

Algal communities of Loch Maree - indicators of a pristine loch?

Lucia Lencioni, PhD candidate

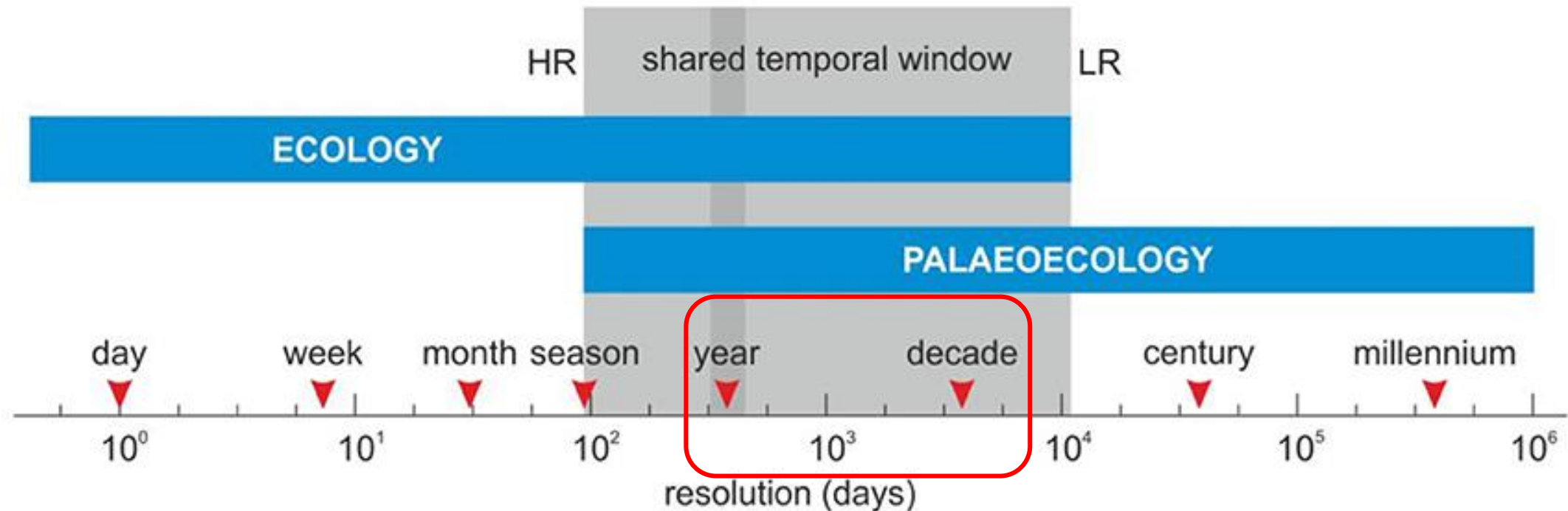
Supervisors: Helen Bennion, Carl Sayer & Nadia Solovieva



- **Background to the wider PhD project**
 - Palaeolimnology to supplement traditional monitoring
 - 17 study sites
 - Groups of study sites - large oligotrophic, shallow
- **Large oligotrophic lochs**
- **Focus on Loch Maree**
 - Previous diatom results
 - Aims at this site
- **Methods**
- **Preliminary data**
 - Pigments
 - Diatoms
- **Next steps**



The role of palaeolimnology in assessing recent responses of Scottish freshwater lochs to changes in nutrient loading and climate change



Rull, 2014

Journal of Applied Ecology

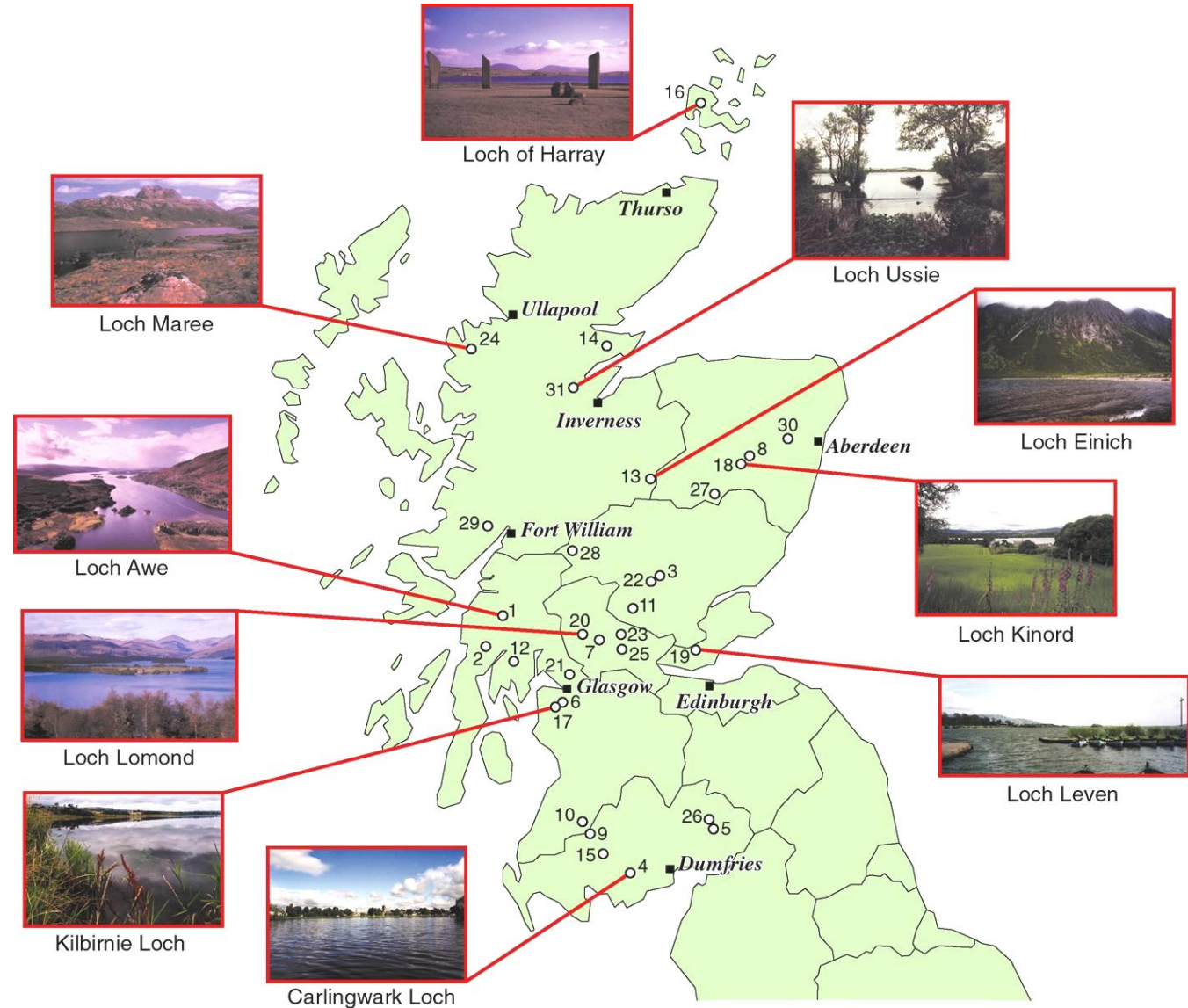
Journal of Applied Ecology 2004
41, 124–138

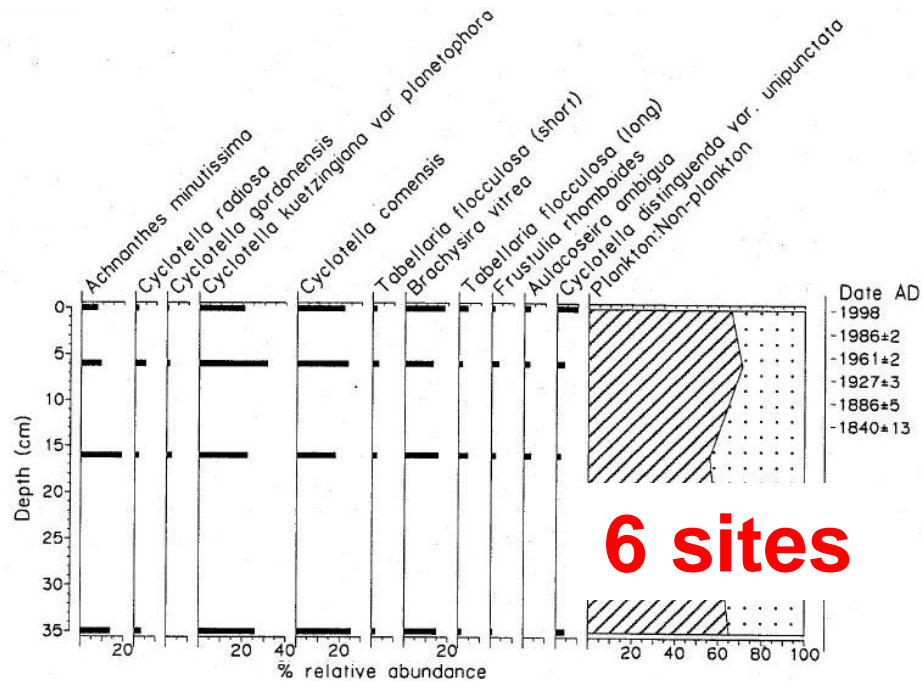
Assessing eutrophication and reference conditions for Scottish freshwater lochs using subfossil diatoms

HELEN BENNION, JENNIE FLUIN* and GAVIN L. SIMPSON

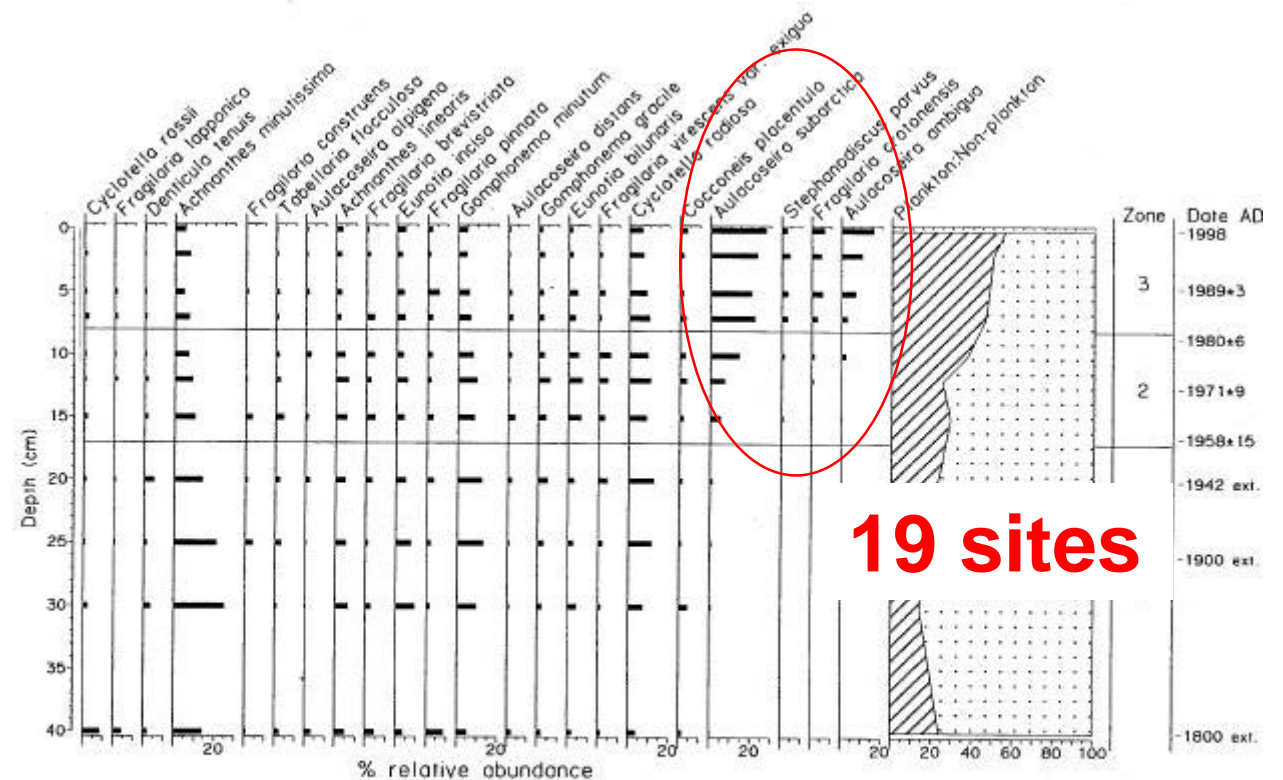
*Environmental Change Research Centre, University College London, 26 Bedford Way, London WC1H 0AI and *Geographical and Environmental Studies, University of Adelaide, Adelaide, South Australia, Australia 5005*

- 26 study sites
- Subfossil diatoms
- Radiometric dating
- 200 year study





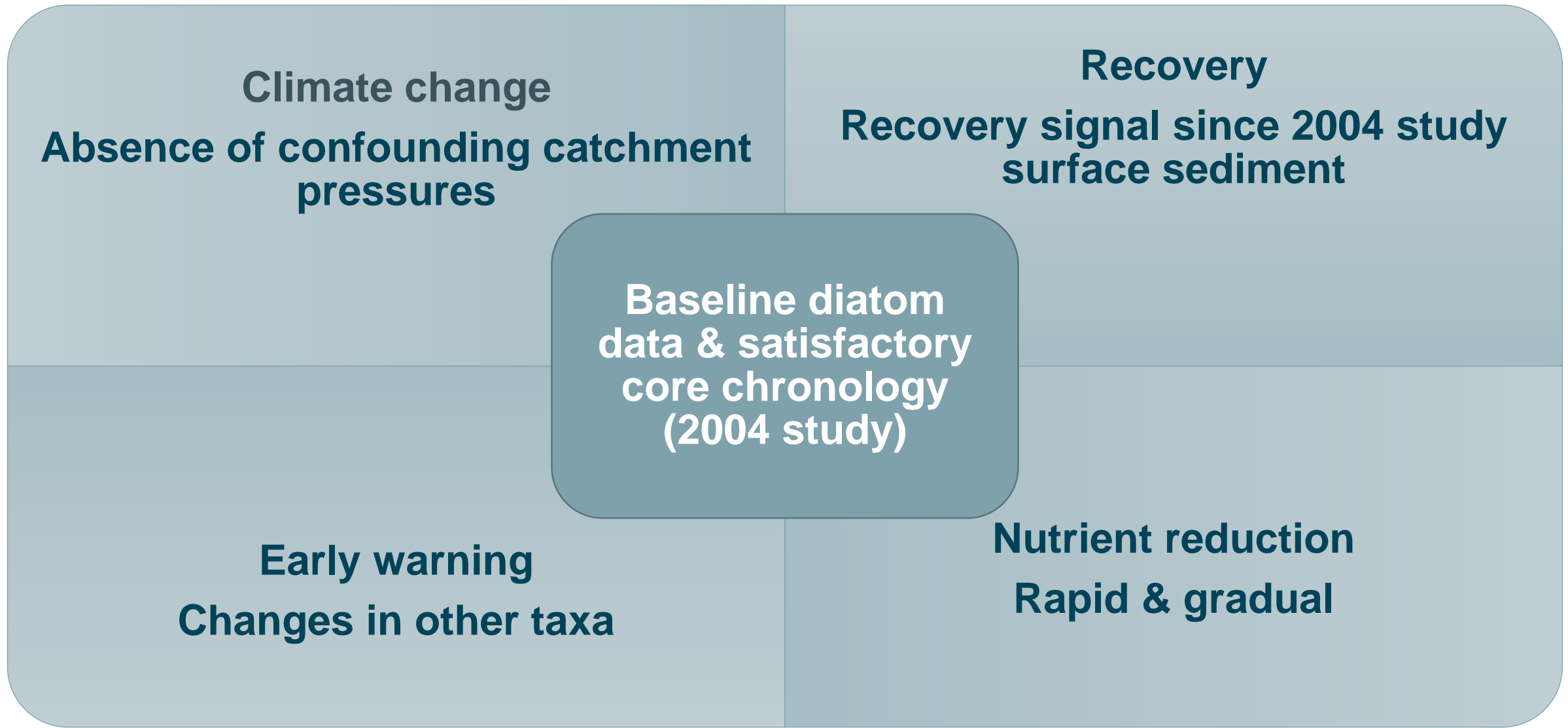
Loch Maree

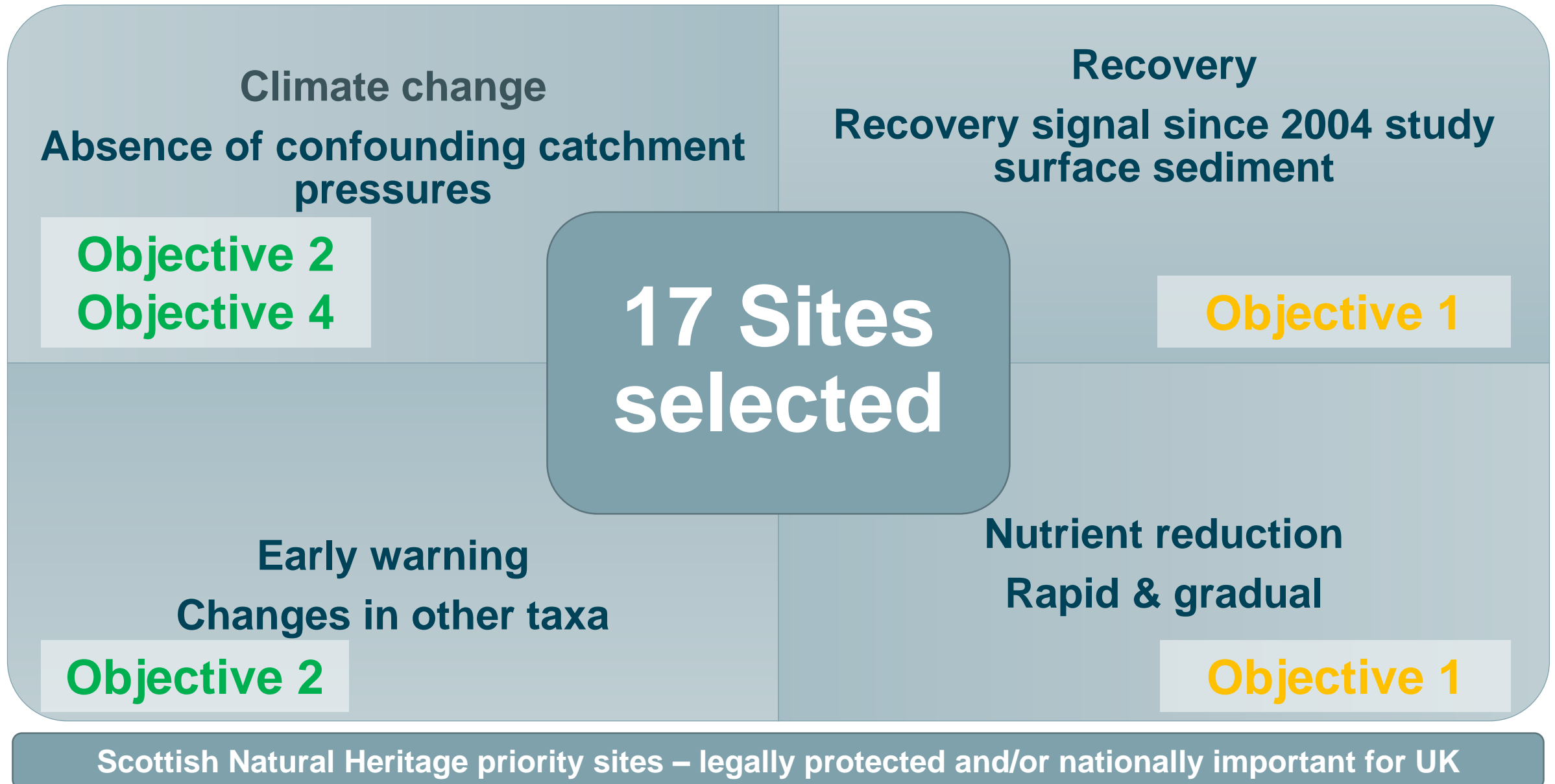


Loch of Butterstone

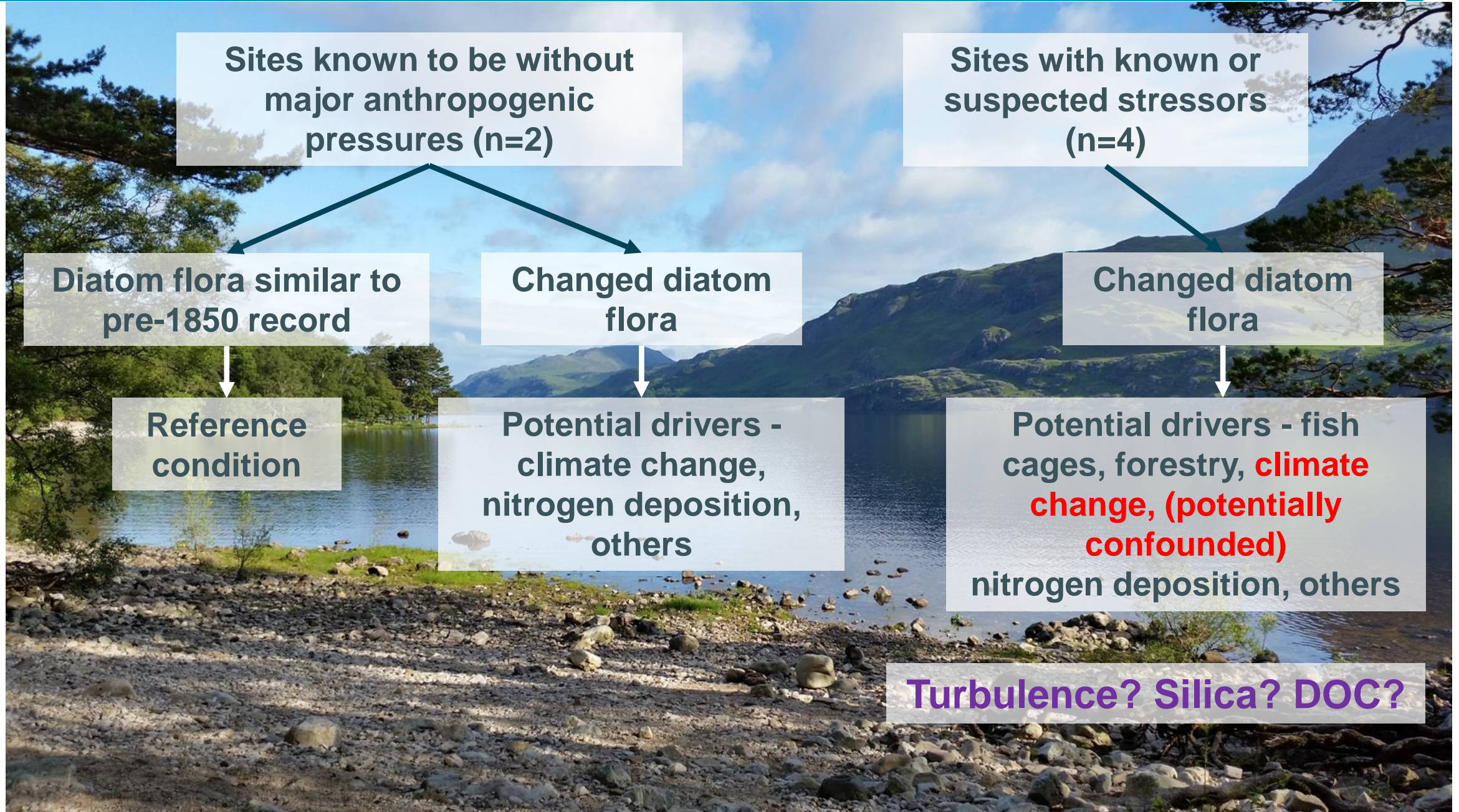
Diatom stratigraphy for Loch Maree and Loch of Butterstone (Bennion et al 2001)

- 1. Assess recovery at sites with reduced nutrient loading**
- 2. Determine whether un-impacted sites have remained so**
- 3. For lochs with signs of enrichment or novel trajectories of change determine shifts in wider ecosystem structure and function**
- 4. Detect climate-driven changes in deep oligotrophic lochs**





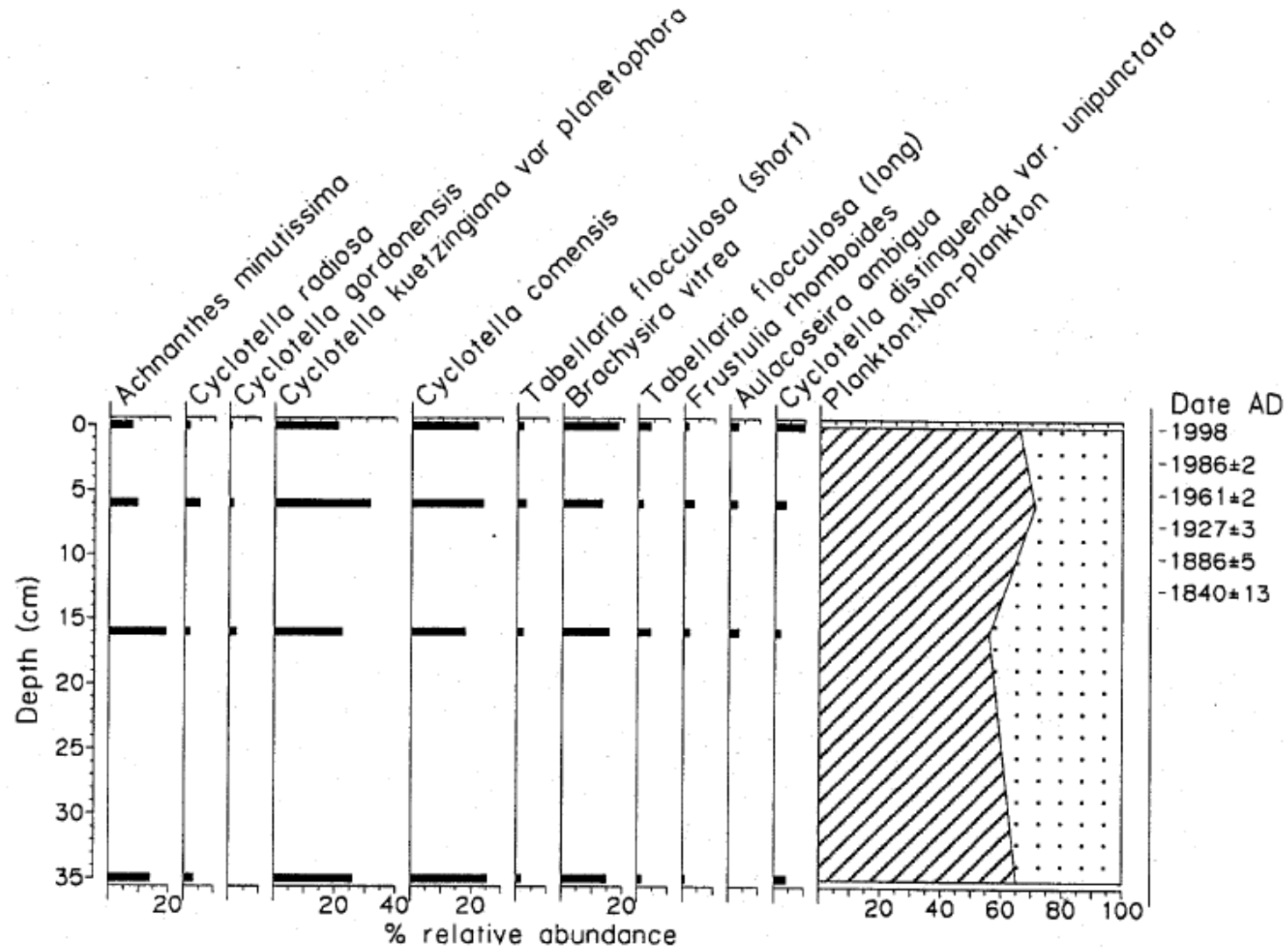
Predicted Outcomes - Deep Lochs



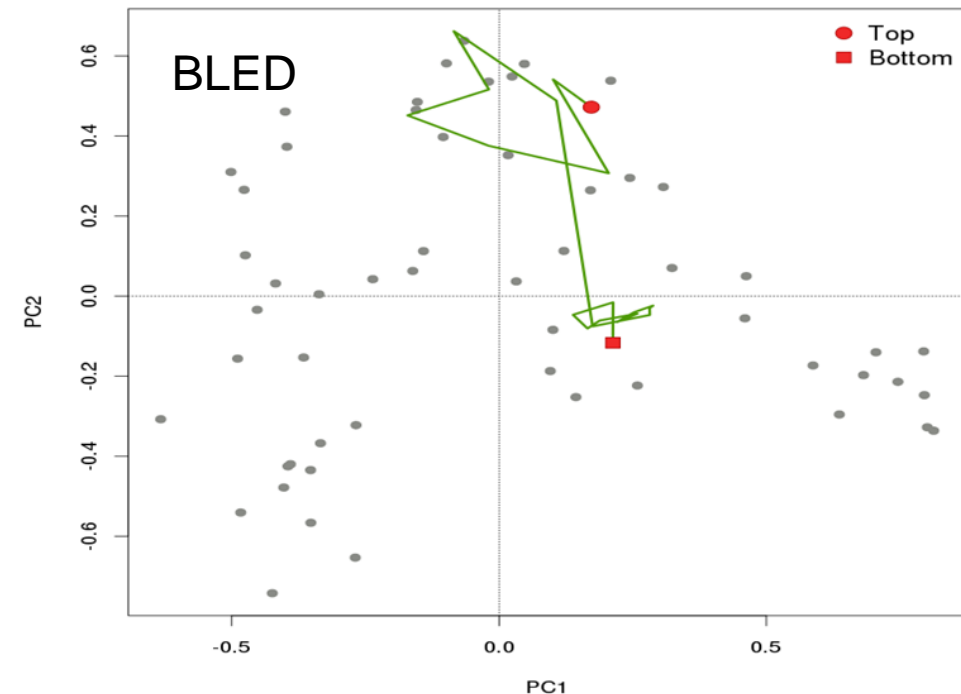
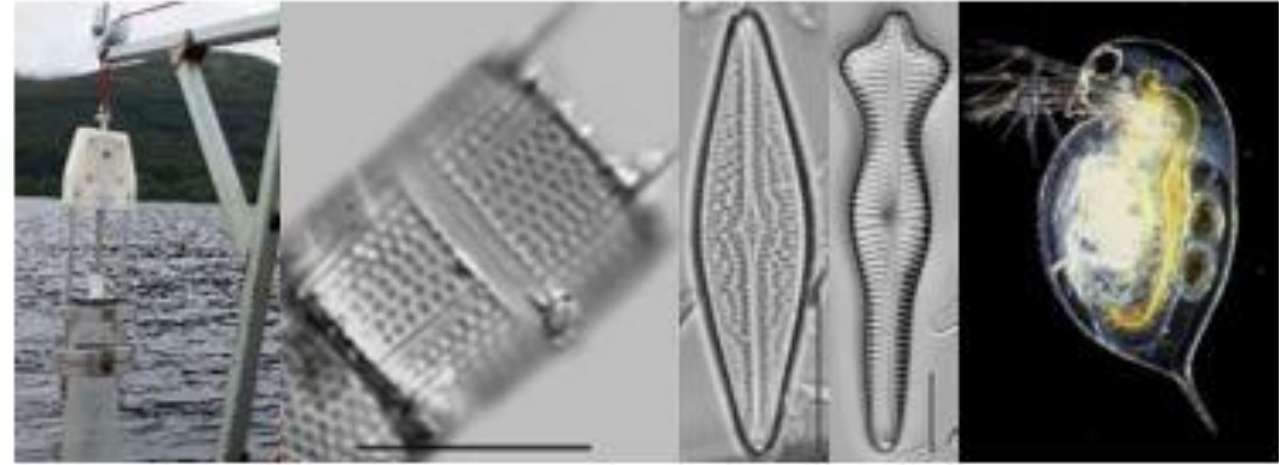
- **“Pristine” loch – SSSI, SAC, SPA, NNR**
- **Glacial origin, depth 112m**
- **Geology – Lewisian gneiss and Torridonian sandstone**
- **Aims at Loch Maree**
 - **Diatoms - 1997 versus now**
 - **Climate change - centrics**
 - **Cladocera community**

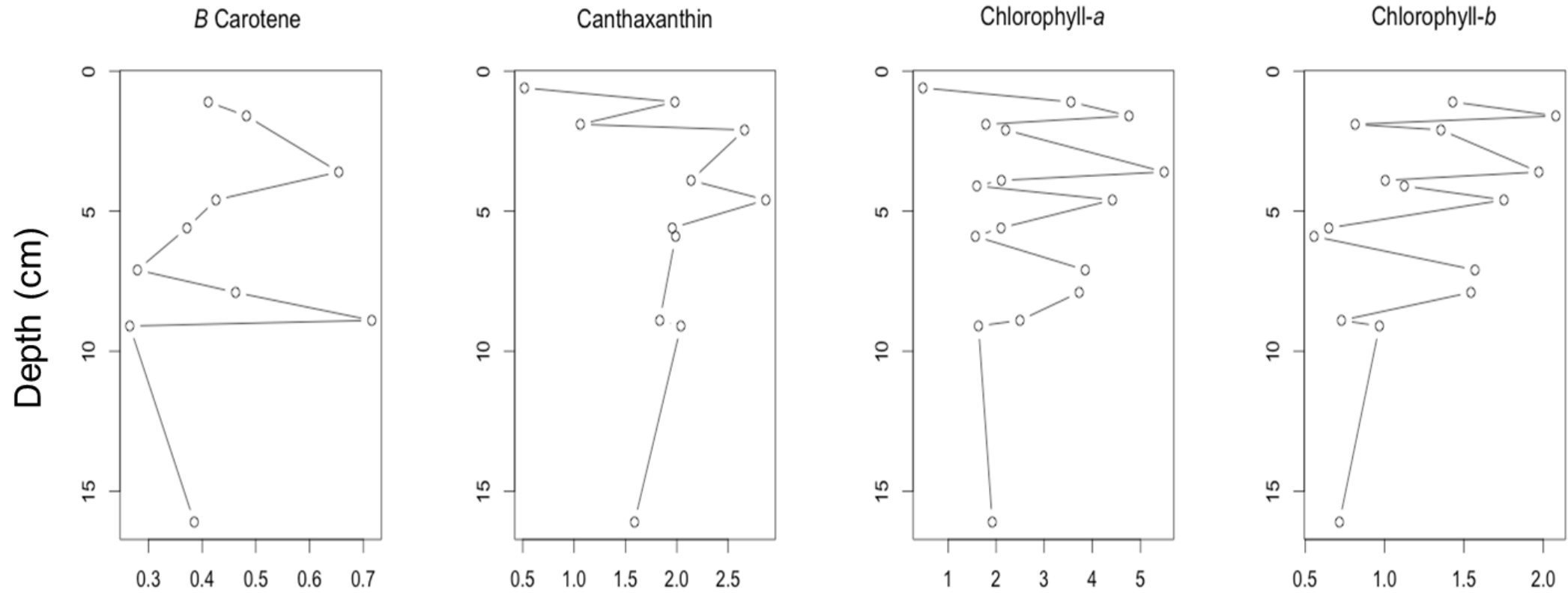


Scotland's Nature blog, 2014

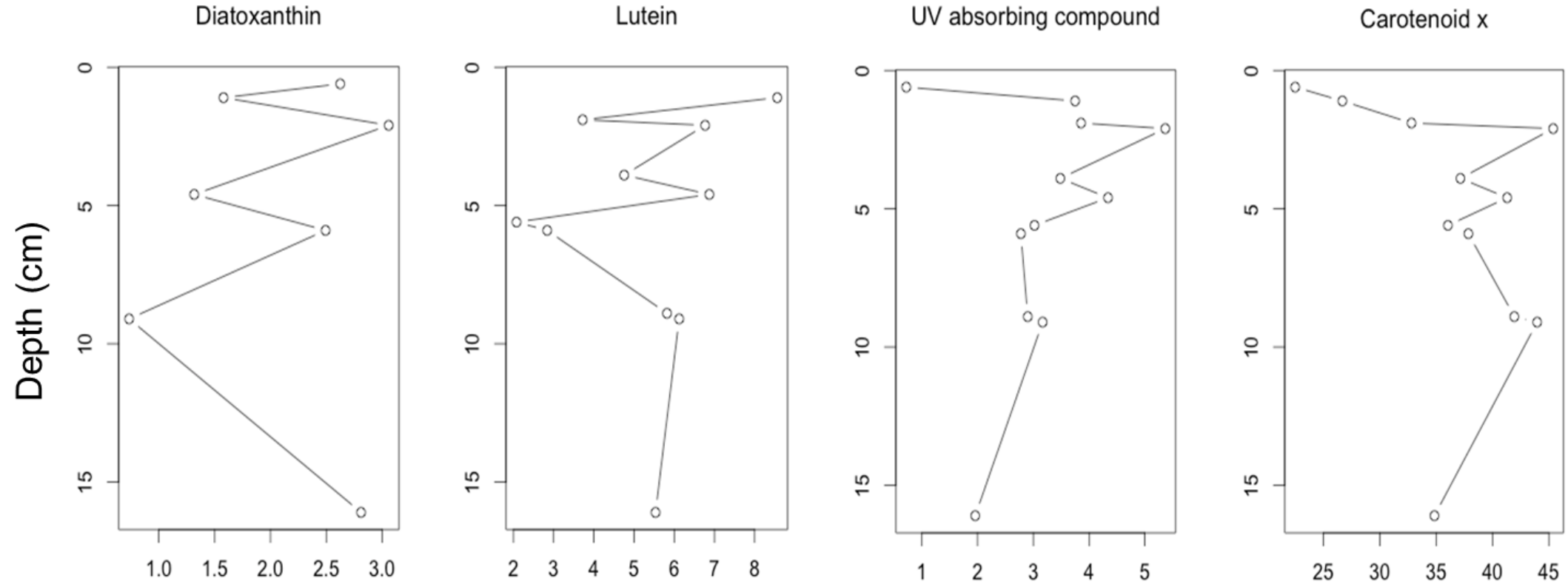


- Proxies – high resolution diatoms, pigments
- Other / future proxies - cladocera, N isotopes, others?
- Experimenting with diatom enumeration
- Diatom plankton size shifts?



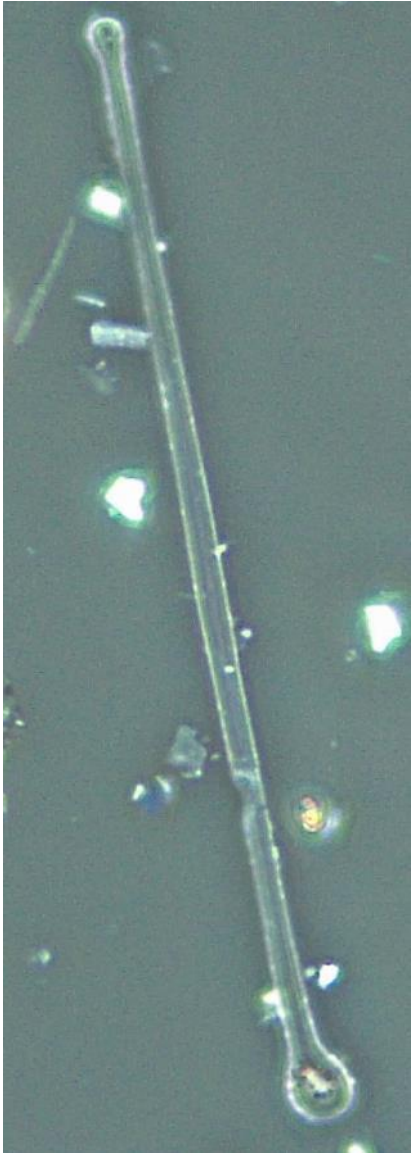
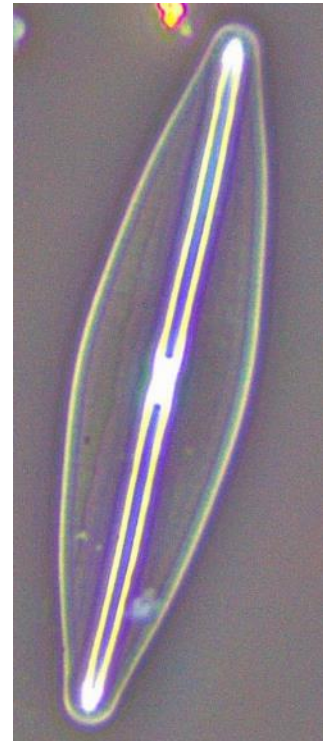
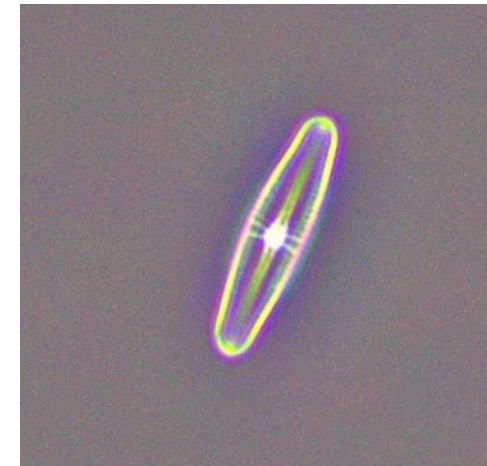
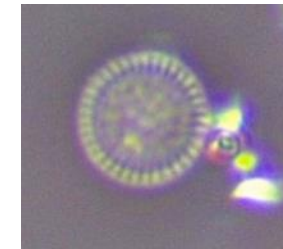
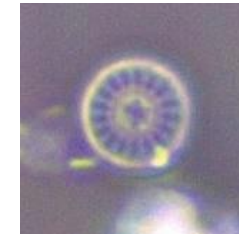
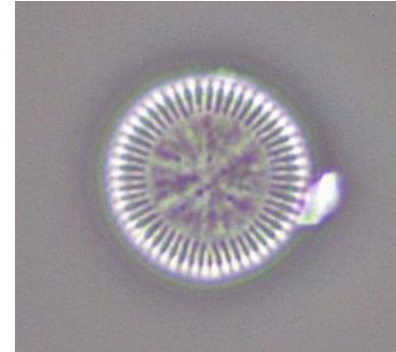


Concentration expressed as nmol of pigment g⁻¹ organic carbon



Concentration expressed as nmol of pigment g⁻¹ organic carbon

Flora still
dominated in
surface levels by
Cyclotella species
– reasonably rare
for Scottish lochs



- **Diatom enumeration & further pigment analysis**
- **Investigation of most abundant pigment, carotenoid x?**
- **Radiometric dating**
- **Cladocera analysis in second core MARE5**
- **Data acquisition for Loch Maree**

Questions and comments?

Thank you to Helen Bennion, Carl Sayer,
Nadia Solovieva, Ian Patmore, Iain Sime,
Suzanne McGowan.

