Genetic rescue of *Cicerbita alpina*

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LEADING IDEAS FOR BETTER LIVES

Cicerbita alpina – Alpine blue sow-thistle

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- At brink of extinction in the UK
- Categorised Vulnerable in Red Data List for Great Britain
- Protected under the Wildlife and Countryside Act 1981
- A priority species in the Scottish Biodiversity Route map to 2020
- Included in the Cairngorms Nature Action Plan
- Threatened by grazing, landslides, climate change

Flagship for species recovery through changed land management

Cicerbita alpina – Alpine blue sow-thistle

Corrie Kander

Why no reproduction?

- Overgrazing?
- Lack of pollinators?
- At edge of distribution range?
- Climate change?
- Genetic problems?

Lochnagar

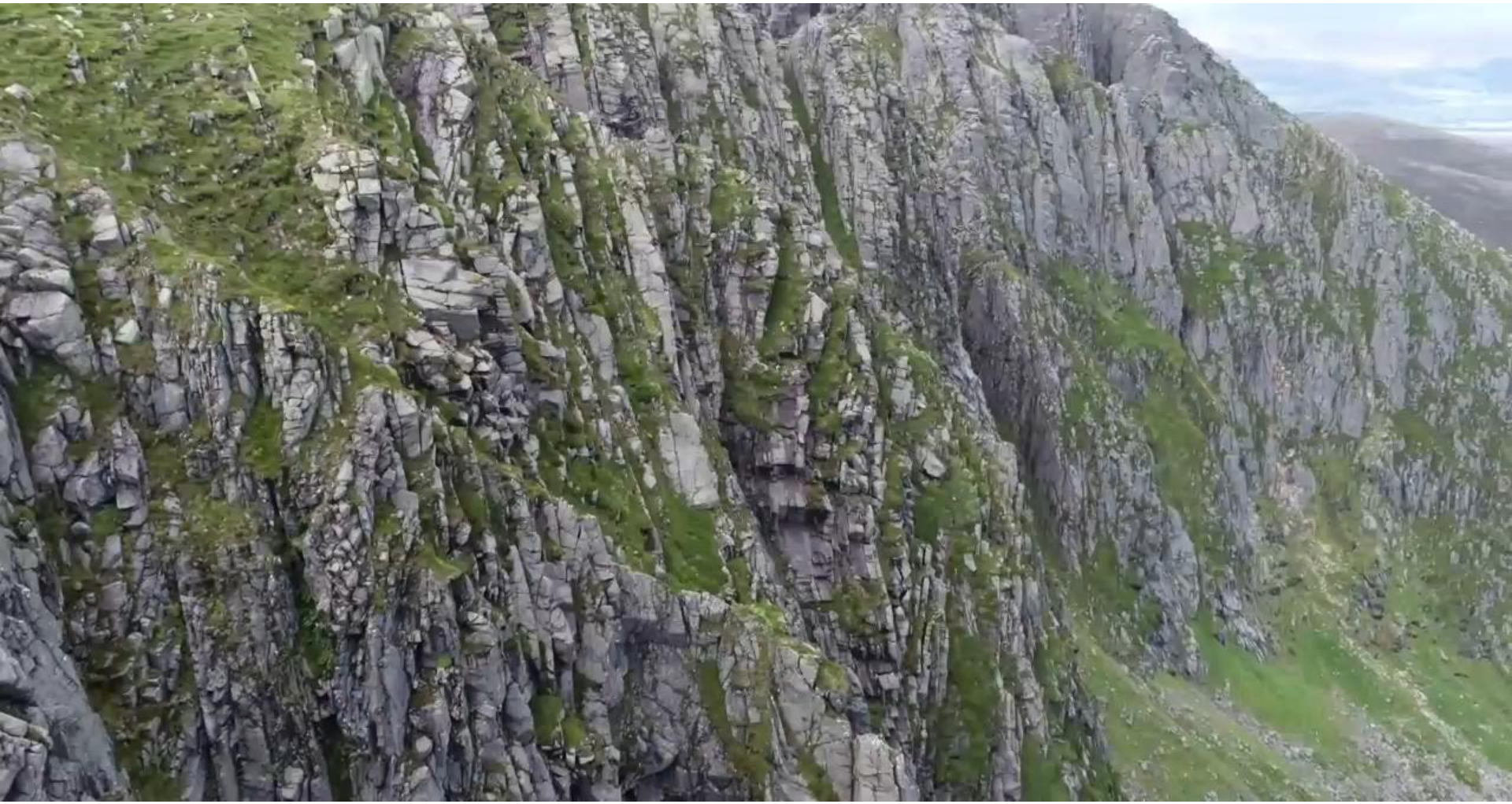
Caenlochan

Corrie Fee

Cicerbita alpina – Alpine blue sow-thistle

Data collection

Counts / monitoring; Collect plants for *ex-situ* collections; Collect leaves for genetic analyses



Cicerbita … thistle

Conservation Genetics

Cicerbita alpina in Norway

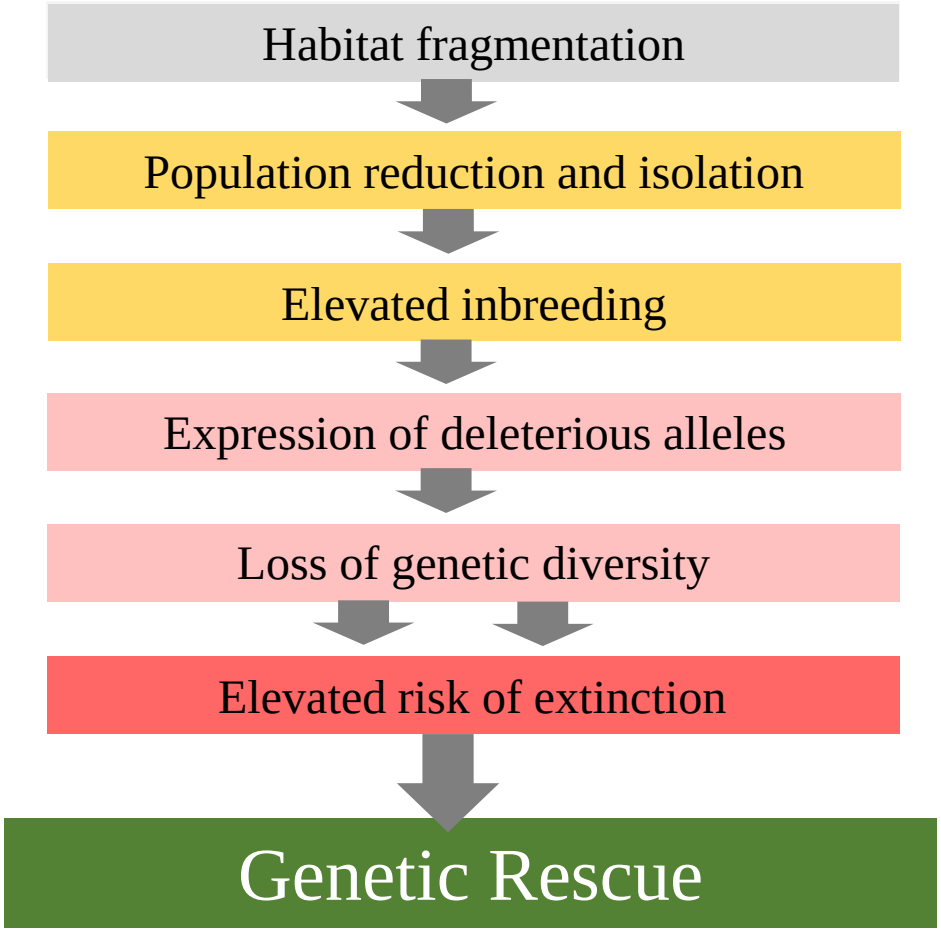
Dr Duncan Halley

Cicerbita alpina in Scotland

Genetic Rescue

"Increase in fitness of small populations resulting from the alleviation of inbreeding depression by immigrants"

Thrall et al. (1998)



Cicerbita alpina – Alpine blue sow-thistle

Corrie Kander ≥ 12 plants

Genetic Data

High Relatedness between individuals

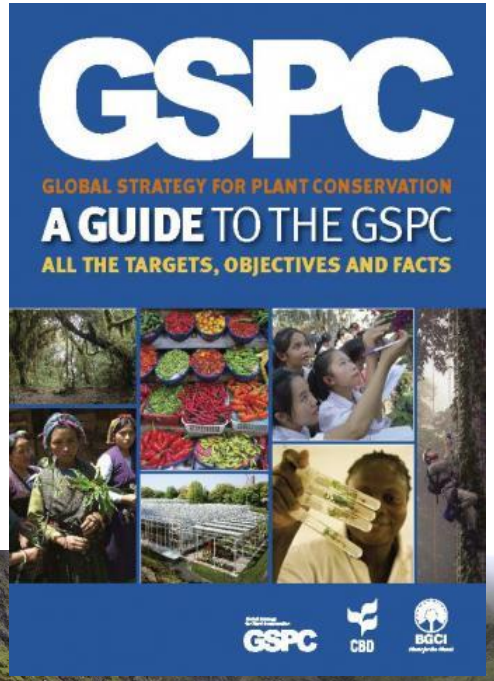
Lochnagar
≥ 14 plants

Caenlochan ≥ 11 plants

Corrie Fee ≥ 19 plants

Cicerbita alpina – Alpine blue sow-thistle

Target 8 of the **Global Strategy for Plant Conservation** aims to ensure that 75% of threatened plants are protected in cultivation, and at least 20 % are available for recovery and restoration by 2020.



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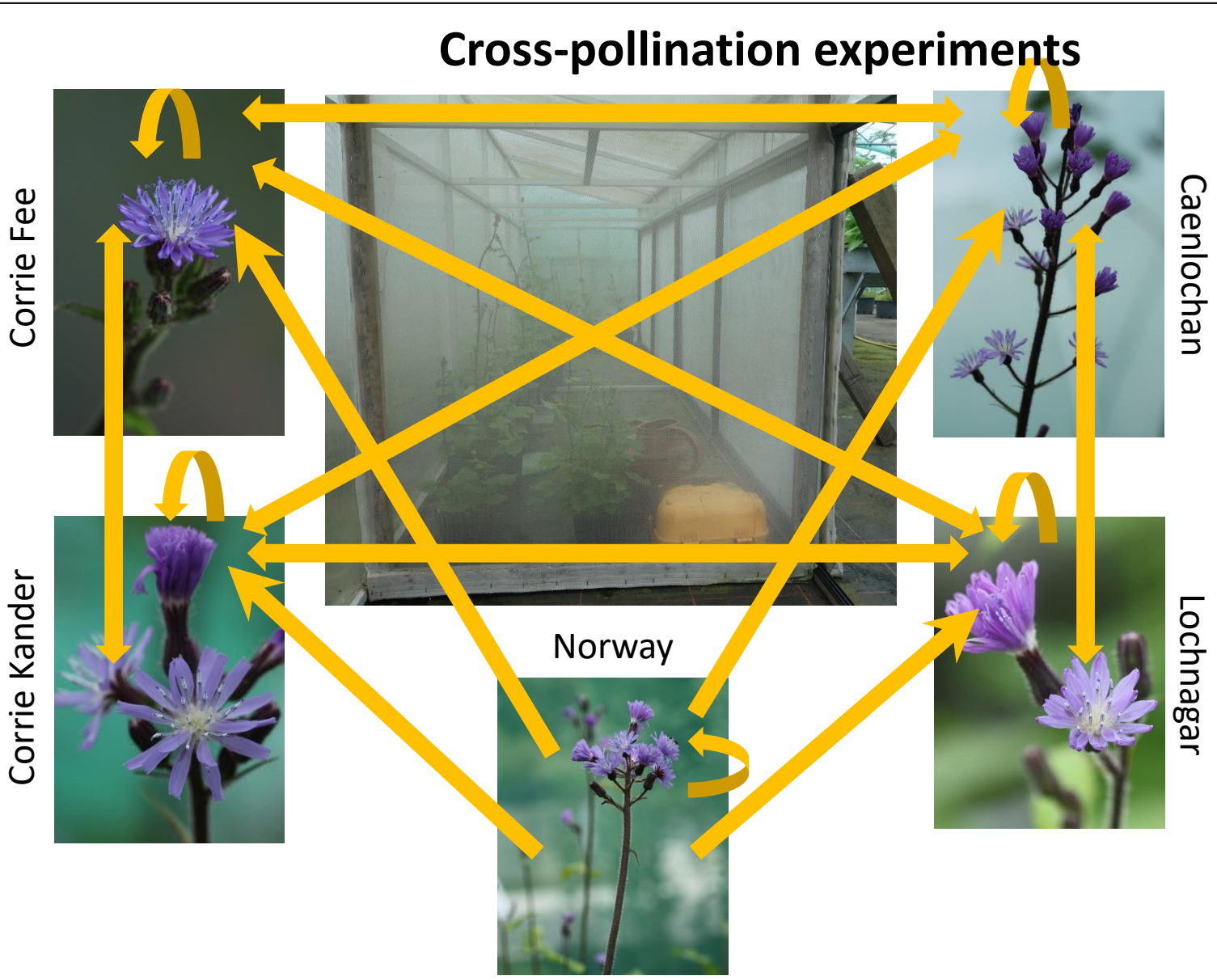

Cicerbita alpina – Ex-situ conservation

2017 + 2018 cross pollination experiments, PRELIMINARY results:

375 seedlings in total

- Crosses between populations
  Leaf area size: 1671 cm
  87% survival after 2 years
  12% flowering in 1st year
- Crosses within populations
  Leaf area size: 1026 cm
  90% survival after 2 years
  0% flowering in 1st year
- Selfing
  Leaf area size: 746 cm
  69% survival after 2 years
  0% flowering in 1st year

→ Crossing between populations increases plant size, survival, time to maturation
→ Whether that results in fitter plants needs to be tested in translocation experiment

Cicerbita alpina – Alpine blue sow-thistle

2017 Conservation Translocations

1. Morrone Birkwood

2. Mar Lodge

3. Corrie Fee

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Corrie Fee 2018, year 1

Corrie Fee 2020, year 3

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Morrone Birkwood and Mar Lodge, year 1 + 2

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Monitoring results 2018 - 2020

Site	Survival year 1	Survival year 2	Survival year 3
Corrie Fee (high alt)	60%	51%	43%
Mar Lodge (low alt)	48%	65% (Vole cages)	43%
Morrone Birkwood (low alt)	35%	21%	6%

- Limited success rates
- High altitude site Corrie Fee has the healthiest and fittest looking plants
- Grazing is problematic at high and low altitudes
- Poor micro-siting at Morrone Birkwood results in translocation failure
- All this information will be useful for larger-scale translocation project in 2021

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In a nutshell

Genetics

- Scottish sites highly inbred & low genetic diversity
- Less than 100 individuals remain
- Cross-pollinations increase, plant size, survival, time to maturation

Translocations

- Grazing has the most imminent impact on plants
- Additional fencing or caging is needed
- Correct micro-siting is very important
- Plants at higher altitude sites seem to grow best (low competition and protective gullies)

Conclusion

- Following long-term isolation, inbreeding has a negative impact on reproduction
- Vital to increase diversity in populations to allow best chances of long-term survival → conservation translocations
- The case of *C. alpina* represents a wider conservation issue that many other species are facing in the UK

Thank You

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