

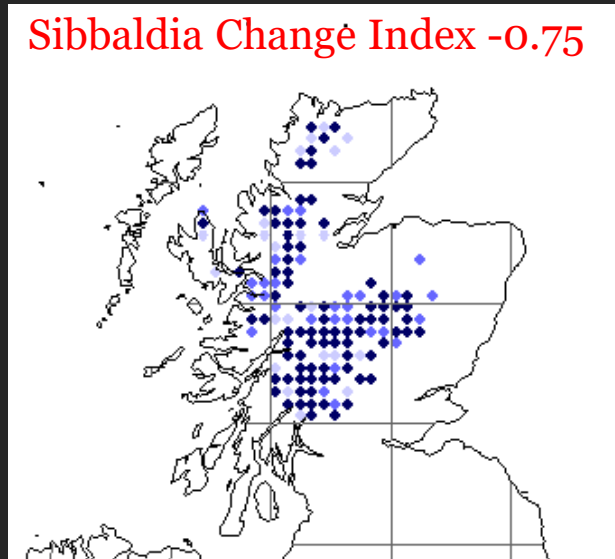
A wide-angle photograph of a lush green mountain valley. A winding stream flows through the center of the valley, surrounded by vibrant green grass and patches of purple heather. In the foreground, two hikers are sitting on a grassy slope, looking out over the valley. One hiker is wearing a blue hat and a dark jacket, and the other is wearing a dark jacket and shorts. The background shows rolling hills and mountains under a clear sky.

# Threatened Plants in Britain and Ireland

**Pete Stroh, BSBI**

# Why was the survey required?

The *New Atlas* was able to compare 1987-'99 data with the First Atlas, and so report the extent of declines.....



.....but many questions remained

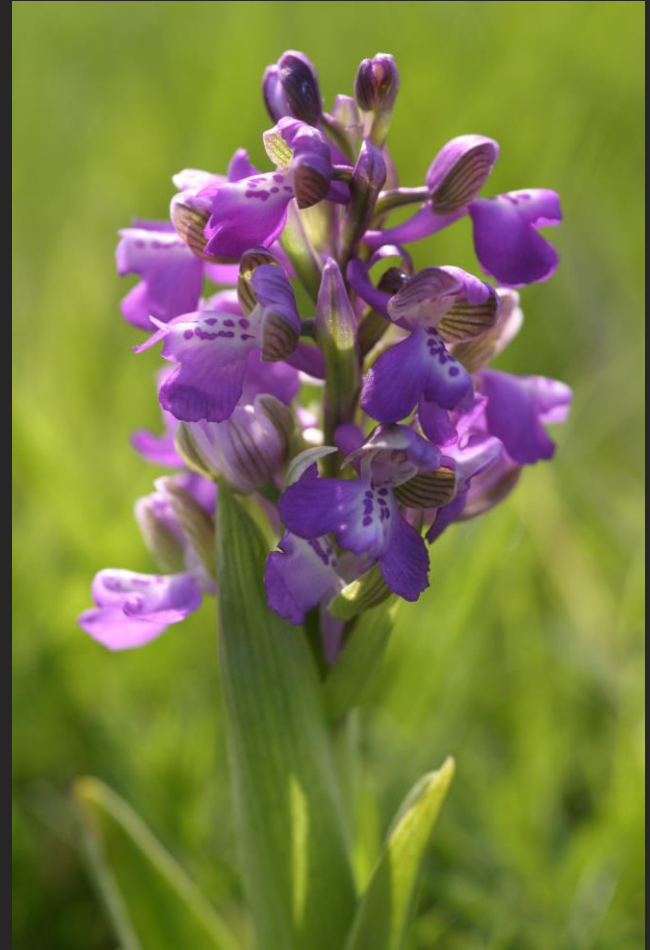
- Real losses or under-recording?
- Causes?
- Abundance?
- Ecological and management requirements?

# Aims of the survey

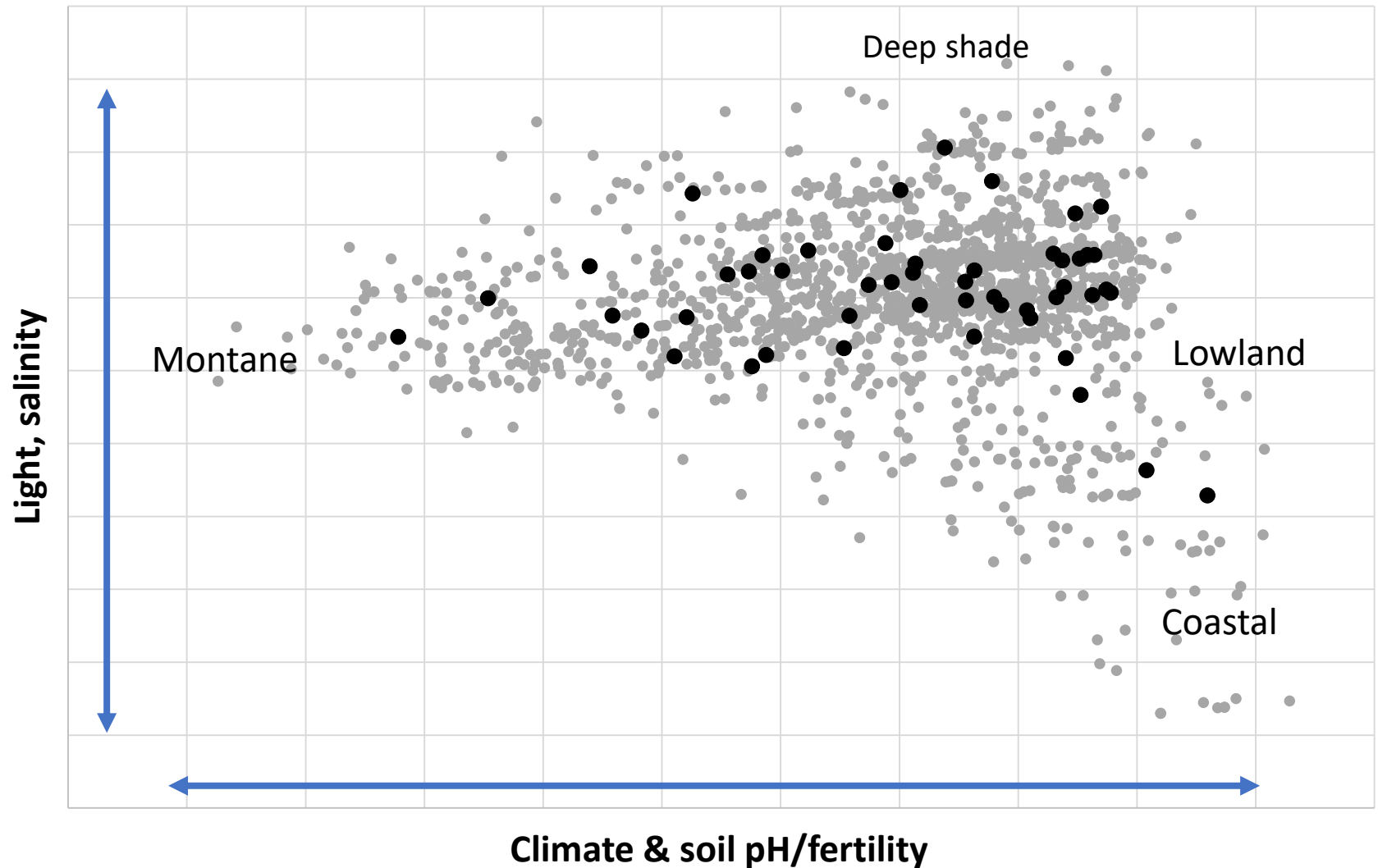
- Improve knowledge concerning **abundance & ecological requirements** of threatened species
- **Quantify change** since 1970
- Improve understanding of the **main threats & management requirements**
- Provide a **baseline** for future surveys
- Inform **conservation** activity

# Species selection

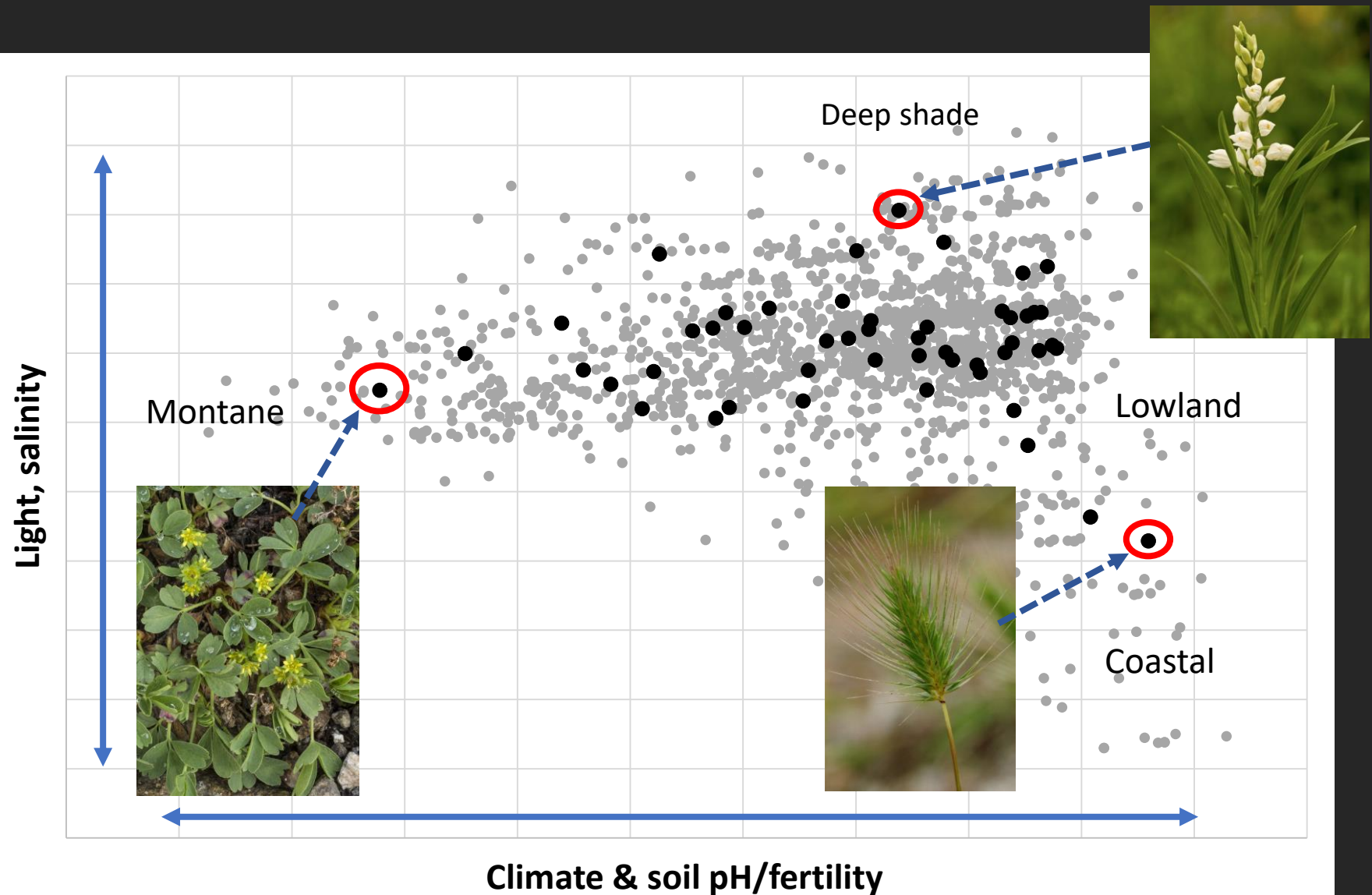
- 50 species: 42 threatened, seven NT, one LC (Juniper)
- Broad range of habitats and geographic areas
- Wide range of ecological and climatic conditions



# 50 species selected covered a wide range of ecological and climatic conditions



# 50 species selected covered a wide range of ecological and climatic conditions




# Selection of populations

- Pops chosen at random from post-1970 records
- Stratified by vice-county, with the number of pops proportional to the number of hectads a species was recorded from (but max 5 pops per county)
- Pops then drawn at random using 100m x 100m resolution records (+coarser precision when necessary)
- **A total of 3,941 populations were selected for survey**
- 10 species surveyed per year


# Field survey 2008-2013

- Six field seasons
- Revisited a **random sample** of historic populations
- Where **present** recorded
  - Location
  - Population size & extent
  - Habitat (vegetation type, sward height, associates)
  - Management
  - Threats
- Where **absent** (null returns)
  - Reason for loss

BSBI Threatened Plant Project recording form Version 3, March 2010

	Species <i>Sibbaldia procumbens</i>	VC 108	Selected site?*	Yes	Day 31	Month 8	Year 2010	Recorder(s) G.P. Rothwell I.M. Evans
	Site Breabag	If yes give site number 1	Aspect N	Slope 10°	Alt (m) 660			

\* VCRs should have been sent a list of pre-selected sites which we would like revisited as part of this survey (these can be downloaded from the BSBI website - www.bsbi.org.uk)

Grid reference(s) Please record presence in 100m or 10m grid cells. Continue on reverse if necessary. NC 2 8 9 8 1 6 7 8 up tiny burn course to Site 1 NC 2 8 9 8 1 6 7 0 Site 2 NC 2 9 1 2 1 6 8 4 Site 2	
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Population size Site 1 0 (null) <input type="checkbox"/> 1-10 <input type="checkbox"/> 11-100 <input checked="" type="checkbox"/> 101-300 <input type="checkbox"/> 301-500 <input type="checkbox"/> 501-1000 <input type="checkbox"/> 1001-3000 <input type="checkbox"/> 3001-10000 <input type="checkbox"/> >10000 <input type="checkbox"/> Actual number if counted <input type="text"/>	Unit counted Site 1 Seedlings <input type="checkbox"/> Rosettes <input type="checkbox"/> Clumps/patches <input checked="" type="checkbox"/> Flowering/fruitle spikes <input type="checkbox"/> Combination of above <input type="checkbox"/> Regeneration Seedlings <input type="checkbox"/> Vegetative <input type="checkbox"/> Flowering <input checked="" type="checkbox"/> Fruiting <input checked="" type="checkbox"/>	Density e.g. a few plants widely scattered Scattered in less densely vegetated areas up burn course Extent e.g. 50 x 100 m 80 x 10 m.
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Habitat type Please give brief description of habitat and where known broad habitat, NVC community, soil type, geology, water regime, etc. Base-flushed montane grassland	Management Please give brief details of management and whether these are appropriate for the threatened species surveyed Grazed by red deer Management details: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">High</td> <td style="text-align: center;">Mod</td> <td style="text-align: center;">Low</td> <td style="text-align: center;">None</td> </tr> <tr> <td>Grazing</td> <td></td> <td></td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>Shading</td> <td></td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>Disturbance</td> <td></td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> </table> Sward height (cm) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">&lt; 10</td> <td style="text-align: center;">11-30</td> <td style="text-align: center;">31-100</td> <td style="text-align: center;">&gt; 100</td> </tr> <tr> <td></td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> </table>		High	Mod	Low	None	Grazing			✓		Shading				✓	Disturbance				✓	< 10	11-30	31-100	> 100		✓			Threats or reason for null record Afforestation <input type="checkbox"/> Agricultural improvement <input type="checkbox"/> Burning <input type="checkbox"/> Lack of management <input type="checkbox"/> Invasive species <input type="checkbox"/> Mineral extraction <input type="checkbox"/> Overgrazing <input type="checkbox"/> Pollution / eutrophication <input type="checkbox"/> Recreation <input type="checkbox"/> Species transient <input type="checkbox"/> Undergrazing <input type="checkbox"/> Urban/road development <input type="checkbox"/> Other (please specify): <input type="text"/>
	High	Mod	Low	None																										
Grazing			✓																											
Shading				✓																										
Disturbance				✓																										
< 10	11-30	31-100	> 100																											
	✓																													

Aquatic species only Water-body margin grazed? YES / NO Water-body recently cleared? YES / NO Water-body affected by drainage? YES / NO	
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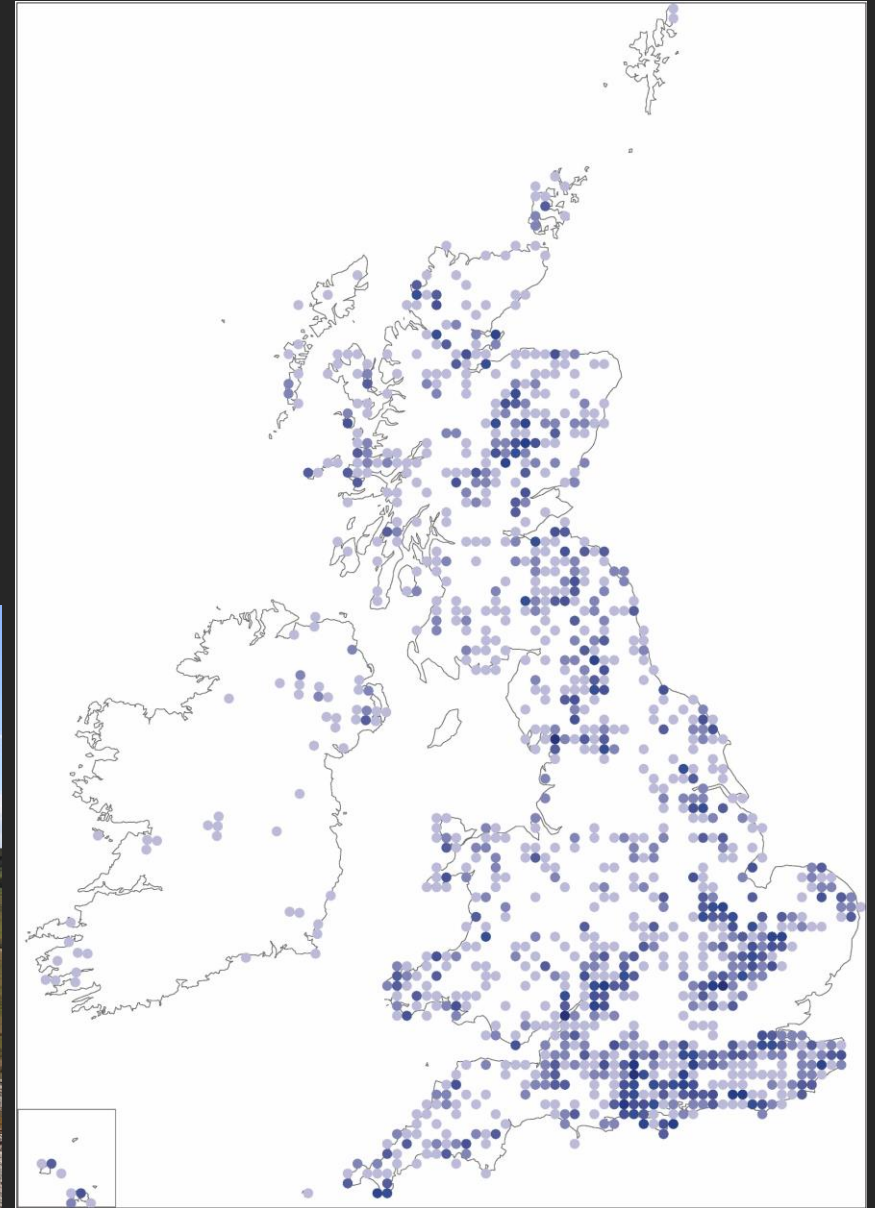


# Survey coverage

- Just over 2,000 pre-selected sites surveyed by c. 800 surveyors
- plus 1,824 self-selected

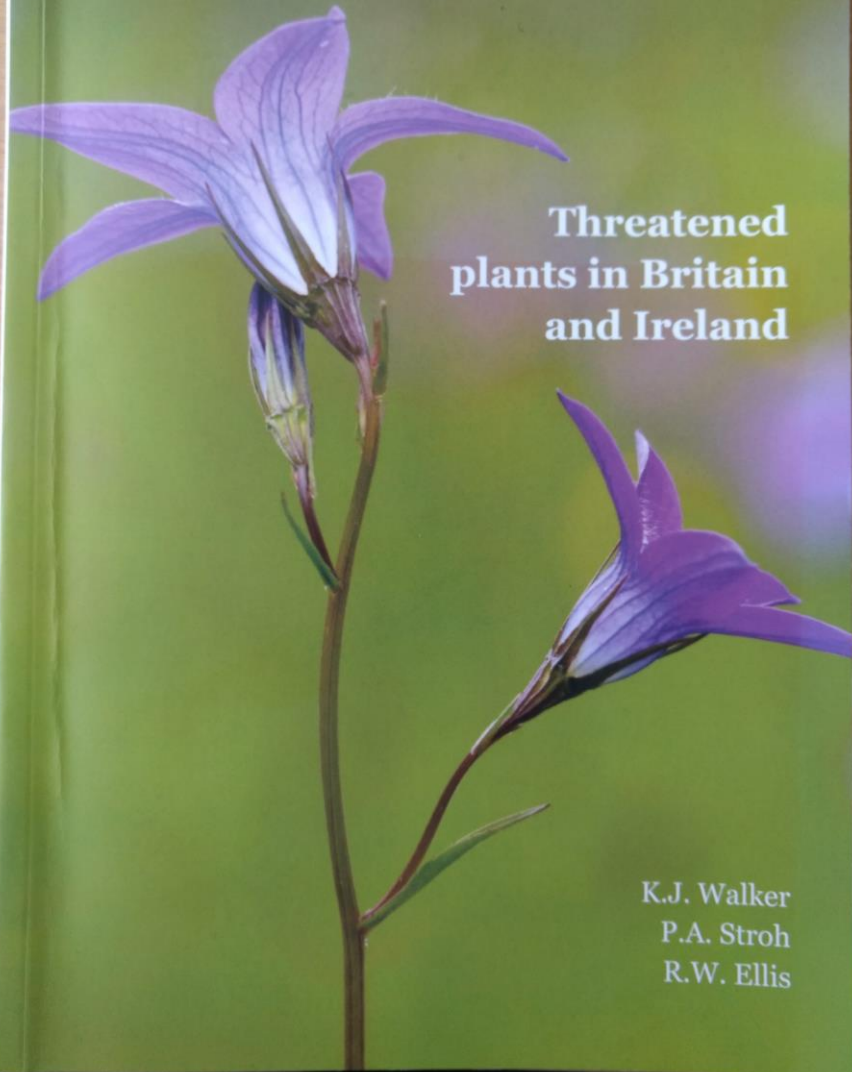


The number of pre-selected populations surveyed per hectad for the TPP, on a coloured scale from pale blue (one survey) to dark blue (nine or more surveys).





**800 BSBI recorders took part!**



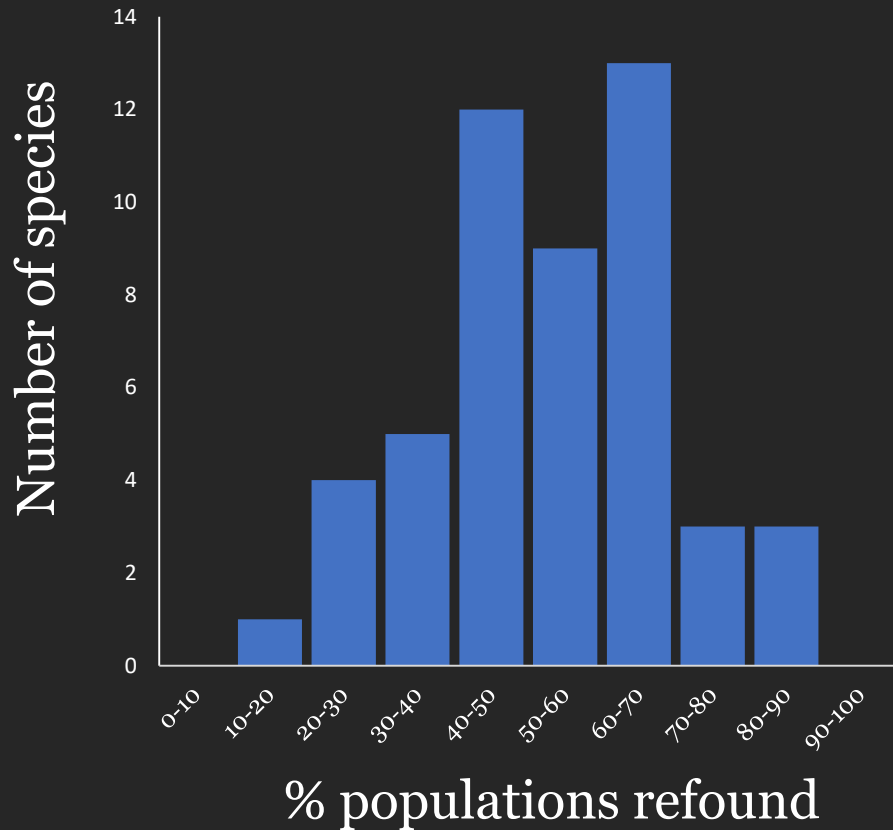
**Threatened  
plants in Britain  
and Ireland**

K.J. Walker  
P.A. Stroh  
R.W. Ellis

# Main findings

# #1 51% of all populations searched for were re-found

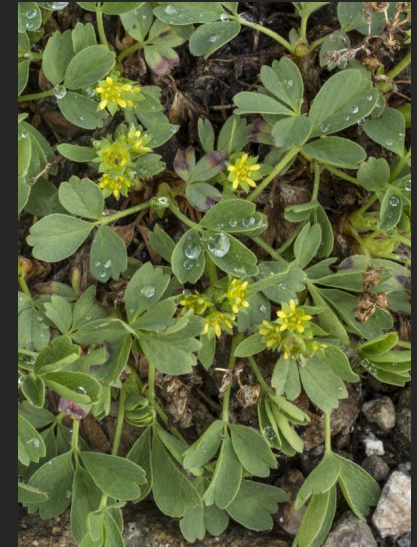
average re-find rate per species = 53% but large variation.....



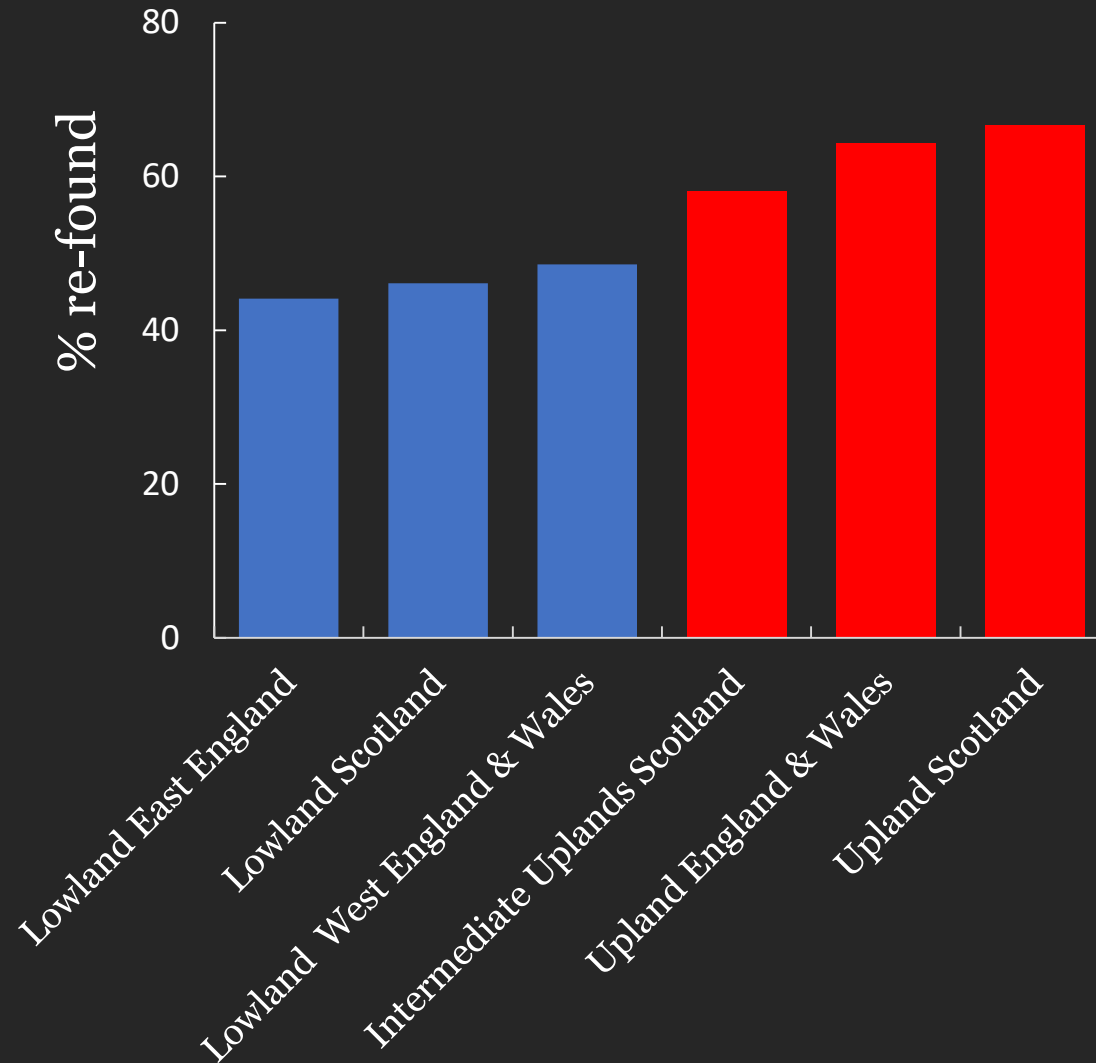
**Lowest = 18%**



**Highest = 87%**



## #2 Higher re-find rates in the uplands



# Rare Spring-sedge *Carex ericetorum*

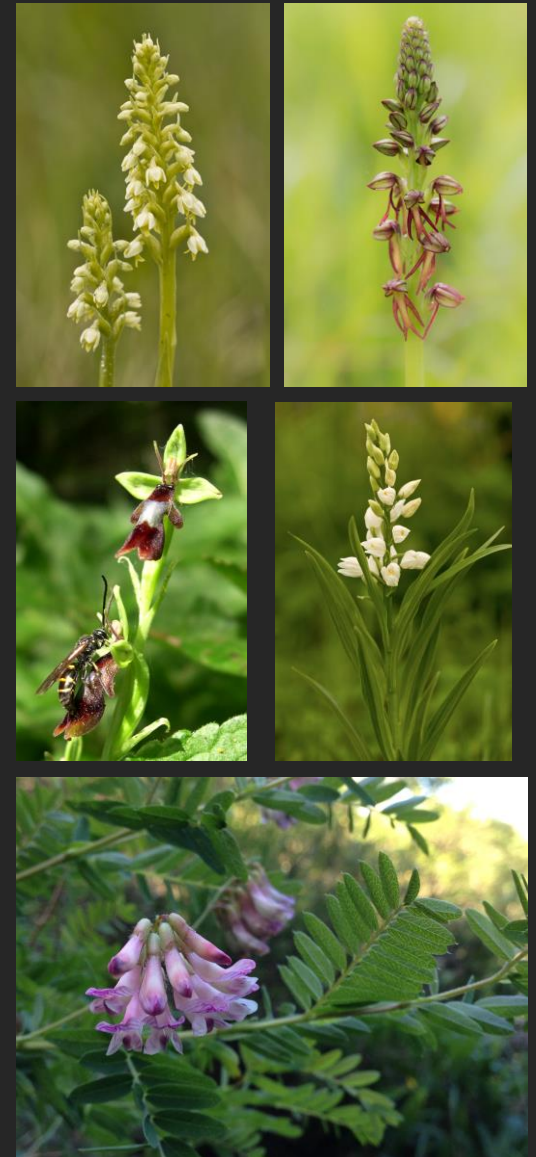
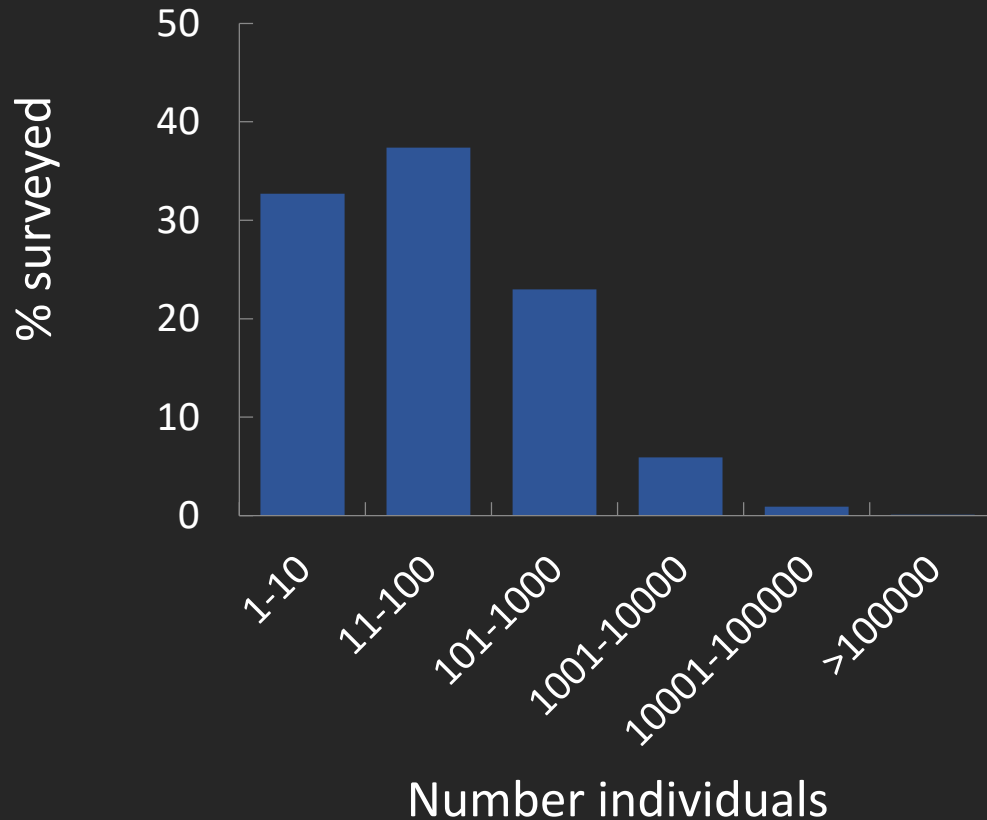


- Short, spp. rich calcareous grassland
- Very poor competitor
- 65% re-find rate (15/23) post-1970
- Upland populations large and stable
- All 8 losses in lowlands
- Very different vegetation
- Undergrazing/neglect



# #3 Very small population size

- Almost 75% pops < 100 individuals
- 8 spp. median population sizes of <10 individuals





# Population size...



- 10,000 plants found on limestone pavement near Lochcarron, West Ross (but median pop < 10)
- Stable since 1970s but generally small population size

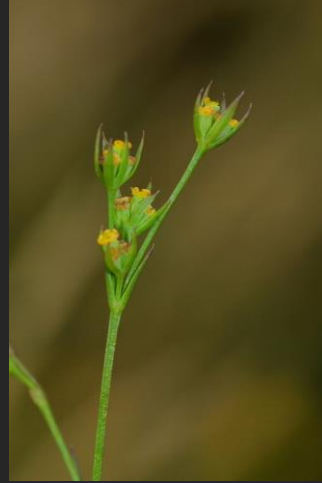


- 1,000 plants of Crested Cow-wheat at three road verge sites (mean pop 403)
- But re-find rate 48%
- Extant pops well-managed, but continued decline post 1970

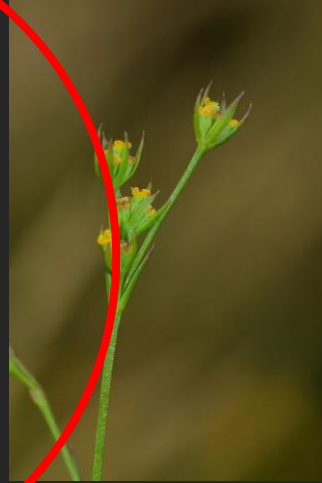


- Median pop < 10 individuals
- Re-find rate 45%
- However, can be very difficult to find, and new pops have been found in areas that were previously intensively recorded

# Highest re-find rates >75%



Highest re-find rates >75%



# Juniper *Juniperus communis* subsp. *communis*

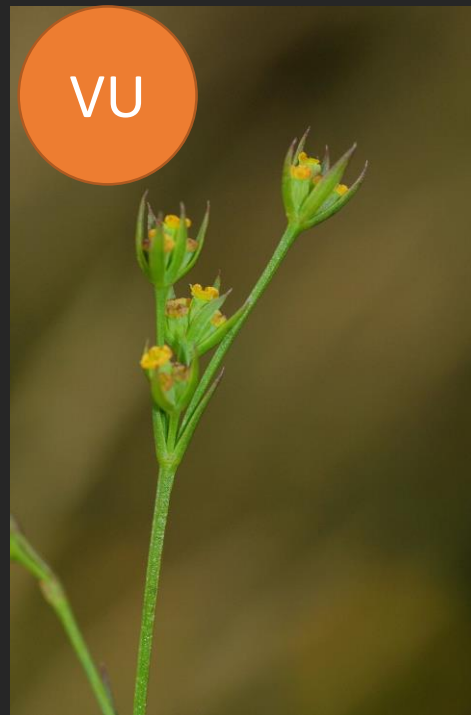
- Lowland pops
- Present at 17/20 post-1970 sites
- Mean pop size 26 individuals (median range 1-10)
- Fragmented habitat
- Lack of age-classes, older trees dominating
- Older trees less successful seed producers
- Lack of regeneration – seedlings/saplings at only 3 sites
- 9 years for seedlings to become robust
- Hard grazed by rabbits or undergrazed



### #3 Some species are not as threatened as we thought



Sibbaldia



Slender Hare's-ear



Northern Hawk's-beard

**Difficult to find; remote locations; difficult to identify**

# *Sibbaldia* *Sibbaldia procumbens*

- Refound at **21 out of 24 sites** in the Scottish Highlands, supporting the view that distribution is stable since 1970s and previously reported declines a result of under-recording.



Mossy snow-bed areas with damp, skeletal soils @ Ben MacDui, South Aberdeenshire

# Slender Hare's-ear *Bupleurum tenuissimum*



- Coastal populations stable
- Red List decline included historical (pre-1930) inland losses
- May have over-estimated decline due to difficulties in detection (late flowering; lack of suitable conditions)
- Random disturbance events + cattle grazing



# Northern Hawk's-beard *Crepis mollis*

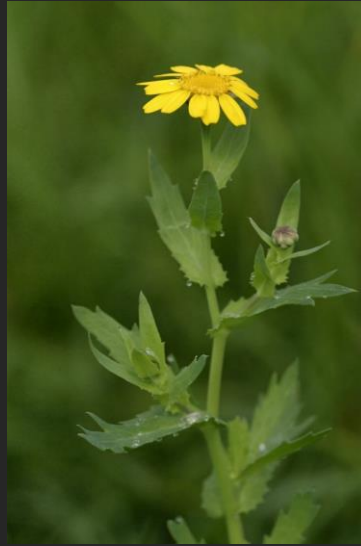


- Often grows in remote locations
- Difficult to find – small pops, lack of flowers (grazed off), confusion with similar species
- Less pronounced decline than previously thought – probably overlooked
- Requires relatively tall, lightly-managed swards (palatable to livestock) – one for the margins
- Consequently over- and under-grazing = threats!





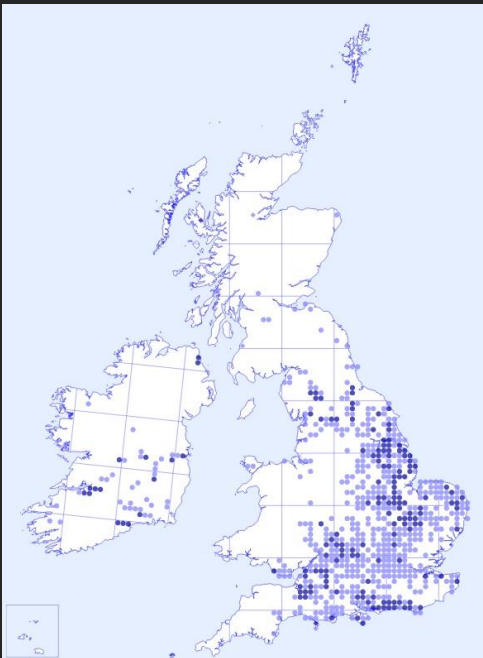
# Lowest refund rates <30%



# Opposite-leaved Pondweed *Groenlandia densa*



- No doubt that there has been real decline
- Eutrophication and lack of management
- But short-term (3-5 yrs) slubbing = may visit at the end of a cycle
- 23% re-find figure still exceptionally low

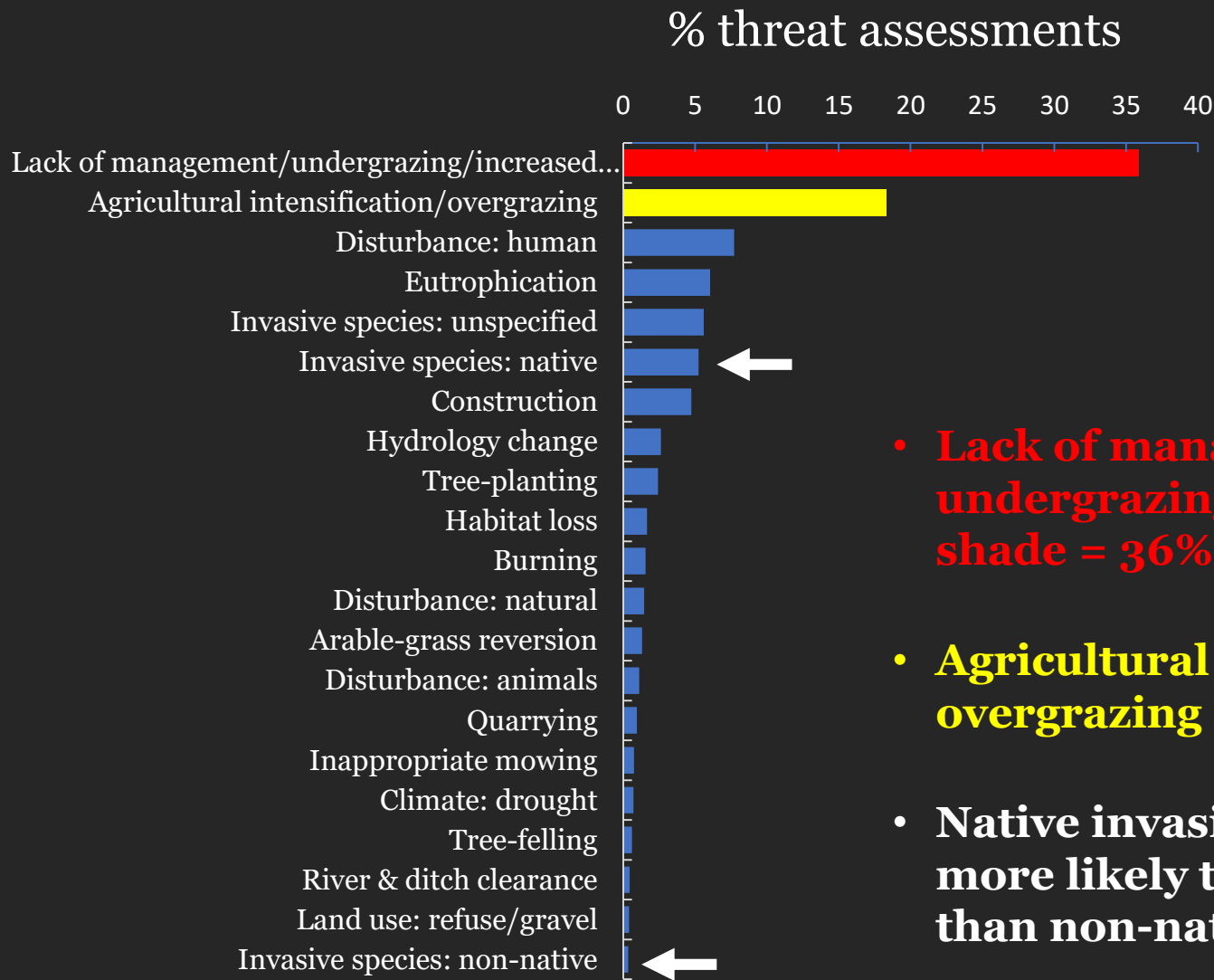


# Loss vs overlooked



- All depend on a degree of disturbance – most are annuals
- Could argue that presence underestimated (seed bank, lack of disturbance, recording)
- General trends over time seem to indicate this is not the case
- Changes to land use/arable post-1970 – lag effect?
- Wrong kind of disturbance

# #4 Threats - too little or too much management



- **Lack of management / undergrazing / increased shade = 36%**

- **Agricultural intensification & overgrazing = 18%**

- **Native invasive species 13x more likely to pose a threat than non-natives (5% v 0.4%)**

# Compare with Perring's threats in the 1970s\*

THE LAST SEVENTY YEARS

135

TABLE IV

Summary of causes of decline

	Arable change	Ploughing	Drainage	Habitat destroyed	Collecting	Forestry	No. management	Natural causes	Totals
Extinctions	1	0	4	4	2	1	0	8	20
Very rare	7	6	5	0	5	2	1	8	34
Rapid decline	3	4	7	0	0	3	0	3	20
Totals ..	11	10	16	4	7	6	1	19	74

\*Perring, F. 1970. The last seventy years, in F. Perring (ed) *The Flora of a Changing Britain*, pp.128-135. BSBI Conference Report No. 11

## #6 Small, short-lived species were often the most threatened



- **poor competitors**
  - rely on grazing/disturbance to reduce competition
- **short-lived seed banks**
  - Unlikely to be 'rescued' from below ground
- **limited dispersal ability**
  - Unlikely to recolonise

*Gentianella campestris* Field Gentian - biennial

# Survival

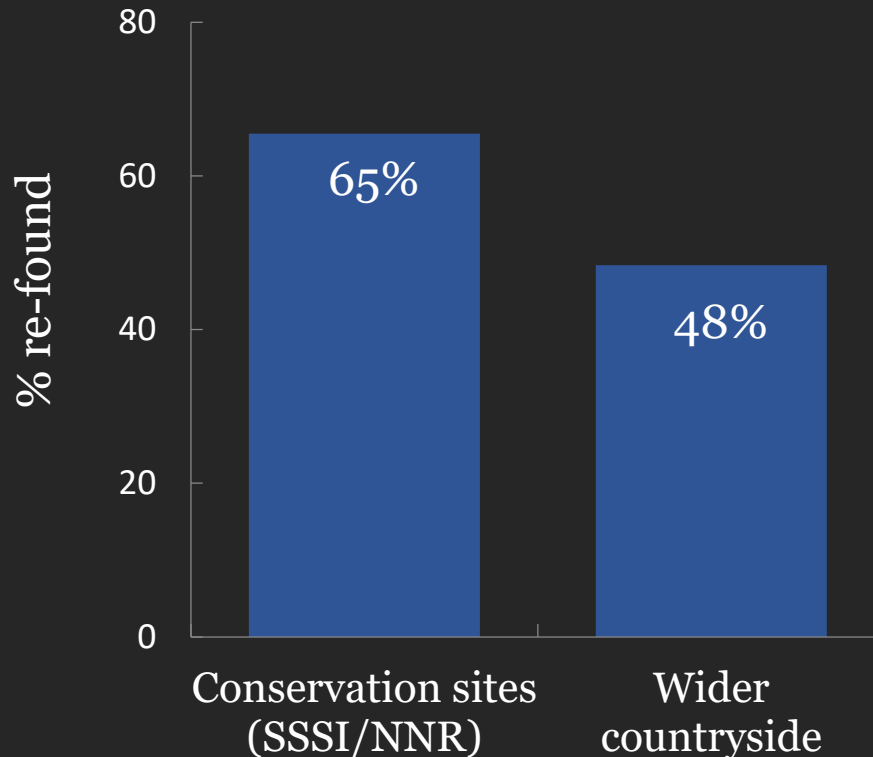
- Perennials that reproduce vegetatively suffered fewer losses
- Capable of withstanding fluctuations in management regimes & temporary suboptimal conditions e.g. Rare Spring-sedge
- Relatively high survival rates for species that require little active management i.e. ‘self-sustaining’ (e.g. *Polystichum*, *Sibbaldia*)
- ‘natural’ disturbance (erosion, rabbits, drawdown)
- Potential for extinction debt in suboptimal situations e.g. Juniper

## #8 Associate species

- Huge amount of information regarding associate species and habitat for the 50 threatened plants surveyed
- For some, the survey has identified hitherto overlooked but important vegetation assemblages/habitat
- This improves our understanding of the ecological niche, and also assists in searching for 'new' populations



## #7 Species have fared better on conservation sites than in the wider countryside



- Consistent across all habitats
- No room for complacency – conservation has in many cases slowed decline, not stopped it
- Lack of suitable management - increasing threat on nature reserves due to lack of resources

# Limitations of the survey

- Rare and scarce species had higher resolution records than ‘widespread decliners’ – **so disparity in accuracy of GR**
- Population not found assumed extinct – clearly some may have been missed for various reasons
- Survey restricted to historic sites - didn’t account for colonisation of new sites
- Single visit survey – influenced by timing of visit
- Some threats were more apparent than others e.g. undergrazing + eutrophication + warmer winters
- N-dep vs undergrazing
- Unseen biological reasons e.g. metapopulation dynamics, loss of insect/fungal associations

# Conclusions

- Lack of suitable management needs to be addressed
- Reinstatement of **low-intensity traditional management** (e.g. grazing, coppicing)
- Sometimes an **interventionist approach** is required e.g. periodic disturbance for species with long-lived seed banks (e.g. Breckland/Lizard rarities)



# Conclusions

- **Protection is not enough** - for many species, the majority of populations occur(ed) outside of protected sites
- **Better communication** between data providers, conservation organisations, landowners, public
- Deliver conservation schemes more effectively through precisely targeted, evidence-based plans
- **Landscape-scale**
- **More research** concerning individual species (Gnaphalium) & 'invisible threats' (N-dep, climate change)
- **Look to your local sites, make a difference!**

