



Morro Bay Volunteer Monitoring Program

Macroinvertebrate Monitoring Update

Fall 2005

Background

The Morro Bay Volunteer Monitoring Program (VMP) collects macroinvertebrate samples each spring from several local creeks. 'Macroinvertebrates' include young lifestages of many aquatic insects such as mayflies, stoneflies and dragonflies, as well as mollusks, leeches, snails and worms. The survival of these freshwater invertebrates is directly influenced by long term water quality conditions in the creek, thus making them ideal indicators of water quality. For example, if only pollution-tolerant macroinvertebrates are found in a sample, it is likely that water quality conditions are poor. If a wide variety of families are found in the sample, including species sensitive to pollution, then water quality conditions are likely better.

Program volunteers collect samples during the early spring, before aquatic insects have reached the adult lifestage and left the creek bed. In the creek, samples are selected from riffles rather than pools due to their shallow depth and diverse substrate, which make them the most productive habitat for macroinvertebrates. A net is set in the water just

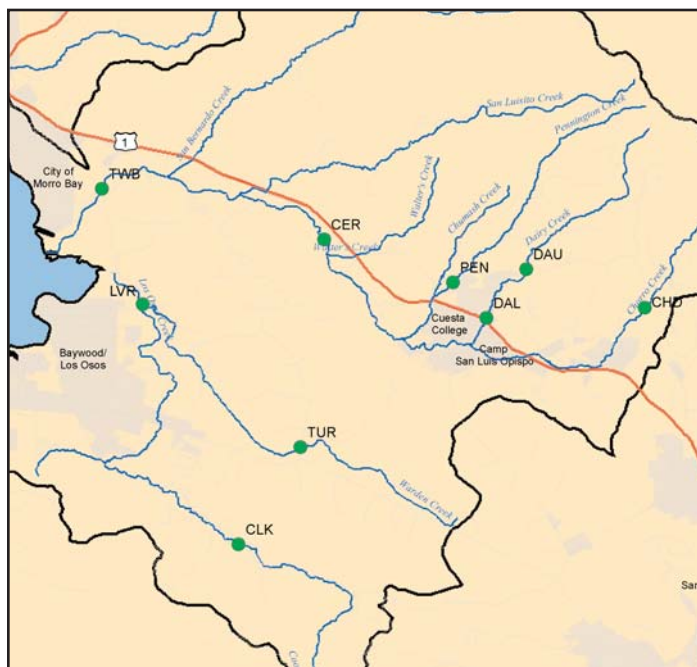
downstream from the riffle and the rocks and gravel are stirred and scrubbed to detach larvae from rocks. The invertebrates float down into the net, and the sample is filtered through a sieve where large debris is removed. Once all the large debris is removed, the samples are stored with preservative and delivered to the lab. The samples are collected in accordance with California Department of Fish and Game protocols and analyzed by their Aquatic Bioassessment Laboratory.

The laboratory sorts, counts and identifies the different types of macroinvertebrates in each sample and returns a spreadsheet of results. One calculation frequently used in comparing the 'health' of each stream sample is the EPT index. EPT stands for the Ephemeroptera, Plecoptera and Trichoptera families of insect. These families include some of the most sensitive species of macroinvertebrates --- mayflies, stoneflies and caddisflies. By calculating and comparing the presence and abundance of larvae from these families, the quality of the creek and its ability to support sensitive species is determined.

Monitoring Sites

There are nine sites designated for macroinvertebrate monitoring throughout the watershed. Due to the high cost of sample analysis, they are not all monitored each year. An unimpacted control site (Coon Creek, Montana De Oro State Park) is monitored each year to provide reference for the highest possible EPT Index for the local area.

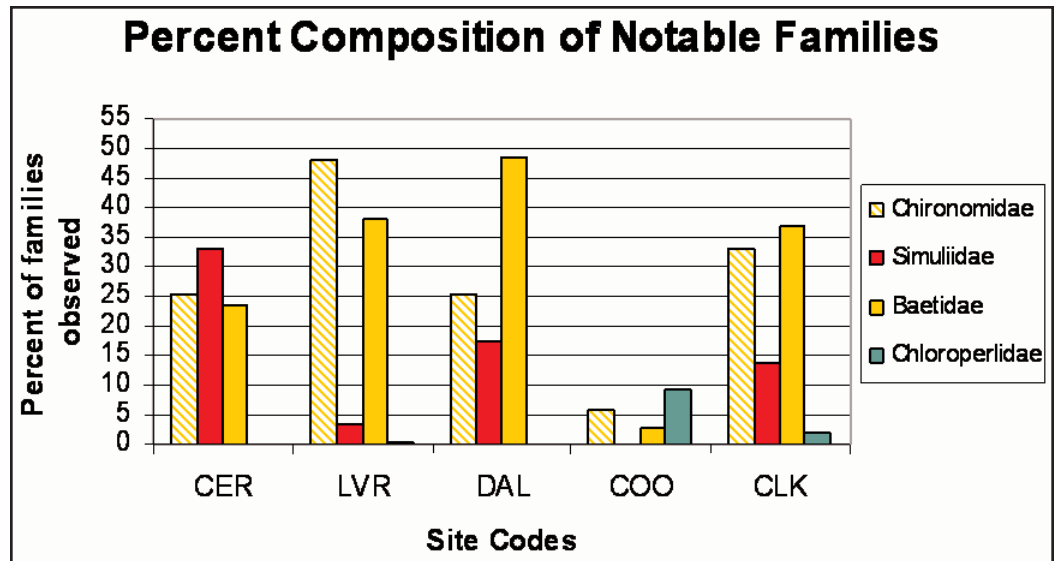
The sites are: Coon Creek (not shown on the map), Chorro Creek below Chorro Dam (CHD), Chorro Creek at Chorro Ecological Reserve (CER), Chorro Creek at Twin Bridges (TWB), Los Osos Creek at Los Osos Valley Rd. (LVR), Los Osos Creek in Clark Valley (CLK), Warden Creek on Turri Rd. (TUR), Pennington Creek (PEN), and Dairy Creek lower (DAL).



What do the bugs tell us about water quality?

This plot shows the results of some of the families found in the 2005 samples.

Chloroperlidae (stonflies), shown on the graph in green, require swift, clean and cool waters and are only found in unimpacted streams. These were present at COO and CLK. Both are considered control sites because they are located in areas less impacted by humans.



Chironomidae (shown in the yellow pattern on the graph) is a diverse family, ranging from very sensitive to very tolerant. When their larvae make up the majority of the community, they indicate poor environmental health caused by some form of pollution. This is the case at CER, LVR and CLK.

They were present in large numbers at all sites except for COO.

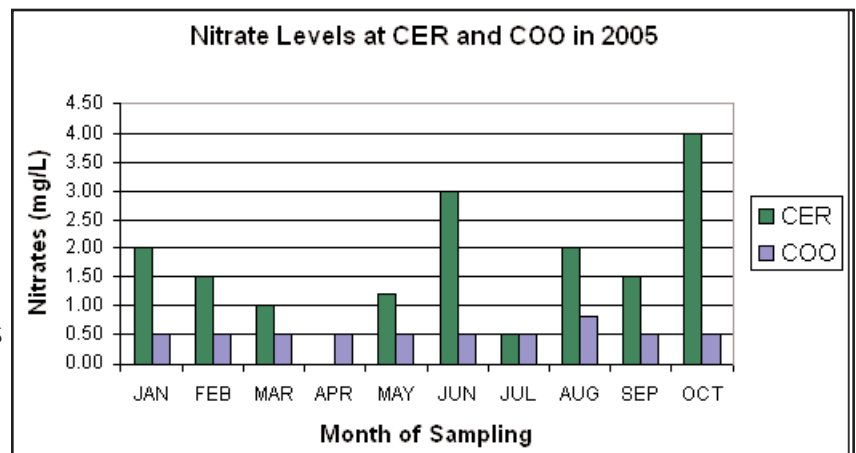
Simuliidae (black flies) are shown in the graph in red. They make up a majority of the population when excess nutrients are present. This is the case particularly at CER.

Baetidae (small minnow mayflies) typically represent degraded waters with high nutrient loads and excessive

Comparing bug data and water quality data

The graph shows nitrate levels at Chorro Ecological Reserve (CER) and Coon Creek (COO). Throughout the year, nitrates are elevated at CER as compared to COO. The bugs found at the site reflect the water quality detected throughout the year.

The graph above shows the different bug families identified at each site. Simuliidae, shown in red, is present when nutrient levels are elevated. They were identified at CER and none were found at COO.



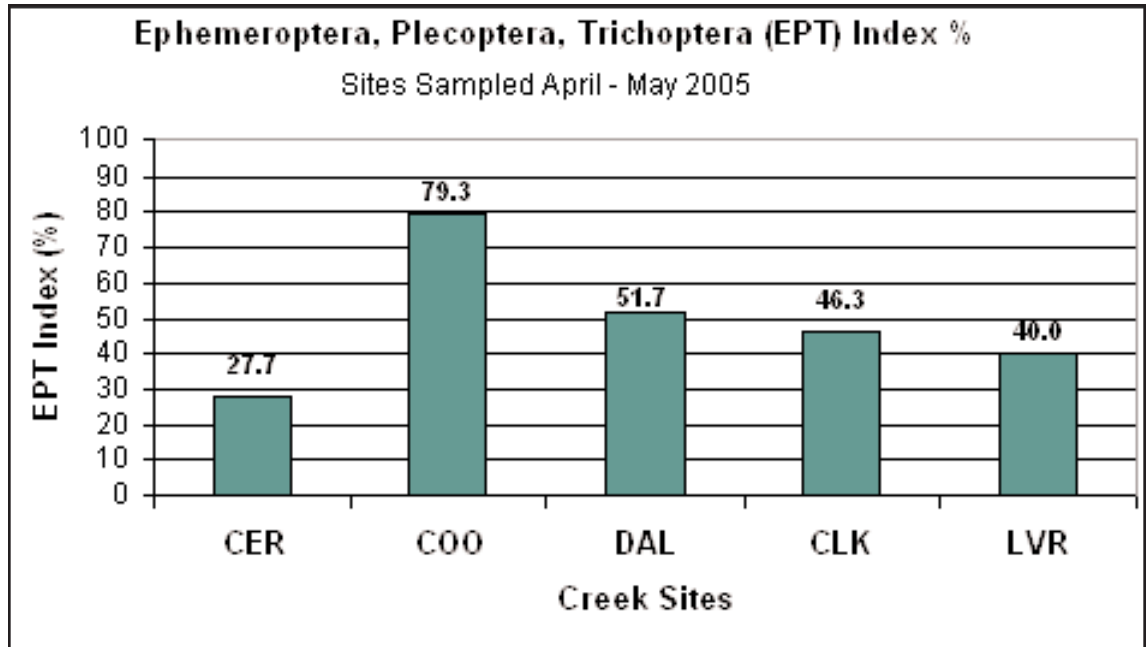
Chironomidae, shown in a yellow pattern, are elevated at CER and almost none were identified at COO. Again, they indicate poor environmental health due to pollution.

Baetidae, shown on the graph in yellow, are typically present when nutrient levels are high. Again, the counts at CER were high, while nearly none were detected at COO.

Overall, in this comparison of sites representing two extremes, the bug data tracks really well with the water quality data. At a site with poor water quality throughout the year (CER), primarily tolerant bugs were found. At a site with good water quality (COO), primarily sensitive bugs were found.

Bug Data at a Glance...

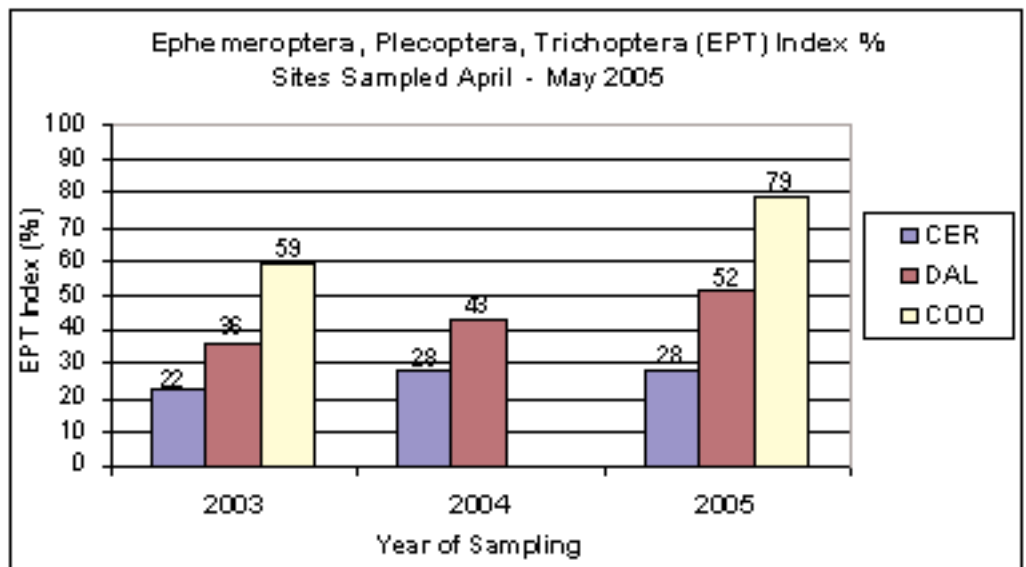
The first graph shows the EPT Index % scores for the sites monitored in the spring of 2005. The control site COO, yielded the highest score with a high diversity of pollution sensitive species. The EPT Index % at CER was significantly lower than all other sites due to the low number of sensitive species and high number of pollution tolerant families.



The LVR site is typically dry during most years and was monitored for the first time due to heavy rains in the 2004-2005 season. High flow volumes allowed the site to sustain riffle habitat for macroinvertebrates, although due to the

short time period of these high flows fewer insects were found in the samples from this site.

The second graph shows trends in EPT Index % scores over three years of sampling at selected sites. The control site COO is consistently higher than other sites throughout the watershed, thus confirming its use as a control. Results from DAL (Dairy Creek) indicate improvements in EPT Index over three years, which indicates water quality and habitat improvements. The consistently low results from CER provide important baseline data for the effects of restoration projects throughout the Chorro Creek watershed.



A big thanks to our bug volunteers!

Thanks to our volunteers for macroinvertebrate sample collection this year: Annie Gillespie, Marc Couacaud and Mike Lacey. It takes some bushwhacking and some splashing around in the creeks, so we appreciate the effort. If you're interested in getting out on the creeks next spring, let us know. We are planning a workshop for the spring to let volunteers know how to collect the data and what it means. Hope you'll join us.

