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science for a changing world

Fluvial aquatic ecology of the Colorado River (…especially Lees Ferry)

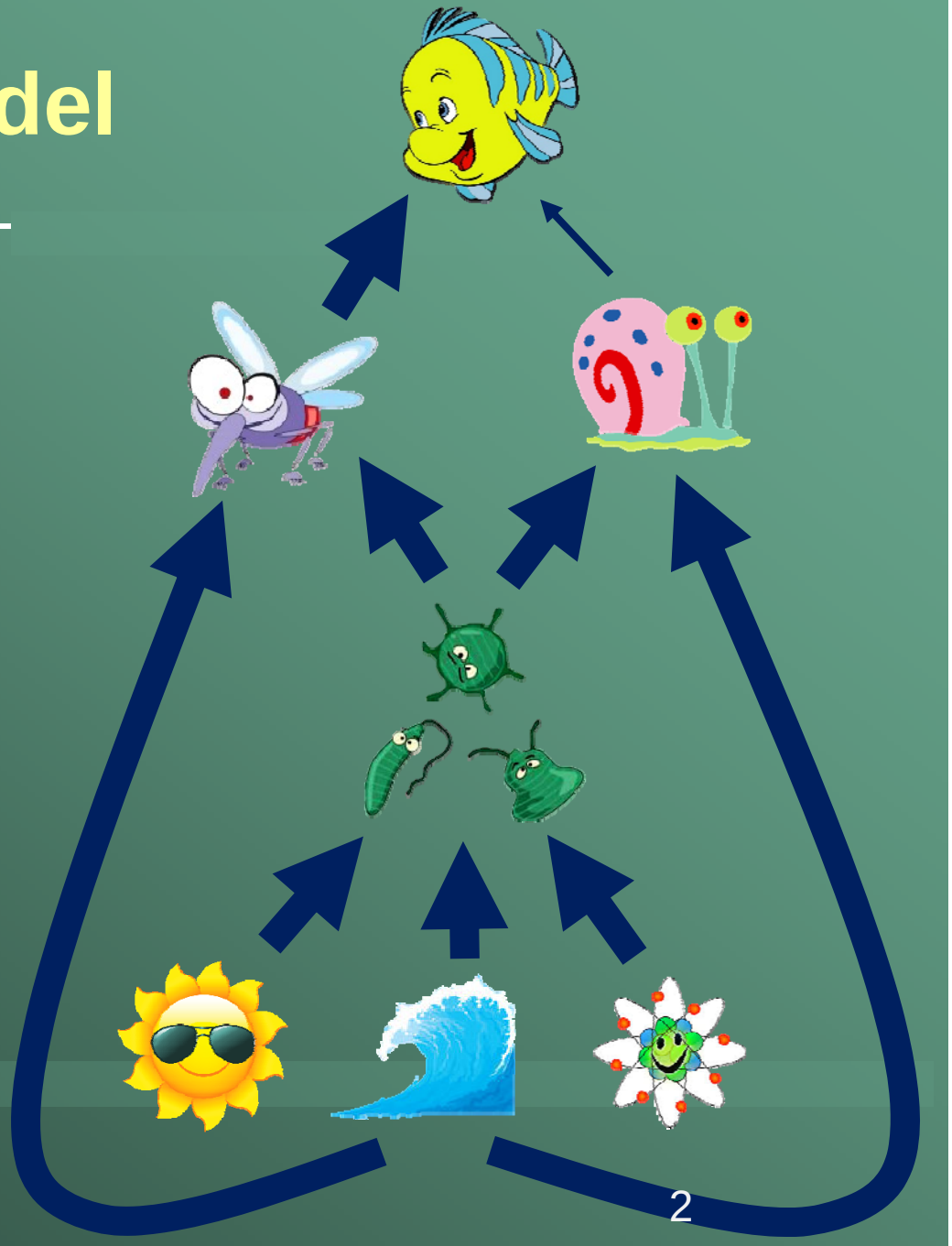
Jeff Muehlbauer

with Ted Kennedy, Charles Yackulic, and many others

Grand Canyon Monitoring and Research Center
Southwest Biological Science Center
U.S. Department of the Interior
U.S. Geological Survey

A conceptual model

- How the ecosystem "works"



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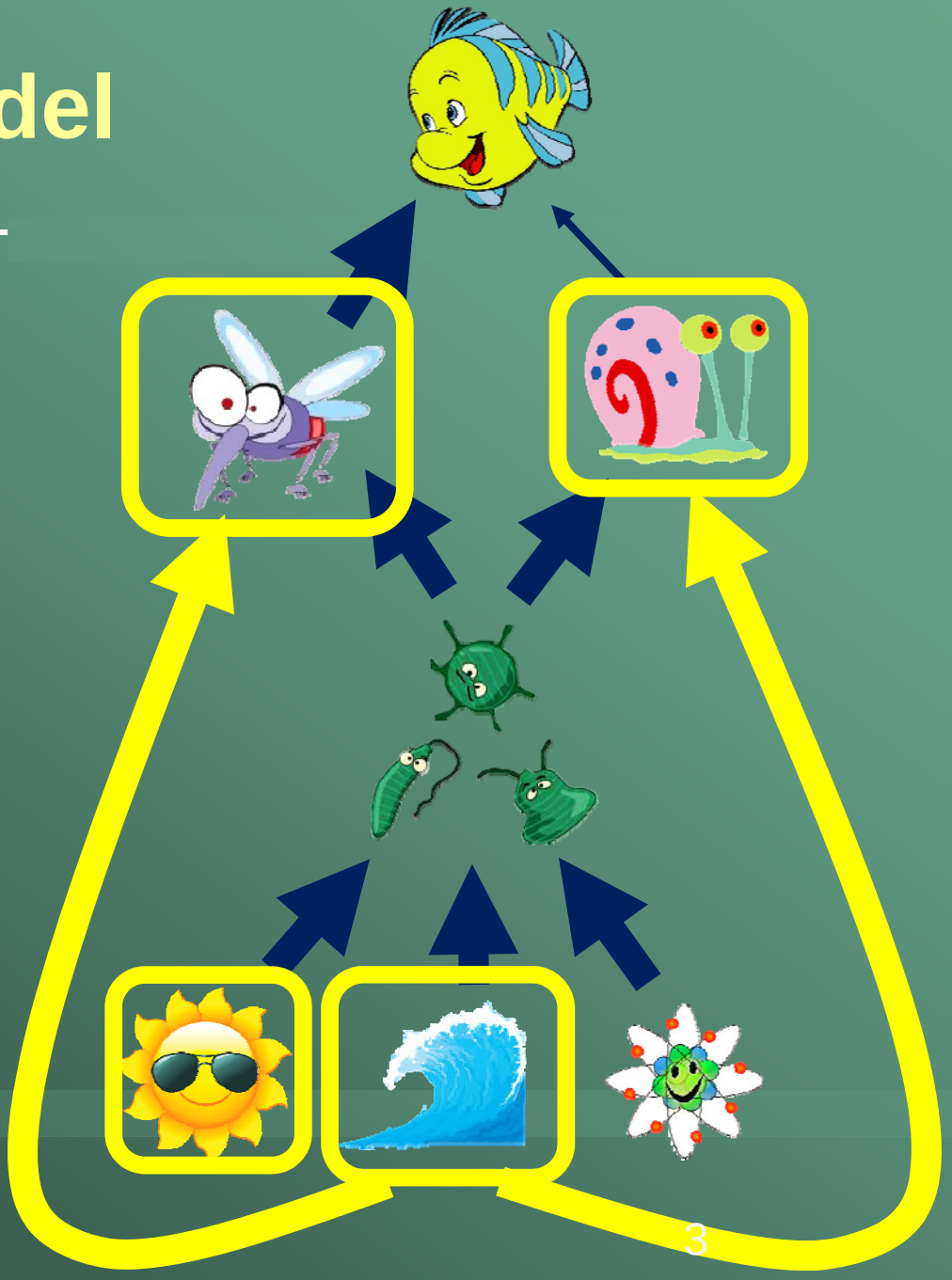
A conceptual model

- How the ecosystem "works"

My talk:
Bugs, light, shear stress, HFEs



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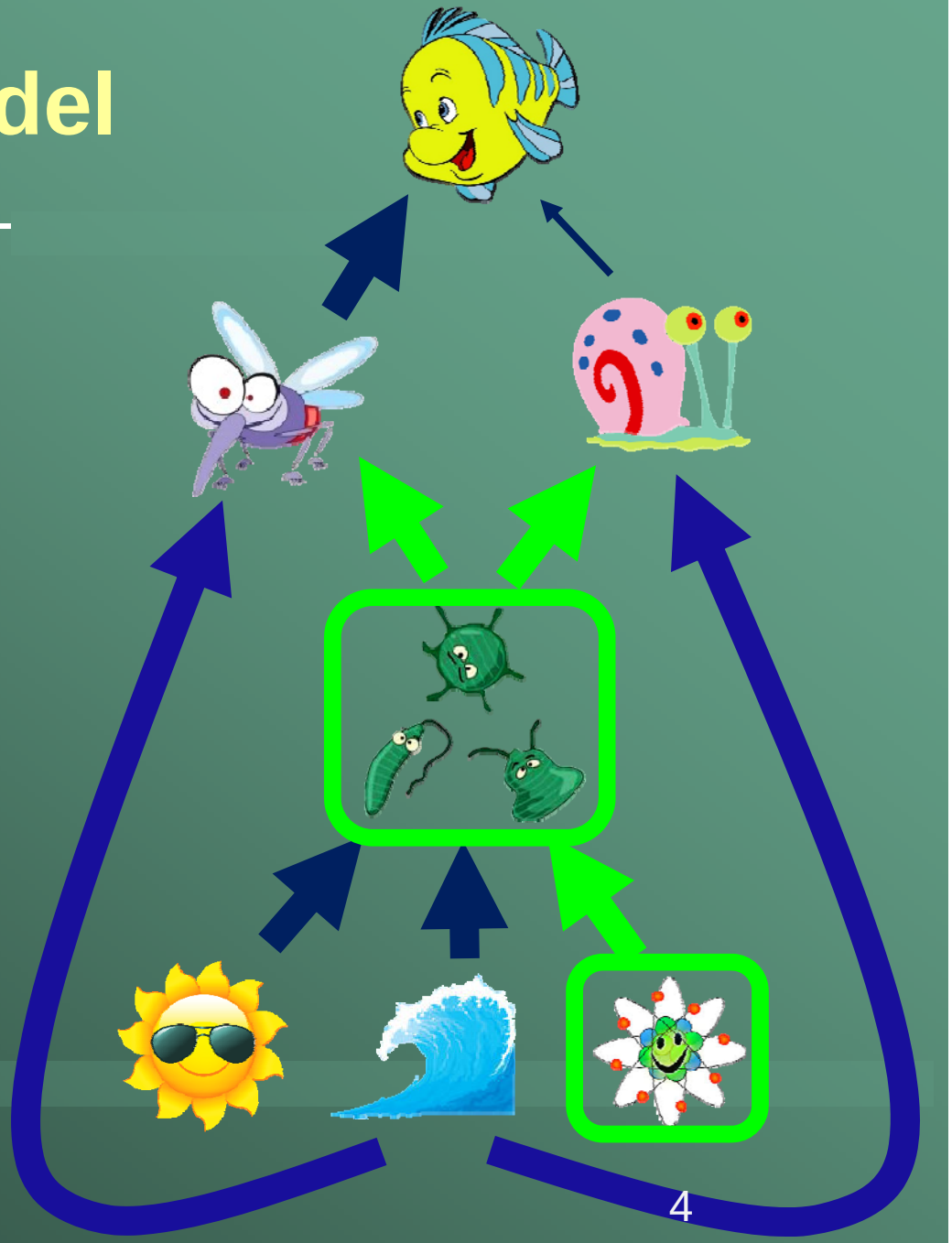
A conceptual model

- How the ecosystem "works"

Charles' talk: Nutrients



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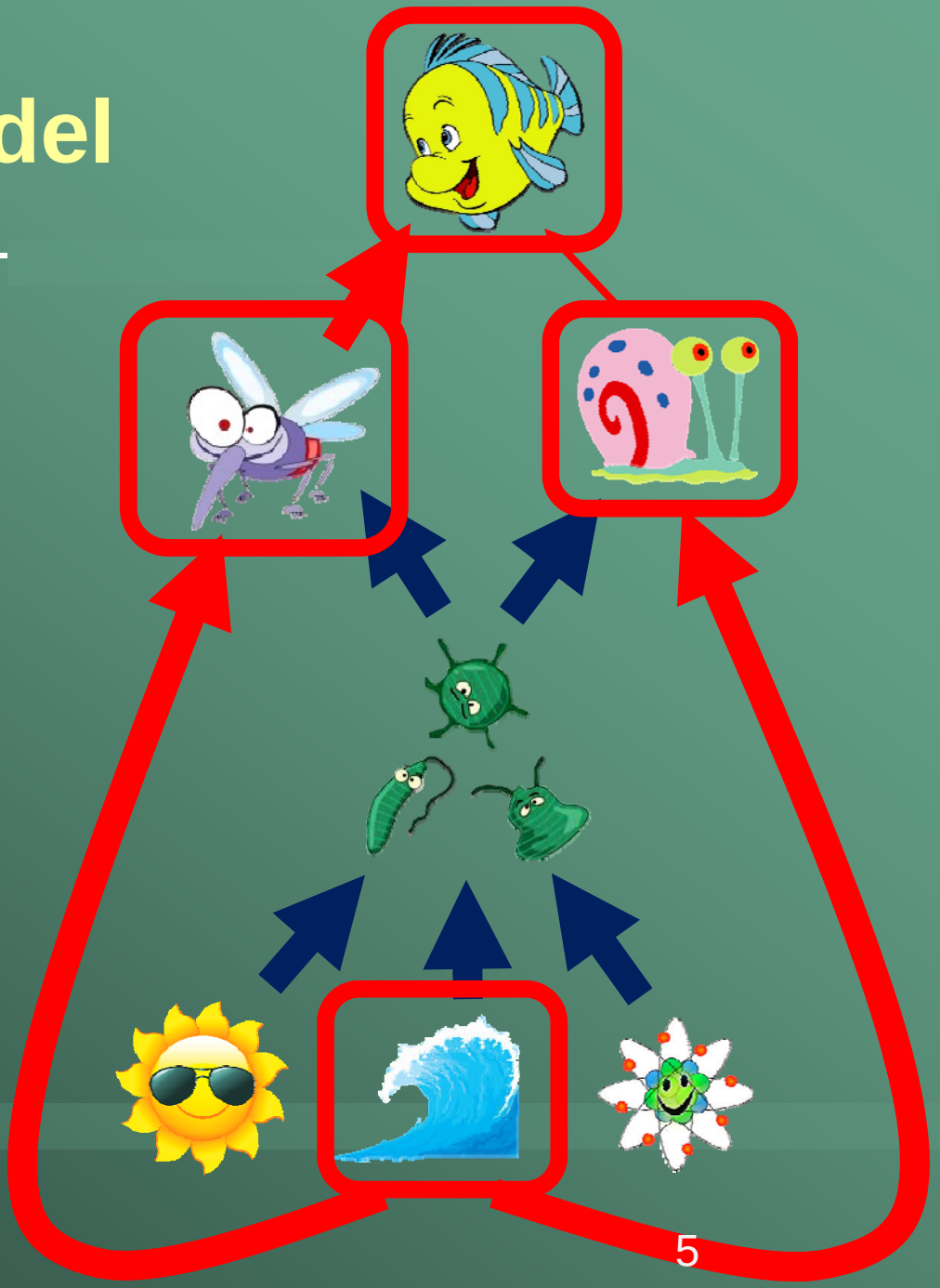
A conceptual model

- How the ecosystem "works"

Ted's talk:
Bugs, flows, fish



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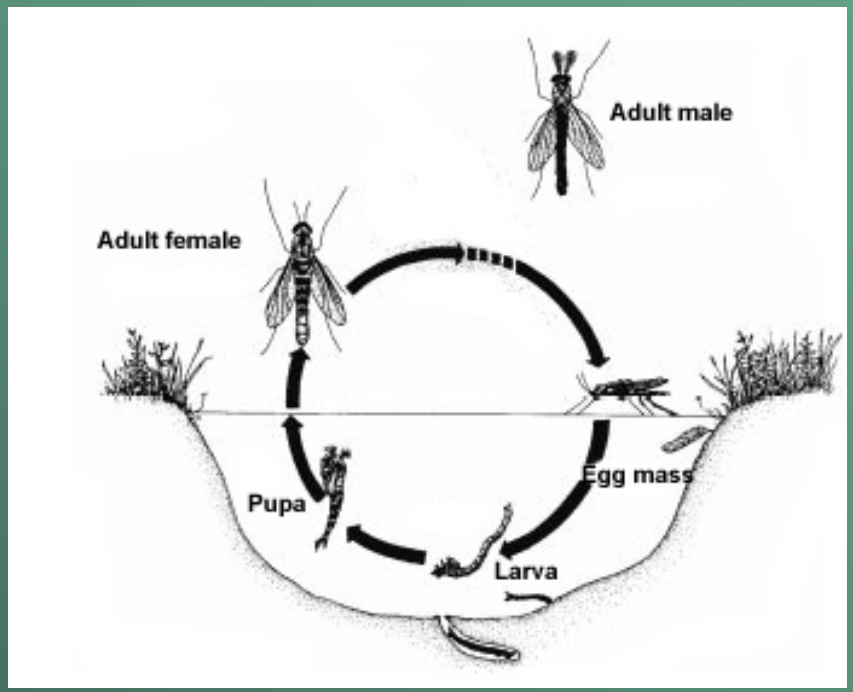
Project 5

- Studies all life stages
- Identifies drivers / constraints of insects
- Estimates food availability for fishes
- Describes feeding habits of fishes



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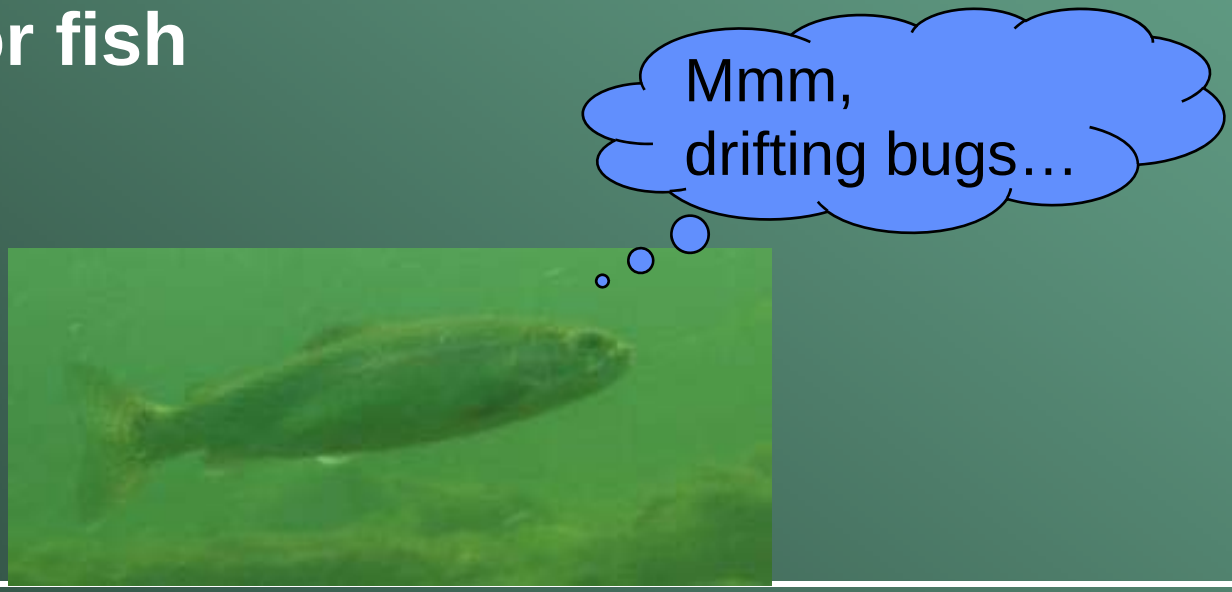
Lees Ferry drift research

Invertebrate drift:

- Entrainment of bugs in water column
- Critical life stage/behavior
- Food for fish



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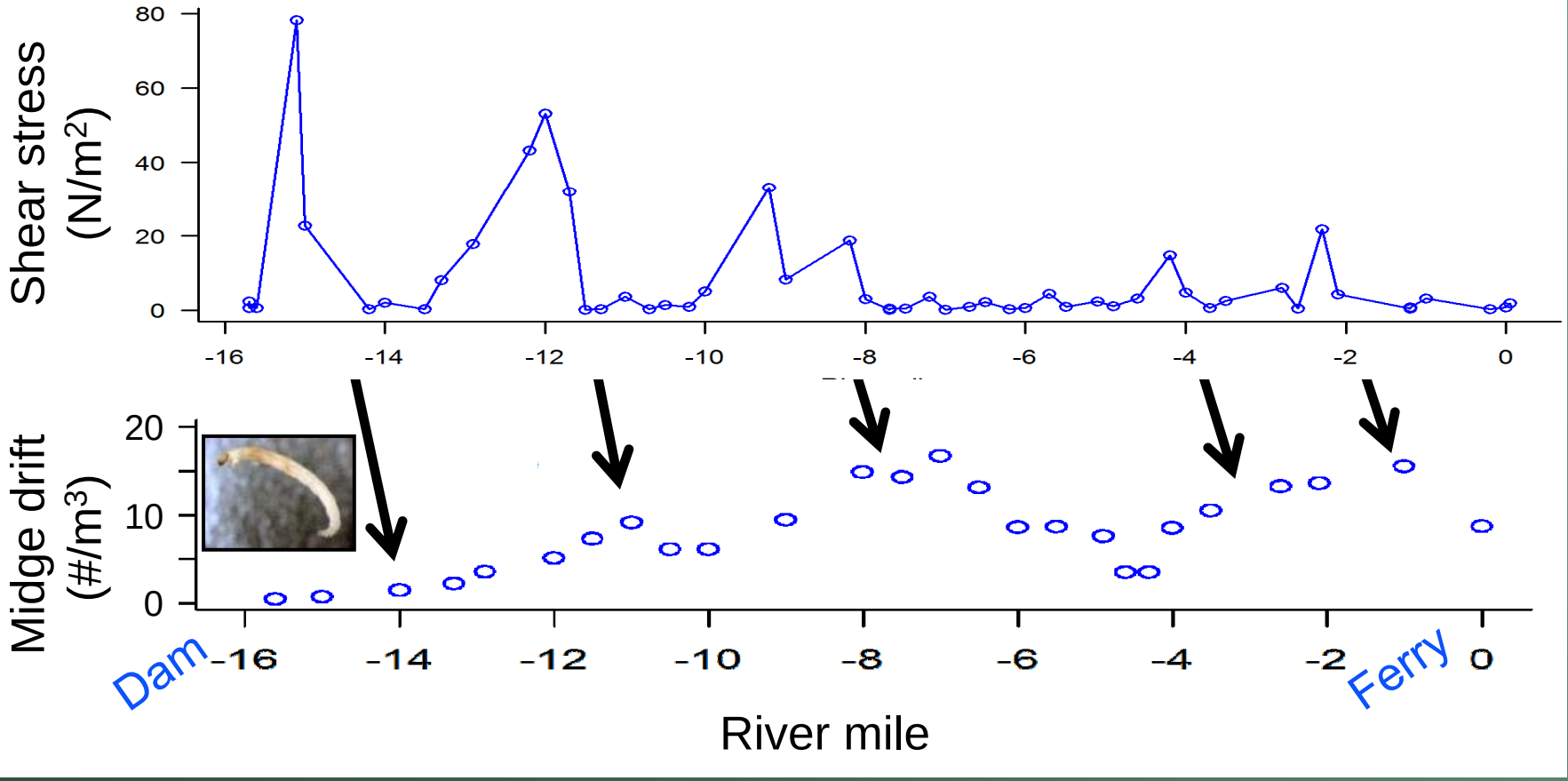
Drift in space

- Shear stress effects on drift (longitudinal)



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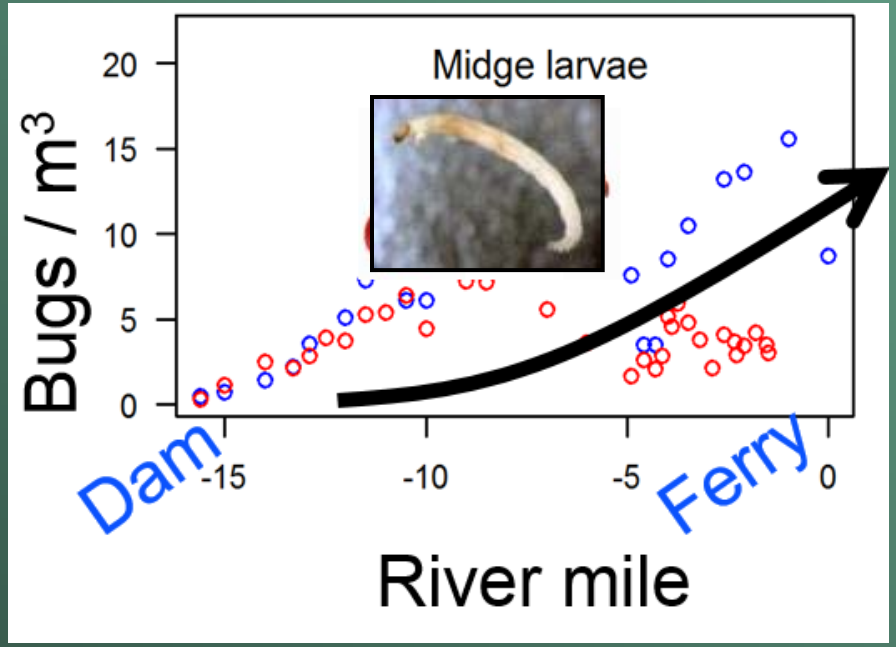
Drift in space

- **Increasing drift with distance from Dam (longitudinal)**



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Lees Ferry sticky trap monitoring

- ~ Every mile monthly: Dam to Lees Ferry
- Began Nov. 2013
- Capture adult aquatic insects
- Effective monitoring tool for food base?

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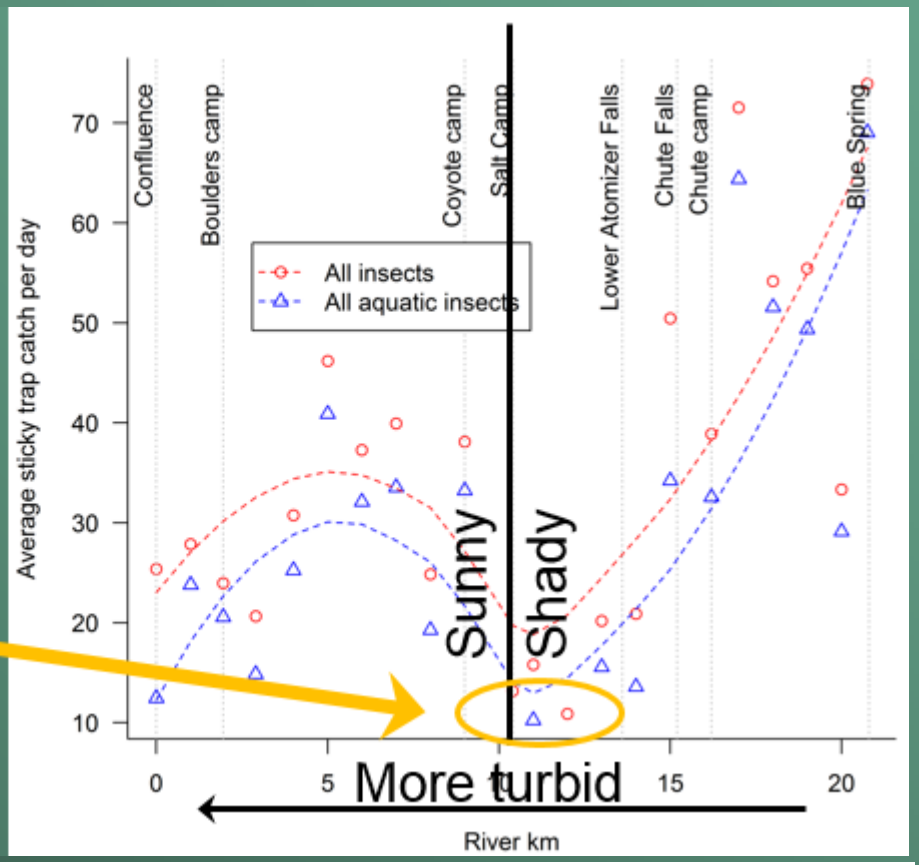
Light effects?

- Fishermen notice hatch patterns at Ferry
- Strong light pattern in LCR



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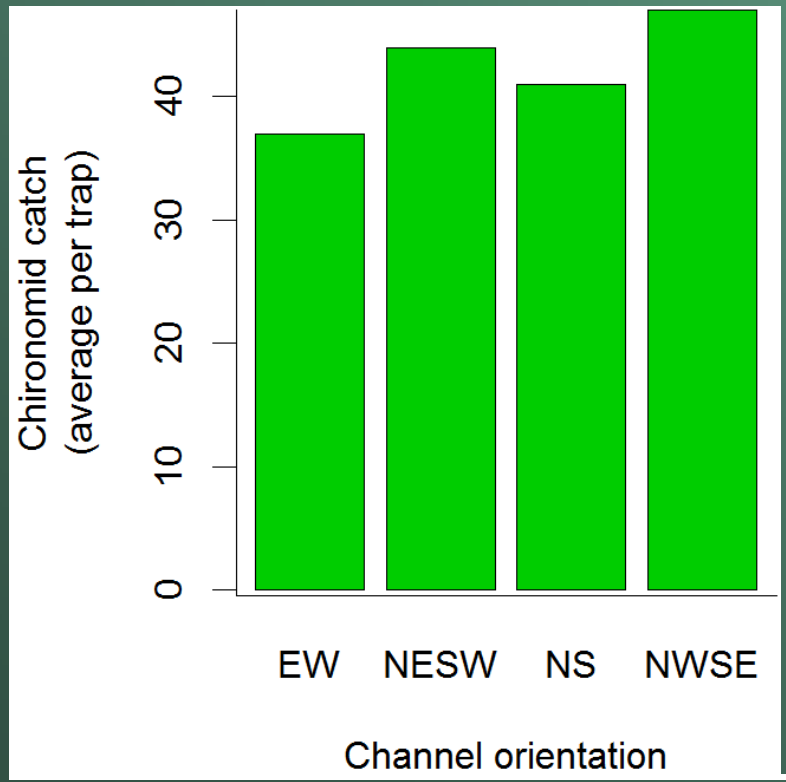
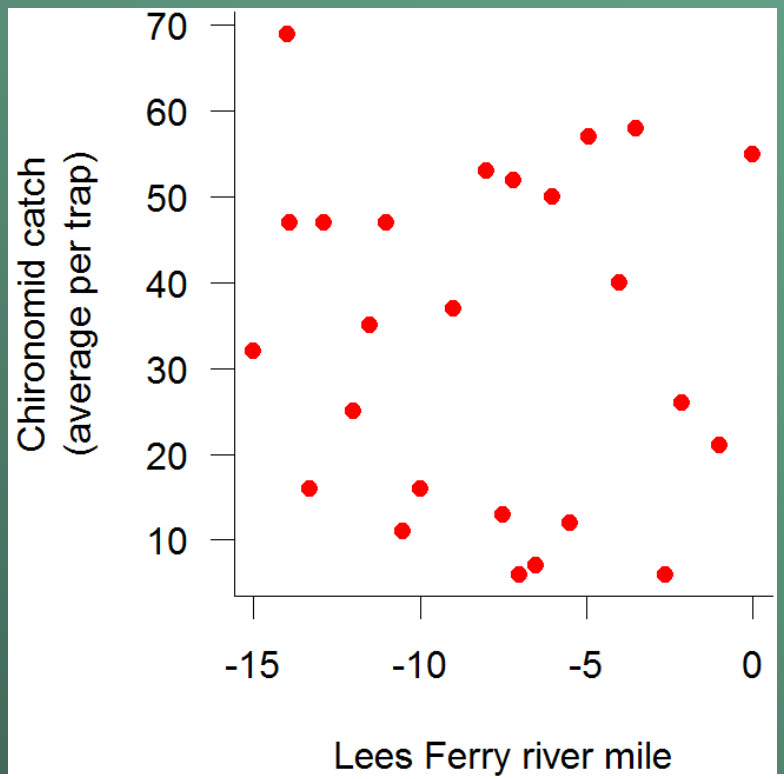
Lees Ferry sticky trap monitoring

Channel orientation



River mile (longitudinal)



Not much of a pattern…

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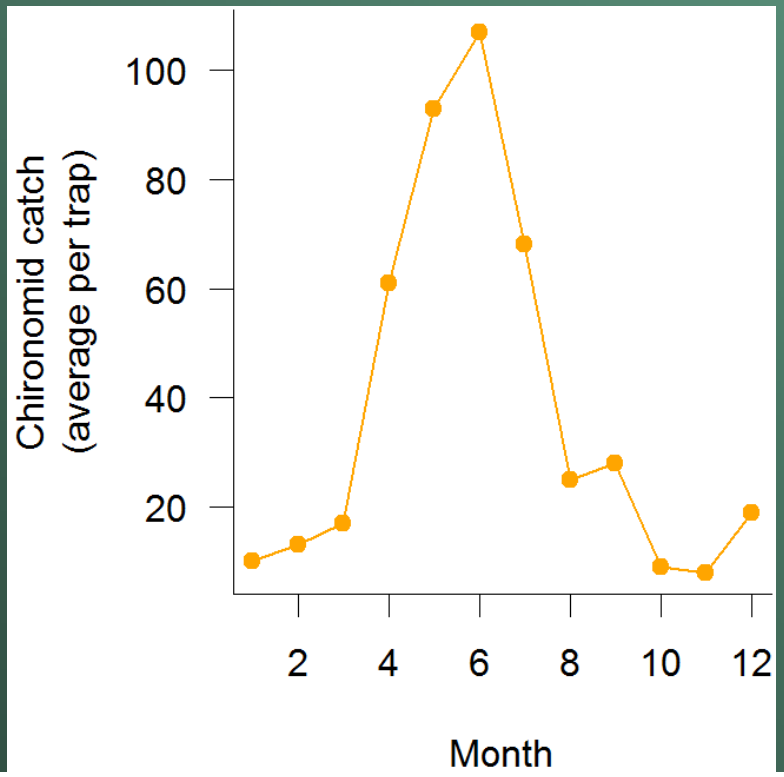
Lees Ferry sticky trap monitoring

Seasonal



- Strong phenological pattern
- Peaks in June
- Very little Aug. to Mar.
- See larger patterns, *IF* they exist

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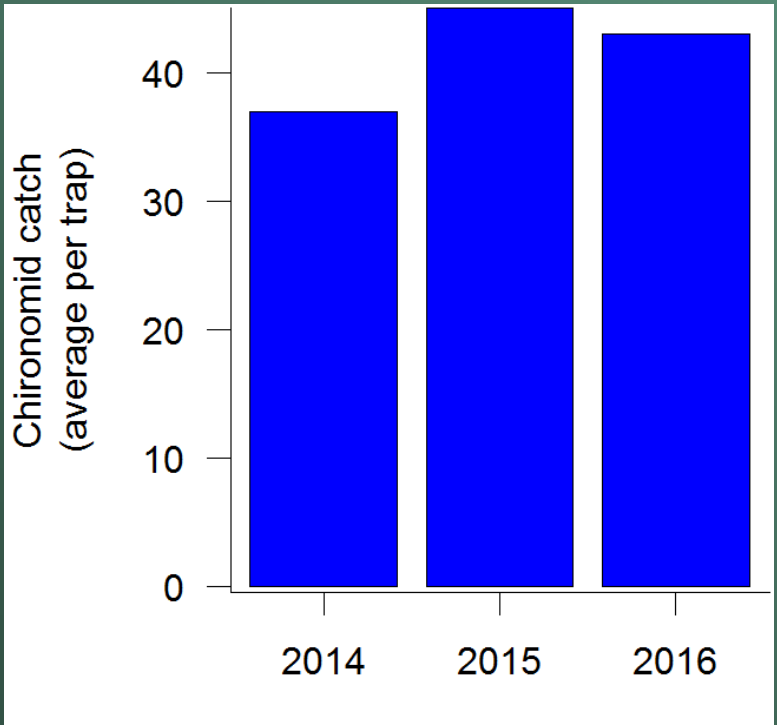
Lees Ferry sticky trap monitoring

Year-to-year



- Stable year-to-year
- But is that “good”?
  - Let’s come back to this…

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Lees Ferry drift monitoring

- Monthly every ~ 3 miles, Dam to Lees Ferry
- Now a long-term dataset (~ 10 years)
- Mid-2016: Ferry to Badger Rapid too
- Let’s look at HFE effects!

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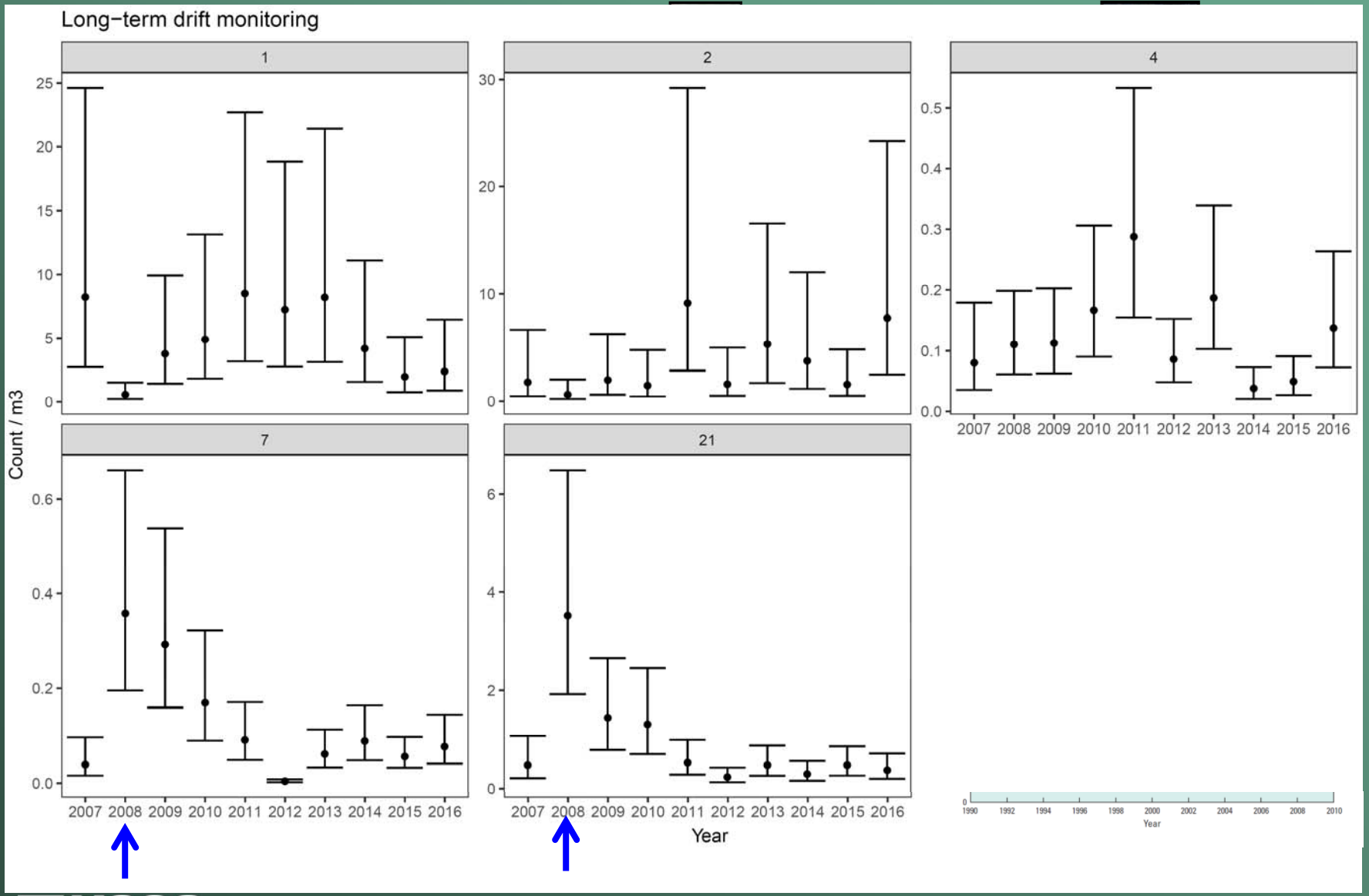
Spring HFE improved food base



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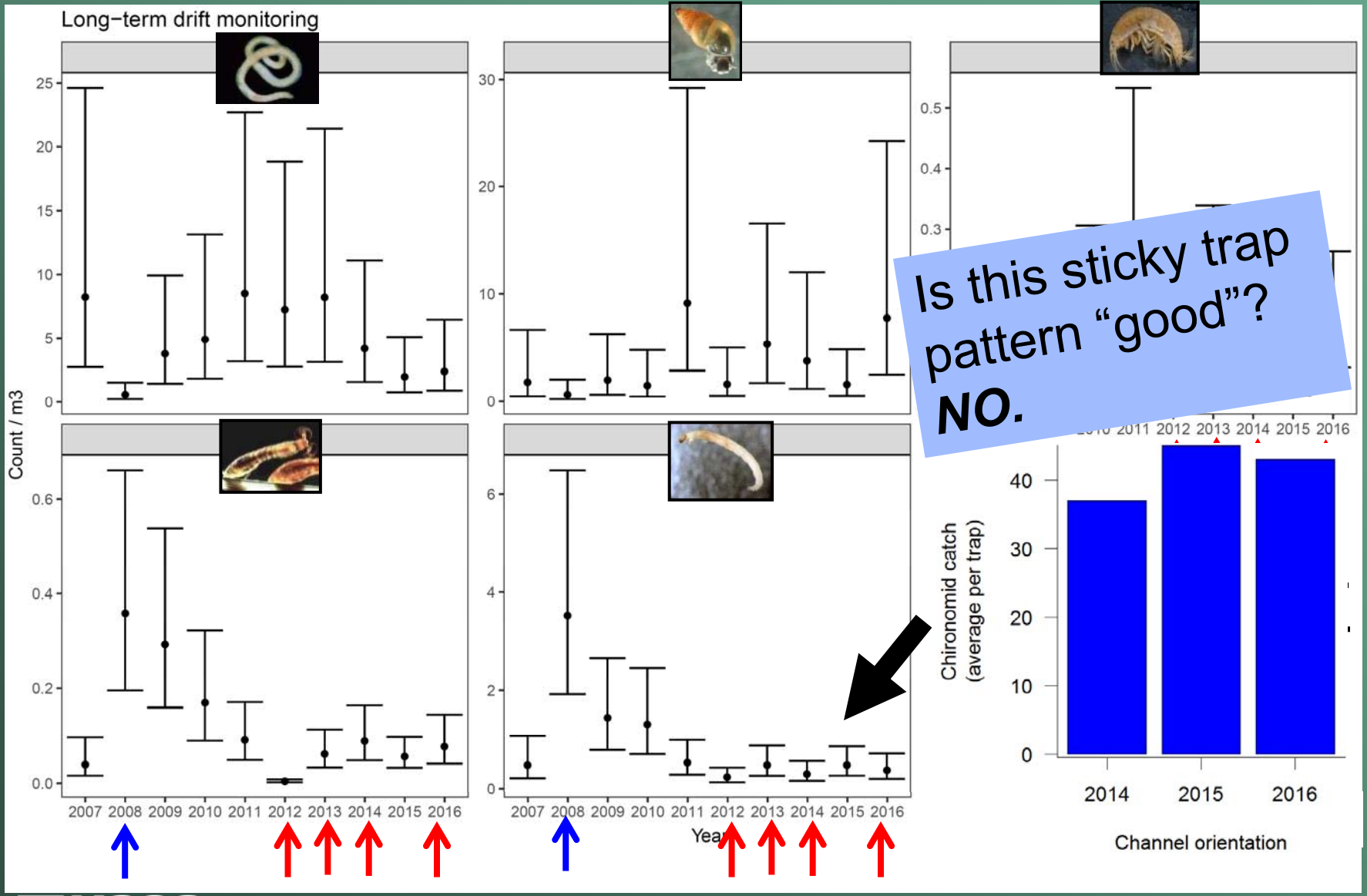
Fall HFEs do not improve food base



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2012-15: Trout target midges and snails

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Summary

- Sticky traps: cheap, effective monitoring tool
- Drift: Good 2008-11, tanking since 2012
  - Spring HFE: Good for bugs
  - Fall HFEs: Neutral to bad
- Only a few bugs to eat
- A house of cards…

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Go fish!

- **Tailwater invertebrates of Glen Canyon and Flaming Gorge Dams**

- **Full deck:**

  Flaming Gorge

- **Clubs only:**

  Glen Canyon Dam

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