

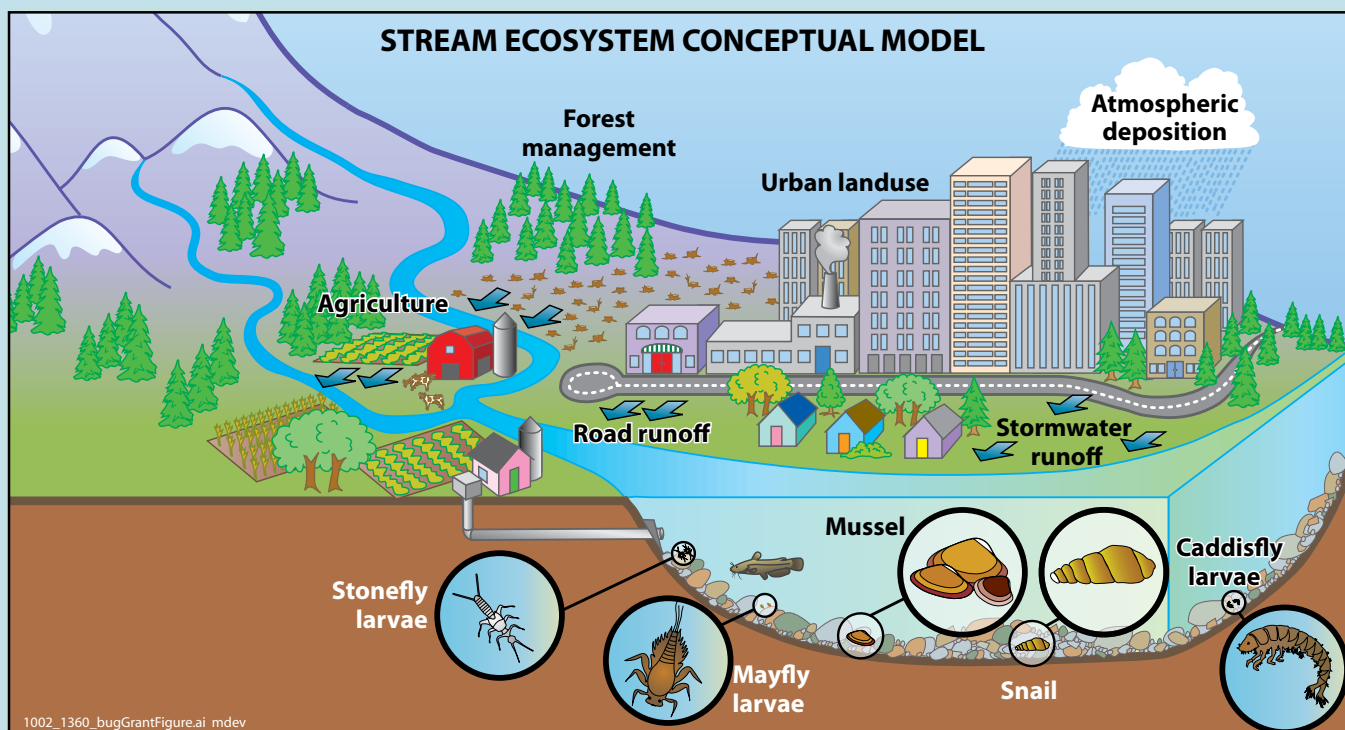


It's all about stream bugs

By Chris Gregersen, King County ecologist

In 2014, King County employees, seasonal workers, and interns visited over 175 stream locations throughout the county to collect bugs...but why? Stream bugs, known to scientists as benthic macroinvertebrates, are the bottom dwelling organisms that you can see that don't have a backbone.

Insect larvae, worms, snails, clams, and crayfish are all excellent indicators of stream health and water quality. As indicator species, stream bugs reflect the overall water quality and stream conditions. Not only do the types and amounts of bugs reflect the water and stream habitat quality at the particular stream location, but because they are constantly exposed to any water flowing past them, they are indicators for the entire watershed upstream of where they live.



A conceptual model of how watershed activities influence stream bugs

Last year alone, over 350 different species of macroinvertebrates were encountered during our sampling throughout King County. This vast array of species exhibits a wide range of pollution tolerance, habitat usage, and adaptability to changing conditions. To characterize the health of the bug community, the Benthic Index of Biotic Integrity (B-IBI) was developed to calculate a score for stream health based on the numbers and species of stream bugs found in a sample. The B-IBI score ranges from 0 to 100, with corresponding categories ranging from "Very Poor" to "Excellent" stream health.

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A King County employee samples a stream's benthic macroinvertebrates.

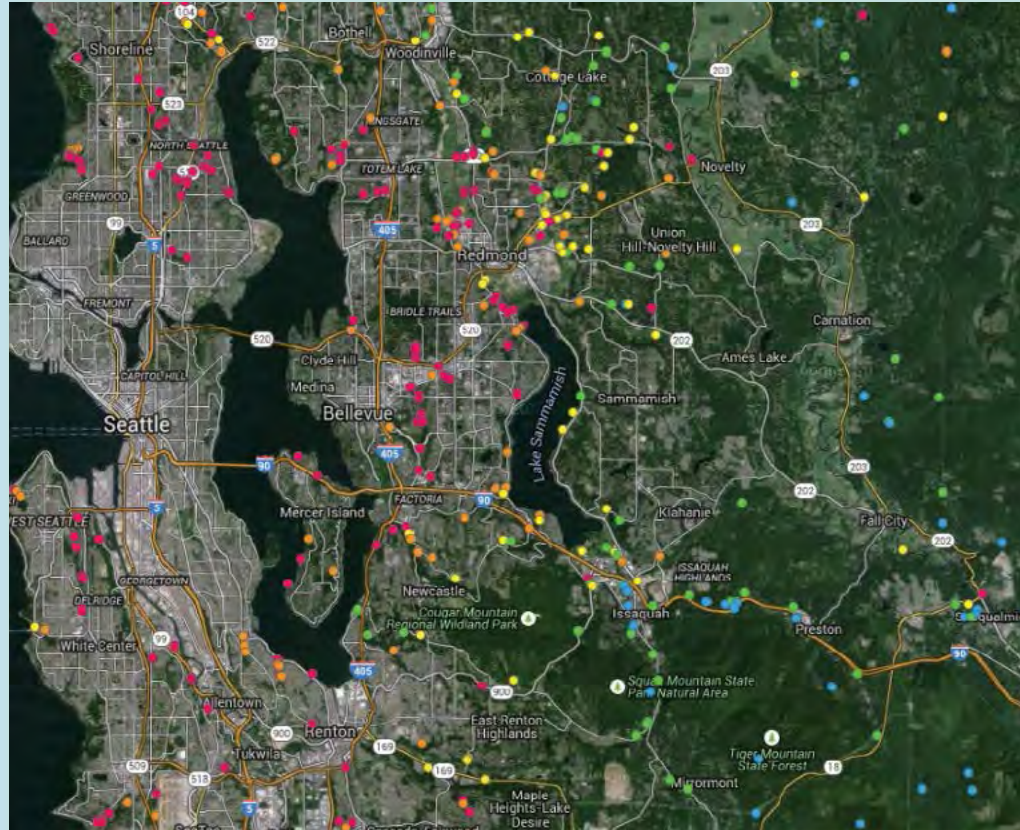
Getting from bugs to a B-IBI score is an intricate process. Bugs are first sampled using specialized nets placed in the stream bottom. Using this, a sampler can stir the sediment where the bugs are living, and allow the current to sweep any bugs into the net. The contents of the net are then transferred to a sample bottle, preserved, and later sent to a laboratory. The lab will then analyze the sample contents and both identify and count any species found. This information is then uploaded into the King County-managed Puget Sound Stream Benthos database (www.pugetsoundstreambenthos.org). This database was developed in 2008 and allows regional groups to share, manage, and analyze macroinvertebrate data as well as make it accessible to the public. Built-in calculation features allow instant calculation of B-IBI scores directly from the lab reported data, which can then be mapped and shared. This has resulted in substantial regional collaboration and made possible various assessments of habitat and stream conditions in King County and throughout the region.

In addition to the database and annual monitoring, King County has lead regional efforts to enhance the use of the B-IBI tool. With funding from an EPA grant from 2010-14, King County worked with regional partners and experts to enhance the B-IBI analysis tools and scoring system, standardize protocols, and encourage collaboration across all jurisdictions sampling in the Puget Sound region. This work has helped King County not only update the B-IBI with the latest scientific information, but also engage with over 100 individuals from almost 50 organizations and jurisdictions ranging from the city level up to federal agencies.

This work contributes to the efforts to restore Puget Sound, as the B-IBI is one of the Puget Sound Partnership's vital signs. King County is also working on a Washington State Department of Ecology funded project aimed at developing strategies and cost estimates for restoring 30-plus basins from "fair" to "good" B-IBI, and protecting those that score "excellent."

Beyond regional monitoring, B-IBI is also an important tool for King County scientists to measure the effectiveness of specific stream restoration projects as well as monitor specific land uses and their impacts to stream health. Stream restoration projects utilize B-IBI by sampling in several locations in and around stream restoration projects over time.

By identifying control areas that represent the project area prior to restoration, scores can be compared between the restored areas and non-restored areas, as well as reaches downstream that might benefit from restoration. B-IBI is also used to monitor specific land use actions such as biosolid application and land development. By taking



Data from the Puget Sound Stream Benthos database showing a sample of B-IBI scores from the central Puget Sound region.

Condition of Biotic Integrity	B-IBI ₀₋₁₀₀ Score
Excellent	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very poor	0-20

samples over time in basins where specific actions are occurring, scientists can use B-IBI to track any resulting changes in the aquatic environment.

B-IBI is an important tool for scientists in the Puget Sound region. Stream health is critical for bugs, fish, and people alike, and using B-IBI helps us identify those streams where the biological condition is impaired. Even though they are very small, stream bugs are helping scientists understand and restore stream health throughout King County and Puget Sound.

Contributor to King County's SciFYI

Chris Gregersen

Chris Gregersen is an ecologist in the King County Science section focusing on stream ecology and fisheries. His work includes investigating riverine habitat use by juvenile salmonids and their response to restoration, aquatic health monitoring, and salmonid population assessment. Chris is a proud WSU graduate, and comes to us with a diverse background in fisheries work from both Idaho Fish and Game and Washington Department of Fish and Wildlife.



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Send questions, comments and future story ideas to:

Kate O'Laughlin - kate.olaughlin@kingcounty.gov, 206-477-4789

Jim Simmonds - jim.simmonds@kingcounty.gov, 206-477-4825

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