Bay Area Macroinvertebrate Bioassessment Information Network (BAMBI)

3rd Annual Meeting

Date/Time: January 29, 2004, 9:15 AM - 4 PM

Place: 1515 Clay St., Room 10 2nd Floor, Oakland

Who Attended: See attached roster list.

1.   Welcome and Introductions
Arleen Feng welcomed attendees and briefly discussed the agenda.

BAMBI Participant Activities

2.   Summary of Bay Area Agenciesí Bioassessment Efforts
Chris Sommers, Contra Costa Clean Water Program, San Mateo Stormwater Pollution
Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program
Chris provided a brief overview of bioassessment activities conducted by these stormwater
management programs. Chris indicated that each Program has conducted bioassessments for at
least the last two years, and plan to continue sampling in future years. All programs are
interested in continued coordination of bioassessment efforts through BAMBI.

Arleen Feng, Alameda Countywide Clean Water Program
A grant proposal was developed for Proposition 13   to   coordinate data management and
supplement existing datasets for development of a Bay Area Index of Biotic Integrity (IBI).
Other efforts include coordination of Bay Area stormwater management program bioassessment
efforts with Regional Water Quality Control Boardís macroinvertebrate data.   Trying to get
monitoring in at proposed or planned restoration sites before channel modification plans go
underway.

Steve Moore, Regional Water Quality Control Board
SWAMP- Surface Water Ambient Monitoring Program augmented its original funding in 2001,
primarily to incorporate bioassessment protocols and sample 79 sites in Year 1.   Goal is to have
an even distribution of sites to include impacted urban and rural areas. Last year, budget was cut
by 90%.   State law surcharge has restored lost budget, but wonít be available until July 2004 and
therefore poses a problem with spring sampling window. To cover the whole region SWAMP
projects a 20-year plan.
Interested in using bioassessment/biocriteria in their water quality standards program.
Biocriteria may tie into TMDLs via RWQCBís mandated   water quality assessments that
produce 303(d) impaired waterbody listings every 2 years.   Eventually attainment strategies will
be developed based on these assessment findings.

Matt Cover, Regional Water Quality Control Board and UC Berkeley

Wildcat and San Leandro Creeks were sampled for 4 years in a special RWQCB project by Andree Breaux.   Another year of sampling being sponsored by UC Berkeley professor (Vincent Resh). Aim is to complete a 5-year monitoring dataset.

Emma Brown, Friends of Sausal Creek
Volunteer coordinator for Sausal Creek in Diamond Park in Oakland.   Activities include monitoring water quality, macroinvertebrates (catch & release), bird counts, garden group doing invasive plant species eradication.   Channel restoration project was done 2 years ago.   Group currently samples invertebrates monthly. She finds that the higher frequency of sampling maintains community involvement and interest.

Changes to CSBP

3.   Recent Changes to the California Stream Bioassessment Procedure (CSBP) ñ Jim Harrington California Department of Fish and Game Aquatic Bioassessment Lab (ABL)
In 1993, the pilot CSBP was developed, and in 1994 a technical advisory committee was formed to review protocol.   In 1996 modifications from the Advisory committee were incorporated. From 1996 to 2003, individuals using the protocol inquired about sampling in special circumstances where the protocol didnít seem to apply. Additionally, to enable the CSBP to be calibrated with other sampling protocols (e.g., EPAís 1999 Rapid Bioassessment Procedure and RIVPACS), the following five changes/additions were incorporated into the CSBP in the December 2003 revision:
Reach Definition: because pool- riffle ratios vary, instead of 5 pool riffle sequences, a fixed distance of 100 meters is used to define sampling reach.
Sampling Area - Adjustment from 2 sq. ft sample area to 1 sq. ft sample area, with a recommendation to error on the larger side of that area size.
Composite Option ñ It is now an option to composite 3 riffle samples and identify 500 organisms, rather than identifying 300 organisms from each of the 3 riffle samples.   Monte Carlo analysis of raw taxonomic data can convert the discrepancy between a 500 and 900 count sampling.   This technique may also be used to merge datasets for IBI blending for Southern and Northern California, likely to be happening in the future.
Field Duplicates - At 10% of sites, duplicate sampling will be required for projects with more than 20 sites.   This is consistent with requirements by EPA and the SWAMP QAPP.
Alternative Protocols - Guidance given on sampling procedures for high and low gradient streams, ephemeral channels, no-flow technique (traveling kick), bifurcaded channels, spot sampling and conditions below dams.

Technical Session- Bay Area Bioassessment Studies

4.   Bioassessment as a Tool to Predict Urban Condition- Alison Purcell- PhD Candidate, University of California at Berkeley
Project conducted with Vince Reshís lab at UC Berkeley, funded in part by the Water Environment Research Foundation. Allison is working with Jim Carter and Paul Randall to compile existing data. Objectives of the study are to identify appropriate methods for determining reference conditions for urban streams and use biological data to evaluate potential

predictive relationships between urban disturbance gradients and biological condition to determine stream improvement strategies and recovery potential. This project is in its first year.

The overall WERF project will compare three different ecoregions using 3 teams: Mid-West (Ed Rankin, Chris Yoder, Les Stumpe), Mid-Atlantic (Tetra Tech: Mike Barbour, James Stribling, Dave Bressler, Erik Leppo) and Mediterranean- Santa Clara Basin (Resh lab, Jim Carter-USGS, Paul Randall, Faith Kearns-UCB). Study sites: Patapsco River Watershed in Maryland, Cuyahoga Watershed in Ohio, Coyote Creek Watershed, Santa Clara Basin. Santa Clara Basin data include: GIS, physical habitat, hydrology, chemical and biological (previously published BMI data available from Jim Carter). There will be a pilot study in the Mid-Atlantic region on GIS data collection protocol.

5. Temporal Variability in BMI Metrics in Sites Above and Below Dams-Paul Weissich, MS Candidate, California State University at Hayward
The goals of the study were to evaluate short-term temporal changes in BMI assemblages and between flow-controlled and uncontrolled sites.
Sites in Santa Clara Basin were selected based on altitude; three upstream (Stevens Creek, Los Gatos Creek, and Guadalupe River) and three downstream (Peters Creek, Saratoga Creek, and Bodfish Creek) of dams. Sampling occurred Feb 2002- Feb 2003 with one sampling event every 2 weeks. Five instream locations were sampled at each site and composited into a single sample. A 100-count sub-sample was then identified.

Selected metrics included total BMI abundance, EPT richness, percent EPT, ratio of Baetidae to total Ephemeroptera, ratio of Hydropsychidae to total Trichoptera, ratio of EPT to EPT plus Chironomidae, and percent Chironomidae. Genus or species level were identified when possible.

Results indicated that temporal variability was extremely high in nearly all metrics, but there was good discrimination between the above-dam and flow-controlled sites during most seasons (except spring). Additionally, no clear index period was evident.

6. Relationship between BMI Metric Scores and Suspended Sediment in Sites Above and Below Dams-Janny Choi, Undergraduate Student, University of California Berkeley
The objective of the study was to determine if the amount of fine sediment deposited on substrate was different between controlled and uncontrolled flow sites. Dams affect regulation of flow, retain coarser sediments, and limit flushing flows downstream. In the Santa Clara Basin, there is some evidence that there is a high amount of suspended sediment below dams and macroinvertebrate communities may appear stressed from this. Excess fine sediment can coat substrate, fill interstitial spaces, induce drift and block photosynthesis. The altered habitat may be favorable for some organisms (e.g., suspended FPOM and CPOM mean more food for Chironomids).

Six streams were sampled, three flow-controlled (Stevens, Guadalupe, Alamitos), three uncontrolled. Five replicates were taken per site. Metrics results include lower EPT density and richness at flow-controlled sites. Uncontrolled had higher than flow-controlled for all metrics. Streams impaired by dams have more fine sediment and fine sediment (including sand) appears

to be a negative factor affecting EPT.

Approaches to IBIs and Indicators

7.   Approach to Developing an Index of Biotic Integrity (IBI) for San Diego Watersheds) ñ Jim Harrington California Department of Fish and Game Aquatic Bioassessment Lab (ABL)
Jim provided a presentation on the development of the San Diego IBI and discussed current efforts to develop an IBI for coastal Southern California that would include San Diego to Monterey.
The San Diego IBI included 93 sites in 2002 and 238 sites in 2003. Reference conditions were developed semi quantitatively through local and watershed condition measures and GIS-based local and watershed scale land use criteria. 21 metrics were tested in 2002 and 61 in 2003 with redundancy testing. Existing data included targeted riffle and multihabitat based data.   A related study recently completed by ABL evaluated comparability of existing datasets using different protocols (e.g. EMAP, Forest Service).   General ranking of sites is very similar, so merging datasets for IBI development is feasible.   Combining data from different methods was done by adjusting the average site scores for each method to the same scale.   Metrics were screened against land use stressor variables using GIS, and a dose response gradient was developed using correlated stressor variables in order to determine the metrics with the most appropriate relationships. During multimetric analysis redundant metrics were eliminated and the final suite of metrics used to construct the IBI.

Jim noted efforts are also underway to develop IBIís for other habitats, including South coastal lagoons and large rivers (EPA).   To questions about how statewide or regional IBIís would be applied in local areas.   Jim suggested that IBI scores might be interpreted against different Tiered Aquatic Life Use (TALU) scoring thresholds for particular regions or waterbody types.

8.   Approach to Developing Reference Conditions in Urbanized Watersheds- Jim Carter and Steve Fend, Biologists, United States Geological Survey (USGS)
Steve Fend discussed the effects of macroinvertebrate life-history on metrics, based on ongoing work in the Santa Clara basin. Two study objectives contribute to being able to relate population data to environmental factors: define seasonal occurrence and collectability, and infer population information from size frequency data for individual taxa.   In streams with uncontrolled flow, Detrended Correspondence Analysis plots show regular cycles in community characteristics through the annual seasons, but in flow controlled streams the pattern is chaotic. Data from temperature loggers suggest that high diurnal ranges in uncontrolled streams may be cueing development.   Major unknowns and data needs concerning basic biology and time-dependent issues.

Jim Carter presented an approach to developing reference conditions in urbanized watersheds. Working within an urban environment introduces unusual factors that could be mitigated (e.g. flow impairment, changes in stream chemistry and riparian vegetation) whereas there are some ìimmutableî factors that cannot (reservoirs, urban development).   BMIs are inexpensive to sample, however, there is a disadvantage of too many species.   One reasoning here is that there is little historical data on their life histories.

So, how do we evaluate the limited historical data and potential reference sites in a coste-effective way?   Factor-ceiling distributions is one approach used in ecological studies. Polygonal relationships have been commonly found on regressions of prey length to predator length and body size.   Is simple linear regression ecologically realistic? Maybe--silver concentrations are a limiting factor on the health condition of clams in SF Bay;   similarly, with high sediment concentrations, there is a decrease in EPT richness.

When looking at the regression of inter-site road density vs. EPT richness in the Santa Clara data, we see a decrease in richness.   Study objective to predict that upper ceiling, using EPT richness standardized to a 300 bug random sub-sample.   Partitional regression iterates successive iterations on the residuals to define successive tiers of impairment below the ceiling. Quantile regression is another alternative; based on medians (instead of means) so outliers become less influential.   Advantages to this strategy are having a continuous gradient of urban conditions instead of creating artificial boundaries between stream classifications, and using less effort per site to sample more sites.

Future Of BAMBI- Where do we go from here?

9.   Proposed BAMBI goals, objectives, and work plan- Chris Sommers, Senior Scientist, EOA, Inc.
Chris Sommers distributed a draft proposed BAMBI 2004 Work Plan and presented the results of Management Questions Survey, which was distributed to BAMBI participants prior to the meeting. The survey results indicated that participants want BAMBI to be more than a forum for sharing of ideas and technical information related to BMI bioassessments in the Bay Area. Responses indicate that participants want BAMBI to also provide:
Technical expertise and guidance,
Data sharing and dissemination,
Promotion the use of standardized field and laboratory methodologies (i.e., CSBP),
Assistance in standardizing a protocol for citizens,
Assistance in providing citizen training,
Assistance in the development of a BMI index and/or biocriteria, and
Assistance in data management.

The BAMBI Agenda Planning Work Group considered these results and prepared a draft work plan with the following elements:

Regional Coordination;
Protocol Standardization;
Data Management; and,
Data Analysis and Assessment.

The draft work plan also lists options for addressing each element, as an initial brainstorm.

10. Discussion of Proposed BAMBI Work Plan and Coordinating Workgroup- Meeting Attendees

Chris asked for feedback and if there were other elements of interest not listed in the work plan draft. The following is a brief summary of items discussed:

The RWQCB feels that working with the presently established State effort being promoted by the California Deptartment of Fish and Game, the CSBP, would be a valuable investment; Collaboration with citizen groups and utilization of citizen collected data, including physical habitat;

Jim Carter explained that in the UK since 1984, inspectors and maintenance staff and engineers have performed data collection;

Meeting participants supported the movement towards collaboration on a regional IBI development.   A Bay Area IBI would provide a common language for assessing progress and help empower citizen groups to continue monitoring on the efficacy of restoration projects;

Need for a long-term workplan outlining tasks, roles, reasons for supporting IBI.

Funding for in-kind staff support is already coming from some stormwater programs and the RWQCB is in support of developing an IBI;

The Stevens Creek and Permanent Creek Watershed Council offered to host website space/staff support for BAMBI listserv/bulletin board/member interface;

Technical information will be available from the Interpretive Report being worked on by the RWQCB (summarizes the first 2 years of data collection for SWAMP and some stormwater programs, will explore approaches to IBI development); and,

Matt Cover, Don Arnold of SCVWD, Chris Sommers, and Arleen Feng/Tom King agreed to be part of a Technical Workgroup which will begin scoping the development of a Bay Area IBI;

11. BAMBI Next Steps and Wrap-up

EOA will produce a meeting summary and attendees list.

Paul Randall will contact the presenters and request their corrected and final presentations.

Meeting Adjourned at 4:15 pm.