DUNE RESTORATION TRUST OF NEW ZEALAND

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WAY OUT WEST

Dune Restoration of NZ Annual Conference 2014

11 – 13th March 2014

Fitzroy Surf and Lifesaving Club, New Plymouth

Presentation: Ecology of New Zealand sand dune invertebrate communities

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Sand dune ecology research at Lincoln University

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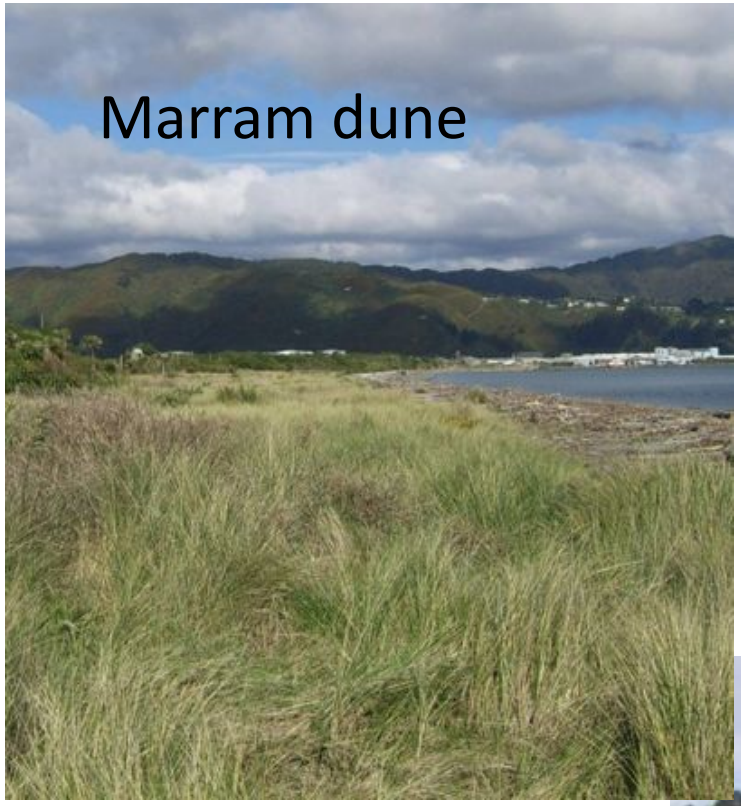
Sand dune invertebrate communities



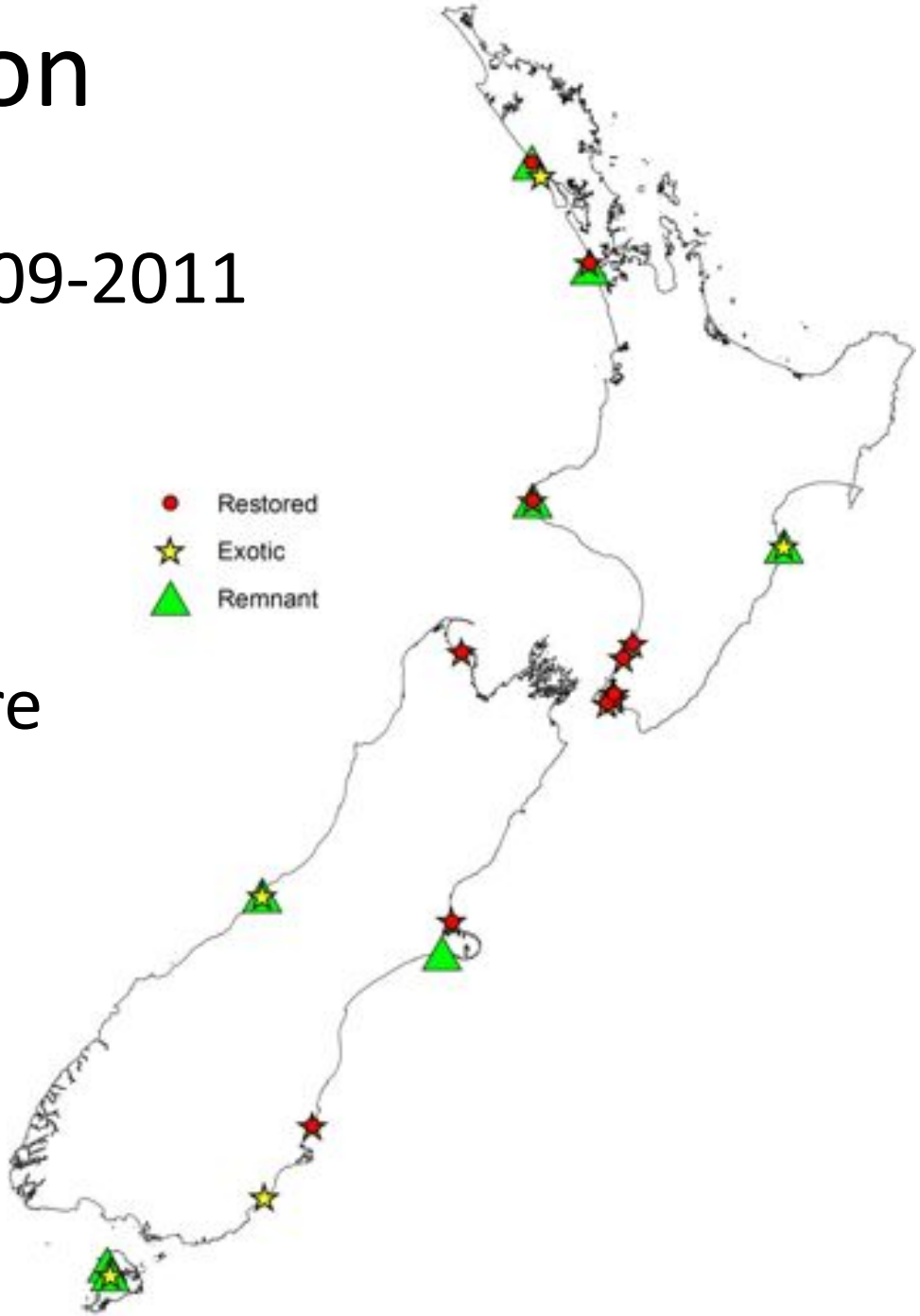
Research in collaboration with Stephen Hartley and Samantha Jamieson (Victoria University of Wellington)

Questions

- How do invertebrate communities differ among exotic, restored and remnant dune sites?
- Is variation in invertebrate community structure related to vegetation, climate, or urban proximity?

Data collection

- Sampled 36 sites from 2009-2011
- Sites were mostly paired
- Pitfall traps on foredunes
- Beetles, flies and spiders
- Identified to species where possible
- Explanatory variables:
  - Vegetation
  - Climate
  - Urban proximity



Community structure: basic statistics

Variable	Beetles	Spiders	Flies
No. of individuals	4,082	1,314 (522 adults + 792 juveniles)	8,600
No. of species	114	41	108
Mean no. species per site (± s.d.)	10.1 (5.5)	4.1 (2.3)	14.4 (7.4)
Number of species occurring only at one site	58 (51%)	14 (34%)	32 (30%)

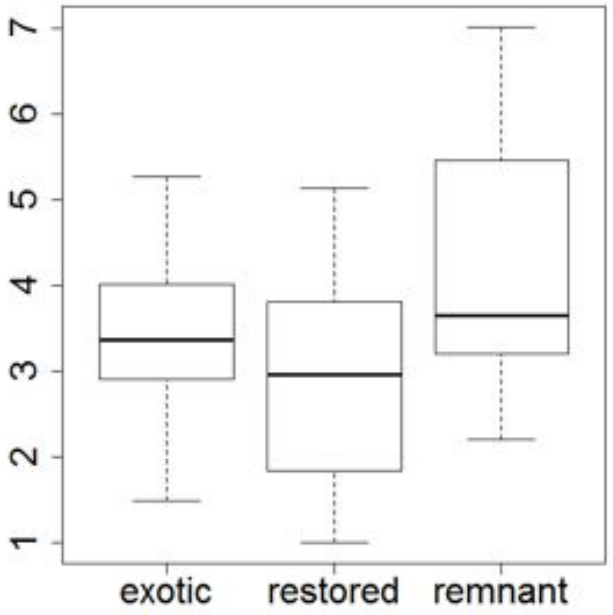
% native vs. introduced beetle abundance

Status	No. of spp
Endemics	82
Introduced	11
Unknown	21

Exotic Restored Remnant

Native
Introduced
Unknown

Log (Native : Introduced ratio)



Dune specialists

	Total no. individuals	No. sites
Cecyropa spp	700	34
Actizeta albata	204	20
Phycosecis limbata	1417	19
Lagrioida brouni	111	15
Mimopeus elongatus	88	15
Triplosarus novaezelandiae	84	8
Actizeta fusca	11	6
Thelyphassa diaphana	32	5
Chaerodes trachyscelides	9	4
Omedes substriatus	14	3
Cicindela perhispida	41	2
Thelyphassa brouni	6	2
Brullea antarctica	2	1
Cafius quadriimpressus	6	1
Creophilus huttoni	1	1
Omaliomimus spp	1	1
*Pericoptus truncatu*s		

Log (Specialists : Non-specialists ratio)

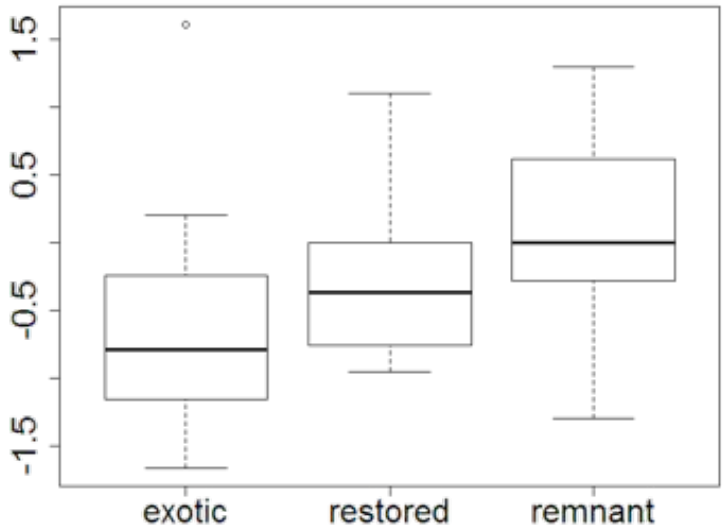
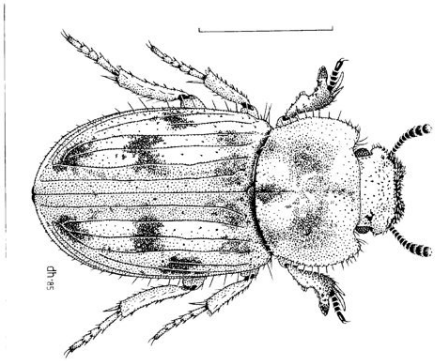


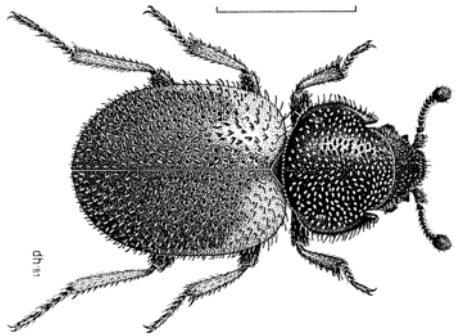
Image (c) Rudi Schnitzler / Landcare Research

Cecyropa spp (Curculionidae); phytophagus sand weevils



Des Helmore, Landcare Research

Actizeta albata (Tenebrionidae); phytophagus detritivore



Phycosecis limbata (Phycosecidae); scavenger

Spider community structure

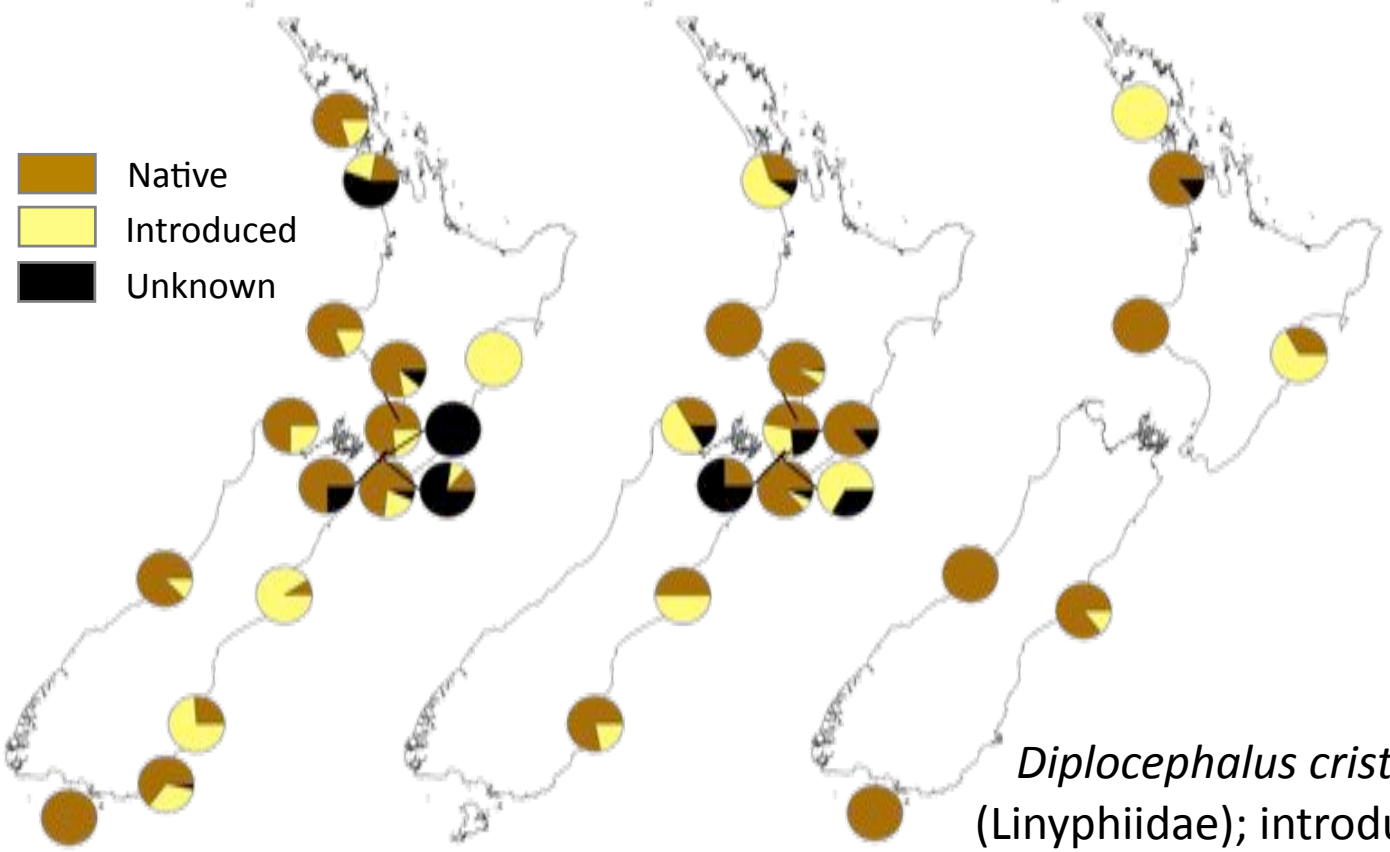
Status	No. of spp
Native	25
Introduced	12
Unknown	4

http://www.flickr.com/robertwhyte

Anoteropsis litoralis (Lycosidae); coastal specialist wolf spider

% native vs. introduced spider abundance

Exotic Restored Remnant



http://ketenewplymouth

Anoteropsis hilaris (Lycosidae); common garden wolf spider

Diplocephalus cristatus (Linyphiidae); introduced dwarf weaver

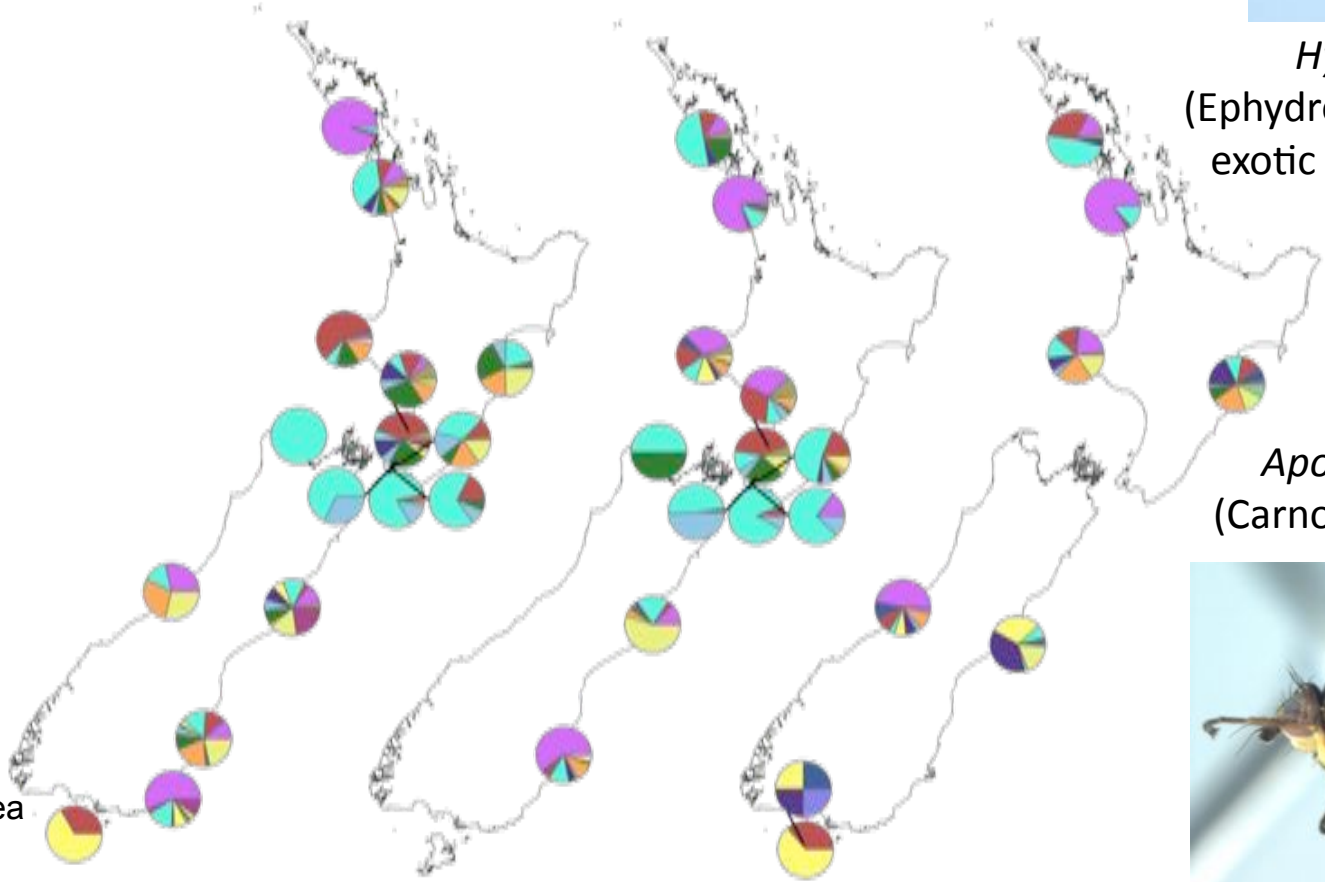
http://www.fugleognatur.dk

Fly community structure

Fly diversity by superfamily (N = 17)

Exotic Restored Remnant

- Asiloidea
- Carnoidea
- Chironomoidea
- Empidoidea
- Ephydroidea
- Lauxanoidea
- Lonchopteridae
- Muscoidea
- Oestroidea
- Opomyzoidea
- Platypezoidea
- Sciaroidea
- Sciomyzoidea
- Sphaeroceroidea
- Stratiomyoidea
- Syrphoidea
- Tipuloidea



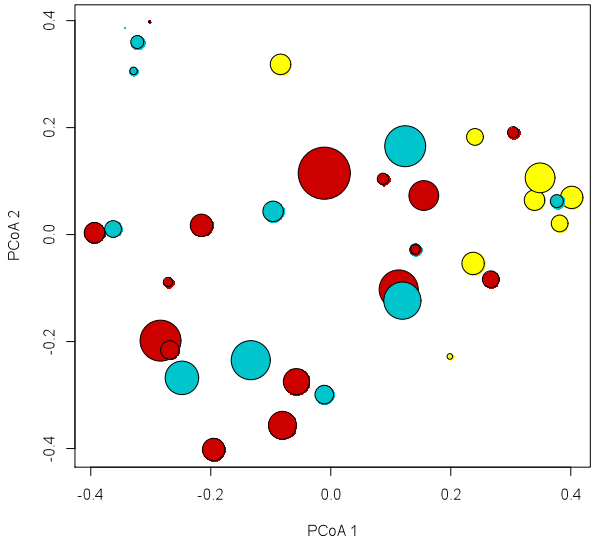
Hydrellia tritici
(Ephydroidea, Ephydridae);
exotic 'black pasture fly'

Apotropina tonnoiri
(Carnoidea, Chloropidae)

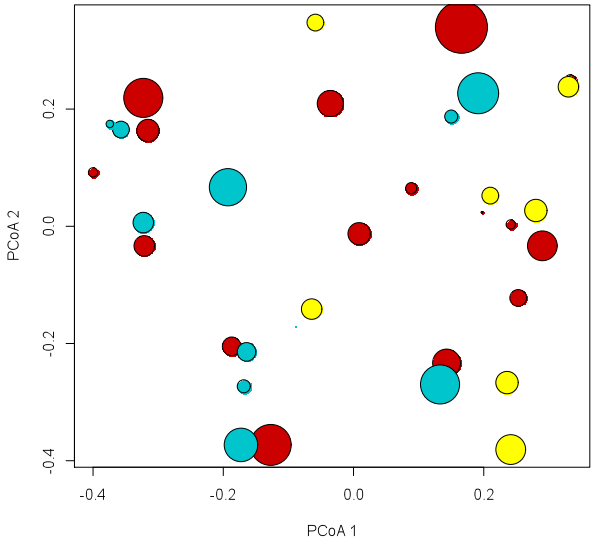
Cerodontha australis
(Opomyzoidea, Agromyzidae);
exotic 'wheat sheath miner'

Species composition varied geographically, not by habitat

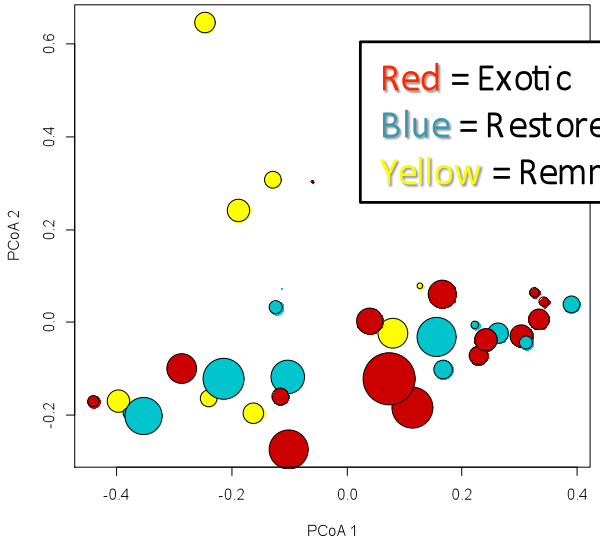
Beetles



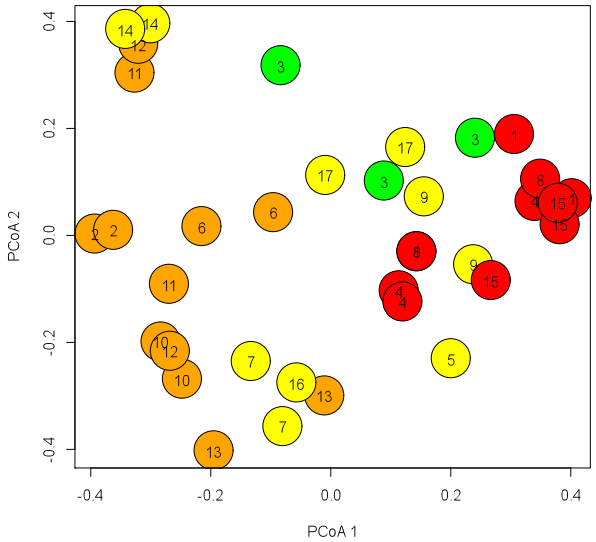
Spiders

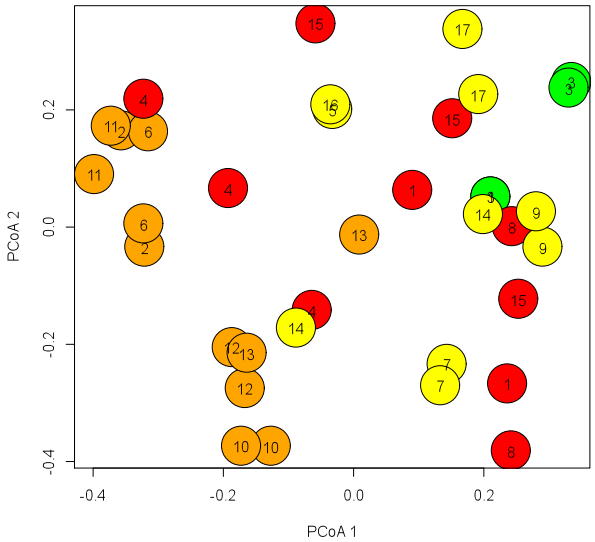


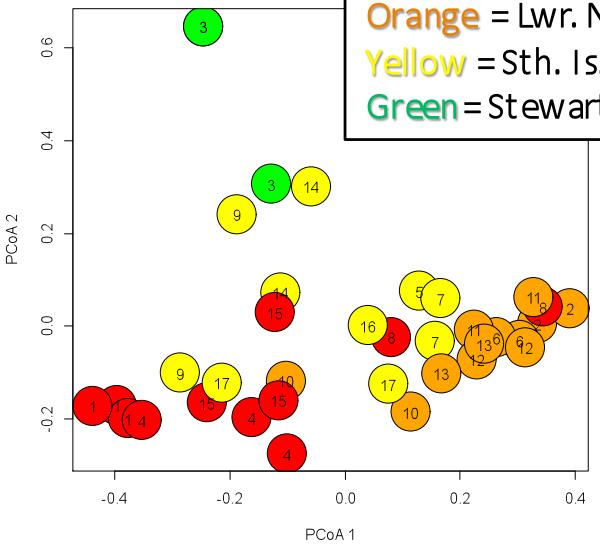
Flies



Symbol size is proportional to species richness







Numbers = paired/grouped locations

Relationships with environment

- Vegetation, climate and distance to urban
- Vegetation structure was unrelated to invertebrate communities
- Beetles:
  - Warmer sites further from urban areas had higher proportions of native species
- Spiders: Wetter sites had lower total abundance of spiders
- Flies: Wetter sites had fewer fly species

Invertebrate research: Summary

- Evaluated community structure of invertebrates in foredune vegetation at a nation-wide scale
- Strong geographic variation in species composition
- Community structure was related to precipitation, temperature, and distance to urban areas
- Few consistent differences among exotic, restored and remnant sites, except for beetles
- Restoration benefits more than just plants!

Acknowledgements

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