Study Plan
Four creeks were selected: Two urban (UB) dominated creeks in Sacramento County, CA; and two agriculture (AG) dominated creeks in San Joaquin County, CA. Monitoring was conducted fall 2002 through spring 2004.

• Physical habitat assessments were completed for each reach, along with the collection and analysis of water, sediment and benthic macroinvertebrates (BMI). Water samples were analyzed for selected organophosphates, pyrethroids, and triazines, and sediment samples were analyzed for pyrethroids. BMIs were summarized into biological metrics.

• Physical habitat assessments and BMI sampling followed DPR SOP #FSWA010.00, Instructions for Sampling Benthic Macroinvertebrates in Wadable Waters Using the Multi-Habitat Method (modified U.S. EPA method) during year one, and DPR SOP #FSWA015.00, Instructions for sampling benthic macroinvertebrates in wadable waters using the Modified U.S. EPA EMAP method during year two.

• Multivariate analysis of biological metrics indicated no significant difference in sampling methods (p=0.281).

Results
Water quality parameters:
Temperature: Similar in both UB and AG sites, and within normal ranges (<35°C) for BMIs over the two-year period. Temperature fluctuations beyond normal levels can have an effect on growth, fecundity, hatching success and adult emergence (premature or delayed).

Turbidity: Levels dropped below normal ranges 13% and 7% of the time for UB and AG sites respectively, though never dropping below 5.5 NTU (normal turbidity unit).

Exceeded 500 μg/l at 6% and 19% of the time at AG and UB sites, respectively. Recent studies indicate that SpC could be an important parameter affecting the composition of macroinvertebrate communities.

Physical habitat scores: Physical habitat scores ranged from 37-124, with the highest score found at one agricultural creek. There was no significant difference between the two types of sites (t-test, P=0.29).

Pesticide detections: Pyrethroids were only detected in the urban creeks and consisted of three detections of bifenthrin in water (trace to 27.5 ppt) and one trace detection of permethrin in sediment. Pyrethroids were only detected in the urban creeks and consisted of three detections of bifenthrin in water (trace to 27.5 ppt) and one trace detection of permethrin in sediment.

Benthic Macroinvertebrates: BMIs were summarized into biological metrics. The high number of BMIs in the chironomidae family found at all sites, relative to baetidae and hydropsychidae families, are indicative of a stressed environment.

Conclusion
Both creeks appear to have stressed environments:
• Urban creeks have higher tolerance values than agricultural creeks indicating more pollution tolerant individuals. (Tolerance Values represent BMI community tolerance to organic pollution, and were obtained from CA Dept. of Fish & Game, CAMLnet, 2003.)

• The high number of BMIs in the chironomidae family found at all sites, relative to baetidae and hydropsychidae families, are indicative of a stressed environment.

• The imbalance of functional feeding groups found at all sites also reflects a stressed environment.

References: