Semi-natural grasslands in Ireland - precious resources under threat

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@GrasslandsIrl

1. What are semi-natural grasslands?
   - Terminology
   - The management spectrum
2. Key features – how to recognise them
   - Types of semi-natural grasslands
3. Where are they found?
4. Why are they important?
5. Are they threatened?
   - Focus on nutrients
6. Top tips for management
7. Key take home messages
8. Some online info sources

Terminology!

1. Natural grasslands
   - elsewhere in the world
   - little altered by man

Ireland:

2. Semi-natural grasslands (our focus today)
3. Improved grasslands
   - used intensively for agriculture (or amenity)

So… why is there so much grassland in Ireland?

… the result of millennia of human activity altering the predominantly wooded landscape that existed >5000 years ago (Hall & Pilcher 1995)

Farmers manage most of our land

Much of Ireland's rich biodiversity has evolved from agricultural land management

=> very important custodians of biodiversity

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Other terms…

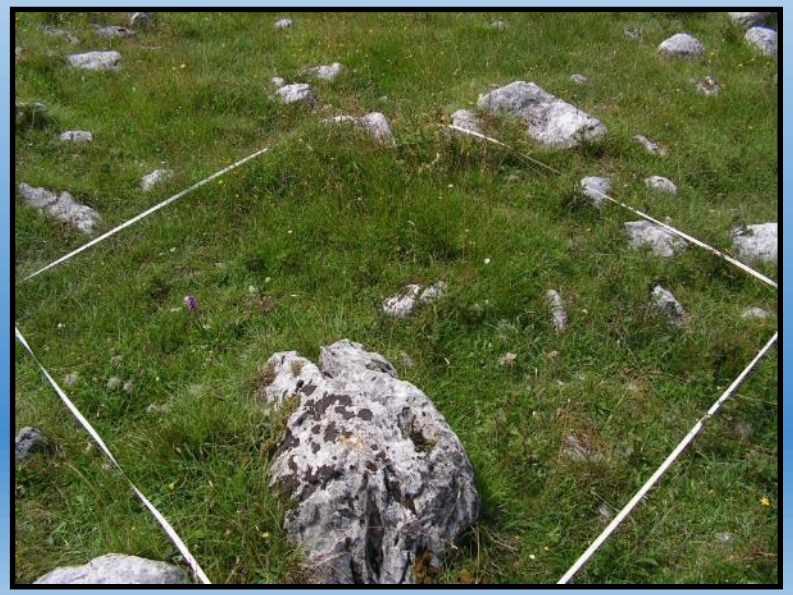
Species-rich?	- context dependent, always semi-natural
Multispecies sward?	- agricultural term, applies to practice of adding handful of extra species into an agricultural sward
HNV?	- High-Nature-Value – mostly semi-natural, farmed in a low intensity way, typically good for and rich in biodiversity/nature

What is a semi-natural grassland?

… altered by man

… altered by and for agriculture

… but the extent to which grasslands are altered varies



Improved Vs semi-natural grasslands

Relates to the intensity of the management

Intensive agriculture will involve some or all of the following:

- Ploughing
- Re-seeding
- Fertilising
- High stocking rates
- Herbicide/pesticide/fungicide
- Hedgerow/field boundary removal
- Lime application
- Drainage

Improved Vs semi-natural grasslands

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The other end of the spectrum... **extensive** farming typified by:

- No ploughing
- Little/no re-seeding
- Little/no fertilisation
- Low stocking densities
- Low/no chemical use (treatment of rushes may occur)
- Field boundaries retained
- May or may not be drained

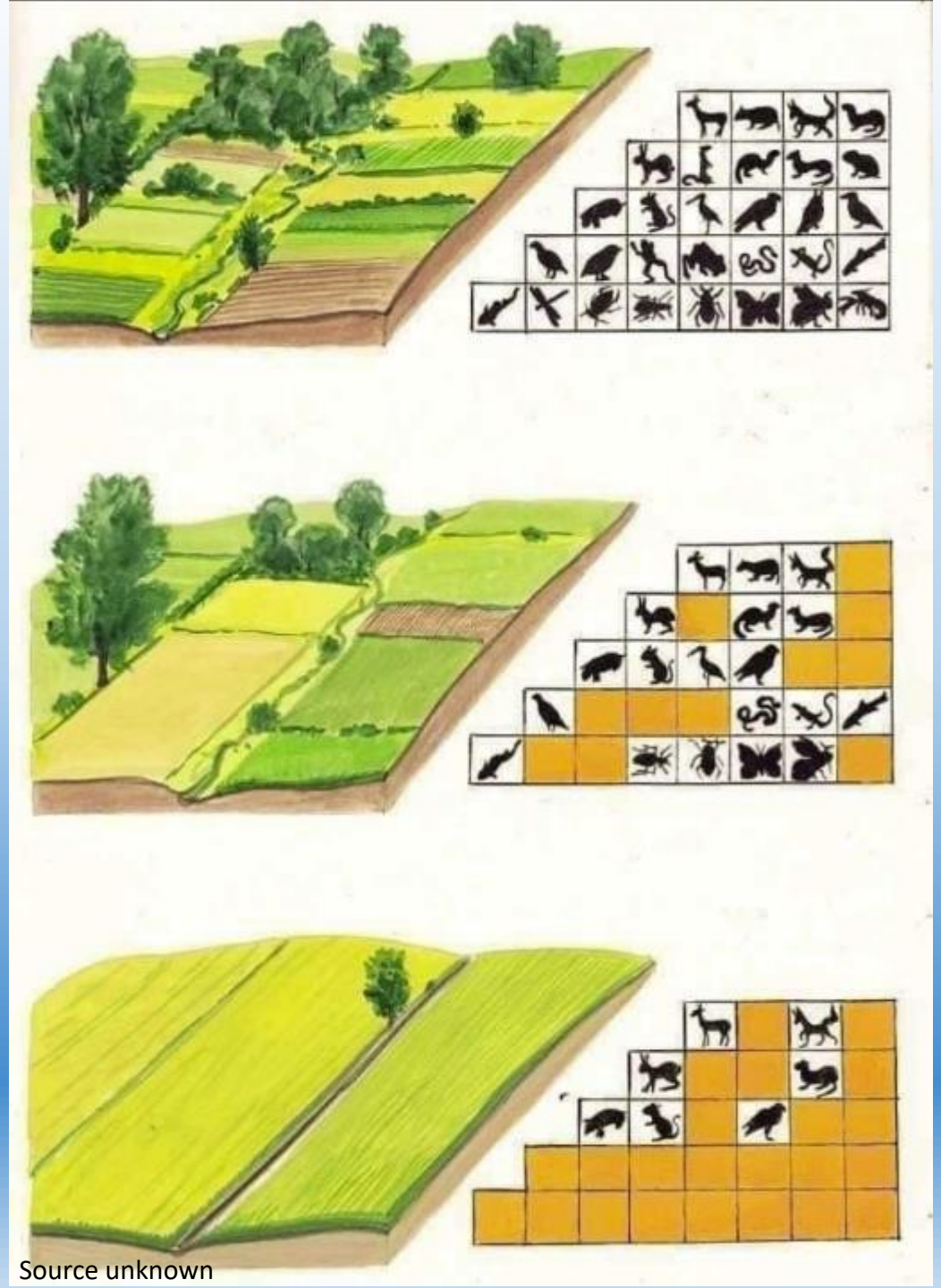
Low-nutrient habitats, need ongoing management

Improved Vs semi-natural grasslands

Does this matter? What are the implications for nature and biodiversity?

Yes! It matters!

- Typical 'improved' field (e.g. silage, dairy)
  - dominated by **one/few species** (often perennial ryegrass, *Lolium perenne*)
  - handful other species which cope well in high-nutrient, high-competition scenarios – e.g. white clover, docks, thistles, nettles, etc.
  - production will be high, but other services such as biodiversity, will be lower
- Semi-natural grasslands
  - **much higher diversity** – of species, of structure, in the soil, etc.
  - may have >40 species in a 2x2m quadrat!
  - much higher resilience due to higher diversity, as well as a raft of other benefits and services



Source unknown

Ecosystem services performed by semi-natural grasslands

Service Group	Final ecosystem service	Goods and benefits
Provisioning	Livestock: forage for cattle, sheep, etc.	Food (meat, milk), fibre (wool), possibly enhanced quality of meat and milk
	Standing vegetation: biomass crops	Possibly fuel
	Crops: pollination and pest control spillover	Food (crops)
Cultural	Environmental settings: valued species and habitats, agricultural heritage, archaeological heritage, grazing for rare livestock breeds, ecological knowledge, training areas	Physical and psychological health, social cohesion, recreation and tourism, UK research base, UK military training
Regulating	Climate regulation: sequestration and storage of carbon and other greenhouse gases	Avoidance of climate stress
Provisioning	Water quantity: storage of water and recharging of aquifers	Potable water, water for food production, flood protection
	Purification: reduced pollution and storage of pollutants	Clean air, clean water, clean soils
Regulating	Wild species diversity: plant genetic diversity, seed for restoration projects	Genetic resources, bioprospecting, recreation and tourism, ecological knowledge

Bullock et al (2011) Chap 6 in 'UK National Ecosystem Assessment: Technical Report'

The humble thistle.....

- Food source for many types of livestock and ourselves, but also wildlife
  - Thistle – host to gall mites, sap suckers, parasitoid wasps, aphids, beetles, moths, flies, shield bugs, ladybirds, weevils, hoverflies, bees, butterflies – at least 37 species live on or in the plant
  - Marsh thistle has been shown to be the best nectar provider to pollinators, in a study of over 250 native plant species in the UK
  - Devil's-bit scabious supports at least 25 insect species, including being the sole food plant for the protected Marsh Fritillary butterfly

http://www.brc.ac.uk/dbif/ - Database of Insects and their Food Plants; Fogarty, P. (2014) Whittled Away

Tips for recognising a semi-natural grassland

Tips for recognising a semi-natural grassland

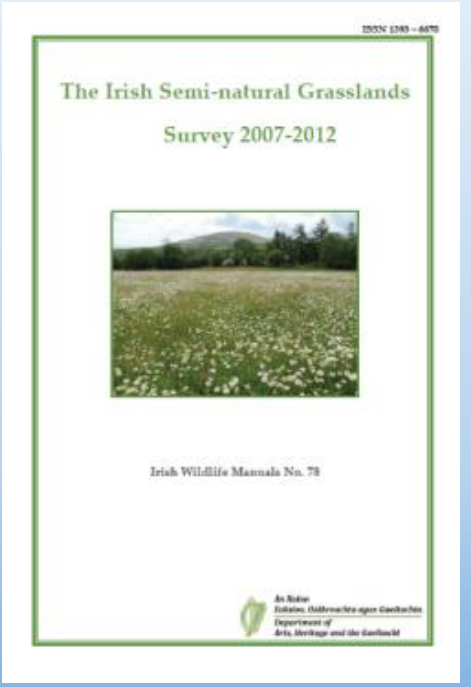
- Lots of species
- Lots of herbs*
- Lots insect life

Sometimes:

- Moss
- Rocks
- Scrub/bushes
- Anthills
- Lumpy and bumpy
- Messy looking at certain times of the year
- Orchids, sedges
- [Healthy soils, with excellent fungal networks]

What types of semi-natural grasslands do we have?

- Irish Semi-natural Grasslands Survey (2007-2012)
- Commissioned by NPWS, carried out by BEC Consultants
  - 1,192 sites surveyed
  - 4,471 quadrats (2x2m, plant lists)
  - 23,000ha mapped
- Via data analysis found:
  - patterns
  - four main grassland types

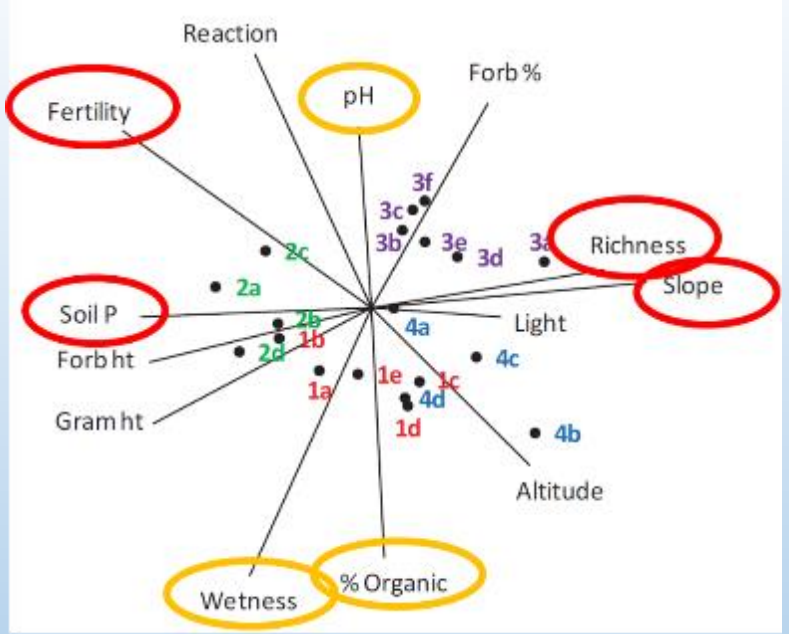


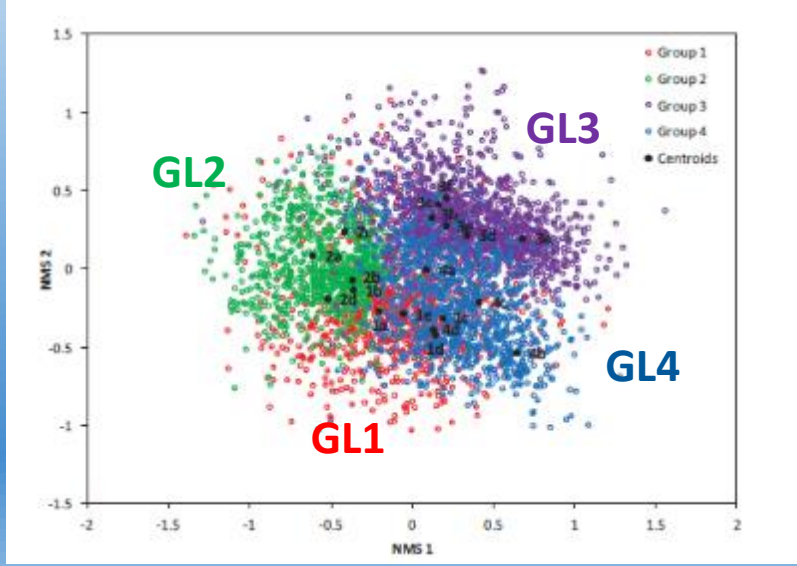
Search for Irish Wildlife Manual no. 78 on
https://www.npws.ie/publications/irish-wildlife-manuals

Don’t mind the details! – what are the patterns?

Patterns:

1. Species-richness higher on grasslands on slopes
2. Species-richness lowest on soils with high fertility
3. pH of soil, and conversely the % organic matter, helped separate out grassland types
4. wetness/dryness also





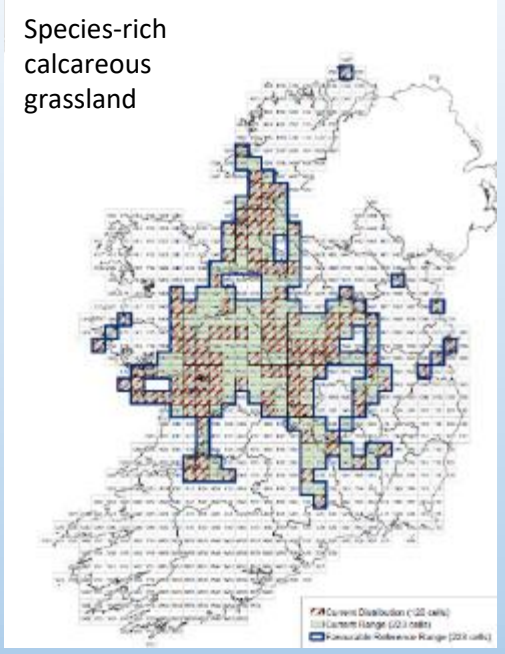
Types of semi-natural grasslands

1. Species-poor damp/wet grasslands on fertile soils on flat land (**GL2**)
   - Think ‘typical’ rushy field
   - May grade into improved category
2. Wet grasslands on often peaty soil; species-richness varies with soil fertility (**GL1**)
   - More species-rich/low-nutrient wet field!
3. Species-rich grasslands on calcareous, nutrient-poor soils, sometimes on slopes (**GL3**)
   - Think of a Burren grassland, or an esker
4. Species-rich grasslands on neutral to acid, nutrient-poor soils, often on slopes (**GL4**)
   - Think of upland acid grasslands

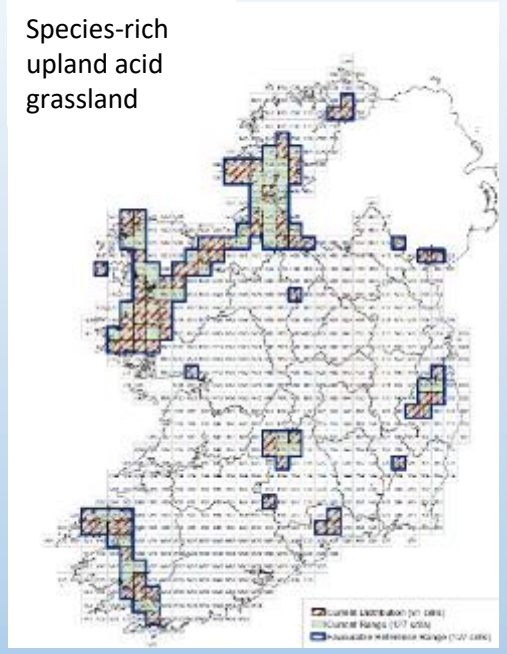
Where?

Habitats Directive-listed grassland types

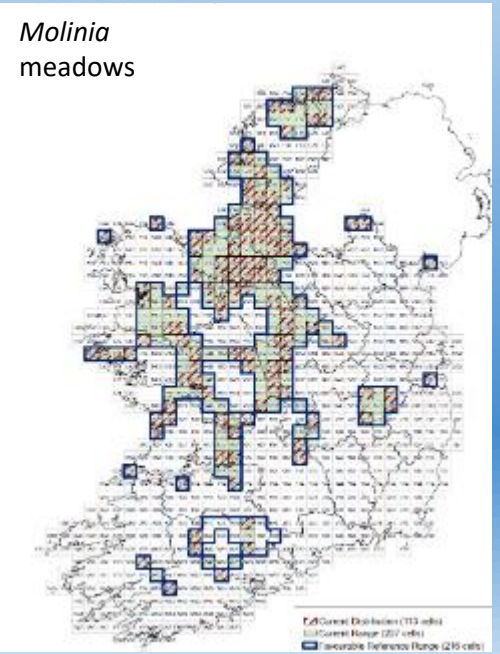
Species-rich calcareous grassland



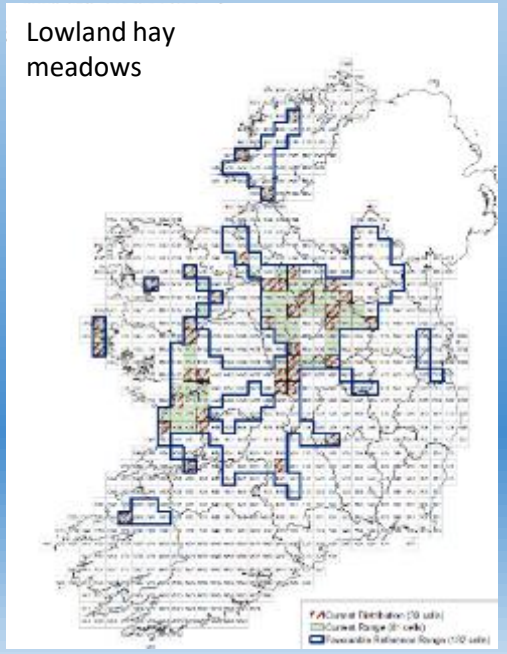
Species-rich upland acid grassland

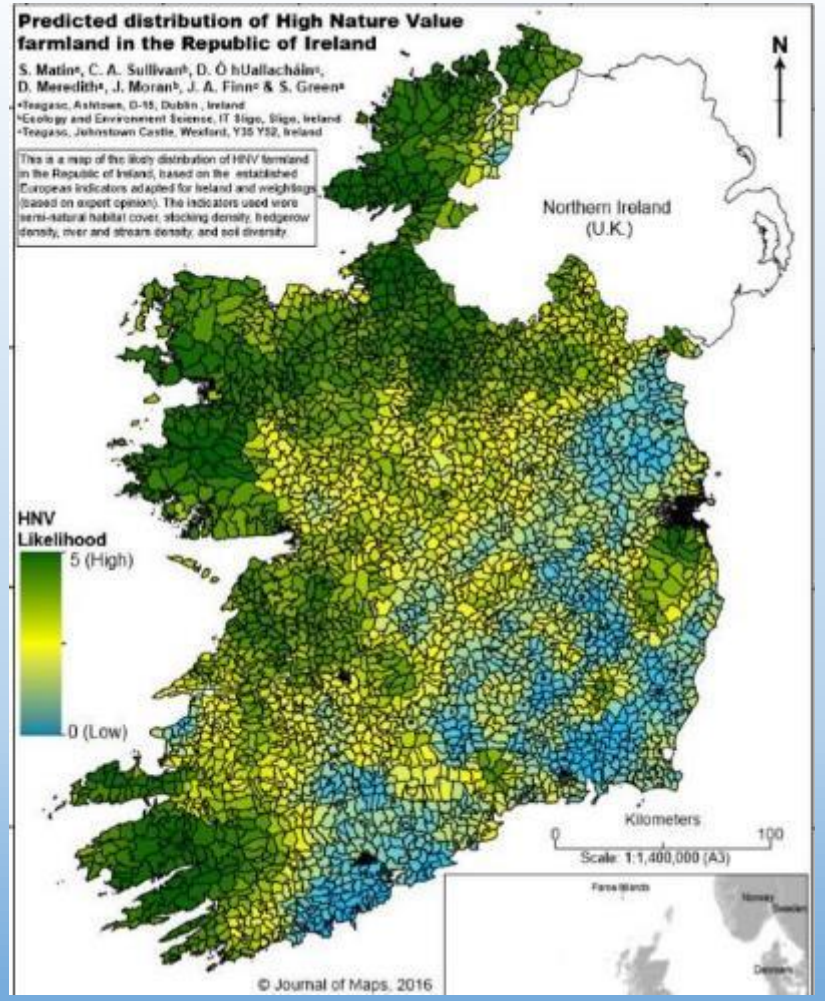


Molinia meadows



Lowland hay meadows





High Nature Value (HNV) farmland

Extensively managed farmland, typically high in, and good for, biodiversity

Matin et al. (2016) Predicted distribution of High Nature Value farmland in the Republic of Ireland, Journal of Maps

Are semi-natural grasslands under threat?

Irish Semi-natural Grassland Survey: 2007-2012

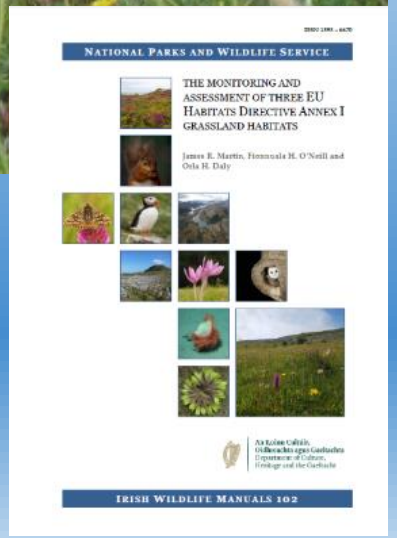
Grassland Monitoring Survey*: 2015-2017, subset of sites re-visited

Between these two surveys (ave. 6 yrs):

- Calcareous grasslands: **31% area GONE**
- *Molinia* meadows: **7% GONE**
- Hay meadows: **28% GONE**

These figures are, unfortunately, underestimates as they are from a subset of the *best* sites. Losses in the wider countryside are likely to be higher.

These habitats consist of c0.08% of the farmed grasslands of Irl



* Search for Irish Wildlife Manual no. 102 on npws.ie/publications/irish-wildlife-manuals

Main threats?

- Habitat loss
  - conversion to intensive agriculture, forestry, quarrying (agriculture: fertilise, re-seed, drain, etc.)
- Abandonment
  - less drastic and immediate, but applies to huge areas

Key message – semi-natural grasslands need management, but it needs to be appropriate

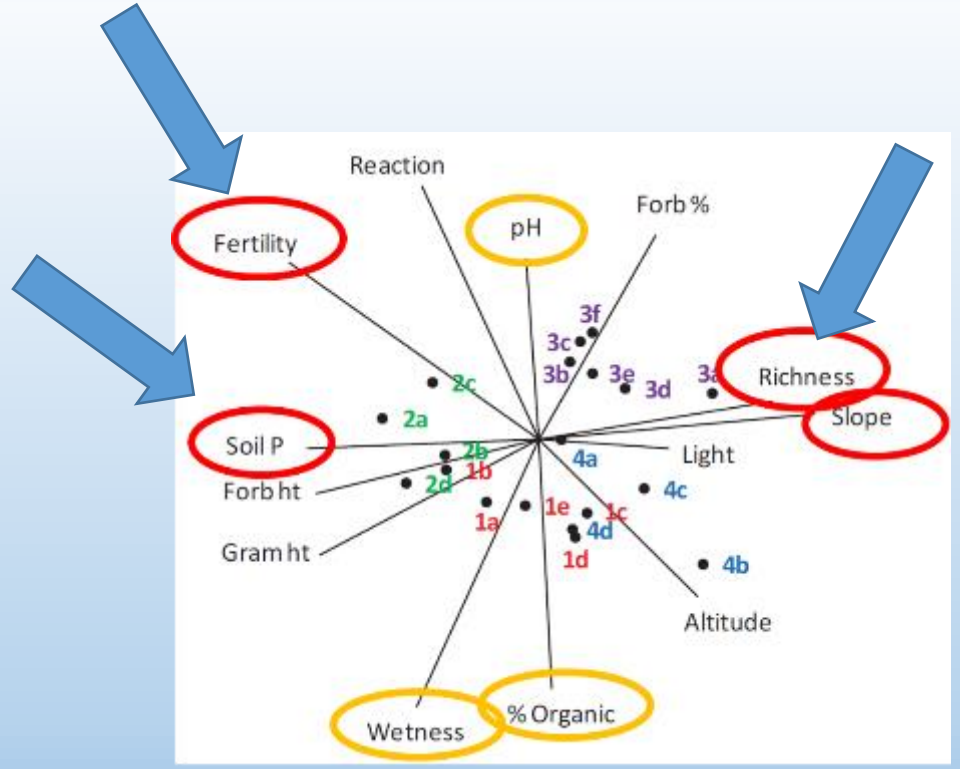
Focus on nutrients, fertilisers

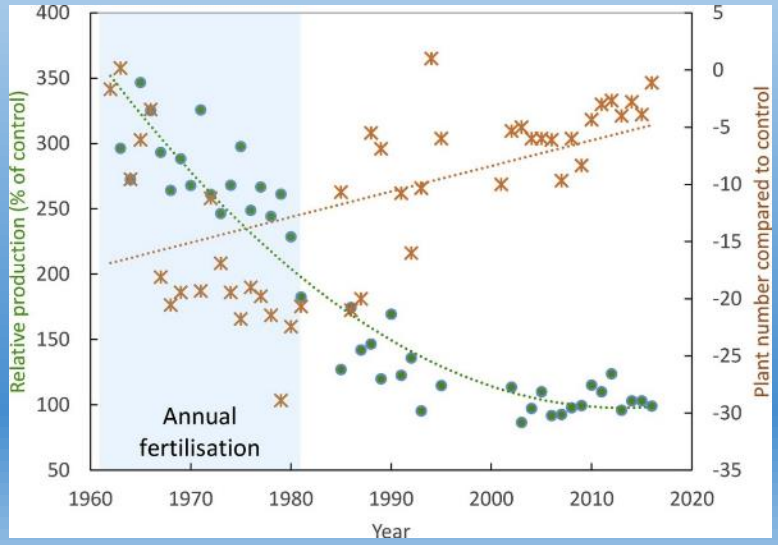
- Apart from re-seeding, most damaging activity
- Semi-natural grassland is valuable *because* of the variety of plant species within it
  - … and all the animals they support
  - … and all the services that they, combined, provide
- Adding nutrients drastically alters the species composition
  - huge competitive advantage to handful of grasses and other species
  - squeezes out most of the other plant species

Effects of fertility/adding nutrients on diversity

- Results from 4,500 samples in the Irish Semi-natural Grasslands Survey
- Estonian long-term study
  - impact of fertilisation on biomass detectable for >10yrs
  - increased ratio of legume biomass noticeable up to 35 yrs after fertilisation
  - Previously fertilised plots still have 5% fewer plant species compared to control plots
- Burren work (NutNet.org) – effects of P on diversity is very strong, dramatic decreases in species number in just 3 yrs; remarkable shifts in abundances – small number of grasses and legumes favoured, to the cost of all others
- Hejcman et al. (2007): 64 yrs of fertiliser application – influence of P was greatest; species indicative of low productivity grasslands did not survive

Current advice:
"Aim to have optimum soil P and K (Index 3) fertility levels in all fields."
"Approximately 90% of the soils sampled throughout Ireland are sub-optimal in either Phosphorus, Potassium or soil pH."





Heinsoo et al. (2020) Agriculture, Ecosystems & Environment

Knock-on effects seen in the UK…..

Example from a county by county analysis of species loss

- 97% UK meadows lost since 1930s
- Ten grassland plant species extinct in UK in last 60 years – but this hides the real extent of the losses….
  - Species being lost at rate of up to nearly <u>one species per year per county</u>
  - Rate of loss accelerating

Plantlife (2012) *Our vanishing flora – how wild flowers are disappearing across Britain* Plantlife, Salisbury

Spring gentian, *Gentiana verna*

Dense-flowered orchid, *Neotinea maculata*

What about Irish species? ….

Some results from the recent Irish Red List for vascular plants

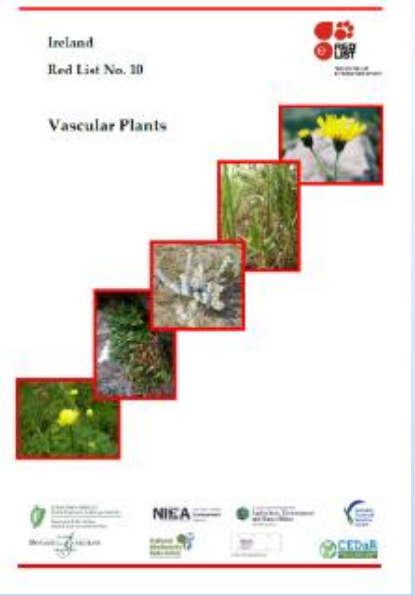
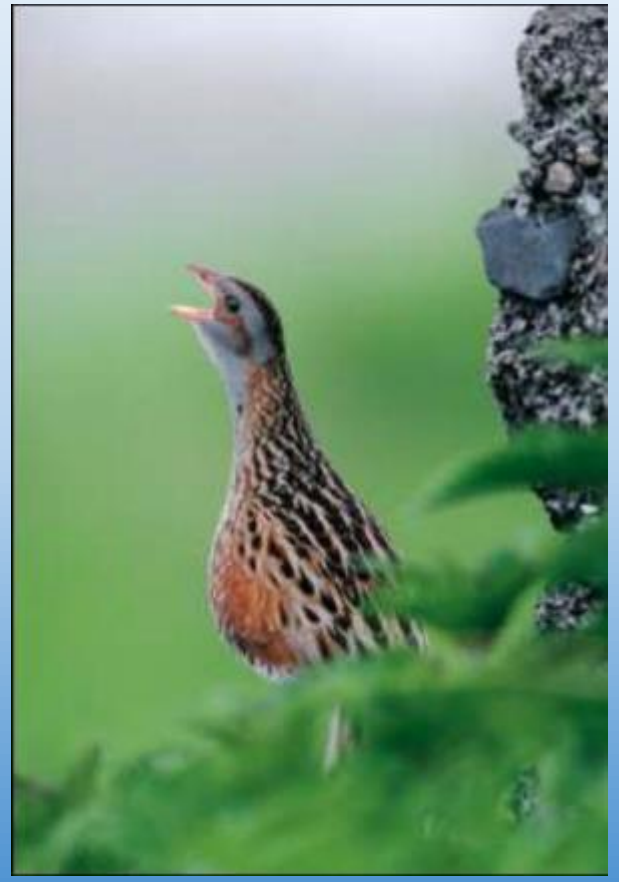


Table 6. Number and proportion of vascular plant taxa in each Red List category in Ireland

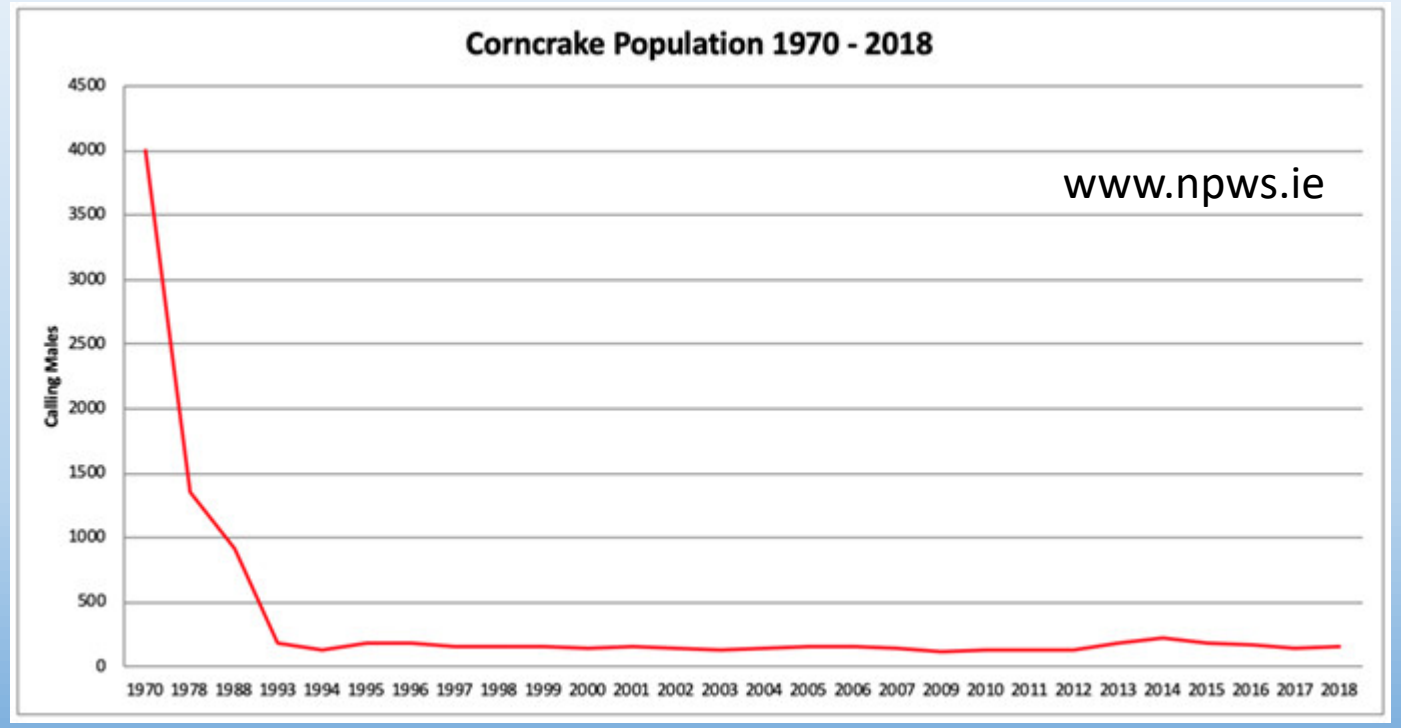
	Ireland		
	No. of taxa	**% of total**	
Regionally Extinct (RE)	15	1.2	
Critically Endangered (CR)	20	1.7	
Endangered (EN)	25	2.1	
Vulnerable (VU)	61	5.0	**17%**
Near Threatened (NT)	98	8.1	
Waiting List (WL)	105	8.7	
Least Concern (LC)	887	73.2	
Total	**1211**	**100**	

Wyse Jackson, M. et al (2016) *Ireland Red List No. 10: Vascular Plants*. Avail. to download: npws.ie/publications

What about Irish animal species? ….



Crex crex
(Corncrake)



- Corn bunting now lost
- Twite: estimated long term population decline of circa 98.2%
- Breeding curlew, lapwing ↓ at least 90%
- Yellowhammer: long term breeding range contraction of 60% but stable short-term population trend.
- Whinchat: 77% decline in the long-term breeding range

Some top tips for managing semi-natural grasslands

Nutrients:

- Reduce/stop nutrient inputs via slurry and artificial fertilisers
  - This will allow more species to thrive

Grazing:

- Try to move to traditional breeds
  - hardier, lighter, thrive better on rougher vegetation
- Winter-graze if possible
  - Traditional breeds make this more feasible
- Keep stocking rates low to moderate

Image: thatsfarming.com

Mowing:

- Mow late; consider after-graze
  - A late mow allows as many species as possible to flower and set seed

Drainage:

- Review existing drains
  - Some may be beneficial, and should be maintained in an ecologically sensitive way
  - In most cases, don't create new ones

Re-seeding:

- Don't re-seed – clearly this destroys the existing vegetation

Key take-home messages

- Keep farming!
- Recognise differing values of different farms/land
  - some for producing food/fodder intensively
  - some for ‘farming with nature’
- This is the future of farming
  - Increasingly land and nature is being valued for a range of services – biodiversity, carbon storage, water retention, water quality, pollinator habitat, etc. etc.
- Even in intensive farming, we must retain *some* ‘space for nature’
- Continue to learn and to be informed… this makes for better decision-making when it comes to farming and land management

Some resources

Information on semi-natural grasslands in Ireland, and their management:

- https://www.npws.ie/research-projects/grasslands - NPWS scientific survey results
- https://bsbi.org/irish-grasslands-project - learn more detail on grass and grassland identification
- https://www.farmingfornature.ie/ - hear it from the horse's mouth! Showcasing Irish farmers who farm with nature in mind
- https://www.npws.ie/farmers-and-landowners/schemes/npws-farm-plan-scheme - NPWS Farm Plan Scheme

Learn more about EIPs and results-based schemes:

- https://rbaps.eu/
- http://burrenprogramme.com/
- https://www.nationalruralnetwork.ie/eip-agri/ - information on all 23 Irish EIP projects.

Two of the biggest, and one focused on making changes in intensive agriculture setting…

- https://www.pearlmusselproject.ie/
- http://www.henharrierproject.ie/
- https://www.thebrideproject.ie/

Great resources on some UK sites:

- https://www.plantlife.org.uk/uk/our-work/campaigning-change/meadows
- http://www.magnificentmeadows.org.uk/
- http://www.floodplainmeadows.org.uk/

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