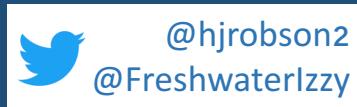




Saving Scotland's rare species using palaeoecology

Izzy Bishop
Hannah Robson



Saving wetlands
for wildlife & people



Palaeoecology and rare species



@hjrobson2
@Freshwaterlzzy

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doi: 10.1111/1365-2745.12195

Looking forward through the past: identification of 50 priority research questions in palaeoecology Seddon *et. al.*

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

Birks, H. J. B. 1996. Journal of Vegetation Science 7, 89 – 98.

Rare species in Scotland

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



Photo: Anja Cervencl

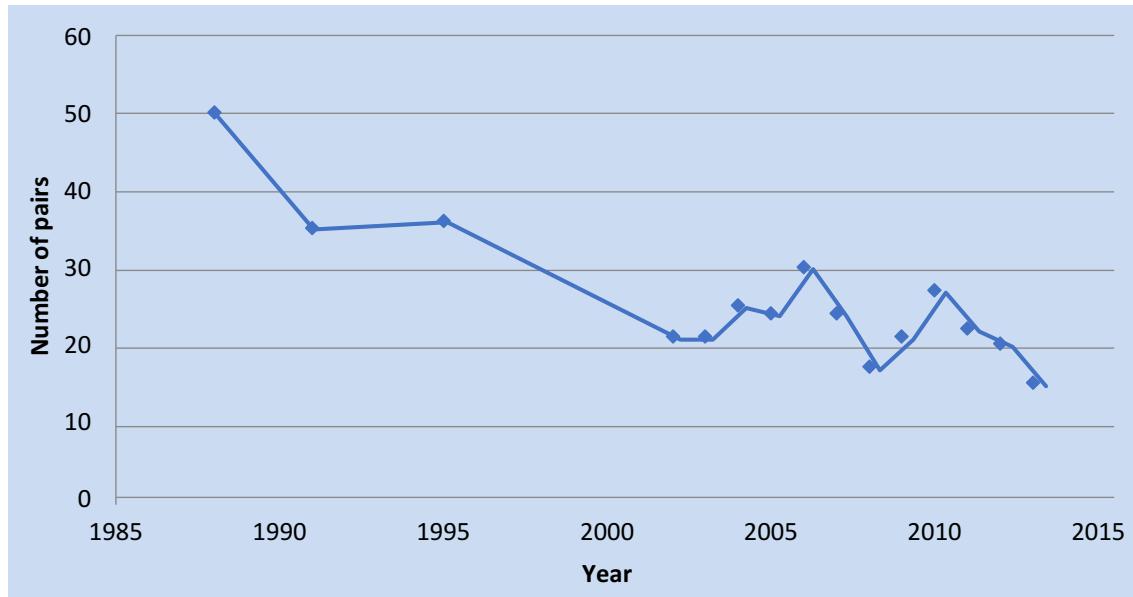
- Diving seaduck
- Breeds at oligotrophic freshwaters
- Large declines in British breeding population since ca. 1980s
- UK population is red listed
- BAP Priority Species

Common Scoter population decline



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Year	Total No. Pairs Scotland	Total number of pairs Flow Country (FC)	Proportion of population in FC
1995	95	35	37%
2007	52	26	50%

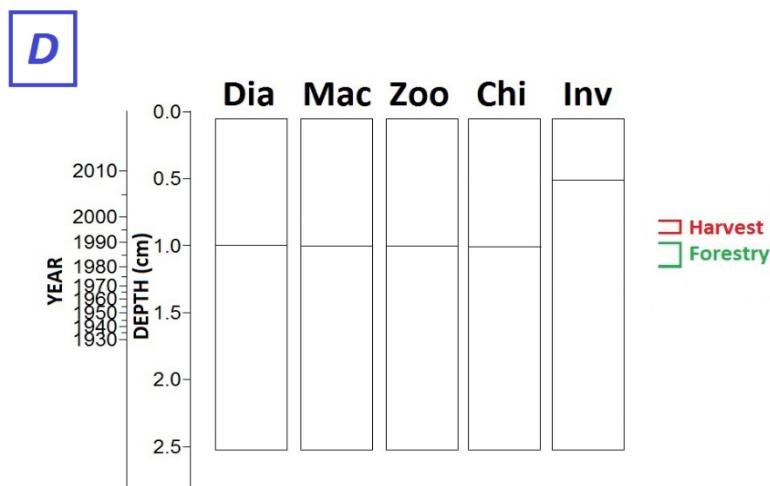
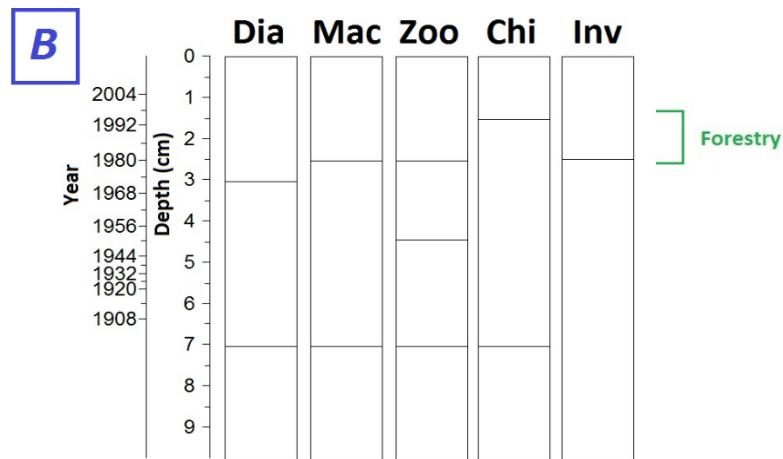
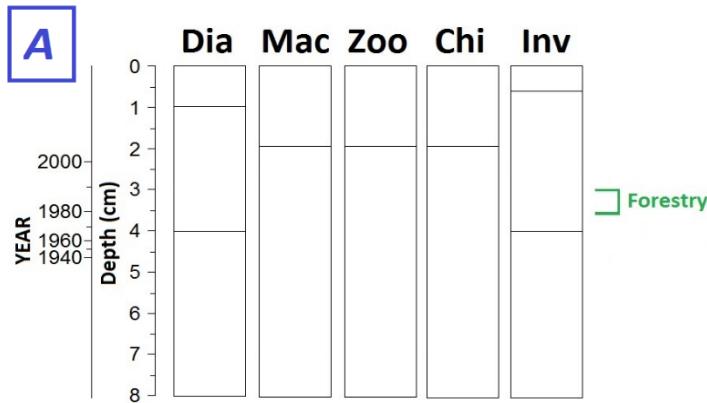
Q: Is Common Scoter breeding habitat being lost?

Flow country habitat changes



- Increased sediment accumulation rates
- Increased abundance invertebrates
- Increases in nutrient tolerant taxa

Flow country habitat changes



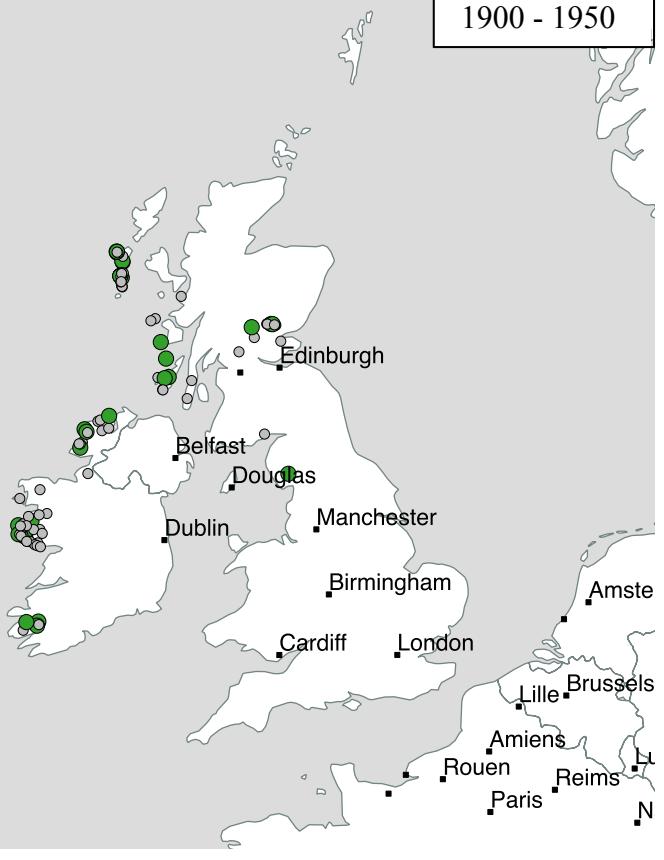
Slender Naiad



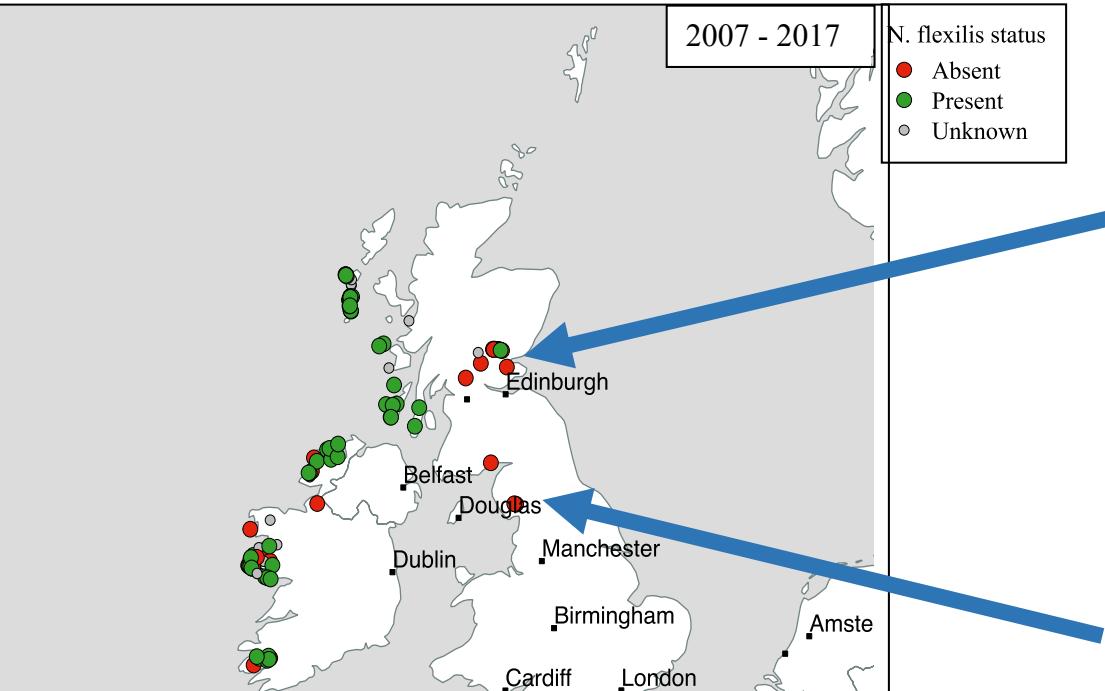
N. flexilis status

- Absent
- Present
- Unknown

1900 - 1950



Slender Naiad habitat decline



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

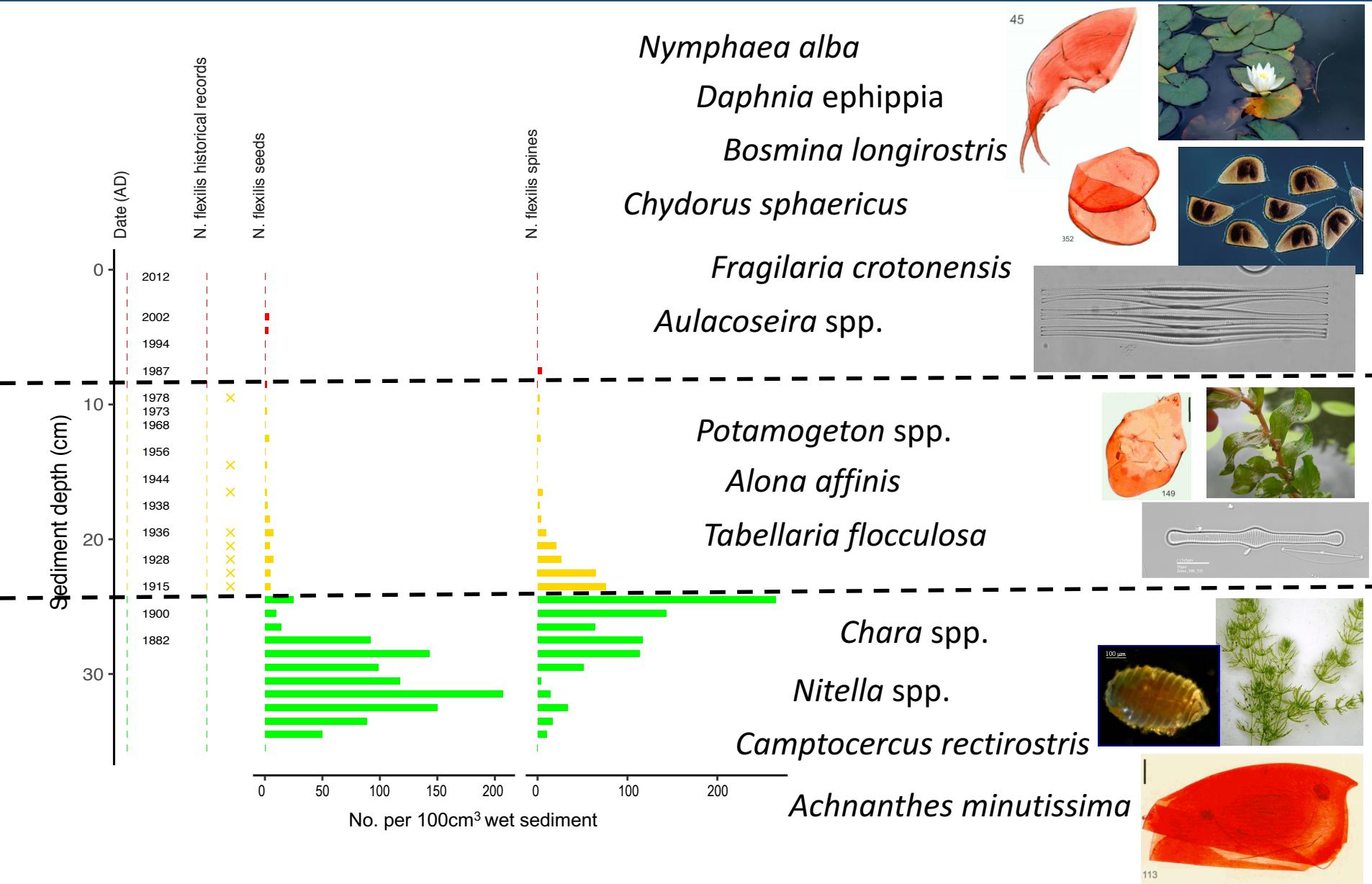
Dunkeld-Blairgowrie Lochs, Perthshire

- Diffuse agricultural nutrient input
- Sewage discharge from SWT visitor centre (mid 1990s)
- Butterstone Trout Fishery (1981 – 2004)
- N. flexilis* recorded on ~10 occasions 1879 – 2007

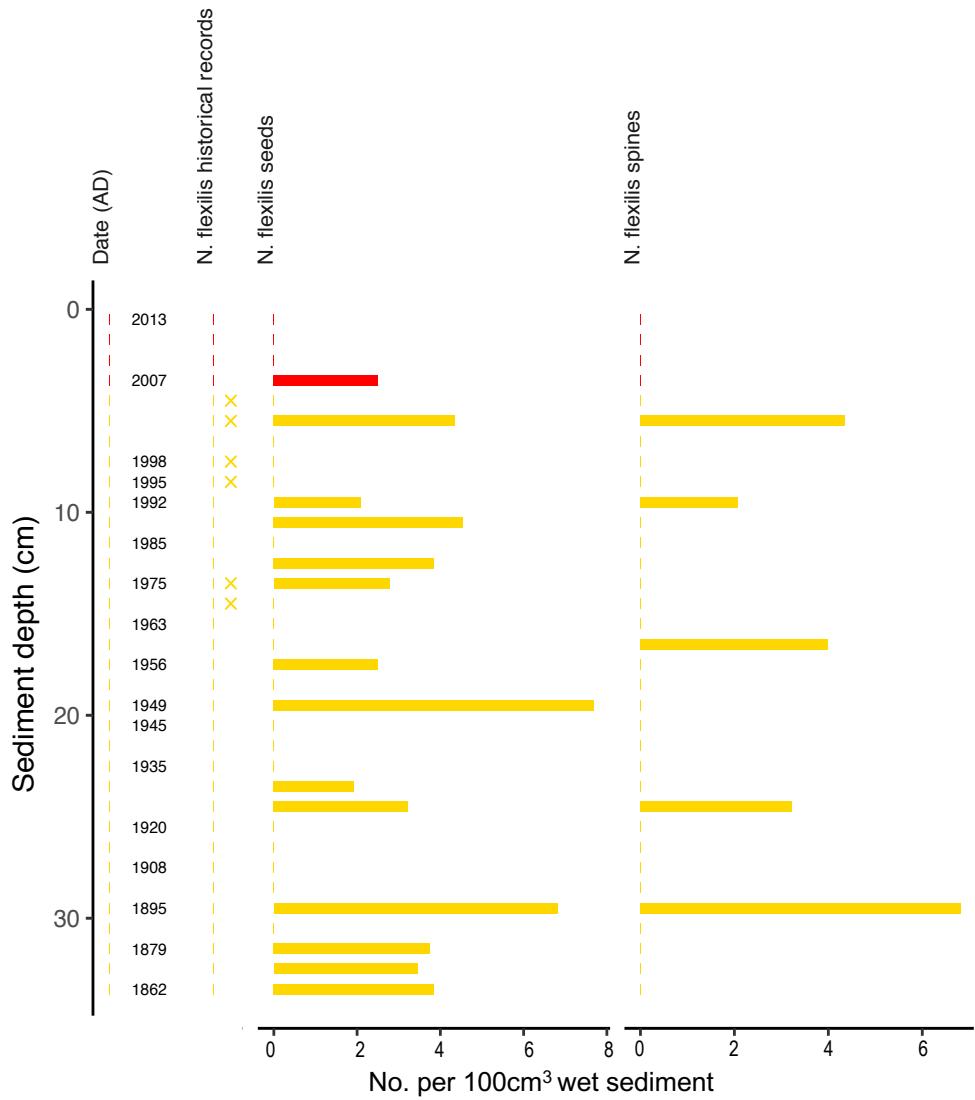
Esthwaite Water, Cumbria

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

Esthwaite Water

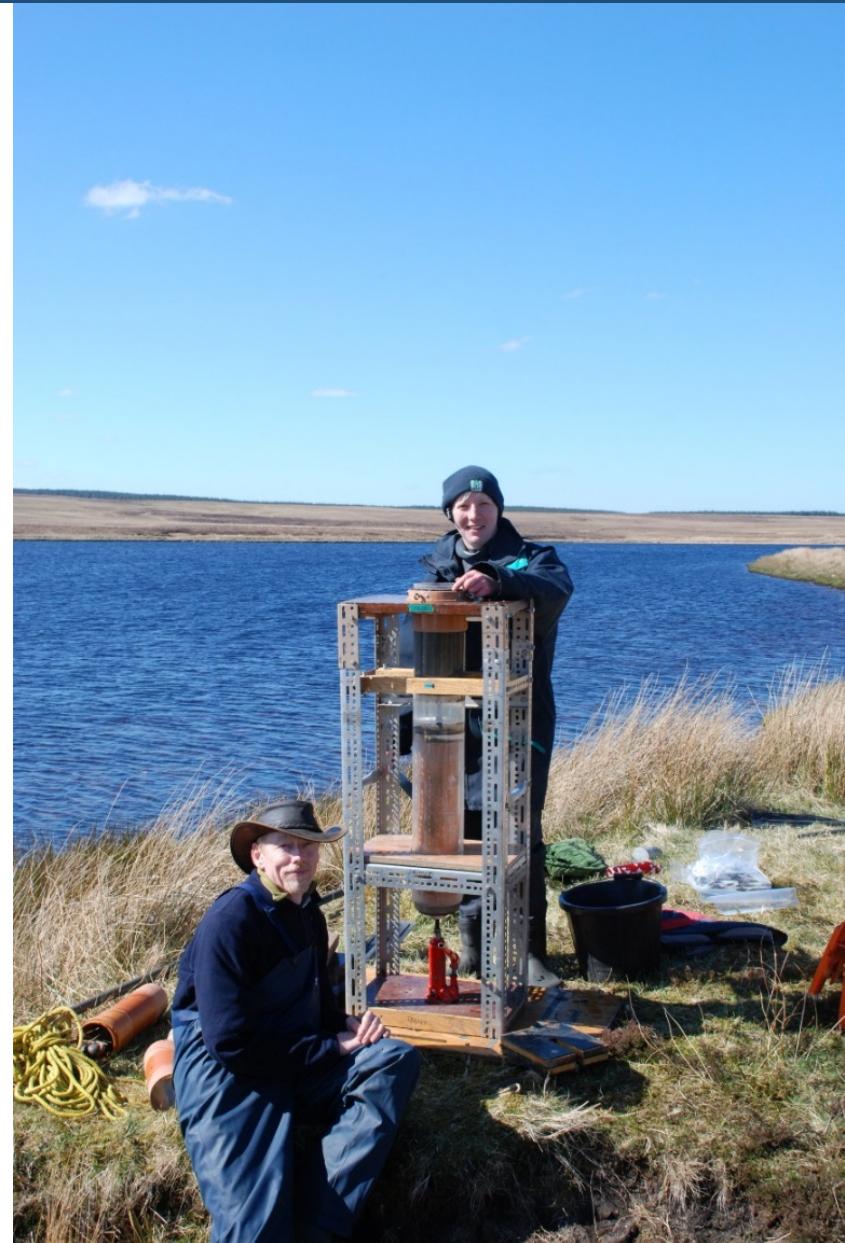


Dunkeld-Blairgowrie Lochs



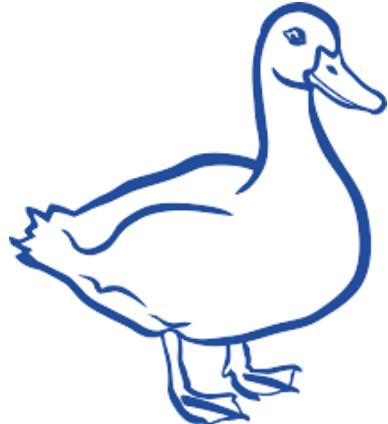
Where now?

- 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

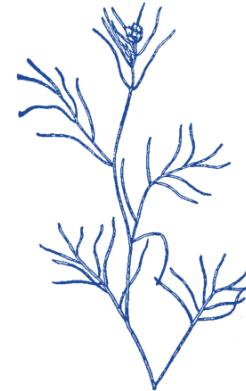


Hannah Robson (UCL/WWT)
hannah.robson@wwt.org.uk

 @hjrobson2

Viv Jones (UCL), Geoff Hilton (WWT), Steve Brooks (NHM), Carl Sayer (UCL), and Andrew Douse (SNH)

Team Naiad



Izzy Bishop (UCL)
i.bishop.11@ucl.ac.uk

 @FreshwaterIzzy

Helen Bennion (UCL), Carl Sayer (UCL), Iain Sime (SNH)