The removal of rusty crayfish from Sparkling Lake: Whole-lake changes and future prospects

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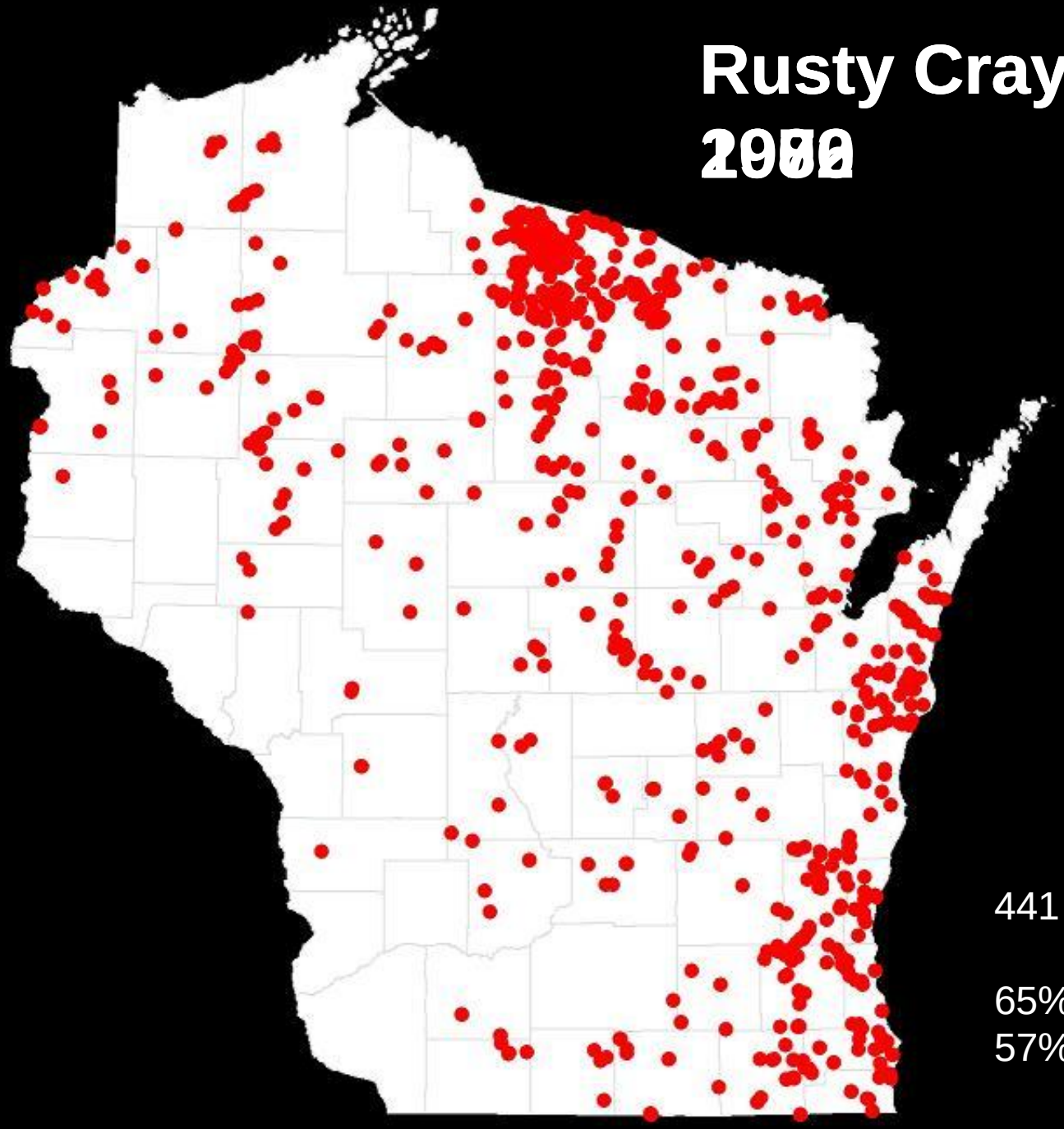
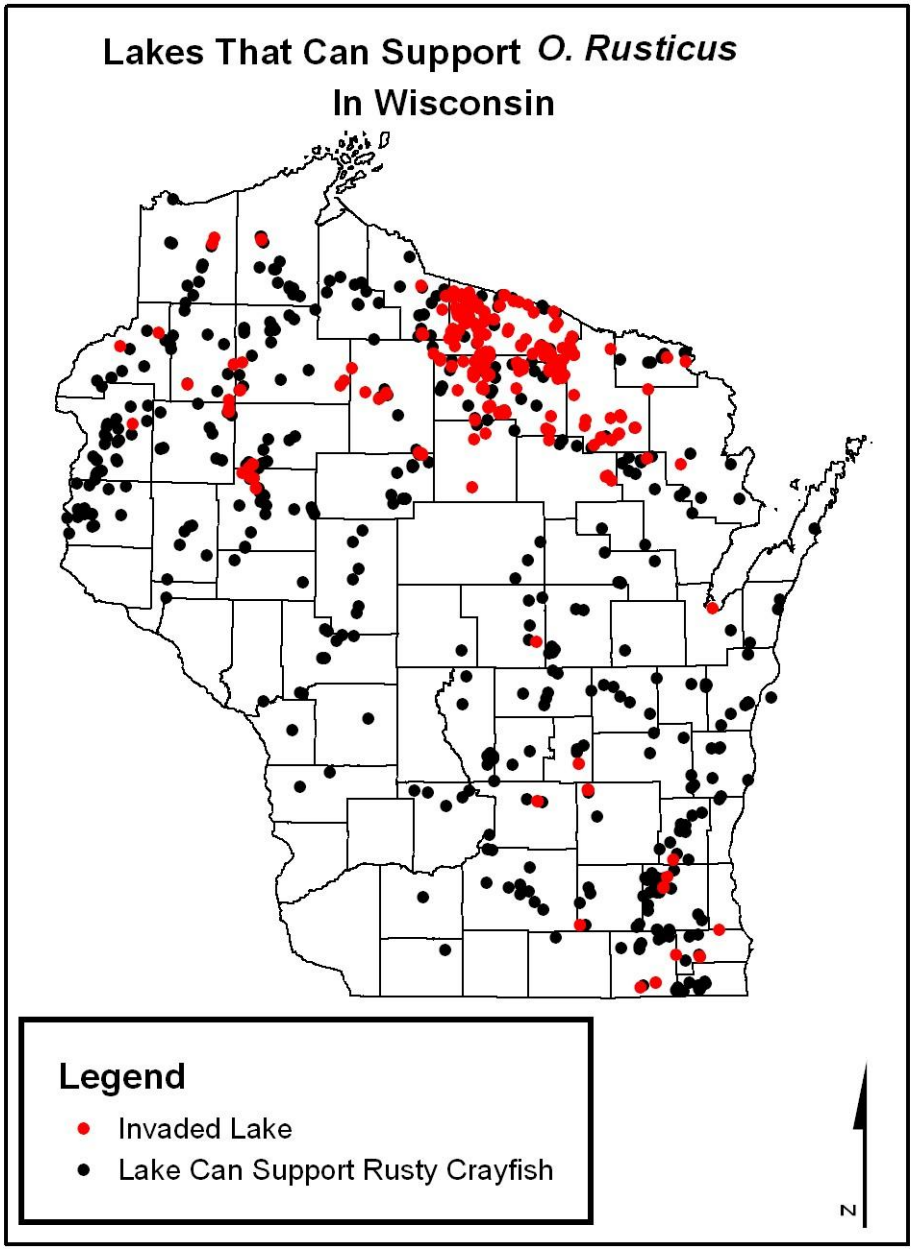
Rusty Crayfish
2000



441 sites sampled

65% of lakes
57% of streams

Potential for expansion is high:
> 85% of WI lakes



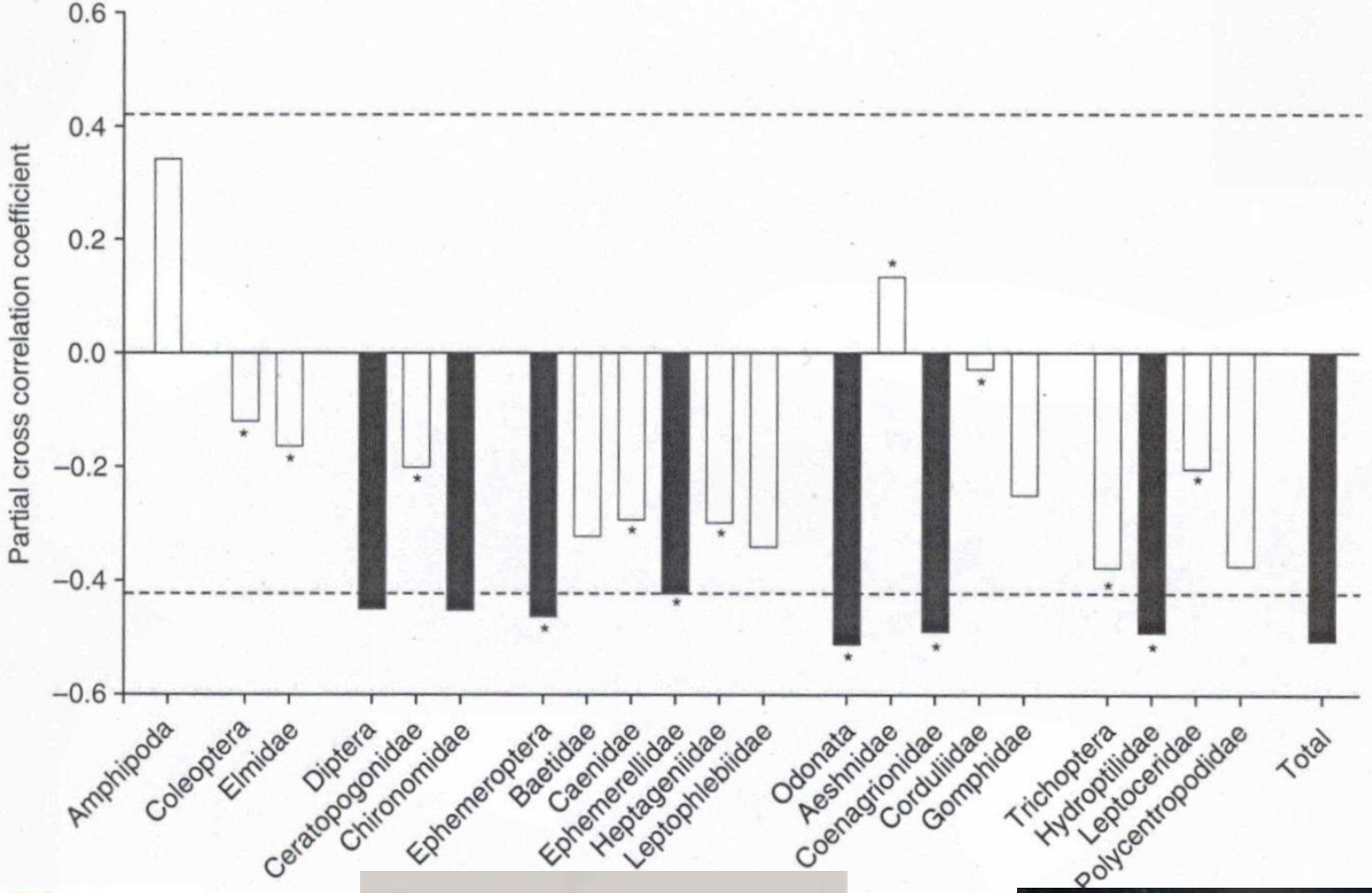
Effects of Rusty Crayfish

- Macrophytes


Low crayfish abundance
High crayfish abundance
Karen Wilson

Effects of Rusty Crayfish

- Macrophytes
- Invertebrates
  - Native crayfish

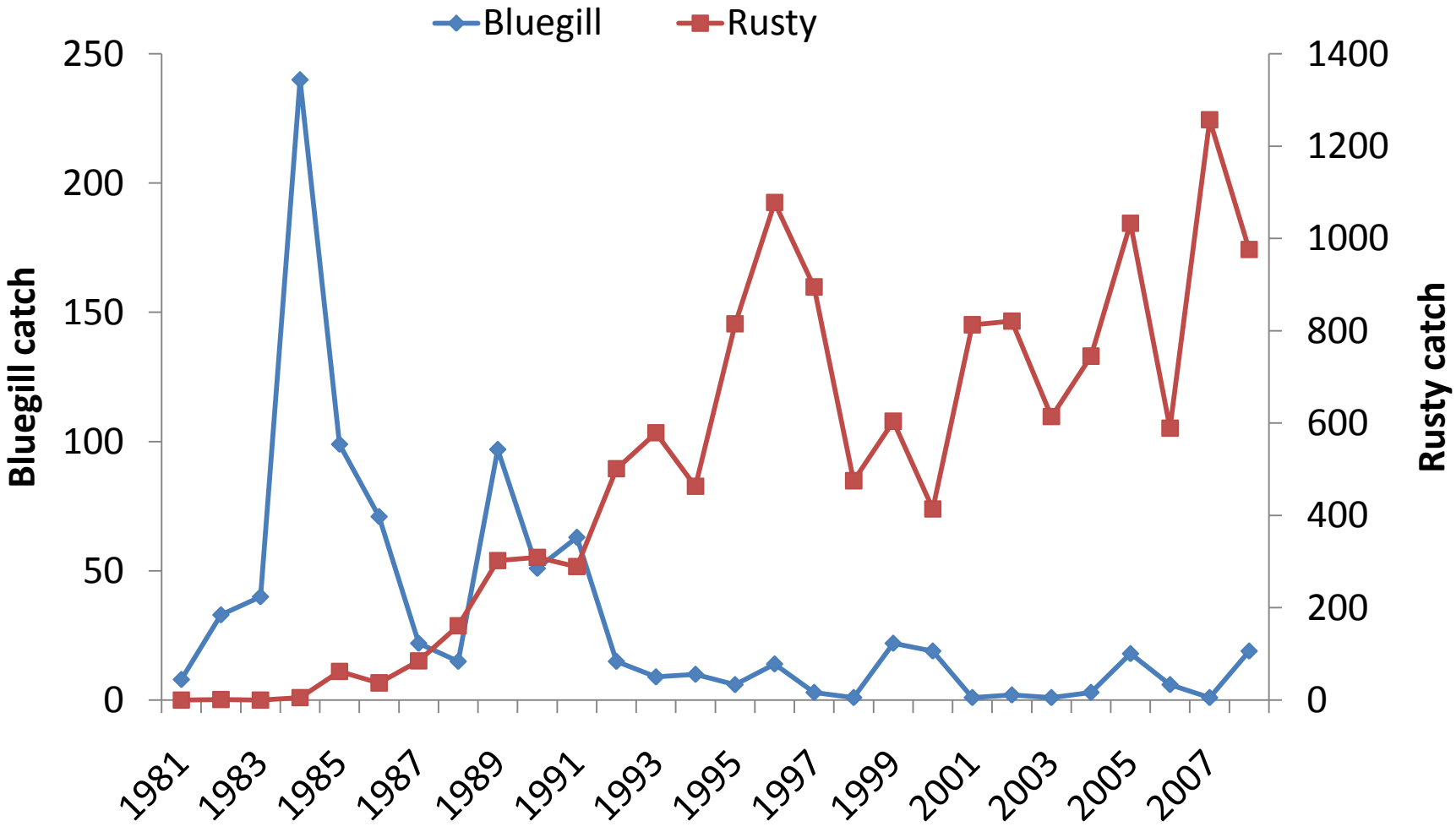


http://www.lwatrous.com/missouri_mollusks/

Effects of Rusty Crayfish

- Macrophytes
- Invertebrates
  - Native crayfish
- Fish

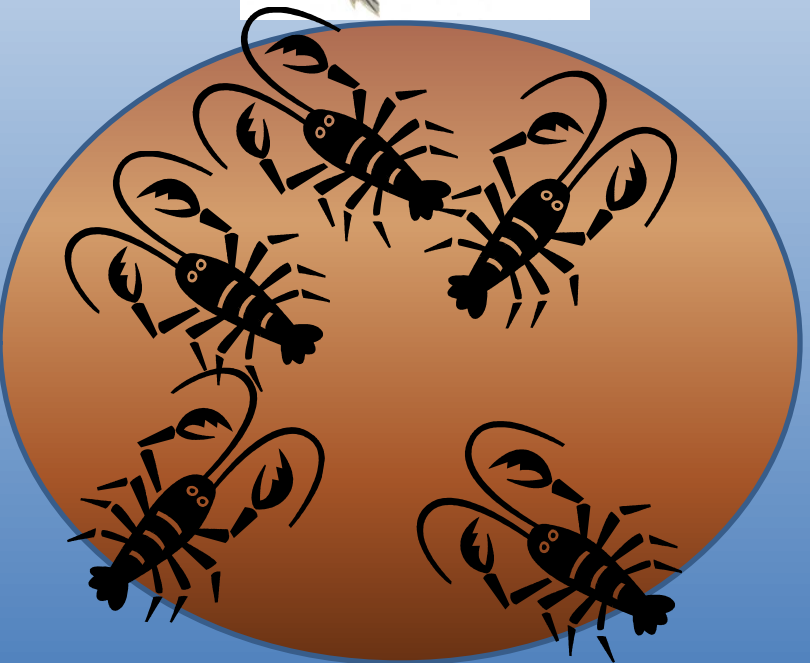
Trout Lake bluegill



Effects of Rusty Crayfish

- Macrophytes
- Invertebrates
  - Native crayfish
- Fish
- Don’t occur in all lakes!

Alternate states



Alternate states

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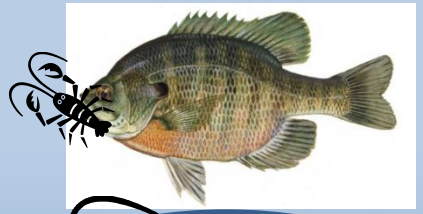
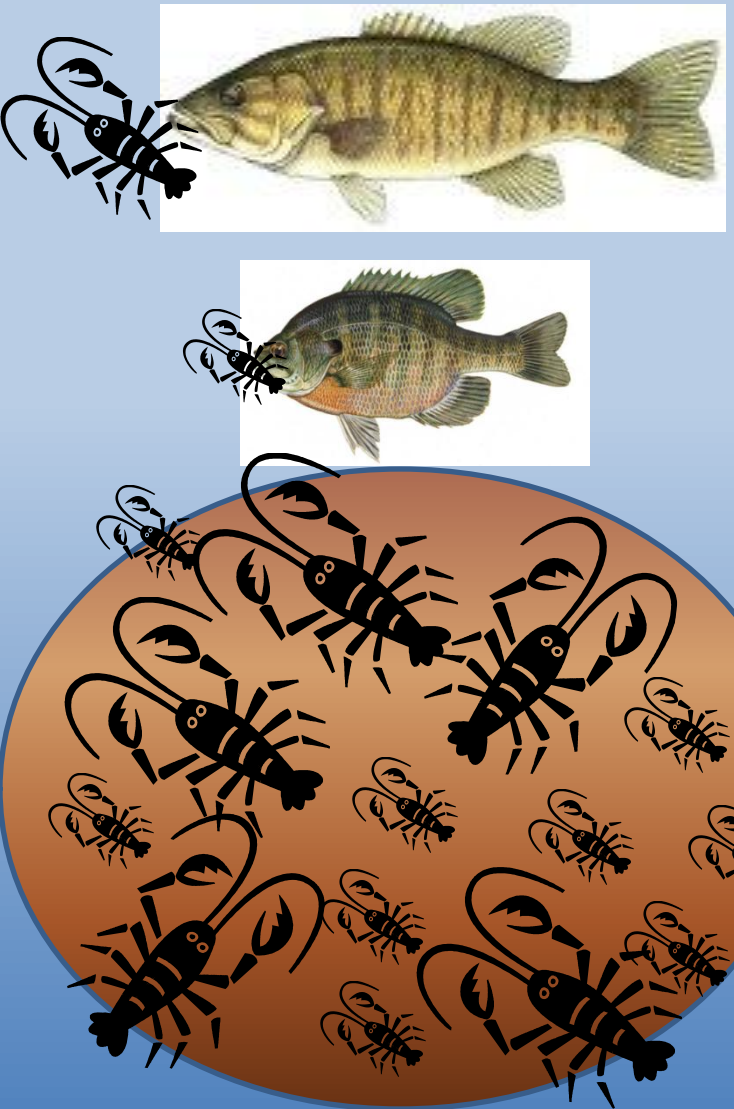
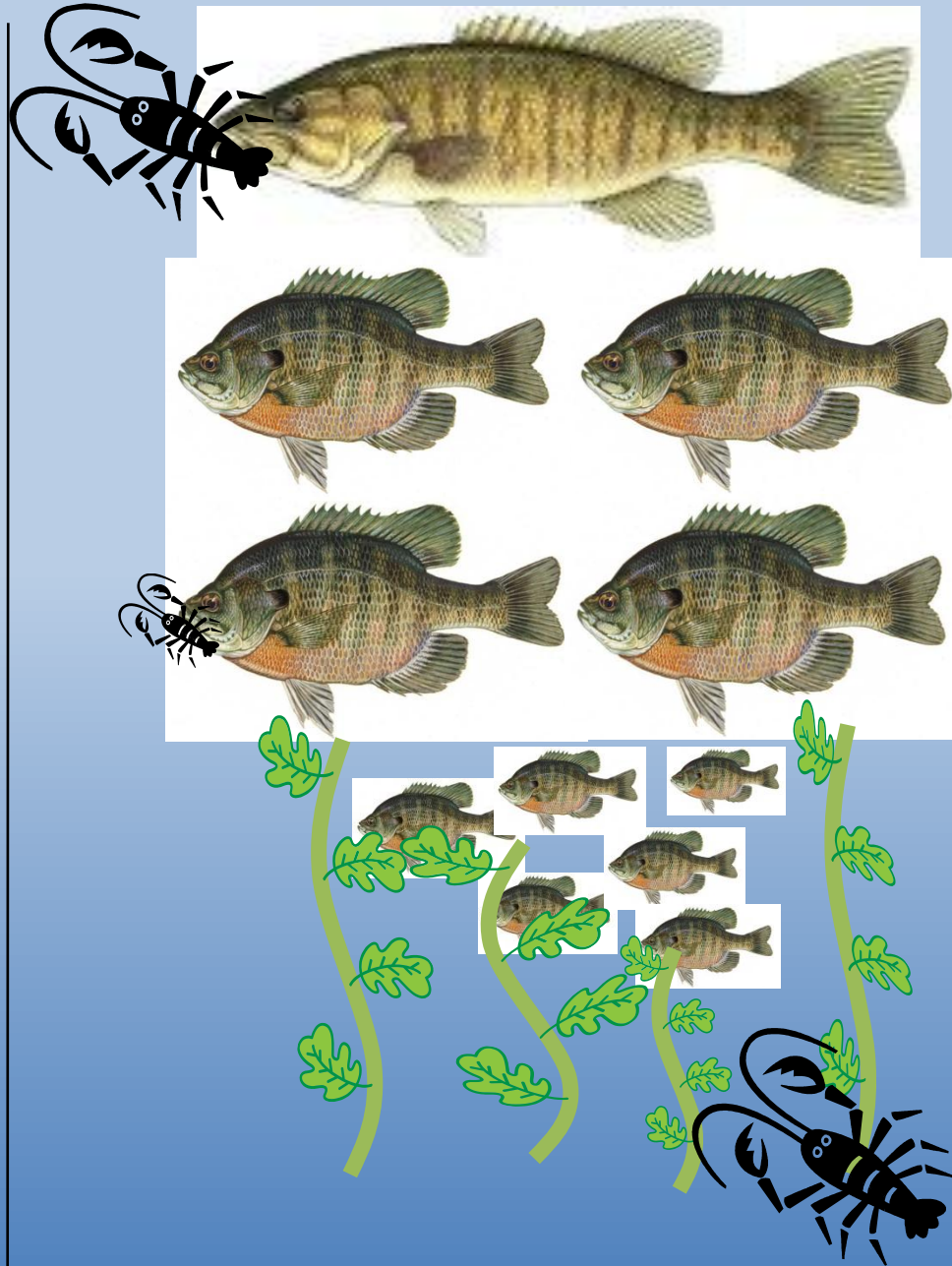
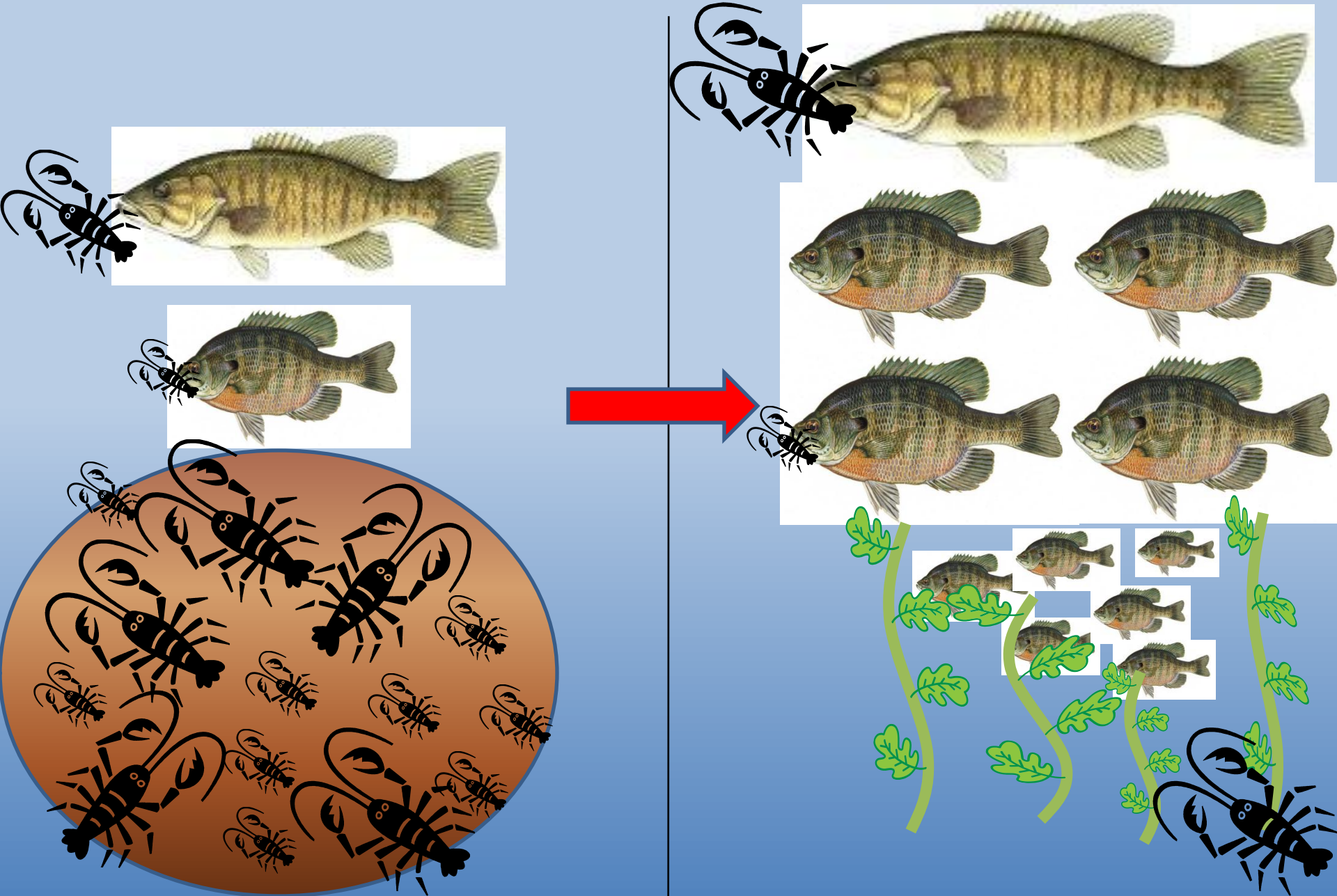


Alternate states

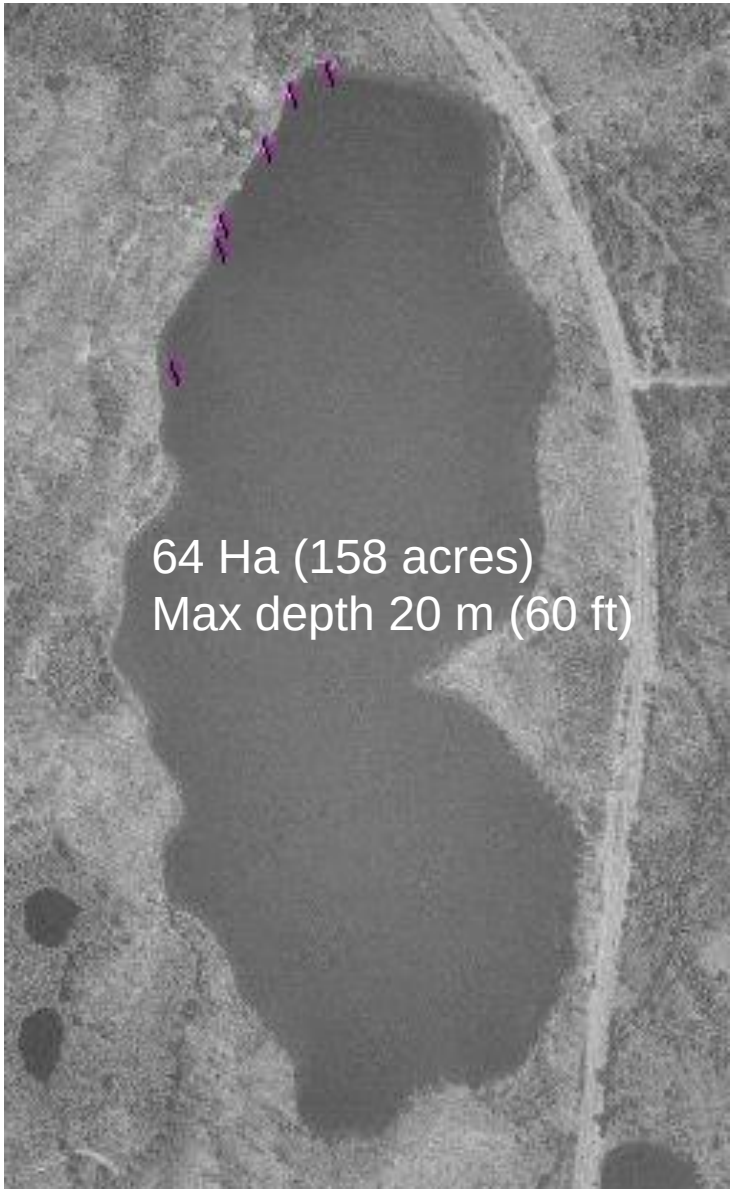




Alternate states



Sparkling Lake



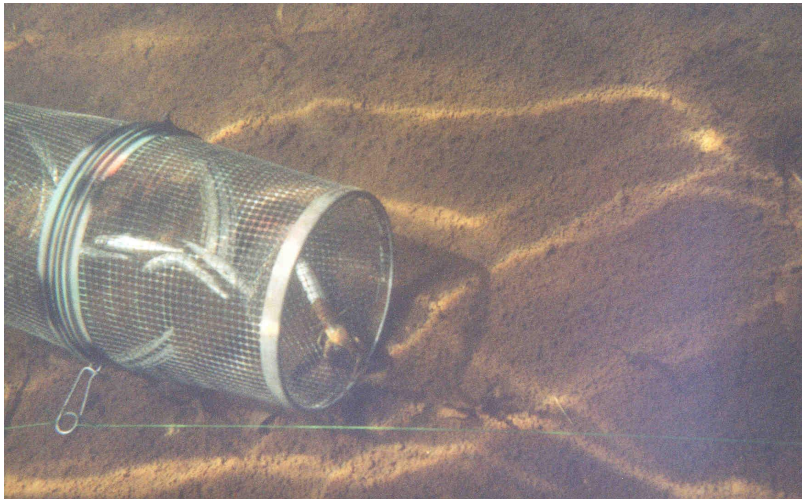
Sparkling Lake

LTER

64 Ha (158 acres)
Max depth 20 m (60 ft)

Sparkling Lake Experiment

- Intensive Trapping
- Change fishing regulations
  - 18” minimum for bass, bag limit 1
  - 28’’ minimum for walleye, bag limit 1



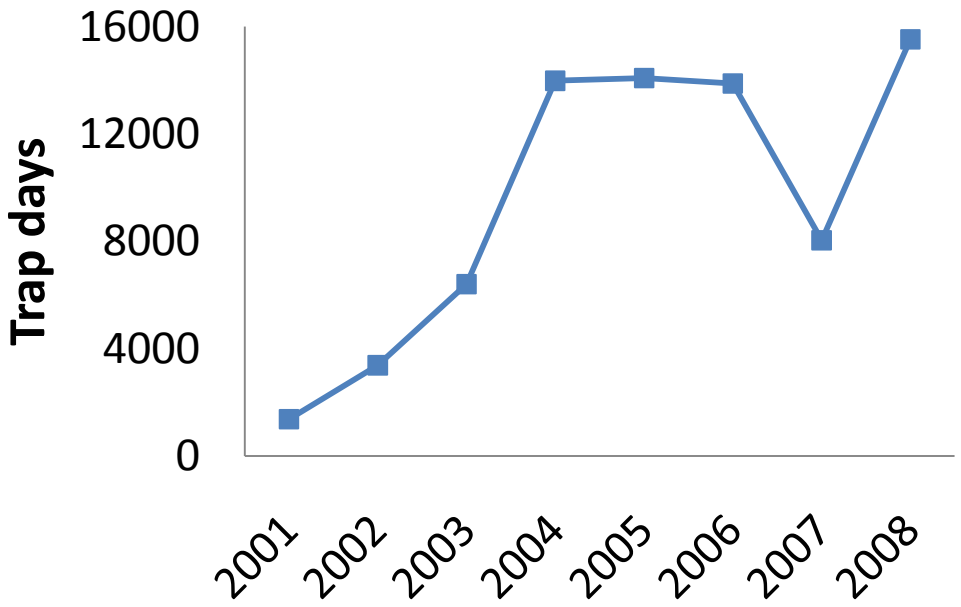
WISCONSIN
DEPT. OF NATURAL RESOURCES

Goals:

1. Overharvest crayfish
2. Observe lake response
3. “Flip” system to alternate state

Trapping Methods

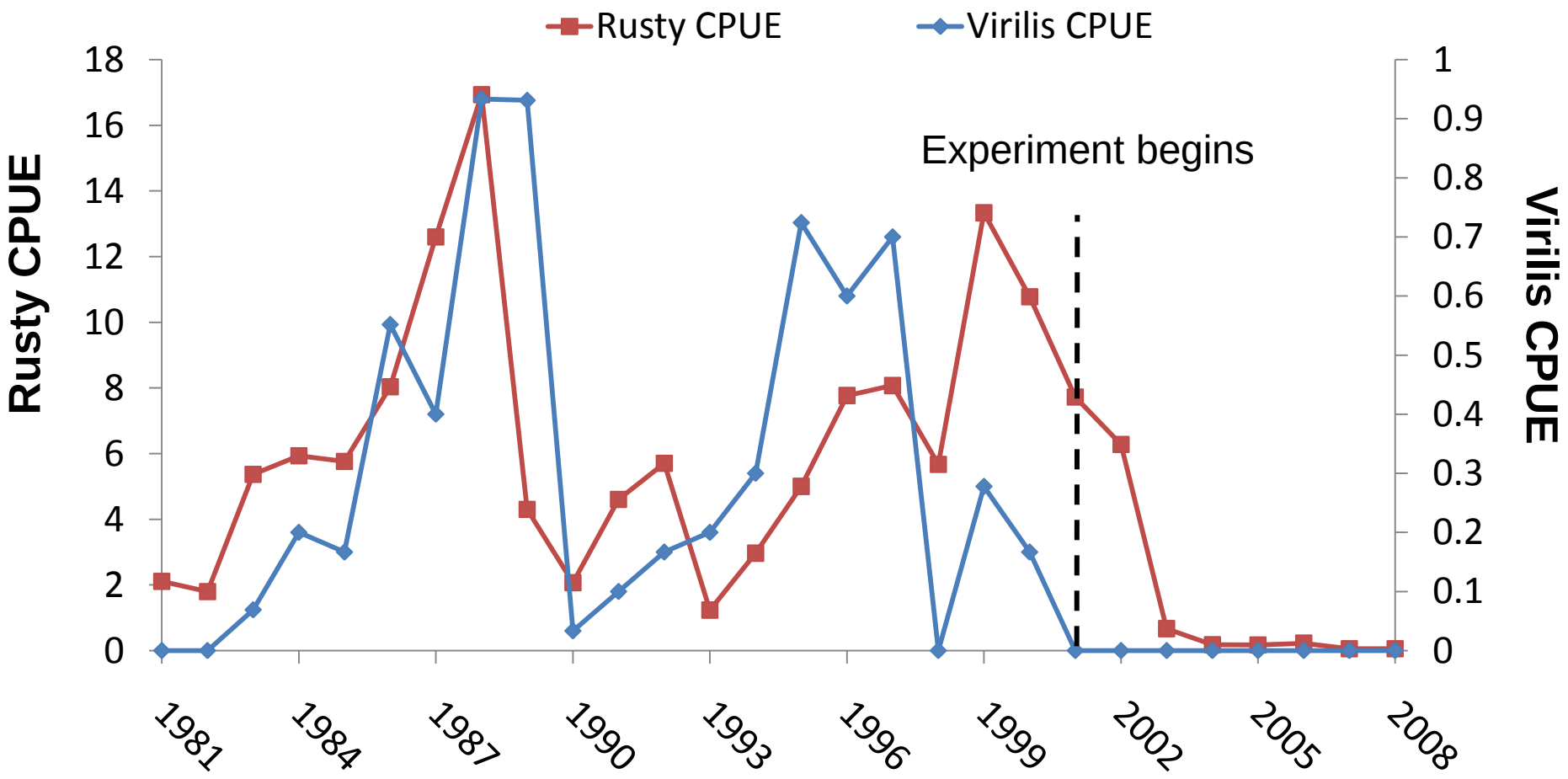
- Baited minnow traps
- Mid-June through mid- to late August
- ~100 traps in 2001, pulled every day
- ~300 traps in 2008, pulled 3 times/week



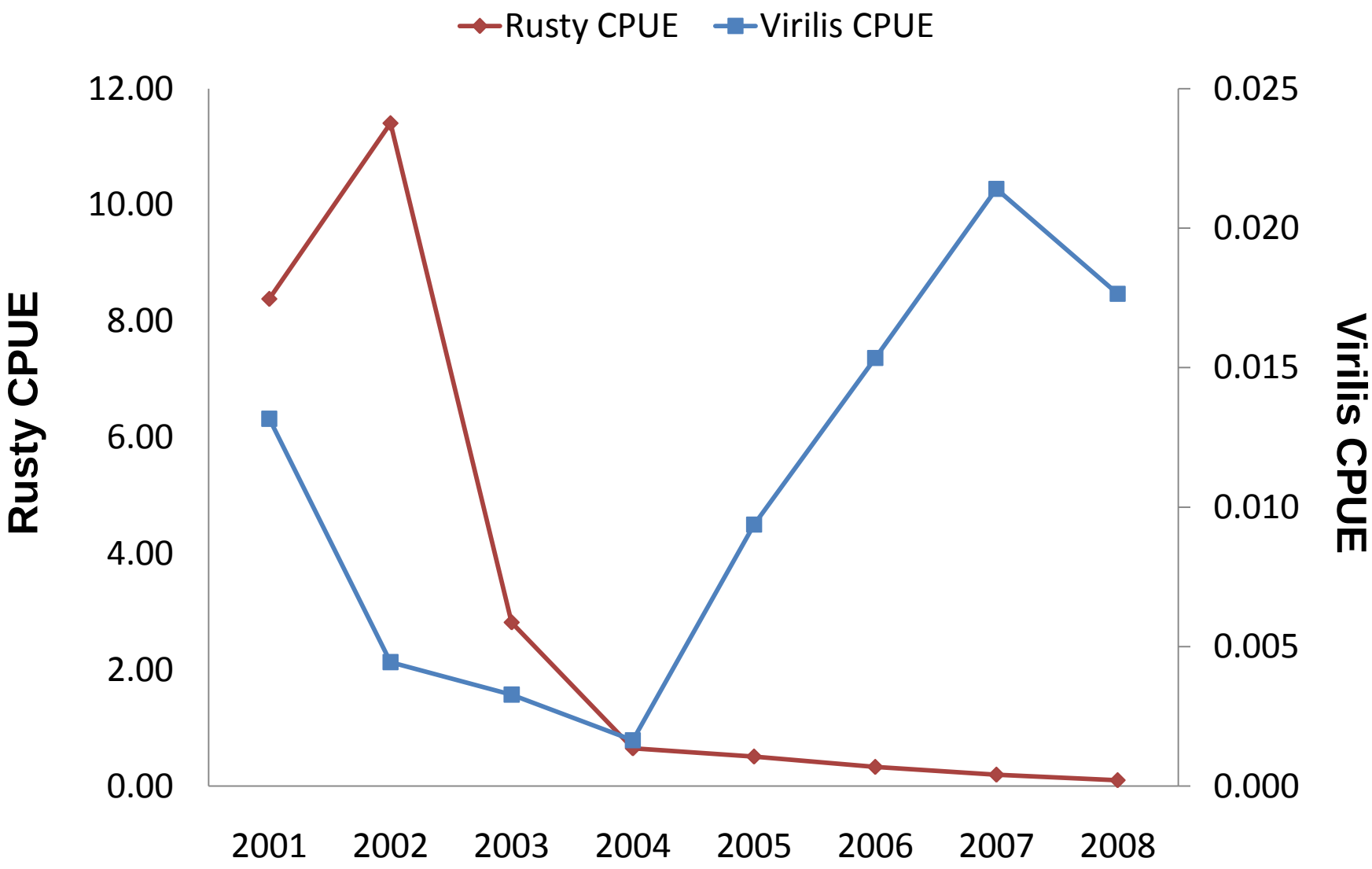
Progress to date

- 76,656 trapping days
- 91,930 rusty crayfish removed

LTER Crayfish Data

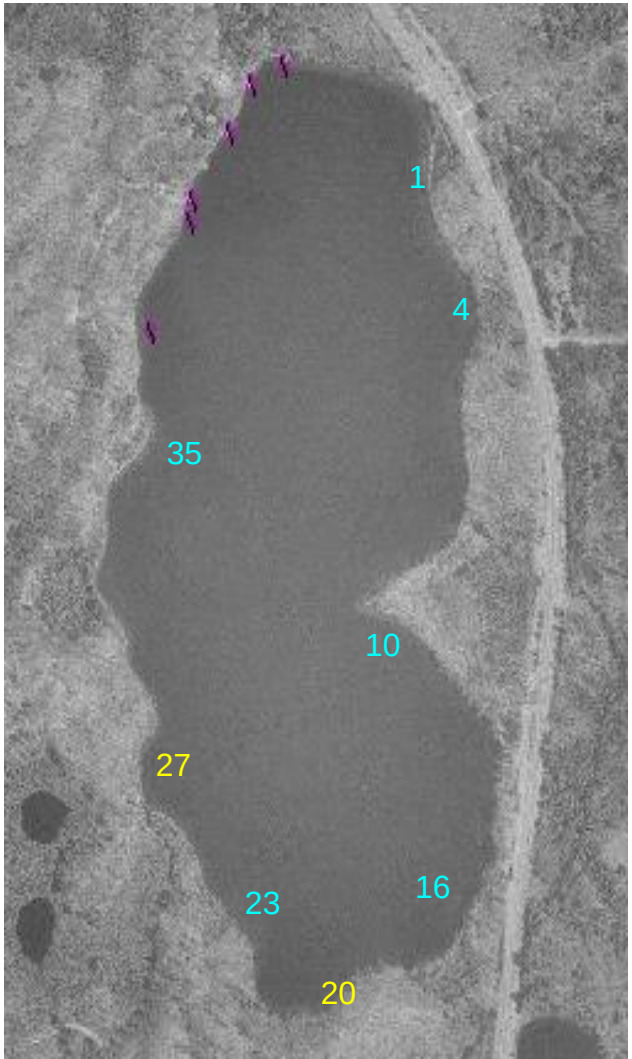


Crayfish Removal

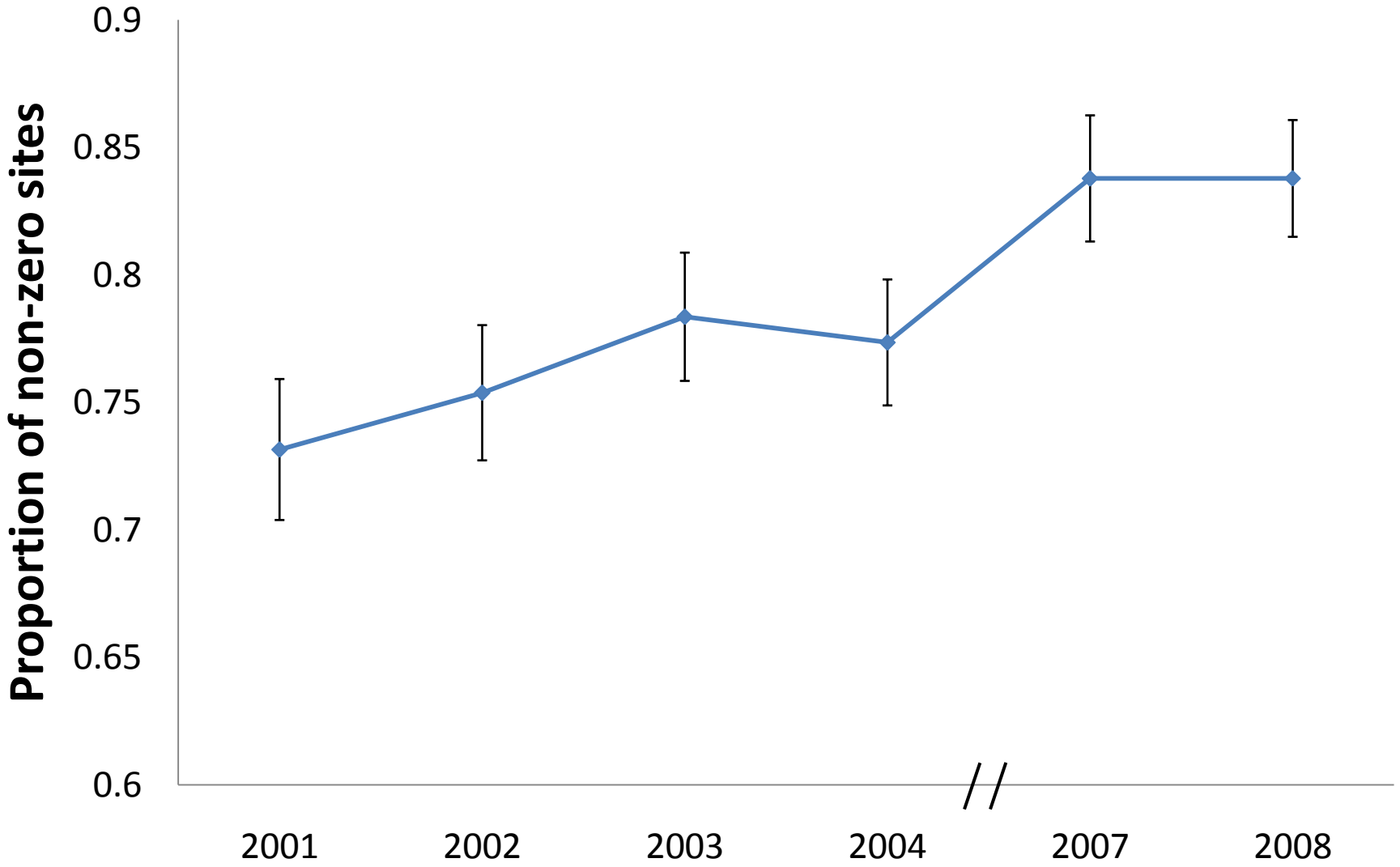


Macrophyte surveys

- Percent cover on 8 transects, 1-4 m depth

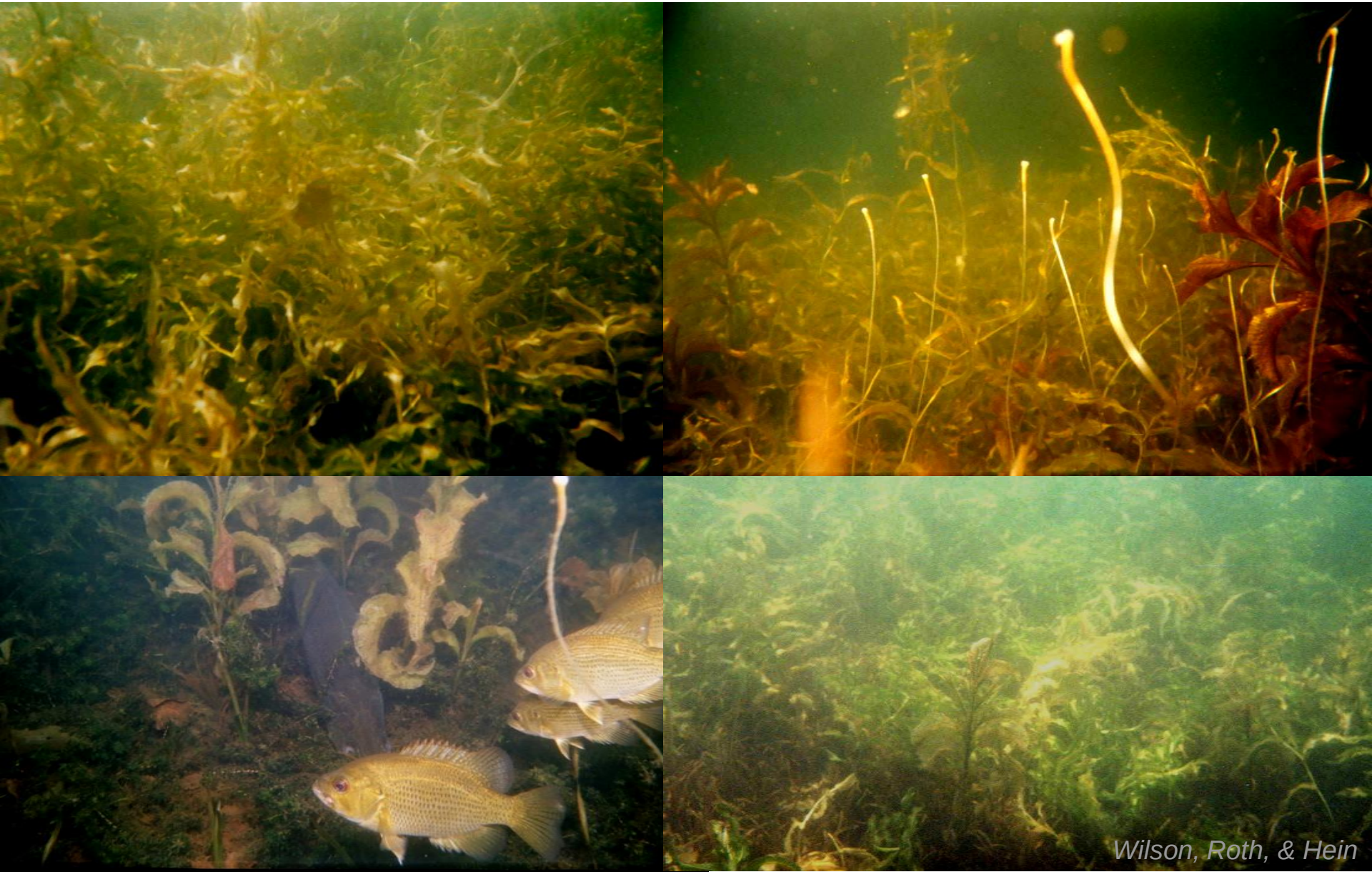


Macrophyte recovery



From This…

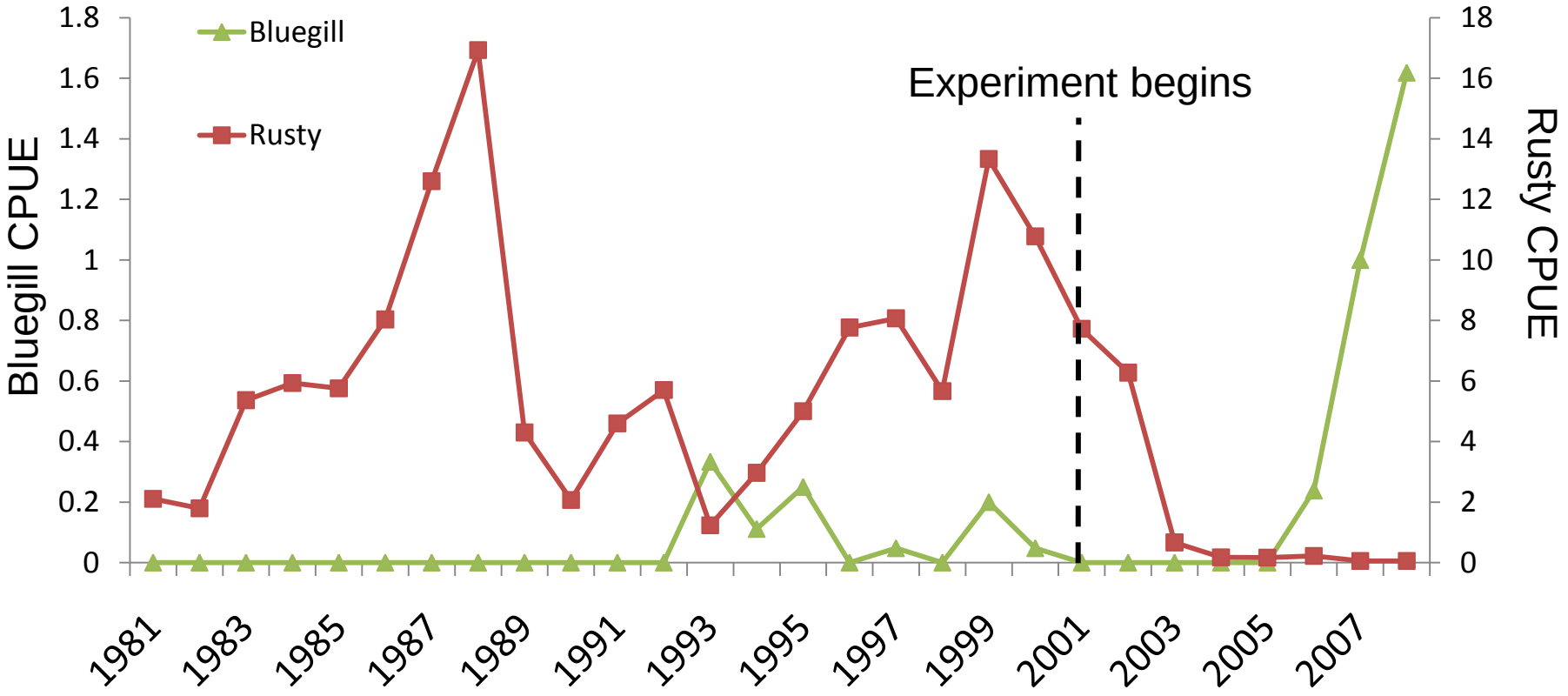
To This…



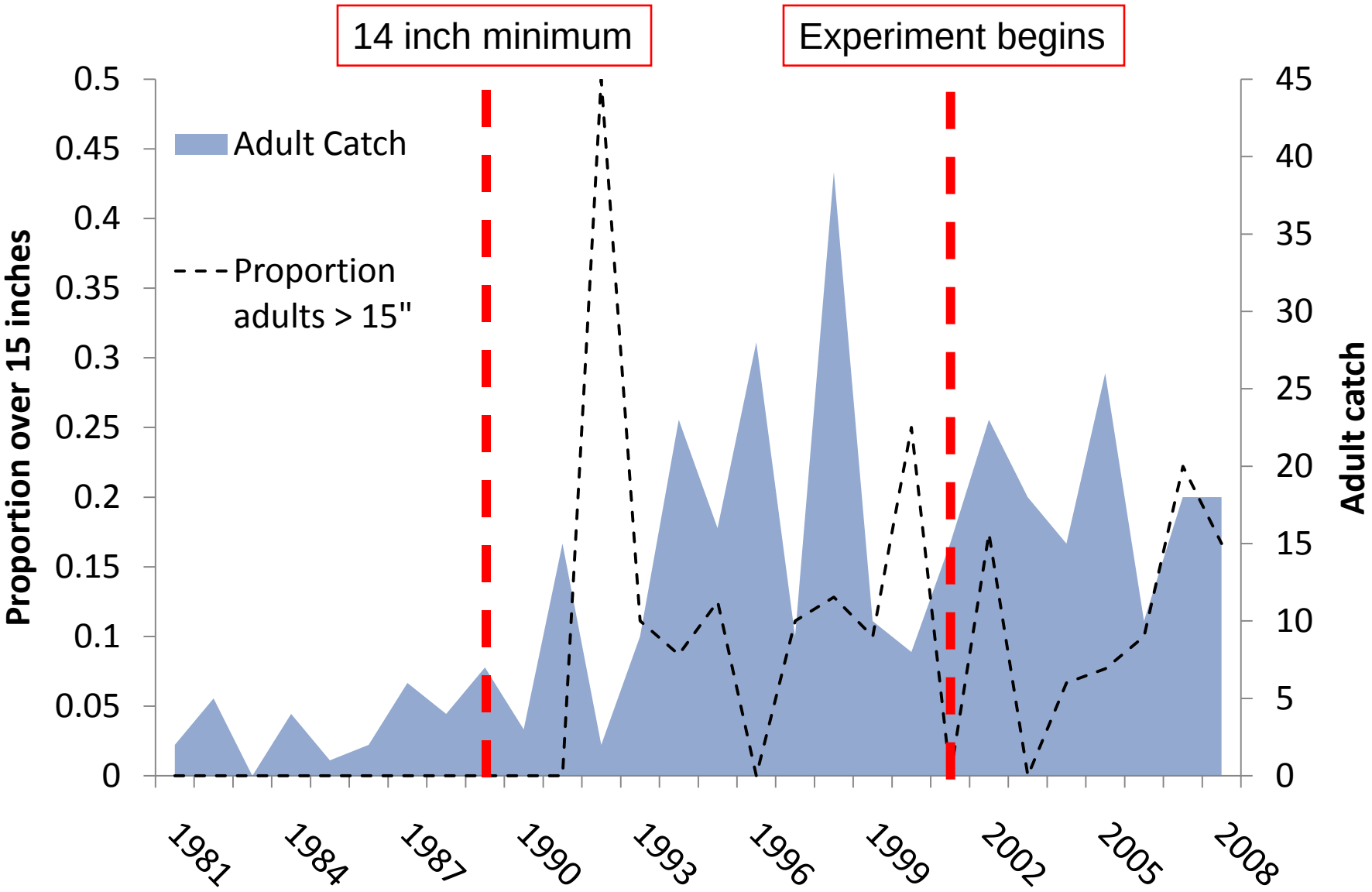
Fish Surveys

- Standard LTER surveys
- One day per year
- Fyke nets, trammel nets, beach seines, minnow traps, electrofishing

Bluegill

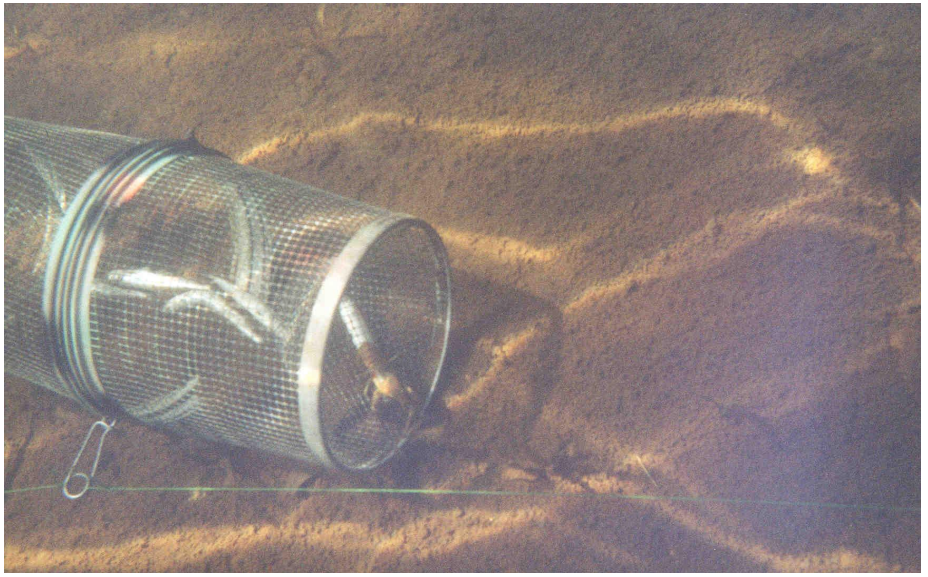

Bluegill
Rusty
Experiment begins
Bluegill CPUE
Rusty CPUE
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
18
16
14
12
10
8
6
4
2
0
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007

Smallmouth bass



Future Directions

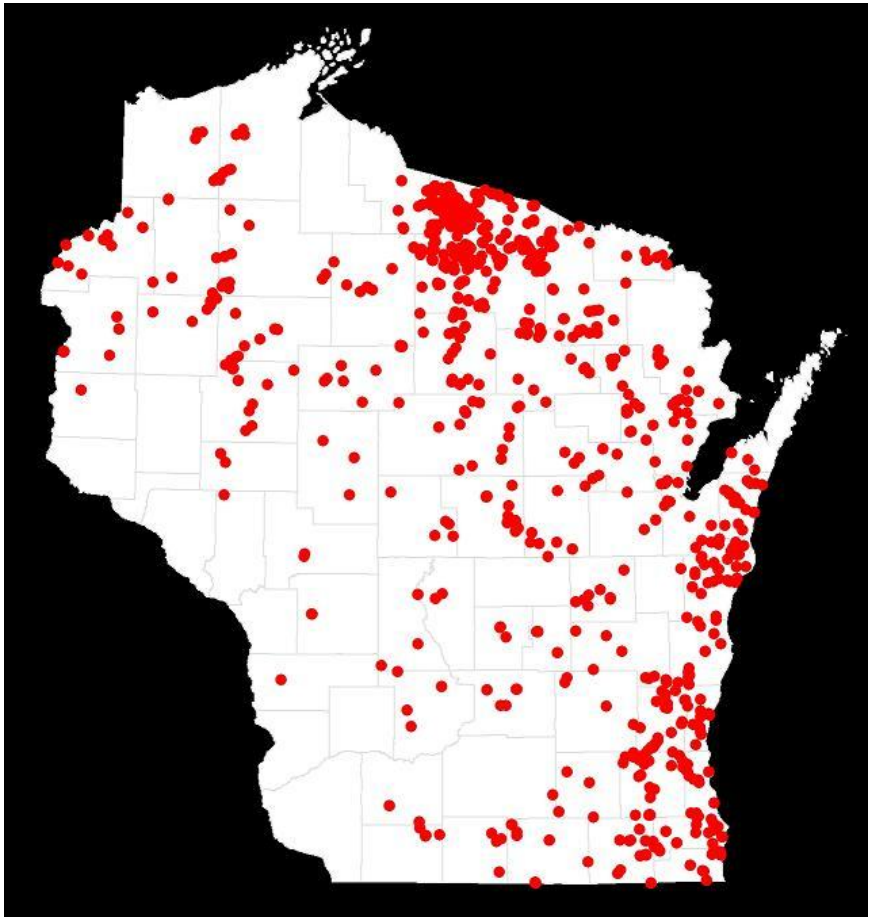
- Further research on population dynamics
- Evaluate roles of trapping and fish predation in crayfish reduction
- Stop trapping!



OUTCOME 1

Experiment works!

Restoration of other lakes



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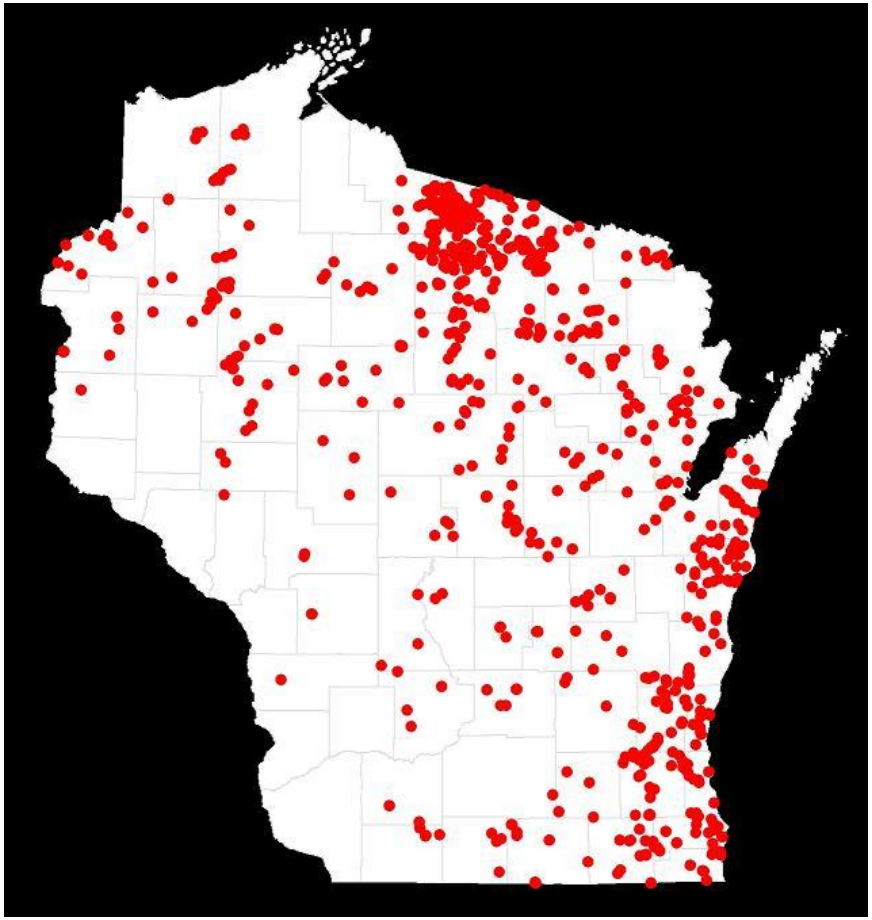
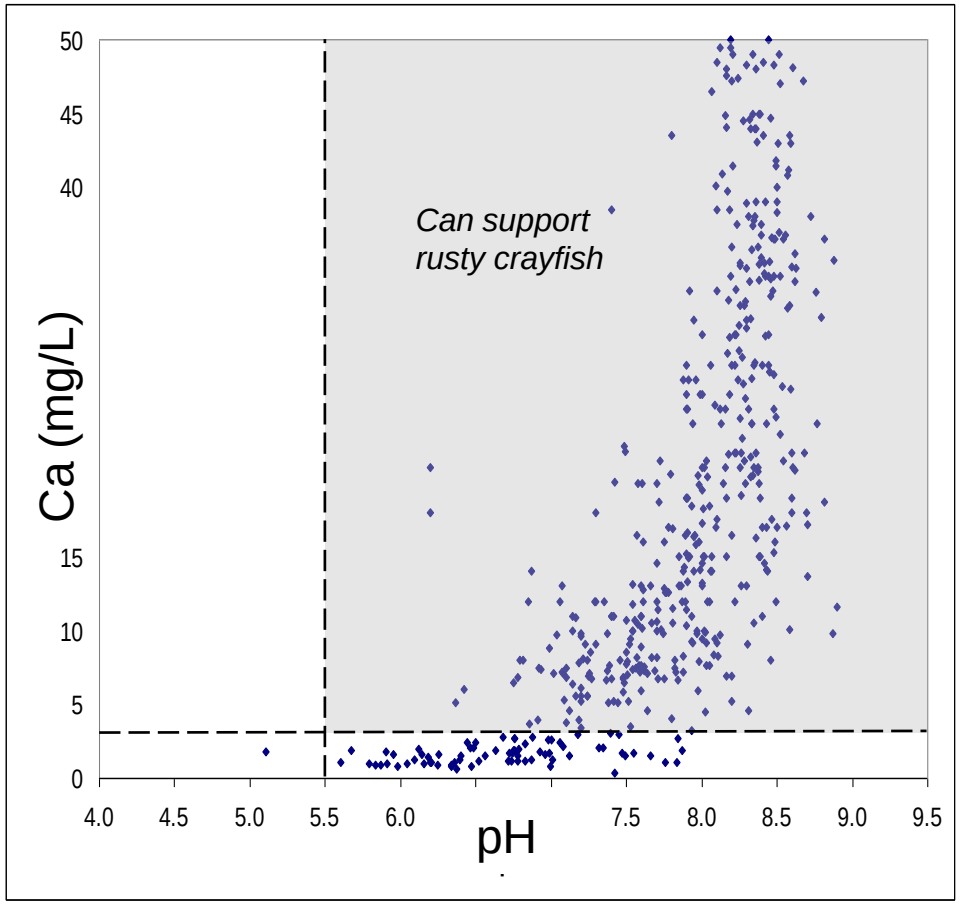


OUTCOME 2

Experiment doesn't work!

Invasive species prevention

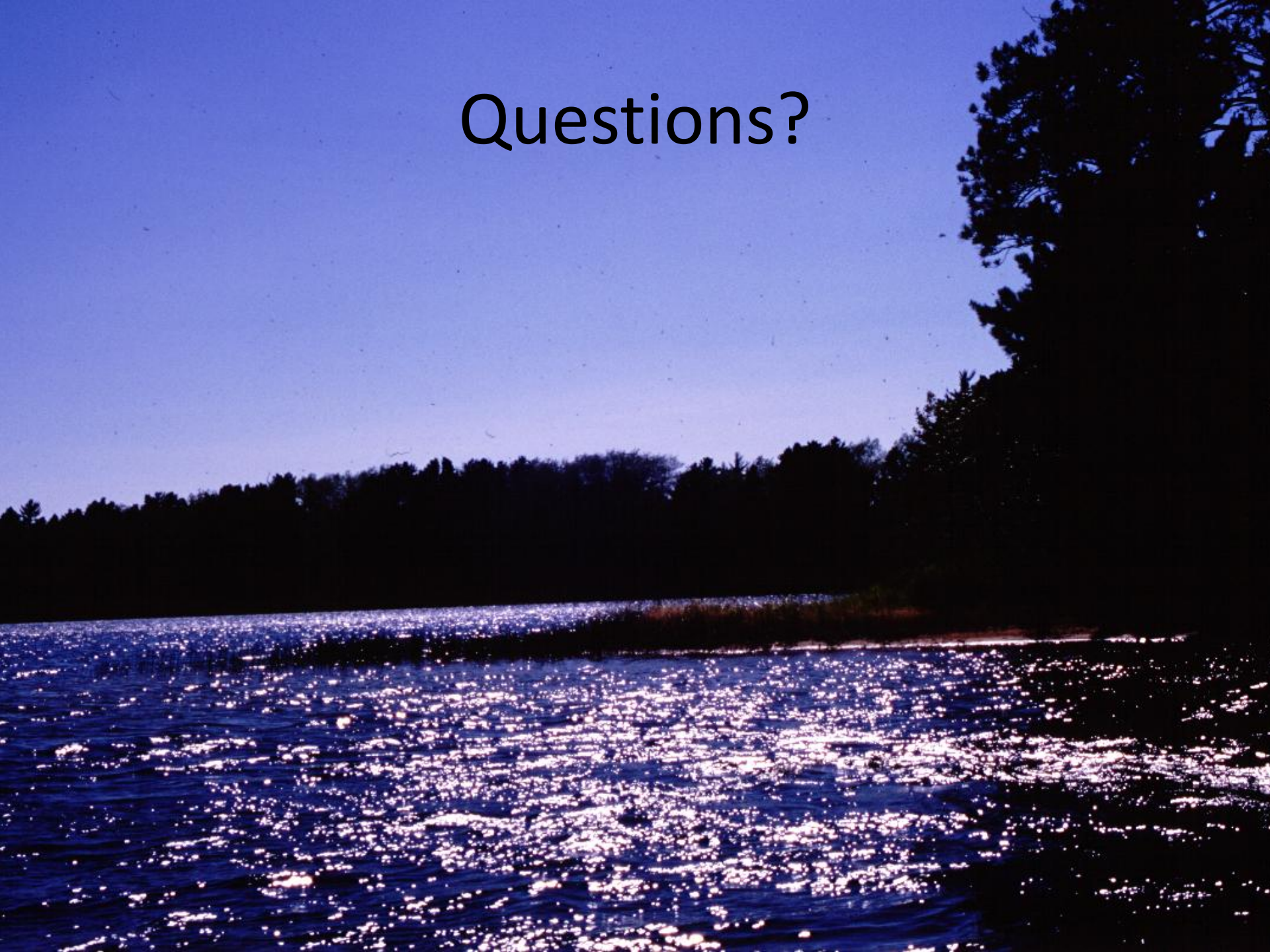


Application to other lakes

- This was an experiment, not a magic bullet!
- Long Lake (1052 acres, Chippewa County)
  - Similar change in fishing regulations(1999), no trapping
  - Rusty population reduced
  - Macrophyte density and richness highest in 2005 compared to any other year
  - Fish community changes
- Rusty movement within invaded lakes

Acknowledgements

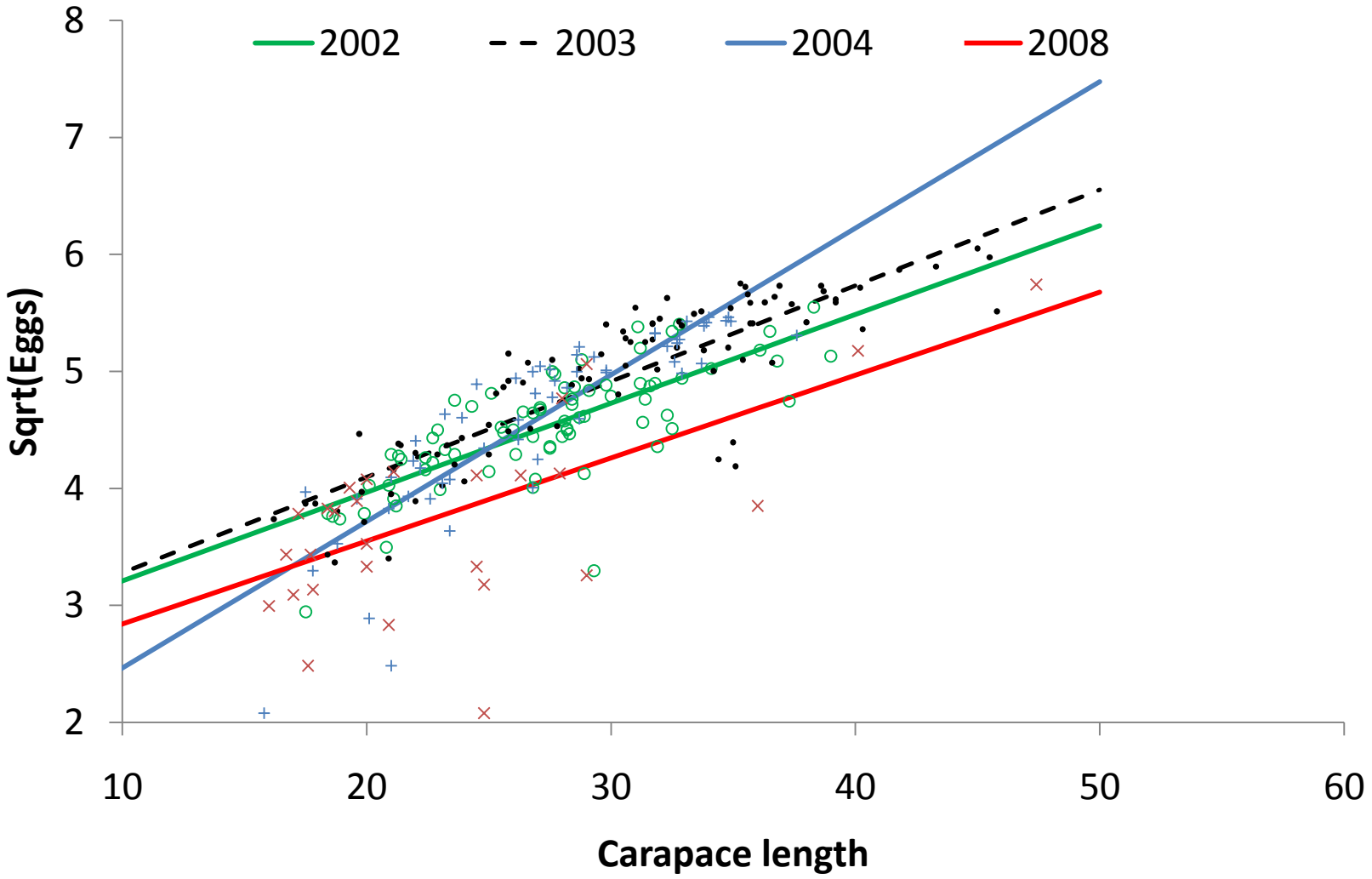
- National Science Foundation
- John Magnuson, Katie Hein, Brian Roth, Jereme Gaeta
- WI DNR, Steve Gilbert
- Legions of crayfish trappers!


Questions?

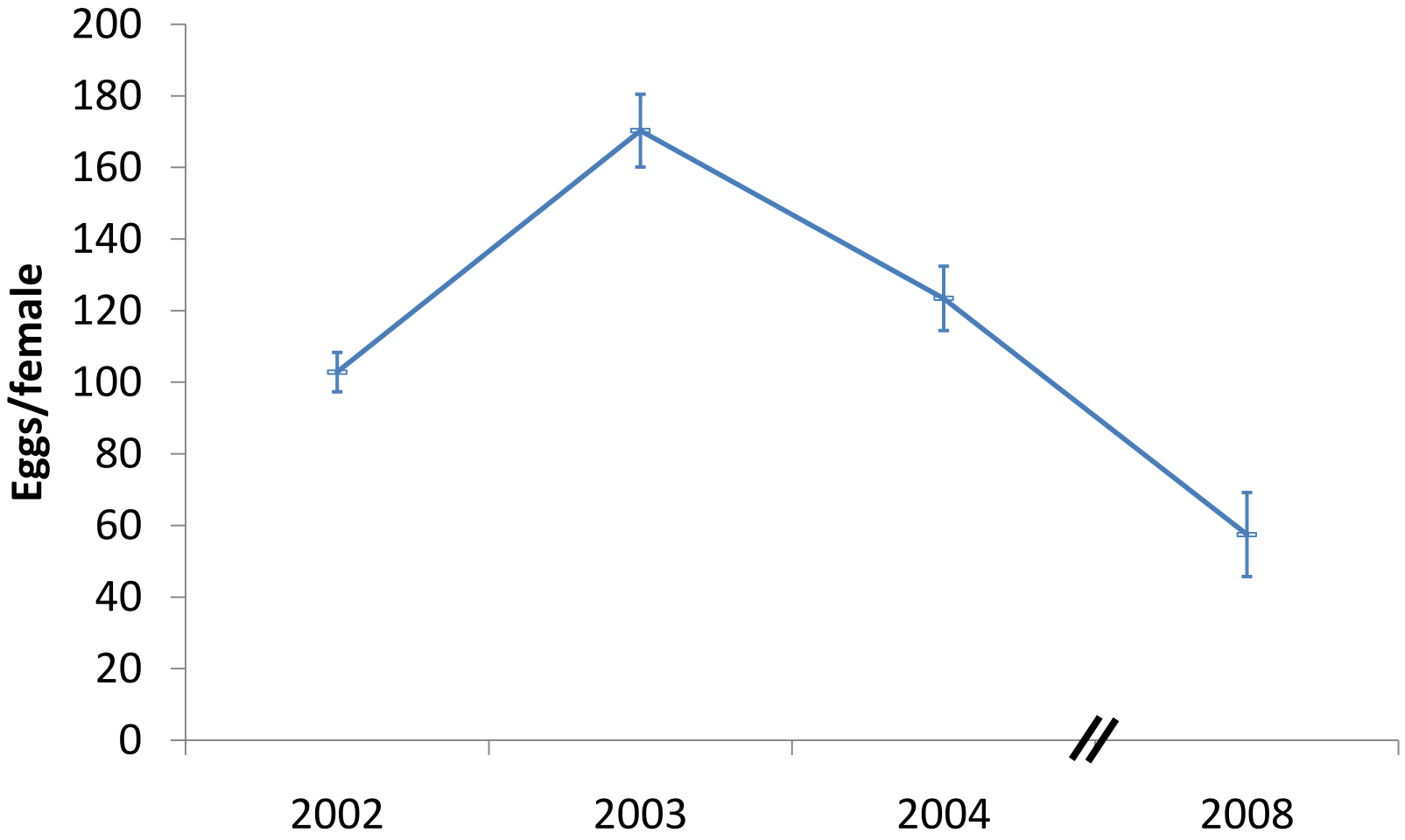
Crayfish fecundity

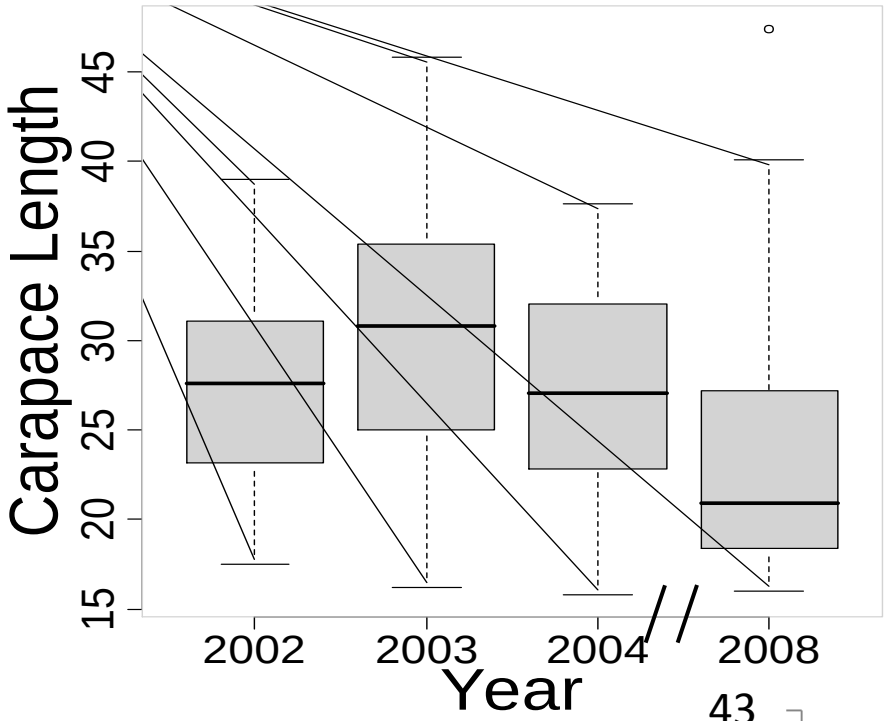
- Early to mid-June
- Collect gravid females
- Count and weigh eggs

Decline in fecundity?



Crayfish fecundity





Gravid females

Trapped