Distribution and trophic interaction of *P. antipodarum* in the Colorado River

by

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Colorado River through Grand Canyon

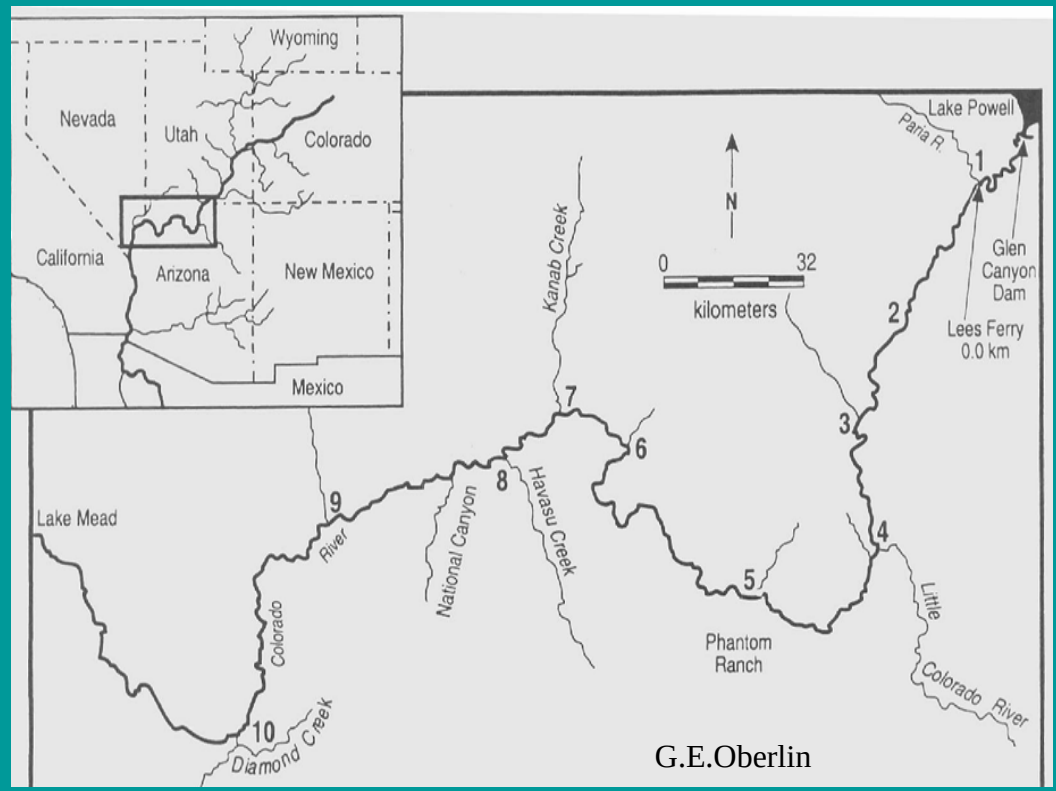


Photo by J. Brownson

Glen Canyon Dam

- Changed ecosystem
- Cool, clear, stenothermic waters
- Dominated by alien taxa (Shannon et al. 2001)

Photo by: GCMRC

Potamopyrgus antipodarum Invasion

- Invaded in 1995
- Hyrobiidae: prosobranchs
- Pass through gut unharmed (Haynes et al. 1985)
- Parthenogenic (Density: >30,000/m^2)

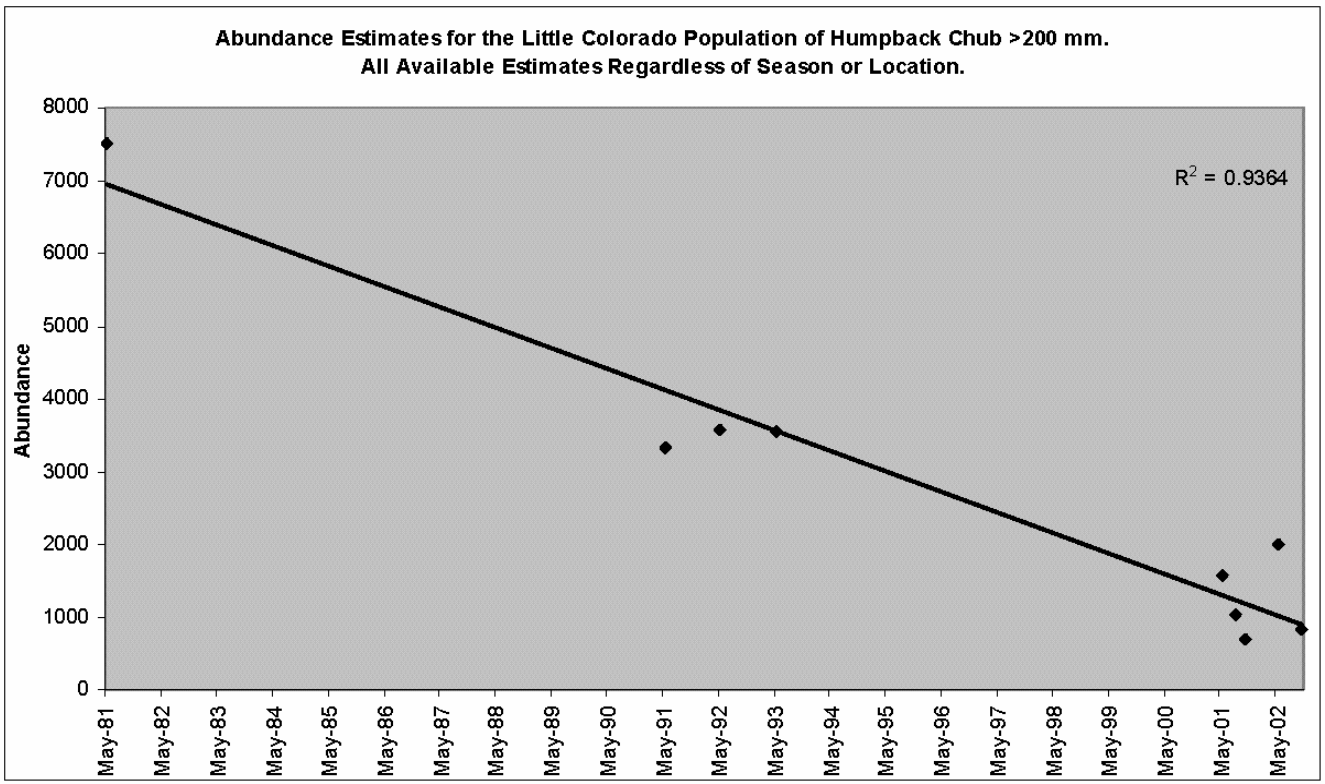
Photo by D.L. Gustafson

Potamopyrgus antipodarum Invasion

- In main stem and 5 of 18 tributaries (27%)

- Previously, *G. lacustris* and Chironomid spp dominated (Blinn et al 1994)

Endangered Humpback Chub (*Gila cypha*)



GCMRC 2003

Objective

Determine if there are potential trophic interactions between *P. antipodarum* and *G. lacustris*

- Relationship between *P. antipodarum*, *G. lacustris*, and primary producers
- Change in benthic community structure over 12 years

Methods

- Nine cobble bars
- 6 Hess samples
- Epiphytic diatoms biomass estimated
- 5 biotic categories (AFDM/m^2)

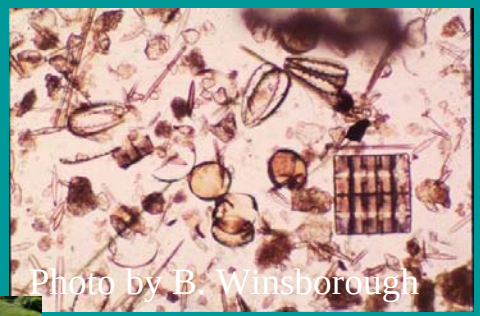
Five Biotic Categories:

1. *C. glomerata*

2. *Oscillatoria* spp.

3. Detritus

4. Miscellaneous Algae and macrophytes



5. Macroinvertebrates

- **Lumbricids**
- ***G. lacustris***
- **Oligocheates**
- **Simulidae spp.**
- **Chironomidae**
- **-Other**
- **Molluscs**

Positive relationship between *P.antipodarum*, *C. glomerata* and Detritus

($F_{2,39}$=45.5, p<0.001, R^2=0.7)

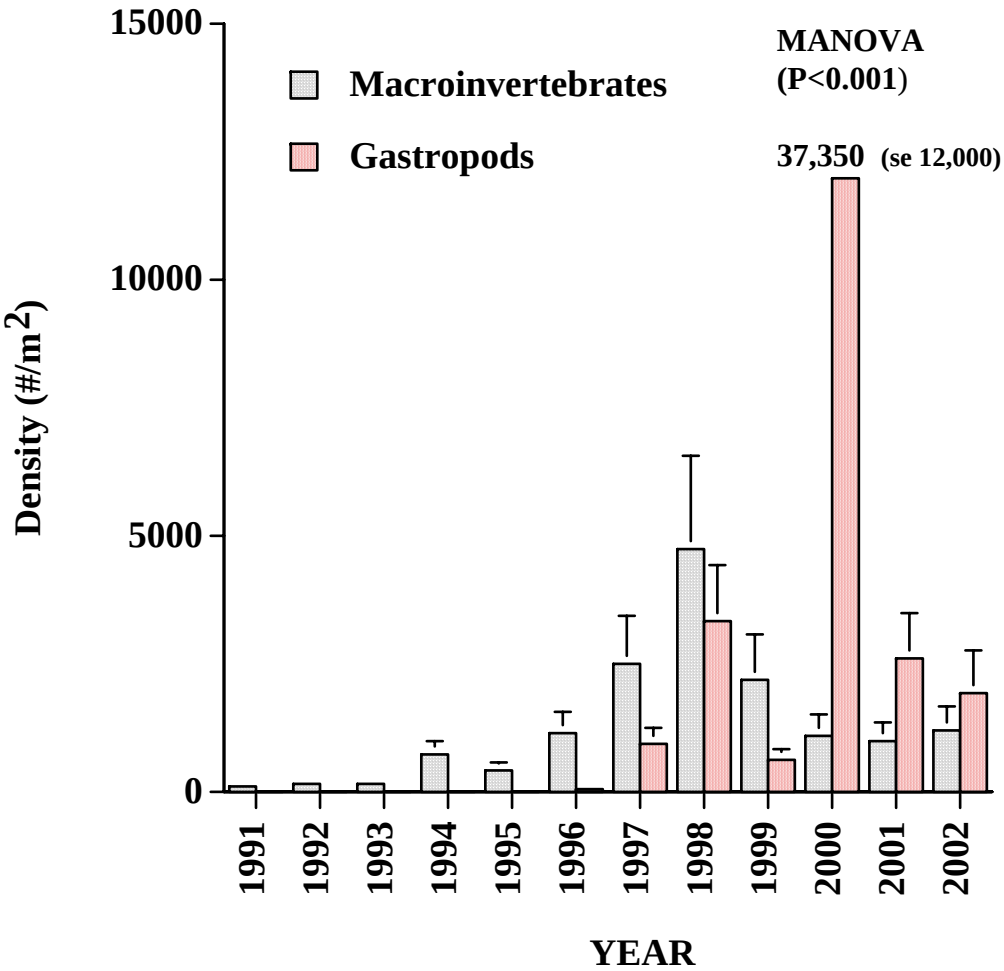
Independent	Coefficient	P-value
C. glomerata	0.004	0.04
Detritus	0.036	<0.001

G. Lacustris and *P.antipodarum* occupy same habitat

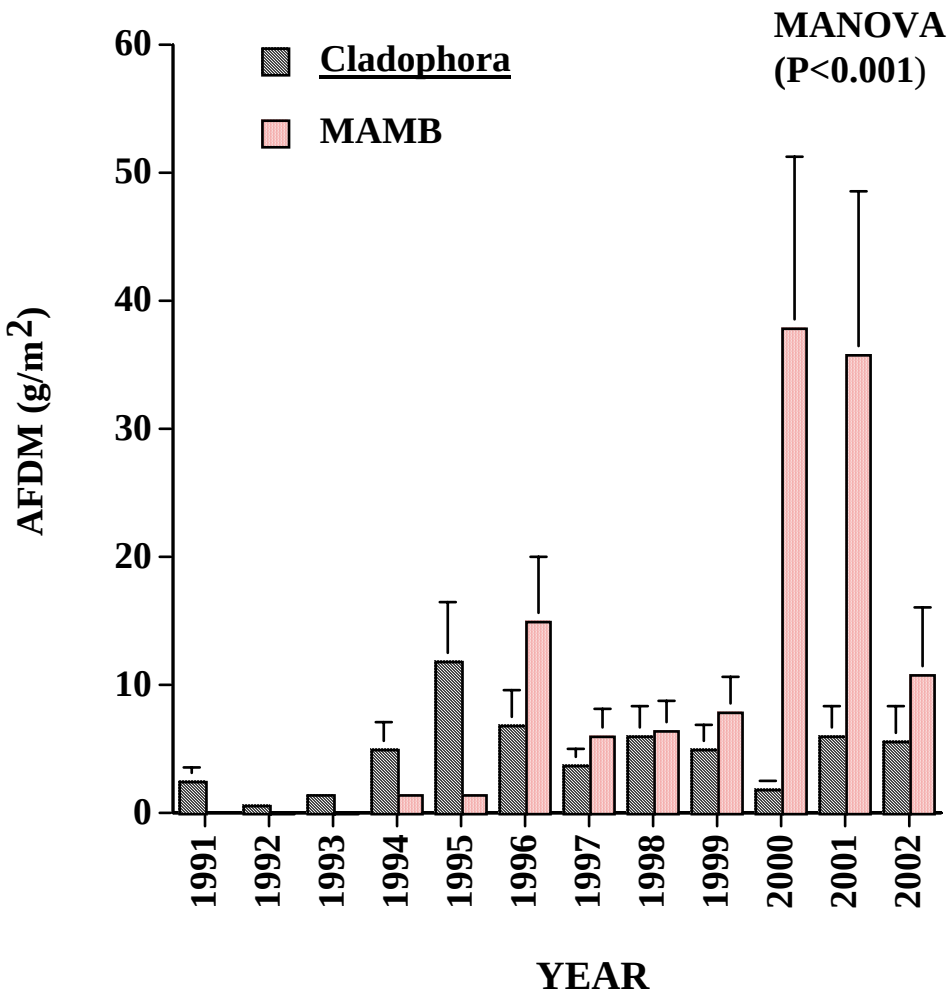
($F_{3,38}$=23.7, p<0.001, R^2=0.65)

Independent	Coefficient	P-value
C. glomerata	1.61	<0.01
Detritus	1.81	0.001
Oscillatoria	-0.57	0.04

P. antipodarum Dominates Benthic Community



Increase in MAMB post *P. antipodarum* invasion



Results

- *P. antipodarum* and *G. lacustris* have a positive relationship with *C. glomerata* and detritus
- *P. antipodarum* dominate the macroinvertebrate community
- *P. antipodarum* may have shifted primary producers from *C. glomerata* to Misc. Algae and Macrophytes

Further Study

- Trophic interaction experiment
- Secondary production
- Distribution of *P. antipodarum* in CO and AZ

Novel Aspects

- Long-term effects unknown
- Alter the aquatic community
- May affect endangered fish species

Photo by D. C. Richards

Acknowledgements:

David Richards
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Ken Coleman
Cécile Walter

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2.) Determine if there are potential trophic interactions between *P. antipodarum* and *G. lacustris*

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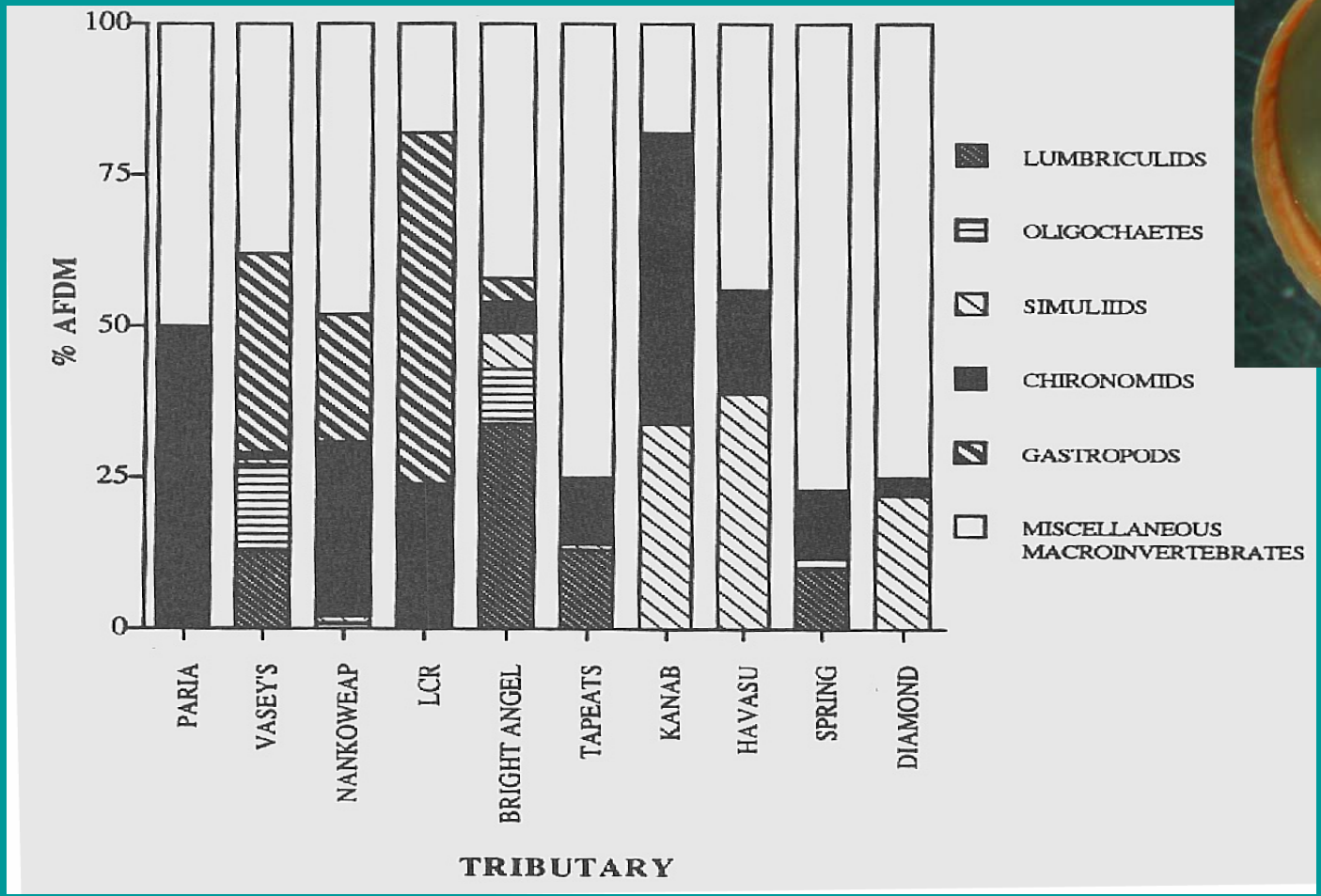
Methods and Distribution

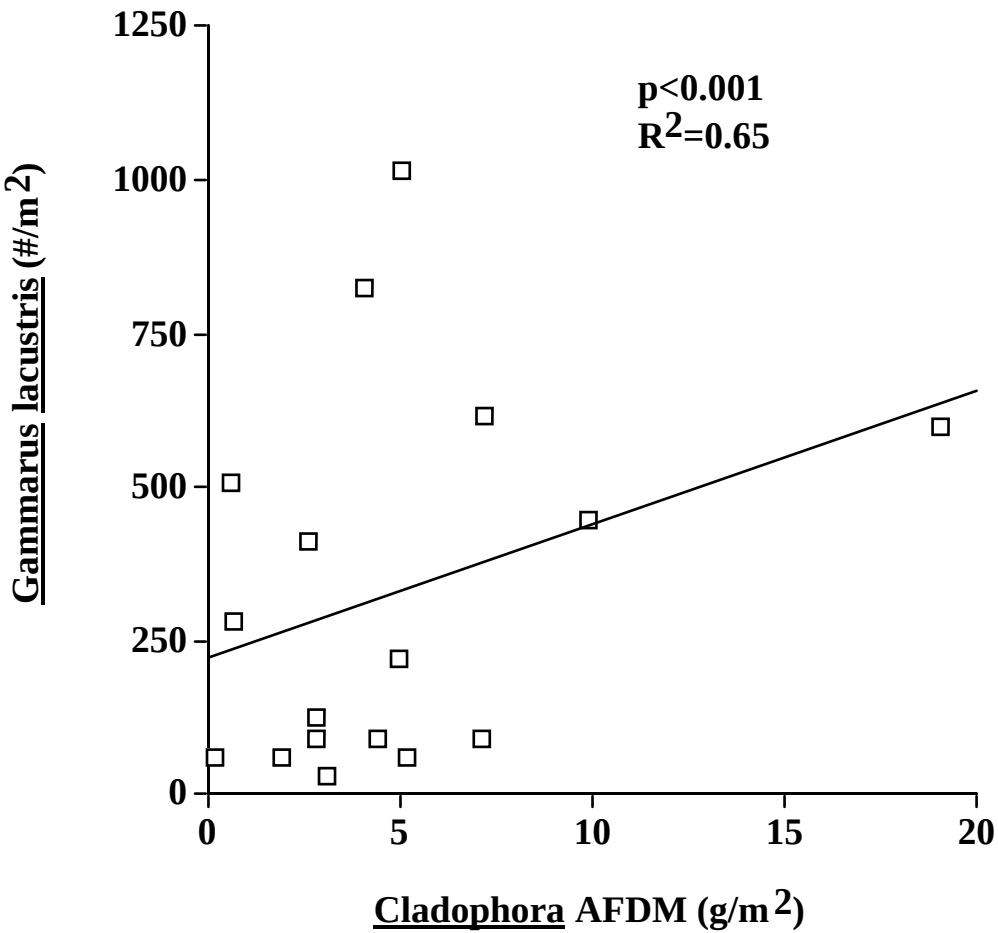
- Surveyed sites in Oct. 2002:
  - 21 main stem
  - 18 tributaries
- Observed in all main stem sites
- Present, but in low densities in 27% of tributaries

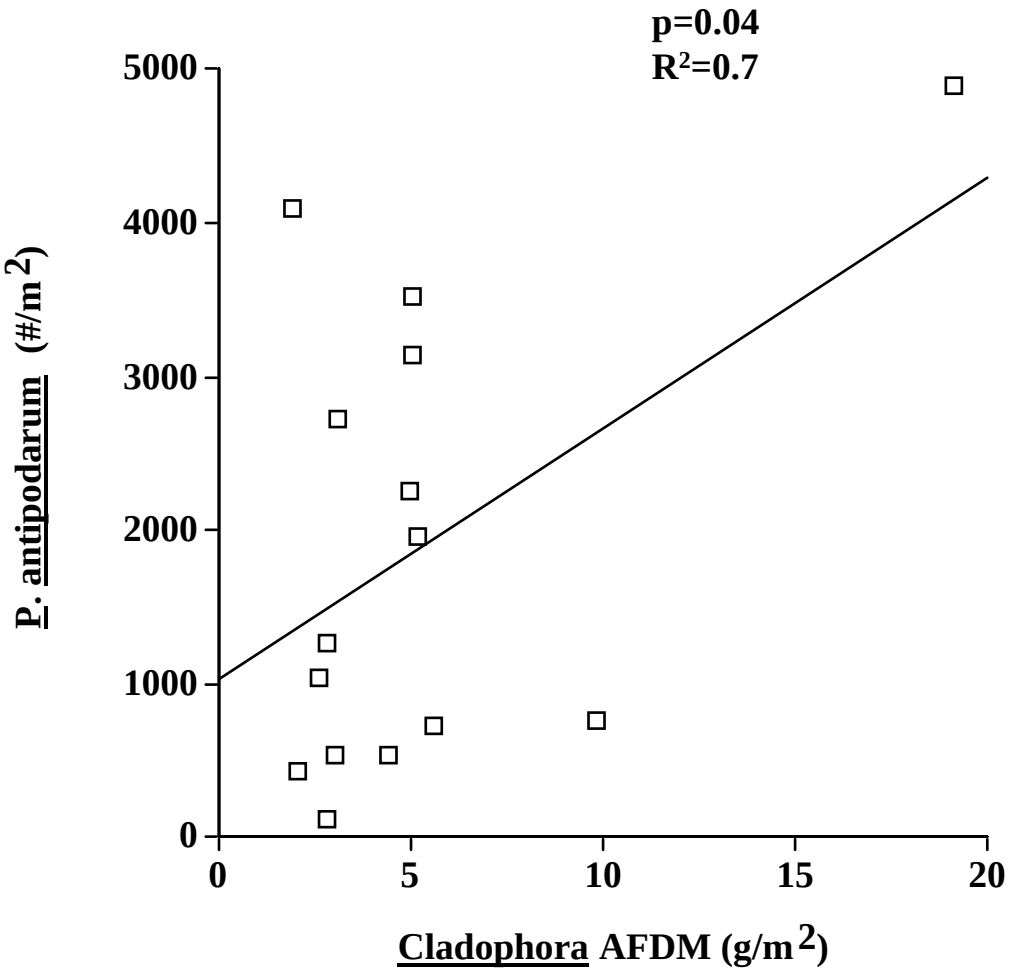
Photo by J. Dykinga

Physid distribution 1991
(Oberlin et al. 1999)



G. Lacustris Consumes Same Resource as *P. antipodarum*




p=0.04
R2=0.7
5000
4000
3000
2000
1000
0
0
5
10
15
20
P. antipodarum (#/m2)
Cladophora AFDM (g/m2)

What Can We Do?

- They are here to stay
- Check shoes and clothes and remove snails
- Dry clothes and gear to prevent spread