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Distribution and Ecology of Invasive Ants

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Photo Source: myrmecos.net Alex Wild, 2003

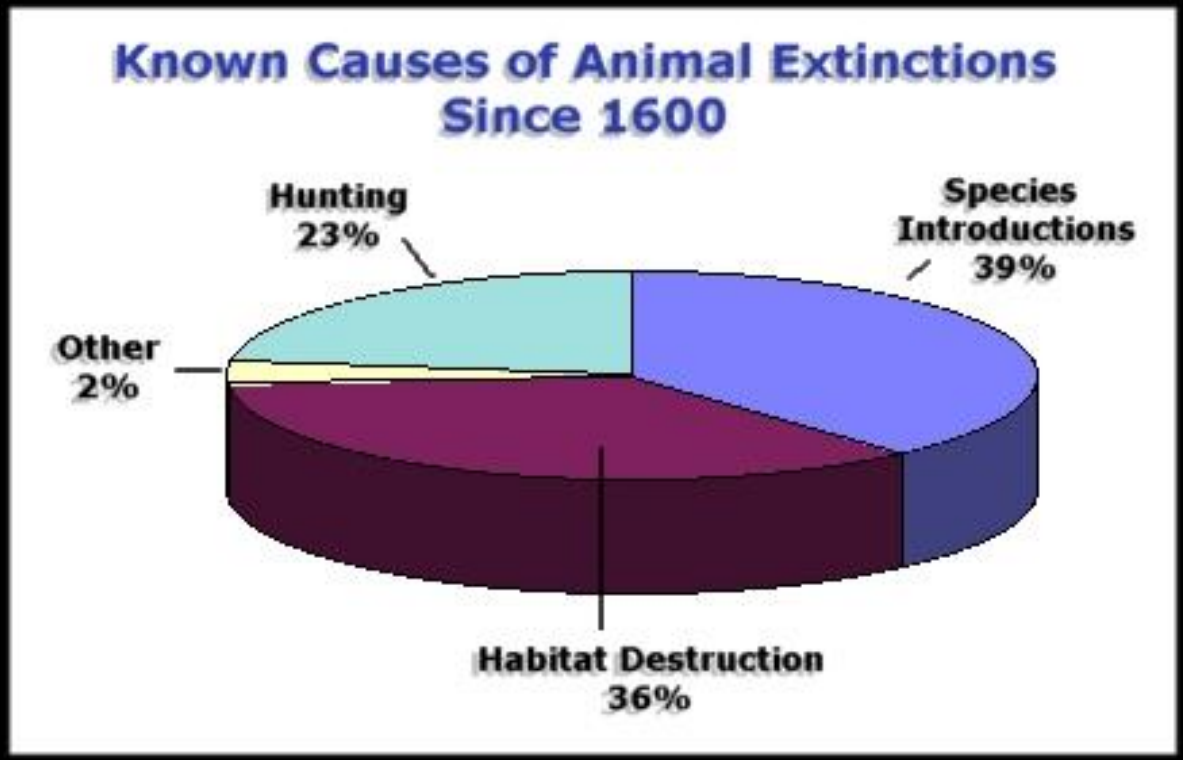
Outline

- Introduction
  - Invasive species – why study them?
  - Ants as invaders
- Pavement ants, *Tetramorium caespitum*
  - Global distribution
- Research
  - Local distribution
  - Consequences of their introduction
    - Competition with native species?

Why?

Introduction

- Invasive species a major threat to biodiversity worldwide



Source: World Conservation Monitoring Centre, "Global Biodiversity" Chapman & Hall, London, 1992

Estimated annual costs associated with non-native species:

Group costs (in millions)

Plants (purple loosestrife, weeds) 34,000

Mammals (feral pigs, rats) 37,000

Birds (pigeons, starlings) 2,000

Fishes 1,000

Arthropods (ants, termites, other pests) 19,000

Mollusks (zebra mussel, asian clam) 1,200

Microbes (plant pathogens, animal disease) 41,000

All organisms over **$136 billion per year**

Source: Pimentel et al. 2000 BioScience

Introduction

- Invasivions are opportunities to study the ecology and evolution of newly assembled communities
- How do populations respond to this kind of perterbation?

Introduction

- Ants among the worst invaders

Linepithema humile – The Argentine Ant

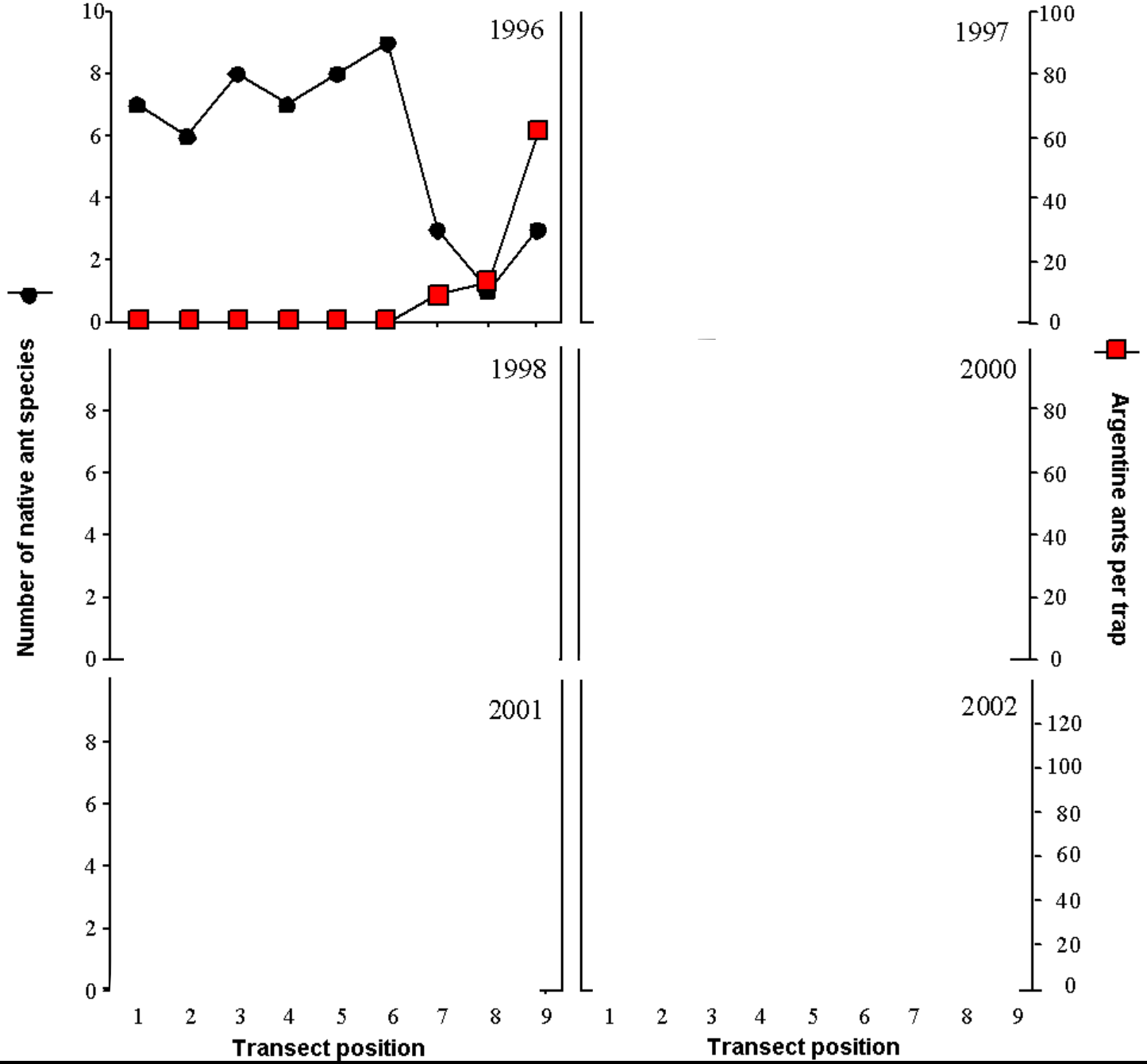
Solenopsis invicta – The Red Imported Fire Ant

Photos: Alex Wild www.myrmecos.net

Introduction

- Invasive species a major threat to biodiversity worldwide
- Ants among the worst invaders
- Lack an understanding of:
  - Distribution and spread of most ant invaders
  - Community-level effects of ant invasion


Rice Canyon
Total native ant diversity: 26 species
1
2
3
4
5
6
7
8
9
© 2006 TeleAtlas
© 2005
Goog
Streaming 100%
Eye alt


1996
1997
1998
2000
2001
2002
Number of native ant species
Argentine ants per trap
Transect position
Transect position

Rice Canyon

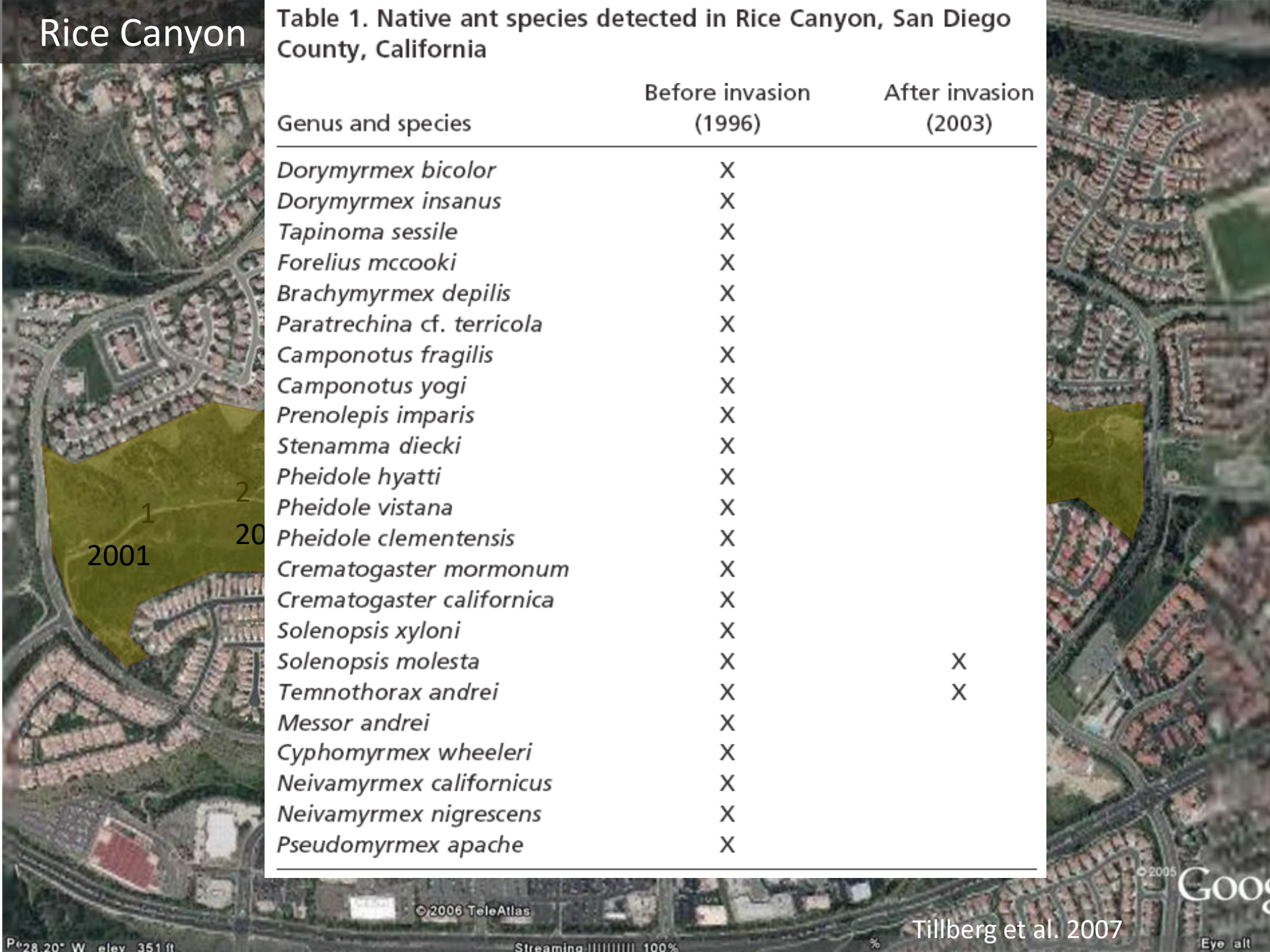


Table 1. Native ant species detected in Rice Canyon, San Diego County, California

Genus and species	Before invasion (1996)	After invasion (2003)
Dorymyrmex bicolor	X	
Dorymyrmex insanus	X	
Tapinoma sessile	X	
Forelius mccooki	X	
Brachymyrmex depilis	X	
Paratrechina cf. *terricola*	X	
Camponotus fragilis	X	
Camponotus yogi	X	
Prenolepis imparis	X	
Stenamma diecki	X	
Pheidole hyatti	X	
Pheidole vistana	X	
Pheidole clementensis	X	
Crematogaster mormonum	X	
Crematogaster californica	X	
Solenopsis xyloni	X	
Solenopsis molesta	X	X
Temnothorax andrei	X	X
Messor andrei	X	
Cyphomyrmex wheeleri	X	
Neivamyrmex californicus	X	
Neivamyrmex nigrescens	X	
Pseudomyrmex apache	X	

Tillberg et al. 2007

Tetramorium sp. E ~~*caespitum*~~

- Common Pavement Ant
- Native range: Southeast Europe
- Widespread throughout U.S. and Europe
- Despite its wide distribution, it is relatively unstudied, especially in its native habitats

Photo Source: myrmecos.net, Alex Wild, 2007

Global Distribution

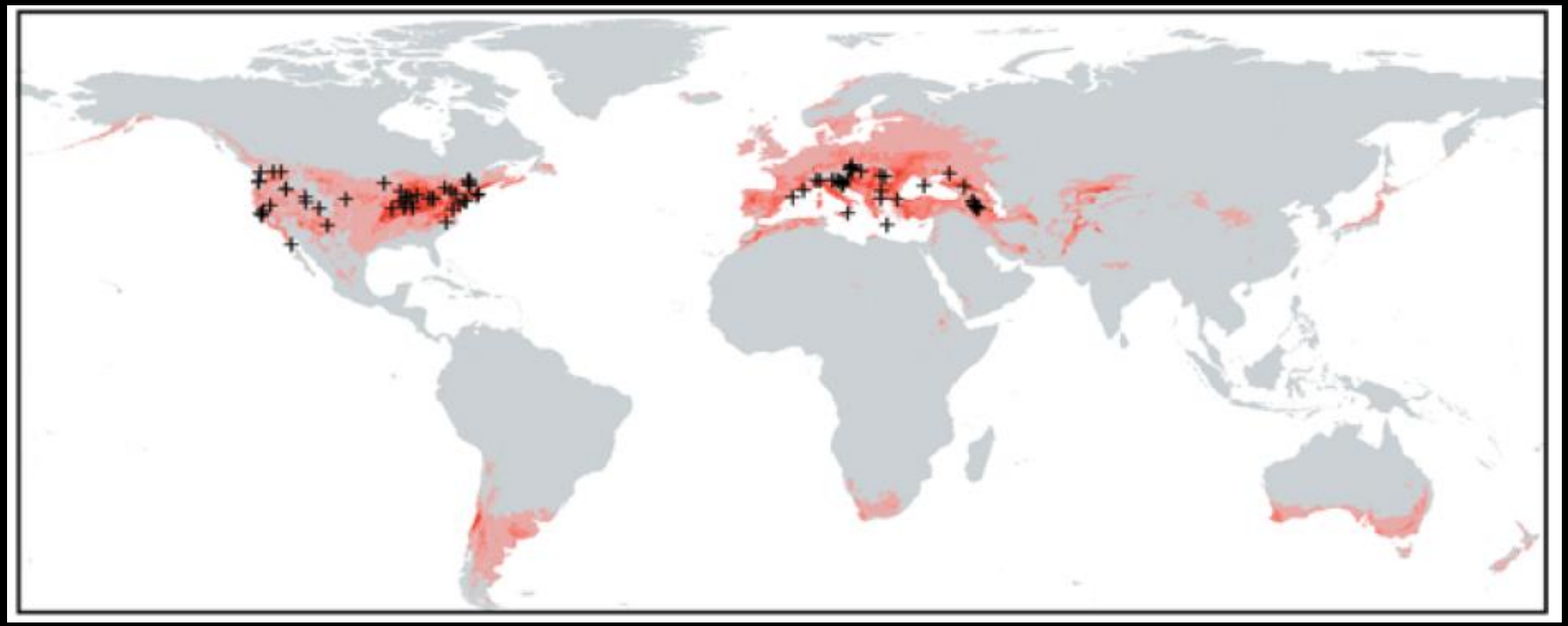
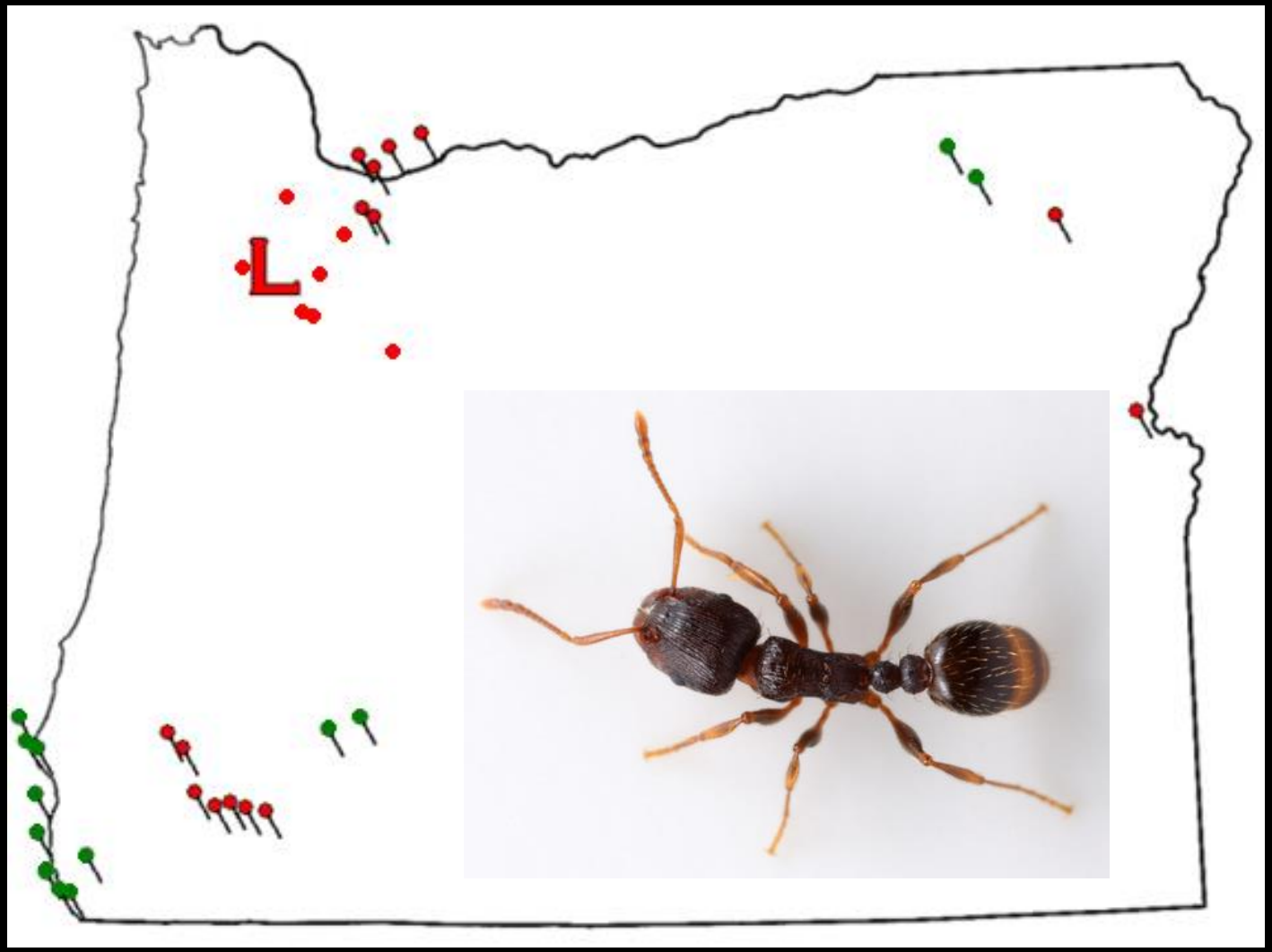


Figure 1 Modelled global distribution of *Tetramorium* sp.E and *T. tsushimae* based on native and introduced occurrences combined. Coloured areas represent the predicted distribution. Darker colours represent areas with better predicted conditions. Crosses indicate data used to build models.

Steiner et al. 2008

Main goals

- Assess the presence and distribution of invasive ants in Oregon's natural areas
  - State-wide distribution
  - Local habitat use
- Investigate the effect of invasive ants on native ant communities
  - Competition for dietary resources
  - Behavioral interactions between invasive and native species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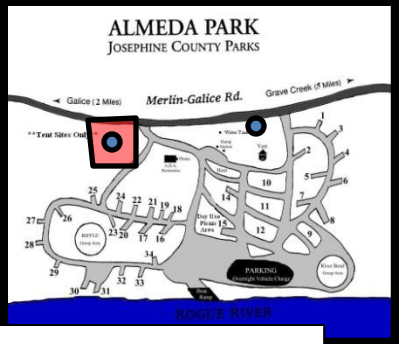
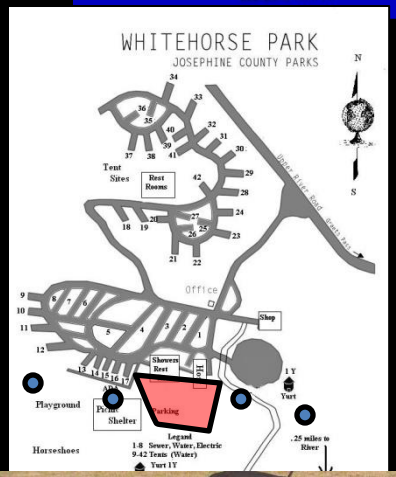
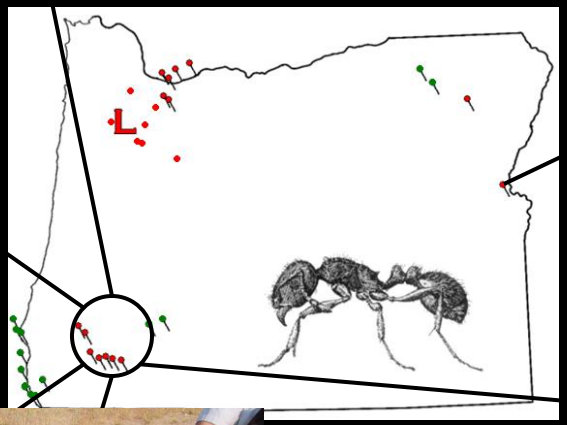
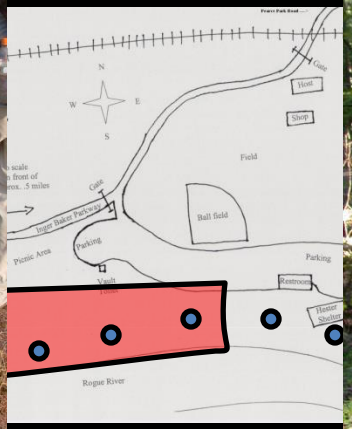
Distribution of *Tetramorium caespitum*

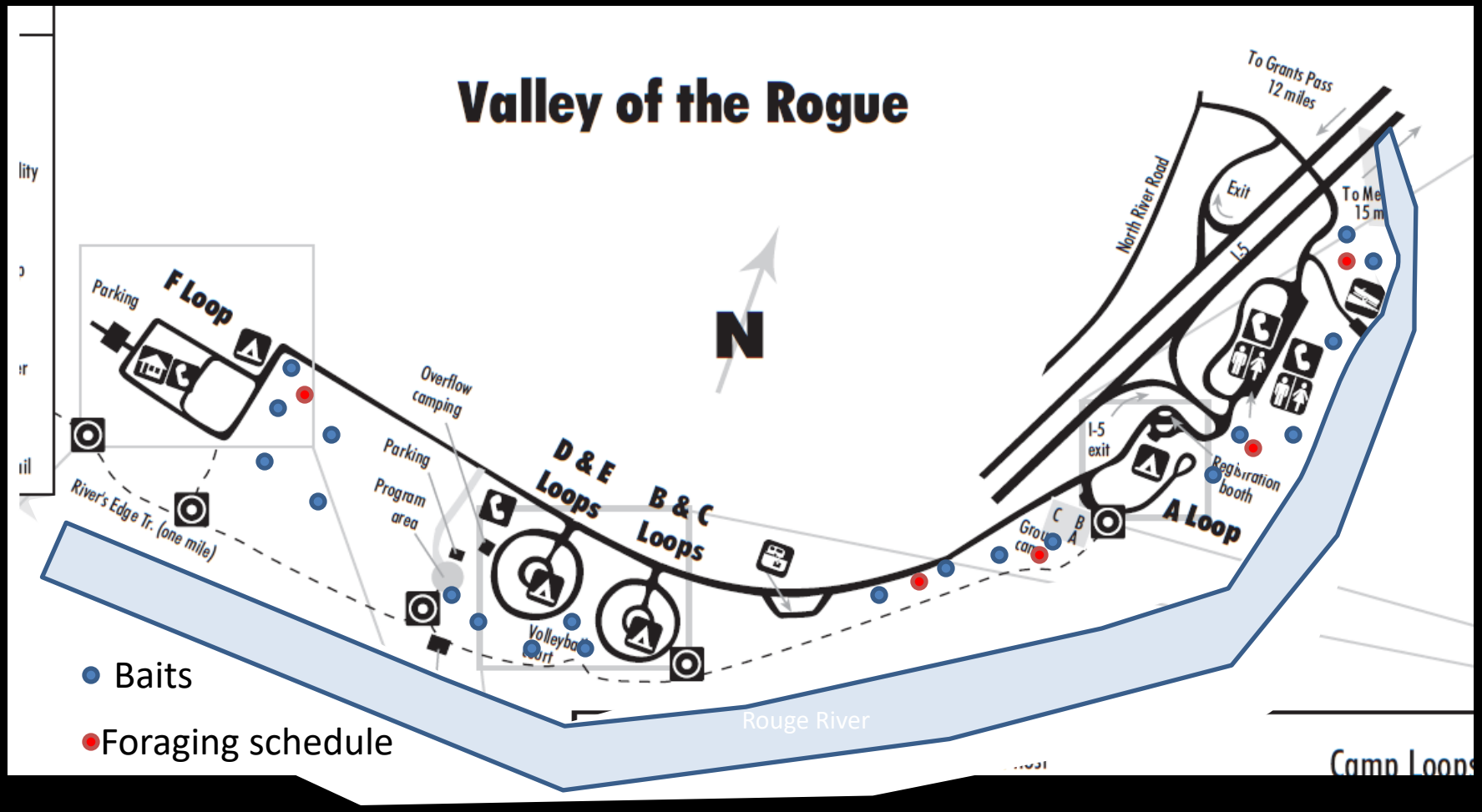
- Pitfall Traps
- *Teramorium* here





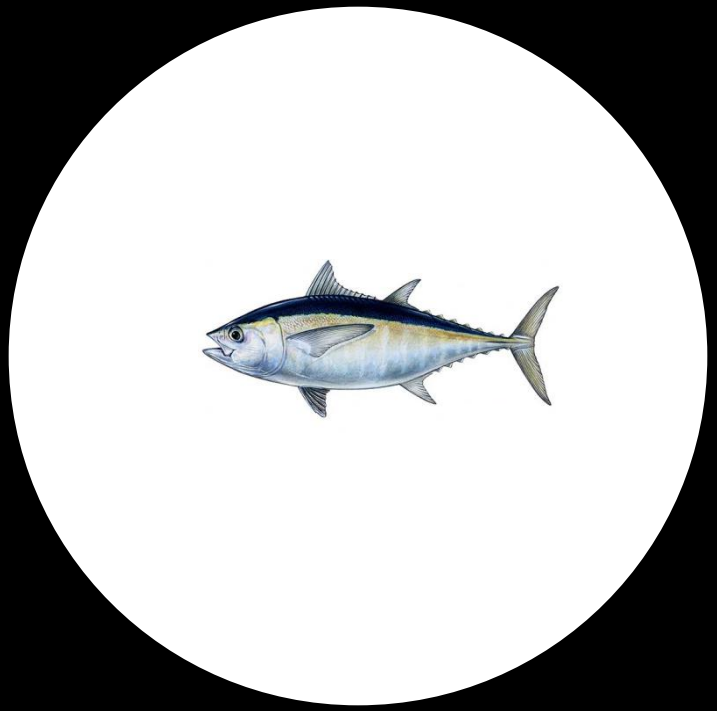


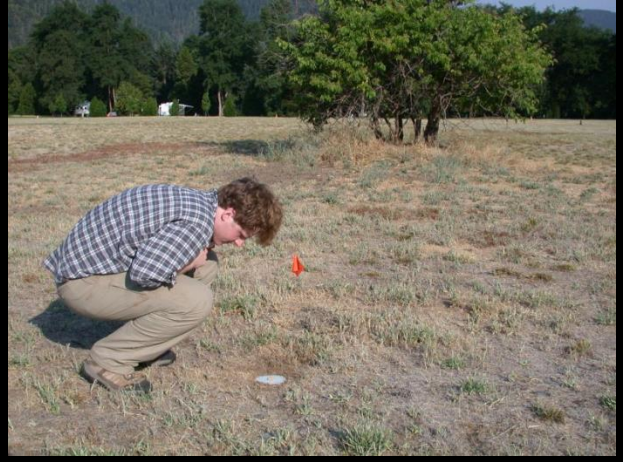



Valley of the Rogue
N
F Loop
Parking
Overflow camping
Parking
Program area
D & E Loops
B & C Loops
River's Edge Tr. (one mile)
Volleyball court
I-5 exit
A Loop
Registration booth
North River Road
Exit
I-5
To Grants Pass 12 miles
Rouge River
Camp Loops
Baits
Foraging schedule

Competition Experiments

- Set bait cards
- Discovery
- Recruitment
- Domination
- Exclusion of *Tetramorium*





Ant Community Competition

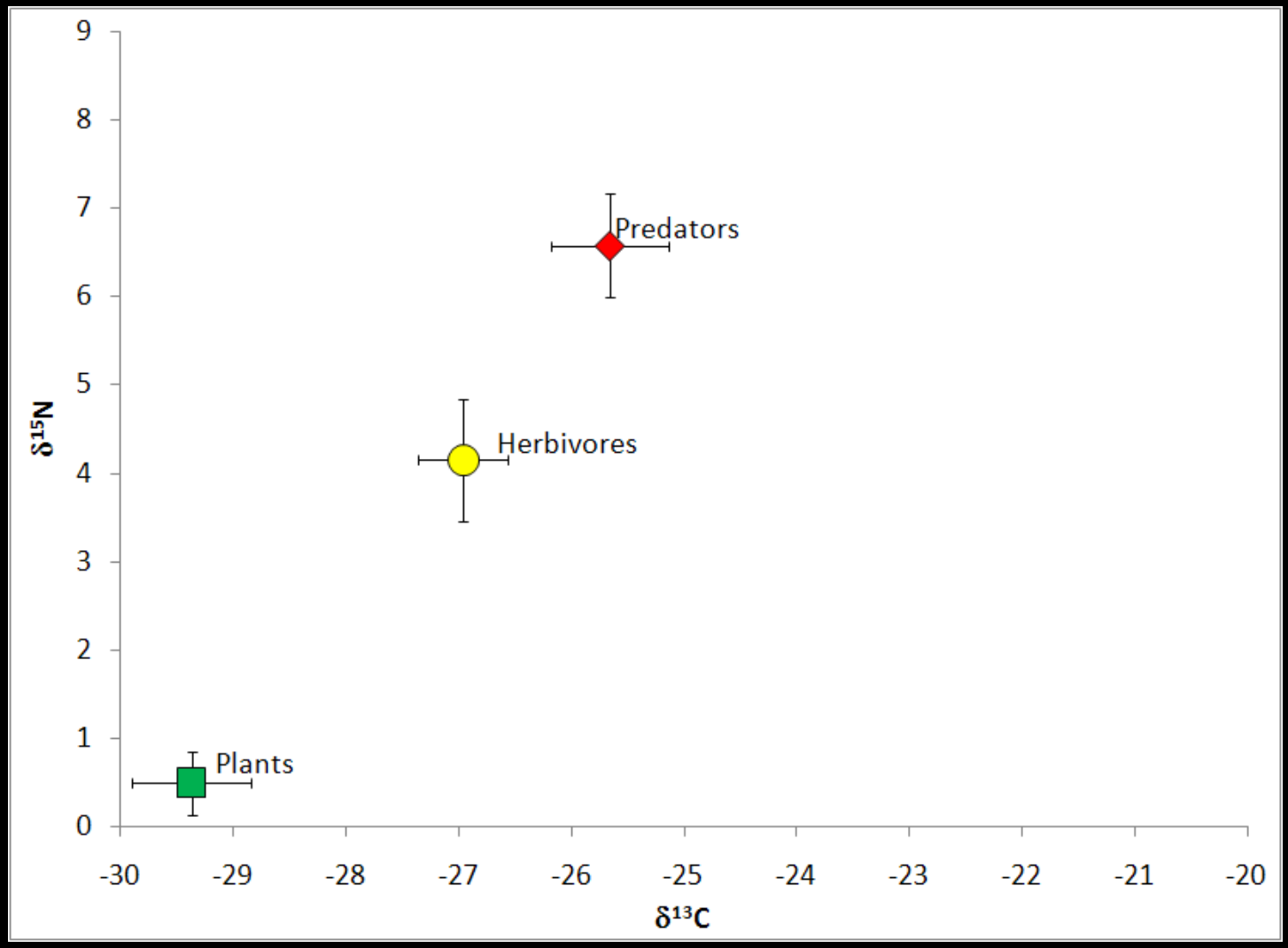
***Tetramorium* Scorecard**

Vs.	W	L	Pct
Brachymyrmex	5	0	1.00
Formica	11	2	0.85
Lasius	8	0	1.00
Liometopum	1	0	1.00
TOTAL	25	2	0.93

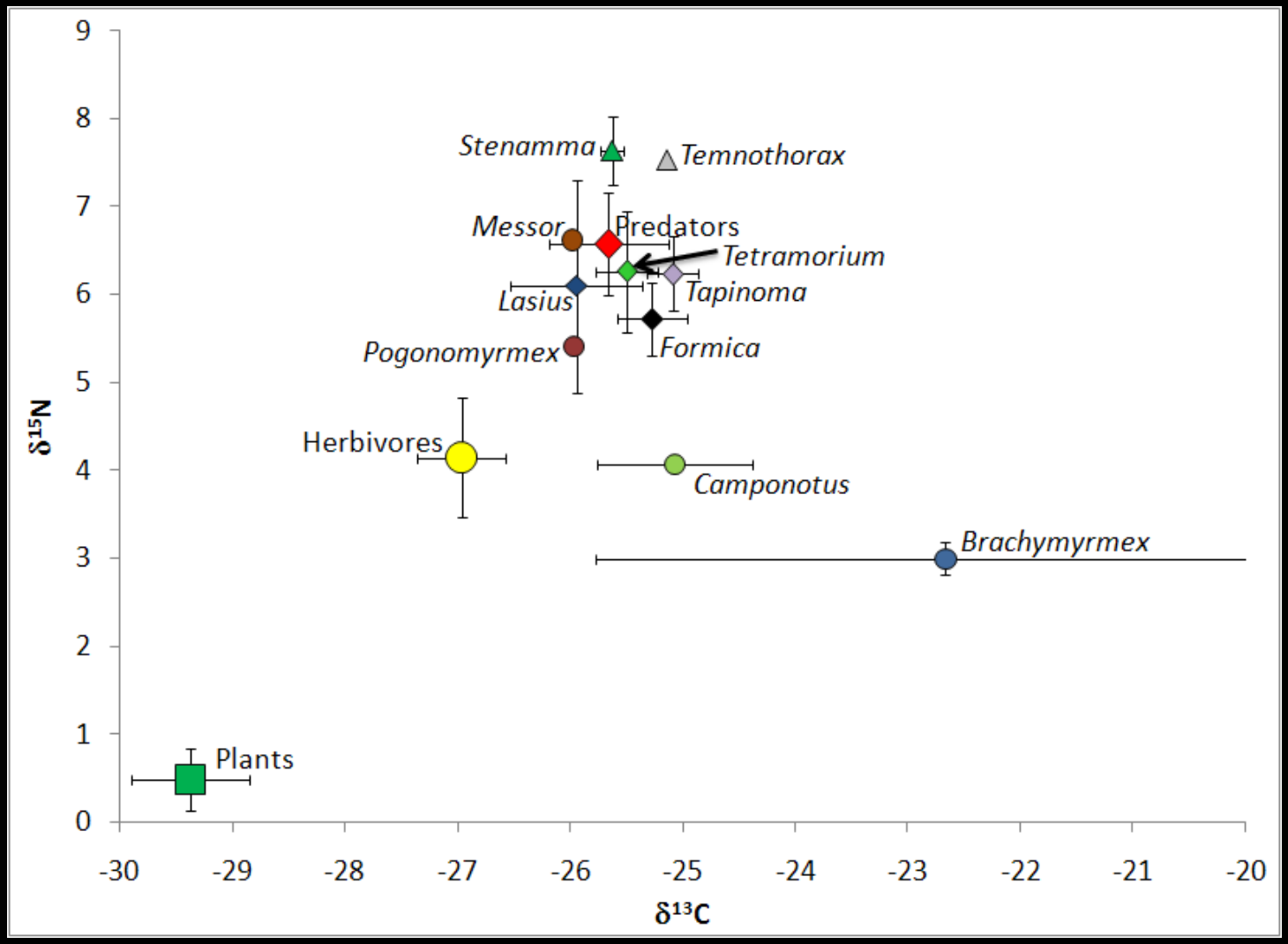
Competitive success of *Formica*

Photo Source: myrmecos.net, Alex Wild, 2004

Trophic Level Analysis



Trophic Level Analysis



Conclusions

- *Tetramorium caespitum* has invaded numerous State and County parks in Oregon
- High-use areas are most prone to invasion
- *Tetramorium caespitum* directly competes with native ants for resources
- Competition reduces resource availibility for native species

Future

- Does this competition lead to native biodiversity decline?

- Continued spread of *Tetramorium caespitum* in Oregon?

Photo Source: myrmecos.net, Alex Wild, 2007

Acknowledgements

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