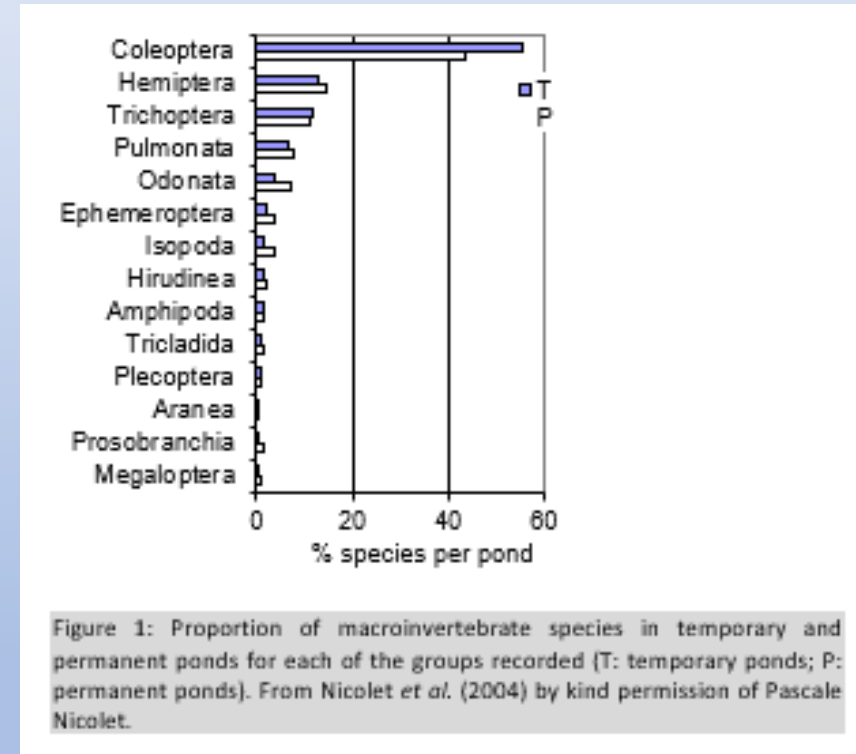


Water beetle recording in Yorkshire



Why water beetles matter

- In still water habitats, water beetles typically make up around half of the invertebrate species easily sampled by hand-netting
- Adults can be found most of the year (lower numbers in high summer/mid-winter)
- Sedentary species indicate ecological continuity



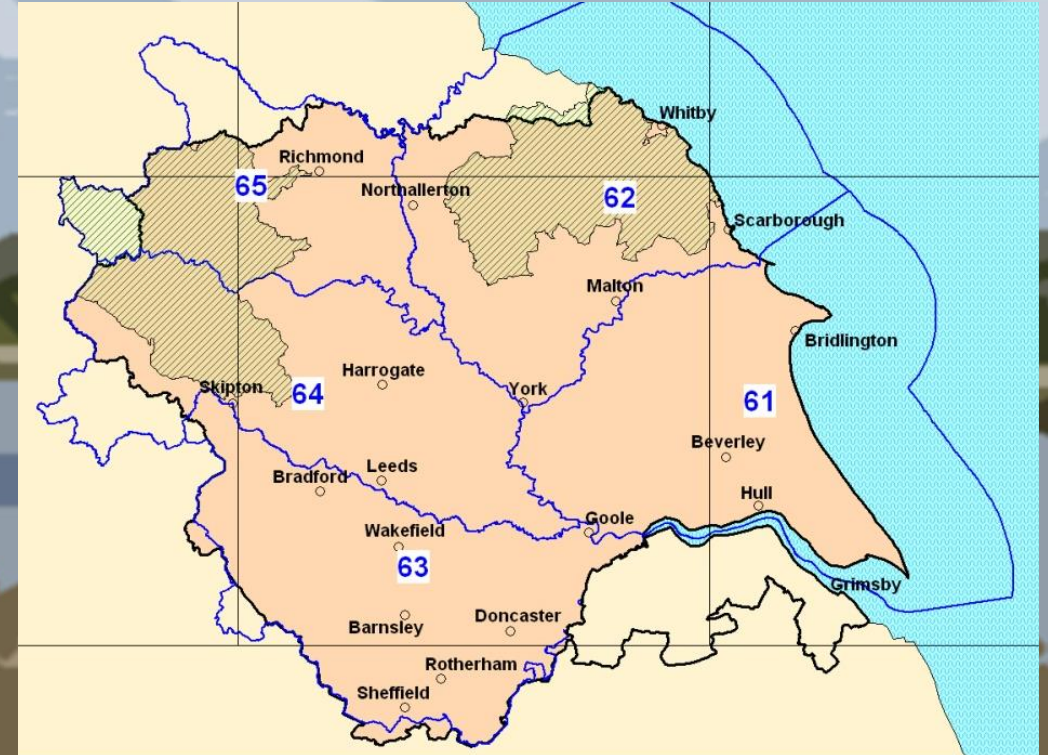
History

- 1808-1832: early lists for Hull, Marton (Middlesbrough), Askham Bog, Hebden Bridge cited in national publications and journal papers
- Diving beetles *Deronectes latus* & *Oreodytes davisii* described new to science
- Importantly, also a rich archive of subfossil data



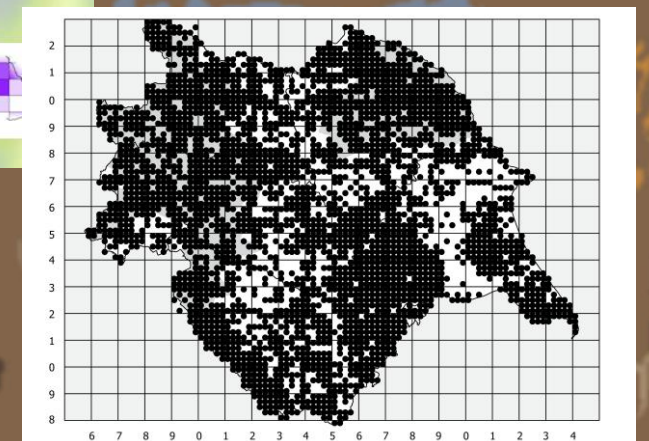
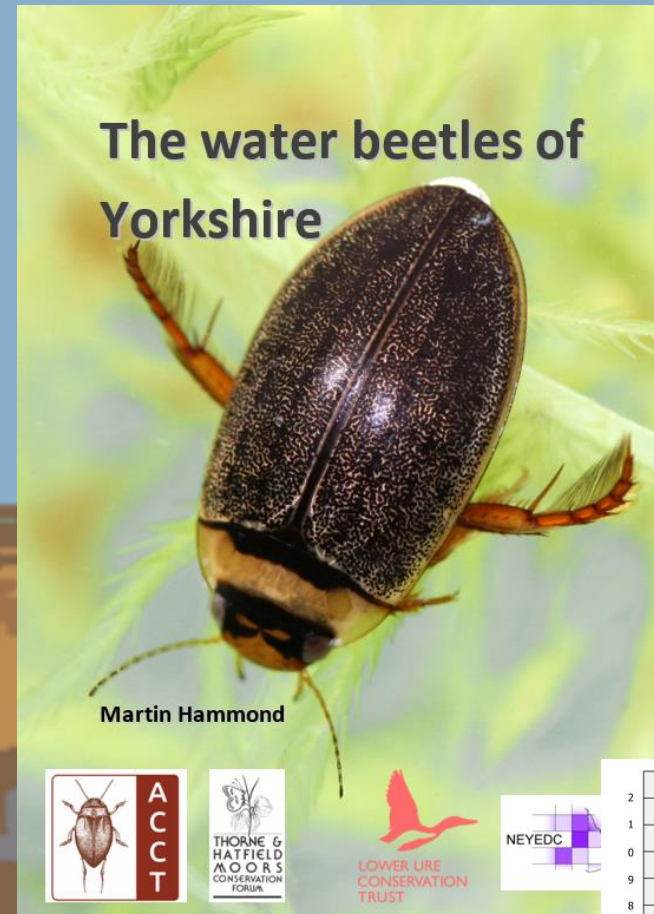
Embarking on a regional atlas

- Defining the study region: what is Yorkshire?
- Mapping scale
- Inclusion of archival records?
- Problem records
- Hard copy?



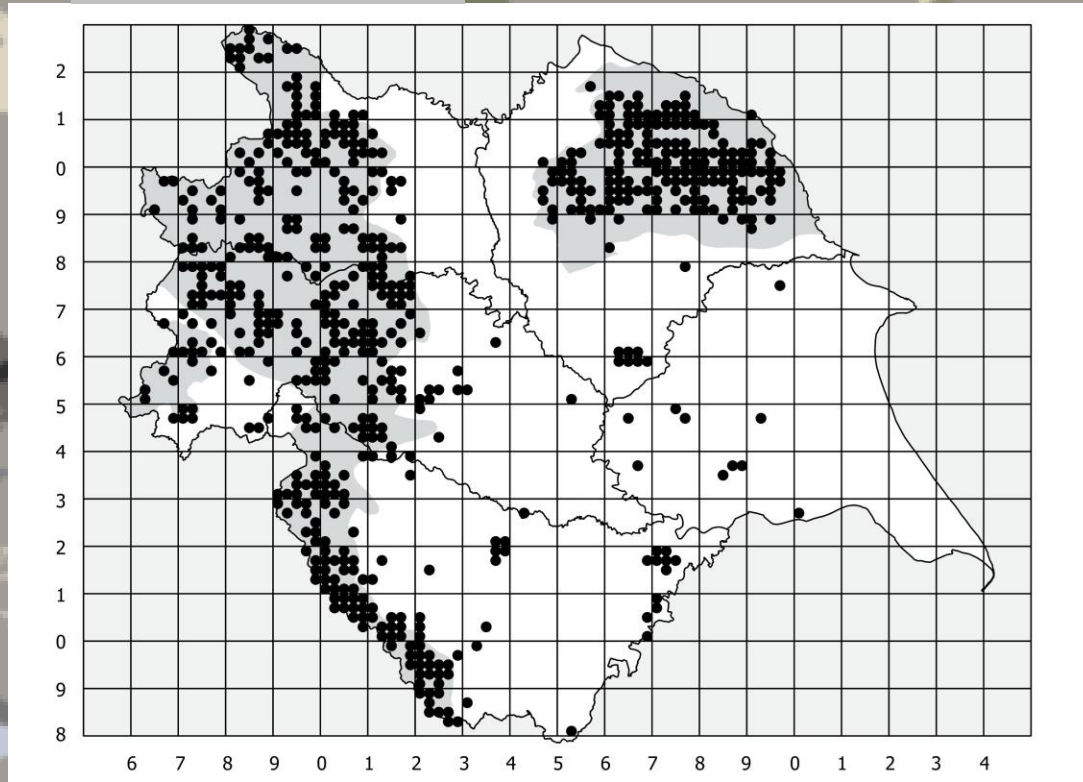
Yorkshire atlas

- Tetrads atlas published 2017, covering 2000-2016
- >62,000 records of 210 species of aquatic Coleoptera

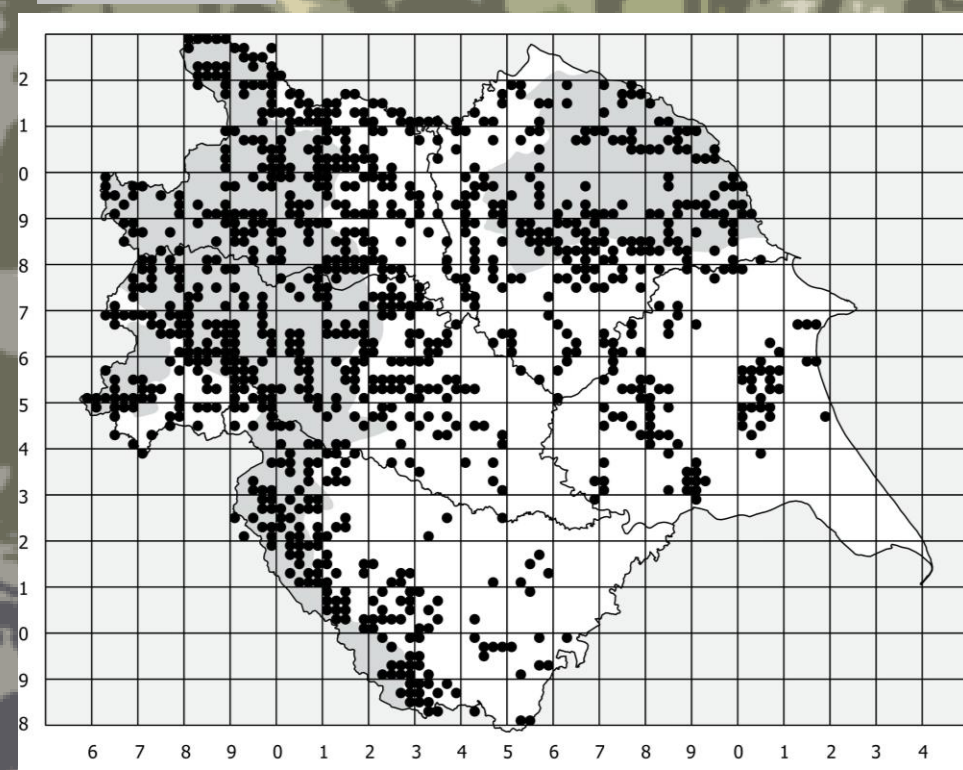


Patterns of distribution

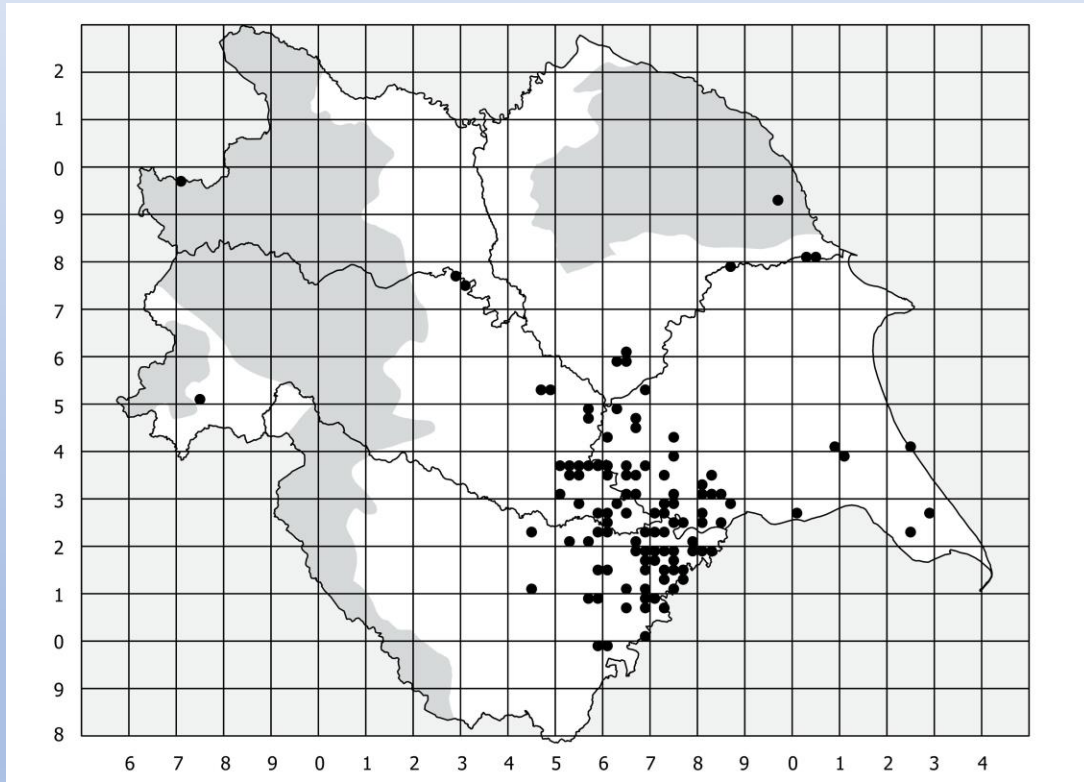
Helophorus flavipes



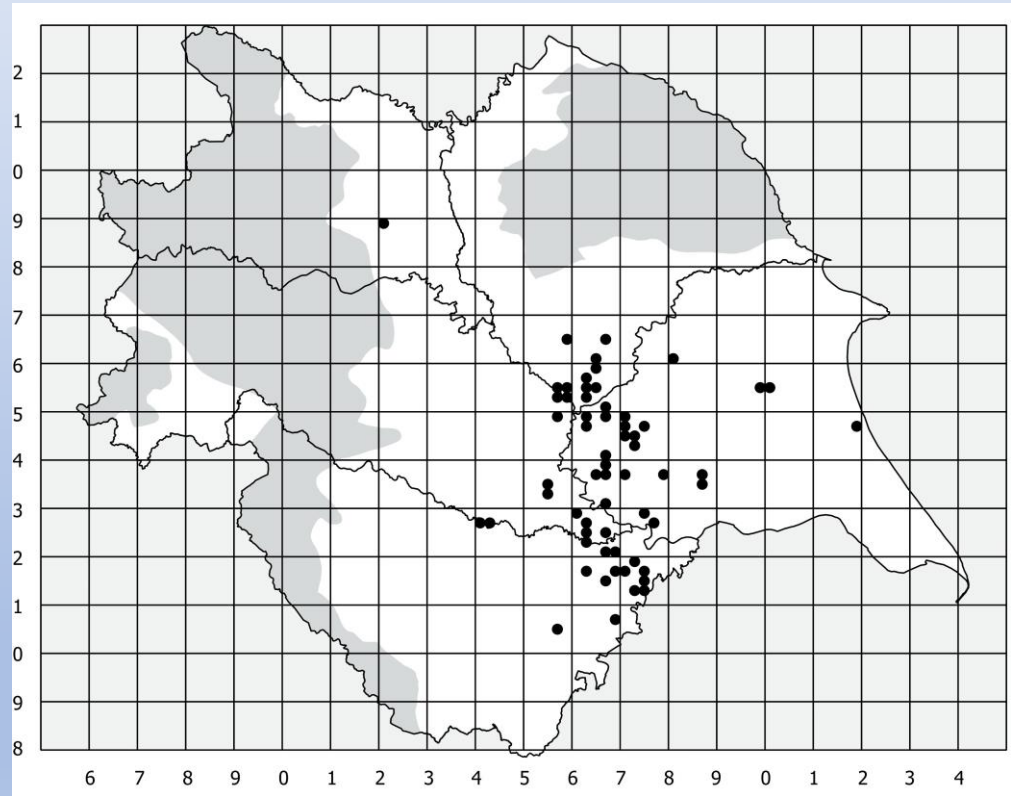
Elmis aenea



Haliphus heydeni



Agabus uliginosus



Future changes?

- Rapid changes in distribution have been evident among *some* aquatic insects since 1990s (Odonata, aquatic Heteroptera)
- Similar pattern among water beetles: northwards expansion of thermophilous southern species (including expansion of climatic envelope inland)



- Boreal, cold-water specialists are especially vulnerable to climate change
- Several of these are at the southern edge of their English range in Yorkshire Pennines
- 1 species (*Hygrotus novemlineatus*) apparently lost since 1990s
- Acidic upland tarns continue to have negligible conservation profile but of high importance for specialised aquatic insects

