



# A social-ecological investigation of riverine habitat complexity: insect emergence, terrestrial insectivores, & public perceptions

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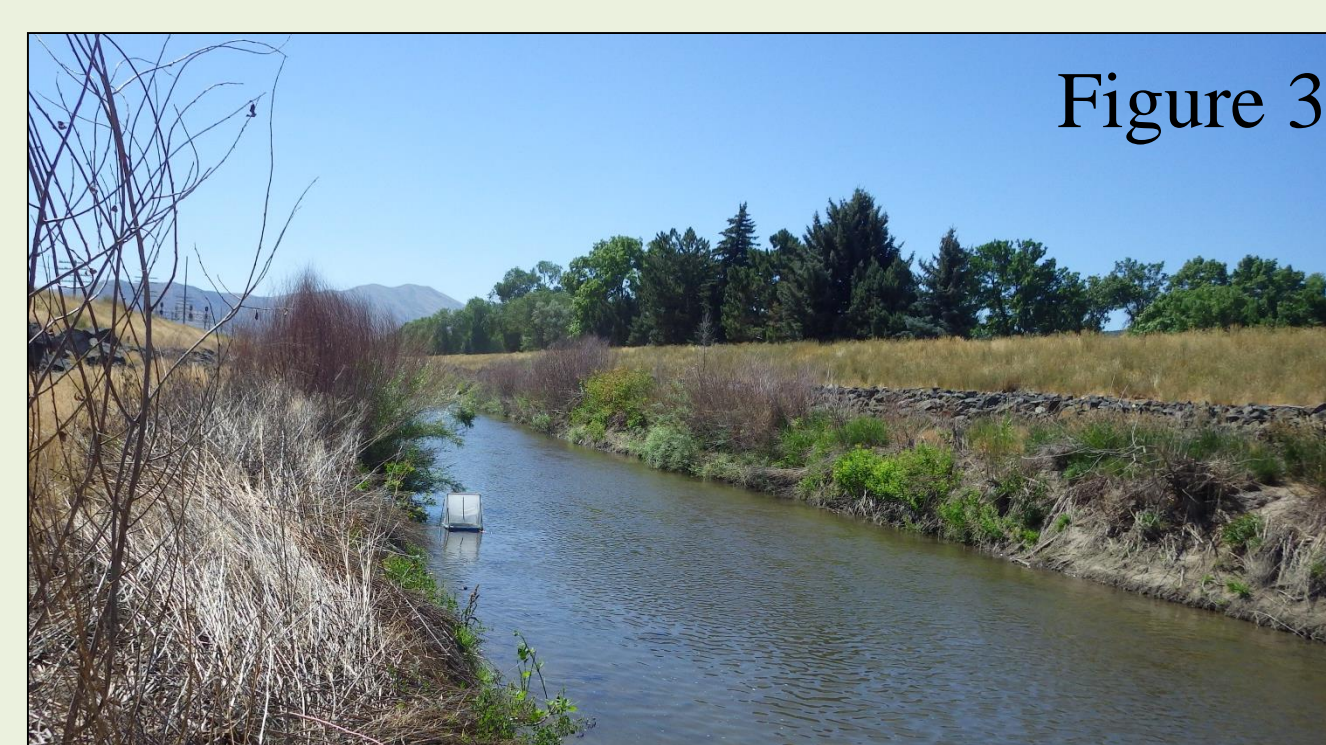
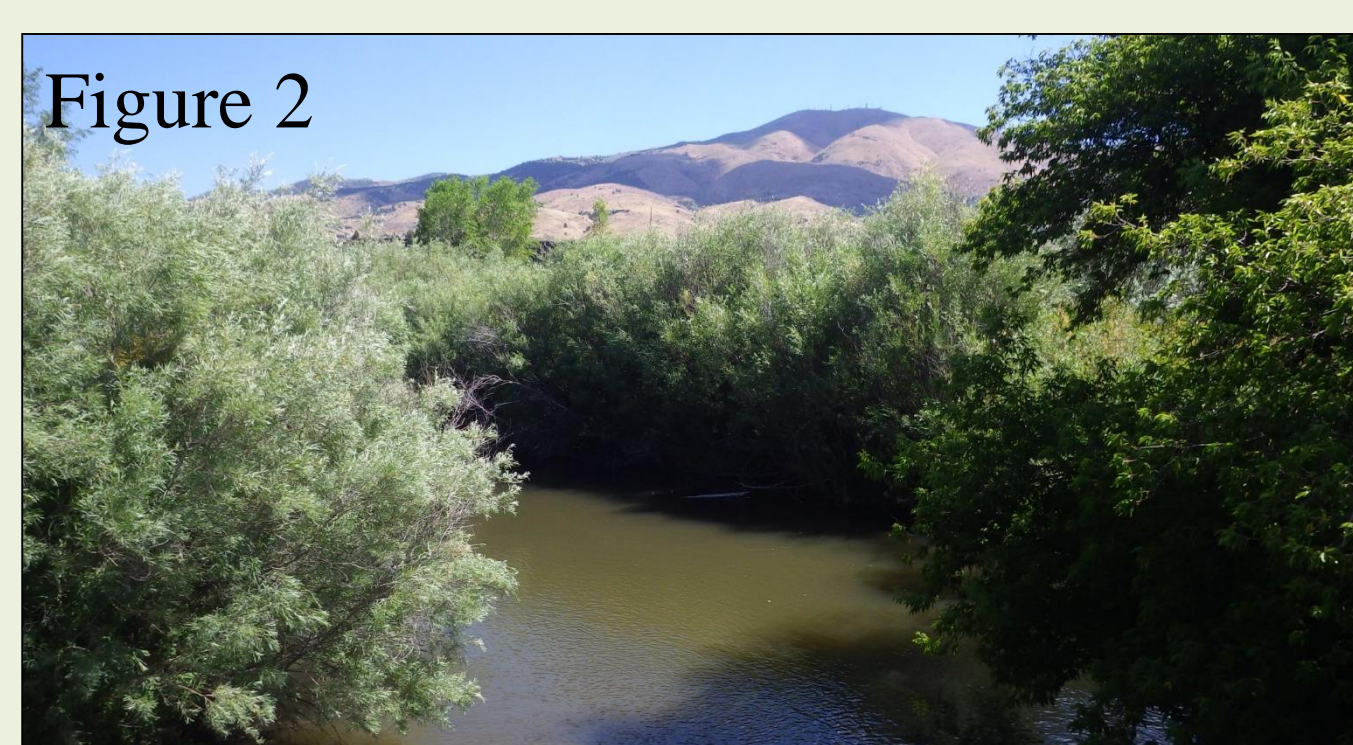
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## BACKGROUND

- Habitat homogenization via channelization affects rivers worldwide, including the Portneuf River in Pocatello, Idaho, which is the focus of social ecological system (SES) studies.
- A community-driven process, the Portneuf River Vision Study, aims to develop restoration plans to restore the river based on citizens' visions, such as that displayed in Figure 1.



- The process provides opportunity to evaluate potential mismatches between visions and river ecological capacity.
- Dominant characters of visions are presence of fish and wildlife species, but low to moderate levels of habitat complexity, a possible mismatch.
- To evaluate ecological outcomes of such visions, we compared two levels of river-riparian habitat complexity:
  - Complex site (Figure 2): relatively natural, sinuous channel with dense riparian vegetation
  - Simple site (Figure 3) straightened channel with minimal vegetation, similar to vision depicted in Figure 1



## OBJECTIVE

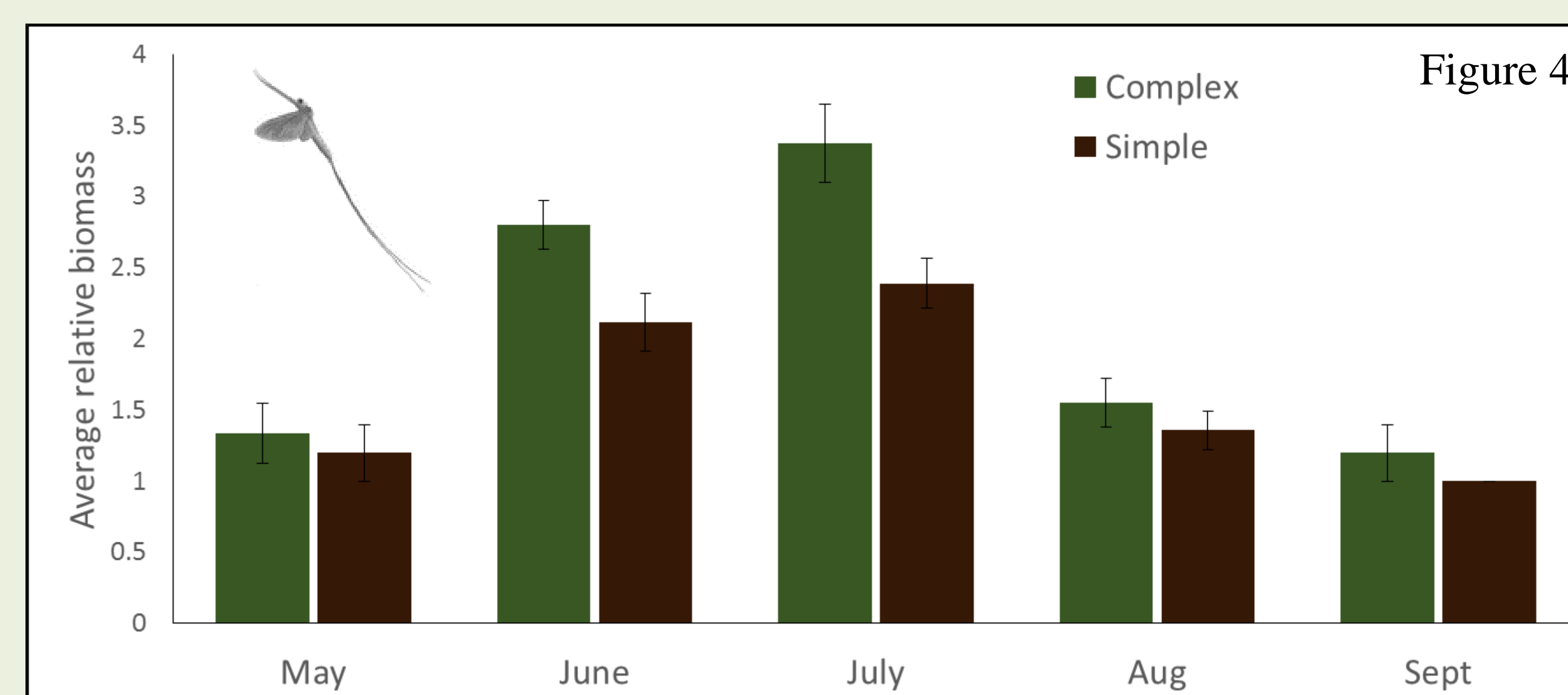
We seek to identify and investigate potential mismatches in the shared vision citizens have for the Portneuf River and the ecological basis for actually achieving that vision, with the ultimate goal of tightening the feedback between science and public perception, policies, and decisions.

## INSECT EMERGENCE

**H1:** Increased spatial heterogeneity leads to increased insect diversity and life-history asynchrony among local habitat patches ultimately resulting in greater and more consistent emergence of adult insects from complex vs. homogenized habitats

### Methods:

- Emergence measured during summer 2016 using floating traps
- Visual, categorical assessment completed to rank total biomass



### Preliminary results:

- At the site with greater habitat complexity, insect emergence was consistently higher throughout the summer, and more than 40% higher during peak emergence in July (Figure 4). Higher productivity could sustain fish, but also terrestrial insectivores.

## TERRESTRIAL PREDATORS

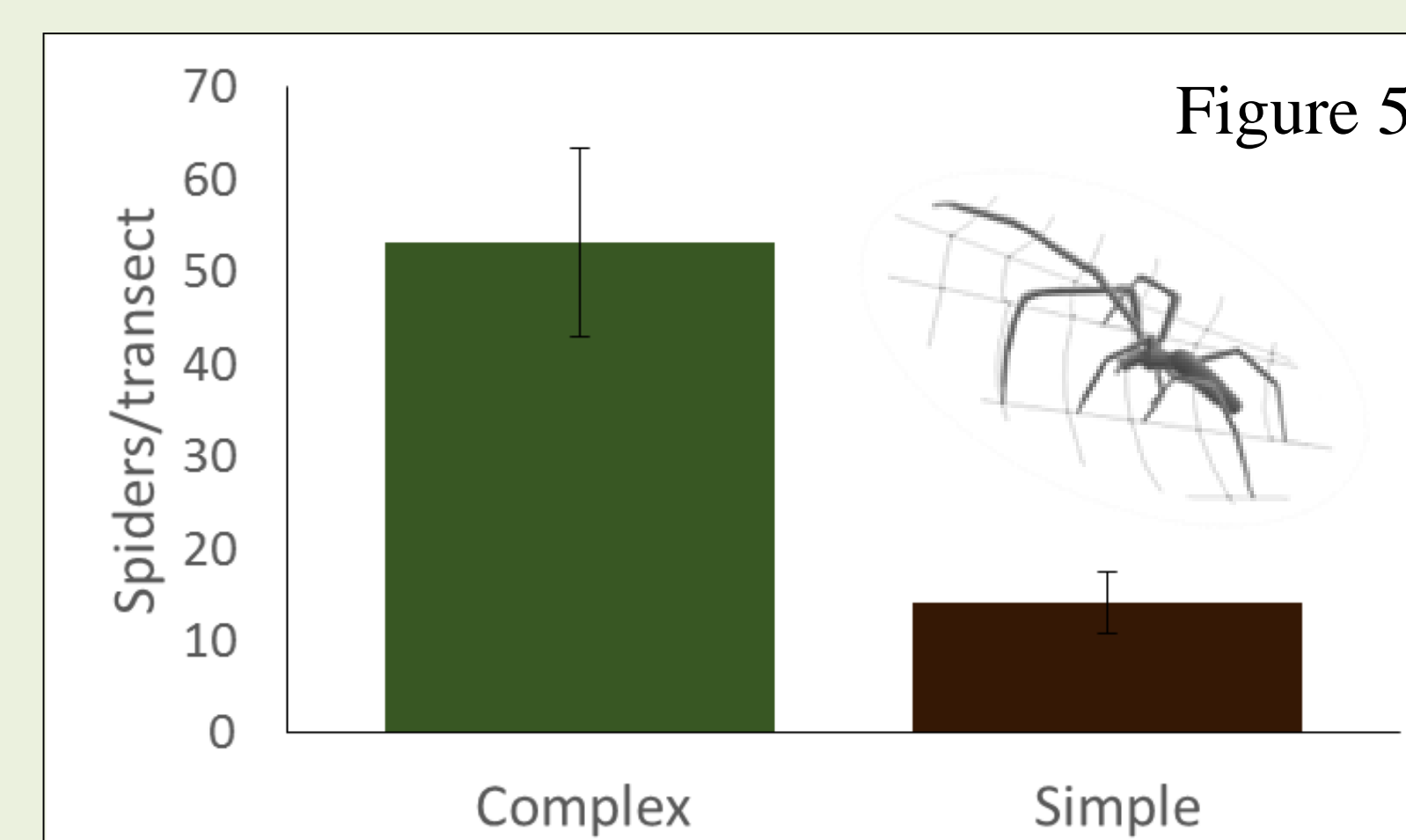
**H2:** Increased spatial heterogeneity and insect emergence results in more riparian spiders, which serve as a bellwether for the health of river-riparian linkages that sustain populations of more mobile terrestrial insectivores, like birds and bats

### Methods:

- Spiders were counted & identified in 50m of each stream reach

### Preliminary results:

- Spider density (85% Tetragnathidae) more than  $3.5 \times$  higher along the complex site than the simple site (60% tetragnathids; Figure 5)



## PUBLIC PERCEPTIONS

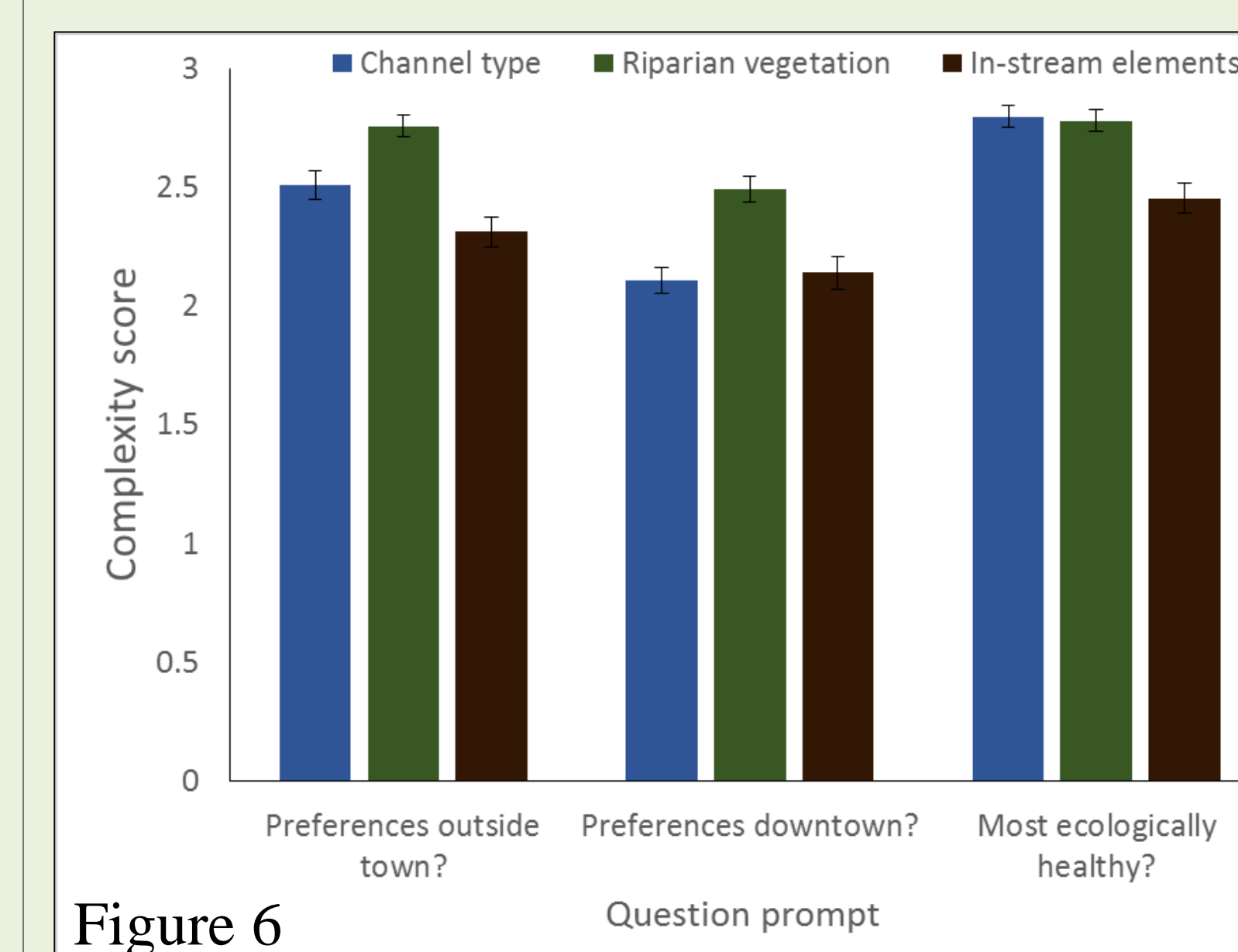
**H3:** Human perceptions and values of habitat complexity exhibit a nonlinear pattern, whereby very simple, homogenized habitats may be viewed negatively, but naturally heterogeneous systems may also be viewed negatively, and perceived as 'messy'

### Methods:

- Image-based survey to assess preferences regarding different levels of riverine habitat complexity

### Preliminary results:

- Participants preferred simpler habitat than what they recognized might be most ecologically healthy



- Participants preferred less habitat complexity for river flowing through town than for setting outside of town (Figure 6)

## SIGNIFICANCE

- Our findings provide a direct, locally relevant basis to provide scientific feedback to the visioning process
- Results suggest adaptation of community visions to include greater habitat complexity will likely be required if the envisioned river is to sustain desired populations of fish and wildlife

## ACKNOWLEDGEMENTS

This work was made possible by the NSF Idaho EPSCoR Program and by the National Science Foundation under award number IIA-1301792. Financial support was also provided by the Shoshone-Bannock Tribes. We thank Becky Abel, Jordan Burke, Janae Crispin, Adam Eckersell, Cody Feldman, Jessica Hamway, Courtney Ohr, Maria Pacioretti, James Paris, & Matt Schenk for their assistance in the lab and in the field.