

Recognized and unrecognized effects  
of invasive bivalves  
on native freshwater mussels

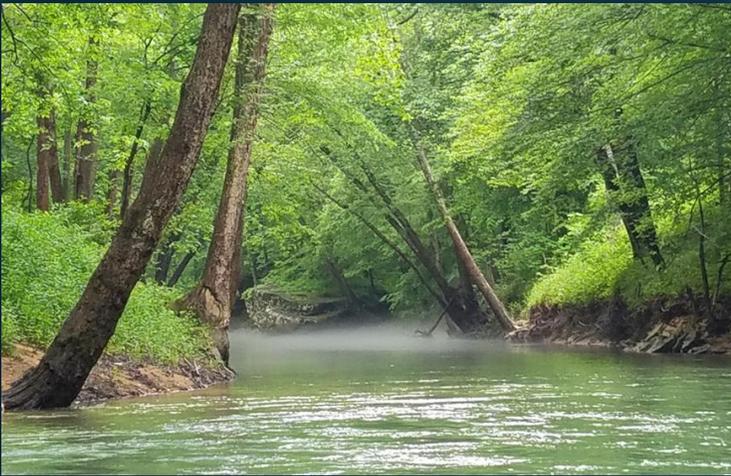
Wendell R. Haag

US Forest Service, Southern Research Station  
Frankfort, Kentucky, USA

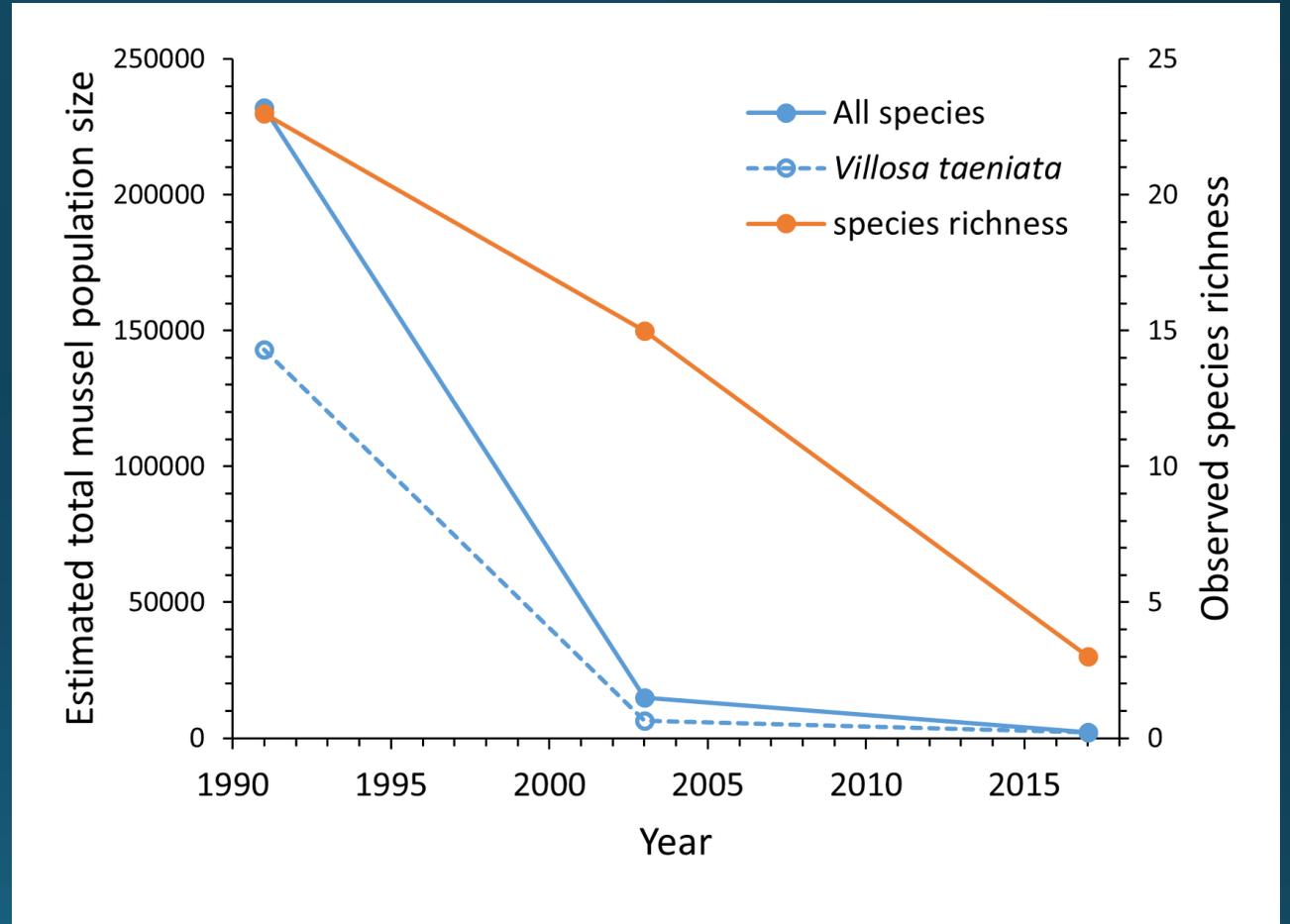




# Horse Lick Creek, KY Daniel Boone National Forest



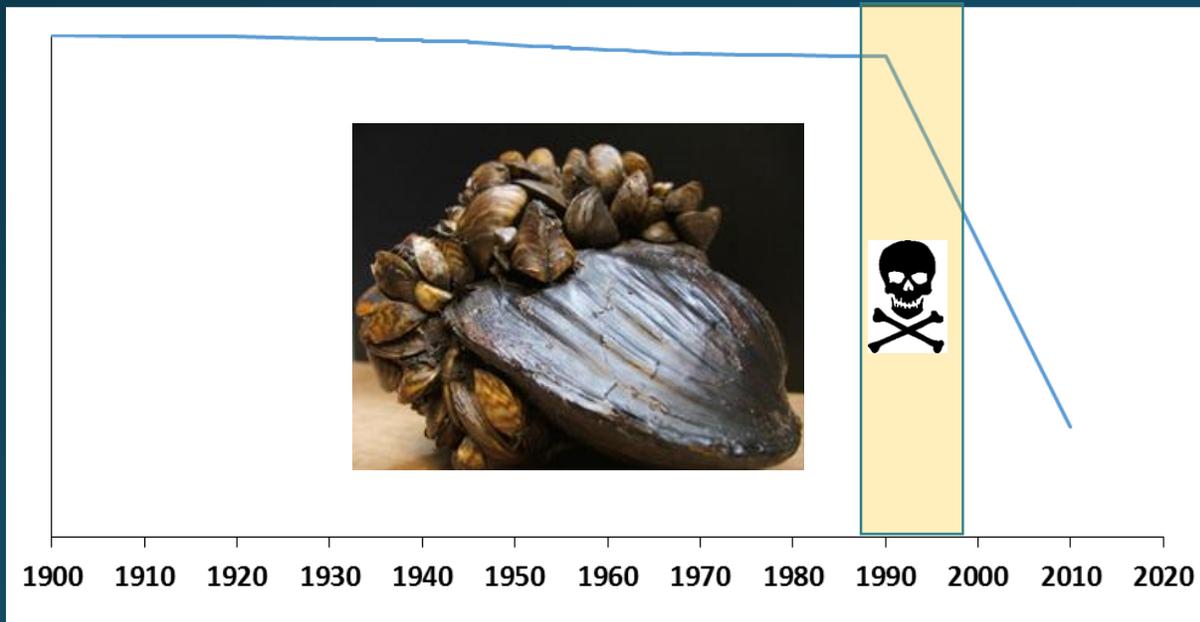
- No clear causes
- Mostly speculation
- Difficult to manage



# Zebra mussels (*Dreissena* spp.)

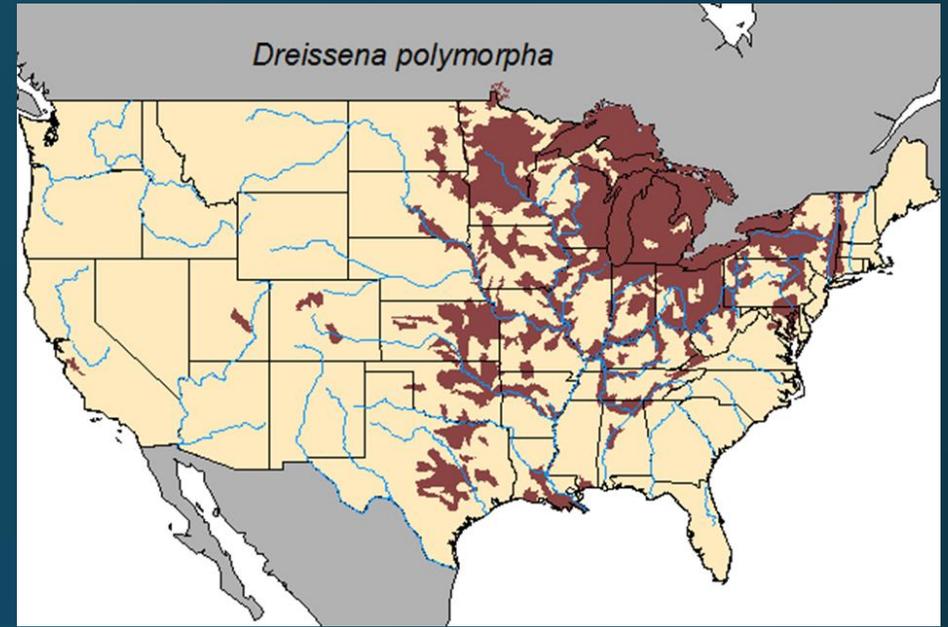
- Arrived North America about 1987
- Radically modified ecosystems
- Practically eliminated native mussels

Mussel abundance  
Great Lakes, Hudson River, etc

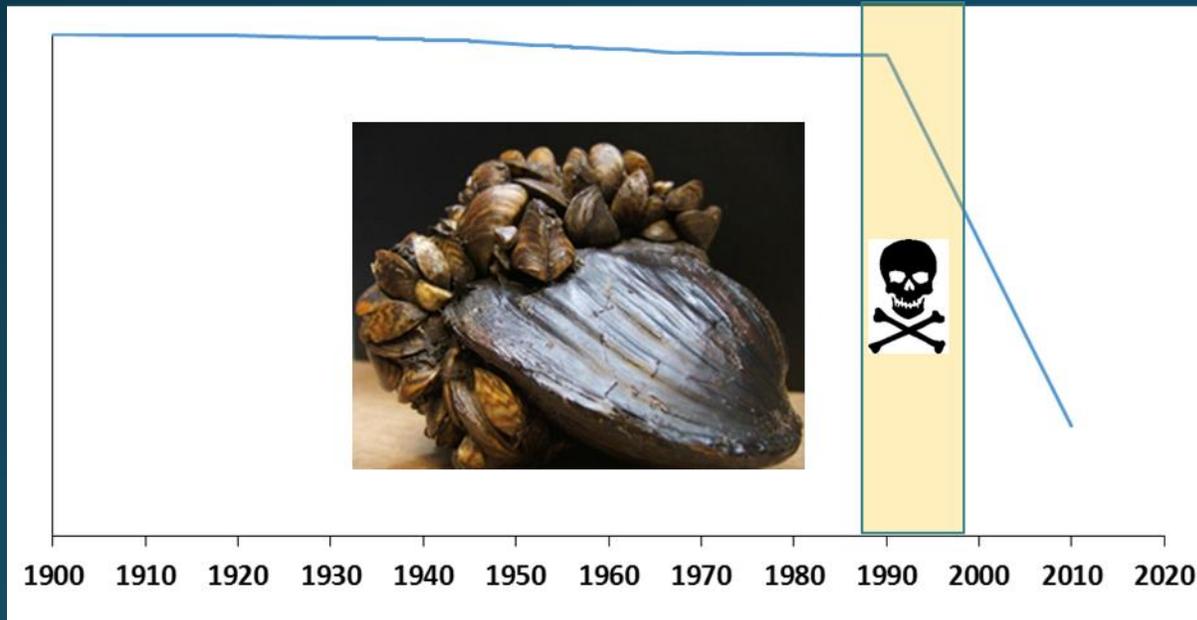


# Zebra mussels (*Dreissena* spp.)

- Arrived North America about 1987
- Radically modified ecosystems
- Practically eliminated native mussels



Mussel abundance  
Great Lakes, Hudson River, etc



- Restricted to northern areas
- Mostly restricted to lakes, large rivers
- Not a big issue for managers in many areas

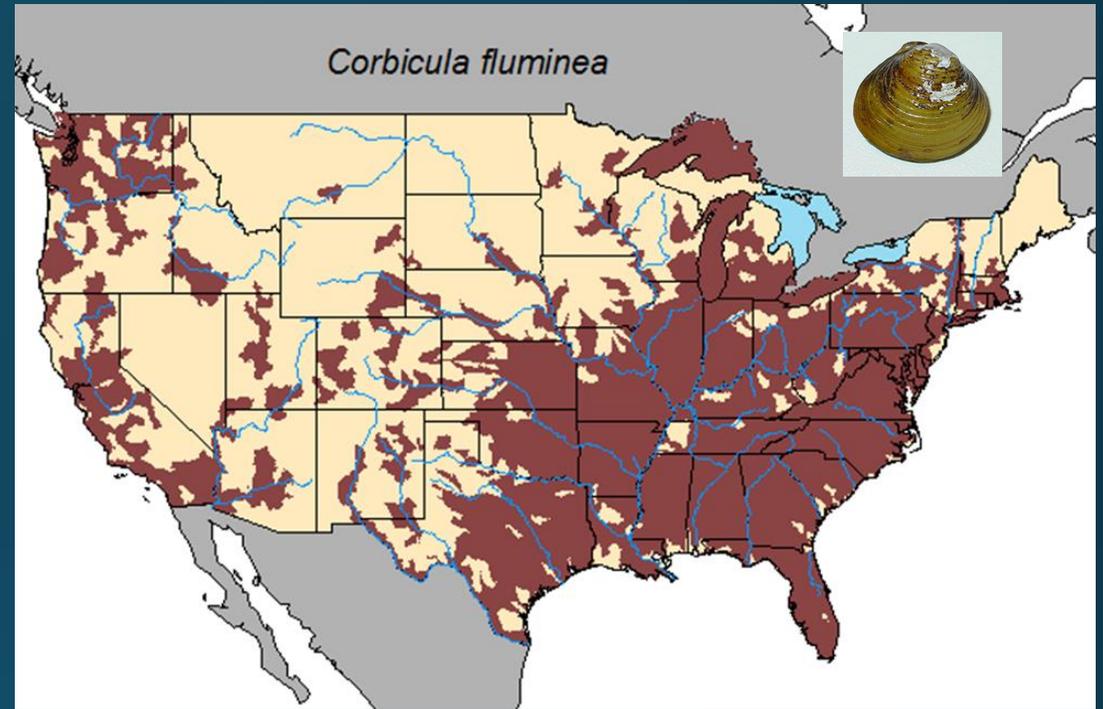
# Asian Clam (*Corbicula* spp.)

- Arrived North America about 1930
- Throughout continent by 1970s
- Effects poorly studied
- Often ignored



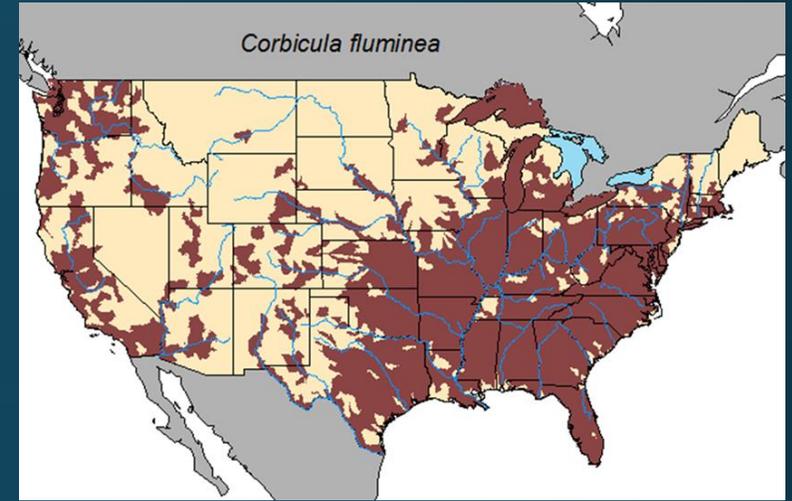
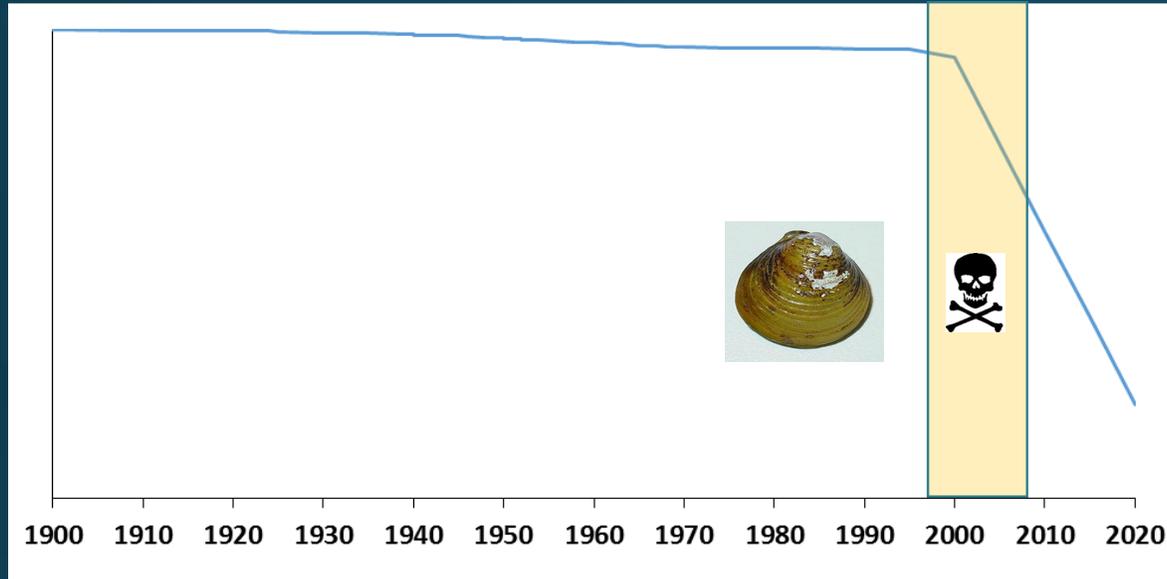
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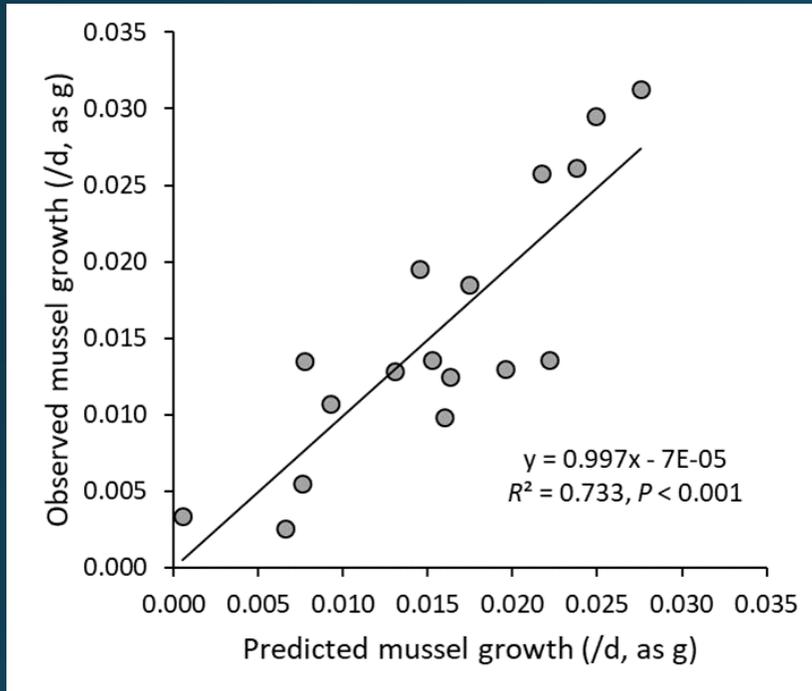
# Circumstantial evidence

Mussel abundance  
Little Tennessee  
River, NC



- Similar temporal agreement in Europe
- Timing also consistent in North America
- Explains upstream pattern of declines
- Explains high quality mussel faunas in northern regions

# Some direct evidence—field studies

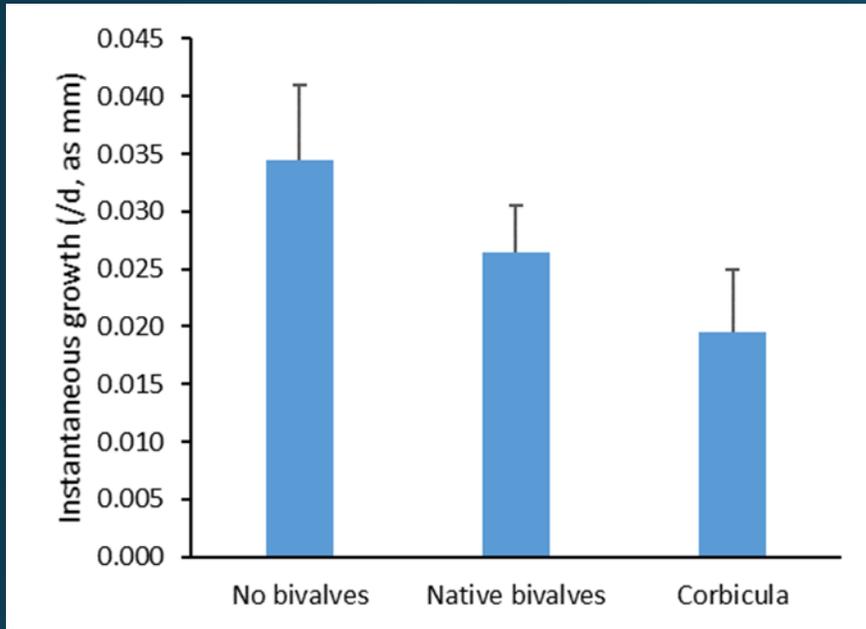


- 17 streams, Daniel Boone NF, KY
- Water temp and *Corbicula* abundance good predictors of mussel growth
- Water quality not predictive

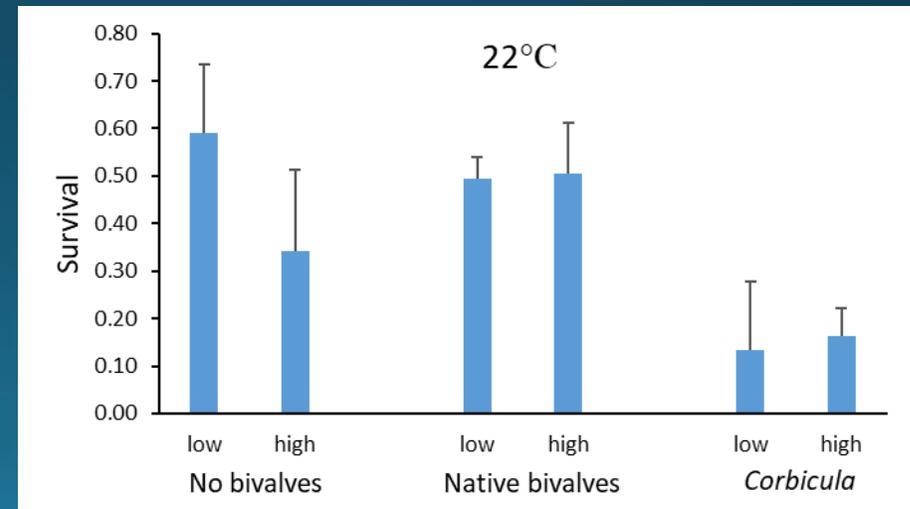
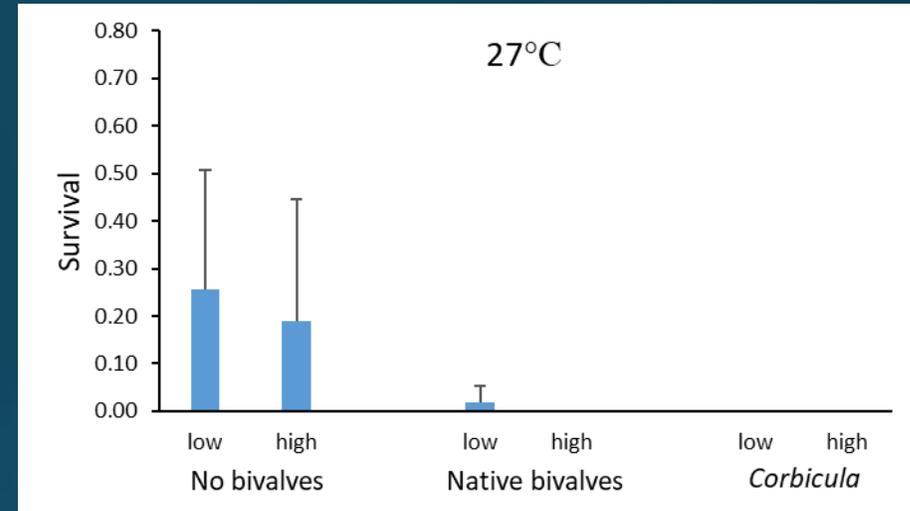
$$\text{Growth} = (0.0043 * \text{temperature}) - (0.0075 * \log \text{Corbicula abundance} + 1) - 0.0704$$

Haag et al. 2021, Freshwater Biology 66:447-457

# Some direct evidence—laboratory studies

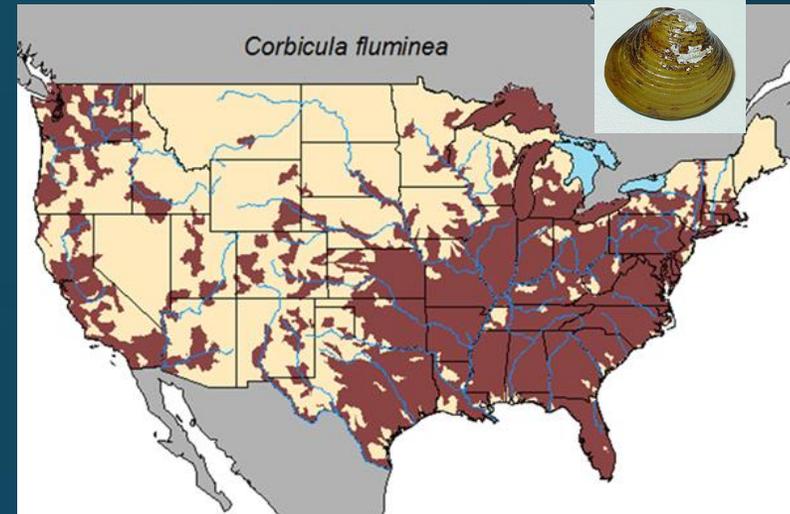


- Corbicula strongly reduces mussel growth and survival
- Native mussels have weaker effects



# Asian Clam (*Corbicula* spp.)

- Arrived North America about 1930
- Throughout continent by 1970s
- Effects poorly studied
- Often ignored
- Major ecosystem effects?
- Important factor in mussel declines?



- Ubiquitous in much of North America
- Potential big issue for managers in many areas
- Climate change will affect *Corbicula* distribution
- Casts doubt on other proposed explanations for mussel declines



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