Saving Scotland’s rare species using palaeoecology

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Looking forward through the past: identification of 50 priority research questions in palaeoecology

9. How can palaeoecological data be used to inform ecosystem restoration, species recovery and reintroductions?

- Indirect reconstruction of habitat decline
- Direct reconstruction of target species

Indirect (habitat) reconstruction

- **Common Scoter** *Melanitta nigra*

Population decline known, no evidence for habitat decline.

Direct (species) reconstruction

- **Slender Naiad** *Najas flexilis*

Habitat degradation/loss observed, no evidence that it was the cause of species loss.
Common Scoter

- Diving seaduck
- Breeds at oligotrophic freshwaters
- Large declines in British breeding population since ca. 1980s
- UK population is red listed
- BAP Priority Species
Common Scoter population decline

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No. Pairs Scotland</th>
<th>Total number of pairs Flow Country (FC)</th>
<th>Proportion of population in FC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>95</td>
<td>35</td>
<td>37%</td>
</tr>
<tr>
<td>2007</td>
<td>52</td>
<td>26</td>
<td>50%</td>
</tr>
</tbody>
</table>

Q: Is Common Scoter breeding habitat being lost?
Flow country habitat changes

- Increased sediment accumulation rates
- Increased abundance invertebrates
- Increases in nutrient tolerant taxa
Flow country habitat changes

A

B

C

D
Slender Naiad

N. flexilis status
- Red: Absent
- Green: Present
- Black: Unknown

Map showing the distribution of N. flexilis from 1900 to 1950.
Slender Naiad habitat decline

**Dunkeld-Blairgowrie Lochs, Perthshire**
- Diffuse agricultural nutrient input
- Sewage discharge from SWT visitor centre (mid 1990s)
- *N. flexilis* recorded on ~10 occasions 1879 – 2007

**Esthwaite Water, Cumbria**
- Diffuse agricultural nutrient input
- Sewage treatment works (1973 – present)
- Fish farm (removed 2009)
- *N. flexilis* recorded ~15 times 1914 - 1982

Q: Is Slender Naiad loss related to observed environmental degradation?
Where now?

• **We know how to save our rare species**
  - Common Scoter
    • Reforestation of catchments/nutrient buffer zones
  - Slender Naiad
    • Identification of key sites (i.e. mesotrophic)
    • Reduce nutrient inputs to these sites

• **We have shown that palaeoecology can be applied to species recovery**

• **Now is the time to adopt palaeoecological approaches more widely**
Got questions?

**Team Scoter**

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