Russian River Early Warning Project

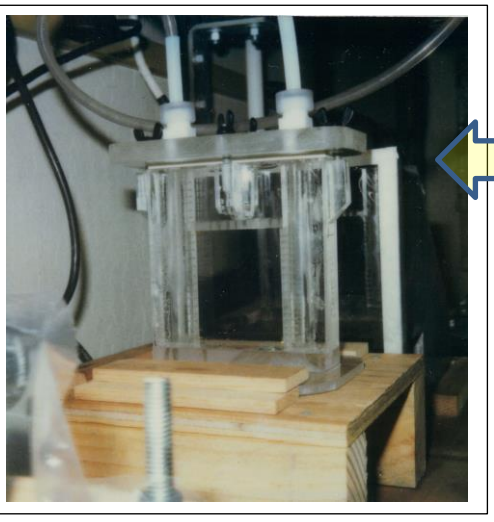
Motion Analysis Element

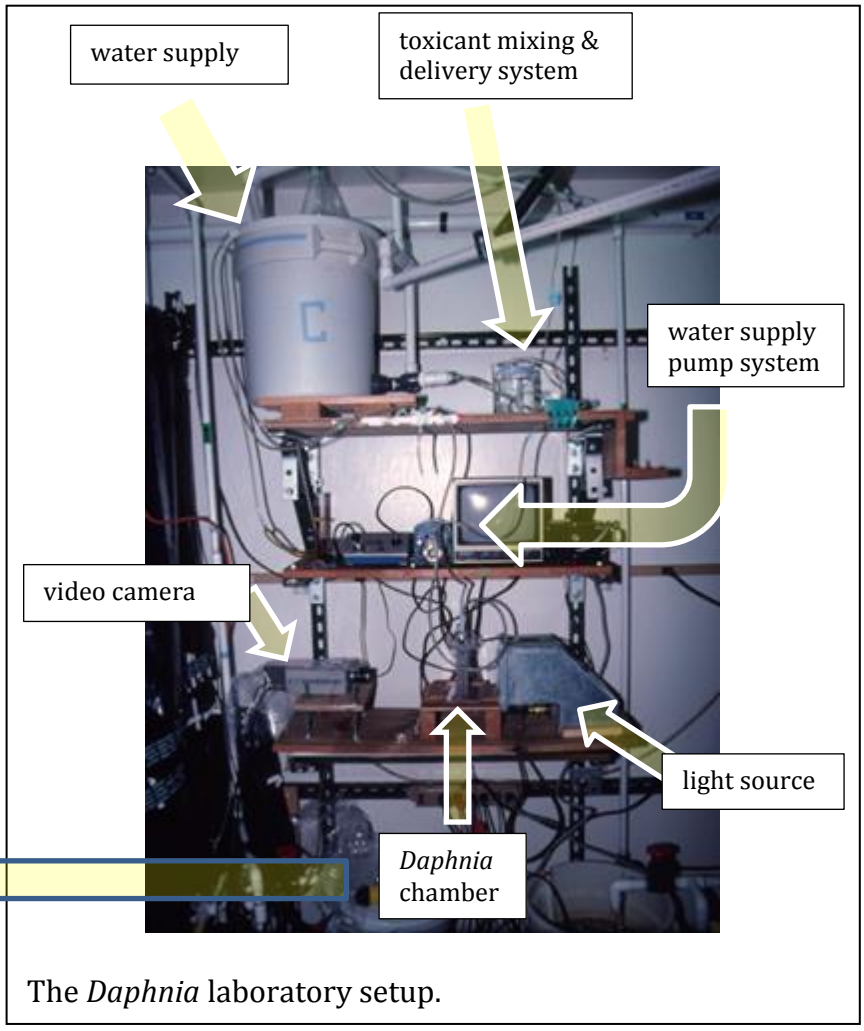
One element of the project was testing the use of water fleas (*Daphnia spp.*) and fathead minnows (*Pimephales promelas*) as real-time indicators of the presence of toxic materials. The basic approach used a motion analysis system to analyze the changes in motility of the subject species when differing levels of toxicants were introduced into a chamber. The chambers were monitored by video cameras that input to the motion analysis system. Changes in direction on an X-Y axis, linear speed, and angular speed were analyzed by the system.

Laboratory experiments formed the basis for actual deployment at an "alpha site" on the Russian River at the Sonoma County Water Agency's dam downstream of Wohler Bridge.

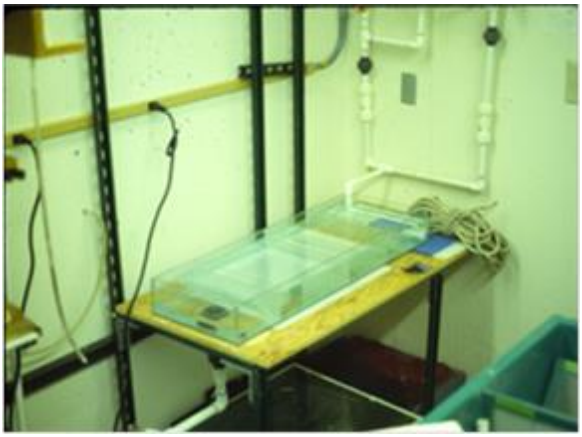
Photos of the laboratory and alpha-site setup follow:

Laboratory control room with video, computer, and data storage. The tests could be run in an adjacent undisturbed room with observation and data collection in the control room.





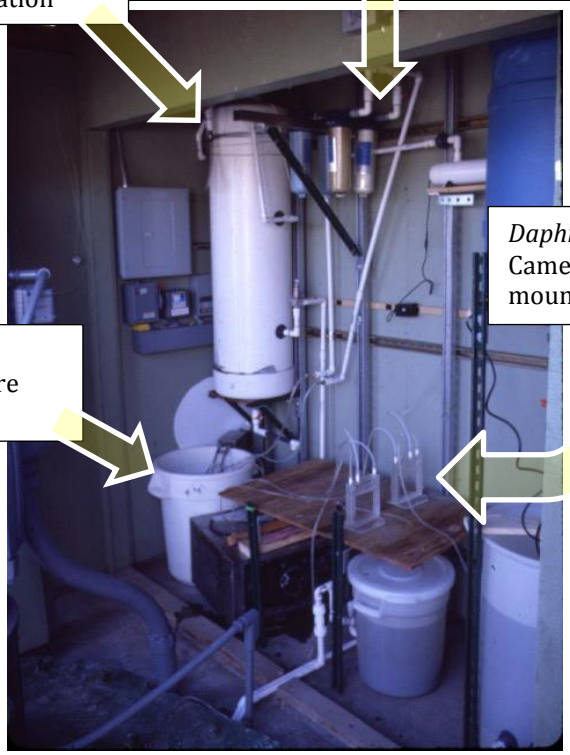
The *Daphnia* laboratory setup.



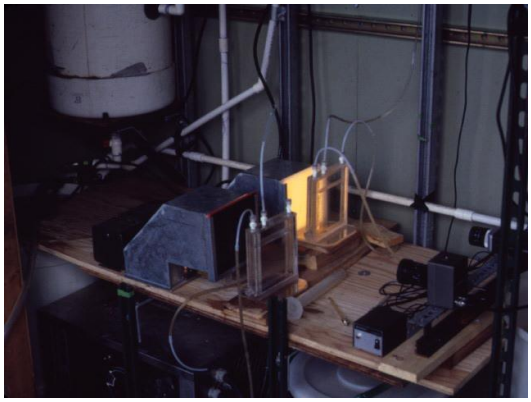
Flow-through laboratory fish observation chamber. I video camera was mounted above the center chamber

Once testing of the basic set up was completed, a system was constructed atop one of the water supply collectors at the Sonoma County Water Agency's Wohler Dam for further testing in a field system. Toxicant testing continued in the laboratory, but not at this "alpha site."

The early warning system "alpha site" at the Wohler Dam Ranney collector. River water was pumped from below the dam to the right of the photo.



Alpha site system on the Ranney collector. This observation room was insulated and separated from the computer control room to avoid disturbance to the organisms.



Alpha site *Daphnia* chambers with lights and cameras installed.

Robert Klamt, April 20, 2016