

Developing methodologies for the genetic conservation of UK crop wild relatives

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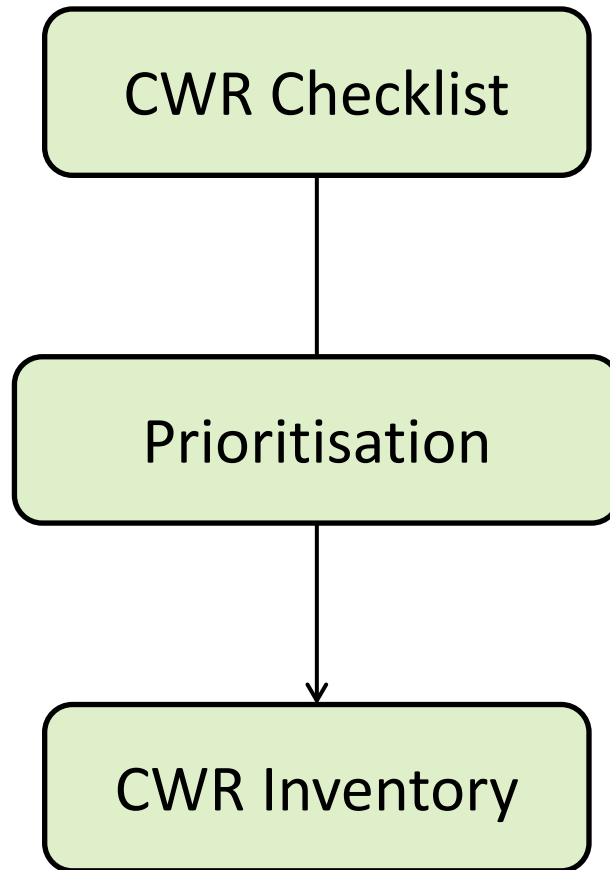
Outline

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 - *In situ* gap analysis
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 - Why the Lizard?
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 - Is the diversity different from elsewhere in the UK?
 - Management implications
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- Future research
 - Genetic reserve network
 - *Ex situ* collection
 - Modelling future climate change

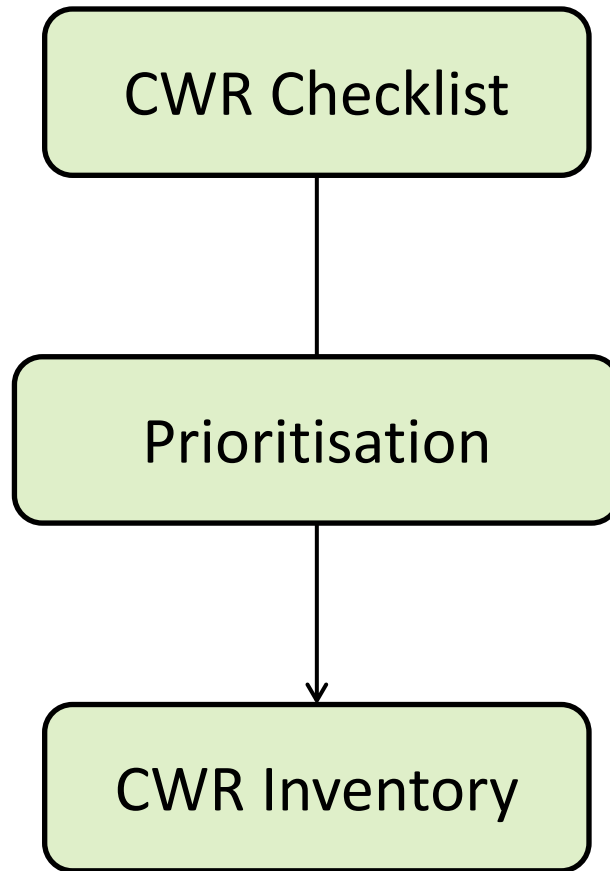


Sea Carrot, *Daucus carota* subsp. *gummiifer*

UK Priority CWR – Inventories

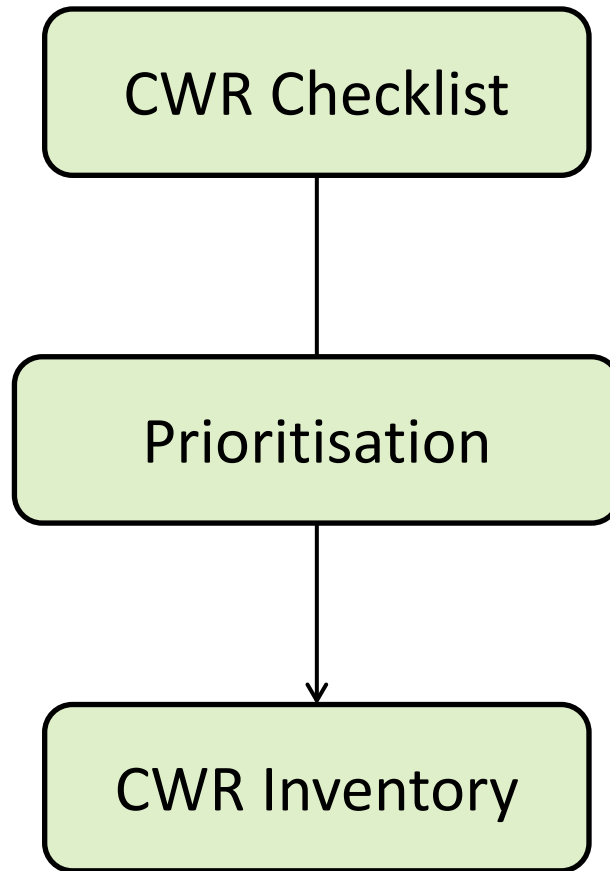


UK Priority CWR – Inventories



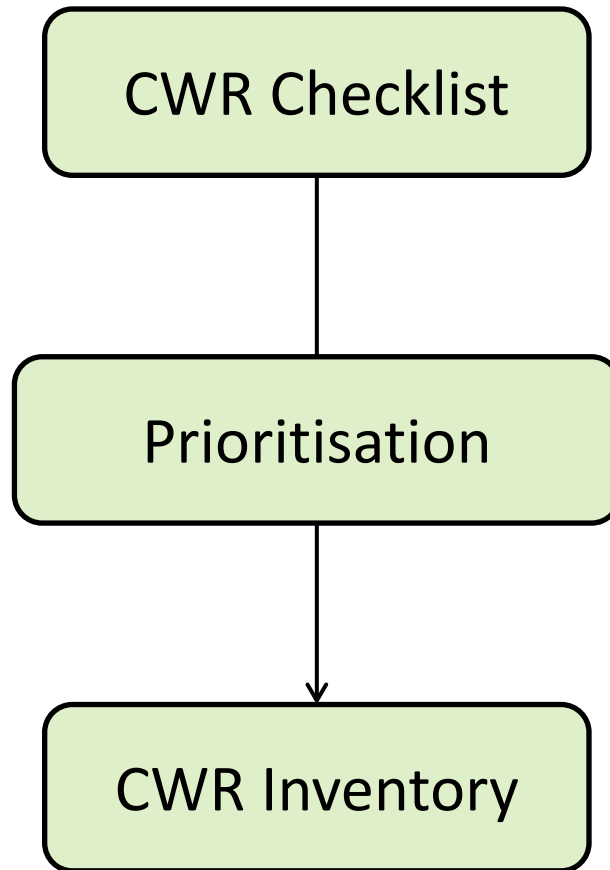
- England, Scotland and Wales (& UK)

UK Priority CWR – Inventories



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- Involvement of stakeholders

UK Priority CWR – Inventories



- England, Scotland and Wales (& UK)
- Involvement of stakeholders
- Selection of criteria:
 - Use of related crop
 - Native status
 - Economic value of crop
 - Gene pool/taxon group
 - Red list threat status

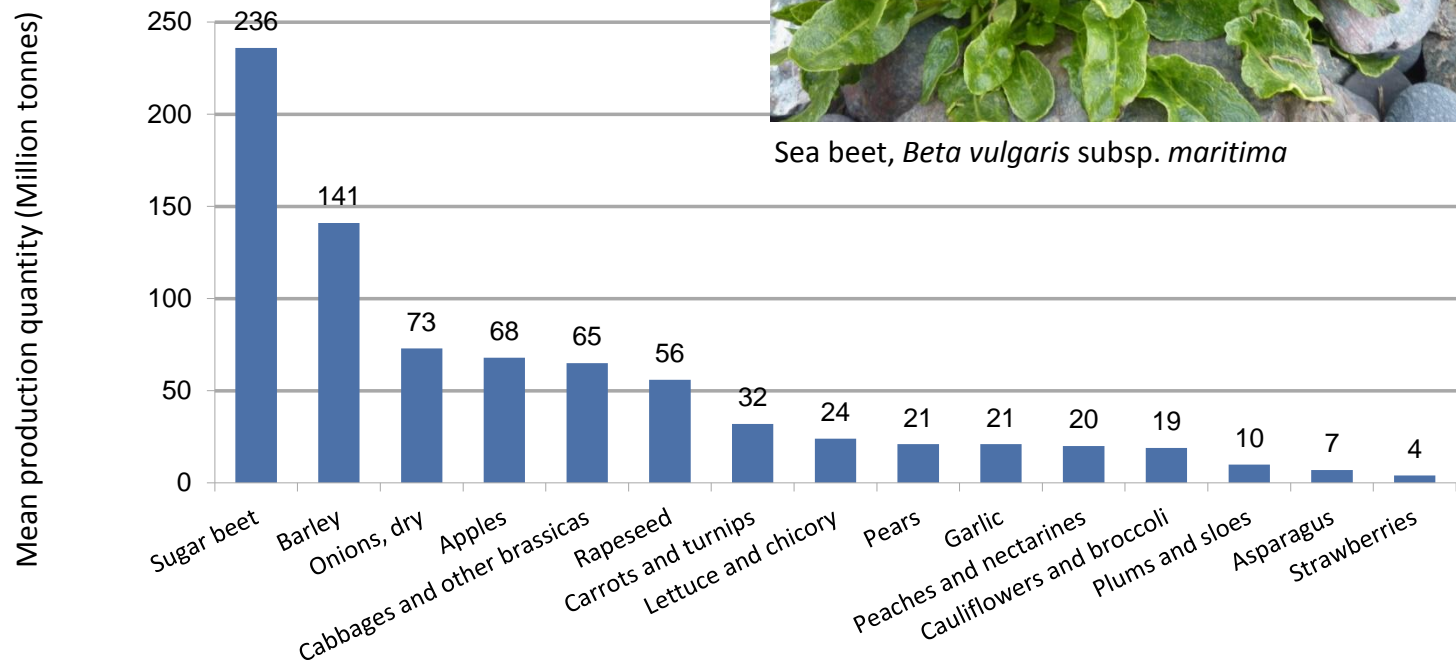
UK Priority CWR – Inventories

E.g. England

- 148 taxa in inventory, including:
 - sea beet
 - sea carrot
 - wild asparagus



Sea beet, *Beta vulgaris* subsp. *maritima*

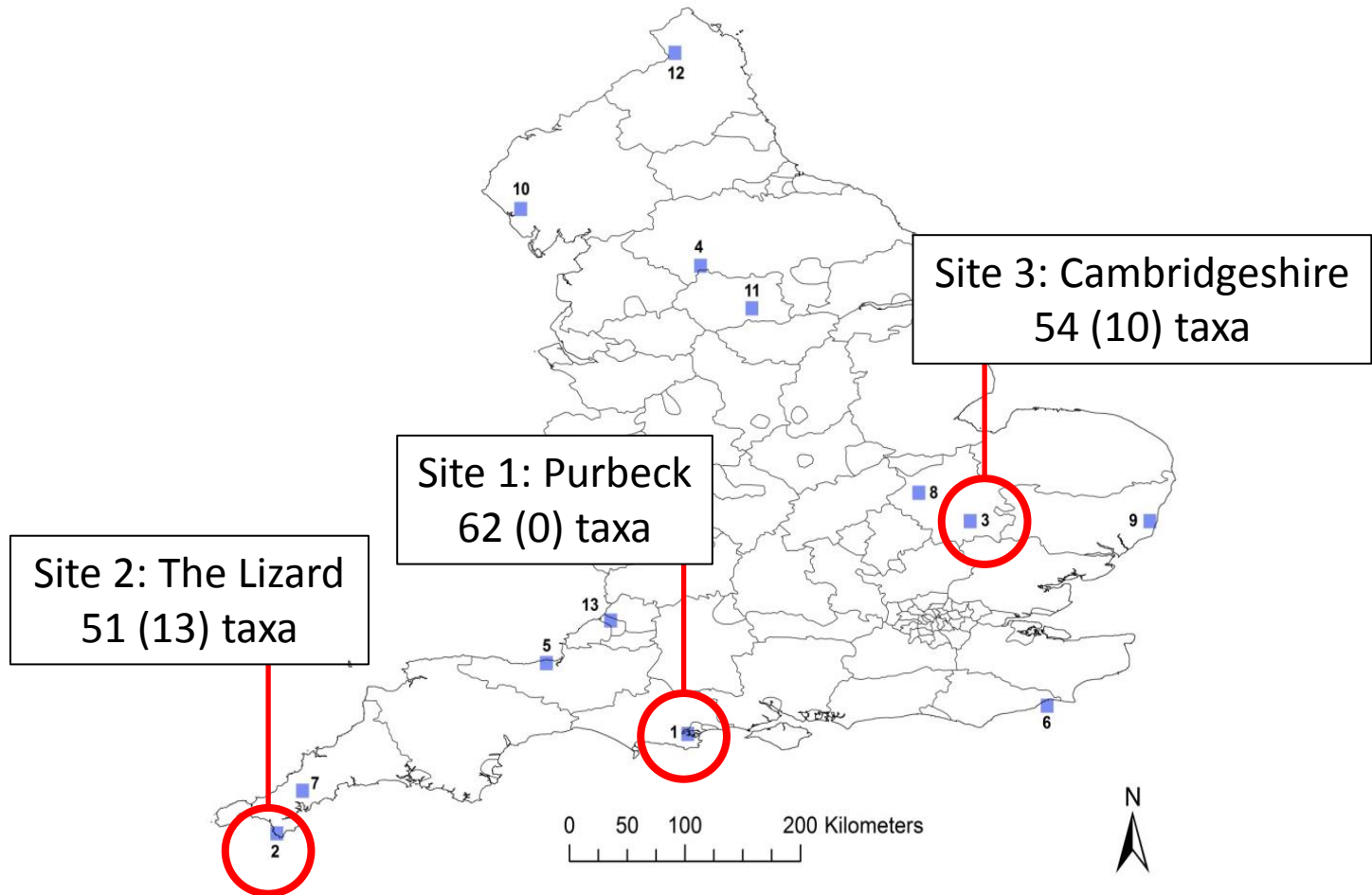


Global mean economic value between 2006 and 2010 (Data Source: FAOSTAT, 2012)

UK Priority CWR – *In situ* gap analysis

E.g. England

Where should we establish genetic reserves for *in situ* conservation?



CWR complementarity analysis for England

Genetic assessment of CWR on the Lizard

Why the Lizard?

- Warm climate
- Complex geology
- Range of soil types
- Microclimatic variation
- Varied land use pattern

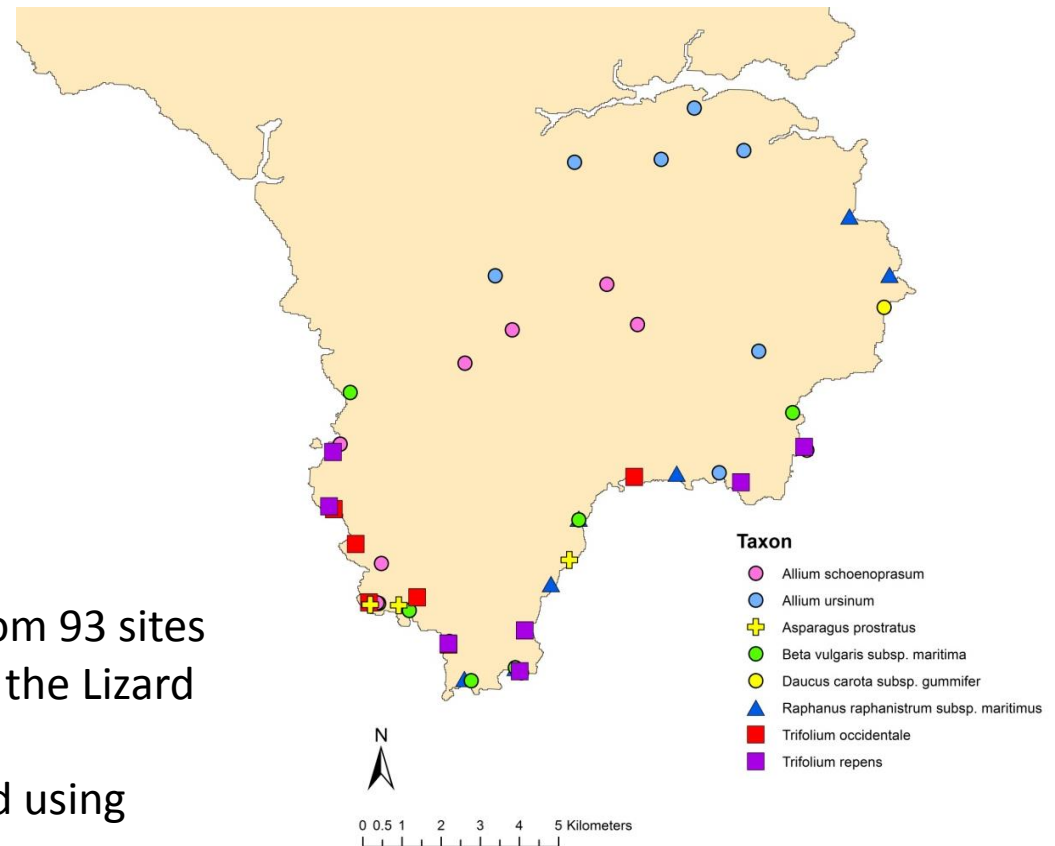


Lizard Point, Cornwall

Genetic assessment of CWR on the Lizard

Methodology

- CWR taxa sampled:
 - wild chives
 - wild garlic
 - sea beet
 - sea carrot
 - sea radish
 - western clover
 - white clover
- Leaf samples collected from 93 sites both within and outside of the Lizard
- Genetic diversity analysed using AFLP molecular markers



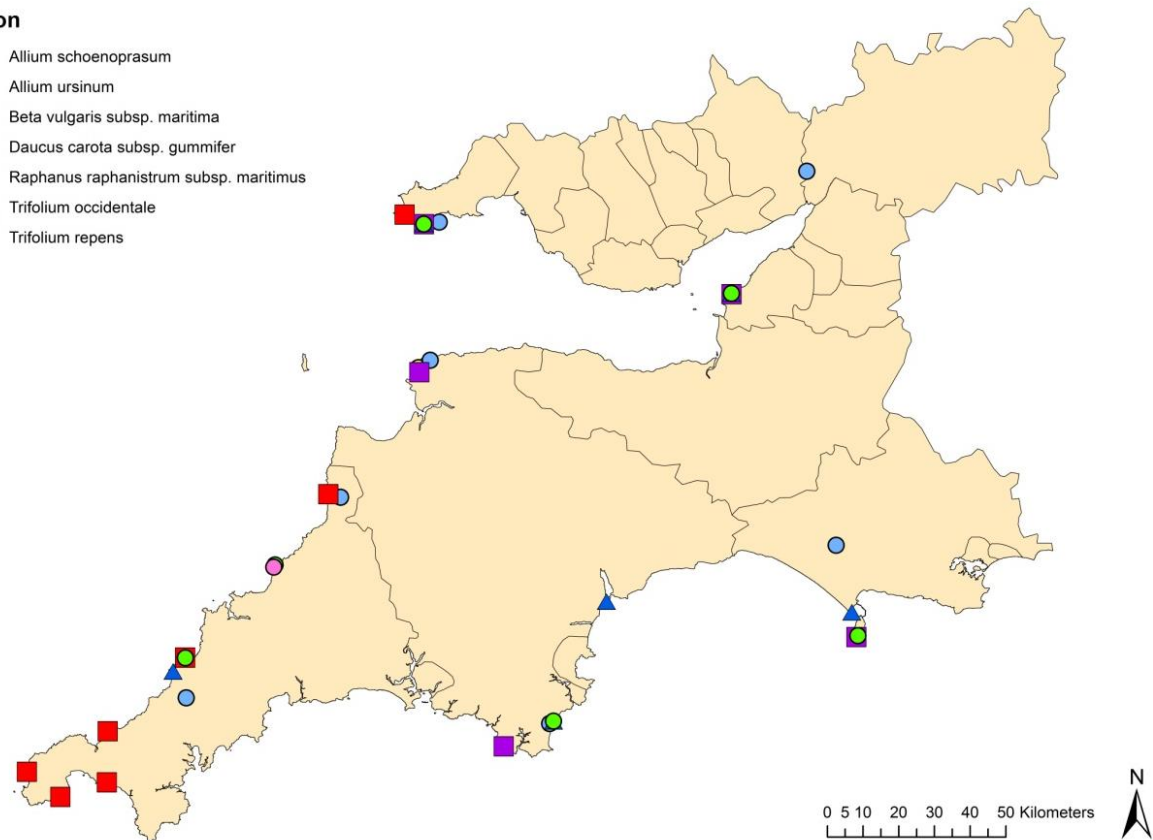
Sample collection sites on the Lizard

Genetic assessment of CWR on the Lizard

Methodology

Taxon

- *Allium schoenoprasum*
- *Allium ursinum*
- *Beta vulgaris* subsp. *maritima*
- *Daucus carota* subsp. *gummifer*
- ▲ *Raphanus raphanistrum* subsp. *maritimus*
- *Trifolium occidentale*
- *Trifolium repens*



Sample collection sites in the south west of the UK

Genetic assessment of CWR on the Lizard

How diverse is the Lizard?

Mean within population expected heterozygosity (H_w) with standard error (S.E) for the Lizard Peninsula and southwest sites

Taxon	Lizard Peninsula		Southwest UK	
	H_w	S.E. (H_w)	H_w	S.E. (H_w)
<i>Allium schoenoprasum</i>	0.191	0.008	0.165	0.022
<i>Allium ursinum</i>	0.086	0.005	0.128	0.020
<i>Asparagus prostratus</i>	0.323	0.008	N/A	N/A
<i>Beta vulgaris</i> subsp. <i>maritima</i>	0.146	0.009	0.162	0.007
<i>Daucus carota</i> subsp. <i>gummifer</i>	0.101	0.002	0.098	0.006
<i>Raphanus raphanistrum</i> subsp. <i>maritimus</i>	0.086	0.006	0.115	0.022
<i>Trifolium occidentale</i>	0.063	0.005	0.061	0.011
<i>Trifolium repens</i>	0.134	0.007	0.132	0.007

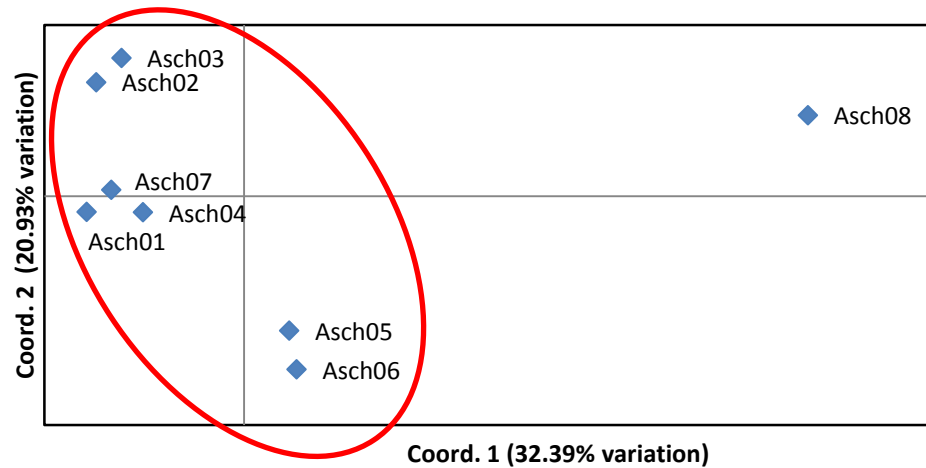
- Results reflect life histories of taxa
- No significant difference between Lizard and southwest sites



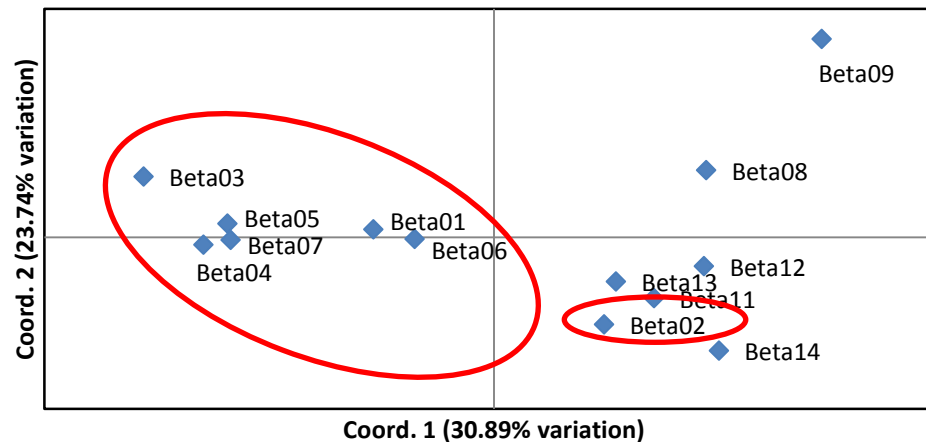
Western clover, *Trifolium occidentale*

Genetic assessment of CWR on the Lizard

Is the diversity different from elsewhere in the UK?



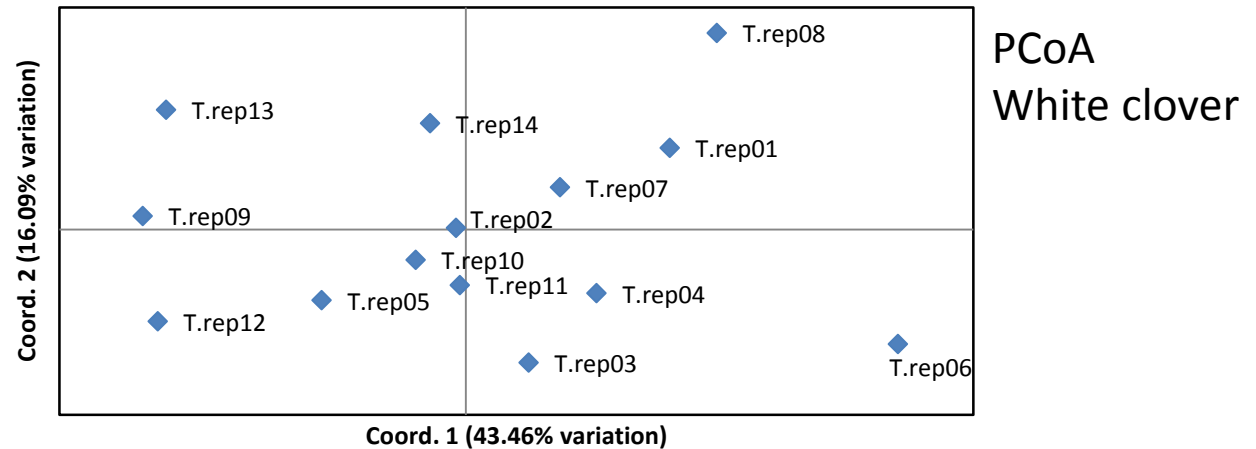
PCoA
Wild chives



PCoA
Sea beet

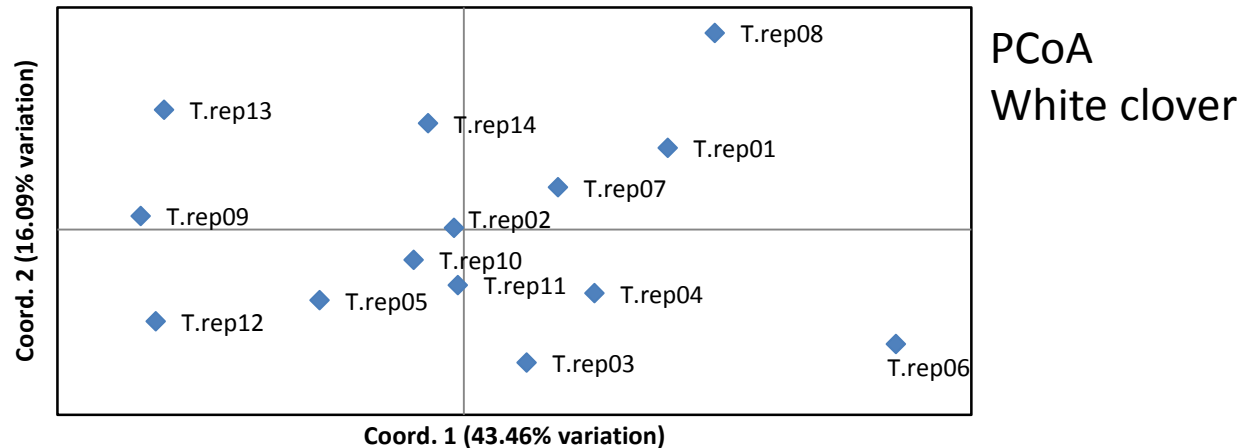
Genetic assessment of CWR on the Lizard

Is the diversity different from elsewhere in the UK?



Genetic assessment of CWR on the Lizard

Is the diversity different from elsewhere in the UK?

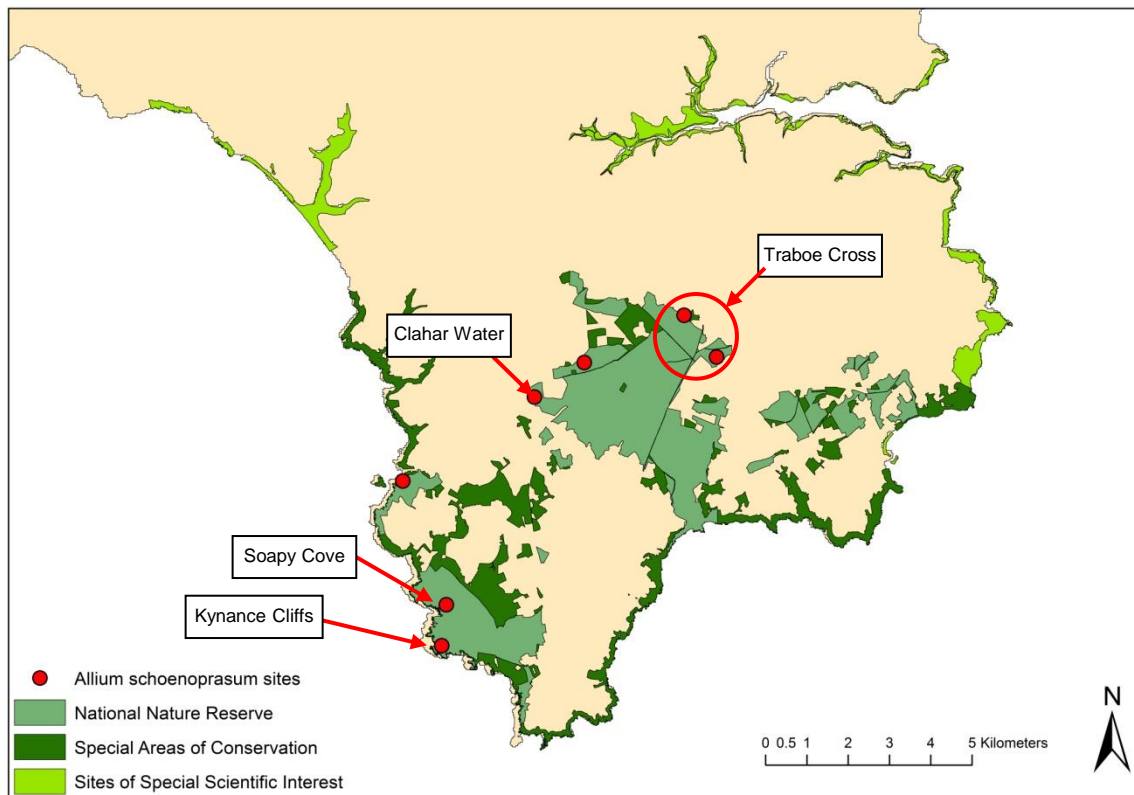


Genetic assessment outcome:

- As much genetic diversity on Lizard as in southwest
- Genetic diversity on the Lizard distinct from southwest
- Lizard is a suitable site for the first UK CWR genetic reserve

Genetic assessment of CWR on the Lizard

Management implications – Wild chives



- Inland and coastal sites
- Cattle grazing
- Controlled burning of heath
- Routine monitoring

Genetic assessment of CWR on the Lizard

First UK genetic reserve

- Part of a network across UK
- Set of minimum standards



Wild garlic, *Allium ursinum*

- The Lizard to be the first in the network
- A model for future sites

Future Research

- Establish a genetic reserve network across UK (Purbeck next?)
- Ensure genetic diversity stored *ex situ* for CWR in genetic reserves
- Model future climate change to inform and adjust CWR management plans



Wild chives, *Allium schoenoprasum*

Thank you for listening



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