Evaluating Biodiversity Impacts of Beavers on Invertebrate and Vertebrate Communities Using Environmental DNA

Tom Spencer, Dr James Gilbert, Dr Claire Howe, & Dr Lori Lawson Handley

In collaboration with Prof. Nigel Willby, Dr Alan Law and Prof. Petri Nummi

What do we know?

- Many studies show the effects of beavers on species and communities across Europe.
- As well as case studies in parts of the UK showing the local effects on biodiversity and taxa.

BIODIVERSITY RESEARCH

Diversity and Distributions WILEY

Are beavers a solution to the freshwater biodiversity crisis?

Alan Law[1] | Oded Levanoni[2] | Garth Foster[3] | Frauke Ecke[2,4] | Nigel J. Willby[1]

ORIGINAL PAPER

Bats benefit from beavers: a facilitative link between aquatic and terrestrial food webs

Petri Nummi · Saara Kattainen · Paula Ulander · Anna Hahtola

Mammal SOCIETY

Positive coexistence of water voles and beaver: water vole expansion in a beaver engineered wetland

Alan Puttock[1*], Mervyn Newman[2], Hugh Graham[3], Mark Elliott, Jake Chant, Roger E. Auster[1] , Richard E. Brazier[1]

The short-term impact of Eurasian beavers (*Castor fiber*) post-reintroduction on amphibian abundance and diversity in a lentic environment

J.B. Wilson[1,2*], J. Bradley[3] & S. Bremner-Harrison[1,4]

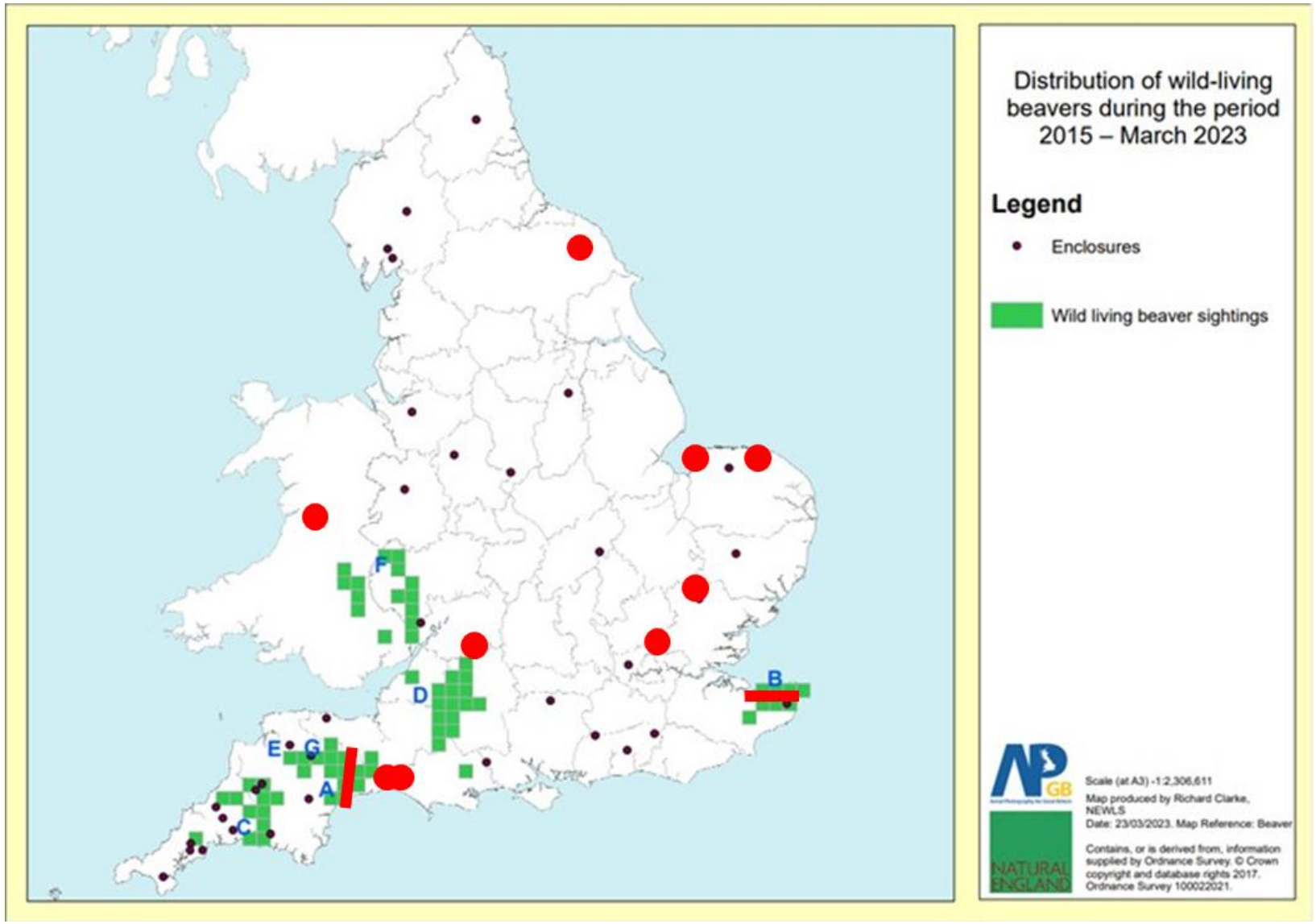
Methods

- eDNA water samples filtered
- Extracted and amplified via a set of Vertebrate and Invertebrate primers
- Sequenced and taxa assigned

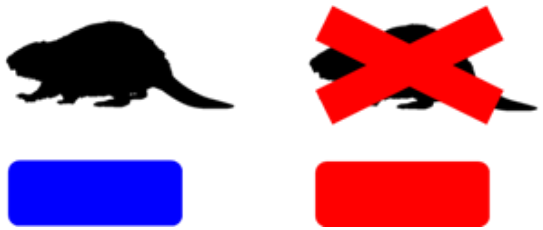
Survey

Surveyed Beaver Enclosure

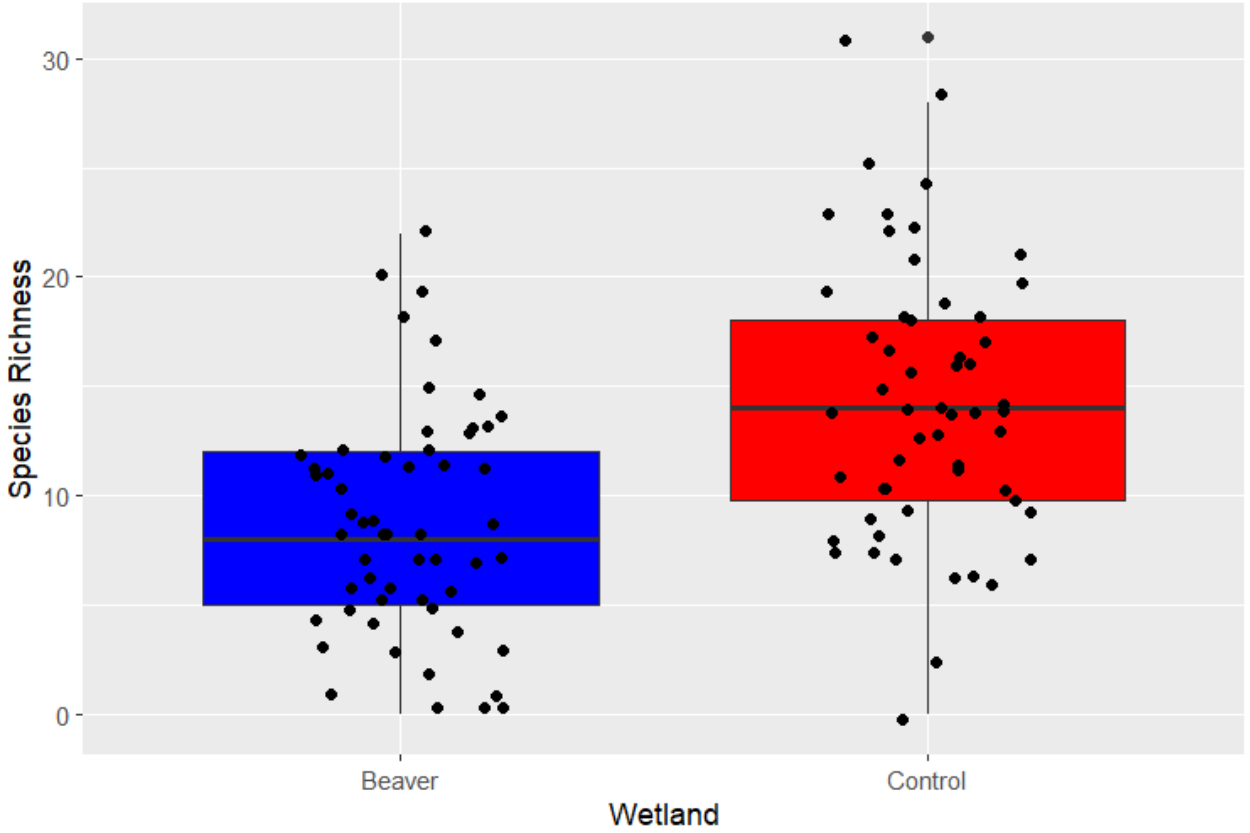
Surveyed Wild Catchment



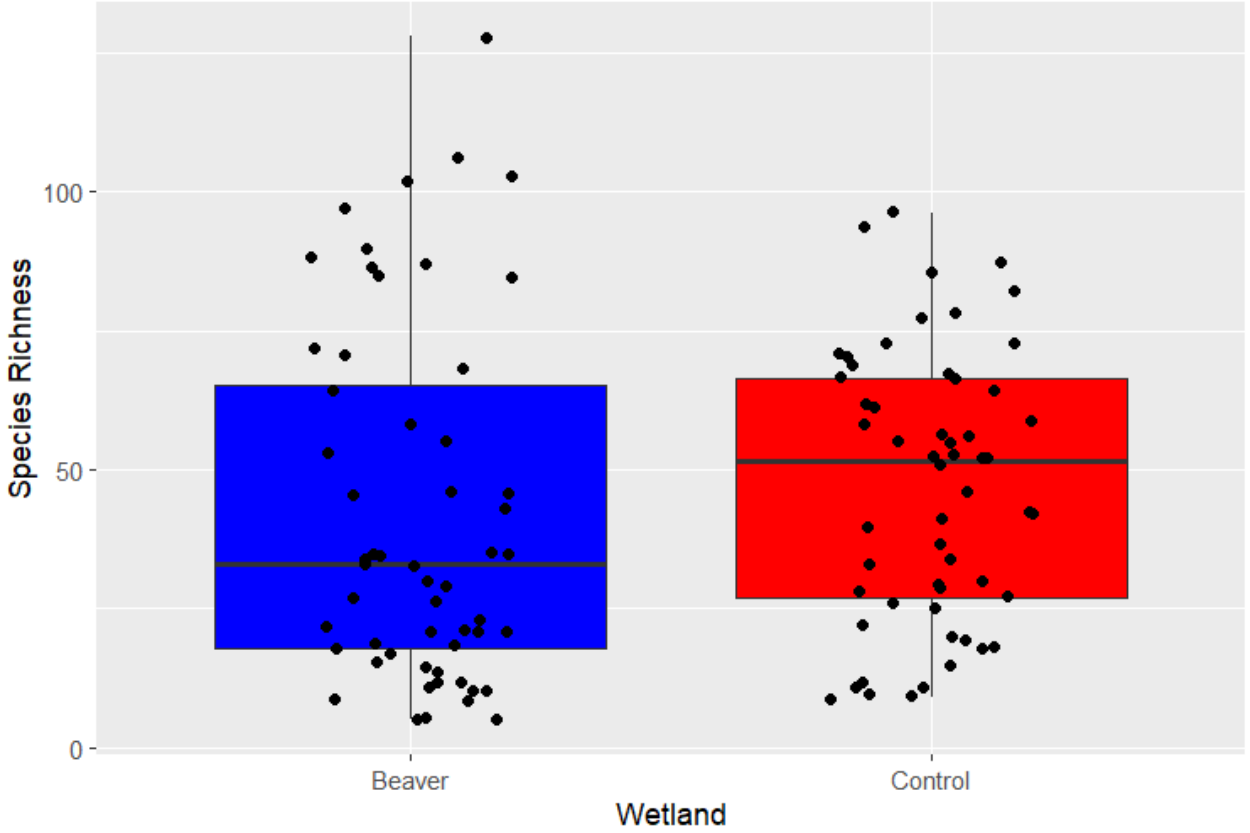
Alpha Diversity of Wild Catchments



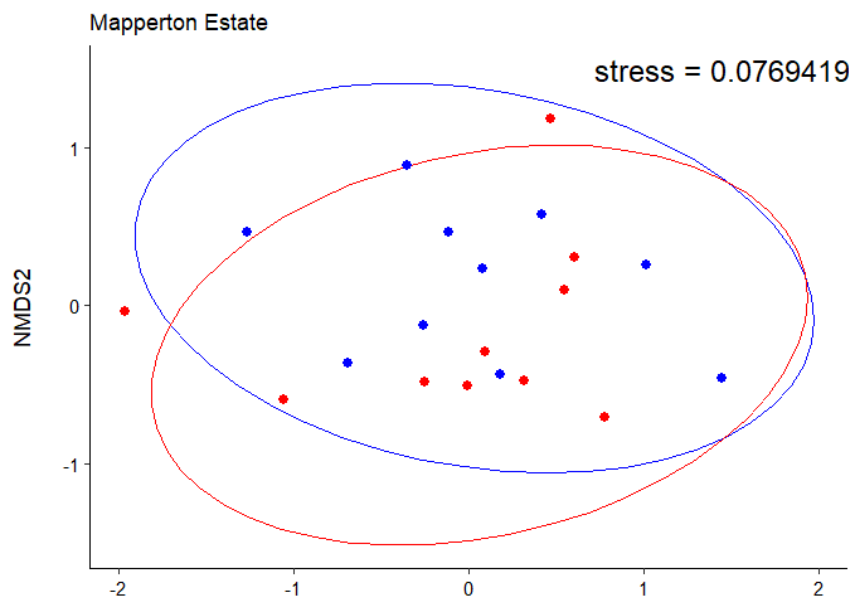
Wild Vertebrates



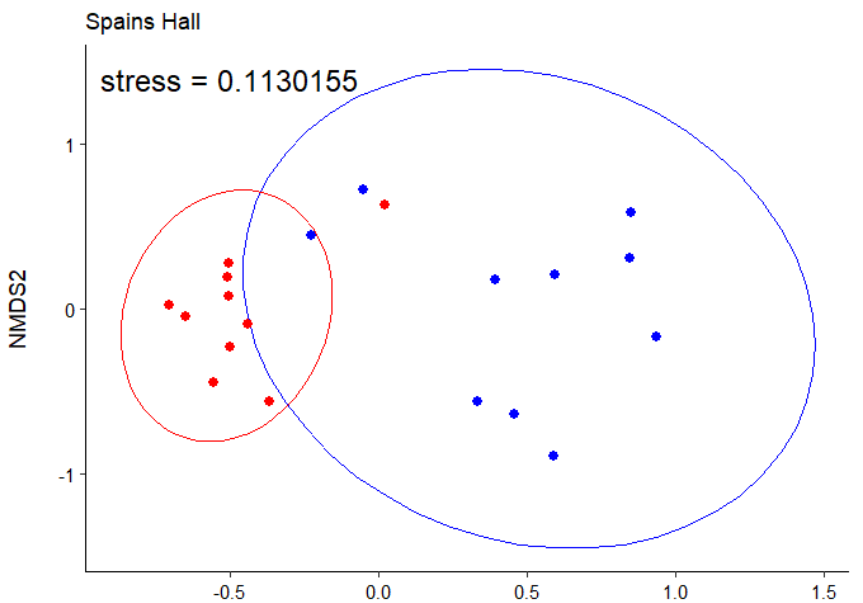
Wild Invertebrates



Community Dissimilarity per Enclosure

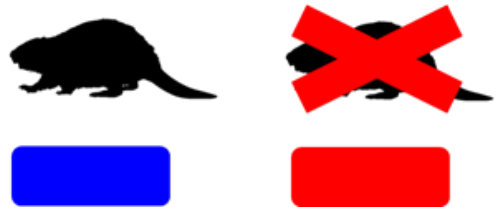


Mapperton Estate
$R^2 = 0.08521$
p=0.063

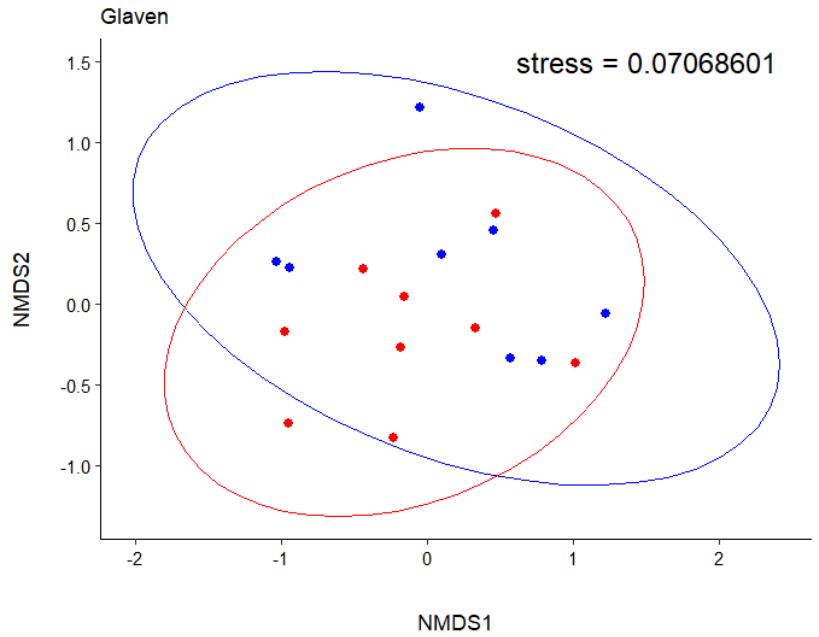


Spains Hall
$R^2 = 0.21976$
p=0.001

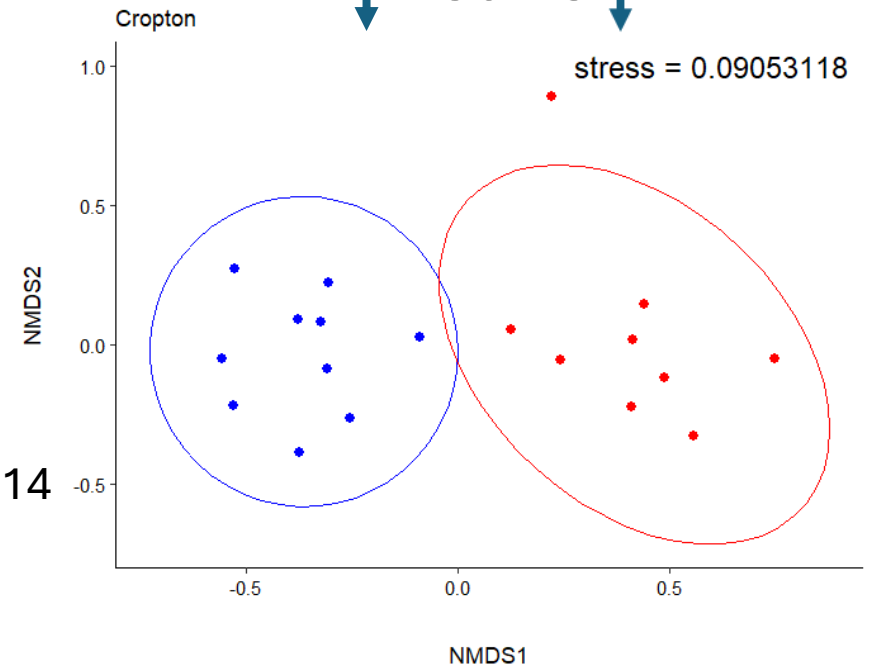
Year 1



Year 3

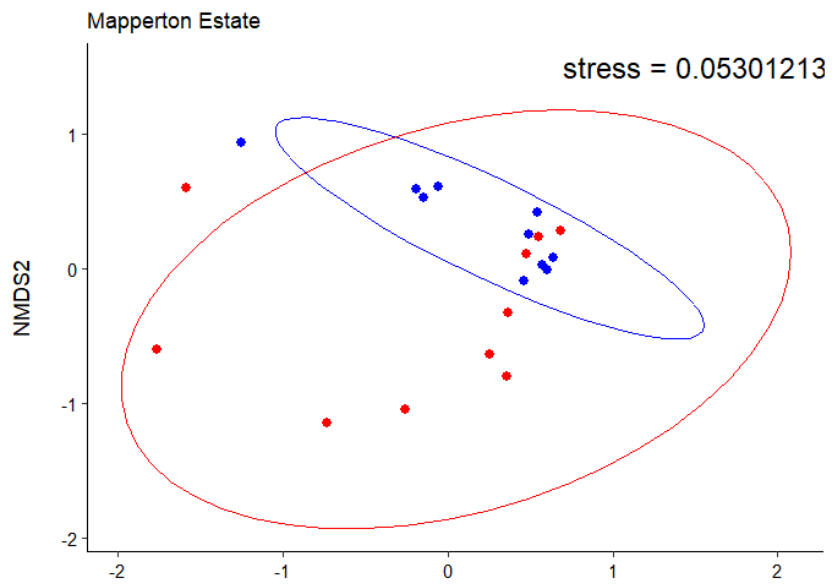


Glaven
$R^2 = 0.08536$
p=0.188



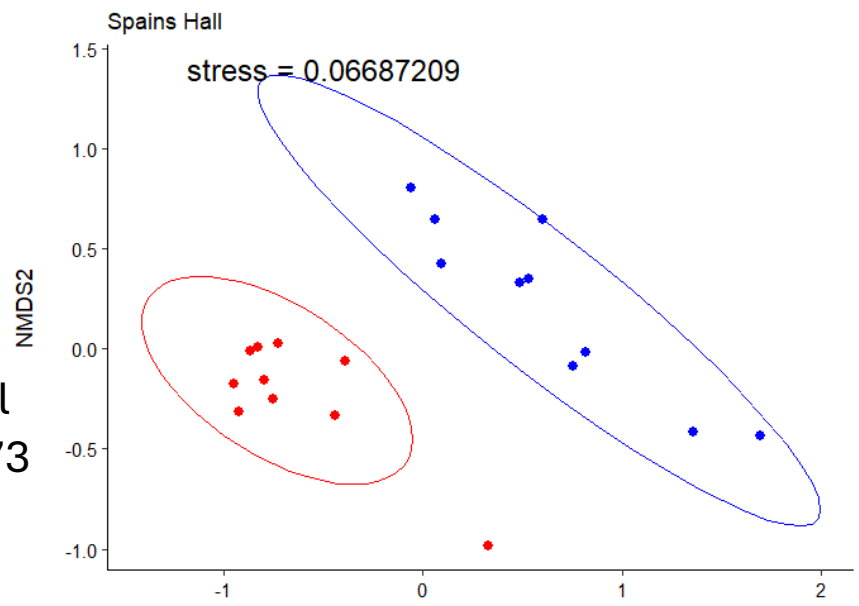
Cropton
$R^2 = 0.31614$
p=0.001

Invertebrates

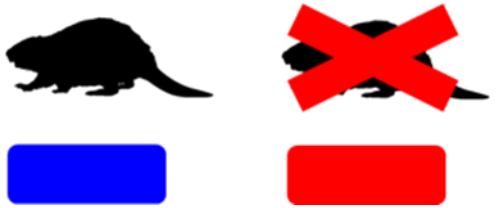


Mapperton Estate
$R^2 = 0.12219$
p=0.002

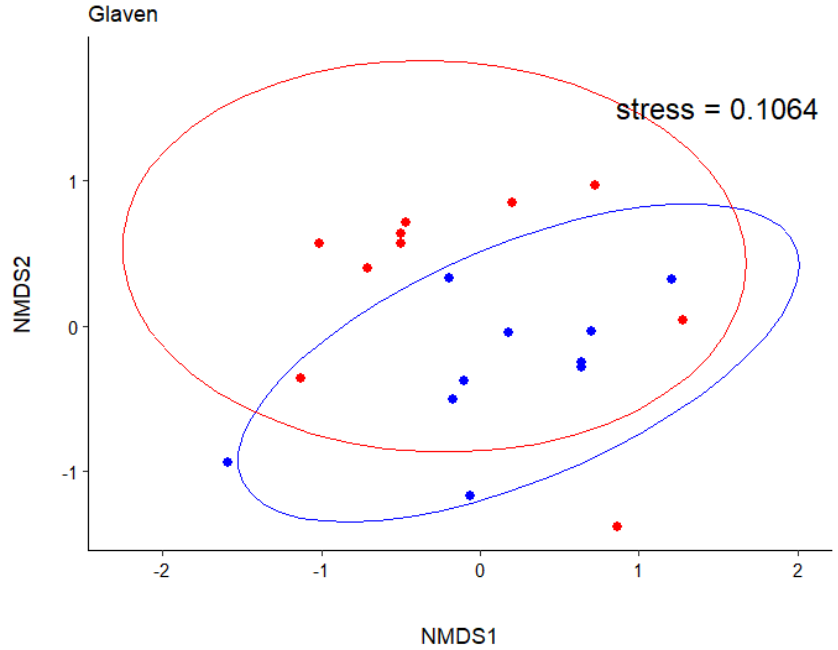
Spains Hall
$R^2 = 0.25573$
p=0.001



Year 1

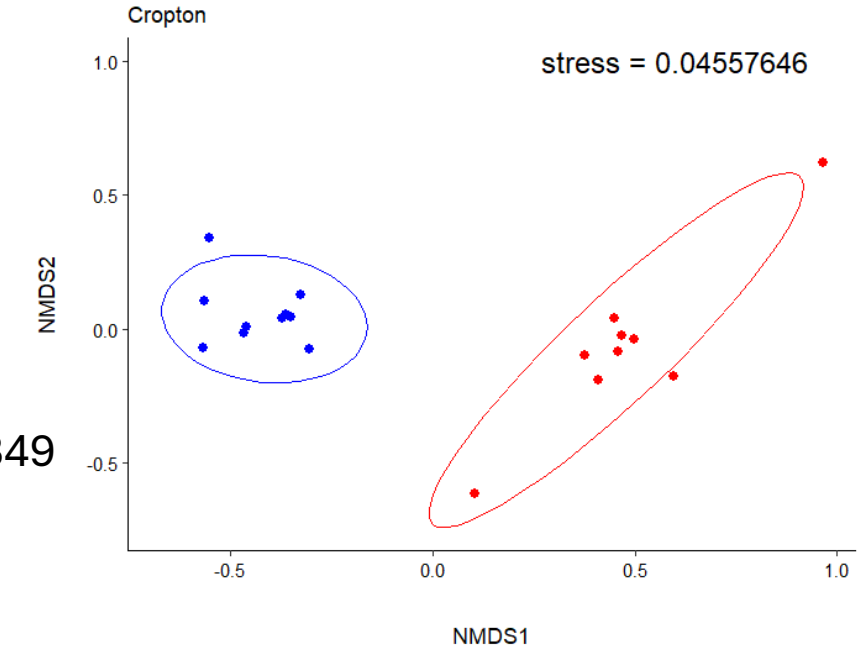


Year 3

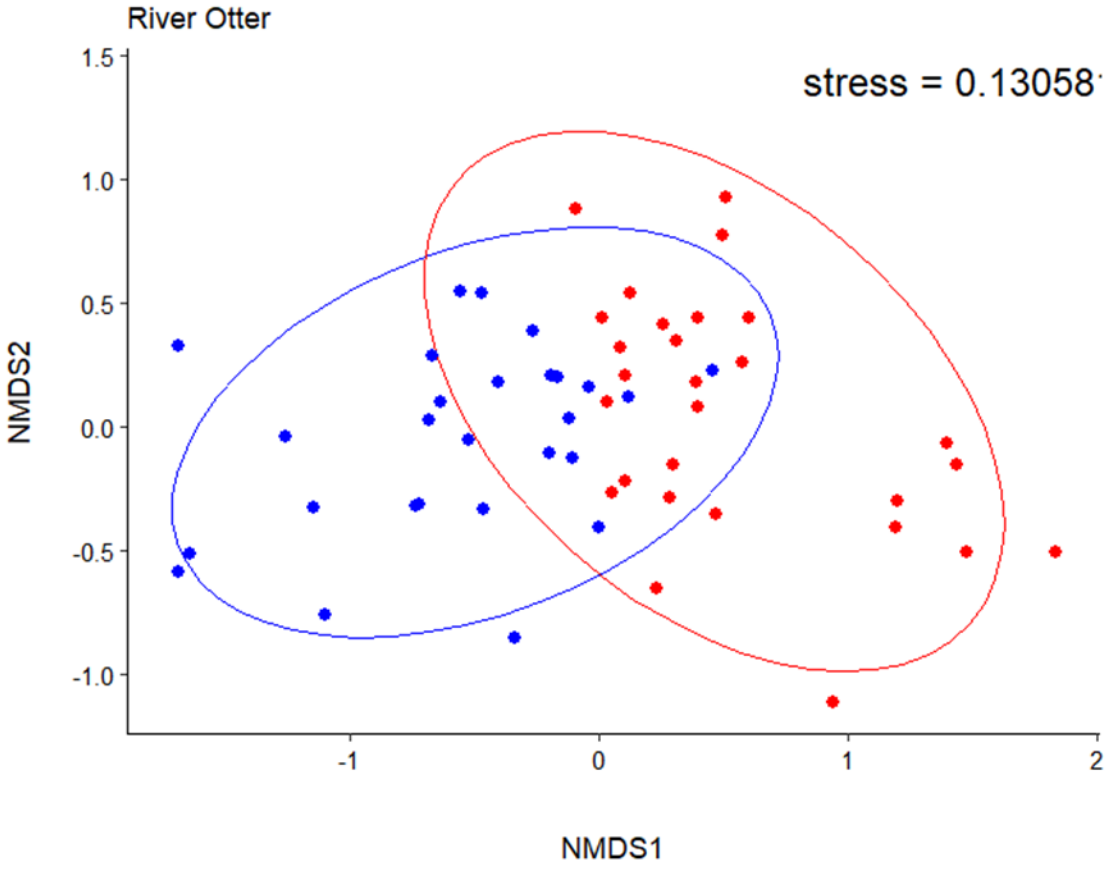


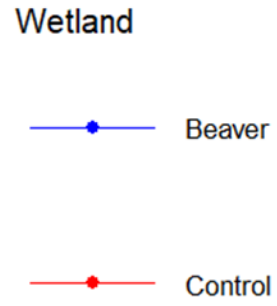
Glaven
$R^2 = 0.9033$
p=0.014

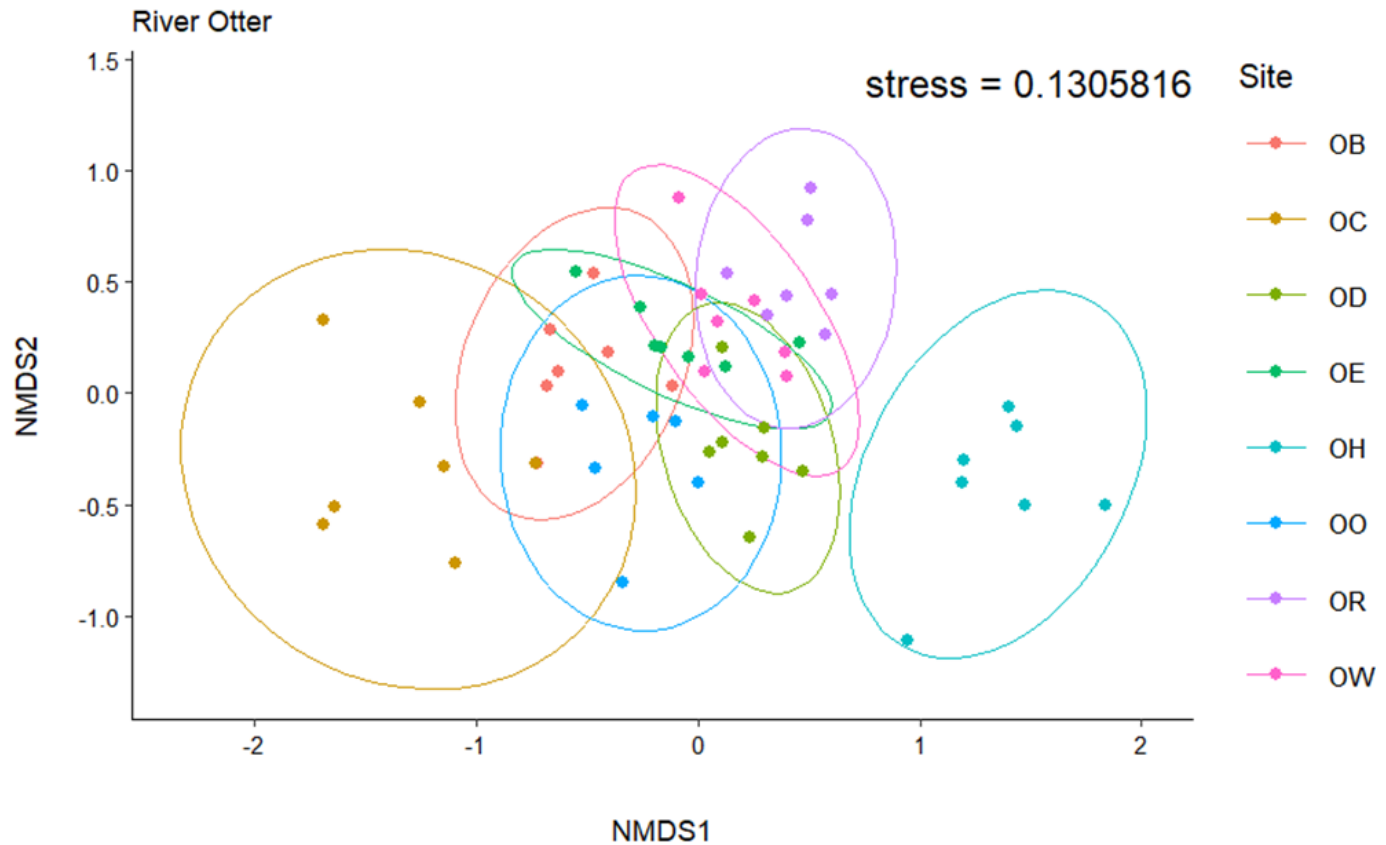
Cropton
$R^2 = 0.27349$
p=0.001



Thankyou!!

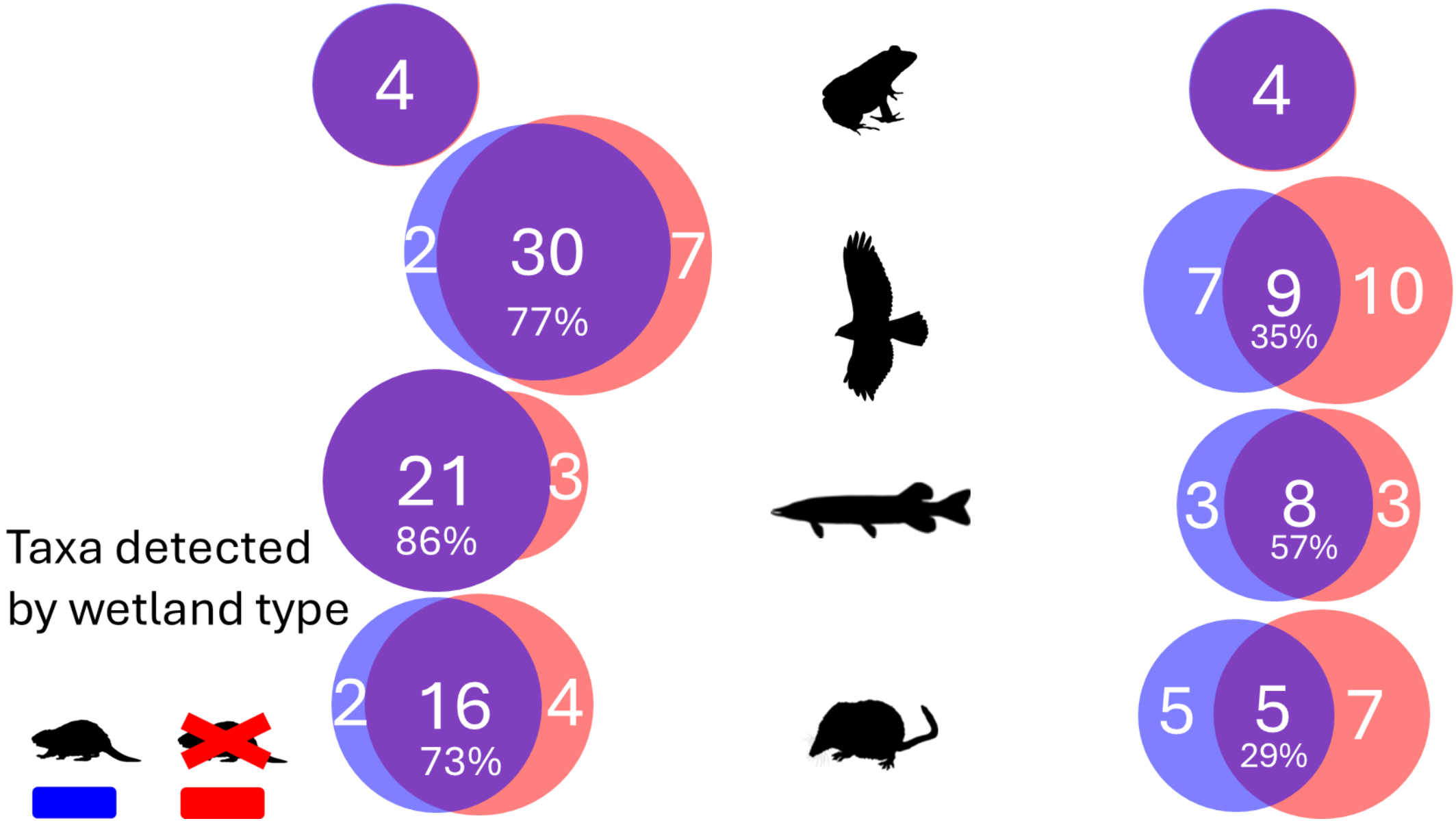

River Otter
stress = 0.13058
1.5
1.0
0.5
0.0
-0.5
-1.0
NMDS2
-1
0
1
2
NMDS1


Wetland
Beaver
Control

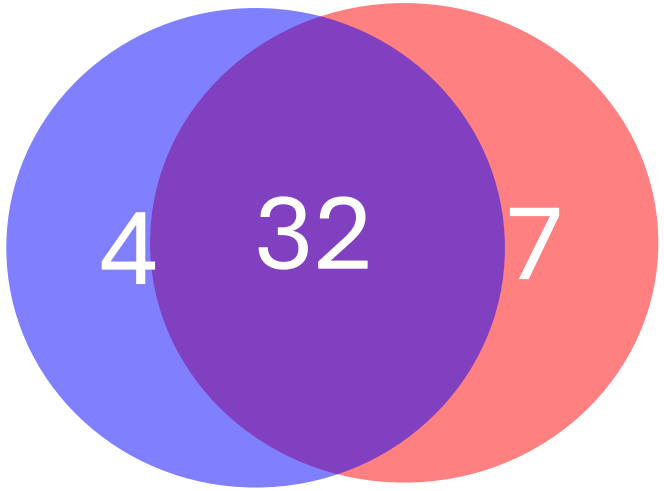

River Otter
stress = 0.1305816
1.5
1.0
0.5
0.0
-0.5
-1.0
NMDS2
-2
-1
0
1
2
NMDS1
Site
OB
OC
OD
OE
OH
OO
OR
OW

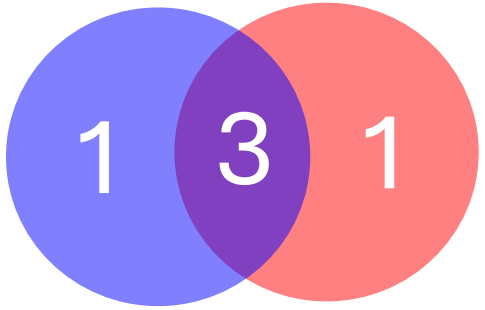
England Wild Sites

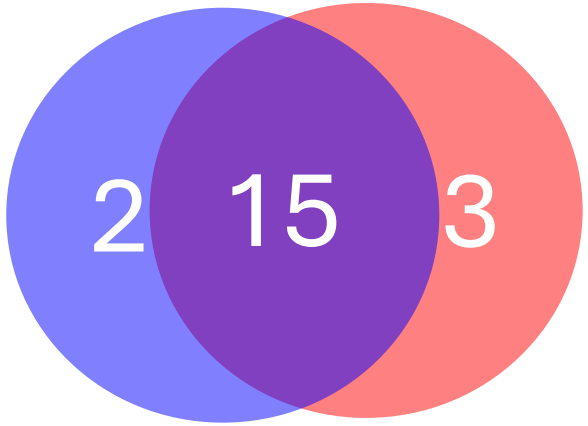
Finland

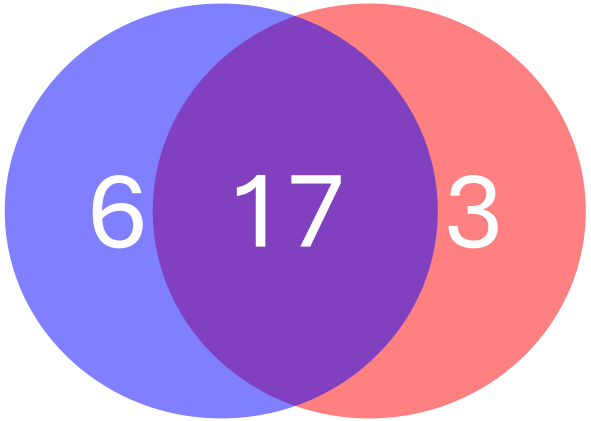


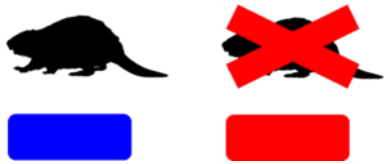
General Taxa Distributions Across Enclosures



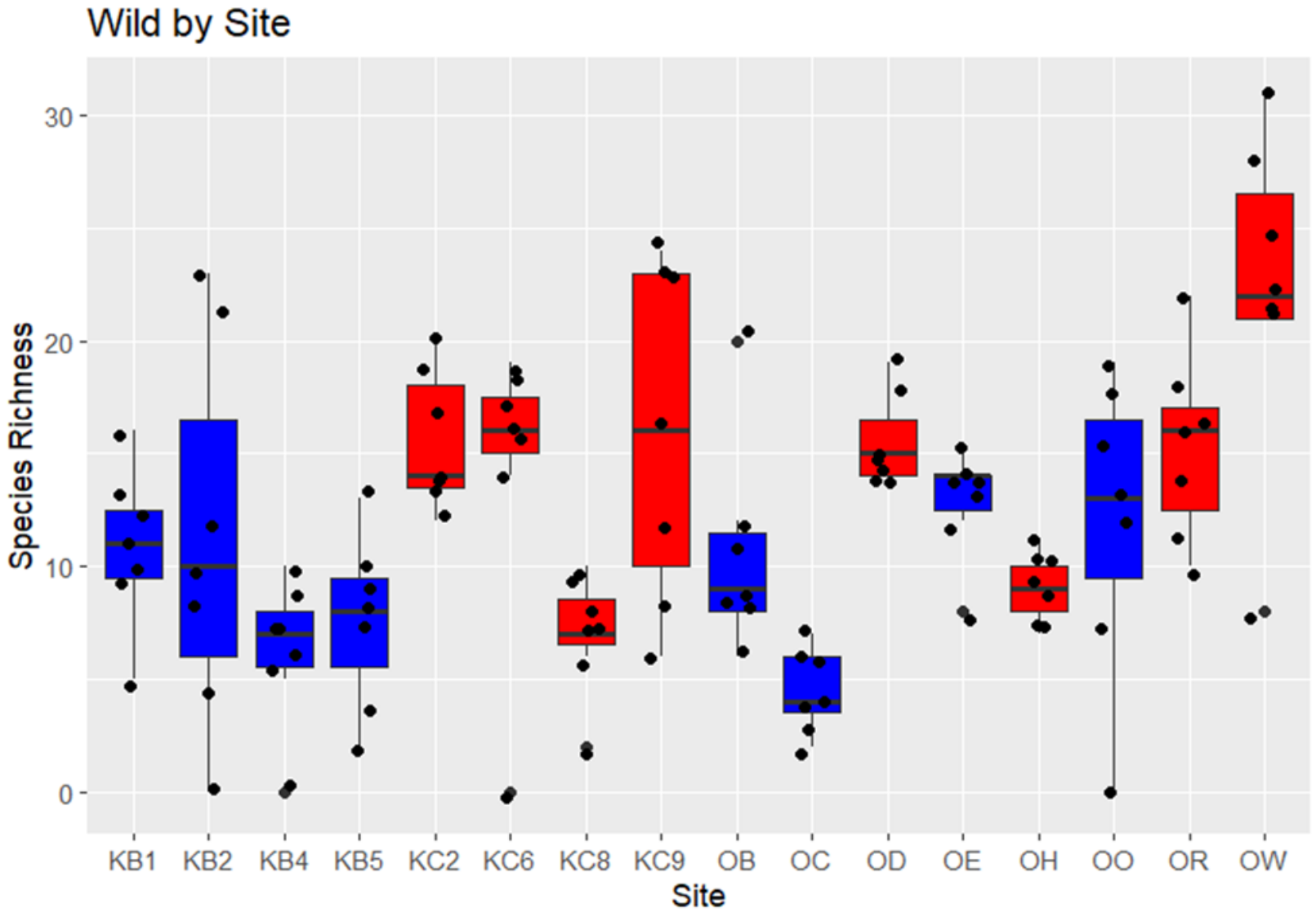




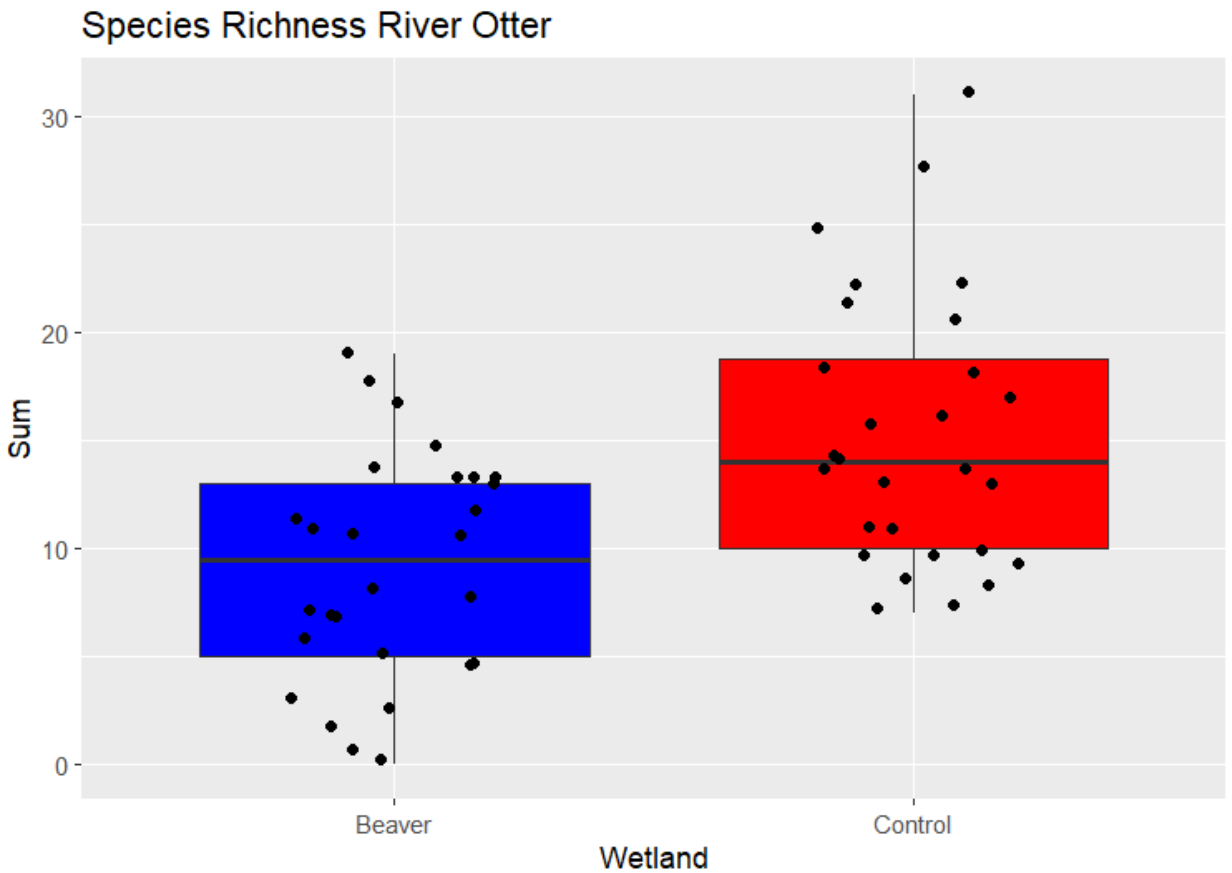


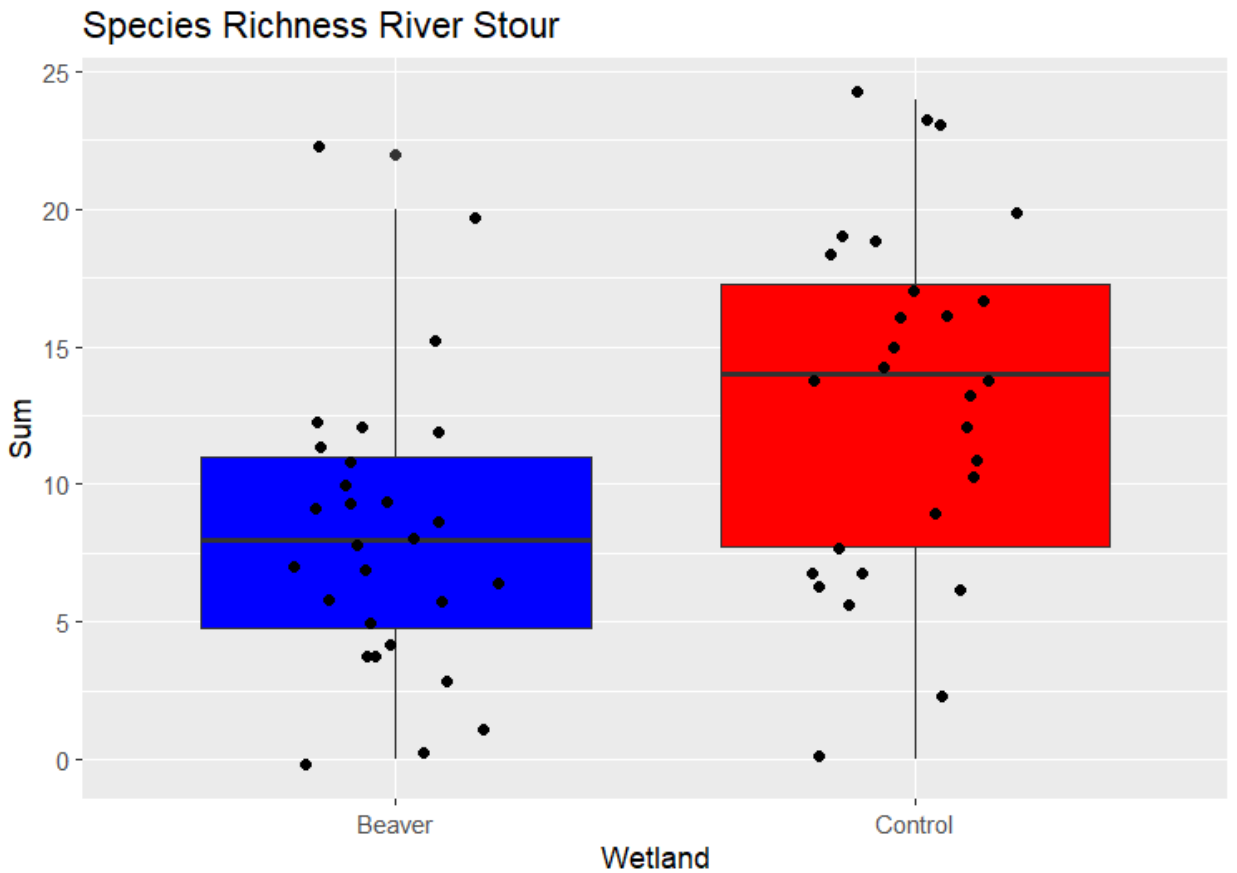


Alpha Diversity per Site

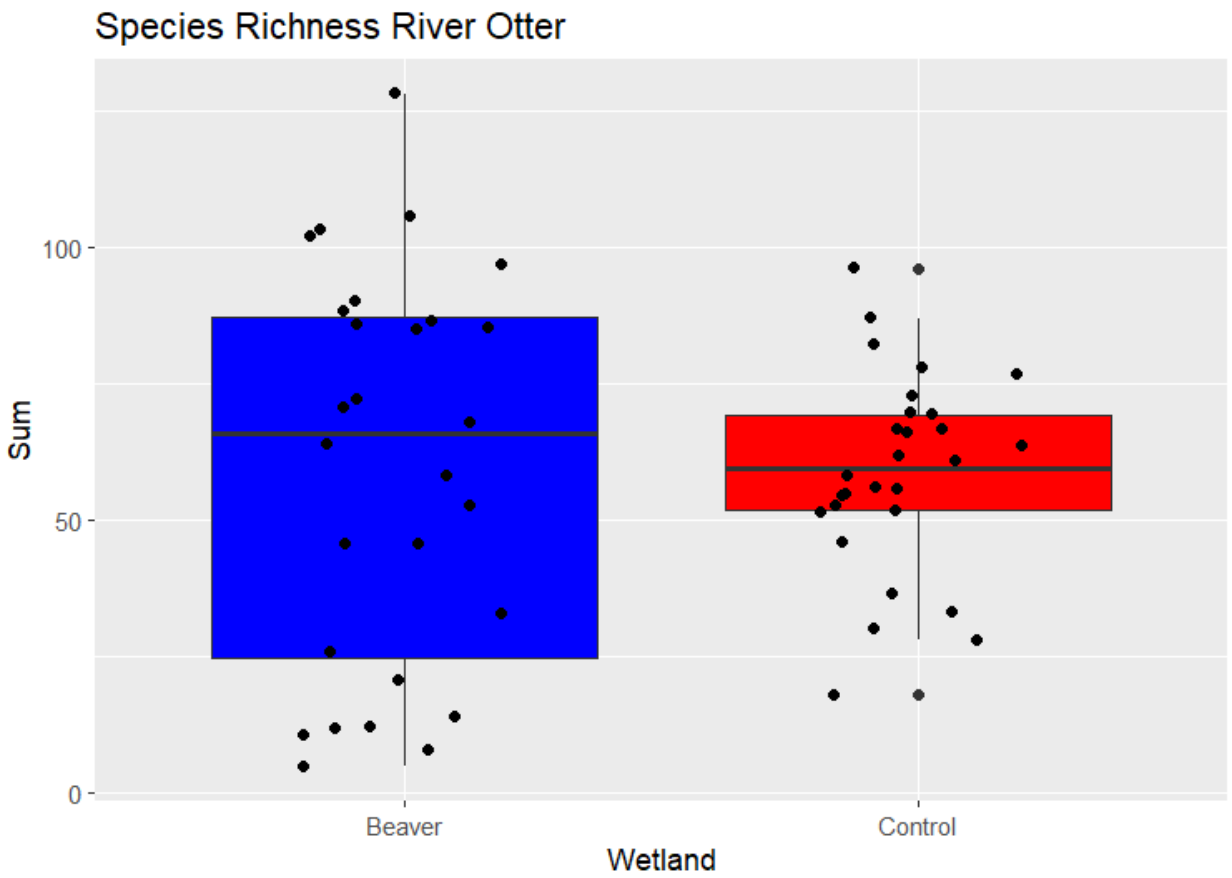


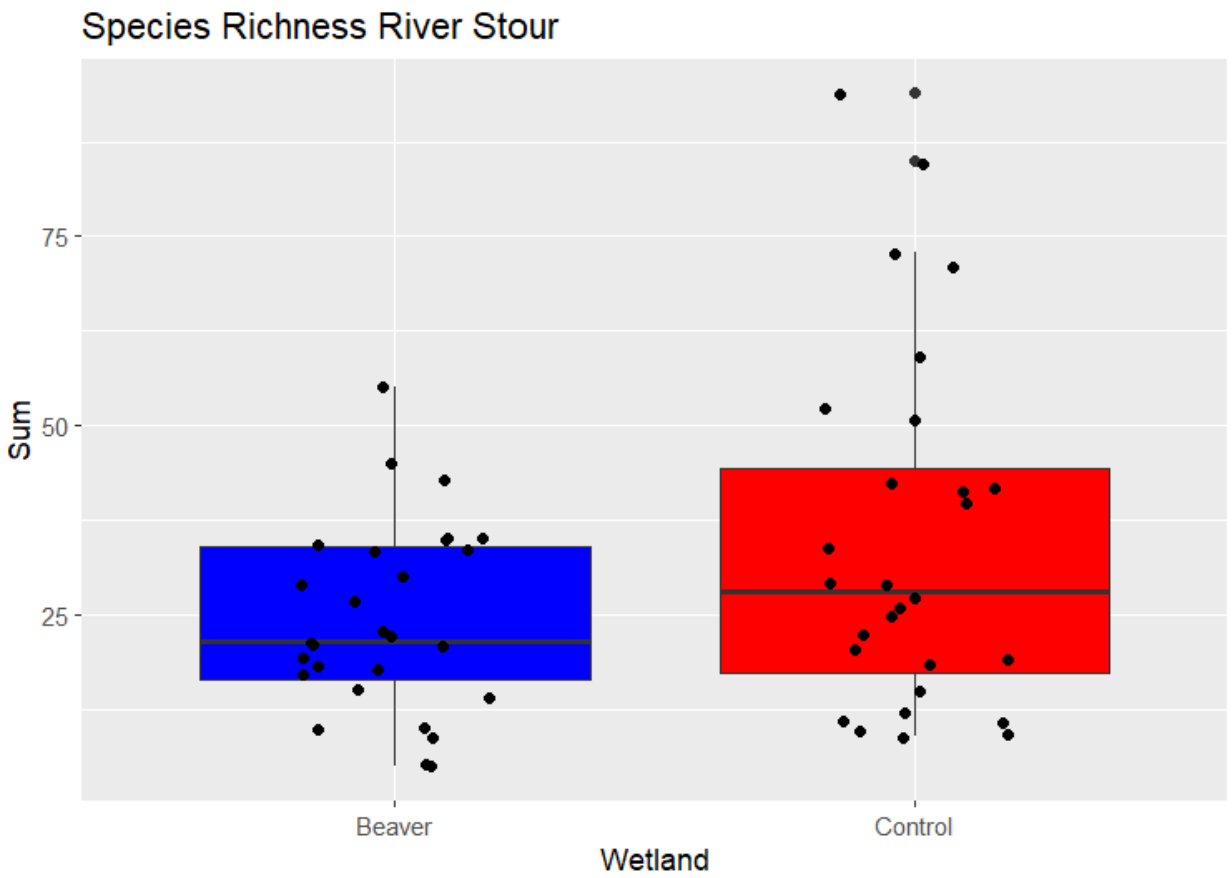
River Otter vs Stour Vertebrates



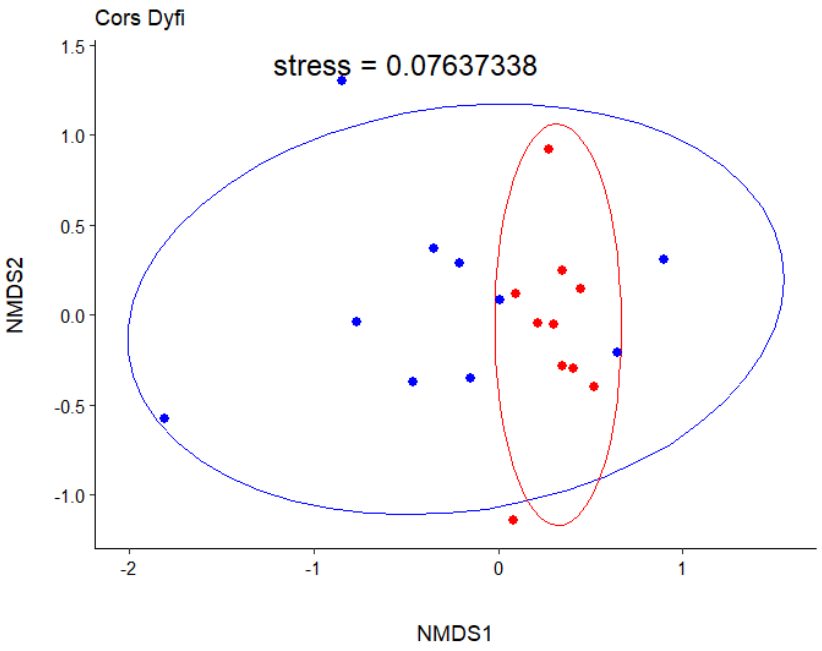


River Otter vs Stour Invertebrates

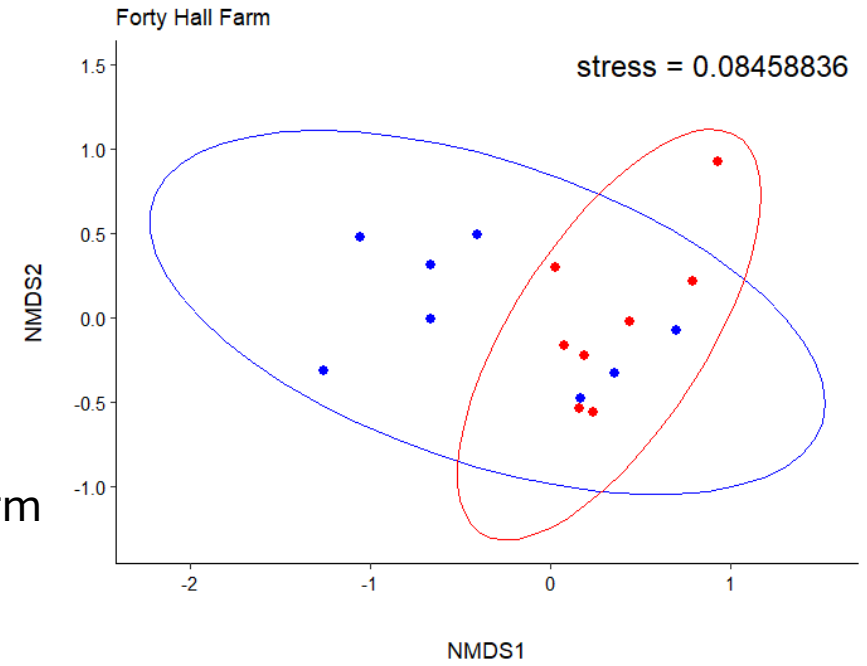




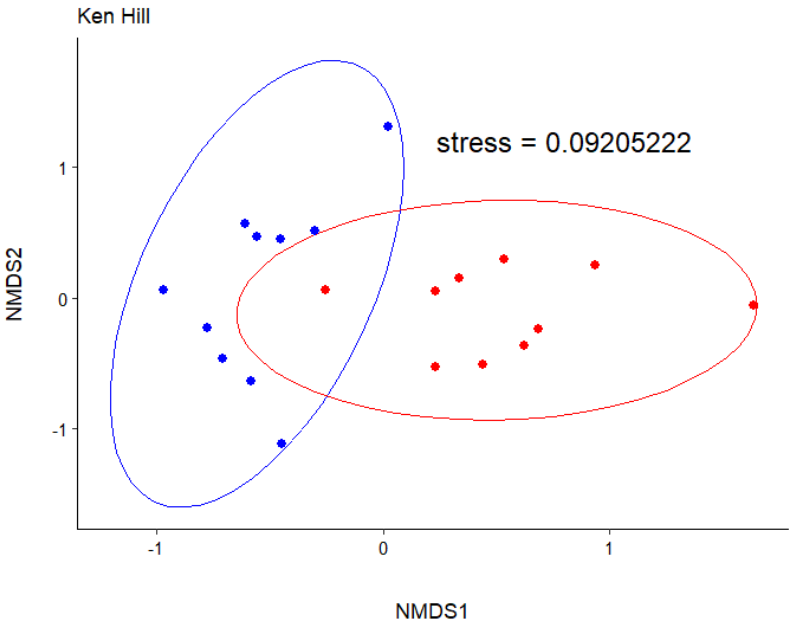
Verts left over



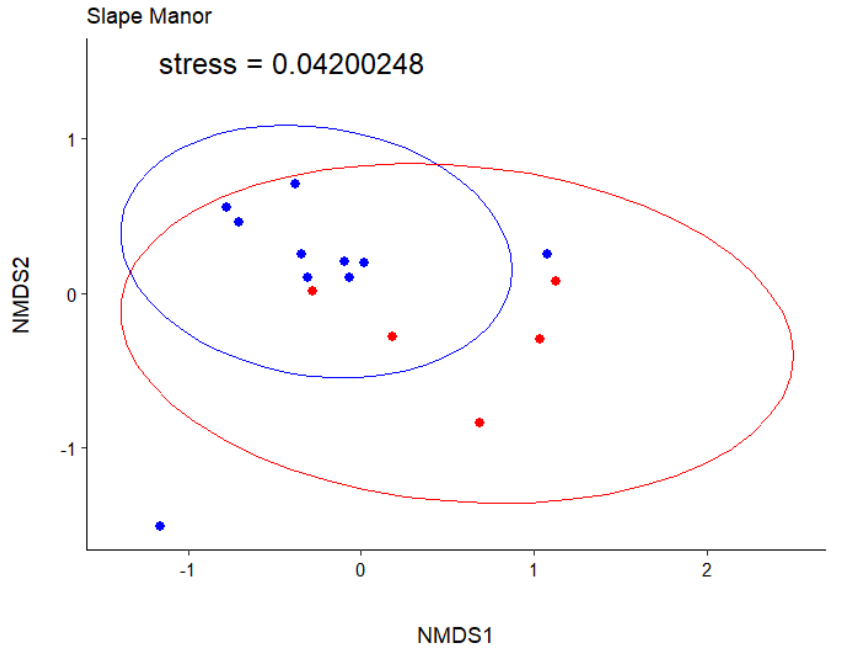
Cors Dyfi
Year 1.5~
$R^2 = 0.16965$
p=0.001



Forty Hall Farm
Year1
$R^2 = 0.12237$
p=0.036



Ken Hill
Year 2
$R^2 = 0.16965$
p=0.001



Slape Manor
Year 1
$R^2 = 0.16753$
p=0.007

Inverts left over