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March 28, 2008

Dear Ken,

As mentioned in our letter of 3/21/08, we are now submitting the remainder of our comments on the draft 2008 State Water Quality Report. Our additional comments relate to two parameters: fecal coliform and bioassessment. In each case, there is a spreadsheet attached with specific problems and recommendations.

- I. **Fecal coliform:** In our comments of 3/21/08, we suggested that when using the “percent-above” criterion, the reporting period should be the entire body of data going back ten years, unless there is both statistical and causal reason to suspect a trend. It’s particularly important to look back at the entire body of data when sampling only occurs quarterly at best, as is the case with the Streamkeepers program. The risk of going too far back in the data, and therefore possibly treating a non-homogeneous sample set as homogeneous, is outweighed by the risk of not going back far enough, and therefore having an inadequate sample size to make a conclusion about the state of the resource. Using this line of reasoning, we have suggested in the attached spreadsheet several water-body segments for either upgrading or adding to the list.
- II. **Bioassessment:** Our comments of 3/21/08 covered the bulk of our bioassessment comments, with the exception of listing numbers 47010, 47021, and 47025, which we will comment on now. At each of those sites, we had a single year of data with adequate sample size and B-IBI scores low enough that we and our advisors felt confident calling them Impaired. In our letter of 3/21/08, we pointed out that DOE seemed to have mistakenly and categorically barred from listing in Category 2 any of our sites with a single year of data and our recommendation of a Category 2 listing. In similar fashion, we now point out that DOE seems to have mistakenly and categorically listed as Category 2 any of our sites with a single year of data and our recommendation of a Category 5 listing. As we pointed out in our previous letter, both Mike Herold and Chad Brown of DOE have acknowledged that Streamkeepers’ bioassessment tool, the 10-metric genus-level B-IBI for the Puget Sound lowlands developed by Karr et al., has well-established reference sites and therefore does not require two years of data for listings, and furthermore, that Streamkeepers’ recommendations for interpreting the B-IBI in terms of state WQ listings (attached with the previous letter) were being accepted *in toto*. We believe that the data set is sound and that a reasonable, conservative interpretation puts the three listings mentioned above into Category 5 rather than Category 2. The attached spreadsheet provides specifics.

Having said the above, we wish to add some comments in the hopes of guiding DOE and the State toward a more effective biomonitoring program:

- A. **Our index should undergo further calibration.** The B-IBI used by Streamkeepers was developed by James Karr at the University of Washington, and it has been shown to be broadly applicable in many different parts of the world.¹ On the other hand, any interpretive tool has its limitations:

1. Karr's B-IBI was developed for small streams, and a 2004 Master's thesis from The Evergreen State College supports the notion that Karr's B-IBI doesn't apply as well to larger rivers, with a suggested threshold of 17.5 m. bankfull width.² Of the three stream sites mentioned above, we believe the Hoko to be larger than this threshold and the Pysht to be near it. The thesis proposes an alternate index incorporating 5 of Karr's 10 metrics and adding 4 new ones. The author has not had the opportunity to fully calibrate this alternate index,³ and we have not had the time to convert this provisional index to a form that will work with our data, but our preliminary investigation has not indicated that there would be a significant difference in scores between the two indices for the Hoko or Pysht sites.
2. A 2003 DOE publication found Level III Ecoregion to be the best classification criterion to distinguish biological indices, with latitude, longitude, stream order, gradient, and bankfull width possible candidates for further reference class partitioning, depending on the ecoregion.⁴ Clallam County spans two ecoregions, with the eastern part of the county in the Puget Lowlands and the western part (including all three sites mentioned above) in the Coast Range. It may be that further research needs to be done to create a separate B-IBI for each ecoregion; however, Karr's research indicates that his B-IBI metrics apply quite broadly to small streams in Pacific temperate zones, having been applied successfully in the Puget Sound area, the Olympic Peninsula, the Willamette Valley, and even Japan; and Karr's B-IBI has been tested and found to be applicable in the Coast Range ecoregion, including the Coast Range of the Olympic Peninsula.⁵

We have been diligent in trying to provide DOE with the best available science. Our opinion, supported by our program's advisors, is that sound scientific evidence supports a Category 5 listing for the three sites mentioned above. Nevertheless, we believe that the science can and should be improved, and that such an ongoing scientific effort should occur at a level broader than that of a single volunteer monitoring program of a rural county, to wit:

B. The State should provide leadership in the field of biological assessment. Our comments on the 2004 Water Quality Report made ample reference to the wisdom of biological monitoring and EPA's support of that concept. Since that time, unfortunately, DOE's program support of biological monitoring has slipped backward: the two staff members with expertise in this area have left, and their biomonitoring projects have been abandoned. Nevertheless, biomonitoring has continued to flourish across the state, carried on by a host of other parties, such as local governments and utilities, citizens' groups, and federal and tribal agencies. There is probably no state in the Union with as variegated an effort to gather biological data, yet there has been no active solicitation on the part of the State to collate these data or coordinate their investigation. We recommend that DOE assume a leadership role in the following areas:

1. **Support a database of biological sample data.** Streamkeepers has gathered data from a handful of monitoring projects across the state, much of which has not been reported to DOE, but we lack the resources to properly collate and document all of it. Meanwhile, King, Snohomish, and Pierce Counties and the City of Seattle are working on a common database for their macroinvertebrate data collected using comparable methods. An effort such as this should be fostered and funded to locate, document, and compare biological data from throughout the state. Some of the above-mentioned parties have submitted a funding proposal to DOE entitled "Stream Benthos Gap Analysis, Coordination, and Data Management" (the prospectus of which we've attached), and we heartily support full funding for their proposal.
2. **Analyze the biological data using appropriate procedures.** Using established statistical methods, develop appropriate indices to best interpret the already-existing data. With such tools, the State could quickly enhance its understanding of the ecological condition of its waters. Once the data are pooled from around the state, this analysis can be done in a more sophisticated fashion, incorporating differences in ecoregion, stream size, etc.

3. **Support the development of specific biocriteria as part of the water quality standards for the entire state.** Going forward, the State should promulgate appropriate indices or other analytical procedures for data-gathering groups to follow and apply, so that they don't have to create new tools from scratch. Thresholds for impairment need to be defined state-wide so that biological condition can be reported in a uniform manner for 303(d) listing. The region also needs to conform with EPA's recommendations for developing Tiered Aquatic Life Uses for surface waters.
4. **Provide program support to monitoring groups wishing to adopt State-sanctioned protocols and criteria.** It is admirable that DOE is a signatory to the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) document recommending standard protocols for the collection and analysis of benthic macroinvertebrate samples in the wadeable streams of the Pacific Northwest.⁶ However, groups such as ours have used slightly different protocols, and we will need help making the transition to these new ones, for example:
 - a. **Perform studies to compare data gathered by different protocols.** Apparently side-by-side data was collected by DOE in 1997 using both the Karr and PNAMP protocols, but these data have not been analyzed to enable comparison of data gathered under the two protocols.⁷
 - b. **Provide funding and technical support for re-tooling.** In order to apply the PNAMP protocol, we will have to re-establish our monitoring reaches, re-train our volunteers, re-train our local taxonomist to perform ID's to lowest-possible-level, and probably reconfigure our metrics to apply the DOE/Wiseman B-IBI (see end-note 3).
 - c. **Support regional meetings to coordinate efforts.** Numerous jurisdictions already collect biological samples from streams, and statewide protocols and biocriteria would greatly accelerate this effort. Because such efforts need to be highly collaborative across many agencies, regional meetings are needed to train new people, compare notes on field work, coordinate how and where sampling takes place, and explore emerging issues in the field of biological assessment.

Obviously, the above efforts would require additional funding for DOE. Hopefully such funding could be obtained from one of the entities with an intense interest in moving forward on biological assessment, e.g., EPA or the Puget Sound Partnership. We would certainly support such funding and believe that many other parties would as well.

We appreciate this opportunity to comment further on your draft report and look forward to further dialogue.

Sincerely,

Ed Chadd, Streamkeepers program manager

¹ The following three publications describe the rationale, development, and application of Karr's B-IBI:

Karr, J. R. 1998. Rivers as sentinels: Using the biology of rivers to guide landscape management. Pages 502-528 in R. J. Naiman and R. E. Bilby, eds. *River Ecology and Management: Lessons from the Pacific Coastal Ecosystems*. Springer, NY.

Karr, J. R., and E. W. Chu. 2000. Sustaining living rivers. *Hydrobiologia* 422/423: 1-14.

Morley, S. A., and J. R. Karr. 2002. Assessing and restoring the health of urban streams in the Puget Sound Basin. *Conservation Biology* 16: 1498-1509.

² Celedonia, M.T., 2004. Development and evaluation of a benthic index of biotic integrity for Western Washington rivers. Thesis for the degree of Master of Environmental Studies, Evergreen State College, Olympia, WA. March 2004. 51 pp.

³ Celedonia, Mark T., 2008. Personal communication.

⁴ Wiseman, C.D., 2003. Multi-metric index development for biological monitoring in Washington state streams. Washington Department of Ecology, Olympia, WA. Publication No. 03-03-035.

⁵ Fore, L.S., 2000. Measuring the influence of timber harvest on stream invertebrates in Western Washington. Report prepared for Quileute Department of Natural Resources, La Push, WA. May 2000. 25 pp.

⁶ Hayslip, G., ed., 2007. Methods for the collection and analysis of benthic macroinvertebrate assemblages in wadeable streams of the Pacific Northwest. Pacific Northwest Aquatic Monitoring Partnership (PNAMP), Cook, Washington.

⁷ Plotnikoff, Robert. 2008. Personal communication.

Draft 2008 WQA SK recommendations & comments, 3/28/08

Fecal Coliform data based on 10% sample exceedance >100 for AA waters and >200 for A waters.

2 or more exceedances required for Cat 5 listing.

Listing ID (hotlink)	SK recommended listing category	Location ID (if not on 2008 draft list)	SK Site Name (WQ class)	Water Body Name	Parameter	Comments
42905	5		Ennis 0.1 (A)	ENNIS CREEK	Fecal Coliform	Submitted 26 samples 2000-06, 4 exceedances >200 = 15%. Public use, near trail & city of PA wastewater treatment plant.
42906	5		Ennis 0.7 & 1.0 (A)	ENNIS CREEK	Fecal Coliform	Submitted 17 samples 2000-06, 4 exceedances >200 = 23%. Upstream of trail
21494	5		White 0.0 & 0.3 (A)	WHITE CREEK	Fecal Coliform	Submitted 27 samples 2000-2006; 3 exceedances >200 = 11%. Public use, near trail & city of PA wastewater treatment plant
none	5	CCWR_00038	Lake 0.0 (AA)	LAKE CREEK	Fecal Coliform	Submitted 15 samples 2000-05; 2 exceedances, = 13%. Public use, fishing.
none	2	CCWR_00581	JCL 0.2a (AA)	JIMMYCOMELATELY CREEK	Fecal Coliform	Submitted 2 samples 2005-06, 1 exceedance.
none	2	CCWR_00608	Dry 0.8 (AA)	DRY CREEK	Fecal Coliform	Submitted 6 samples 2005-06; 1 exceedance = 16%.

Dept of Ecology 2008 Draft WQA, Bioassessment, SK recommendations & comments, 3/28/08

Listing ID	Draft WQA Category	SK suggested Category	Water Body Name	SK Site Name RM	Parameter	SK Notes
47010	2	5	HOKO RIVER	Hoko 3.2a	Bioassessment	Listed as cat 2, 2004 score of 28 = impaired = cat 5, one year data
47021	2	5	LYRE RIVER	Lyre 4.2	Bioassessment	Listed as cat 2, 2004 score of 30 = impaired = cat 5, one year data
47025	2	5	PYSHT RIVER	Pysht 6.5	Bioassessment	Listed as cat 2, 2004 score of 30 = impaired = cat 5, one year data

Stream Benthos Gap Analysis, Coordination, and Data Management: A Pilot Project Proposal for Demonstrating Regional Monitoring Coordination

Scoping Committee: Jim Simmonds (King County), Dan Smith (Federal Way), Leska Fore (Statistical Design), Heather Kibbey (Pierce County)

1. What problem(s) is being addressed by the proposal, and what would be the expected outcome(s) of the project?

Many Puget Sound entities, including local jurisdictions, state and federal agencies, tribes, and NGOs, collect stream benthic macroinvertebrate samples to assess stream health. Most collection efforts in the Puget Sound region generally follow collection protocols required for calculating the Benthic Index of Biotic Integrity (BIBI). Currently, each entity manages their data using spreadsheets, and it is extremely difficult to compare results across sampling programs and across years. King County, Pierce County, Snohomish County, and City of Seattle are developing an integrated data management system, with standardized taxonomic naming conventions and metric and index algorithms, allow for enhanced data analysis and interpretation. Expansion of this system to cover all stream benthic macroinvertebrate data collection efforts in Puget Sound is proposed.

2. What is the current status of the situation? In other words, is anything underway today to address or resolve the problem or are the “tools” needed to address it in place? Has there been some success, or is the problem getting worse?

A data management system for stream benthic macroinvertebrate data is currently being jointly developed by King County, Pierce County, Snohomish County, and City of Seattle. This system is designed to manage data collected using protocols that are generally comparable to those required for calculating the BIBI. Version 1 of the system is projected to be completed and live by the end of the March, 2008. Version 1.1, addressing any additional high-priority needs, will be released by end of December, 2008. Key features of this system include:

- Any jurisdiction, agency, or other entity that collects the data retains ownership of the data, with the exclusive right to edit or delete their existing data, along with the ability to add additional data, via a secure, web-based, data stewardship controls.
- All entities that contribute data to the system agree to allow for unlimited data sharing with other jurisdictions, state and federal agencies, tribes, public, etc.
- All entities that contribute data to the system agree to an ongoing annual fee (not yet determined, but currently estimated between \$1,000 to \$5,000) to maintain the system. Should an alternative funding source be developed for maintaining the system, the annual fee would be dropped.

Stream Benthos Pilot Project Proposal

- Data will be displayed and downloadable via the web, and housed in a SQL database.
- Key features of the website include maps for locating sampling sites, ability to download raw data (taxonomic counts), use of standardized Integrated Taxonomic Information System (ITIS) codes for taxonomic identification, ability to download multiple metrics (e.g., tolerant species, Hilsenhoff, etc), ability to download BIBI scores, ability to graph metrics and scores, etc.
- Development of a standardized laboratory data form for participating entities.
- Data will be hosted at an independent Internet Service Provider (ISP) to ensure data integrity.

3. Who should participate in the project, and why?

A small project team would implement this project. Every jurisdiction, agency, or other entity that collects stream benthic macroinvertebrate data within the Puget Sound region should participate in this project, with an aim of establishing long-term coordination and data sharing.

4. What process or steps would be needed to address the problem and achieve the expected outcomes?

Task 1 – Survey and Gap Analysis

Starting in June, 2008, staff will contact every jurisdiction, volunteer group, WRIA, and Tribe in the Puget Sound region to establish status of their macroinvertebrate sampling programs. Each entity will be asked whether they collect stream benthic macroinvertebrate data. Those that do collect stream benthic macroinvertebrate data will be asked whether they

- Are interested in sharing sampling plans, reports and data with others.
- Generally follow the collection protocols required for calculating the BIBI.
- Have need of a data management system for their stream benthic macroinvertebrate data.
- Might be interested in having their data be incorporated into the system currently being cooperatively developed.

Results from this survey will be compiled in a technical memorandum by December 2008.

Task 2 – Obtain and Enter Data

Starting in January, 2009, those jurisdictions, agencies, and other entities that responded positively to the four survey questions will be contacted again to solicit electronic copies of their sampling plans, data reports, and data from 2002 through 2007. Each jurisdiction, agency, and other entity will also receive a copy of the laboratory data reporting sheet format for future use. Staff will coordinate with each jurisdiction, agency, and other entity to enter data into the Puget Sound stream benthic macroinvertebrate

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system. Data will be available on-line by June, 2009. A technical memo summarizing the level of participation, issues faced, and summarizing benthos data available on the system will be produced.

Task 3 – Project Management

Monthly progress reports will be produced documenting budget expended, progress made, obstacles encountered, and anticipated progress in the next month.

5. *What would be the approximate cost of the project? What portion of the costs would be paid out of the funding Department of Ecology received to launch this program? What portion if any, would be paid by others?*

The approximate cost of the project is shown in Table 1.

Table 1. Approximate Cost of Pilot Project to Expand BIBI Data Management System

Task	2008	2009	Total
Survey and gap analysis report	\$25,000	\$0	\$25,000
Obtain and Enter Data	\$0	\$50,000	\$50,000
Project Management	\$2,500	\$5,000	\$7,500
Total	\$27,500	\$55,000	\$82,500

This project builds on work already being conducted by King County, Pierce County, Snohomish County, and City of Seattle to construct a stream benthic macroinvertebrate data management system. The four coordinating jurisdictions are contributing over 1000 hours in staff time, along with over \$10,000 in consultant support to develop the initial system. The expansion of the system to include additional jurisdictions would be 100% funded by the Ecology grant.

6. *How would this project address interests, needs and concerns of rural communities?*

Many jurisdictions, agencies, and other entities collect stream benthic macroinvertebrate data. These data are collected in both urban, rural, and urbanizing areas of Puget Sound. This system will allow for data sharing and comparison between communities in a manner not previously possible.

7. *How would the project meet the criteria agreed to by the Committee in October? Those criteria are:*

a) Builds the credibility of the program.

This proposal is to build on an existing coordination effort between four jurisdictions. Expanding this coordination to include all other entities collecting stream benthic macroinvertebrate builds on the credibility of all monitoring programs.

b) Tests working relationships.

This project will establish long-term, ongoing work relationships to coordinate and cooperate with regards to stream benthic macroinvertebrate monitoring.

c) Provides credible and meaningful information that addresses the framework questions.

This project allows for assimilating disparate monitoring data into useful information regarding overall health of watersheds. This directly addresses the framework questions.

d) Encourages leveraging of resources.

This project leverages resources already committed and partially expended by King County, Pierce County, Snohomish County, and City of Seattle.

e) Is voluntary (“a coalition of the willing”) and attracts additional participants over time.

By definition, this project is both voluntary and aimed at attracting additional participants.

f) Is simple.

This project is simple and achievable.

g) Can get going in less than one year.

Yes, this project will begin in 2008 and be completed in 2009.