Freshwater Mussel Growth Rates Differ Along an Environmental Gradient

ILLINOIS
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Need

Metrics and indices of assemblage composition have a long history of use for evaluating environmental condition (i.e., as bioindicators). In Illinois, common assessments of mussel assemblage composition include species richness (e.g., INAI designation, BSS classification) and the Mussel Community Index. Yet, other metrics calculated from information collected during standard mussel surveys may serve as useful bioindicators.

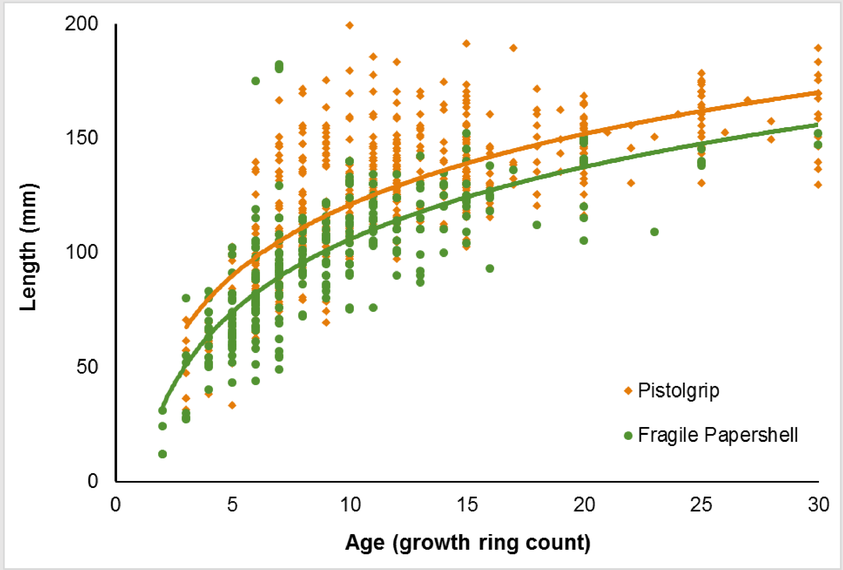
Objective

Evaluate the relationship between growth rate (mm length/growth rings) of mussels and environmental setting to identify rate differences along an environmental gradient.

Analysis

- **We limited our analyses to two mussels species with sufficient occurrence within the Kaskaskia River basin.**
- **Only age 6-14 individuals were used.**
- **Multiple linear regression was used to evaluate the relationship between growth rate and environmental setting (individually for both species).**
- **Environmental setting included substrate, channel morphology, land use, geology and point-source discharge measures.**
- **AIC was used to identify the most informative models.**

Mussel Growth



- **Growth rates vary within each year class.**

	Pistolgrip	Fragile Papershell
n top models	6	7
Range of model r^2	0.20 - 0.37	0.20 - 0.32
Environmental variables present in top models. Number of models in which the variable appears and direction of the relationship with growth rate in parentheses.	1. Dominant substrate (6, +) 2. Prop. agriculture in watershed (2, +) 3. Prop. fine soils in watershed (2, -) 4. Prop. fine soils in local catchment (2, -) 5. Prop. wetland in watershed (1, -)	1. Prop. wetland in watershed (7, -) 2. Prop. forest in riparian zone (5, +) 3. Prop. urban in local catchment (5, +) 4. Prop. fine soils in local catchment (3, +) 5. Dominant substrate (1, +)

Focal Species

Pistolgrip
Tritogonia verrucosa

- **Inhabits areas with stable flow and firm substrates.**
- **Is a Species in Greatest Conservation Need due to declining populations.**
- **Recorded at 23 locations in the Kaskaskia River basin since 2009.**

Fragile Papershell
Leptodea fragilis

- **Habitat generalist.**
- **Stable statewide distribution and abundance.**
- **Recorded at 37 locations in the Kaskaskia River basin since 2009.**

Conclusions

- **Growth rates differ along a gradient of land use, geology and substrate.**
- **Growth rates of individual species differ in their relationship with environmental setting.**
- **This study suggests mussel growth rates serve as a useful indicator of environmental condition.**

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