



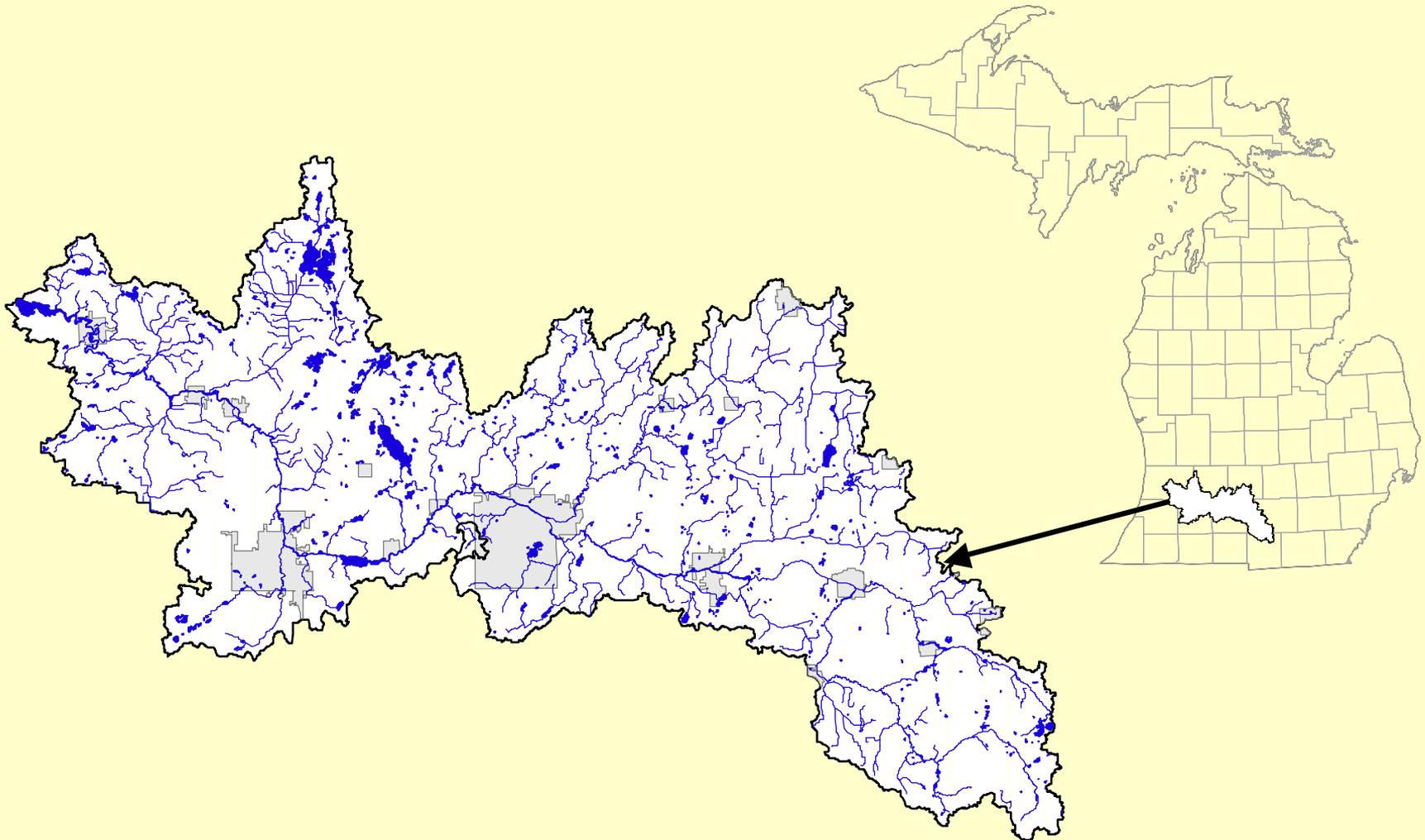
Relationships between total phosphorus and transparency

Integrating research and extension in a southwest Michigan TMDL watershed

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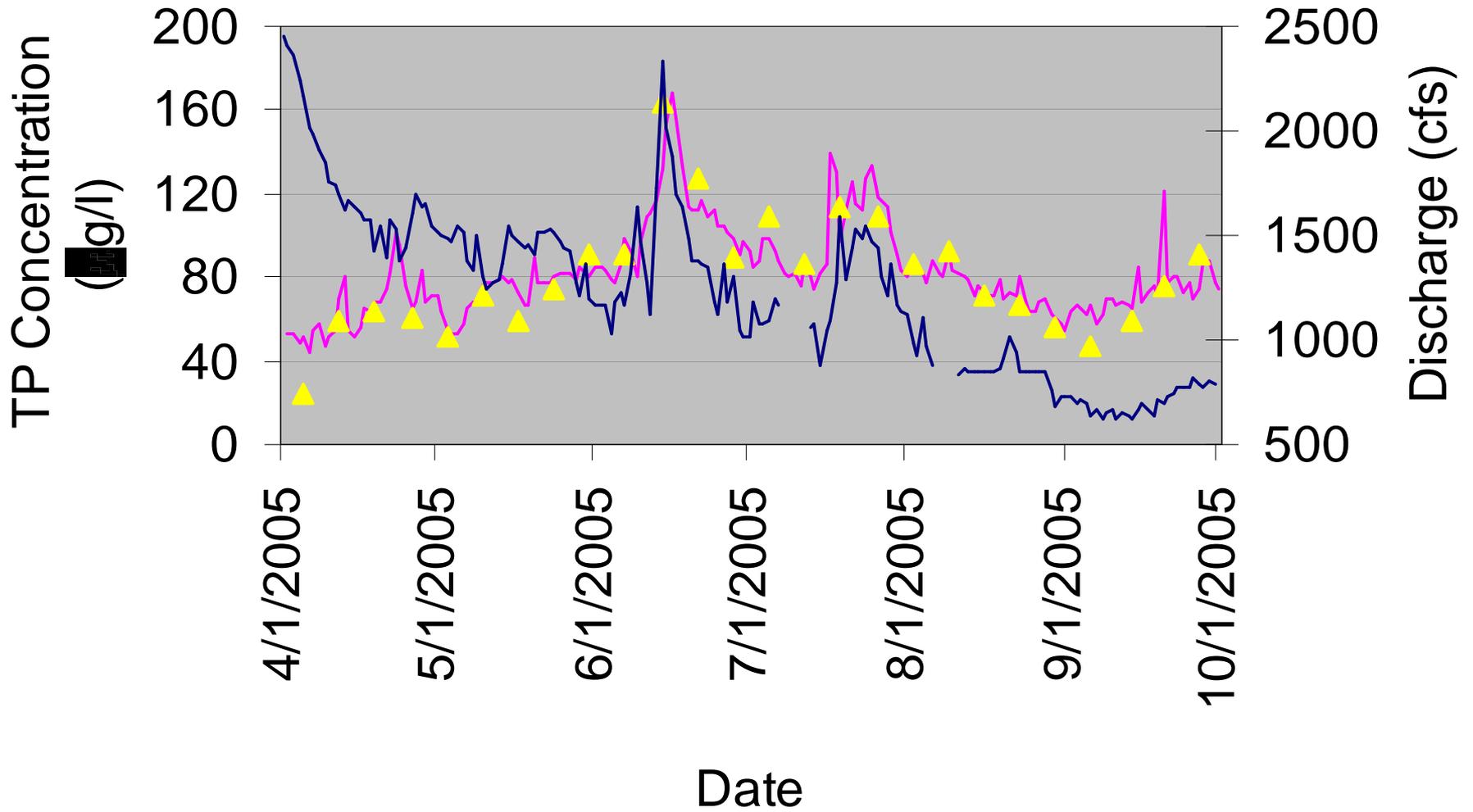
Lake Allegan/Kalamazoo River phosphorus TMDL watershed



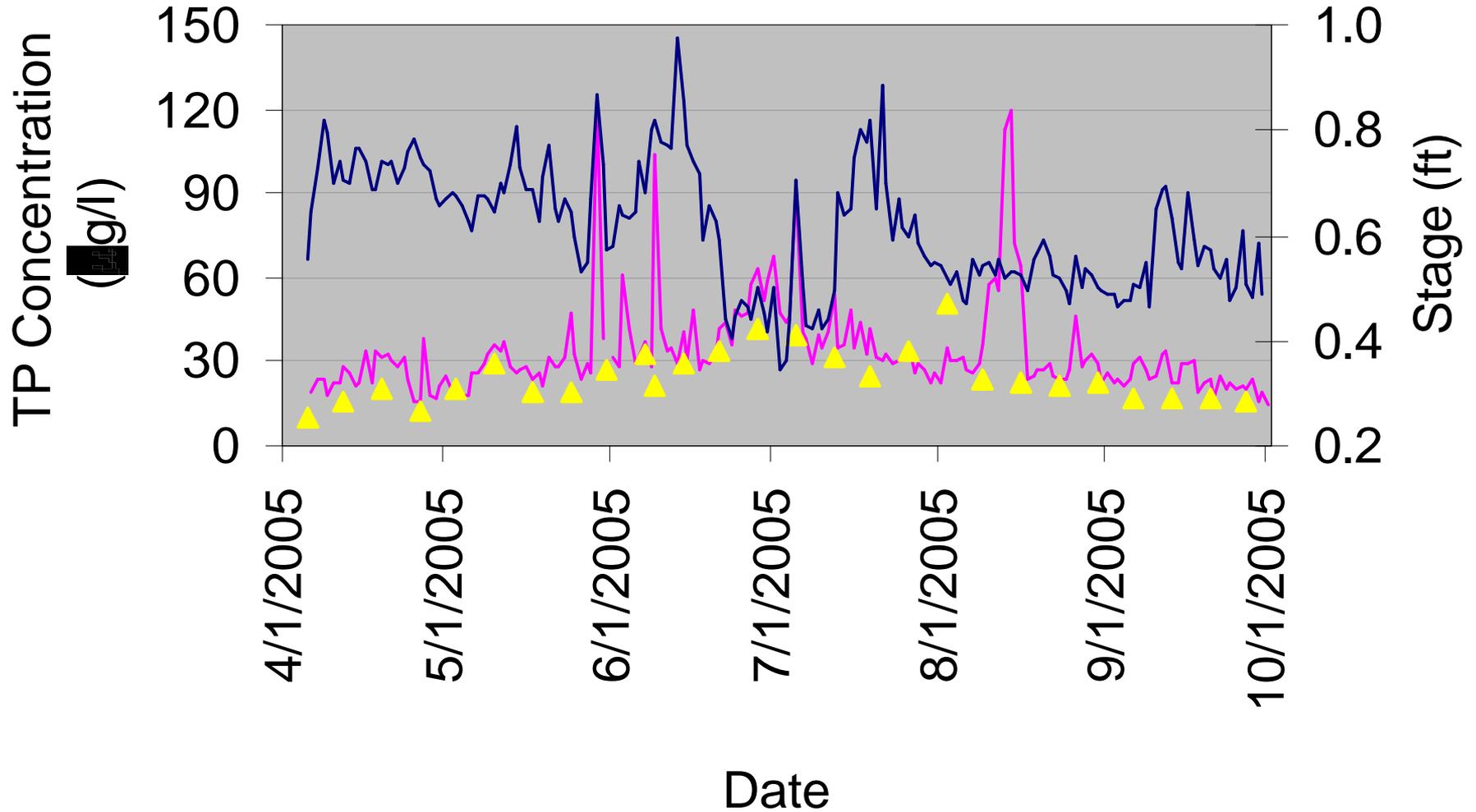
Lake Allegan/Kalamazoo River phosphorus TMDL project

- CSREES water quality project goals
 1. Characterize the fate and transport of phosphorus in the watershed
 2. Results inform volunteer phosphorus monitoring effort
 - Things to consider:
 - Sampling frequency
 - Sampling locations
 - Sampling method
 - Volunteer training

Kalamazoo River at M222

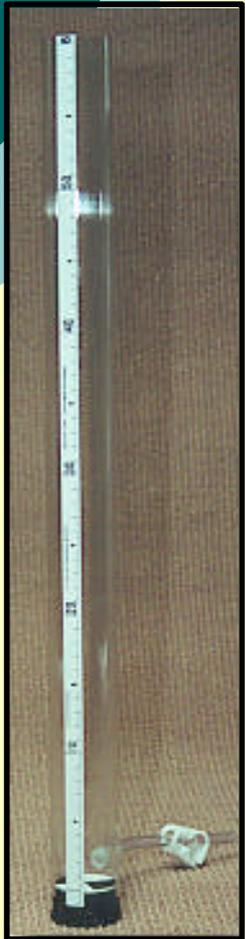


Eagle Lake Tributary

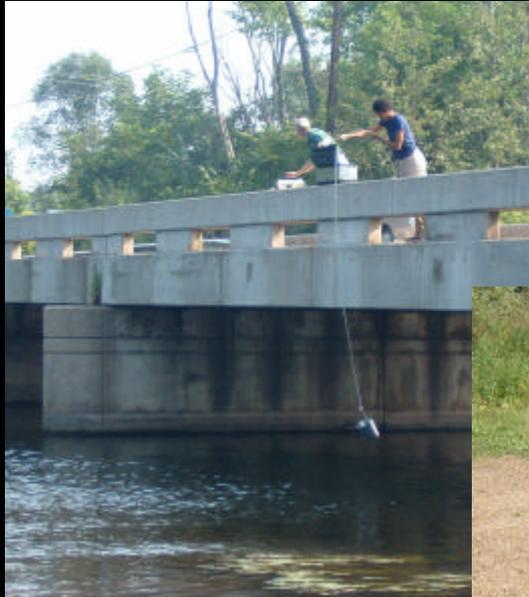


Transparency tube readings as surrogate for other parameters?

- Ohio and California– turbidity and total suspended solids
 - *Anderson, P. and R. D. Davic. Lake and Reservoir Management 20(2)*
 - *Dahlgren, R., Van Nieuwenhuyse, E., and Litton, G. California Agriculture 58(3)*
- Could transparency tubes estimate total phosphorus?
 - Improve sustainability of TMDL volunteer monitoring effort (low cost, low maintenance)

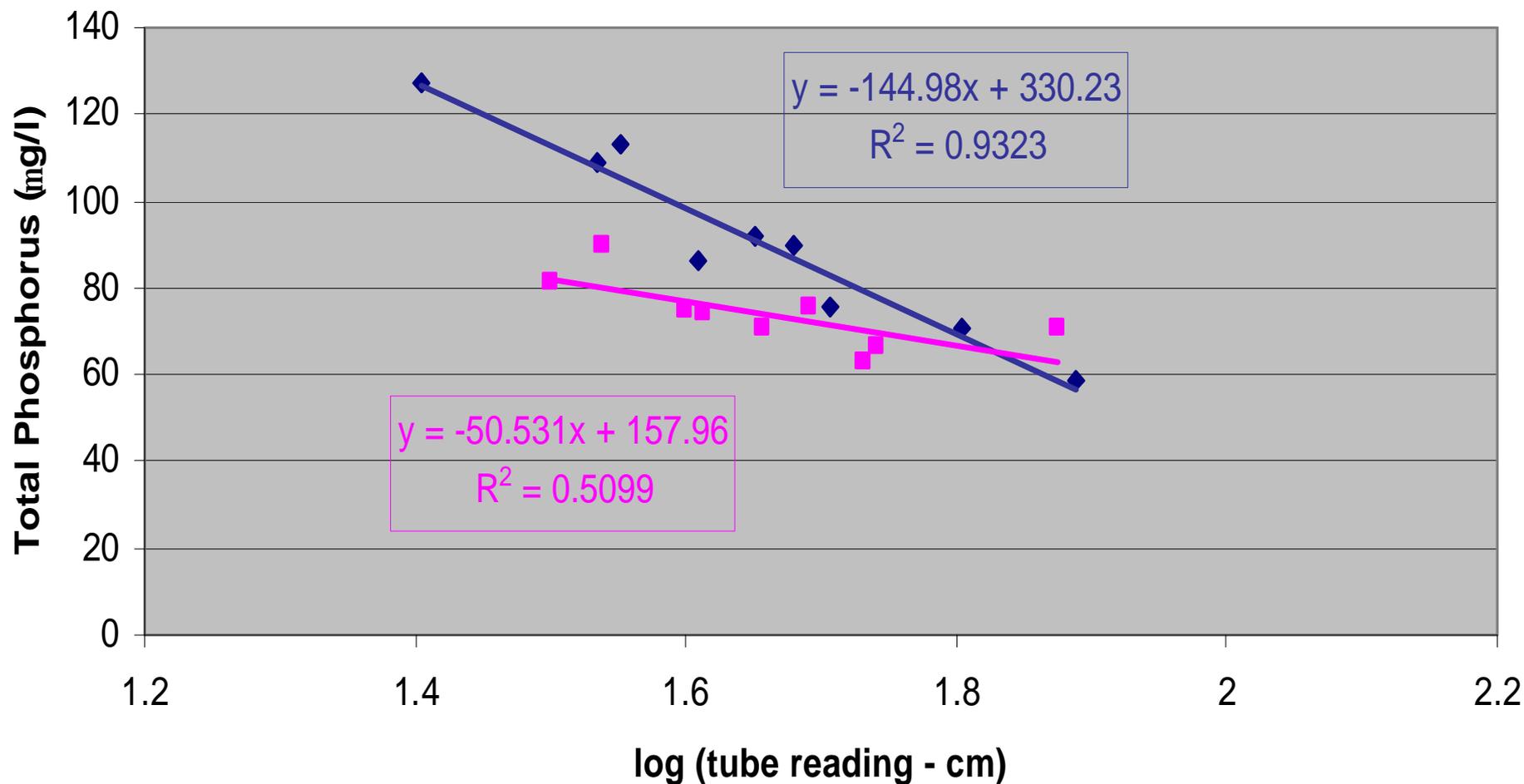


Exploring the possibility Summer 2005

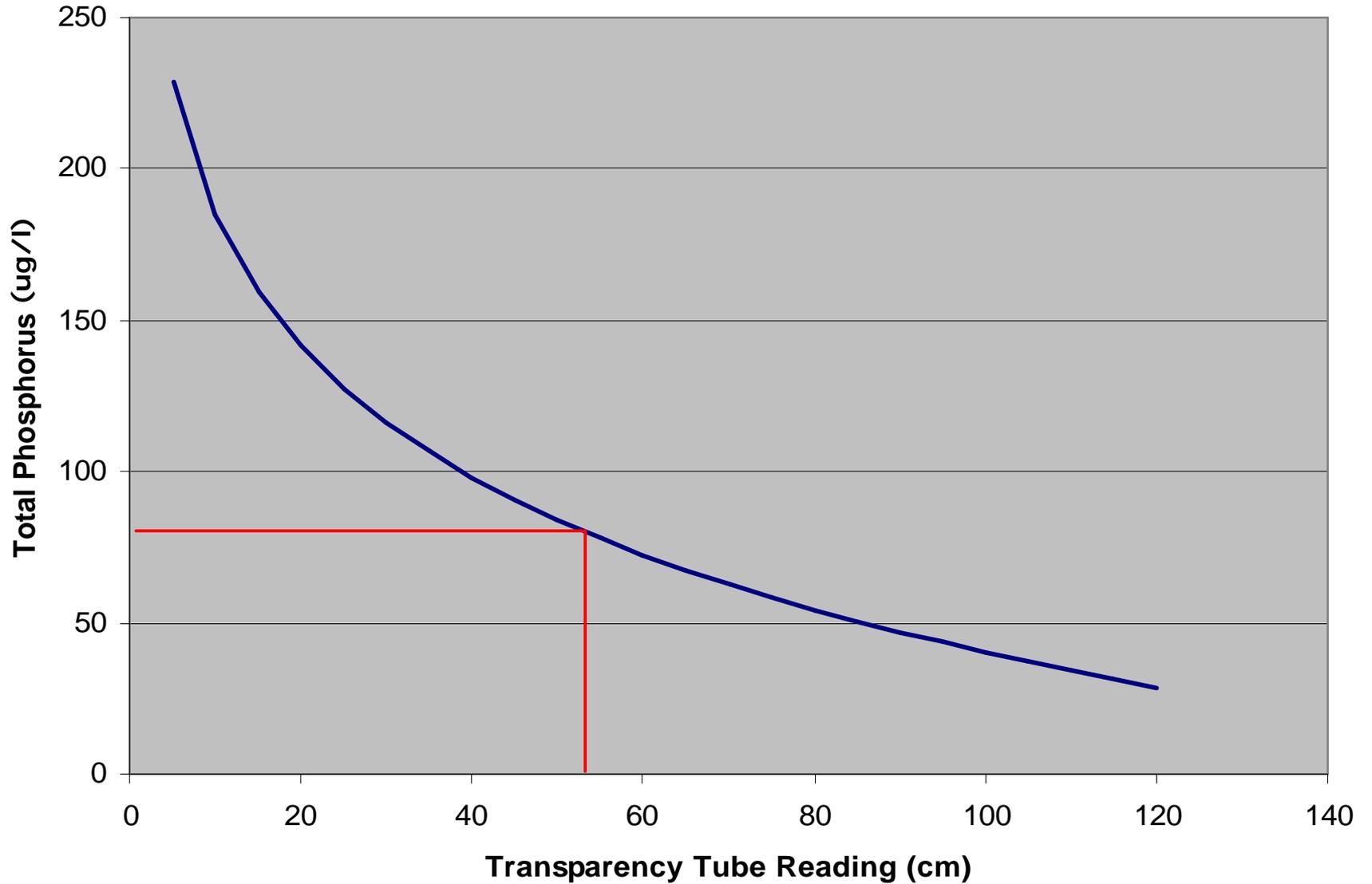


Reference "end point"
as it comes into view.

Kalamazoo River



Transparency Tube Reading Versus Total Phosphorus Kalamazoo River Inlet to Lake Allegan



Training volunteers to use transparency tubes, Fall 2005

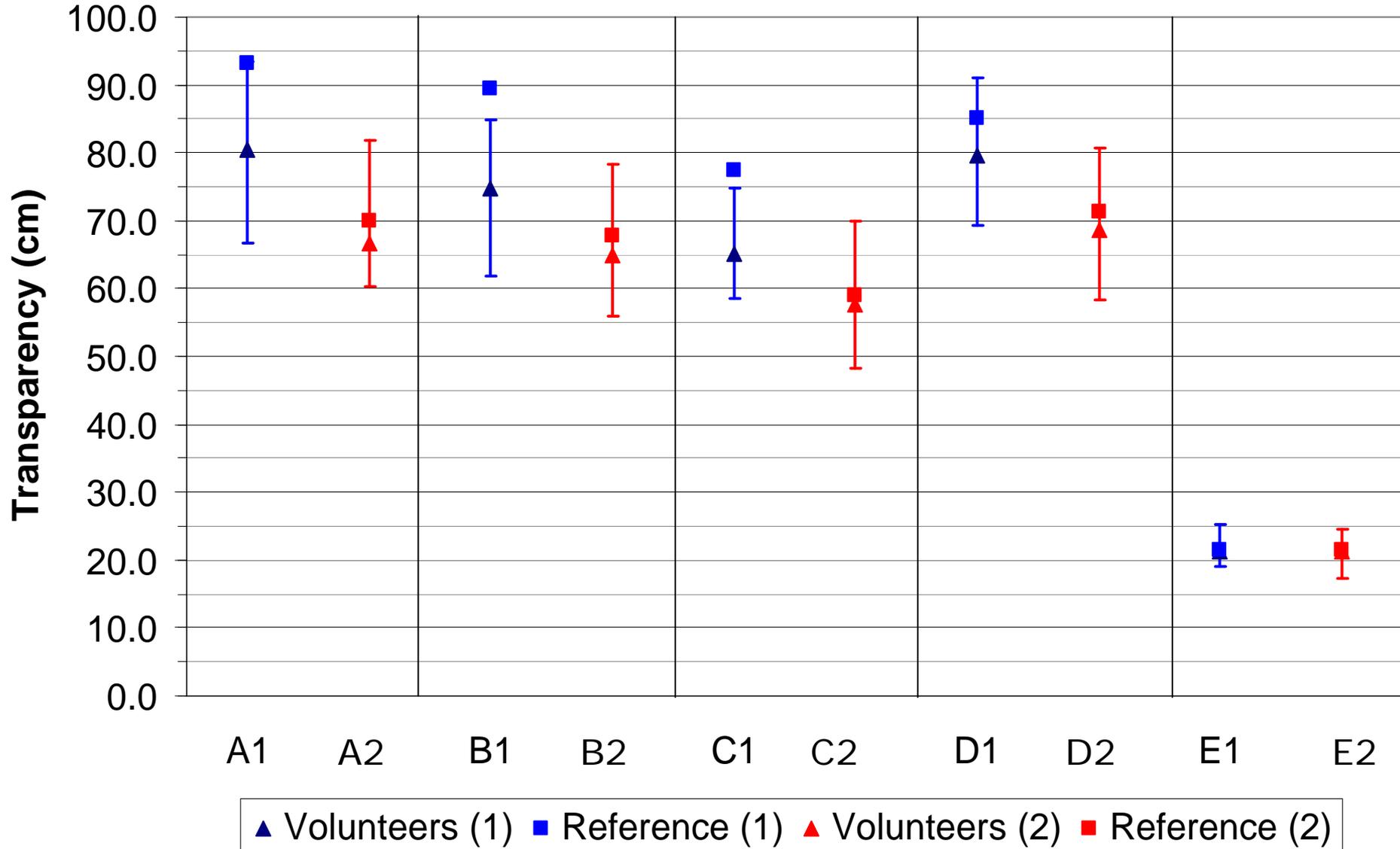


Training "end point"
as it comes into view.

Transparency tube training results

Fall 2005 (n = 9)

Acceptable margin for our study: 5cm = 3 $\mu\text{g/l}$ TP





What we've learned so far

- Transparency tubes can estimate total phosphorus at certain locations in the Kalamazoo River watershed
 - May improve sustainability of TMDL volunteer monitoring effort (low cost, low maintenance)

What we've learned so far

- Training volunteers to use transparency tubes is relatively easy

Future trainings:

- Flag each individual's first readings
- Allow time to do additional training with individuals
- Schedule periodic skill testing and updates

What we've learned so far

- Volunteer monitoring using transparency tubes only works at certain locations:
 - Strong relationship between TP & transparency
 - Lower transparency waters
 - Slower response to precipitation events
- For our study: 9 out of 13 locations
 - Relationship is unique at each location



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- CSREES Water Quality Program
- MSU Extension Water Quality Area of Expertise Team

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