Little whirlpool ramshorn snail update meeting, 2016

Dragonfly House,

Norwich

abrehart ecology Ltd

AECOM

29/11/2016

Welcome

[redacted]

Natural England

Meeting Overview

[redacted]

AECOM

Meeting Overview

–Housekeeping
- Natural England

–Welcome and Meeting overview

–The Acle Straight
- Highways England

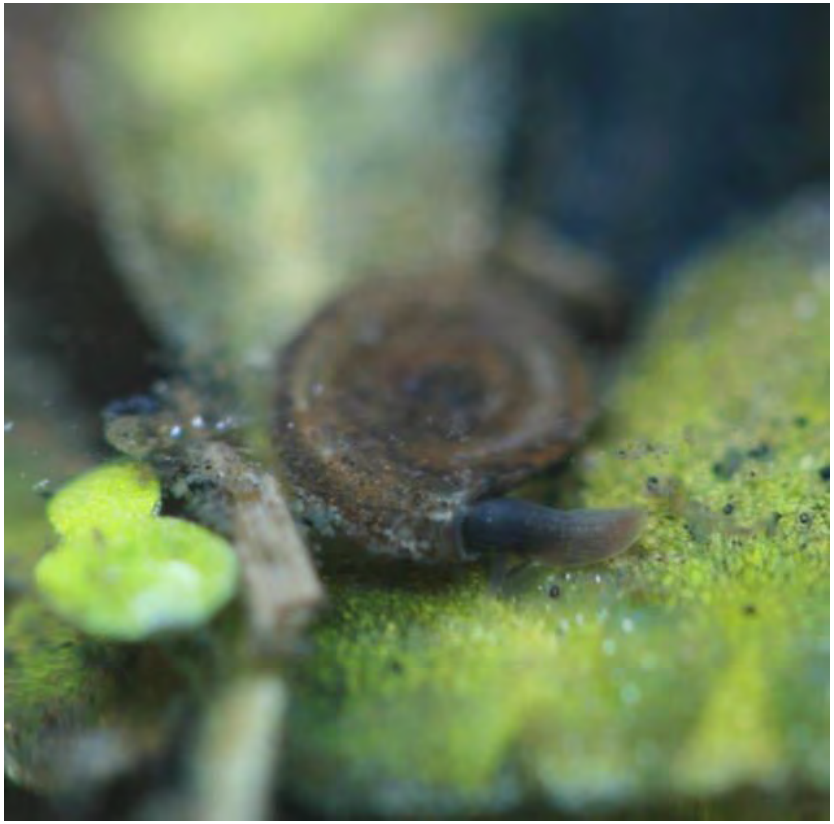
–The story so far…
- AECOM

–Translocation
- Abrehart Ecology

–Multivariate analyses
- Physalia

–The next chapter…Q&A / Discussion

–Lunch



Introduction

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Highways England

Acle Straight

– **A47 Feasibility (Feb 2015)**
  - Reported that to widen or make the road a dual carriageway could require significant environmental constraints to be overcome
  - Recommended appropriate mitigation measures that may be required be investigated

– No Economic appraisal was carried out

– Highways England plan to carry out work to improve safety at collision sites

Acle Straight

Department for Transport

Road Investment Strategy:
Investment Plan
December 2014

The A47/A12 corridor, A47 Acle Straight measures:

"Addressing safety concerns by making short-term and long-term improvements, potentially including installation of safety barriers, junction improvements, road widening and capacity improvements. These will be subject to appropriate mitigation, working with Natural England and the National Park Authority at all stages"

highways england

The story so far…

[redacted]

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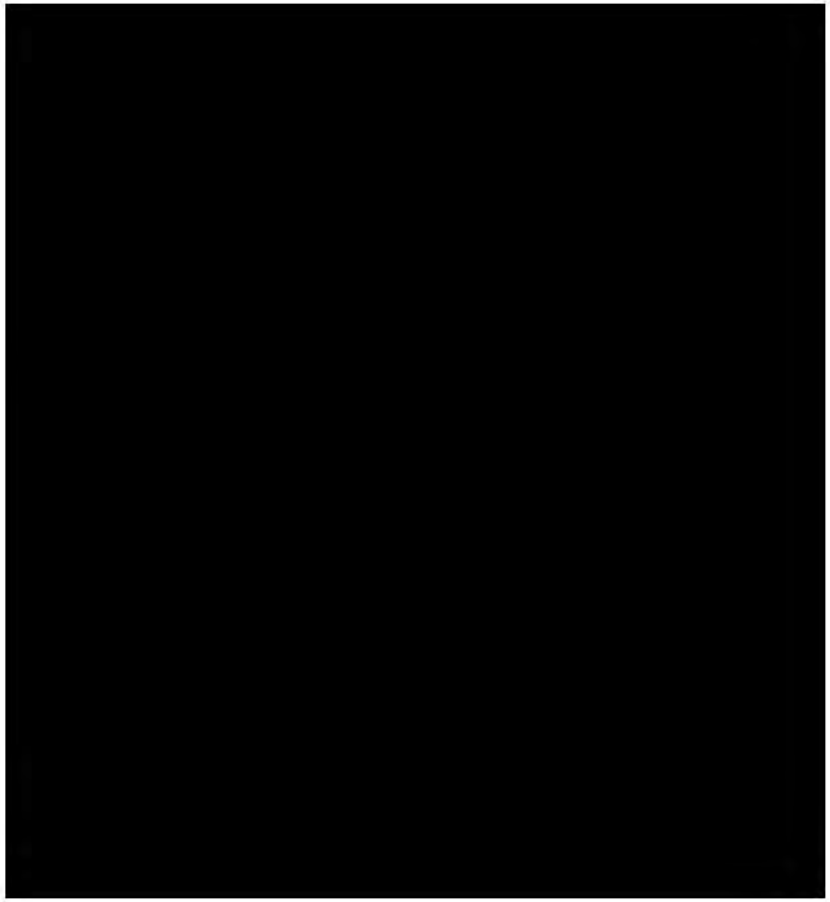
Species Description (Terrier, 2006)

- Little whirlpool ramshorn snail is a small aquatic snail with a flattened spiral shell 0.5-0.8 mm high and 4-5 mm in diameter
- The shell is pale, yellowish-brown and has longitudinal micro-ridges.
- 5-6 convex whorls with the penultimate whorl only slightly smaller than the last.
- The functional upper side (i.e. that of the crawling animal) is flat to slightly concave, whereas the lower is more distinctly, but not deeply, concave.
- The aperture is oval-elliptical with a depressed outer margin.
- Often confused with whirlpool ramshorn snail *Anisus vortex*

Species Distribution (UK)

Preferred Habitat

- Ditches – particularly grazing marsh
- Clean, calcareous water
- Dense vegetation
- Submerged vegetation
- Emergent vegetation
- Both submerged and emergent vegetation
- Other molluscs
- Shallow margins
- Not over shaded
- Naturally mesotrophic
- Appropriate management
- If conditions are right it can be present in high numbers – habitat specialist, with ability to establish quickly.
- No one over riding factor, conflict in studies



Conservation Status

- Since 2004, the little whirlpool ramshorn snail has been listed in the EU Habitats and Species Directive as a species of community interest, requiring special areas for conservation (Annex II) and strict protection (Annex IV).
- It is further listed as Red Data Book: Vulnerable, threatened by drainage, over-frequent dredging and eutrophication.
- Little whirlpool ramshorn snail is a UK Biodiversity Action Plan Priority Species and the only British non-marine, aquatic snail which is a European Protected Species.
- Section 41 Natural Environment and Rural Communities Act 2006

Threats & Management
(sources: Literature Review)

– THREATS

- Lack of knowledge
- Drainage
- Over frequent dredging
- Intensive methods of dredging
- Eutrophication
- Erratic water supply
- Rising sea levels
- Dispersal (the paralysed snail!).

– MANAGEMENT

- Not cleared more frequently than every 7 years
- Assessed, whether clearance is absolutely necessary
- “Stagger” clearance
- Consider cutting rather than excavation
- Timing – conduct clearance in Autumn
- Light grazing

Conservation status assessment for Species: S4056 - Little whirlpool ramshorn snail

Future prospects for the species:

Poor prospects. Species likely to struggle unless conditions change

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Feasibility study

- PURPOSE TO INVESTIGATE THE FEASIBILITY OF CONDUCTING A CONSERVATION TRANSLOCATION

- *Included:*
  - Baseline – literature review and consultation
  - Constraints
  - Translocation Protocol
  - Post Translocation Requirements
  - Feasibility Determination

What is Conservation Translocation?

"*conservation translocation is the deliberate movement of organisms from one site for release in another, with a measurable conservation benefit at above individual level achieved, thus conservation translocation must benefit the levels of a population, species or ecosystem*".

IUCN Guidelines (2013)

Hypothesis:

"Little whirlpool ramshorn snail can be translocated under a Class Licence as a by-product of ditch management"

WML CL14 Class Licence - Reminder

“WML CL14: To permit the maintenance of ditches and other water bodies inhabited by the Little Whirlpool Ramshorn Snail”

– This licence allows maintenance of drainage ditches inhabited by little whirlpool ramshorn snails.

– However, these actions may only be taken to:

- conserve wild animals
- preserve public health or safety
- prevent serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, timber or any other property.
- The purpose of the licence is to allow necessary maintenance as long as the management complies with a management protocol that forms part of the licence.

The feasibility study

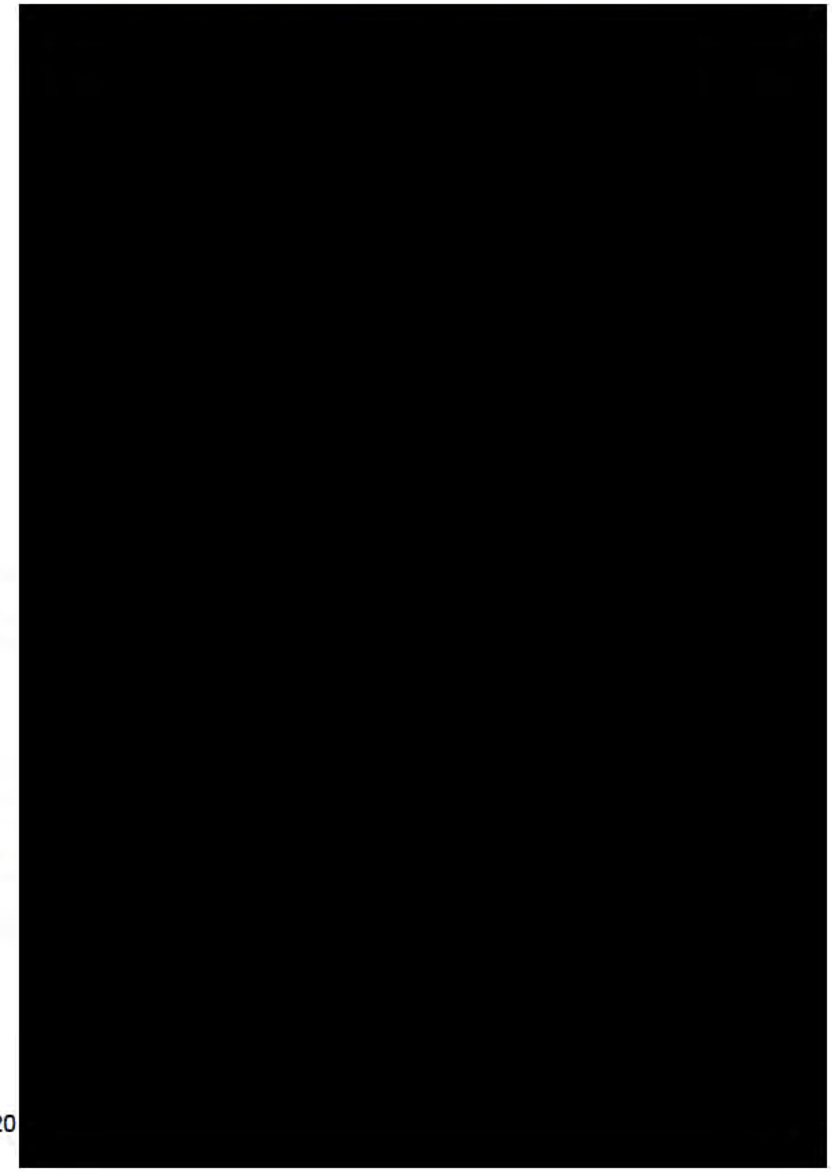
– *RESULTS OF THE FEASIBILITY STUDY :*

- A detailed report – source of information and reference.
- It would be **legal** to move species in this way – but not **informed mitigation**.
- Recommendation of a pilot study
  - Outlined methods, protocols, identification of constraints and best practice.
  - Offered a way forward
  - Identified sites for study based on vegetation classification.

Scoping survey – survey areas

– Survey Areas

- Five land parcels withi [redacted]
- Each of the areas understood to be characterised by slow flowing ditches within grazing marsh
- Area 1 – identified as a potential donor site (records of presence)
- Area 2 – 5 land plots [redacted], selected because land access secured and potential receptor ditches
- More than 34 km of ditch to be appraised!



Scoping survey – survey method and appraisal criteria

- Site walkover survey and habitat appraisal to inform subsequent surveys
- Appraisal based on set criteria/habitat suitability
- Habitat suitability criteria based on expert knowledge & habitat data in literature

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- Relatively late succession
- Diverse & abundant emergent and floating-leaved macrophytes
- Presence of shallow marginal habitat
- Low density grazing
- Appropriate management
- Not polluted

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- Highly eutrophic (significant algal growth)
- Heavily shaded ditches, or with few macrophytes
- Arable landuse, high cattle densities
- Regularly managed or intensely dredged
- Evidence of pollution

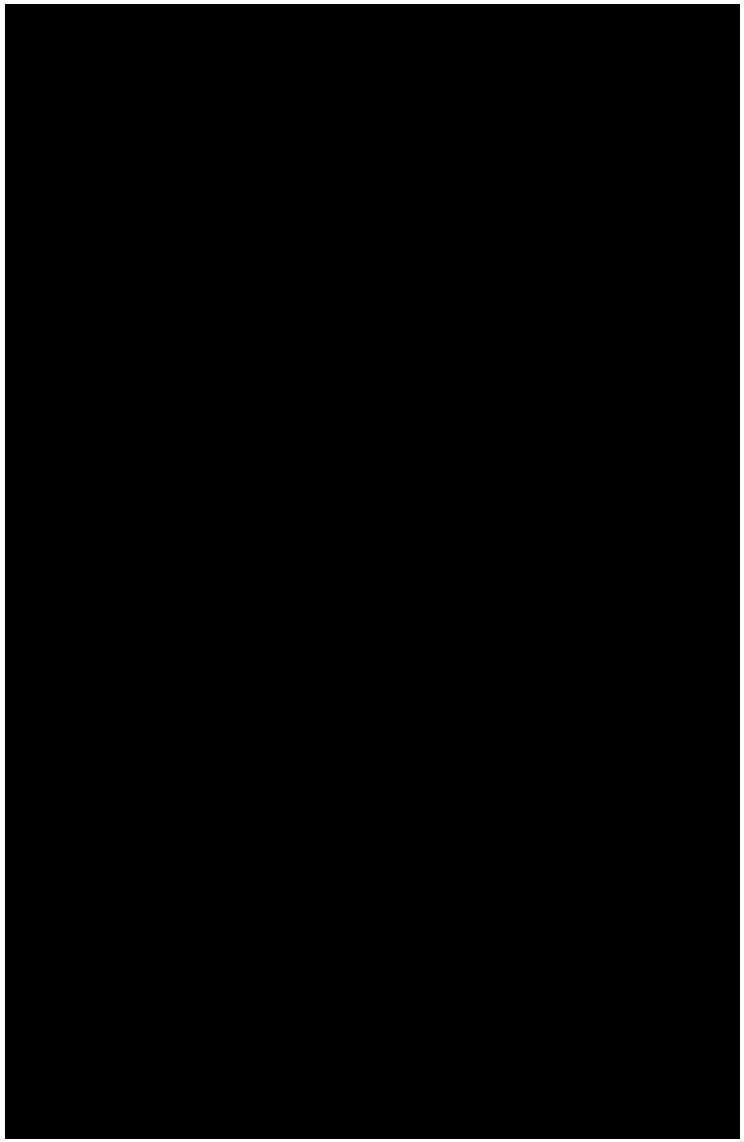
Scoping survey – appraisal criteria & classification

Habitat Suitability
5 – Very good potential
4 – Good potential
3 – Good/moderate potential
2 – Moderate potential
1 – Low potential
0 – No potential

Scoping survey – conclusions

- 9.1 km of good/very good and 5.5 km of moderate – for potential further surveys
- Areas 1, 3 and 5 had ditches with highest potential for further detailed survey
- 19.5 km scoped out of further surveys
- Several ditches could have potential to act as receptor or donor ditches… depending on presence/absence of *Anisus vorticulus*
- Survey helped understand how we could practically survey the ditches and 'fine tune' detailed survey method (how many ditches/day etc.)

Methods in the field



- Sampling was carried out by two teams: Quality control applied
- Sample site approximately every 50 metre
- Consisting of three sub samples – 15 metres apart
- Three ten second sweeps were made at each sub sample
- Combined into a single sample in a white tray
- Agitated and surface material poured off *Lemna* and silt
- Retained mollusc concentrations examined: Species recorded

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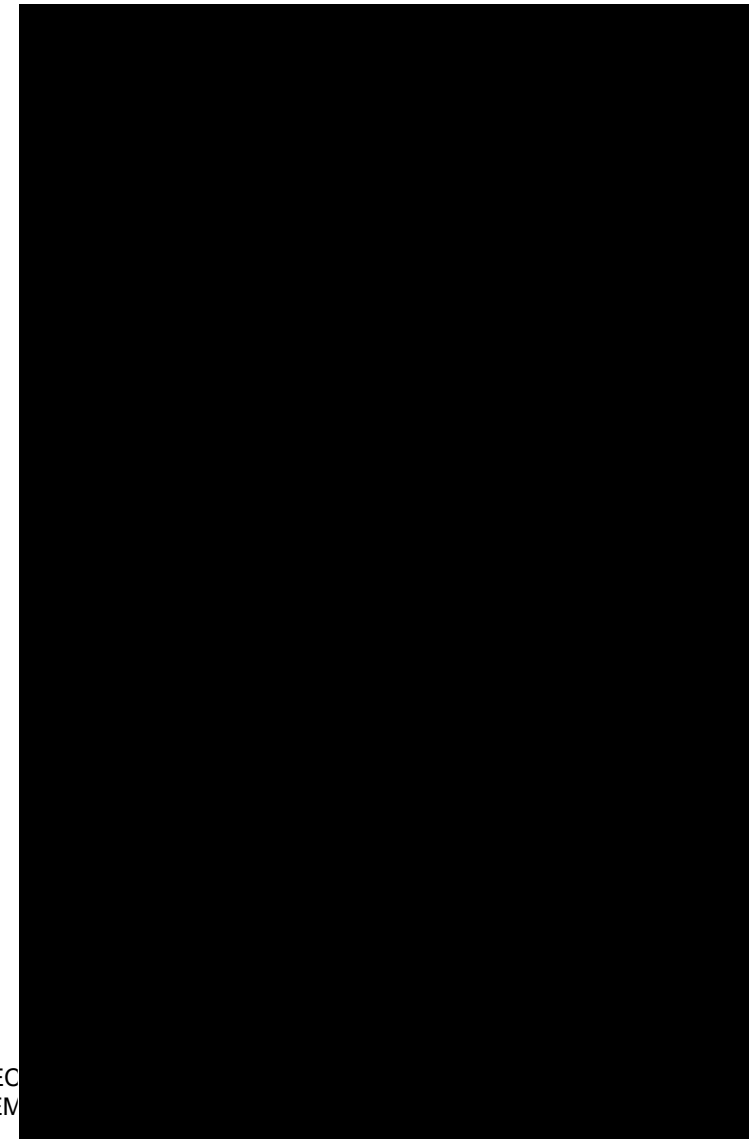
Methods in the field



- Abiotic and botanical
- Wide range of abiotic factors were also recorded
- Following an adapted grazing marsh recording form from Buglife
  - Water features
  - Adjacent land use
  - Bank vegetation structure
  - Ditch features
  - Management
- Botanical species recorded for each sub-sample
- Bank side, emergent and aquatic flora

Detailed survey – 2015 summary

- Produced approximately 10,000 unique records of flora and fauna
- Discovered a new large population of *Anisus vorticulus*
- Mapped many RDB species across all sites visited
- Helped determine the quality of the SSSI
- Confirmed potential donor sites
- Found potential receptor sites

Timeline

- Dec 2014 – June 2015: Feasibility Study
- June – July 2015: Scoping Study
- July - Sept 2015: Detailed Survey
- April – May 2016: Translocation; Multivariate Analysis
- Sept – Oct 2016: Monitoring; Multivariate Analysis; Scoping
- Oct – Nov 2016: Detailed survey
- 2016 – 2020?: Monitoring; Future studies

Translocation

[redacted]

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Initial Surveys

- Initial surveys conducted 2015
  - Candidate study areas identified
  - Mollusc and vegetation communities surveyed
  - *Anisus vorticulus* presence/absence assessed in the field & confirmed with lab microscopy
- Receptor and donor sites identified
  - Based on mollusc communities, vegetation, and abiotic factors

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Locations of donor and receptor sites

Donor sites:
Anisus vorticulus present at high density.

Receptor sites:
Habitat suitable but *Anisus vorticulus* currently absent.

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Translocation

- Carried out April-May 2016
  - Conducted under licence 23292-SCI-SCI
- 800 *Anisus vorticulus* moved
- 3 donor sites
- 8 receptor sites
  - Two groups of 50 animals per site

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Findings to date

– Still early stages, more surveys required

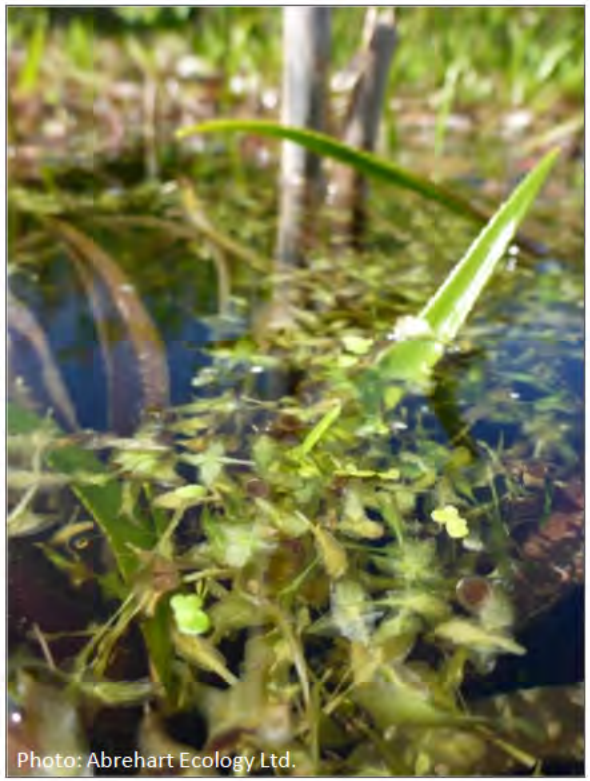
Photo: Abrehart Ecology Ltd.

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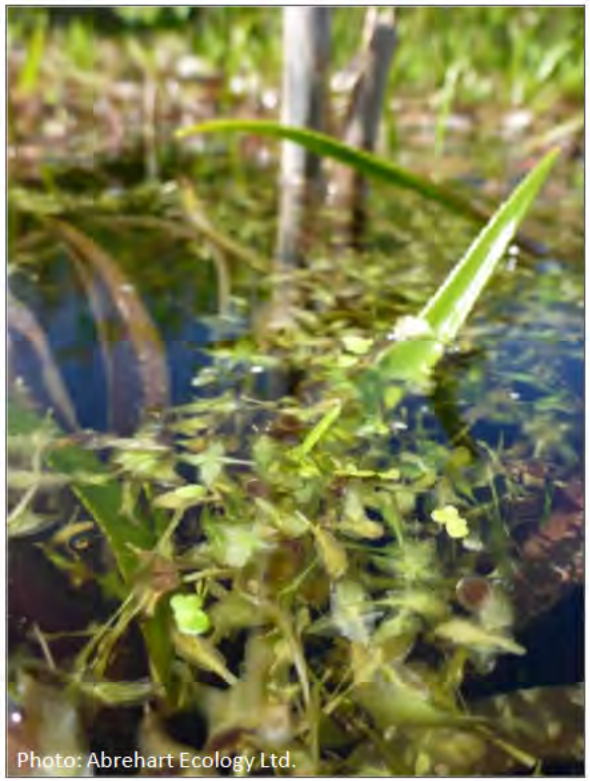
Findings to date

- Still early stages, more surveys required
- *Anisus vorticulus* found alive at all sites
- Numbers varied
  - Populations from donor site 2 most successful



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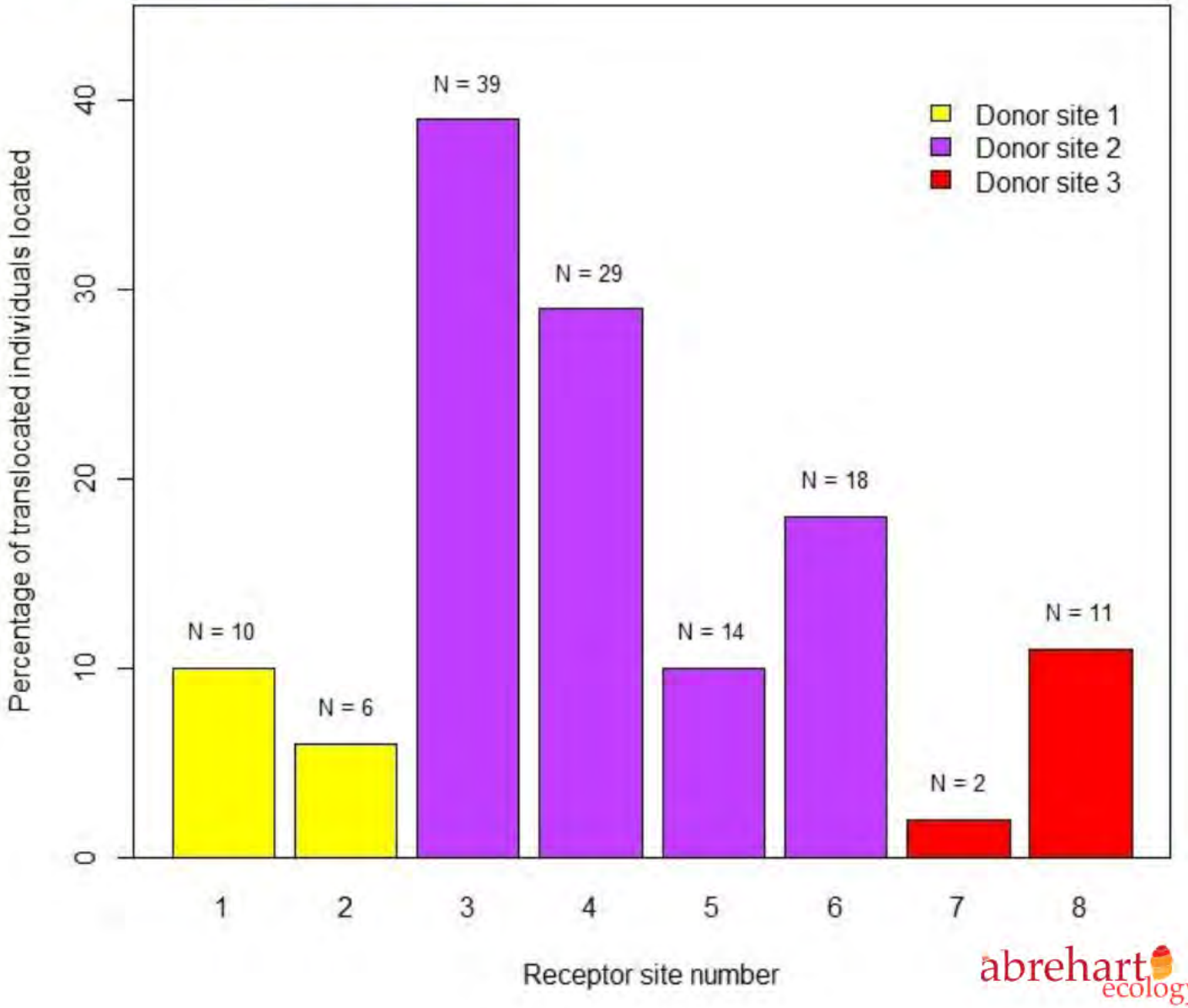
Percentage of *Anisus vorticulus* found at each receptor site 6 months after translocation



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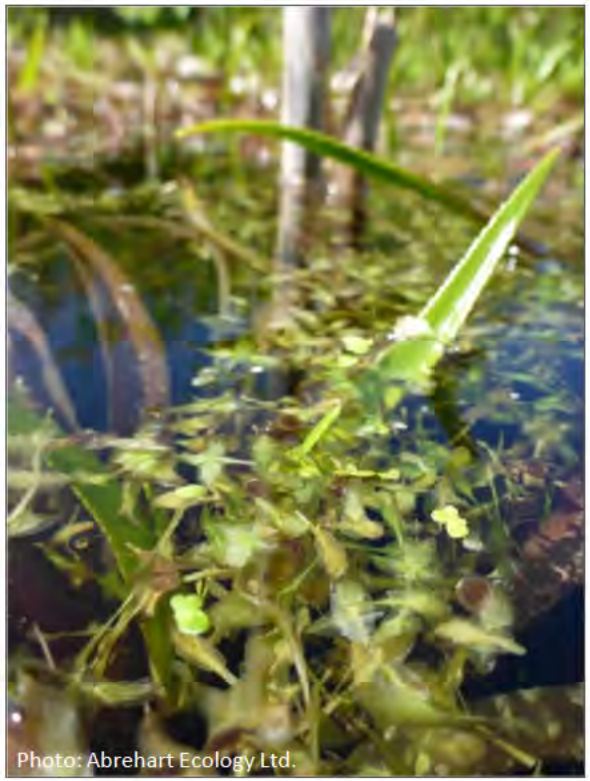
- Evidence of breeding
- High numbers of juveniles found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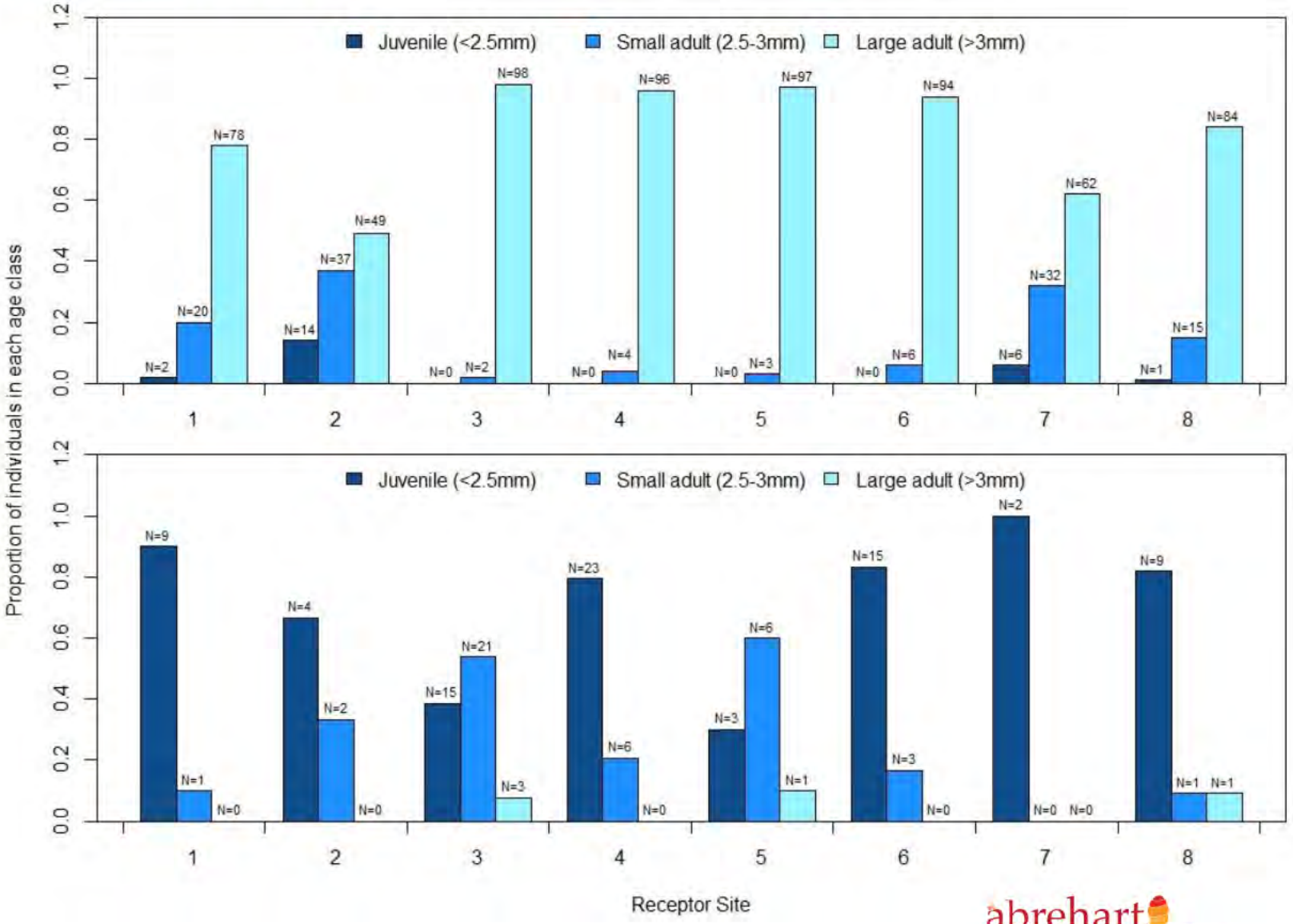
Age structure in samples at time of translocation and 6 months after translocation



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- No change in donor population density
- Similar numbers of individuals found per sweep
  - Age structure similar to receptor sites

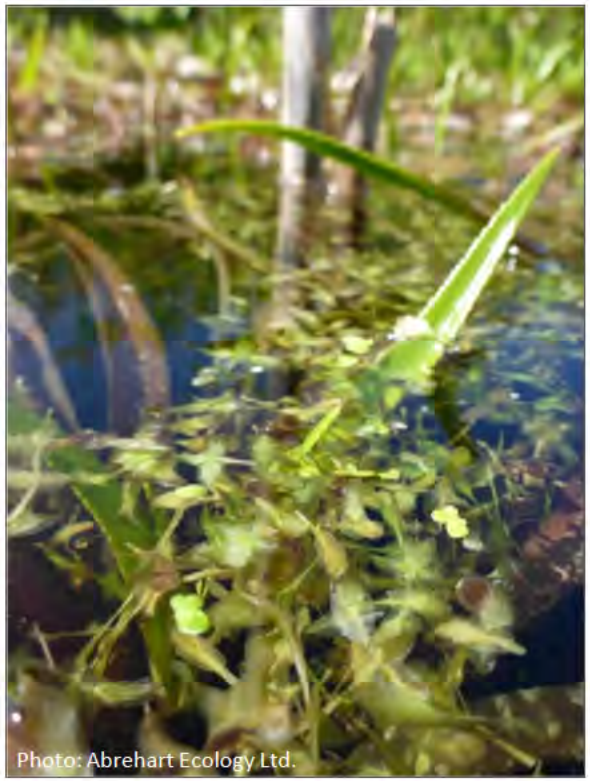
Photo: Abrehart Ecology Ltd.

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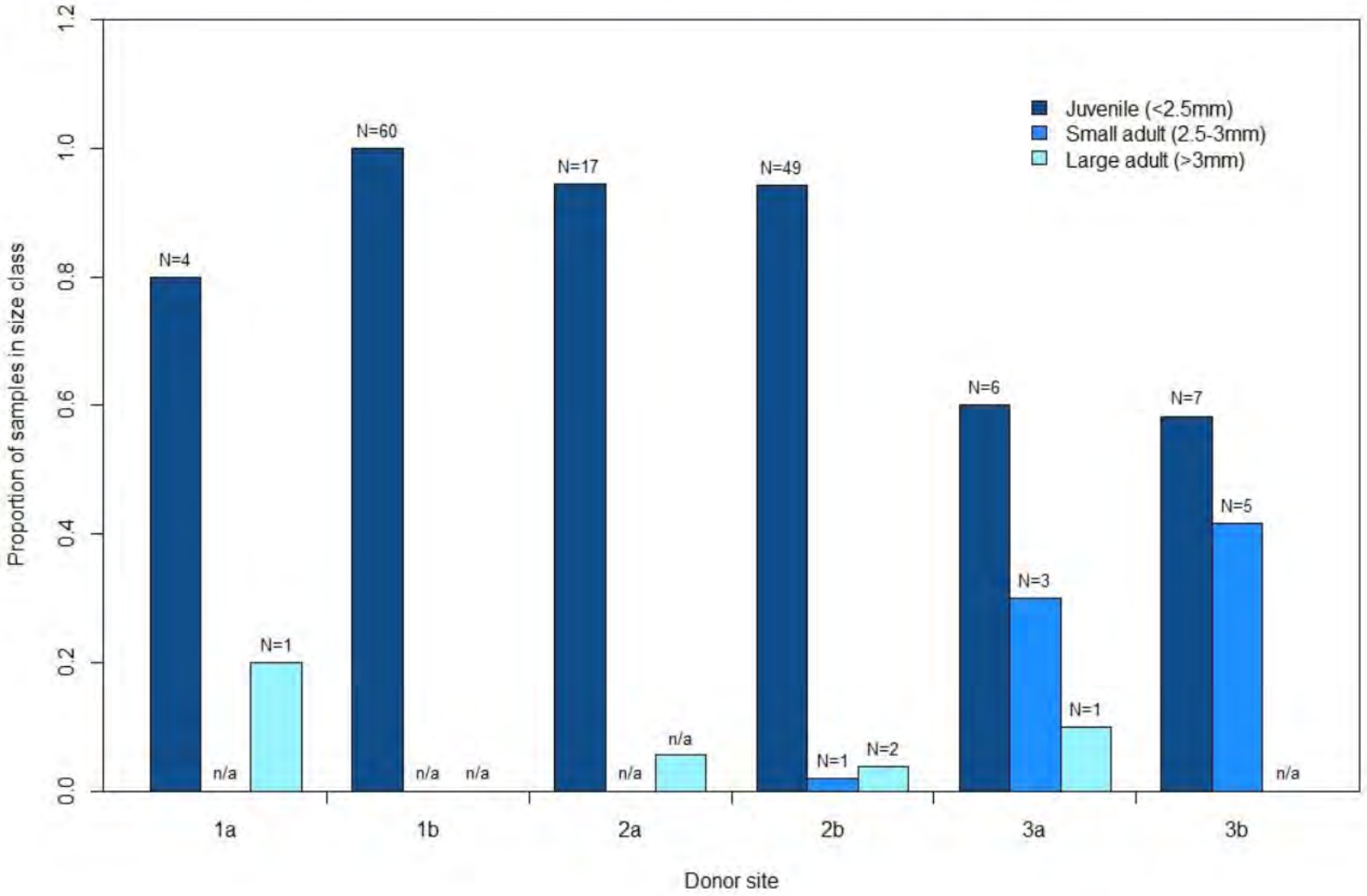
Age structure in donor site samples 6 months post-translocation



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  - Age structure similar to receptor sites
- Evidence of wider ditch colonisation?
- Early indications that new populations are spreading out

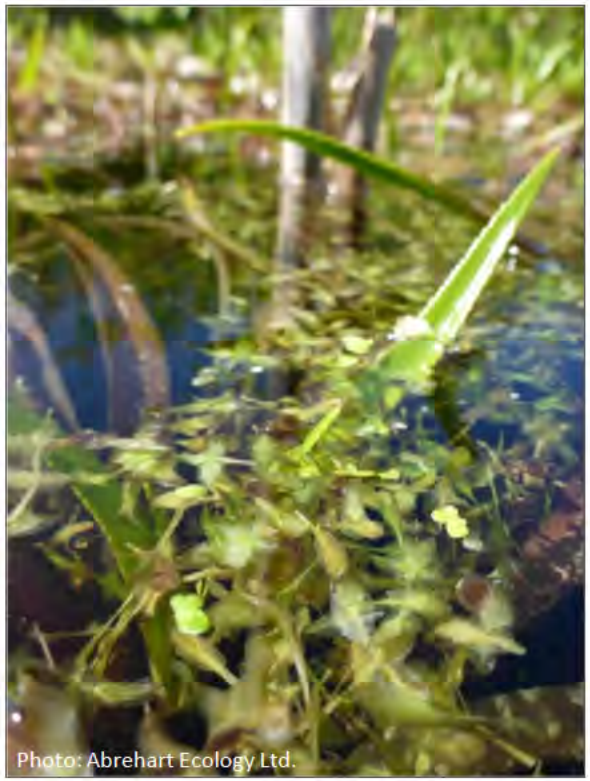
Photo: Abrehart Ecology Ltd.

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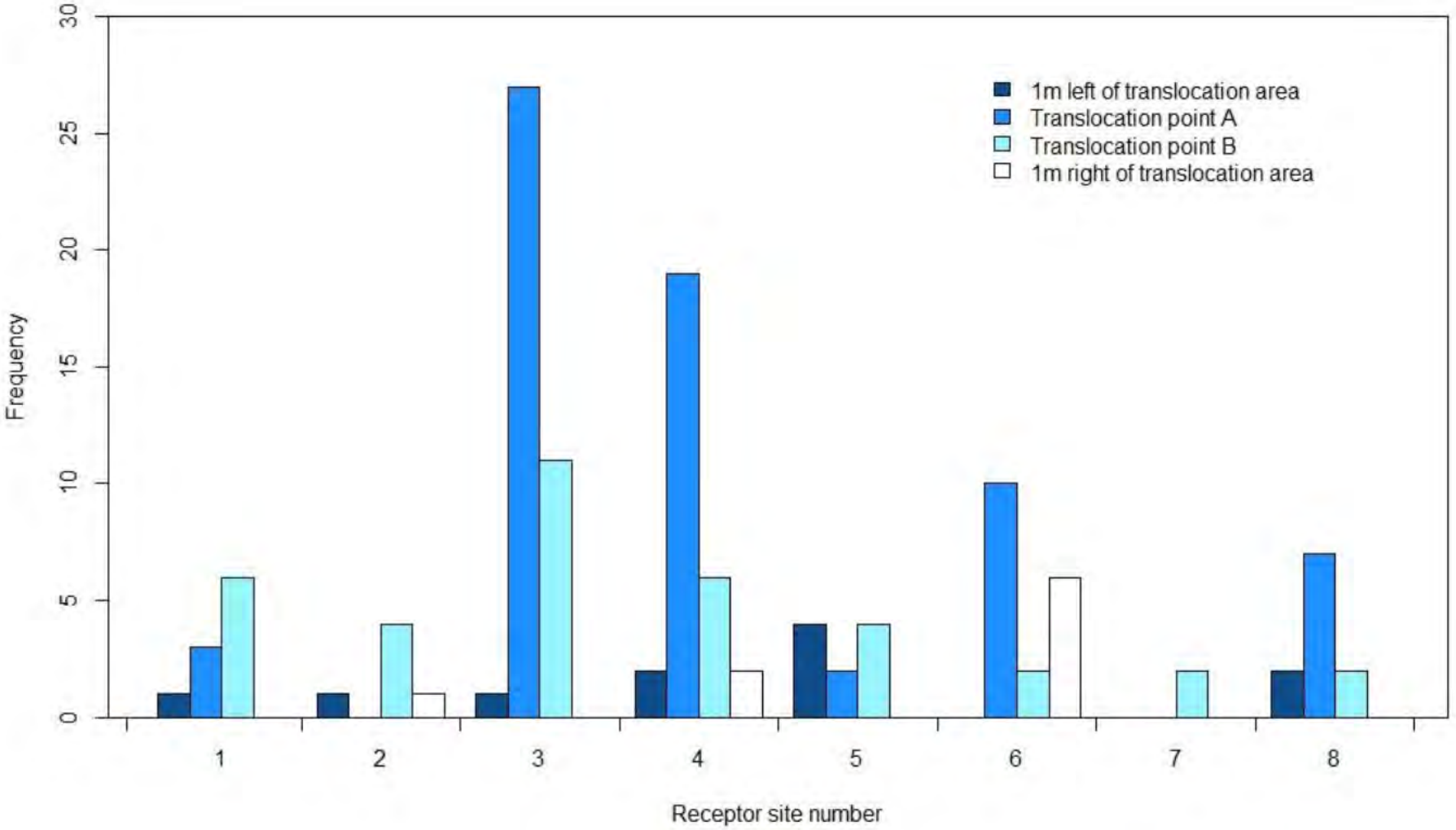
Locations of *Anisus vorticulus* found 6 months after translocation



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Summary

- Still early stages, more surveys required
- *Anisus vorticulus* found alive at all sites
- Evidence of breeding
- No change in donor population density
- Evidence of wider ditch colonisation?

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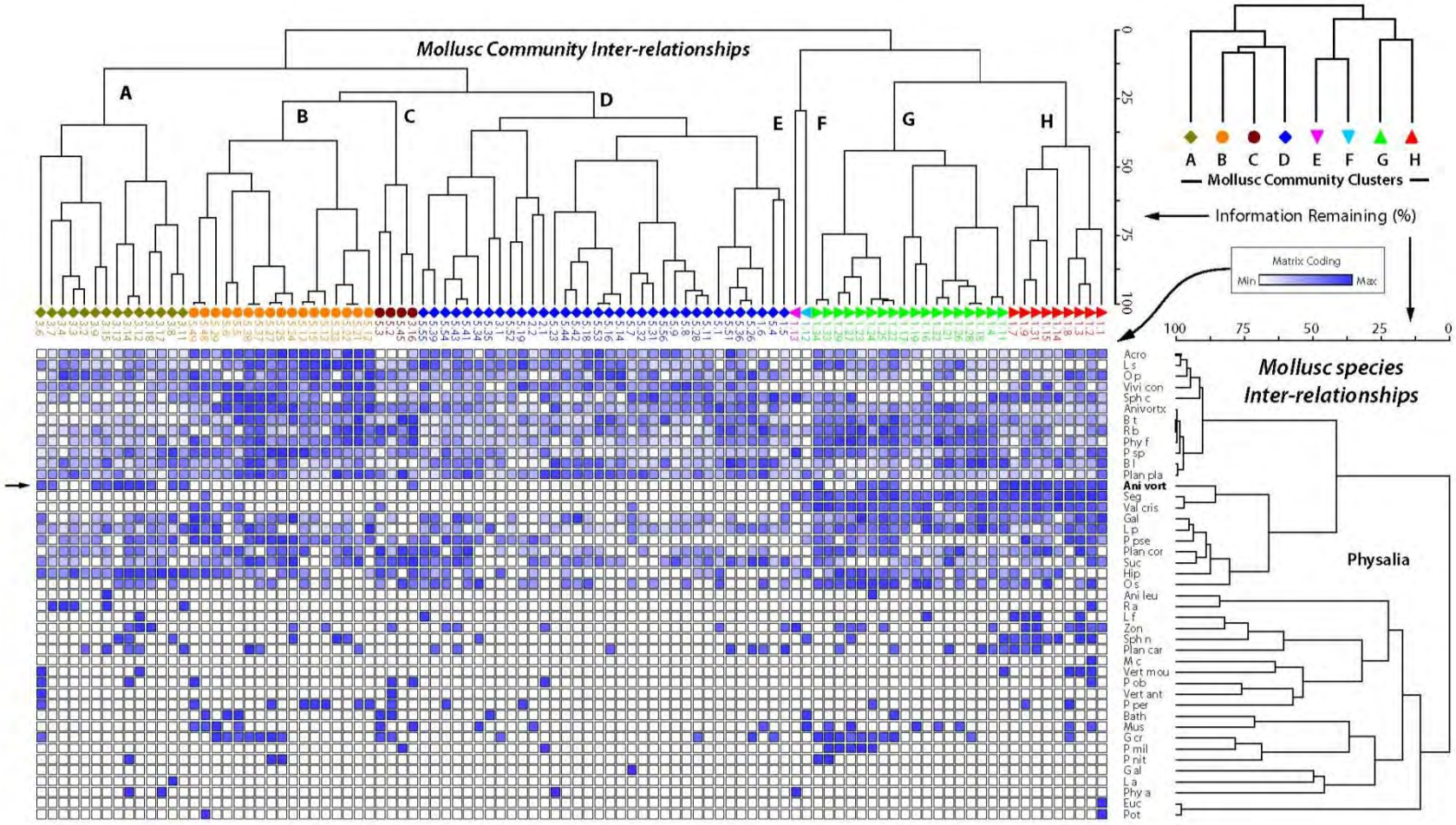
Multivariate analyses

[redacted]

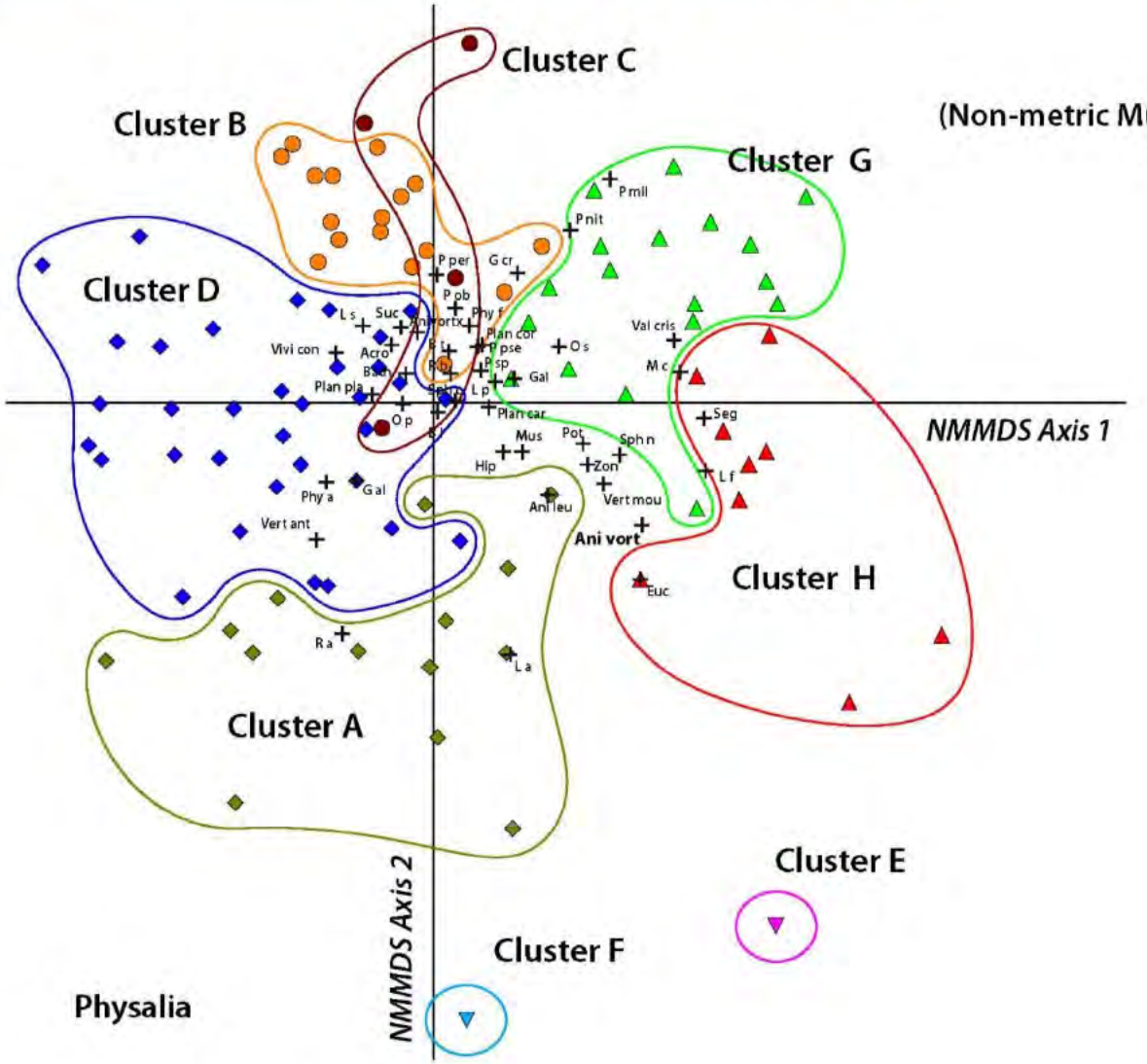
Physalia Consultants

AECOM

Mollusc community relationships



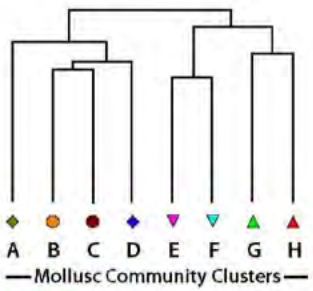
Mollusc communities - Ordination

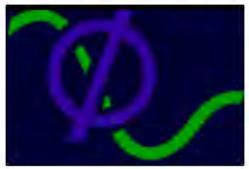


Ordination Analyses
(Non-metric Multi-dimensional Scaling)
of Mollusc Communities
Axes 1 and 2

Axes	R^2	Cumulative Increment
1	0.305	0.305
2	0.342	0.647
3	0.153	0.800

Key to the Mollusc Community Cluster Relationships





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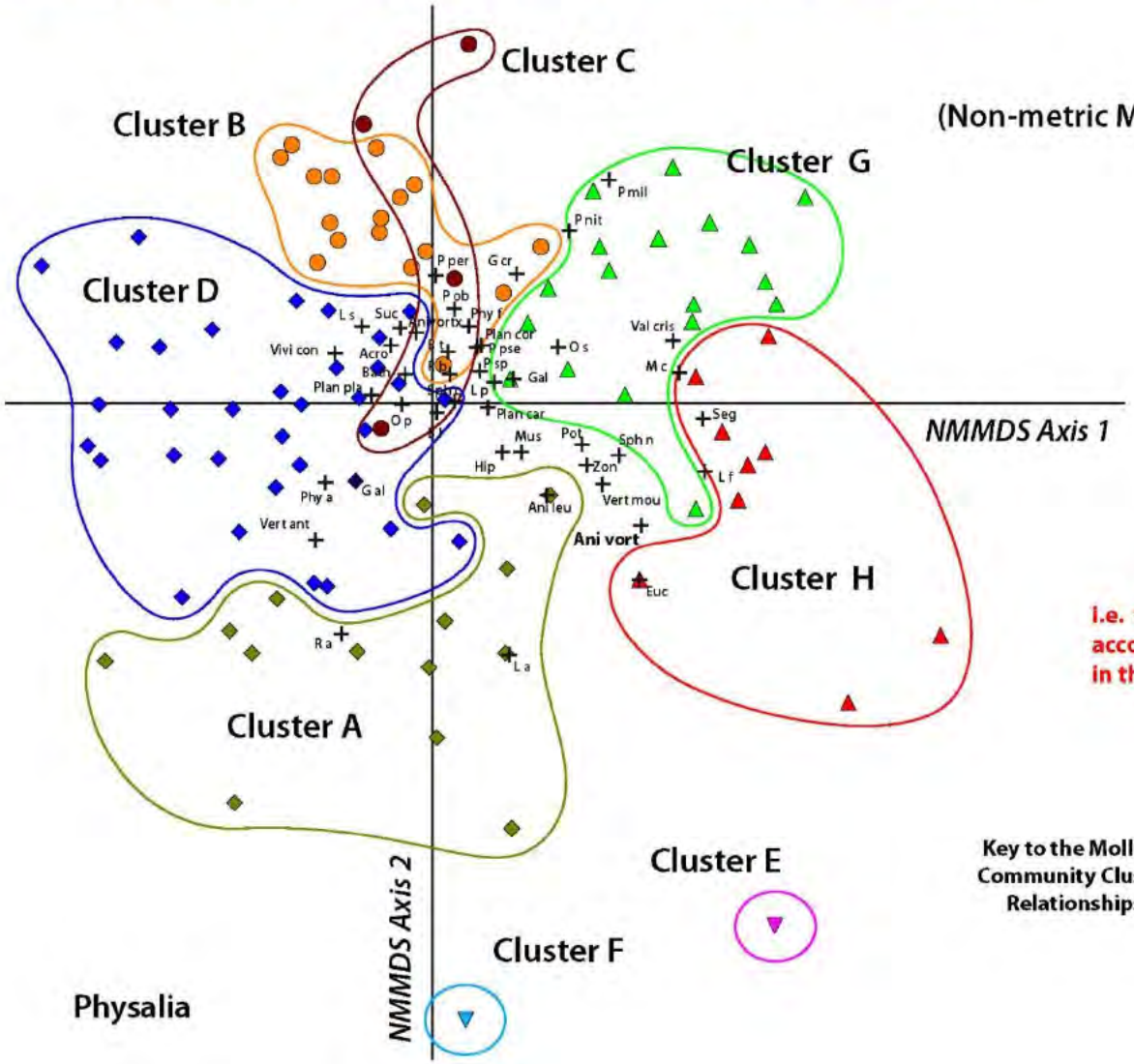

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Axes	R^2	Cumulative Increment
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i.e. the 3 axes in this set of analyses account for 80% of the total variation in the mollusc community structures

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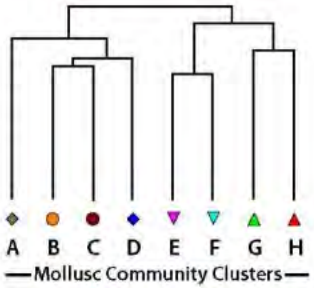
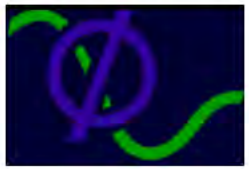




Molluscs – Indicator species

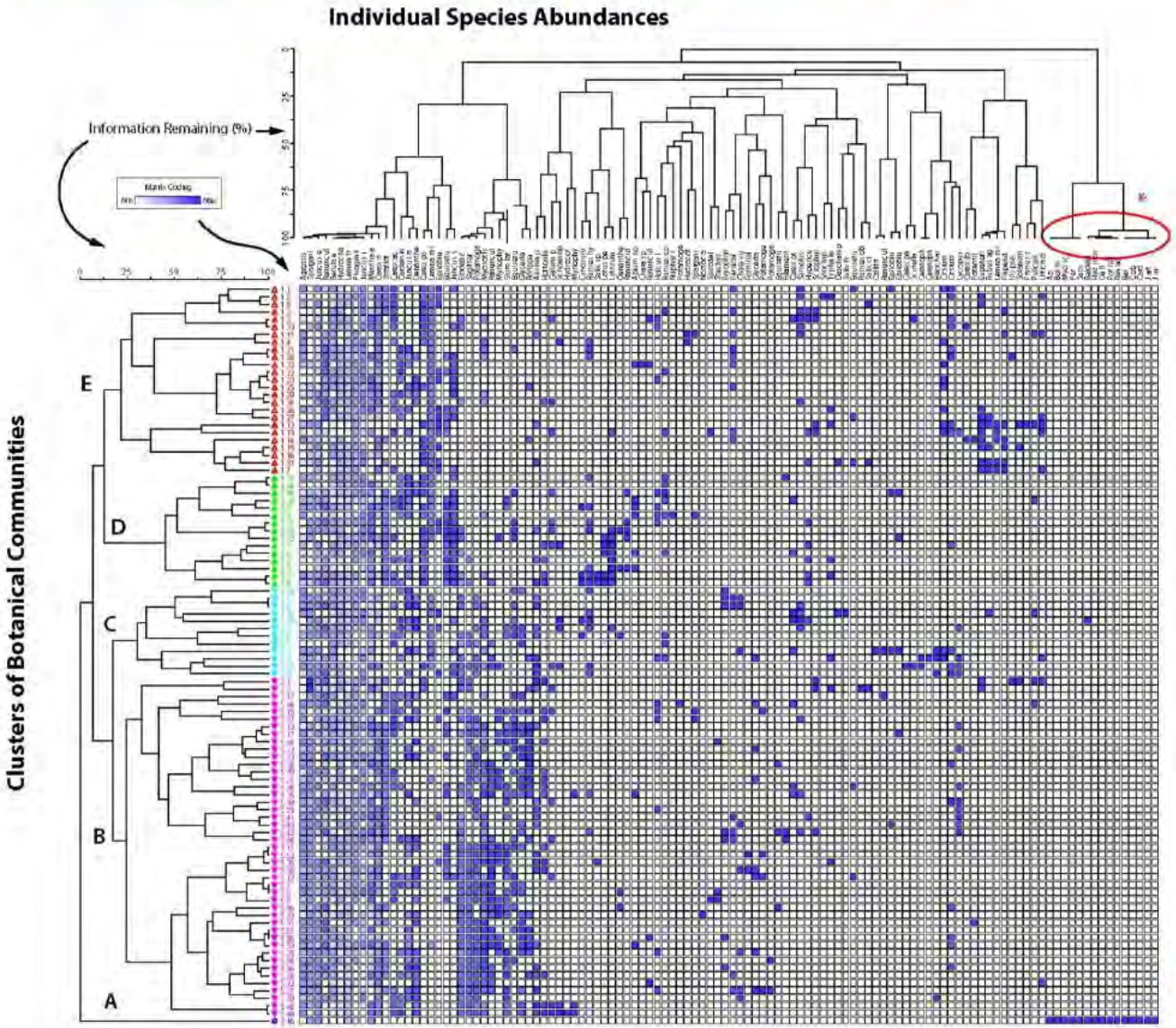
Indicator Species Analyses (ISAs)

Statistically Significant Mollusc Indicator Species for the Four Clusters identified in the Multivariate Analyses of the Abrehart Ecology

Target Species of specific conservation interest →

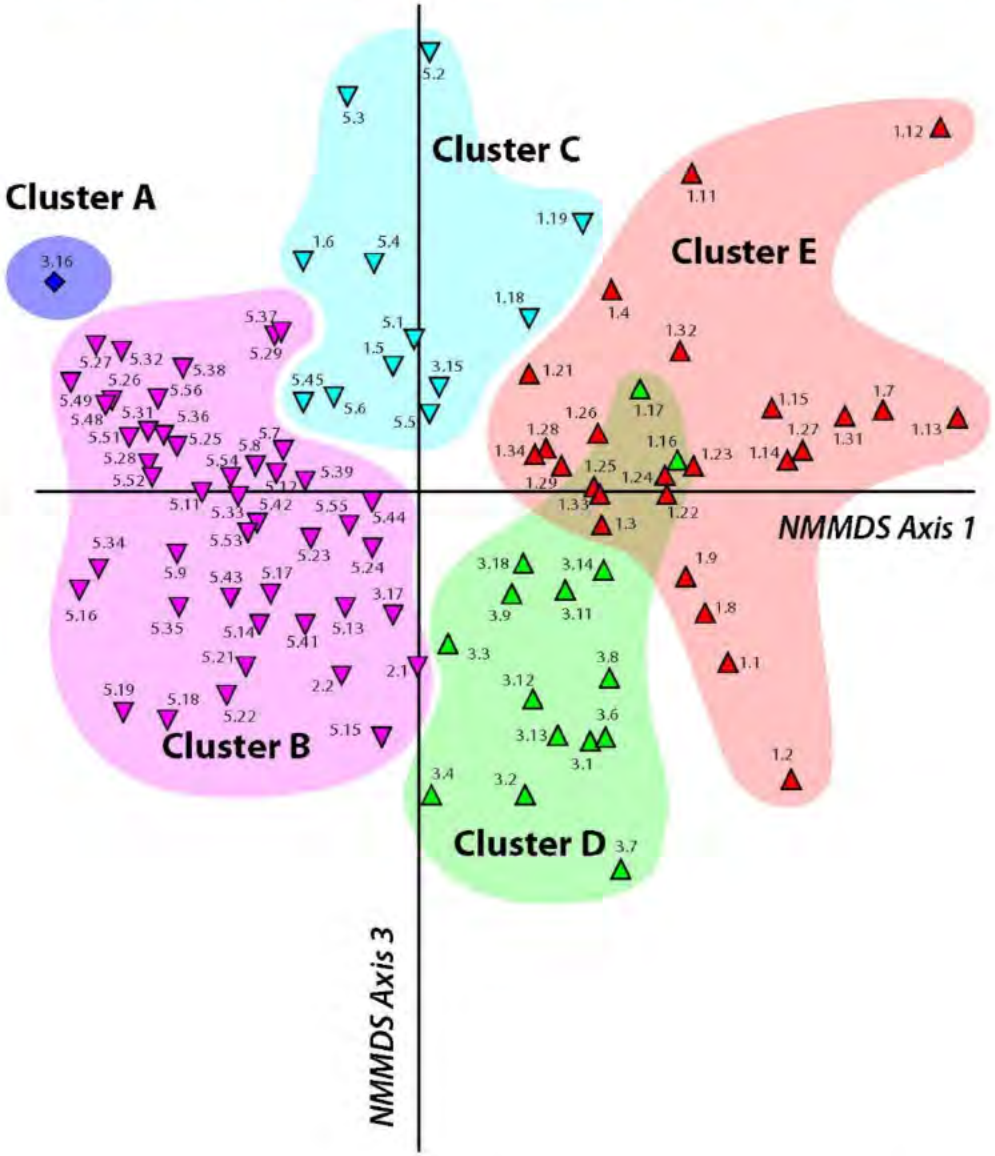
Species Code	Species Name	Cluster Number	Cluster Letter	IV	Mean	S.dev	*p*-Value
Hip	*Hippeutis complanatus*	35	A	36.7	19.1	4.90	0.0086
R a	*Radix auricularia*	35	A	29.2	8.6	5.48	0.016
Acro	*Acroloxus lacustris*	52	B	37.4	20.5	2.69	0.0002
Vivi con	*Viviparus connectus*	52	B	40.8	19.4	3.92	0.0002
Ani vortx	*Anisus vortex*	52	B	28.9	19.9	2.06	0.0004
L s	*Lymnaea stagnalis*	52	B	27.5	20.5	3.29	0.0378
P sp	*Pisidium* species	52	B	23.5	19.9	1.74	0.040
P pse	*Pisidium pseudosphaerium*	52	B	29.3	17.9	5.12	0.0418
Suc	*Succinea putris*	40	C	41.0	19.8	4.18	0.0002
R b	*Radix balthica*	40	C	26.1	19.8	1.51	0.0018
Bath	*Bathyomphalus contortus*	40	C	35.3	9.3	6.33	0.011
Plan cor	*Planorbarius corneus*	40	C	31.8	19.8	4.32	0.018
P ob	*Pisidium obtusale*	40	C	30.1	9.1	6.07	0.0192
Mus	*Musculum lacustris*	40	C	26.7	11.5	6.42	0.0354
Phy f	*Physa fontinalis*	2	G	25.8	19.9	2.19	0.0112
L p	*Lymnaea palustris*	2	G	29.1	20.3	3.03	0.0122
B t	*Bithynia tentaculata*	2	G	21.1	19.1	1.05	0.0446
O s	*Oxyloma sarsi*	2	G	28.6	17.4	5.49	0.0458
Ani vort	***Anisus vorticulus***	**1**	**H**	**60.0**	**13.6**	**6.02**	**0.0002**
Seg	*Segmentina nitida*	1	H	65.1	14.0	6.07	0.0002
Sph n	*Sphaerium nucleus*	1	H	51.7	11.4	6.34	0.0014
Val cris	*Valvata cristata*	1	H	42.6	14.6	5.64	0.0032
L f	*Stagnicola fuscus*	1	H	35.4	8.8	5.60	0.0096
Vert mou	*Vertigo moulinsiana*	1	H	22.4	8.8	5.85	0.0286
Sph c	*Sphaerium corneum*	1	H	28.8	19.6	4.11	0.0352

Botanical community relationships



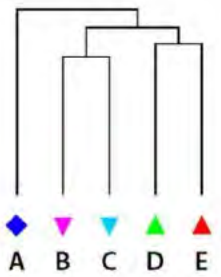
The Full Botanical Two-way Classification Matrix for the Botanical Communities and their Interrelationships

Botanical communities - Ordination



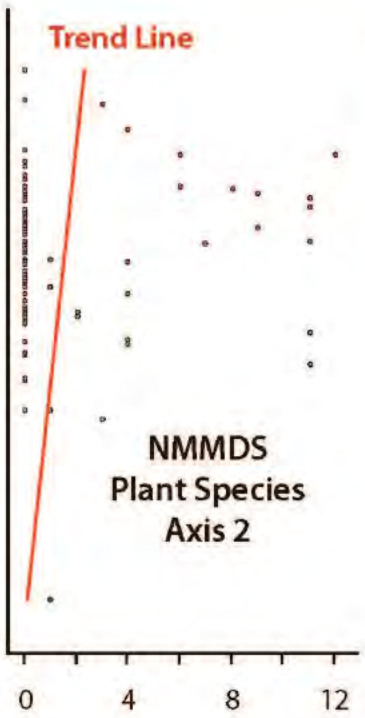
Ordination Analyses
Aquatic Flora; Axes 1 and

Clusters:

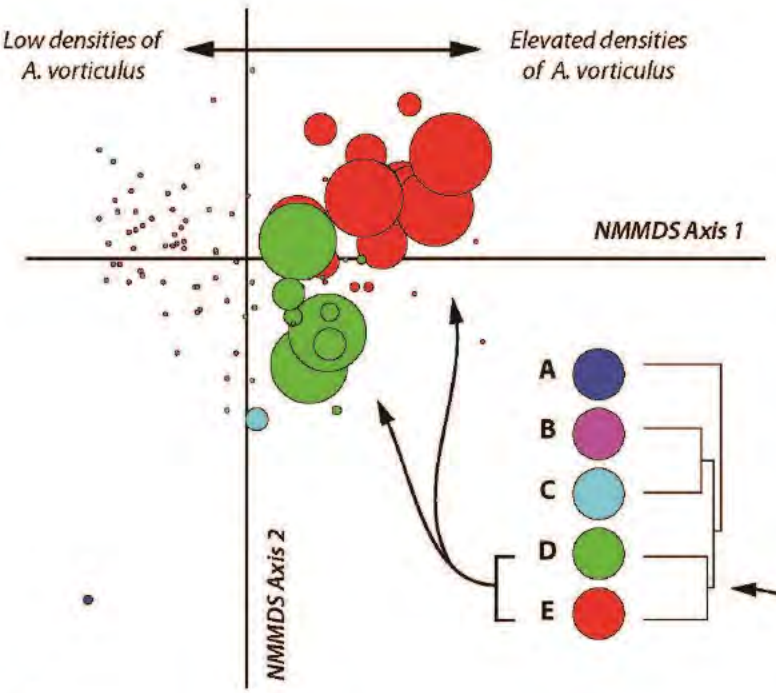


Key to Aquatic/Emergent
Plant Assemblage Relationships

Botanical communities and *Anisus vorticulus*



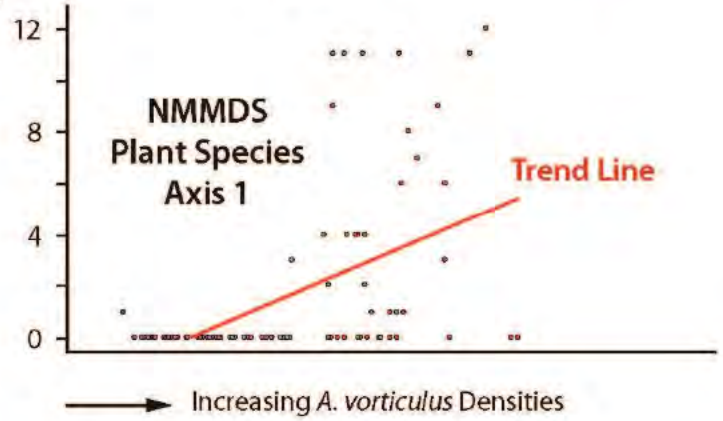
Axis 1
r = .513 tau = .442
Axis 2
r = .099 tau = -.005



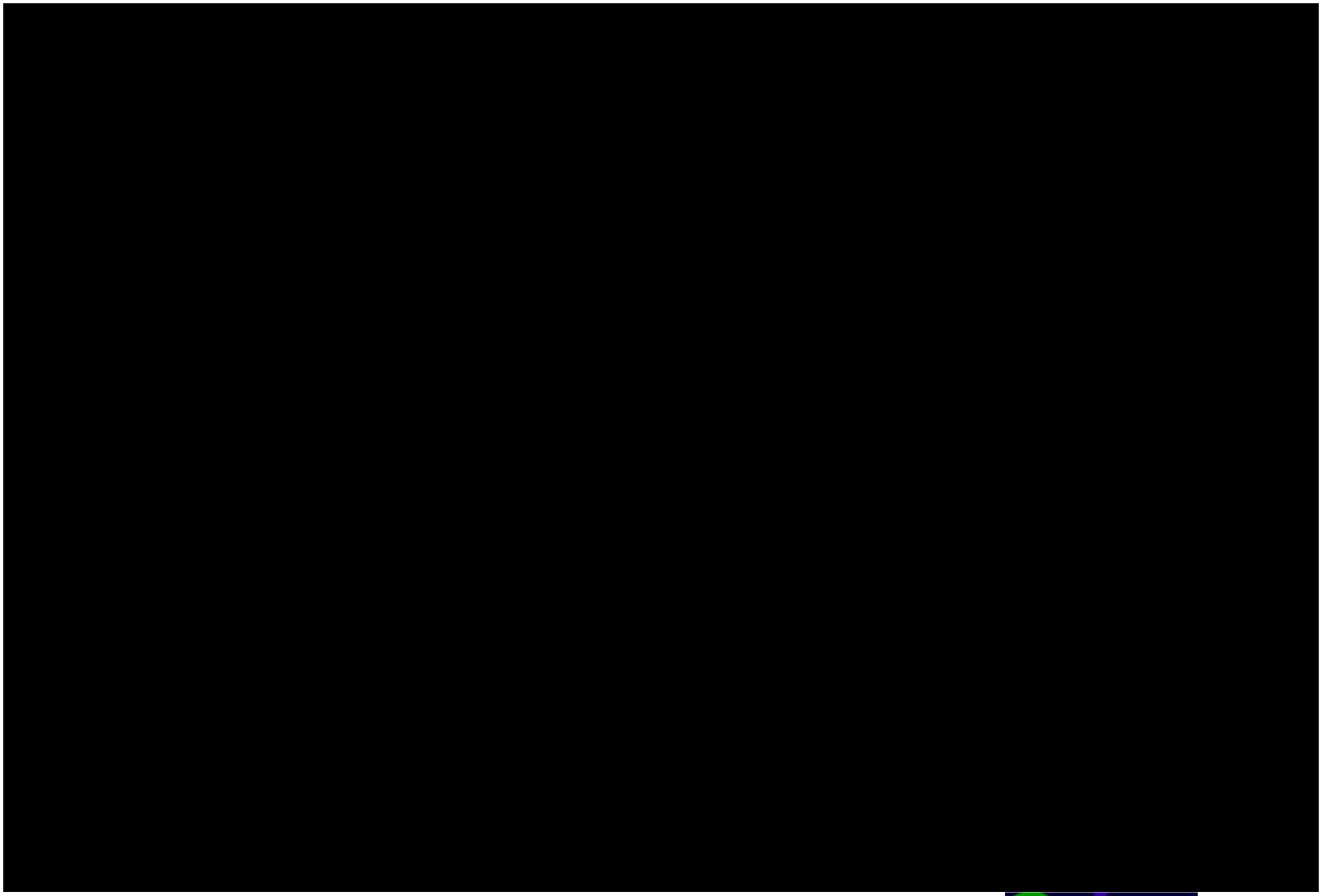
Plant Species Multivariate Ordinaton (NMMDS Method)

Plant MVA Data with Scaled Symbols Depicting *Anisus vorticulus* densities

Plant communities associated with the highest densities of *A. vorticulus*



Mollusc communities – Spatial patterns



Mollusc communities – Environmental predictors

Environmental Factor Codes	Env_*p*_Value (not adjusted for multiple comparisons)	Environmental Factor Codes	Env_*p*_Value (not adjusted for multiple comparisons)
WaterColour	0.109	BankTopWidth	0.131
AdjLandUseA	0.029	FreeBoard	1.000
AdjLandUseB	0.001	WaterDepth	0.048
BankVegA	0.055	SiltDepth	0.190
BankVegB	0.097	BankSlopeA	0.044
OpenWaterSurface	0.569	BankSlopeB	0.201
LemnaMinor	0.001	UnderWaterProfileA	0.046
OtherFloatingAquatics	0.123	UnderWaterProfileB	0.027
FloatingAlgae	0.738	Substrate	0.283
LemnaTrisulca	0.001	Turbidity	0.958
OtherSubmergedPlants	0.127	GrazingA	0.001
SubmergedAlgae	0.738	GrazingB	0.022
OpenSubstrate	0.826	PoachingA	0.065
LowSwamp	0.070	PoachingB	0.012
ExposedVegetation	0.829	BlockFormationA	0.041
ExposedMud	0.094	BlockFormationB	0.523
Litter	0.335	ShelfFormationA	0.206
Shaded	0.926	ShelfFormationB	0.008
EmergentsPresent	0.005	YearsSinceCleared	0.322
WaterWidth	0.023	WaterToNormal	0.142

Mantel Permutation Test (Non-parametric)

Mollusc communities – Environmental predictors

Environmental Factor Codes	Env_*p*_Value (not adjusted for multiple comparisons)	Environmental Factor Codes	Env_*p*_Value (not adjusted for multiple comparisons)
WaterColour	0.109	BankTopWidth	0.131
AdjLandUseA	0.029	FreeBoard	1.000
AdjLandUseB	0.001	WaterDepth	0.048
BankVegA	0.055	SiltDepth	0.190
BankVegB	0.097	BankSlopeA	0.044
OpenWaterSurface	0.569	BankSlopeB	0.201
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EmergentsPresent	0.005	YearsSinceCleared	0.322
WaterWidth	0.023	WaterToNormal	0.142

Mantel Permutation Test (Non-parametric)

The next chapter

[redacted]

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Phase 4 Scoping surveys

– Scoping conducted Sept-Oct 2016

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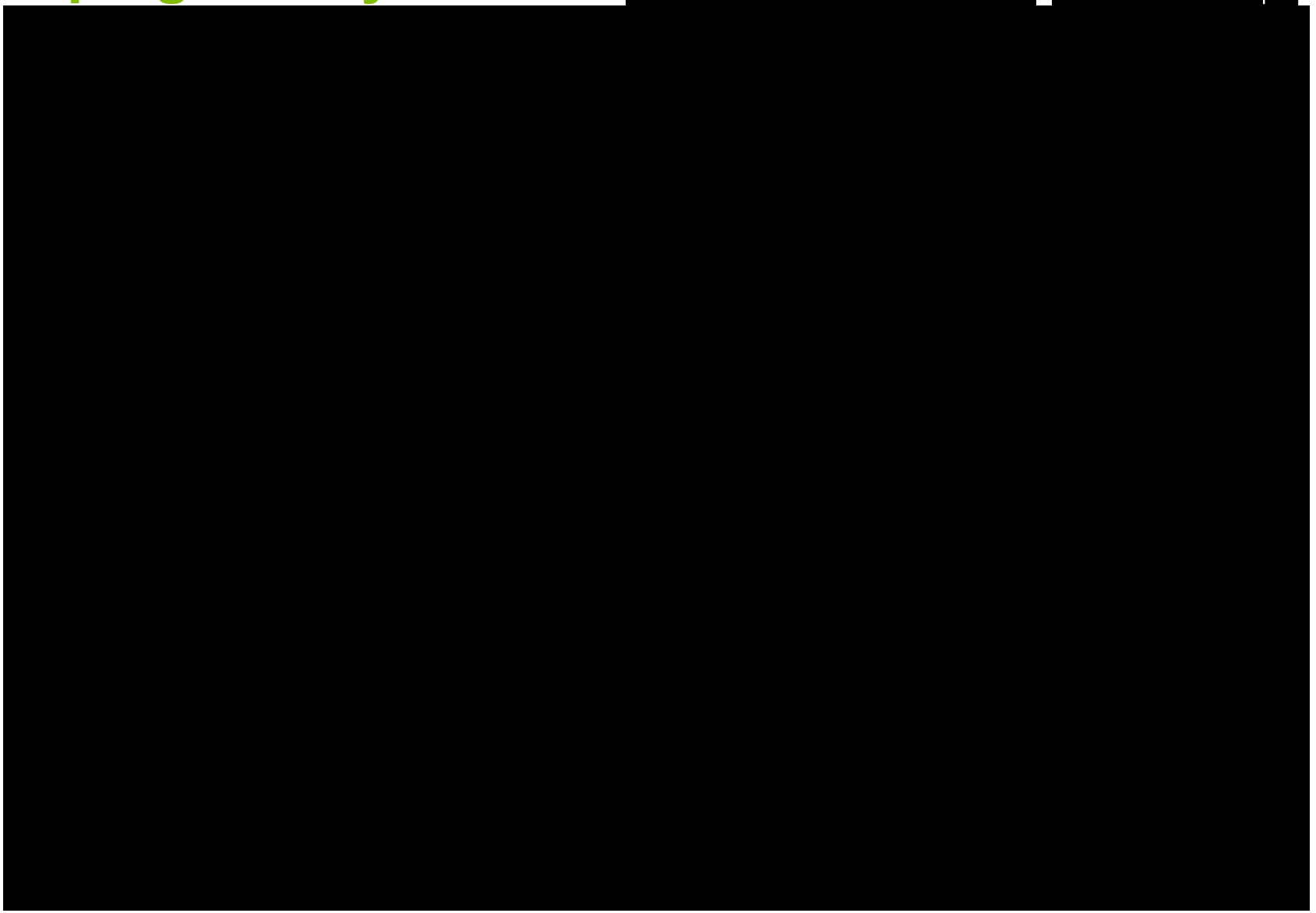
Scoping survey areas – [redacted]



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Scoping survey areas - [redacted]

[redacted]

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Scoping survey areas - [redacted]

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Phase 4 Scoping surveys

- Scoping conducted Sept-Oct 2016
- Conducted under licence 25961-SCI-SCI
- Full surveys completed Oct-Nov 2016

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Anisus vorticulus distribution – Phase 4 areas

Legend

A. vorticulus present/absent

- Absent
- Present

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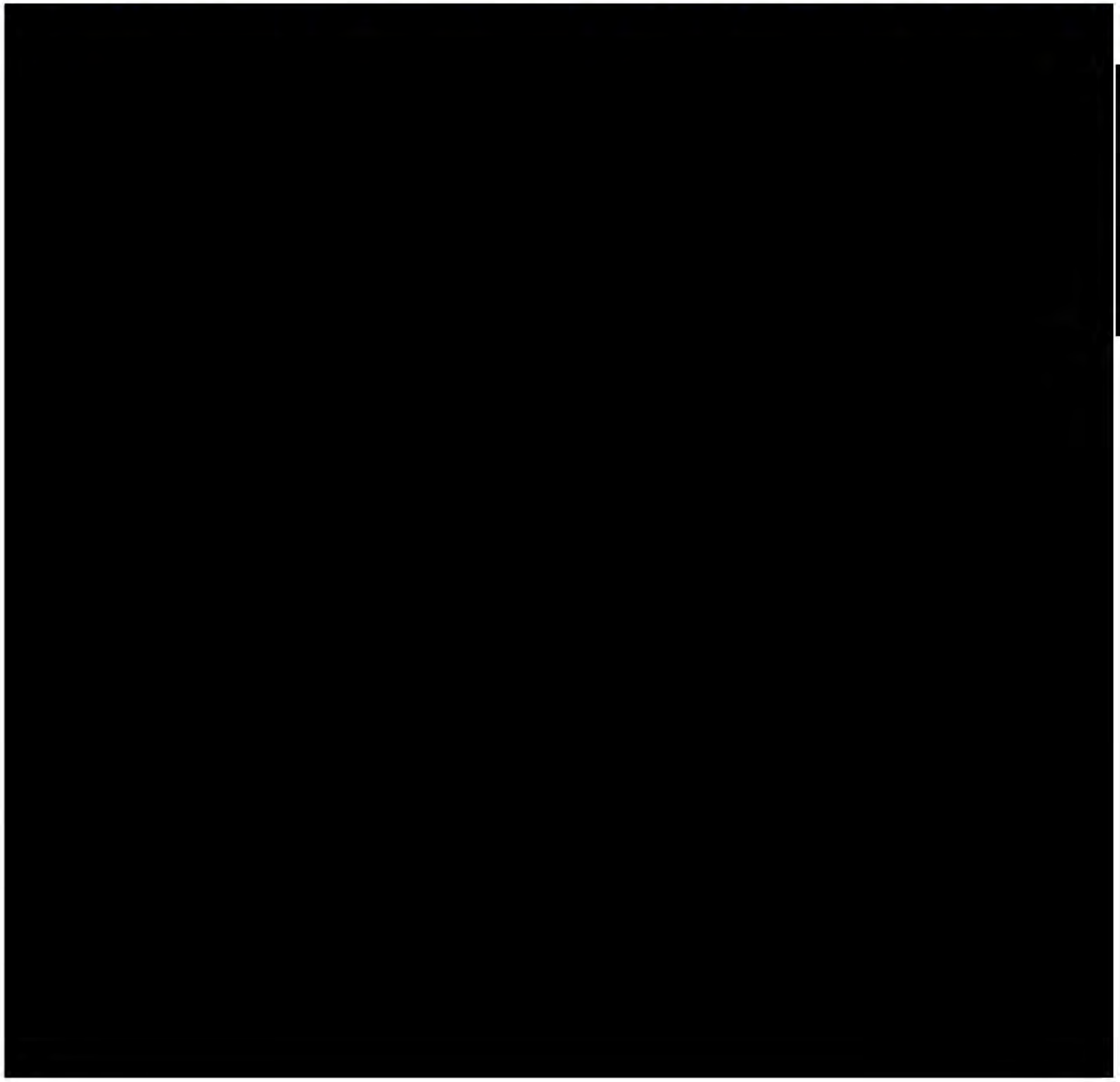
Anisus vorticulus distribution – Phase 4 areas



[redacted]

Legend

A. vorticulus present/absent

- Absent
- Present

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Anisus vorticulus distribution – Phase 4 areas

[redacted]

[redacted]

Legend

A. vorticulus present/absent

- Absent
- Present

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Anisus vorticulus distribution – Phase 4 areas

[redacted]

Legend

A. vorticulus present/absent

- Absent
- Present

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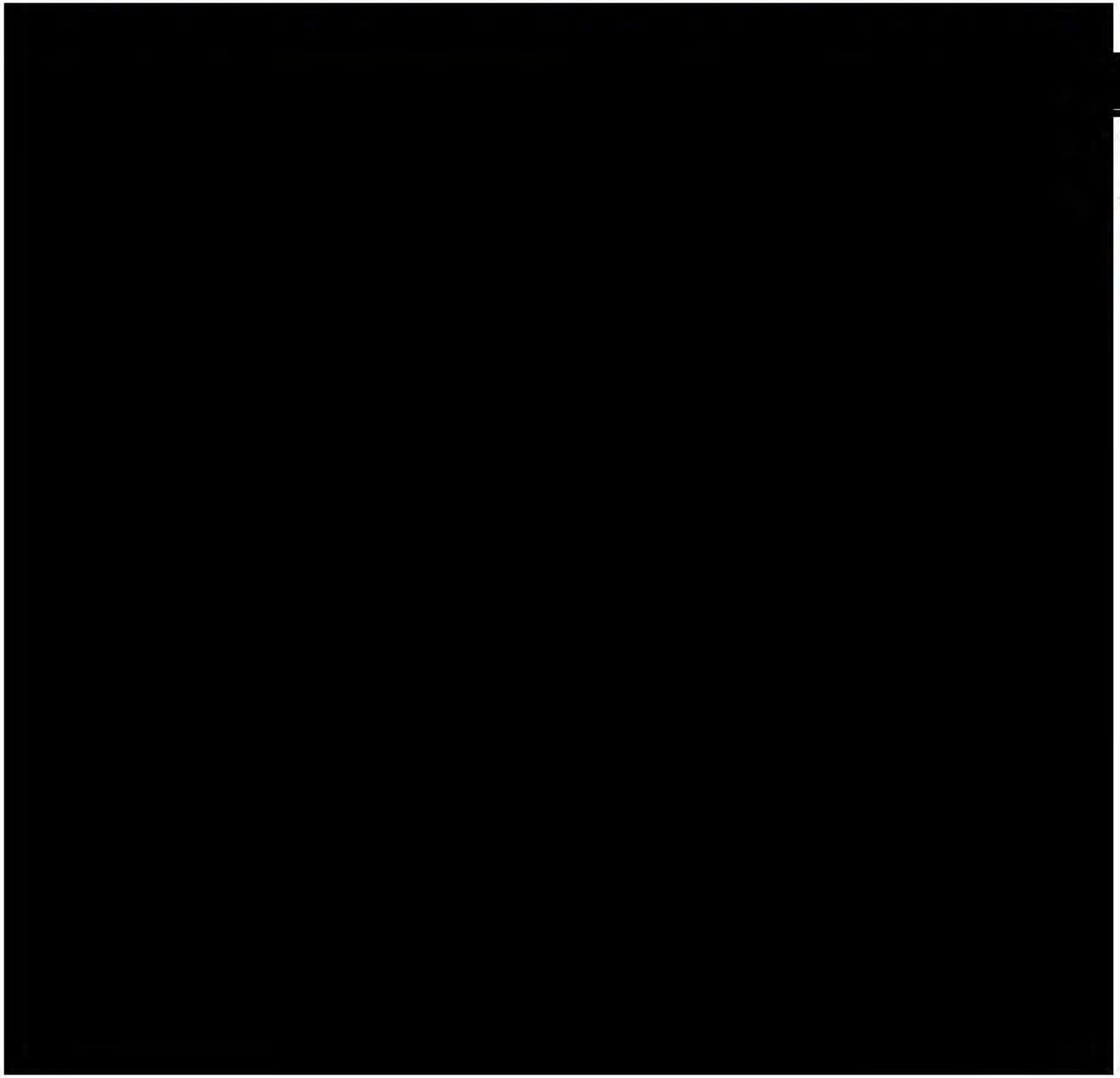
Anisus vorticulus distribution – Phase 4 areas



Legend

A. vorticulus present/absent

- Absent
- Present

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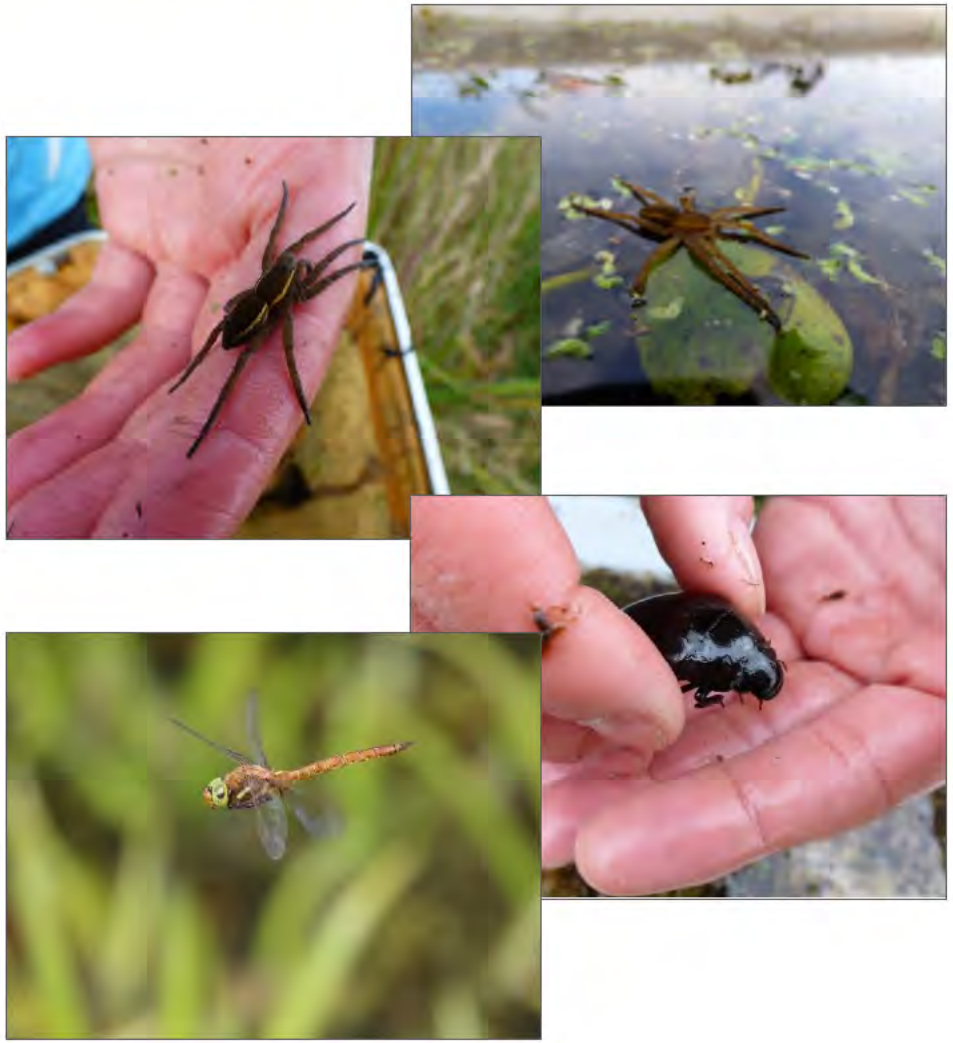
Other species of interest

- Fen raft spider (licence 26279-SCI-SCI)
- Great silver water beetle
- Norfolk hawker
- Water vole
- *Tracya hydrocharidis*
- *Lemna turionifera*



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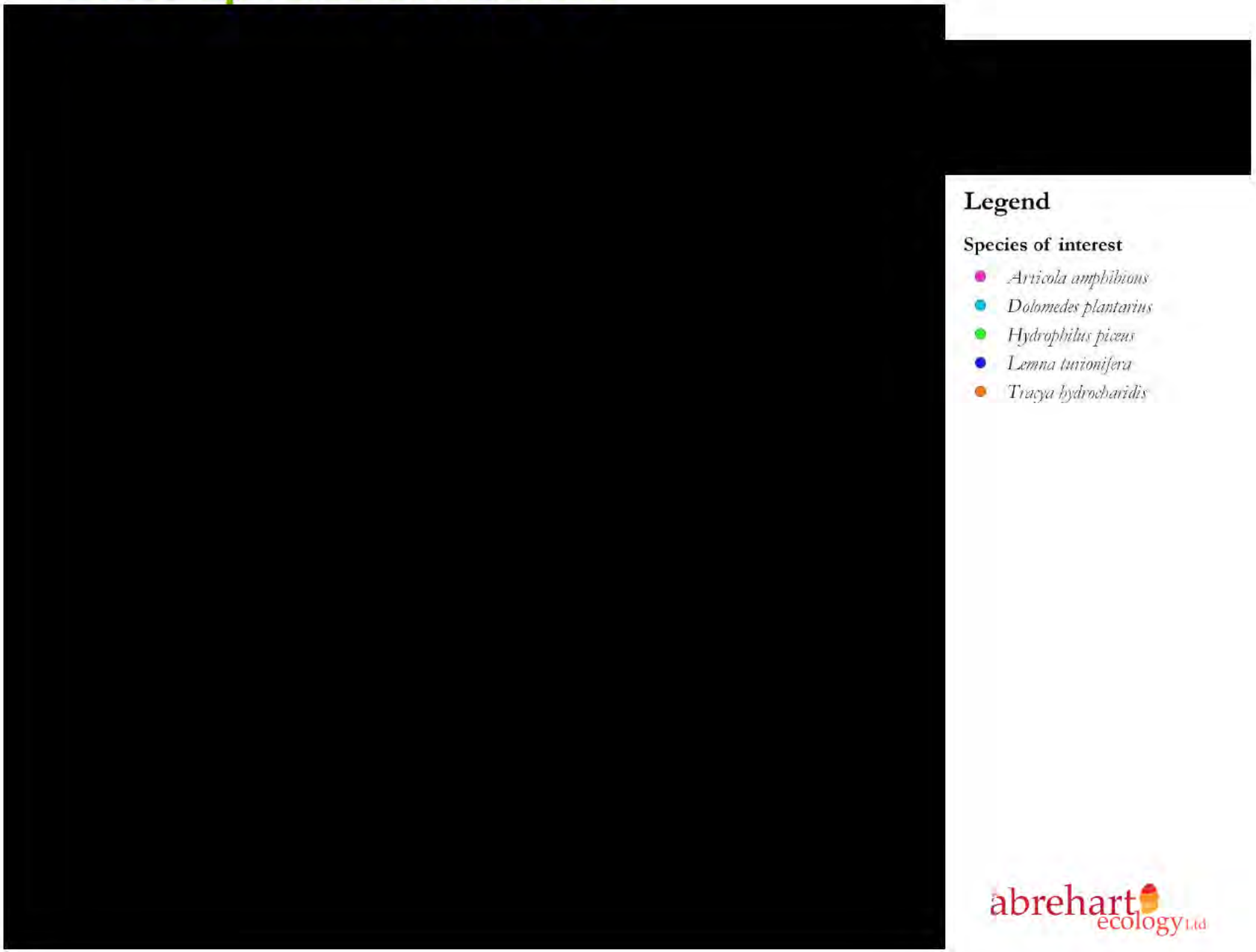
Other species of interest



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Monitoring & future work

- Multivariate analysis combining data from [redacted] and new sites
- Analysis to include water chemistry data
- Second round of translocations over a larger distance
  - 2000-3000 animals in March-April 2017
- Potential donor populations:

- Potential receptor site:

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Monitoring & future work

- Monitoring at donor and receptor sites
- Bi-annually for 5 years post-translocation
- Monthly monitoring at a subset of sites
  - Population dynamics and breeding cycles
- Monitoring for flood dispersal
- Diatom analyses
- Population genetic analysis (Brighton University)?

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Q&A / Discussion

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Thank you

For more detail contact:

[redacted]

[redacted]

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