

# Moving bugs to urban streams can help restore biodiversity

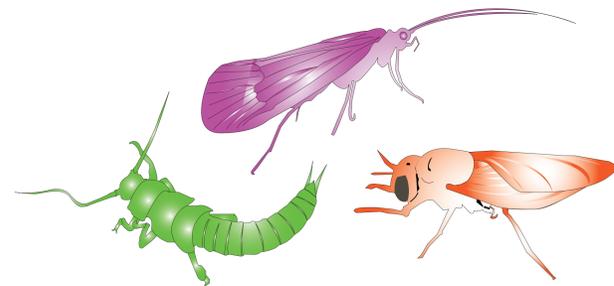
## Can relocating bugs to urban streams improve diversity and integrity scores?

### INTRODUCTION:

- Macroinvertebrate diversity in urban streams is often low, even after restoration.
- One reason may be that urban streams are far from sources of sensitive taxa, and thus natural recolonization is slow or impossible.
- To test the isolation hypothesis and jump start recovery, we collected and moved macroinvertebrate communities from healthy streams to degraded streams and checked to see if they persisted.

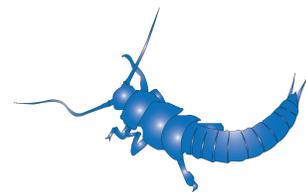
### METHODS:

- In summer 2018, we placed colonization baskets in 2 healthy "donor" streams.
- After six weeks, baskets were collected and moved to 4 streams with low diversity and low Benthic Index of Biotic Integrity (B-IBI) scores.
- We estimate we added ~46,000 macroinvertebrates to each recipient stream, including on average 15 new mayfly taxa, 9 new stonefly taxa and 13 new caddisfly taxa.
- Recipient streams were re-sampled in summer 2019.



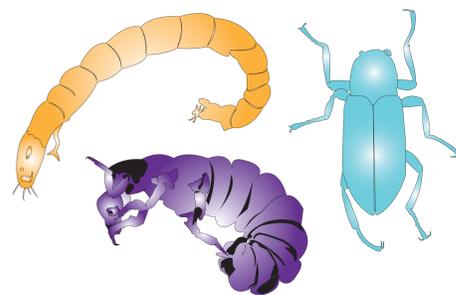
### SCORES WENT UP!

New for sure: a stonefly (*Pteronarcys princeps*), and likely new: a caddisfly (*Wormaldia*) and a fly (*Glutops*)



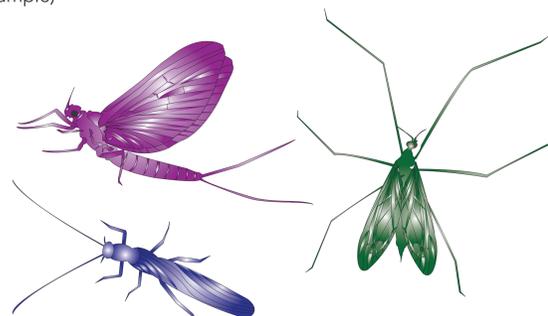
### SCORES DID NOT IMPROVE

New for sure: a stonefly (*Pteronarcys princeps*) (whole sample)



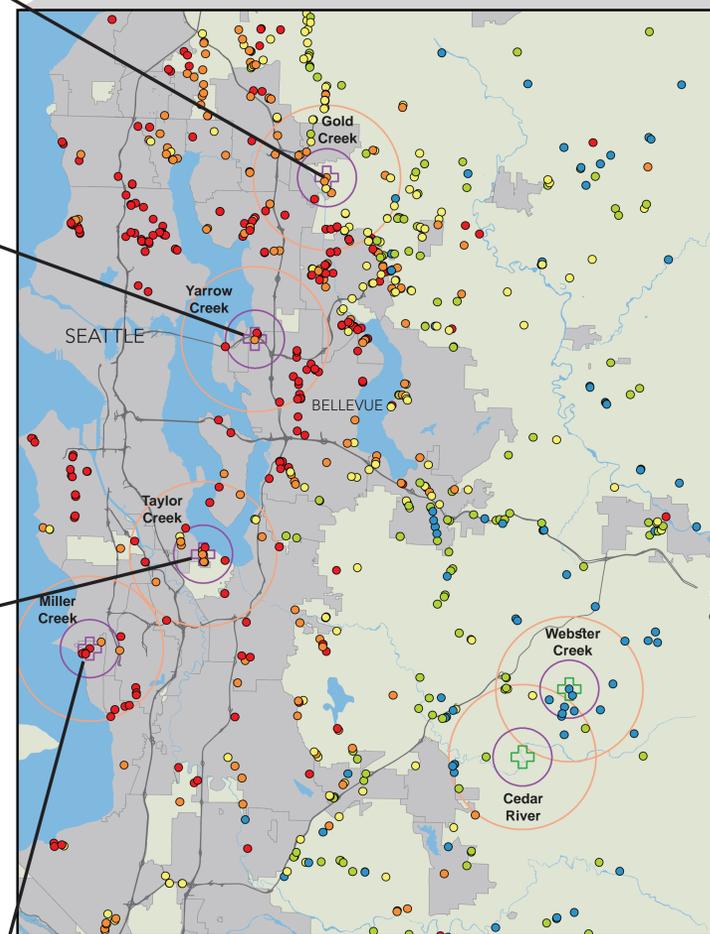
### SCORES WENT UP!

Likely new: a beetle (*Zaitzevia*), a midge (*Krenopelopia*), and a caddisfly (*Glossosoma*) (whole sample)



### SCORES DID NOT IMPROVE

New for sure: a mayfly (*Dipheter hageni*), and likely new: a stonefly (Leuctridae) and a crane fly

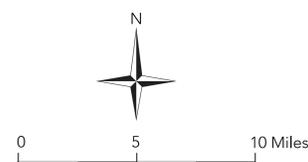


**B-IBI Scores & Seeding Sites**

2016-2017

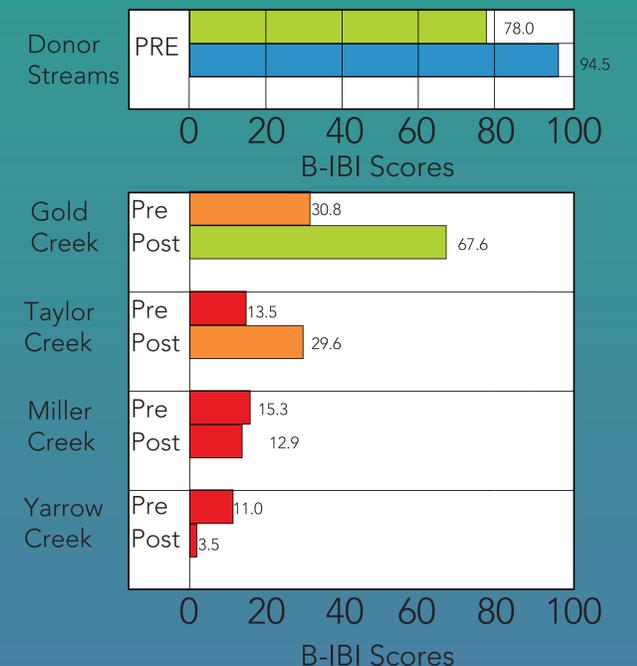
- Excellent
- Good
- Fair
- Poor
- Very Poor

- ⊕ Recipient Sites
- ⊕ Donor Sites
- 2 km radius
- 5 km radius



### RESULTS:

- Most of the new taxa were not found in the recipient streams a year later.
- However, in each stream, there were 1 to 3 new or likely new taxa.
- Other rare taxa were found in some streams, but we cannot be certain that their presence is due to the experiment.
- B-IBI scores increased in two streams, and remained low in the other two.



### CONCLUSION:

- Relocation efforts should be done with caution. Care needs to be taken to ensure invasive species and diseases are not spread.
- Where appropriate and safe, moving sensitive macroinvertebrate communities to urban streams may help jump start recovery.
- If added taxa do not become established, current conditions – and not a lack of colonists – may be limiting recovery.
- Several years of monitoring will be needed to determine true, sustained success.