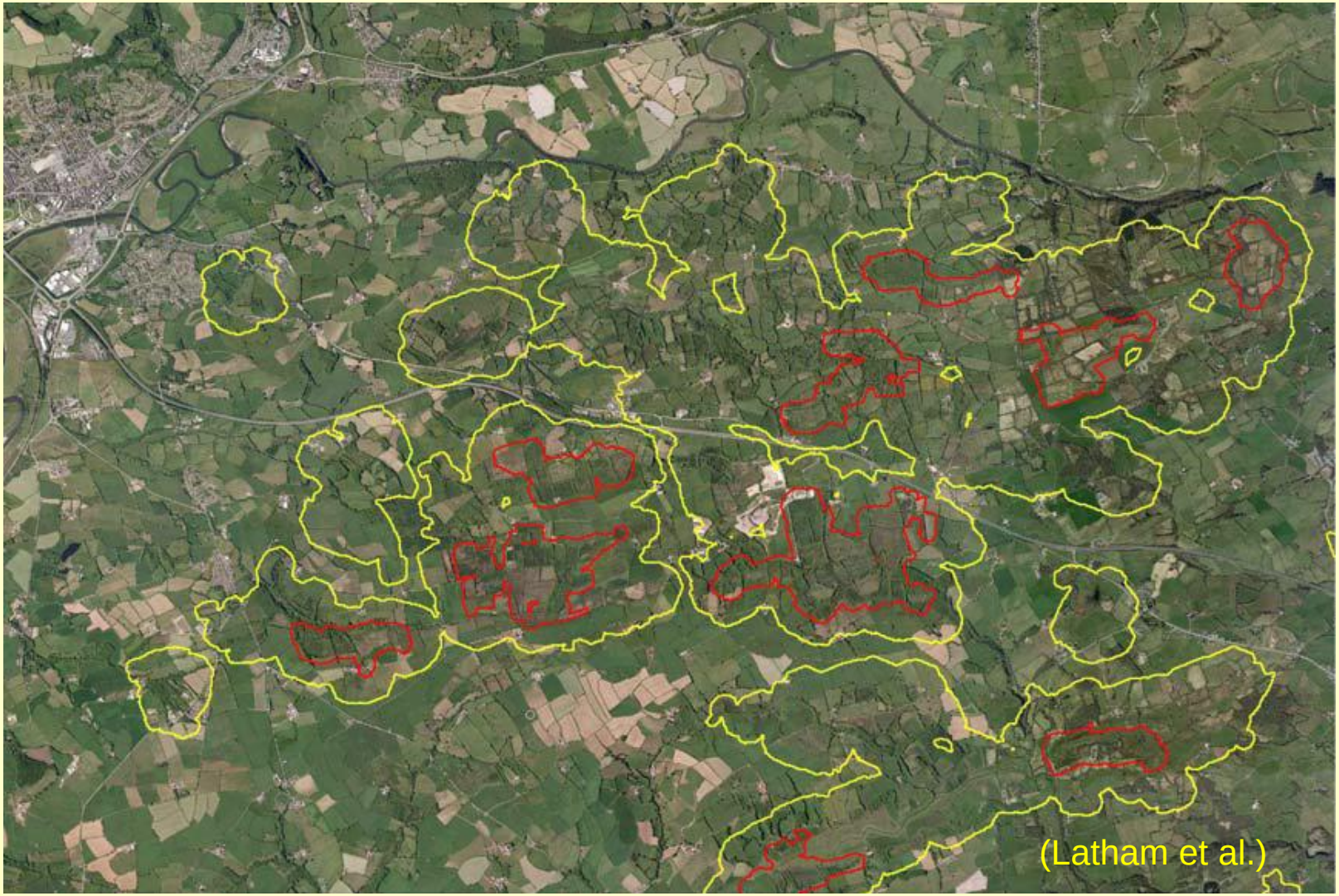
Habitat networks



Euphydryas maturna
(Ahlen)

Melitaea cinxia
(Saccheri et al.)

Habitat networks



Farming systems approach - needs to be tested

1) Is there >66% semi-natural pasture or meadow on the farm's *SPS-eligible* IACS area OR does the farm have an IACS livestock density of <0.4 LU/ha?

If yes, HNV

If no, go to 2

2) Is there >20% semi-natural pasture or meadow on the farm's *SPS-eligible* IACS area?

If yes, go to 3

If no, go to 4

3) Is >33% of the farm's *total* IACS area semi-natural pasture or meadow (excluding semi-improved) or semi-natural woodland (including young broadleaved plantations) AND does the farm have an IACS livestock density of <0.8 LU/ha or <1 LU/ha where 2/3 or more of the livestock units are cattle?

If yes, HNV

If no, go to 4

4) Is median field size <2 ha or is the density of hedgerow in good condition* >200 m/ha AND does the farm have an IACS livestock density of <0.6 LU/ha or <0.8 LU/ha where 2/3 or more of the livestock units are cattle?

If yes, HNV

If no, not HNV at farm scale

Conclusions

- A good land cover map is possible and provides an excellent basis for HNV identification, monitoring and targeting
- SOME complementary data is needed, but surprisingly little in this case study
- Species data was surprisingly useless in this study
- Vision/value for semi-improved grassland is a key issue
- Landscape (habitat network) context raises considerable challenges
- What kind of policy is needed? Field scale is starting point and “easy”, but maybe too simplistic on its own - landscape scale, socio-economic factors…