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## Benthic Macroinvertebrates as Bioindicators of water quality on the Mad River

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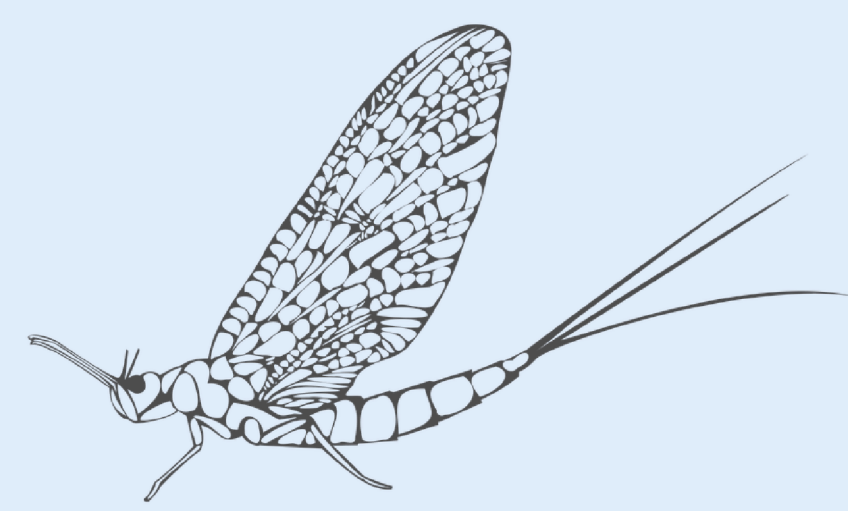
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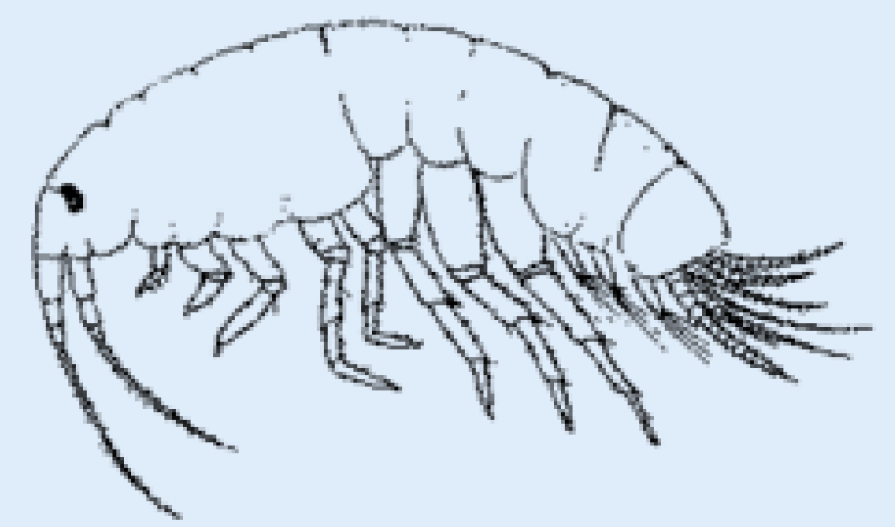
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# Benthic Macroinvertebrate as Indicators of water quality in Humboldt County

Cal Poly Humboldt, Department of Wildlife  
Benjamin Bouchard



## Why Benthic Macroinvertebrates?

- ❖ They are abundant and easy to collect
- ❖ Certain species are sensitive to local changes in water quality
- ❖ They offer a cost effective alternative to traditional aquatic assessments

Changes in benthic invertebrate communities when the land use is altered has been observed. In particular mayflies, (Ephemeroptera) stoneflies, (Plecoptera) and caddisflies (Trichoptera) were found to be sensitive to chemical pollution and other forms of disturbance. A change in land use that could degrade habitat is agricultural activity

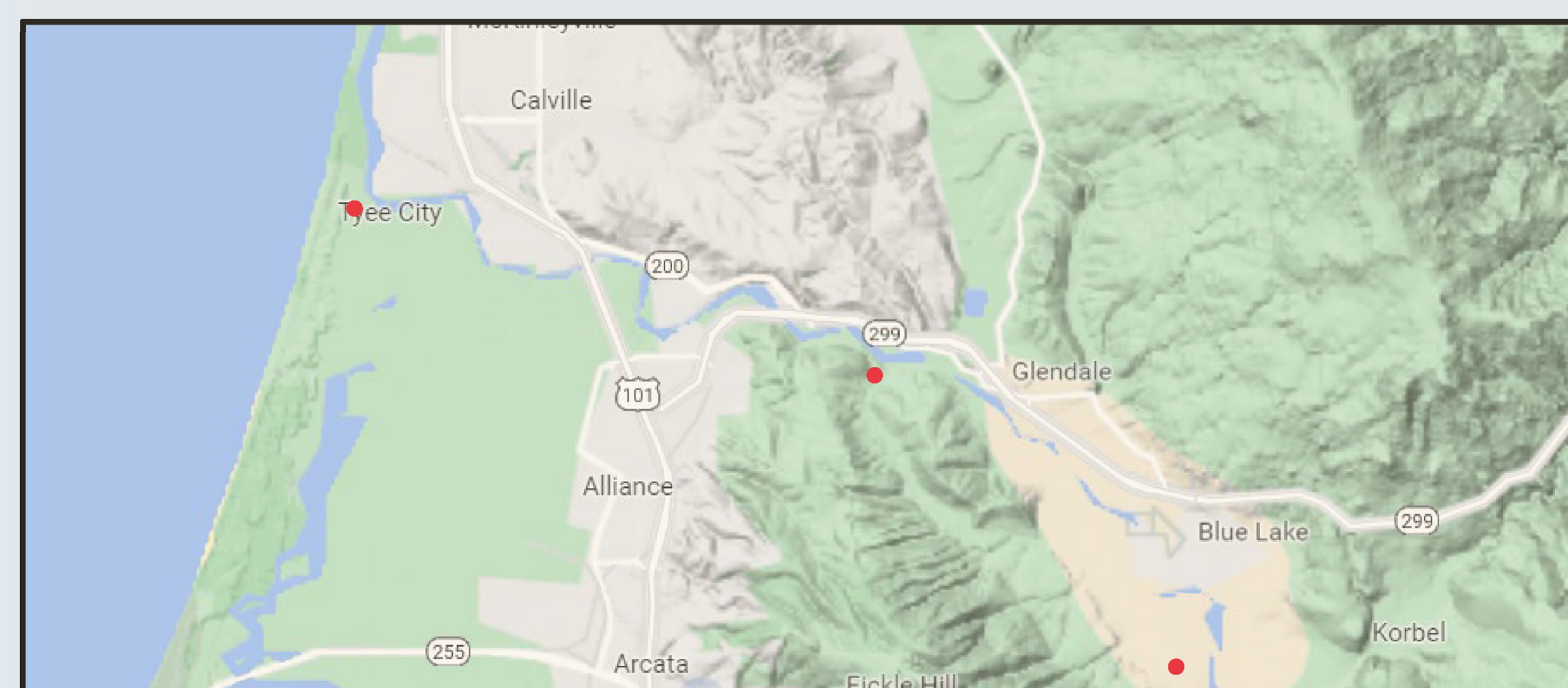
What can we learn about the current status of the Mad River from the benthic macroinvertebrates present?

### Study area

I sampled three locations on the Mad River in Humboldt County, CA. (From left to right) the Hammond Coastal Trail, Mad River Pump Station 4, and Blue Lake Recreation Area.

### Water quality

Water quality was assessed by measuring the dissolved oxygen, nitrates, and phosphates at each site using testing tablets and color comparison charts.



Site map of North Arcata CA, with sites marked by red dots.



Pump station #4 photograph

### Macroinvertebrate collection

I sampled 26 sample units across the three sites. 13 sample units were taken from the combined upstream sites while 13 sample units were collected at the Hammond Coastal Trail. A sample unit was defined as 40 sweeps with a 32cm dip net.



Naucoridae



Pteronarcyidae



Lepidostomatidae

## Results

- ❖ A total of 1642 individual macroinvertebrates were collected and identified between the three sites.
- ❖ The taxa of upstream sites represented 15 families and 649 individuals. Downstream a greater number of individuals were collected (n = 993) representing a fewer number of families amounting to 9 (fig. 2).
- ❖ Taxa differed significantly between upstream and downstream sites ( $p < 0.001$ ).

	Blue Lake	Pump Station	Hammond Coastal Trail
DO % saturation	0.34	0.34	0.34
Nitrate	4ppm	5ppm	7ppm
Phosphorus	1ppm	1ppm	2ppm

Table 1. Recorded chemical levels at the three sites on the Mad River. Upstream is blue and downstream is red.

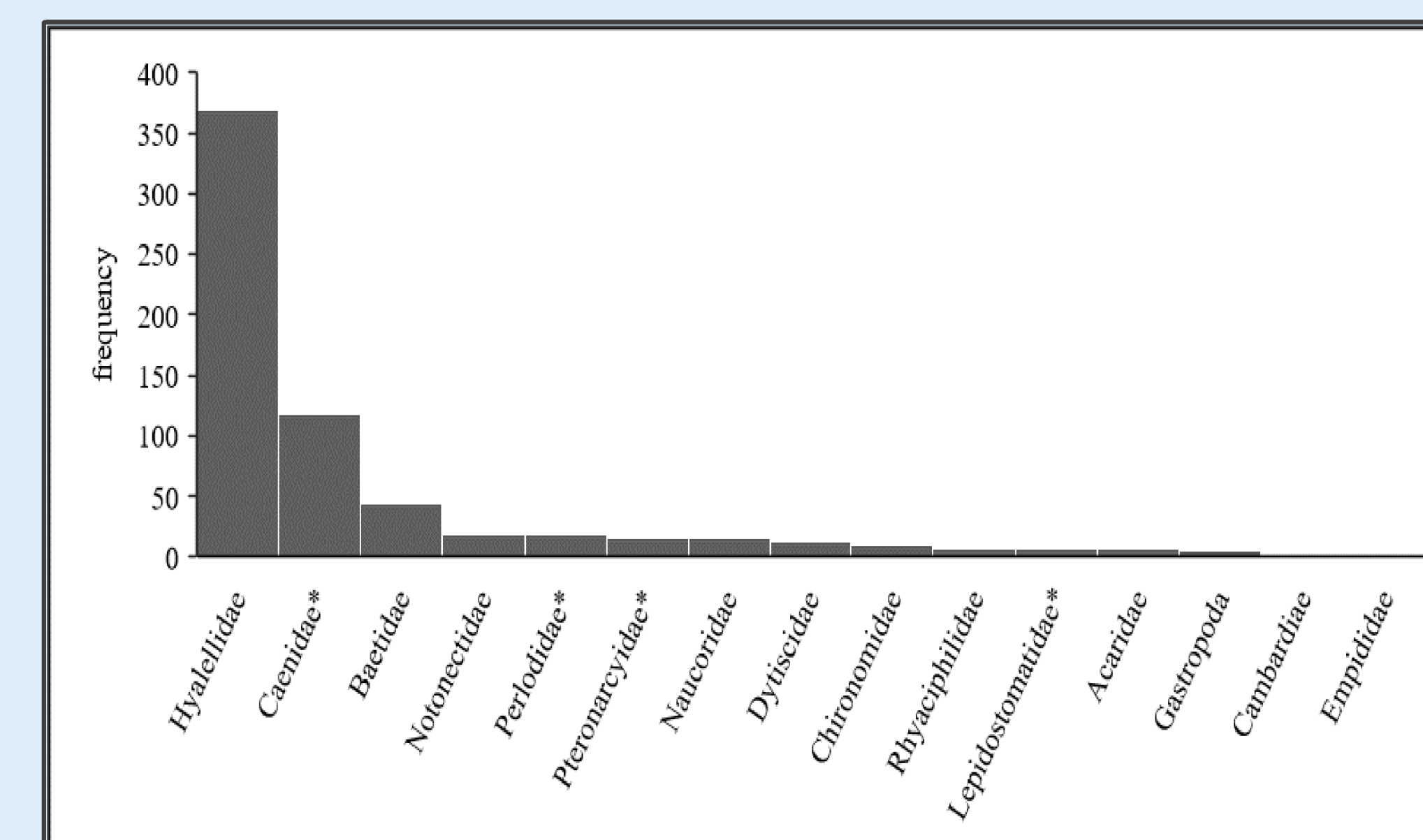


Fig 1. Rank abundance at the upstream sites.

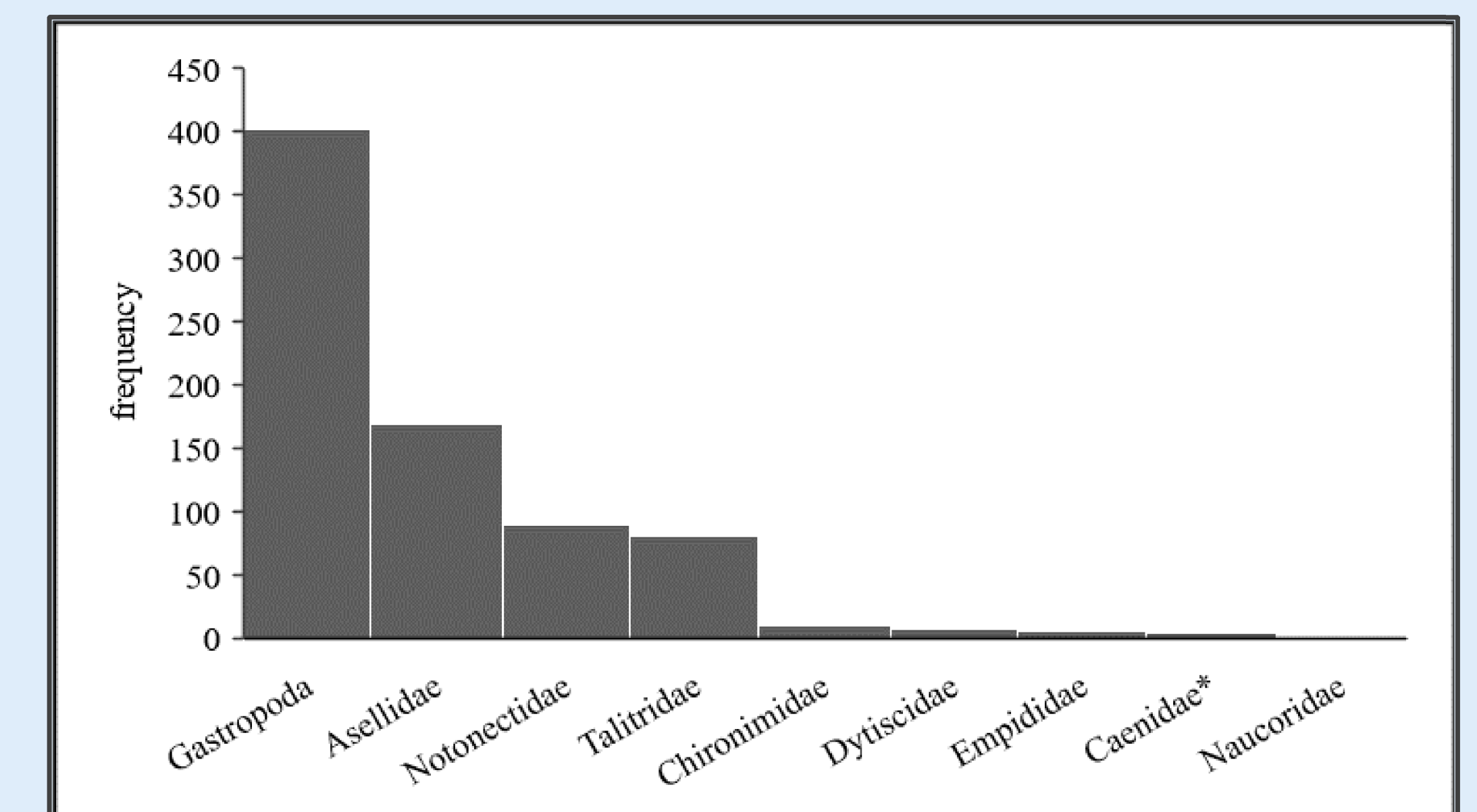


Fig 2. Rank abundance at the downstream site

## Discussion

- ❖ Taxa known as pollution sensitive (Perlodidae, Pteronarcyidae, Lepidostomatidae, and Rhyaciphilidae), were present in the upstream sites and absent from the downstream site.
- ❖ The absence of Plecopterans at the downstream site means that some change in habitat is making that section of the Mad River unsuitable for sensitive species.
- ❖ species diversity was lower the downstream site ( $9 < 15$  families).

## Management Implications

- ❖ As more research is being done, it is only becoming easier to compare sampled species to a known index tolerance for habitat change.
- ❖ Macroinvertebrates are also sensitive to changes in water flow from anthropogenic changes like dams.

## Acknowledgements

- ❖ Thank you to Cal Poly Humboldt for providing the lab space for specimen identification.
- ❖ Thank you, Frank Fogarty, for guiding me through the manuscript process.