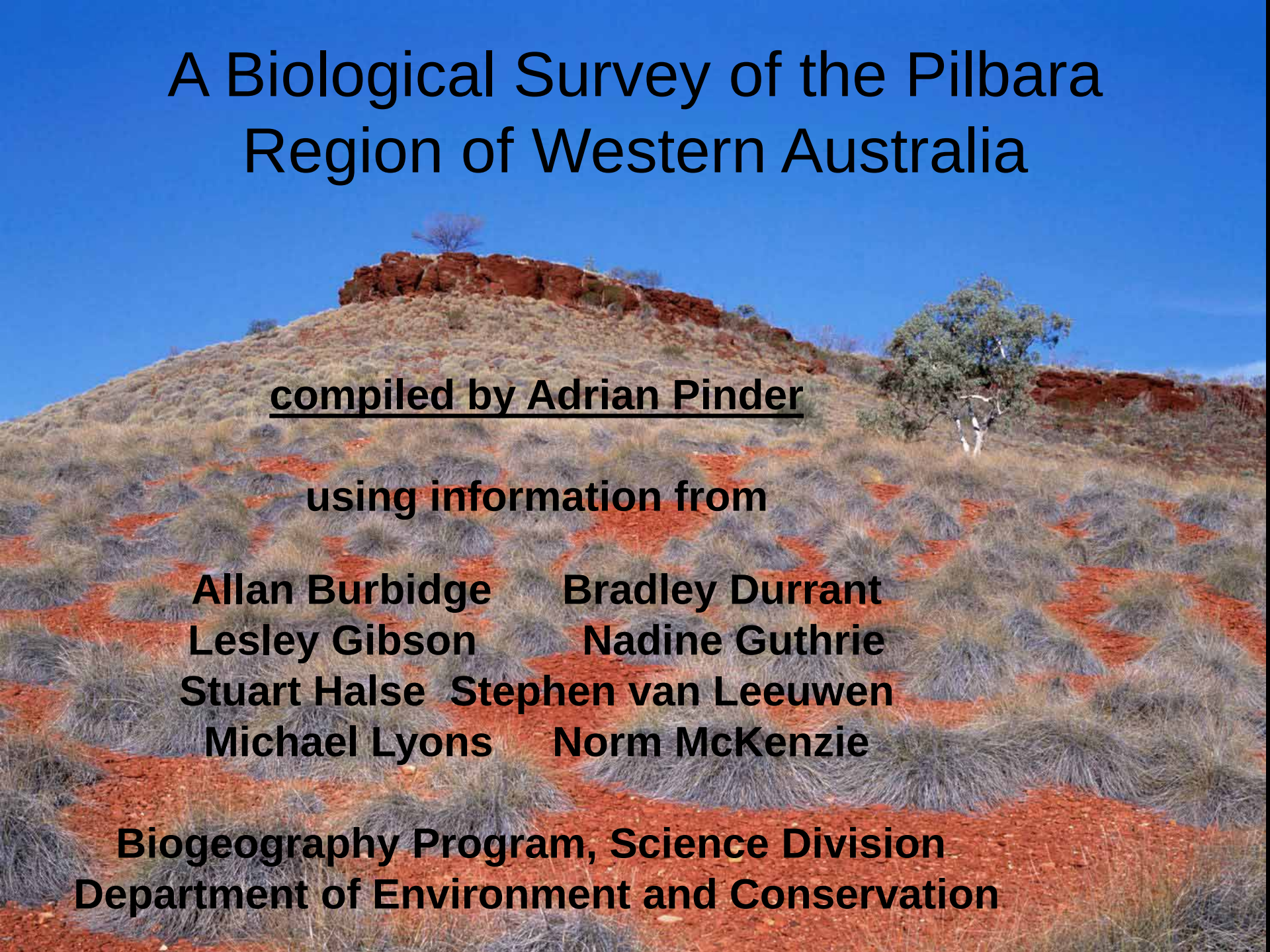
A Biological Survey of the Pilbara Region of Western Australia



compiled by Adrian Pinder

using information from

Allan Burbidge Bradley Durrant
Lesley Gibson Nadine Guthrie
Stuart Halse Stephen van Leeuwen
Michael Lyons Norm McKenzie

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Aims of the biological survey program

Provide detailed and systematic information on the extent and distribution of the State's biodiversity, in order to:

- Appraise the adequacy of the existing conservation reserve system
- Prioritise other conservation activities – e.g. identification and assessment of threatened species and ecological communities
- Improve environmental impact assessment
- Better understand correlates of biogeographic patterning
- To provide more comprehensive data on species' distributions

Pilbara Biological Survey 2003-2007

Coordinated by Norm McKenzie and Stuart Halse

5 major components

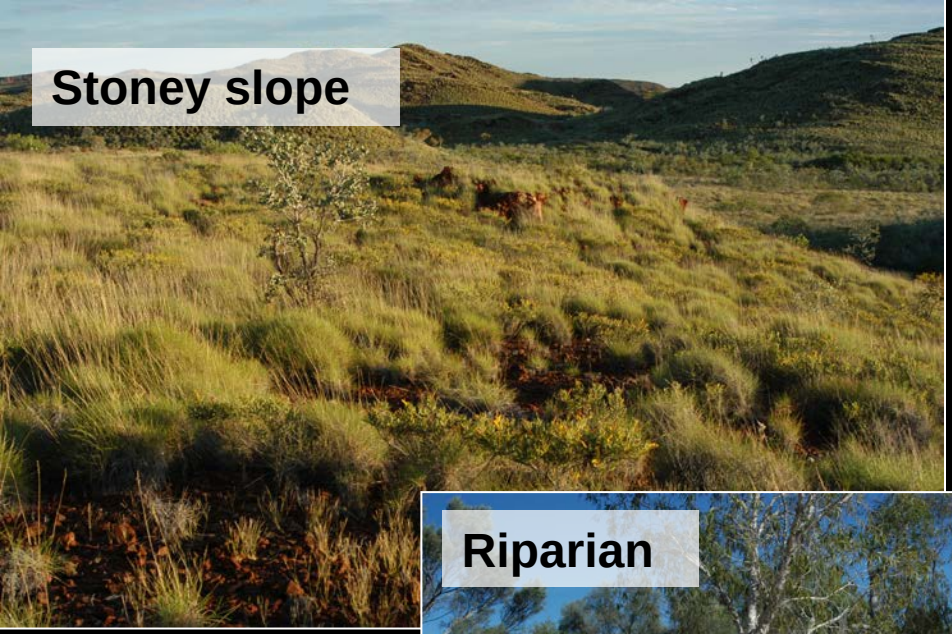
- Terrestrial fauna – vertebrates and invertebrates
- Terrestrial flora
- Wetland flora
- Wetland fauna - invertebrates and waterbirds
- Stygofauna

Collaborations with >40 external specialists

Terrestrial fauna

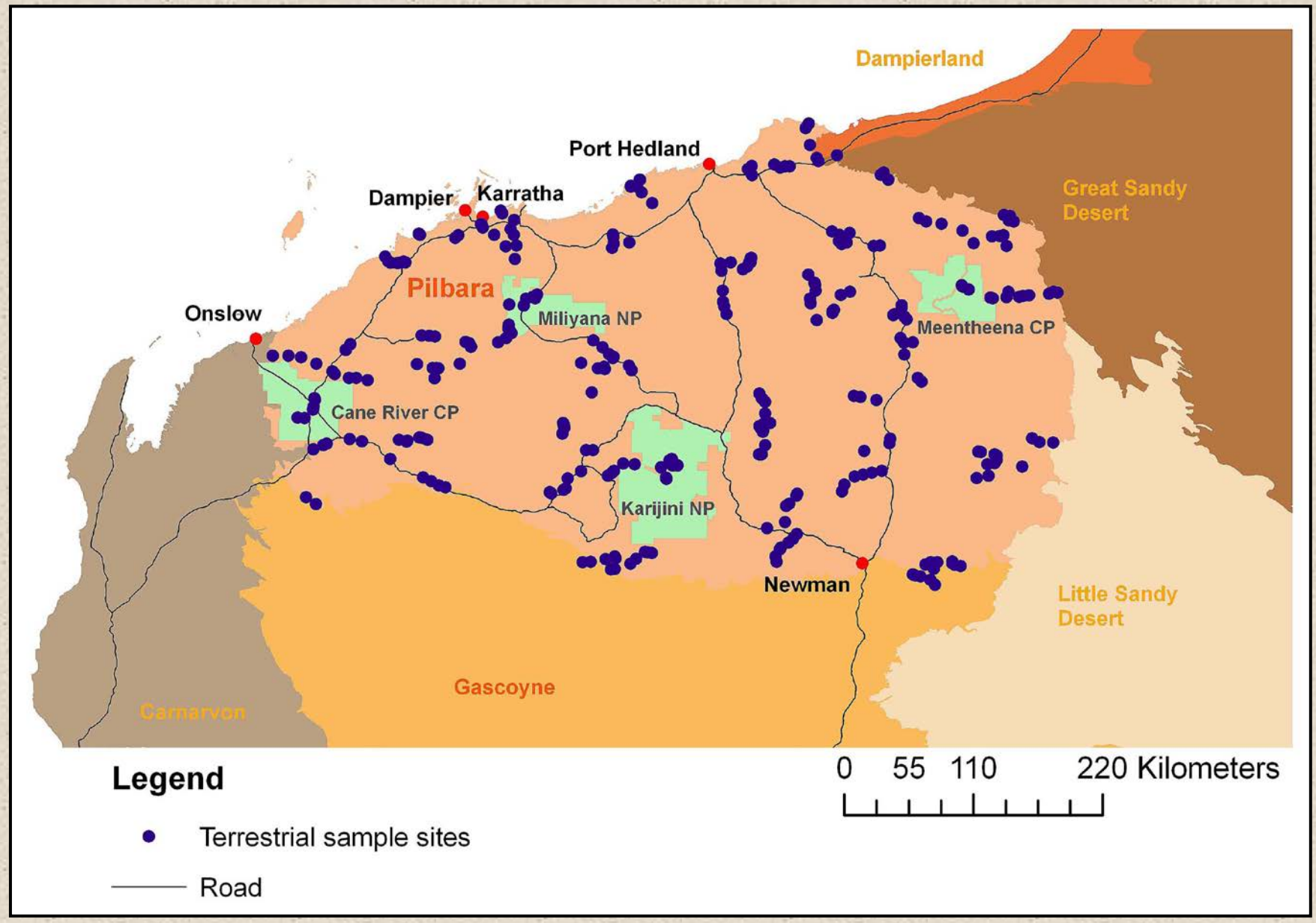
Norm McKenzie, Allan Burbidge, Lesley Gibson, Bradley Durrant, Nadine Guthrie, Peter Kendrick, David Pearson, Jim Rolfe, Gaynor Owen and Judy Dunlop

- 306 sites - stratified by geology and landform, sampling a cross-section of soil, climate and vegetation types
- Vertebrates - 2 lines of 5 pitfall traps connected by a drift fence – 7 consecutive trap nights x 2 seasons
- Invertebrates - 5 additional pitfall traps for invertebrates
- 48 sites sampled for bats (2 sites in each of 24 sampling areas) – echo-location



Examples of substrates sampled

Terrestrial survey sites



Terrestrial faunal groups

- Invertebrates (focusing on spiders, wasps and bees, isopods, beetles and bugs)

- Reptiles and frogs

- Small mammals (including bats)

- Birds

Terrestrial fauna

Progress

- Vertebrate sampling complete for most sites
- Preliminary identifications for vertebrates complete for 50% of sites
- Invertebrate collection and sorting complete for 50% of sites & identification underway
- Invertebrate collection continuing for a further 5 months for second half of sites

Terrestrial vertebrate fauna

Preliminary outcomes

- 18 mammal species recorded (excluding bats)
- > 100 reptiles species recorded
- New gecko species discovered during first week of sampling - several other new species recognised, more expected
- Range expansions of many species observed

New gecko species

Diplodactylus stenodactylus
New Pilbara species

Gehyra punctata
Split into 5 species

Tympanocryptus
2-3 new species

Diplodactylus savagei - split into 2 species

Terrestrial invertebrate fauna - spiders

Preliminary outcomes

- ~ 500 species from 21 families
  (80-90% will be new to science)
- 50% are zodariids (ant spiders), gnaphosids (ground spiders) or salticids (jumping spiders)
- usually 30-40 species / site
- many will be short-range endemics, with some zodariids belonging to species complexes unknown from Australia

Terrestrial invertebrates – non arachnids

Preliminary outcomes

- 50 beetle families found to date, >500 species

- most species undescribed, probably many short-range endemics, but some with wider and often disjunct distributions

- Some affinity with NT/Kimberley or inland arid areas

- Wasps, bees, isopods being identified by external specialists

Terrestrial flora

Stephen van Leeuwen, Greg Keighery, Neil Gibson, Margaret Langley, Sue Patrick, Bill Muir and Bob Bromilow

Progress

- 423 sites in total (306 = terrestrial biodiversity sites)
- About ½ of these scored twice, rest to be scored again in spring 2006
- 40 sites scored 3 times, with the third scoring revealing up to 20% additional taxa
- 14 external collaborators greatly enhancing identification process

Terrestrial flora

Preliminary outcomes

- About 1100 taxa collected (= 47% of known Pilbara flora)
- Many taxa new to science and/or Pilbara recorded
- Multiple new populations for taxa on the Priority Flora list have been identified
- Two new weed species recorded for the region

Terrestrial Flora

Euphorbia sp. nov.

Eremophila sp. nov.

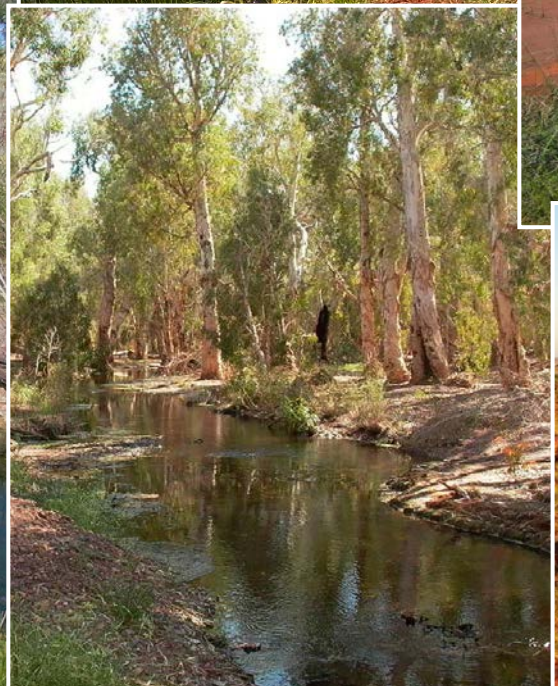
Ptilotus trichocephalatus
Priority 1 flora species

Wetland flora (Mike Lyons, David Mickle) and fauna (Adrian Pinder, Jane McRae and Leah Stratford)

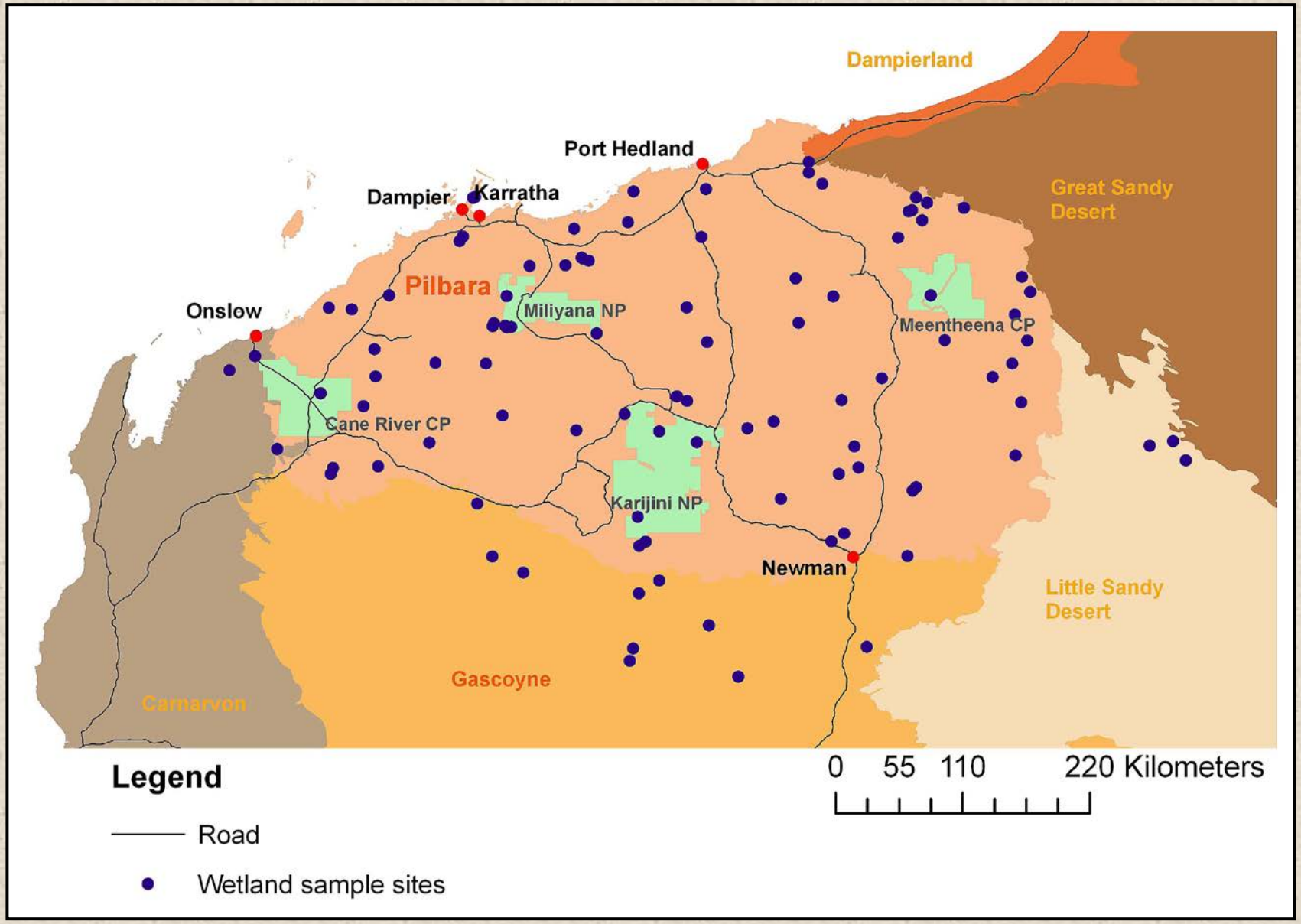
- Riparian flora
- Aquatic vascular flora and Characeae
- Algae (filamentous, other attached incl. diatoms, plankton)
- Aquatic invertebrates
- Waterbirds
- 98 wetlands, stratified by:
  - Major catchments
  - Position in catchment
  - Type of wetland
- Autumn (post wet season) and spring (dry season) sampling






Wetland sites



Wetland flora and fauna

Progress

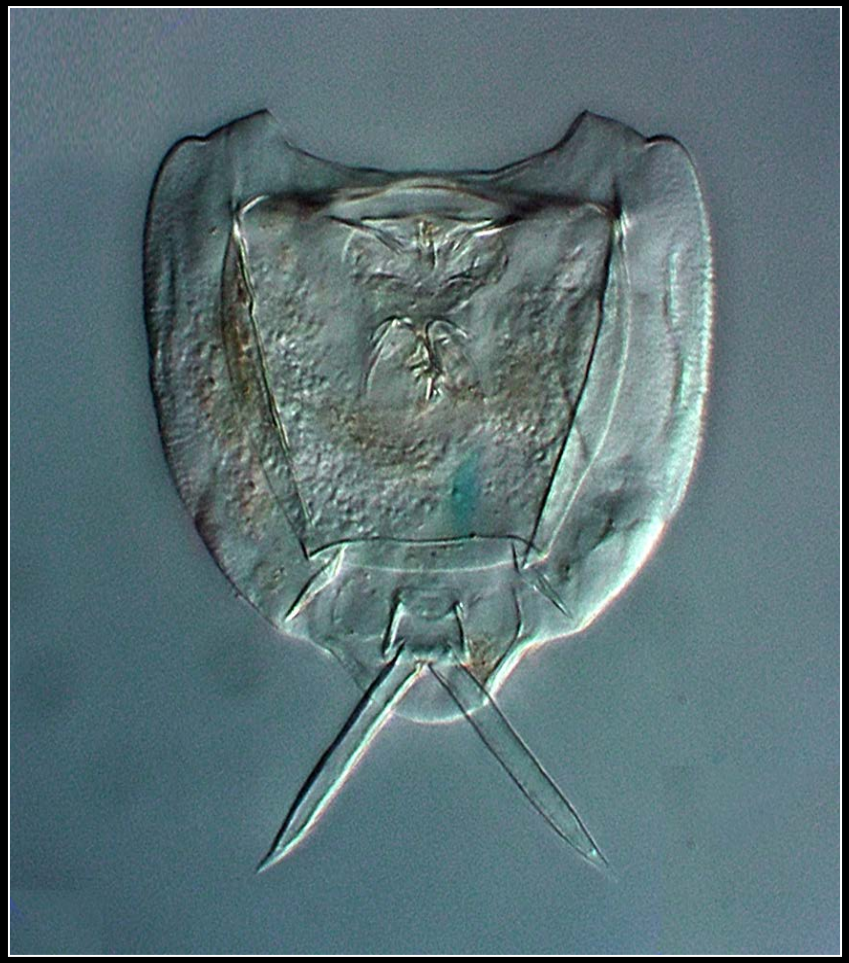
- 88 sites sampled twice
- 10 sites sampled once - ephemeral claypans and creeks
- 60% aquatic invertebrate samples identified
- Good progress on algal identifications by external specialists
- Aquatic and riparian vascular flora partly identified

Wetland fauna

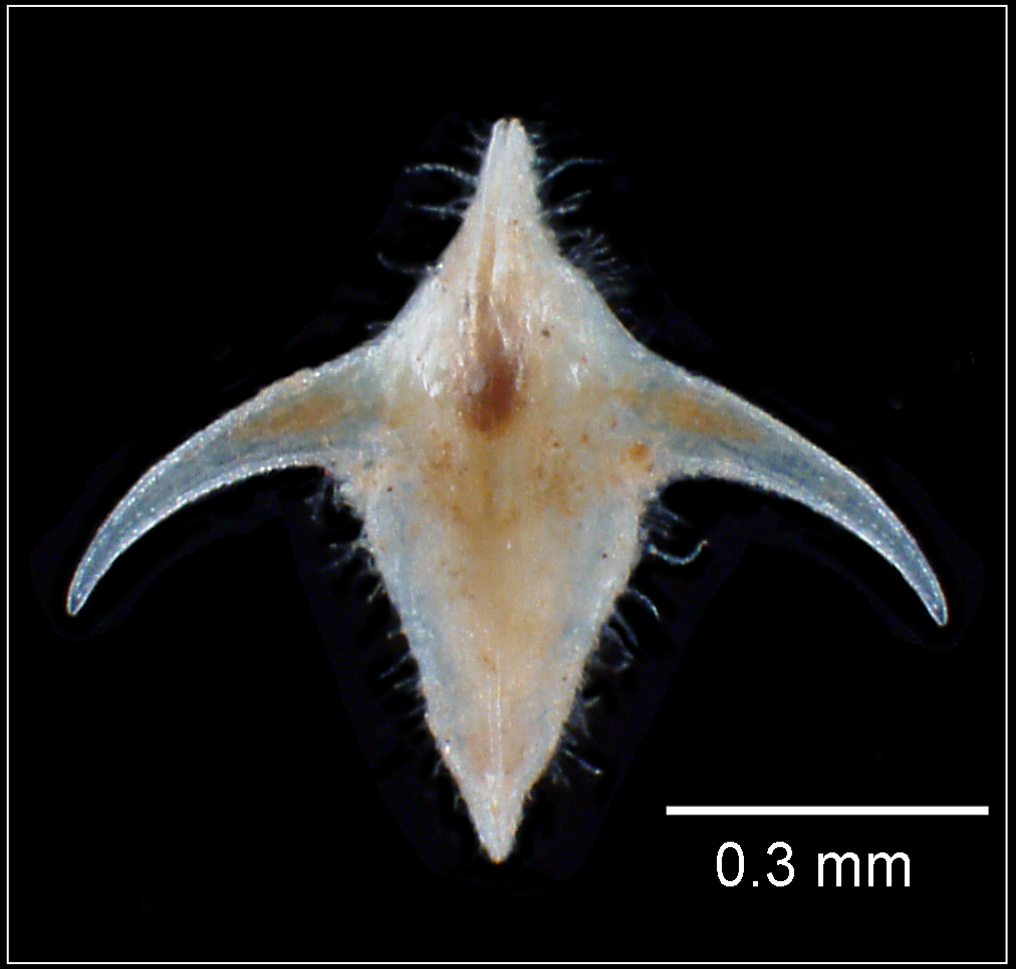
Preliminary outcomes

- 980 species of aquatic invertebrate identified
- mostly new records for Pilbara, 15+ confirmed new species probably ~100 new species in total
- average site richness much higher than expected (3 times that of Carnarvon Basin wetlands)
- strong affinities with northern and inland Australia faunas of other regions
- many species likely to be north-west endemics are restricted to claypans

Wetland fauna new species



Rotifer
Lecane cf. *spenceri* n. sp.



Ostracod -
Limnocythere n. sp.

Wetland fauna new species

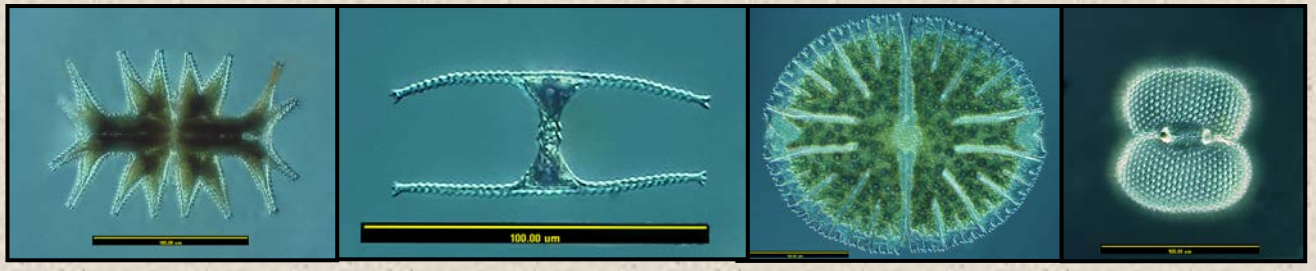
Conchostracan – *Limnadopsis* n. sp.

Beetle
Haliplus n. sp.

Wetland flora

Preliminary outcomes - algae

- >300 species of algae identified from 2/3rds samples – mostly described species but some probably new



- 30 species of Characeae, 4 genera (1 new) – affinities with swWA, seAsia and inland eastern Australia – some new spp.

Wetland flora

Preliminary outcomes – aquatic vascular flora

- most taxa widespread across region, with an affinity to Kimberley flora

Aponogeton euryspermus

Nymphoides indica

Wetland flora

Preliminary outcomes – vascular flora

- Cyperaceae determinations completed

  - This group, including *Cyperus*, *Eleocharis*, *Fimbristylis*, *Schoenoplectus,* widespread in moist terrestrial habitats
  - Many restricted to wetland margins

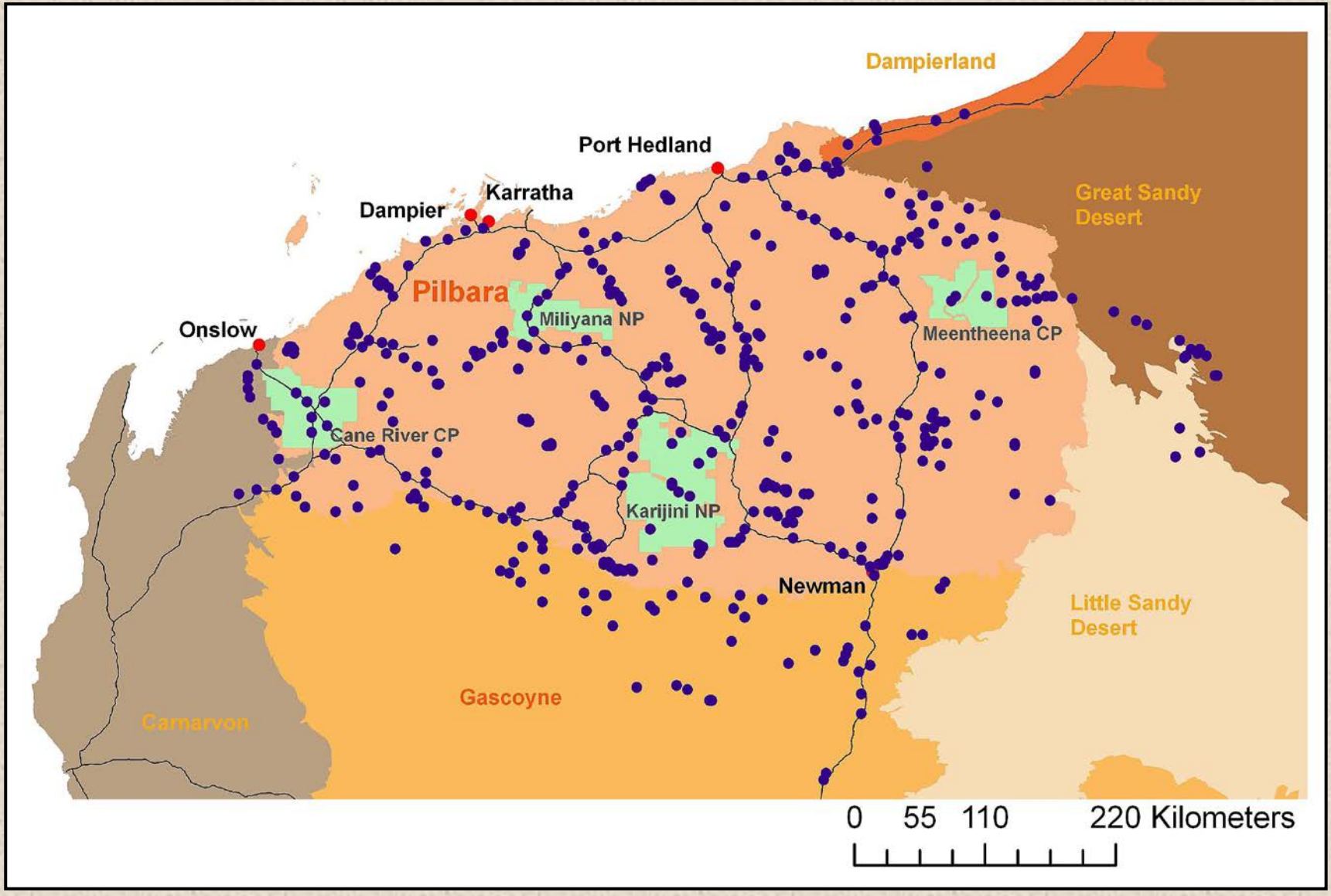
Stygofauna

Stuart Halse, Stefan Eberhard, Mike Scanlon, Jim Cocking and Harley Barron

Sampling

- 378 pre-existing bores and 122 wells, each sampled twice using weighted nets
- 14 bores sampled more frequently to investigate sampling efficiency
- Sites spread across the Pilbara to include a wide variety of aquifers and geology, with multiple bores per aquifer

Stygofauna

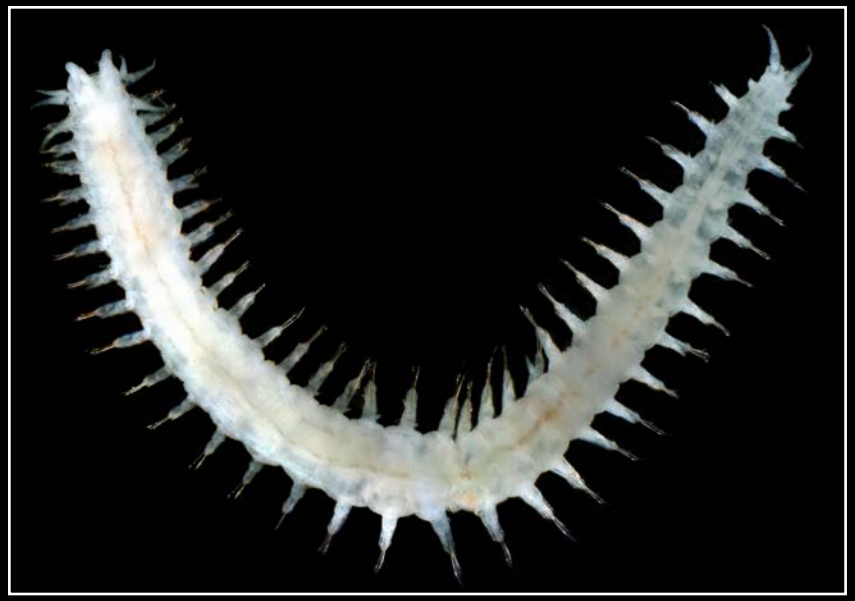

Dampierland
Port Hedland
Karratha
Dampier
Great Sandy Desert
Pilbara
Miliyana NP
Onslow
Meentheena CP
Cane River CP
Karijini NP
Newman
Little Sandy Desert
Gascoyne
Carnarvon
0 55 110 220 Kilometers

Stygofauna

Preliminary outcomes

- 2/3rds bores yielded stygofauna on first sampling
- Regional richness increased from 40 to 300+ species
- Vast majority of species new to science
- Many new genera, one new copepod family
- Some Pangean, Gondwanan and marine elements
- Pilbara now recognised as a global biodiversity hotspot

Stygofauna



Next steps

- Field work mostly complete
  - remaining terrestrial sampling to be completed Spr 2006
  - algae to be sampled at some wetlands in Spr 2006
- Complete identifications and data entry
- Data analysis and write-up (mid-2007)
- Provision of an assessment of regional biogeographic patterns that will make a major contribution to providing a scientific basis for future management
- Communicated through:
  - Scientific, technical and popular publications
  - Direct knowledge transfer to conservation managers
  - Enabling electronic access to information
  - Presentations to stakeholders

Acknowledgements

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- DEC
- National Heritage Trust
- The Western Australian Museum
- Straits Resources, Pilbara Iron, Rio Tinto

The following people have made invaluable contributions to the survey:

- Staff of the DEC (ex CALM) Office in Karratha and of Millstream and Karijini National Parks
- Staff of the Western Australian Museum
- Terrestrial quadrat installation teams
- Landholders
- Many other external collaborators
- Volunteers