PS2339
Do aquatic mesocosms represent real edge of field water bodies in the UK?

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Cambridge Environmental Assessments

CEA is part of the ADAS Environment Group

Introduction

- Key questions
- Objectives
- Data collection
- Results
  - Macroinvertebrates
  - Phytoplankton
  - Zooplankton
- Questions

Key questions

- Are mesocosms sufficiently ecologically representative of UK water bodies in the UK agricultural landscape?
- Do mesocosm studies with spring/summer applications represent the ‘worst-case’ scenario?
- Do seasonal changes in community structure increase the uncertainty associated with mesocosm endpoints when applied to autumn pesticide applications?

Objectives

1. ID significant differences & similarities between waterbody types and landscape classes for each taxonomic group.
2. Determine how ecologically representative mesocosms are of field sites by comparing taxonomic composition
3. Assess temporal variation within and between field sites and mesocosms for each taxonomic group.
4. ID environmental variables potentially influencing taxonomic composition in field sites for each taxonomic group.

Data collection

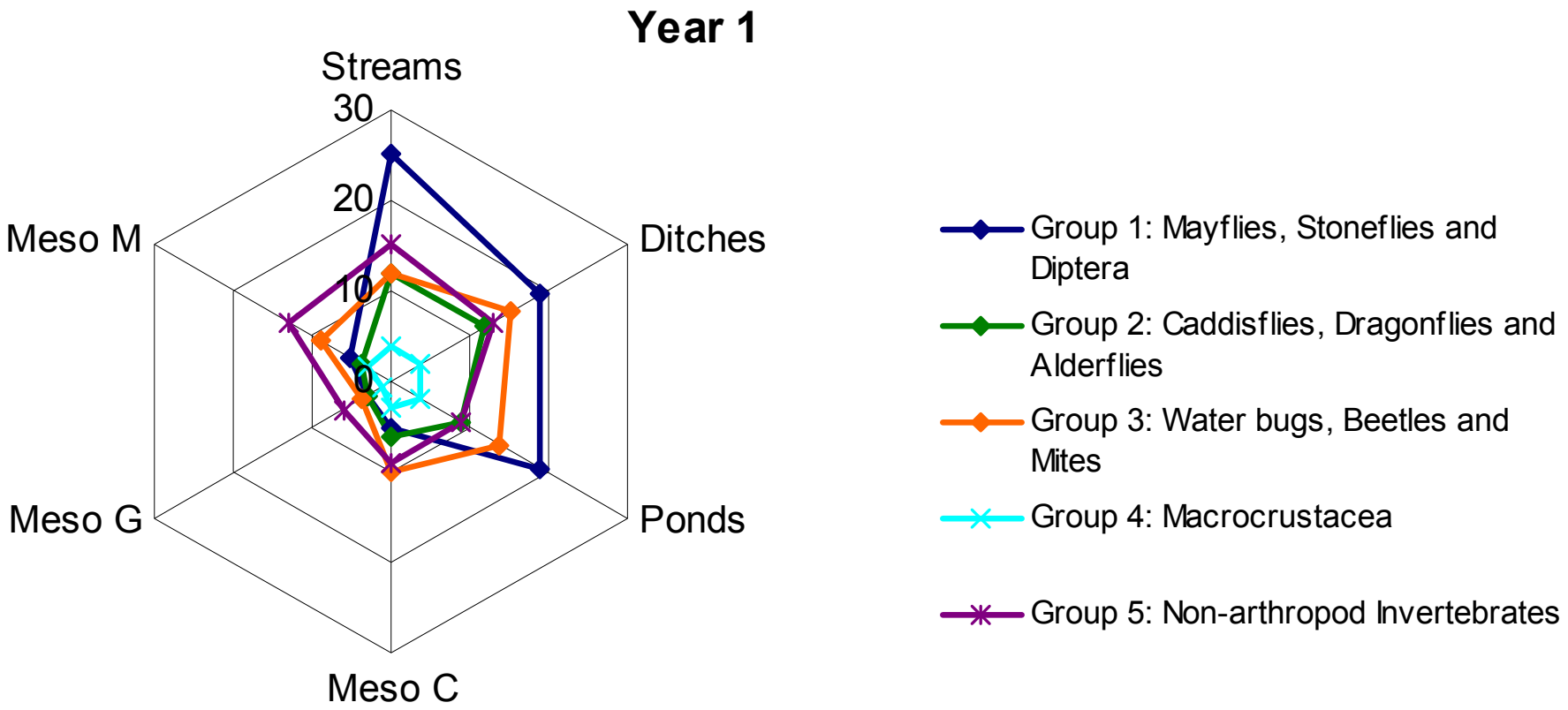
- Abundance data for macroinvertebrates, zooplankton and phytoplankton.
- Ponds, ditches and streams sampled from four distinct landscape classes (36 sites)
- Four mesocosm facilities provided data
- Environmental variables also measured at field and mesocosm sites
- Sampling duration: Monthly samples for 2 years

Objective 1

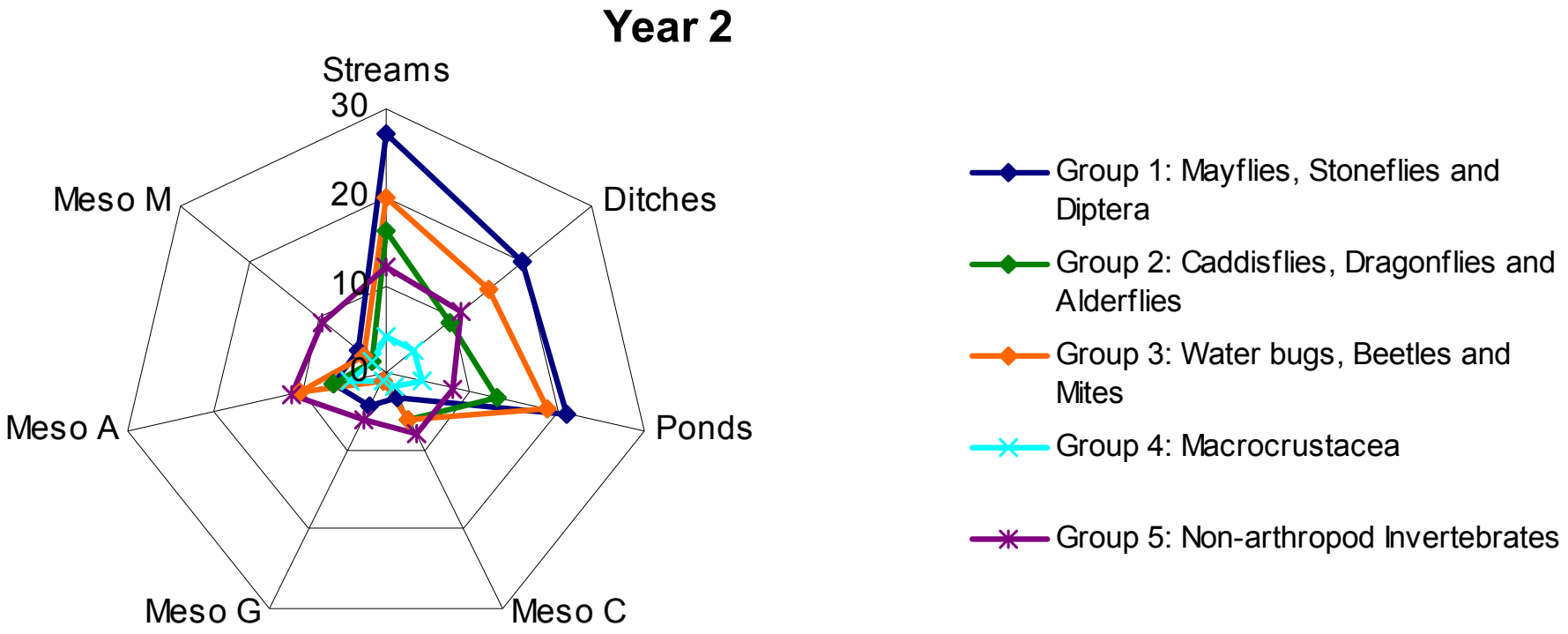
ID significant differences and similarities between waterbody types and landscape classes for macroinvertebrates, zooplankton and phytoplankton.

Macro-invertebrates

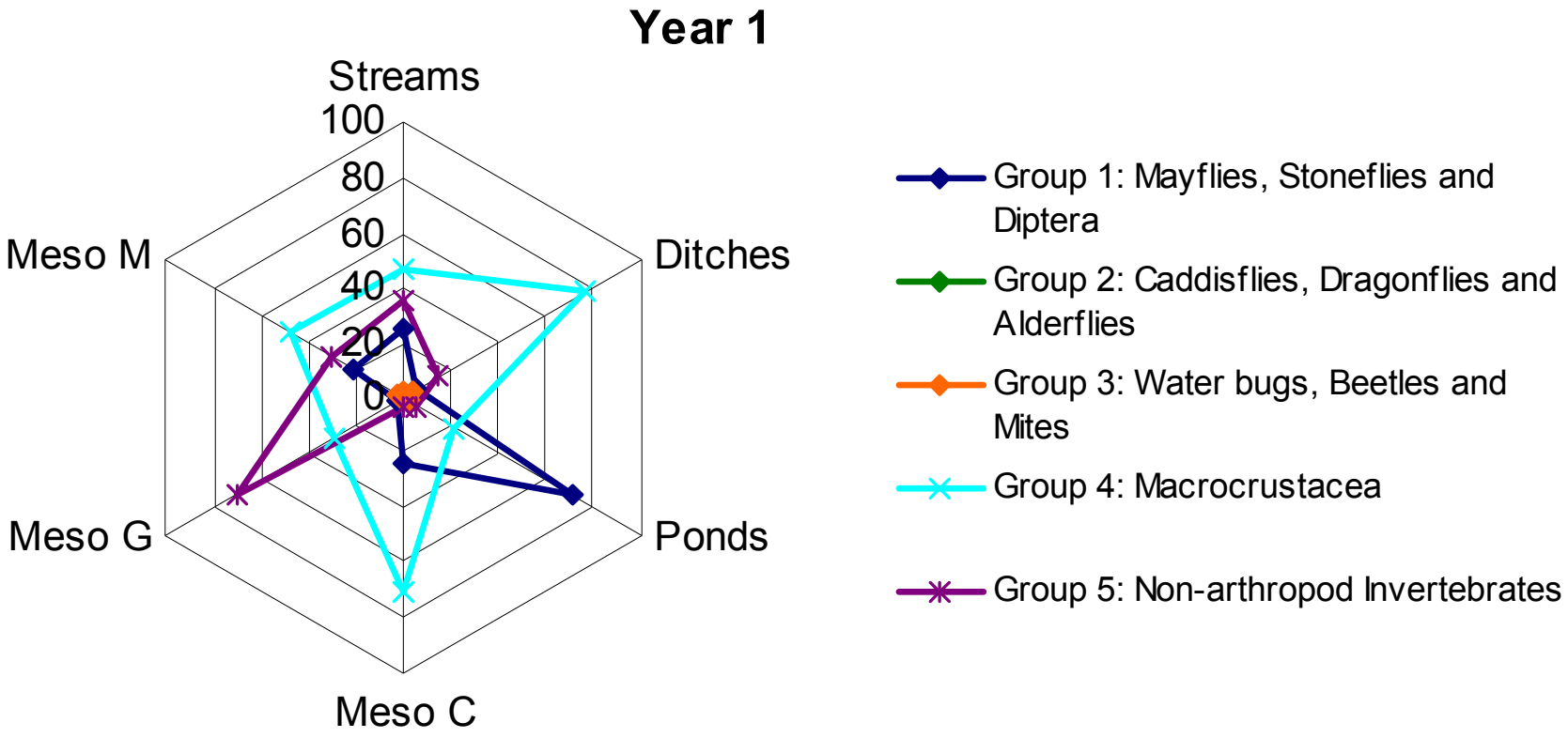
Macroinvertebrates: Taxa Richness



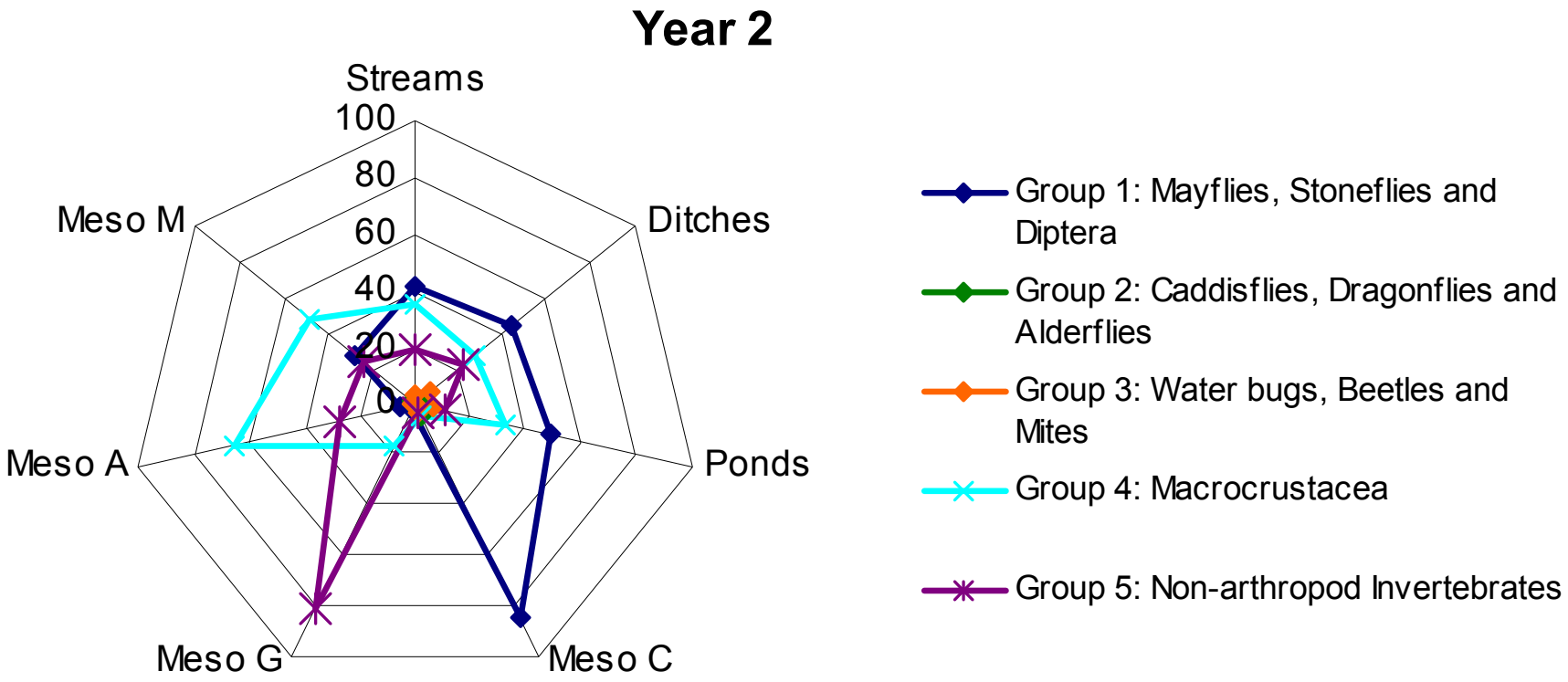
Macroinvertebrates: Taxa Richness



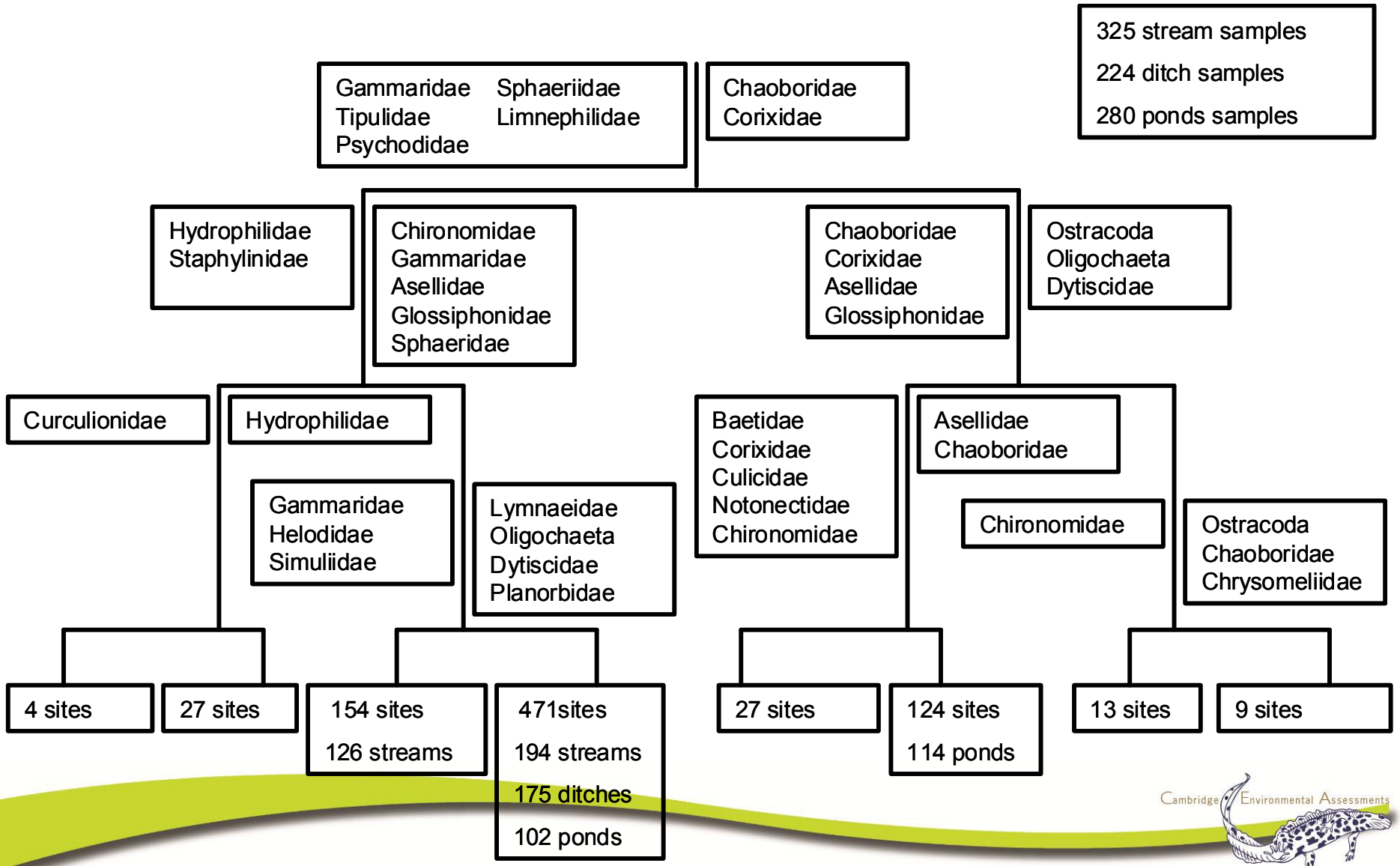
Macroinvertebrates: Relative Abundance



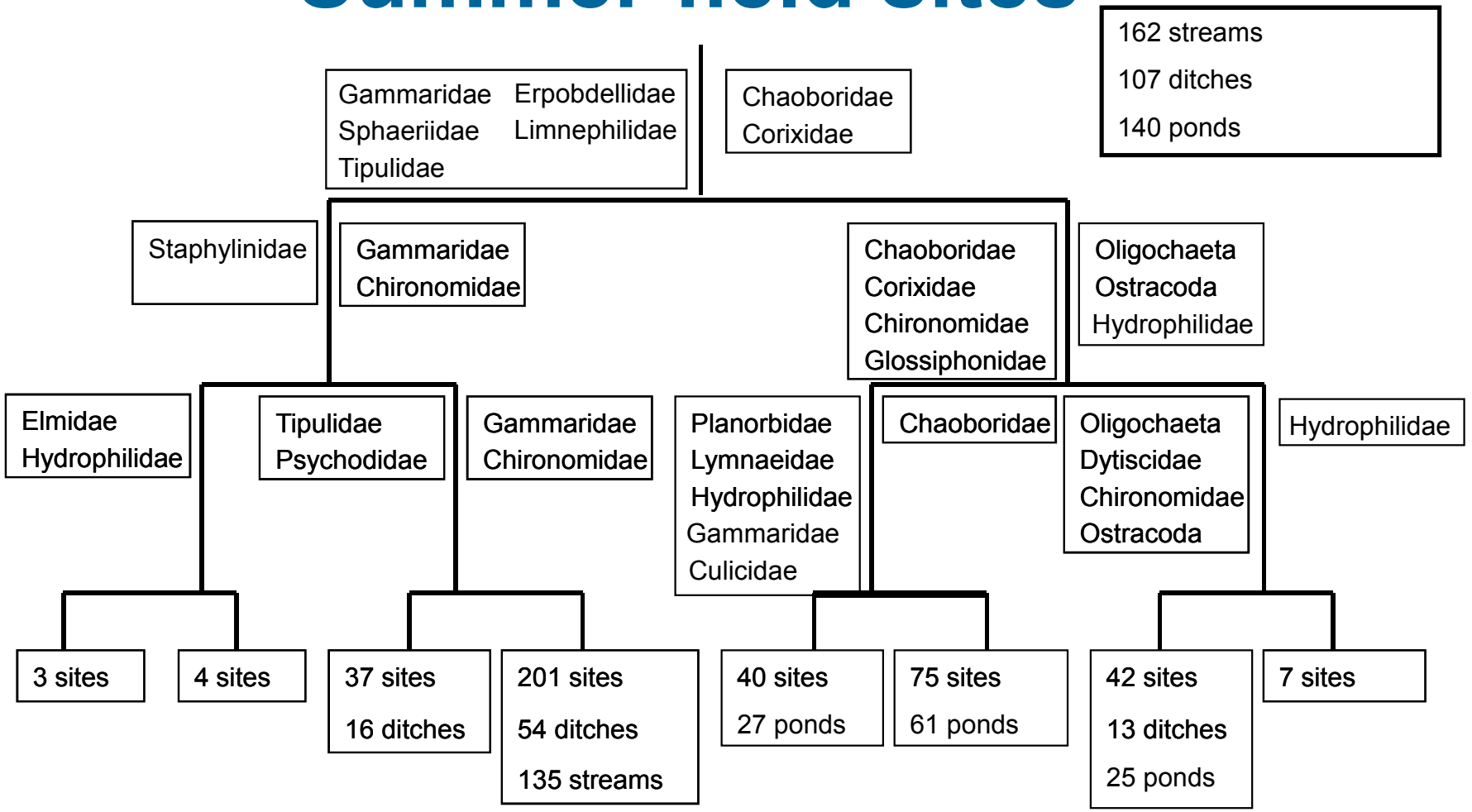
Macroinvertebrates: Relative Abundance



Macroinvertebrates: TWINSPAN



Macroinvertebrates: TWINSPAN Summer field sites



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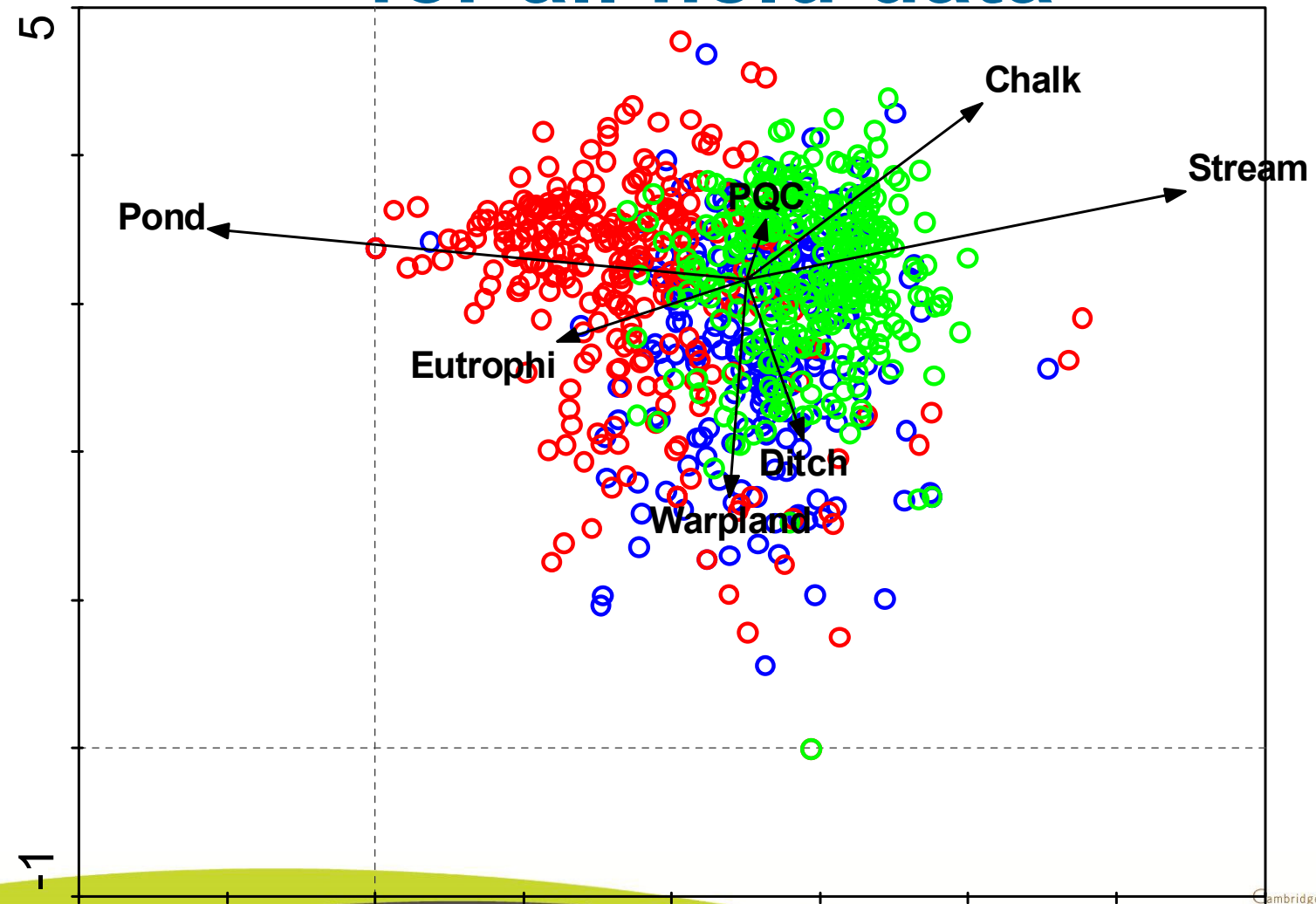
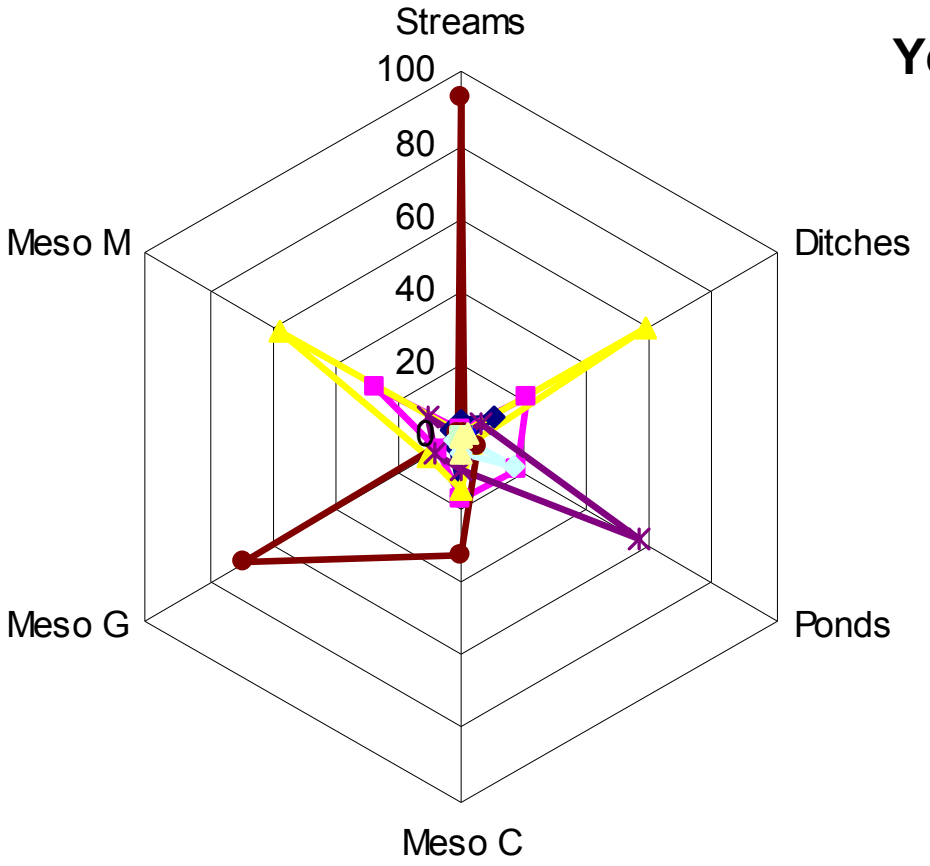
Macroinvertebrates: Indirect DCA for all field data



Phytoplankton

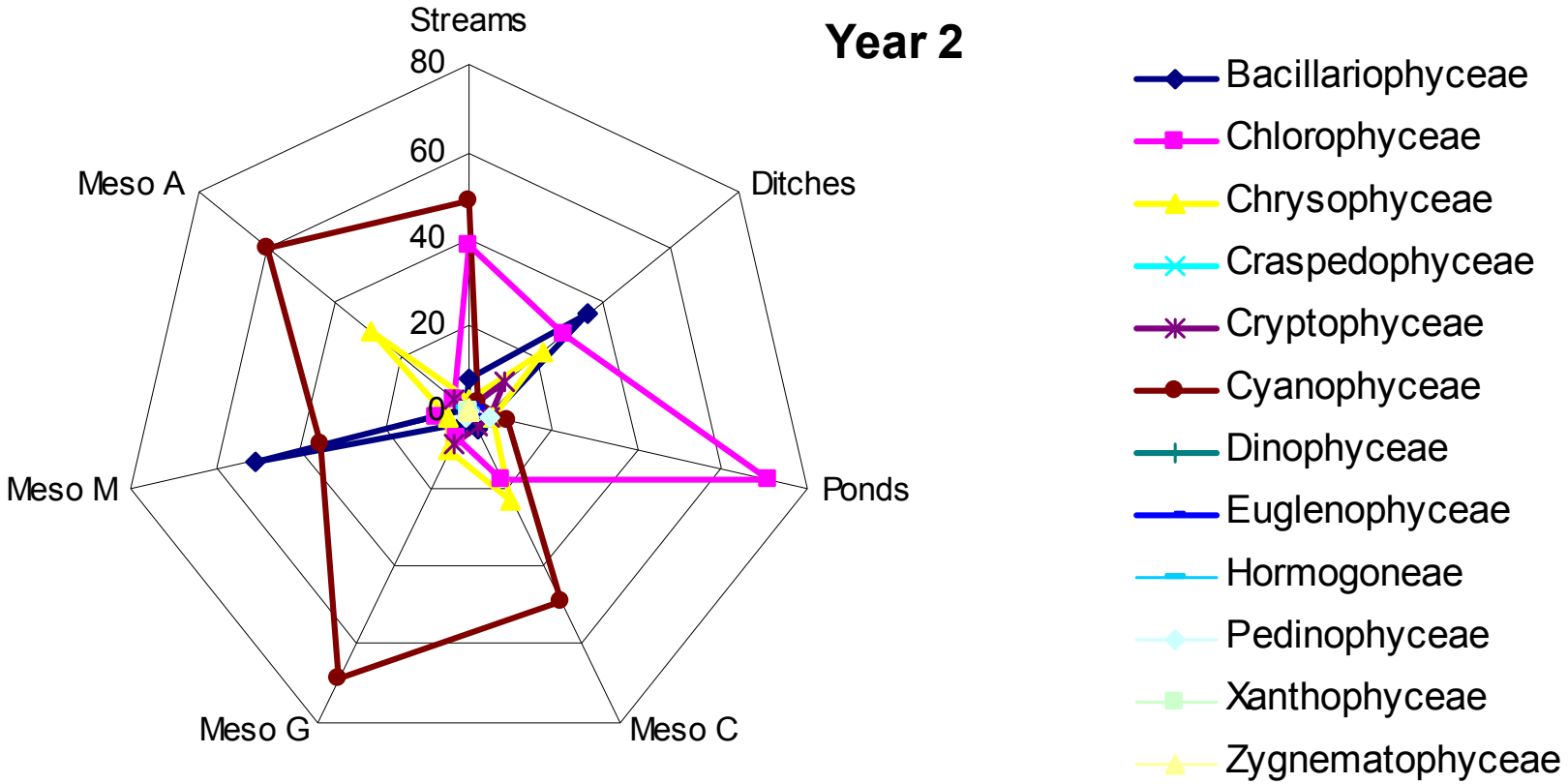
Phytoplankton: Relative Abundance



Year 1

- Bacillariophyceae
- Chlorophyceae
- Chrysophyceae
- Craspedophyceae
- Cryptophyceae
- Cyanophyceae
- Dinophyceae
- Euglenophyceae
- Hormogoneae
- Pedinophyceae
- Xanthophyceae
- Zygnematophyceae

Phytoplankton: Relative Abundance



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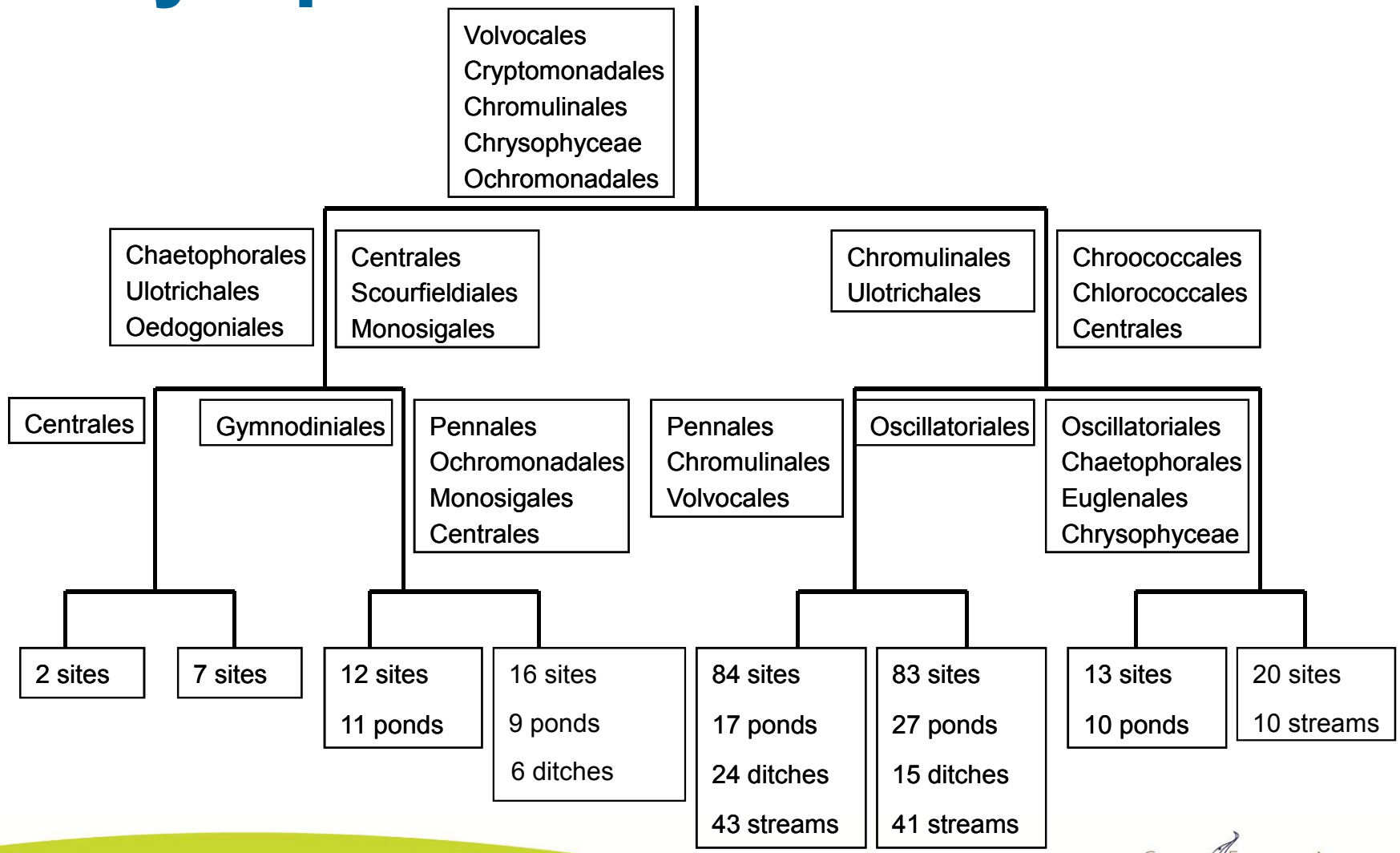
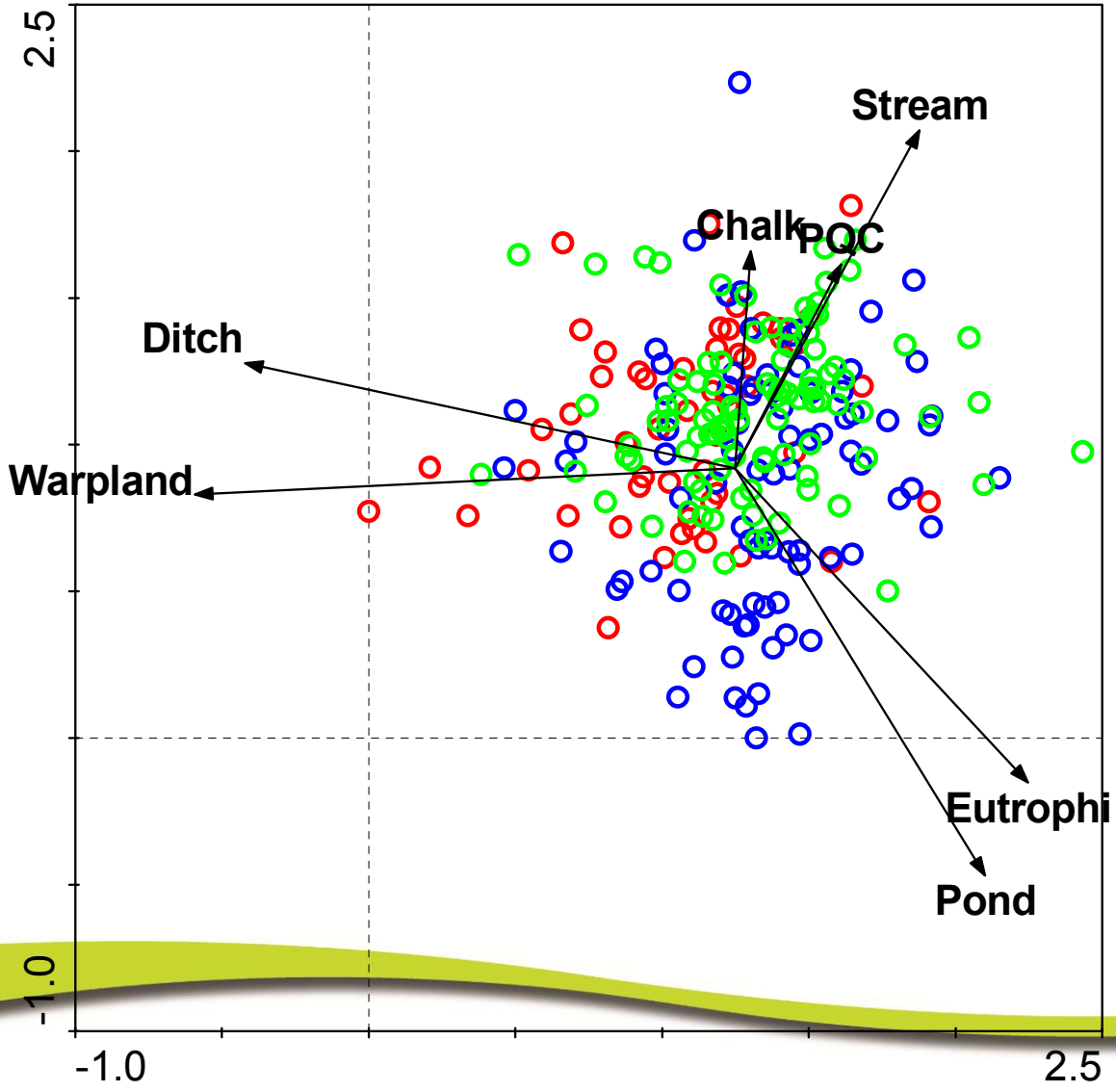
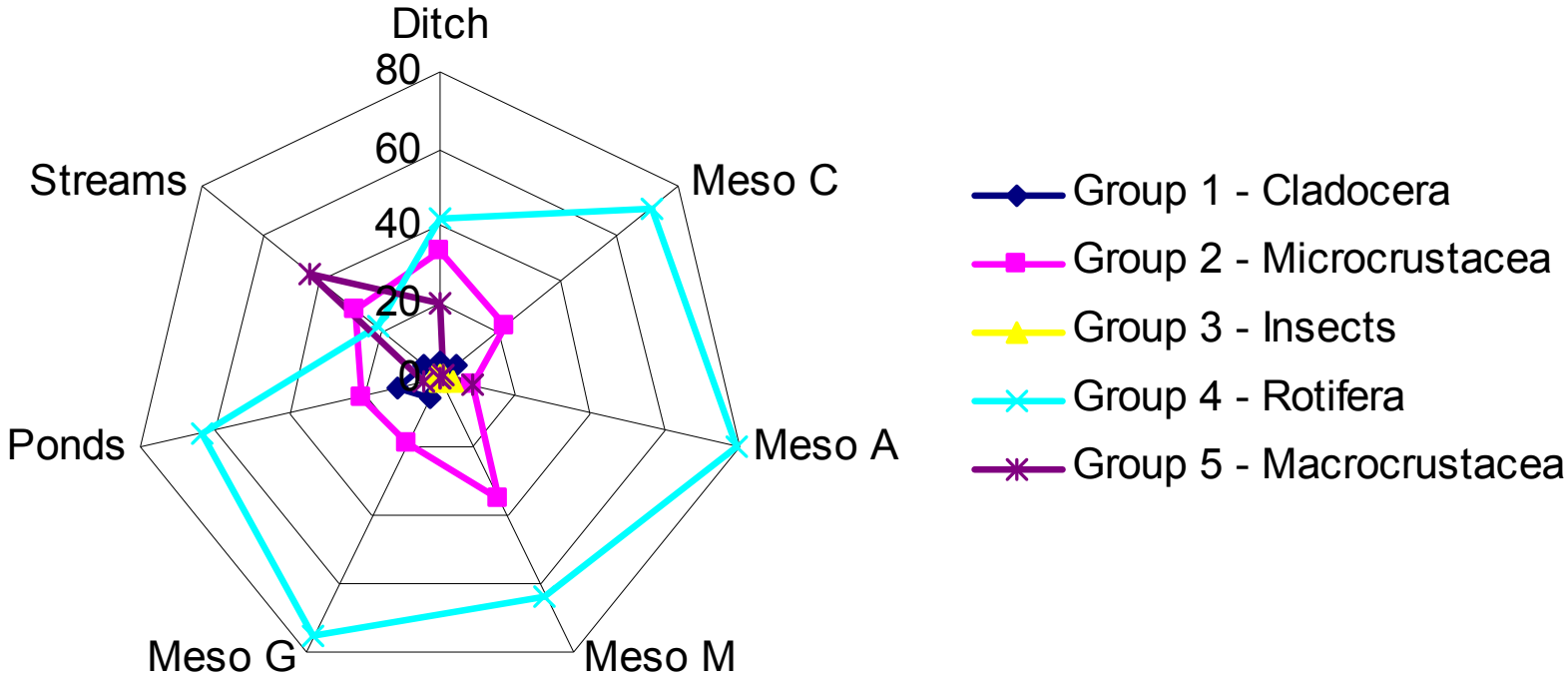


Phytoplankton: Indirect DCA for all field data

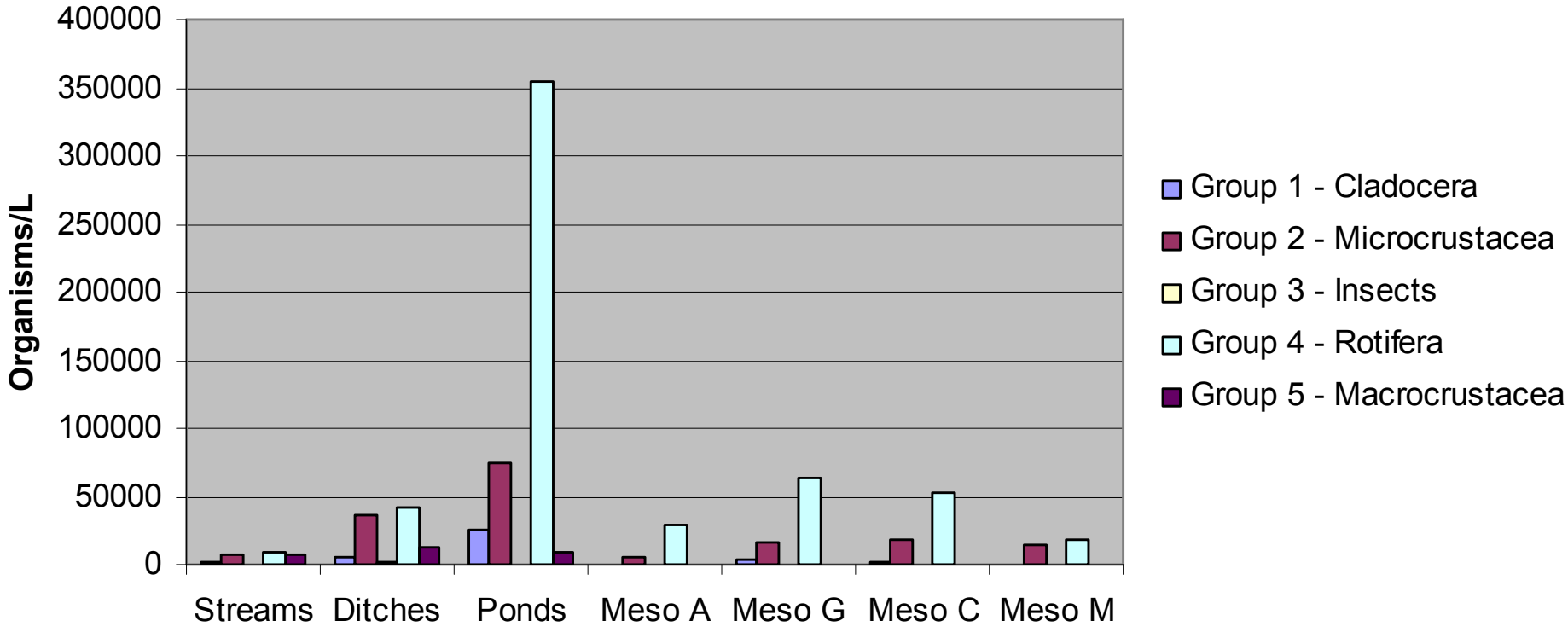


Zooplankton

Zooplankton: Relative Abundance



Zooplankton: No. Organisms



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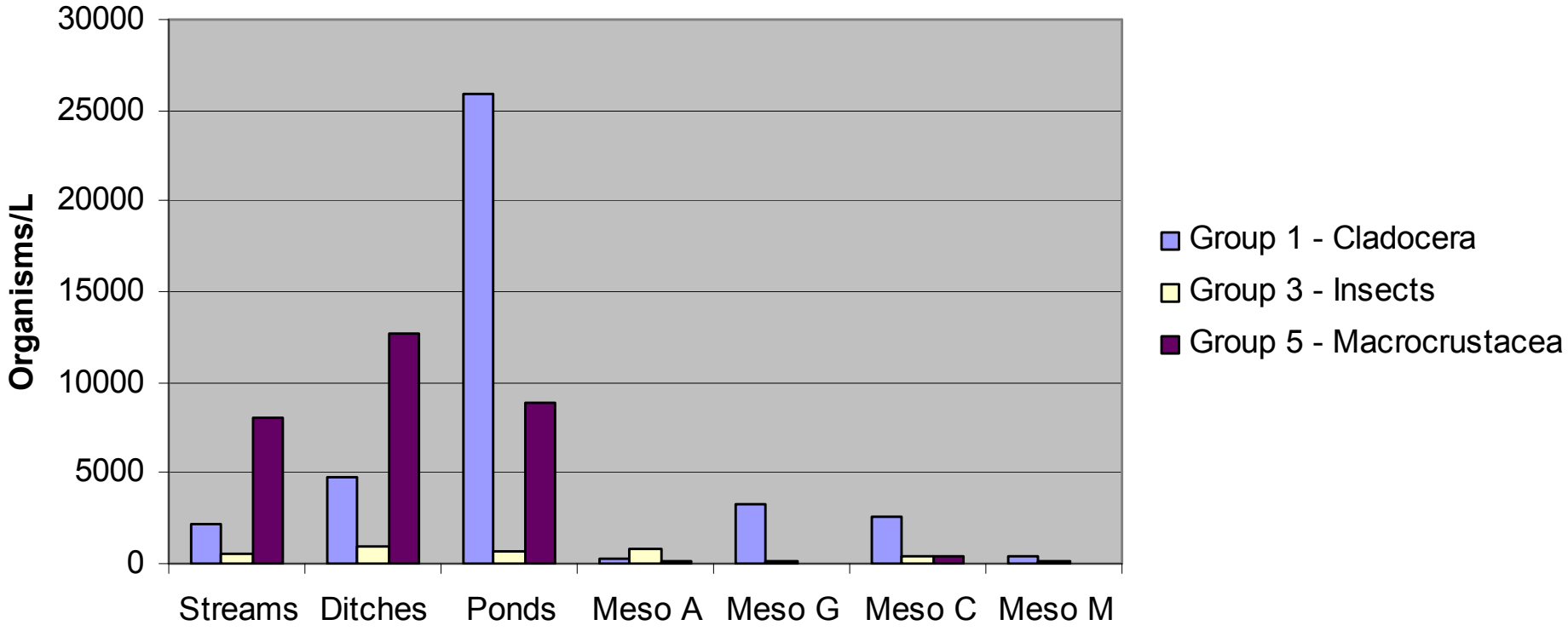
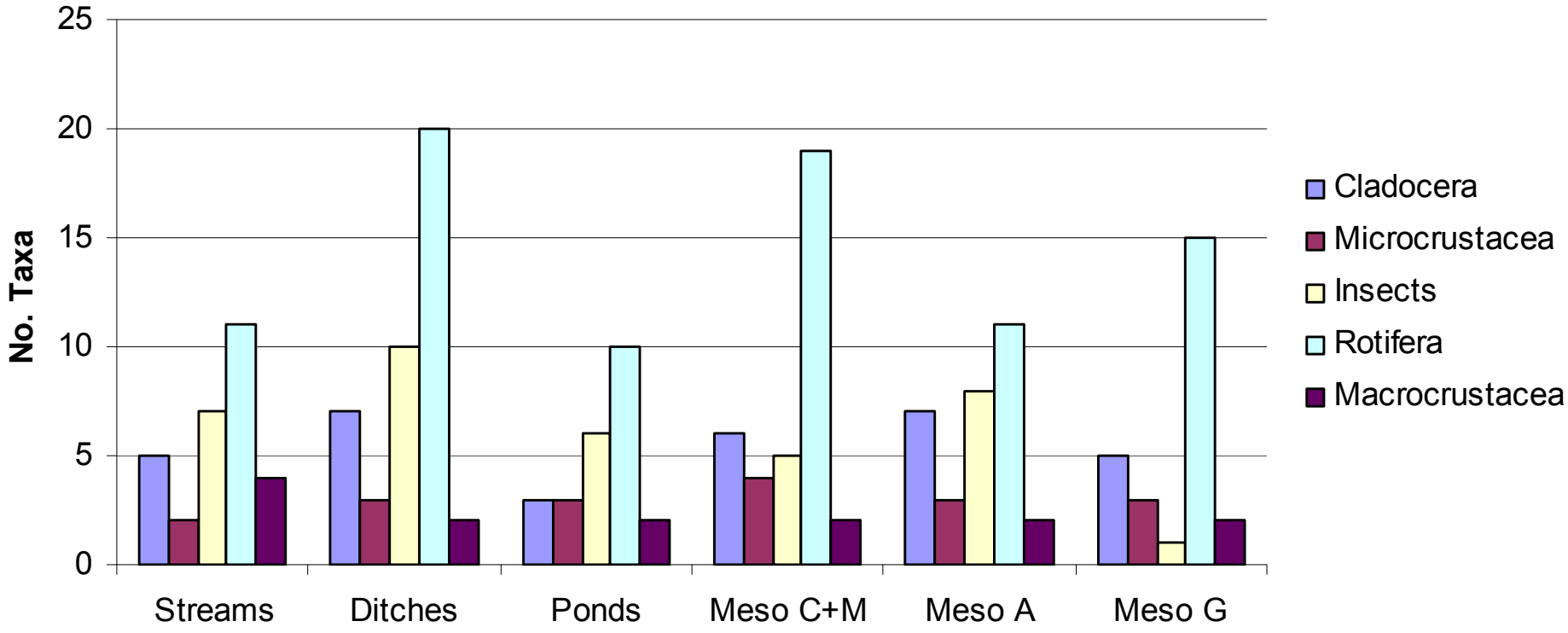
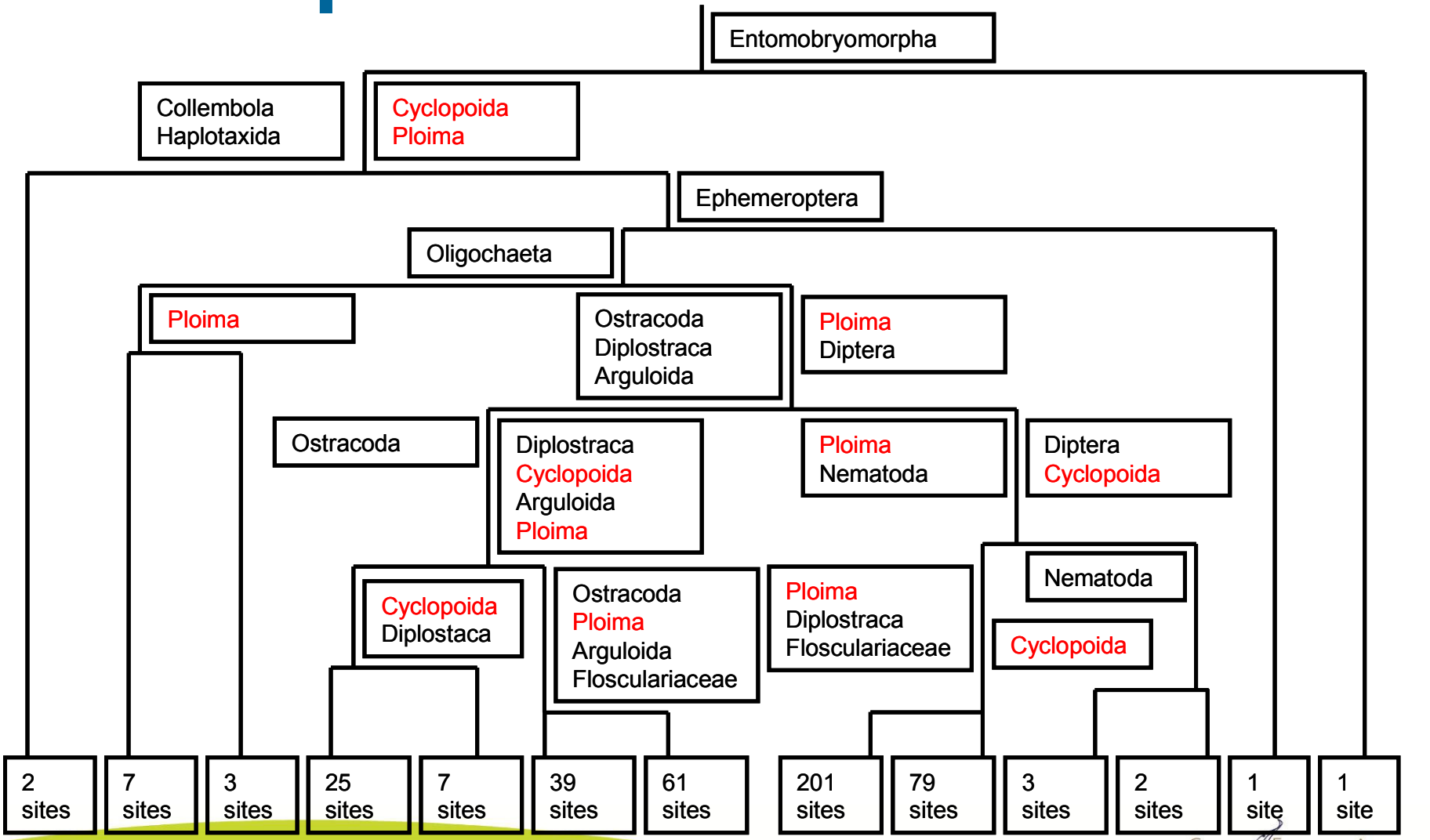


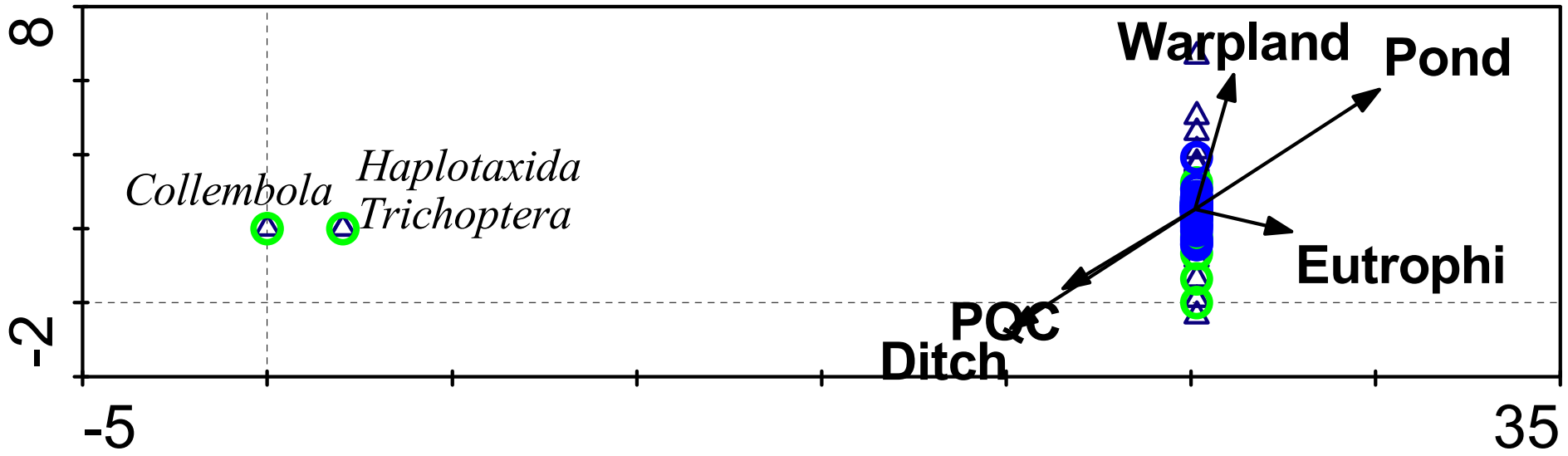
Zooplankton – No. Taxa



Zooplankton: TWINSPAN



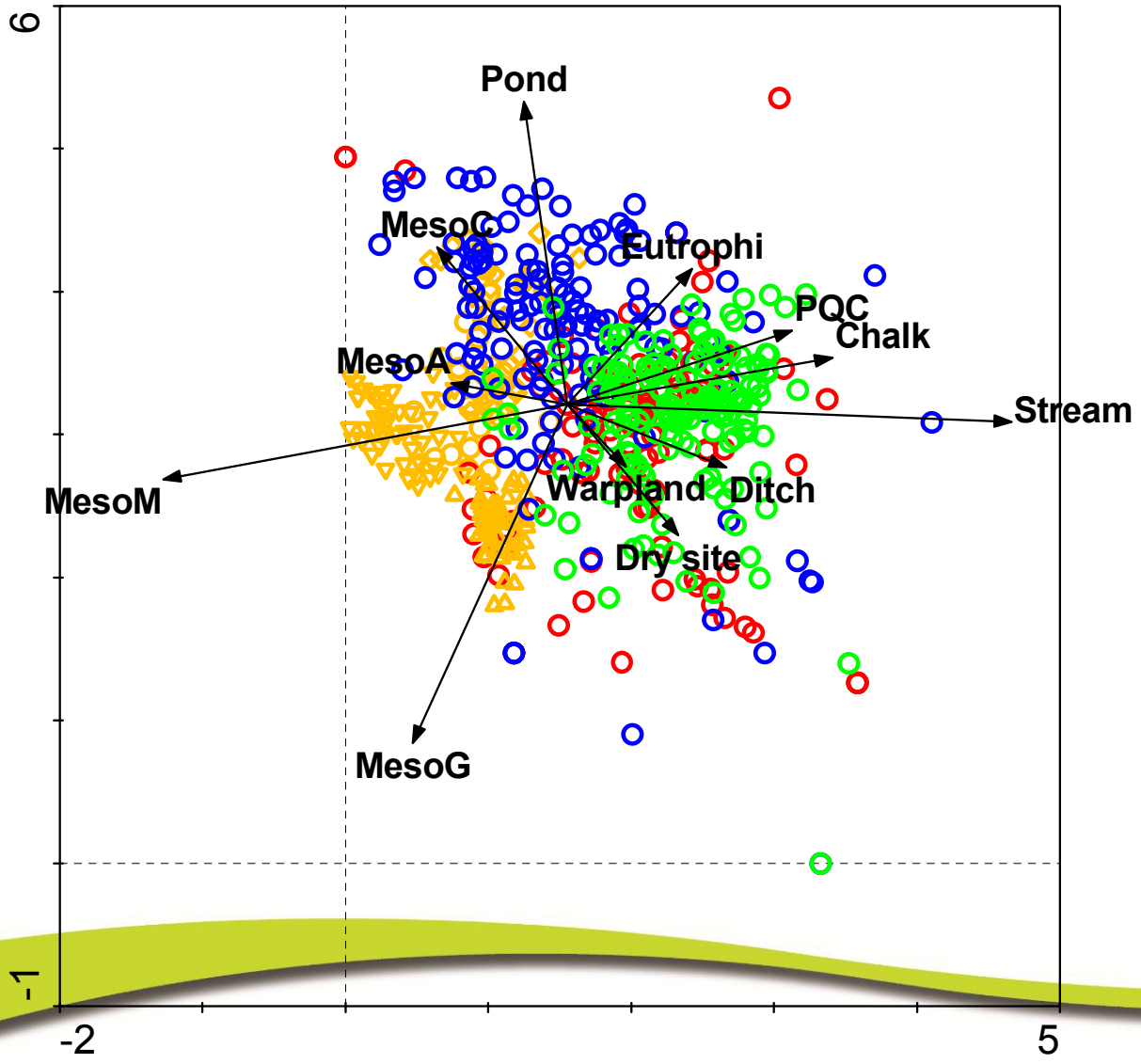
Zooplankton: Indirect DCA for pond and ditch field data



Objective 2

Determine how ecologically representative mesocosms are of field sites by comparing taxonomic composition for Spring/Summer (April-September).

Macroinvertebrates: Indirect DCA for field and mesocosms



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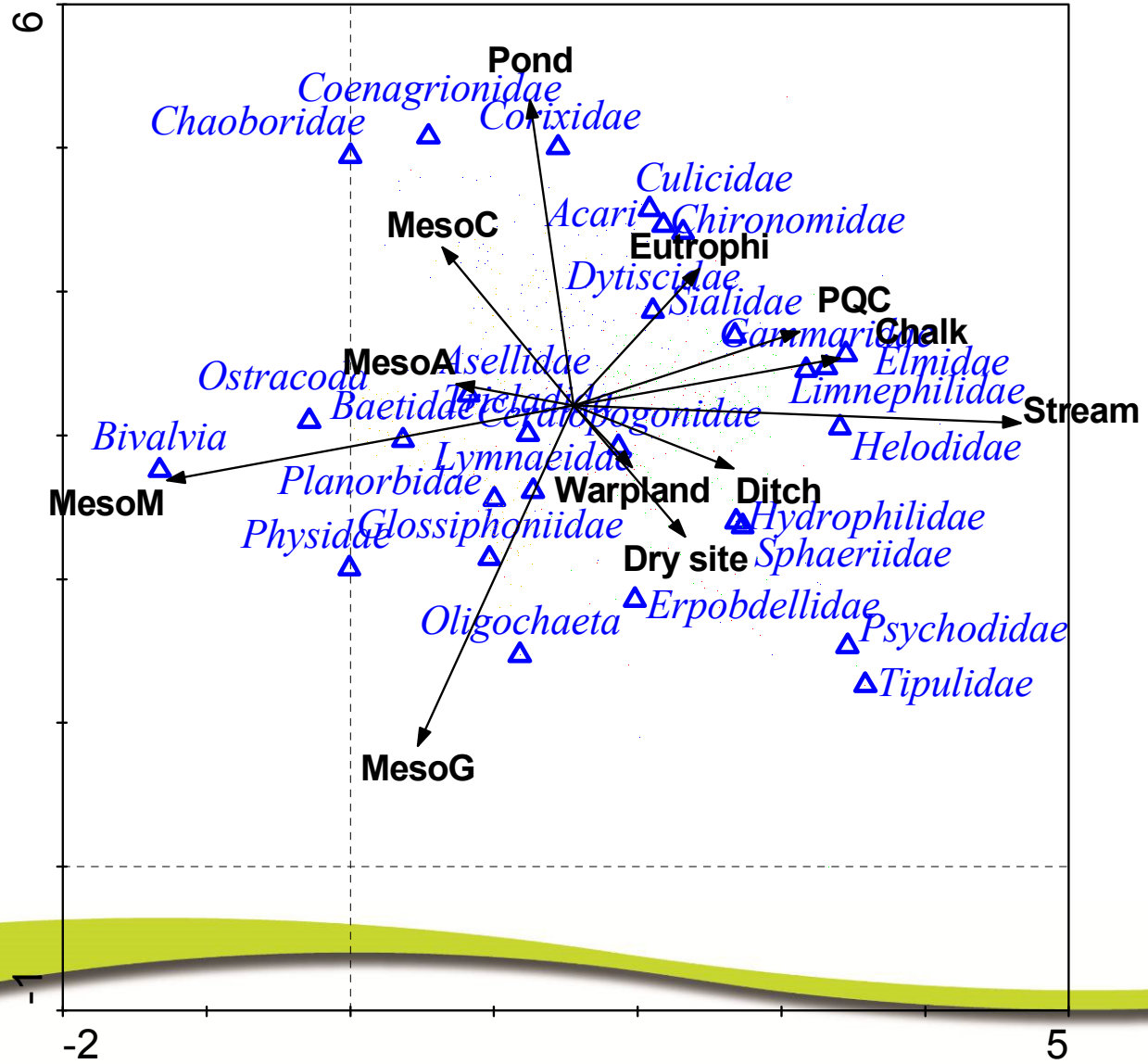
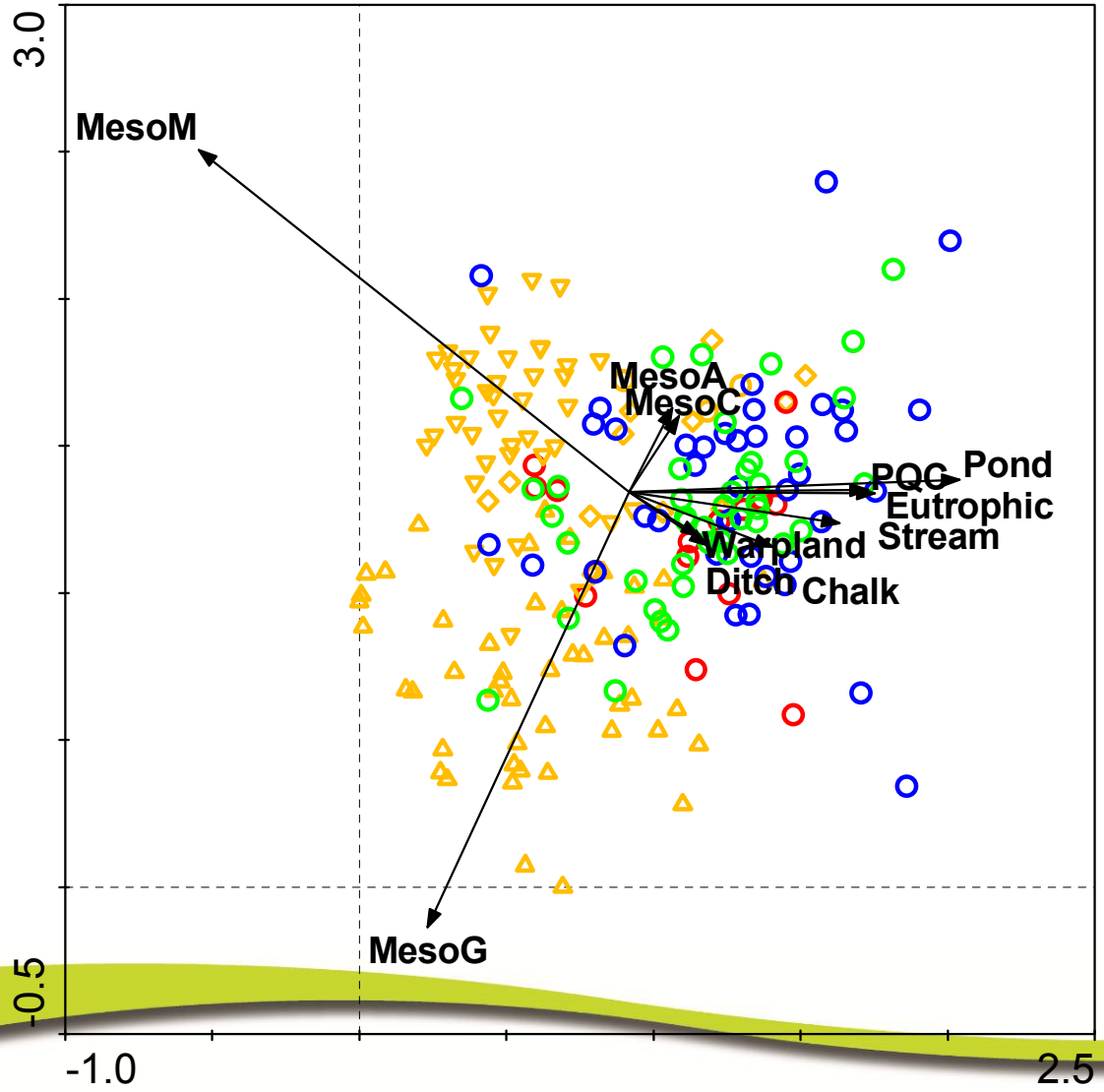
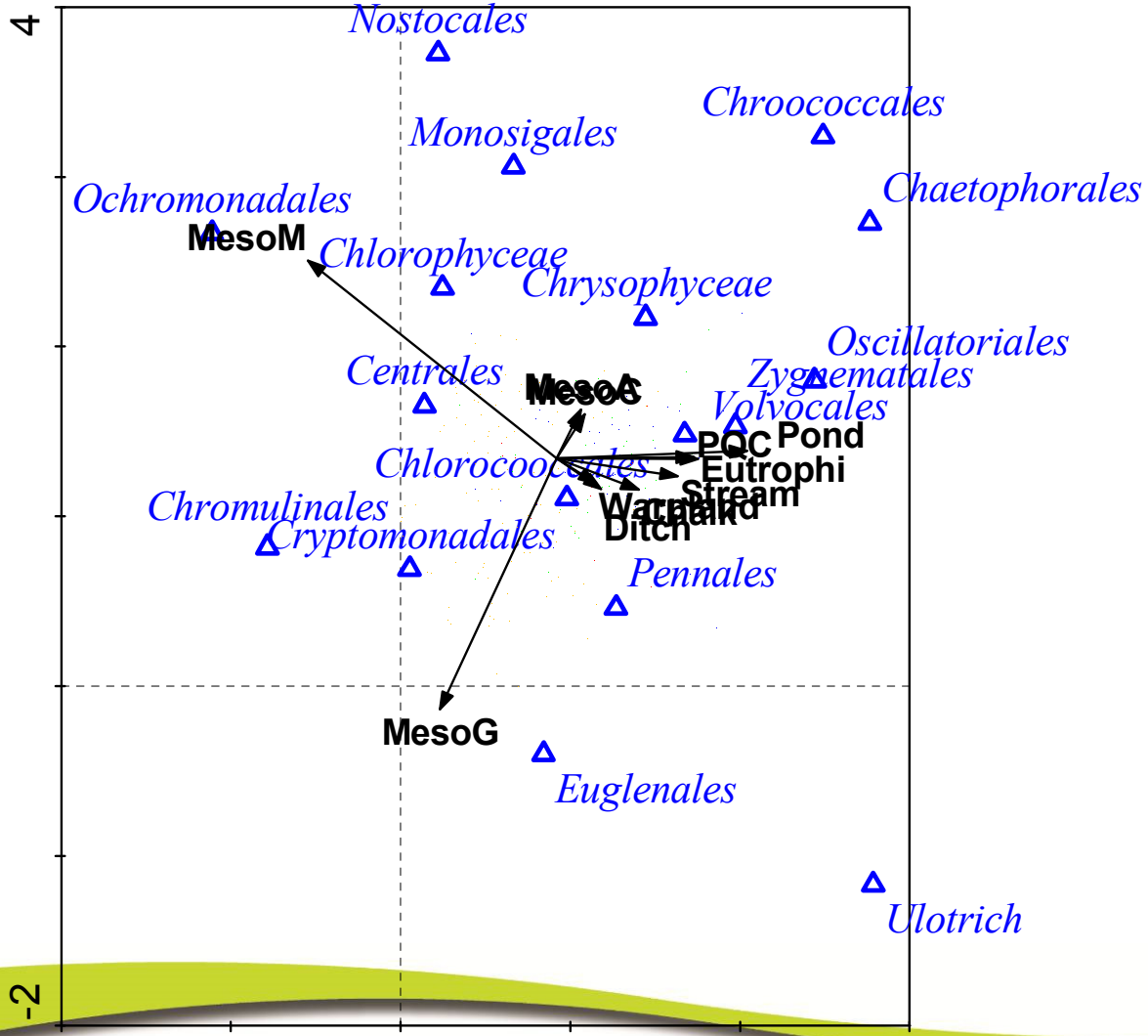


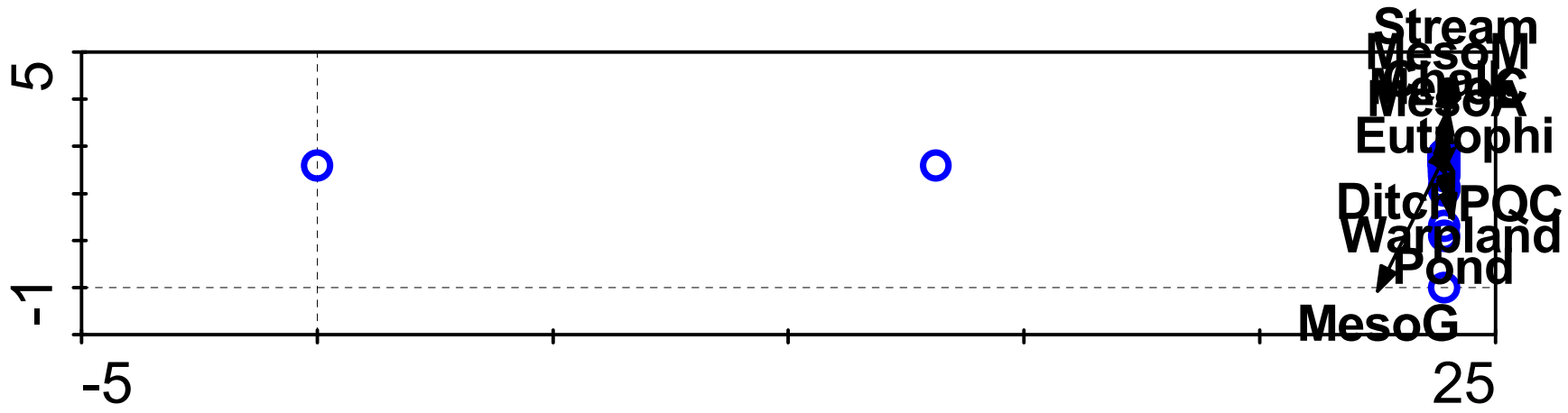
Phytoplankton: Indirect DCA for field and mesocosms



Phytoplankton: Indirect DCA for field and mesocosms



Zooplankton: Indirect DCA for field and mesocosms



What does it mean?

- Communities in different water body types (not landscapes) are different however, mesocosms can be generally representative of edge of field water bodies
- Mesocosms contain organisms known to be sensitive to PPPs but some inter-mesocosm variability can lead to uncertainty
- Spring/summer applications are worst case in that community similarities are more close in spring/summer when compared to winter
- More up to date technical guidance is required

Future presentations

- Influence of temporal variation within and between field sites and mesocosms for macroinvertebrates, zooplankton and phytoplankton.
- Determine which environmental variables influence taxonomic composition in field sites for macroinvertebrates, zooplankton and phytoplankton.
- Use of SPEAR to determine relative sensitivity of UK agricultural waterbodies and mesocosm facilities
- Regulatory recommendations

Thank You for your attention

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