



Streamside Runoff

CENTER FOR STREAMSIDE STUDIES

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Eastside Historic Riparian Forest Characterization

In light of current requirements for stream shade due to listed salmon stocks and 303d listed streams, there is a growing question about how best to manage eastside riparian forests. Are these stands best managed through no-cut buffers that may favor dense stands of species that did not exist historically and may be more susceptible to disease, insect infestation, and fire? Or, could active management be used to return these areas into a condition that more closely mimics forests before mass settlement and harvest of these areas around the turn of the century?

Stand reconstruction and fire history studies have investigated historic forest types and disturbance but there is little information on riparian stands and historic shade levels in particular. This information is critical in order to begin to answer the above questions. The objective of this project is to characterize historic riparian forest conditions in Eastern Washington, taking into account the historic fire

regime. The focus is historic riparian stand conditions including canopy closure. The specific variables to be studied include percent canopy closure (stream shade), trees per acre, and species composition. Another CSS project (*Stream Temperatures of Eastern Washington*) is investigating additional factors besides riparian forest condition that may affect stream temperature on the eastside.

Preliminary work has involved a search for available historic resources and data, an evaluation of the accuracy of data sources, and the location of potential reference sites. Data sources that have been pursued include air photos, survey records, and maps. Air photos have been located that date back to 1938 in some

areas (Stevens County) and 1944 in other areas (Colville National Forest). The USDA Forest Service, Washington Department of Natural Resources, soil conservation districts, Army Corps of Engineers, Washington Department of Transportation, the National Archives, and other agencies have been and will continue to be contacted in search of old air photos.

There are also various maps and surveys that have been located that may assist in our historic characterization. These include timber cruises and land sur-

veys near the turn of the century. Work on stand reconstruction may also be used by extrapolating out probable shade levels from reconstructed riparian stands.

An alternative method for estimating historic riparian condition is to look at sites that currently retain conditions that are analogous to historic conditions. These sites may be difficult to locate, especially considering that fire suppression has occurred nearly every-

where. However, preliminary investigations indicate that there may be sites that can provide a glimpse into what these forests looked like in the past.

Currently, work is being conducted to evaluate the usefulness of these various data sources and to identify specific stream systems to use for the study. Through this investigation, we anticipate being able to depict the general character of these stands and how they may have affected stream temperature. This information will be useful for riparian management.

(Gardner Johnston is a graduate student in Forestry. Funding for this project comes from the Upper Columbia Timber Growers Association, the USDA Forest Service PNW Research Station, and CSS.)



Eastern Washington streams are often characterized by dry forest types dominated by Ponderosa Pine and commonly suffer from warm water temperatures.

The mission of the Center for Streamside Studies is to provide the necessary information for the resolution of management issues related to the production and protection of forest, fish, wildlife, and water resources associated with the streams and rivers in the Pacific Northwest.

Ecological and Hydrogeomorphic Effects of River Channelization

Throughout the summer and into the fall, CSS will continue to write a white paper on *Floodplain and Riparian Corridor Issues* for the Washington State Department of Transportation, Washington Department of Fish and Wildlife and Washington Department of Ecology. As part of the process outlined in Washington's *Statewide Strategy to Recover Salmon: Extinction is Not an Option*, the State has initiated the development of habitat protection and restoration guidelines for salmon recovery. CSS is writing one of many white papers that will produce the background research needed for the future guidelines, which will likely take the form of a series of manuals addressing many aspects of aquatic habitat protection and restoration.

Specifically, CSS is researching many of the ecological issues associated with developed and degraded lowland river corridors and floodplains that include:

- Ecological effects of channelization and altered channel migration.
- Ecological effects of in-stream structures (wiers, spurs, Large Woody Debris, etc.)
- Ecological effects of channelization on hyporheic zones.

The white paper will not only address the current state of knowledge and knowledge gaps of the effects of these stream modifications, but will also identify habitat protection, mitigation and restoration techniques. Both successful and unsuccessful techniques will be outlined and current gaps in applied river corridor restoration will be identified.

While the emphasis of the paper is on ecological effects of channel modifications, the paper will also cover the indirect effects of changes in channel morphology and habitat forming processes on aquatic ecosystem integrity. The effects of instream modifications in lowland rivers are cumulative and often go unnoticed as piecemeal changes in physical habitat conditions occur over long periods of time. Thus, the potential direct and indirect ecological effects of more than one hundred years of cumulative lowland river modification in Washington State will be determined from a thorough literature review of existing river modi-

fication research from the Western United States and around the world.

The draft white paper on *Floodplain and Riparian Corridor Issues* is scheduled to be completed by fall 2000, while the development of thorough habitat protection and restoration guidelines by the State of Washington will be an ongoing iterative processes over the next several years.

(Jeff Shellberg is a graduate student in Forestry.)

Restoration with a Biological Focus

With millions of dollars in federal funds recently allocated for salmon recovery and a public increasingly active in river conservation, hundreds of urban stream restoration projects are being planned around the Puget Sound Lowlands. What is worrisome is a deficiency of consistent pre- and post-project monitoring to guide project placement and design, and to evaluate what techniques are working where. The mission underlying the majority of these projects is salmon recovery, yet very rarely are salmon or any other element of stream biota directly monitored to assess restoration success.

Because declining biological conditions in running waters have many potential causes, a broad perspective is needed for their protection. The overall objective of this study

is to apply tools of biological monitoring to urban stream management and restoration. The specific method of biological assessment utilized is the benthic index of biological integrity (B-IBI), a multimetric index based on attributes of stream benthic invertebrates (Karr and Chu 1999).

Extensive and diverse activity throughout the Puget Sound basin has altered the region's landscapes—with especially devastating effects on stream biota. Half of the stream sites sampled in this study were in poor biological condition; almost all sites lacked even a single "intolerant" taxon and at the most urbanized sites no stoneflies were found. Although the sites from this study were not randomly selected, such degraded conditions are typical of many streams in and around major metropolitan areas in the region (Kleindl 1995). The survival of wild salmon in the Pa-



A typical channelization project in the Pacific NW

The online riparian bibliography by the USFS Stream Technology Center and CSS is finally up! The url is <http://wwwdev.cfr.washington.edu/ris/html/Intro.htm> and we encourage people to give us feedback on the bibliography. Lenore Jensen will begin standardizing the keywords next Fall.

cific Northwest depends on many factors, crucial among them being high quality streams for spawning and rearing of young.

Overall, B-IBI did not detect any substantial positive effect on biological condition from the restoration activities at the time scales sampled. Biologically, placing logs devoid of bark, roots, branches, or leaves into urban streams is not equivalent to natural recruitment, where wood is but one benefit of a forested riparian corridor and comes in a variety of forms, sizes, and configurations. In order to achieve meaningful long-term biological recovery, restoration efforts must take a broad focus to address why wood is lacking from urban streams in the first place, and what else is amiss. This entails looking beyond local scale in-stream habitat manipulation to address factors operating across the entire basin.

As both a conservation and restoration strategy, protection and reforestation of riparian areas is critical for preventing severe stream degradation, but alone these measures are not adequate to maintain biological integrity in streams draining highly urban basins. In some of the most urban basins of this study B-IBI was still very poor even in reaches with some degree of forested corridor.

The underlying goal of many urban stream management and restoration practices in the Pacific Northwest is biological. Instead of defining "critical thresh-

olds" of basin development to generate formulas for stream protection, the biological condition of the streams that drain those basins should be examined directly. Routine biological assessment is also critical for deciding how most effectively to spend limited restoration dollars.

(Sarah Morley just received her Master of Science degree from the University of Washington.)

Third Annual Urban Stream Temperature Survey

The Center for Urban Water Resources Management (CUWRM) and the Center for Streamside Studies are organizing the third annual urban stream temperature survey. The data collected will provide information about the effects of human influences on streams in Puget Sound. For the past two years approximately 100 people from agencies, community groups, and the University of Washington have gathered air and stream temperature data for urban creeks in King, Pierce, Kitsap, and Snohomish counties during the peak summertime high temperatures. The date for this year's event is Wednesday, August 2, from 3-5 PM. For more information on this project or to volunteer, contact Derek Booth at dbooth@u.washington.edu (or view <http://depts.washington.edu/cuwrw/>).

Funding

CSS received one more year of funding from the University of Washington with a match from the College of Forest Resources (with a fifth year contingent upon an approved strategic plan). During this year, the Center will be writing a strategic plan and searching for sustainable, long-term funding. If you know of any funding opportunities, please contact Leslie Wall at cssuw@u.washington.edu or 206-543-6920. If you would like to give input on the strategic plan, feel free to contact us in response to the following three questions:

1. What are the goal(s) of CSS?
2. What are the barriers to achieving these goals?
3. What are some actions that CSS could do to overcome these barriers?

We hope to finish the strategic plan by early Fall.

Graduate Student Funding

Last year, the Washington Fly Fishing Club (WFFC) offered \$1000 of funding for a CSS graduate student. Applicants were pre-screened by a CSS committee and then sent to WFFC for the final decision. WFFC was so impressed with the two final applicants that they voted to fund both of them instead of only one. Two students were awarded \$1000 each:

Jon Honea, *Effects of Marine-Derived Nutrients on Macroinvertebrate Production in Salmon Spawning Streams*, (Ph.D. Forestry)

Jennifer McLean, *Hatchery/Wild Steelhead Interactions and Reproductive Success on Forks Creek*, (Ph.D. Fisheries)

Announcements

CONGRATULATIONS

This year at the Annual Review, CSS awarded \$200 to the best talk and the best poster. The winner for best talk was **Scott Gende** (Ph.D. Fisheries) for his talk *Consumption choice by bears feeding on salmon*. **Jim Helfield** (Ph.D. Forestry) won the poster competition for *Fertilization of riparian vegetation by spawning salmon: effects on tree growth*

and implications for system productivity. Abstracts for all presentations are available on the CSS website.

The following students completed their degrees: **Scott Bechtold** (M.S. Forestry) *Seasonal and Successional Controls on Nitrate Leaching from a Floodplain Forest*; **Jim Dooley** (Ph.D. Forestry) *Collaborative Design of Fish Habitat Enhancement Projects in Streams and Rivers of Washington State*; **Scott Elliott**

CONGRATULATIONS CONT'D.

CSS 11th Annual Review

We are waiting for confirmation on the availability of the HUB West Ballroom for early February 2001. We will post the date of the 11th Annual Review on the CSS website (depts.washington.edu/cssuw/Events) in a few weeks.

(M.S. Forestry) *The Impact of Riparian Disturbance on Physiochemical Parameters of Suspended Particles at Summer Baseflow*; **Sarah Morley** (M.S. Fisheries) *Effects of Urbanization on the Biological Integrity of Puget Sound Lowland Streams: Restoration with a Biological Focus*; **Rick Morse** (M.S. Forestry) *Topographic and Physiographic Influences on Fire Severity in Stream Valleys of Northern Wenatchee National Forest*; **Anne Watts Savery** (M.S. Forestry) *A Comparison of the Hydraulic Effect of Large Woody Debris and an Engineered Alternative*; **Jason Toft**

(M.S. Fisheries) *Community Effects of the Non-Indigenous Aquatic Plant Water Hyacinth (*Eichhornia crassipes*) in the Sacramento/San Joaquin Delta, California*; **Ilir Vescho** (M.S. Forestry) *Influence of Old-Growth Canopy Gaps on Microclimate, Litter Decomposition and Soil Nitrogen Dynamics in Olympic National Park, Washington*.

Congratulations to **Rick Edwards** on his new job at the USDA Forest Service in Juneau, Ak. Rick is still affiliated faculty with the Center and we plan on working with him on upcoming projects.

CALENDAR OF EVENTS

August 2, 2000 - Urban stream temperature collection, 3-5 PM. Contact CSS for more information.

August 27-31, 2000 - **Riparian Ecology and Management in Multi-Land Use Watersheds**, Portland, OR. For more information go to <http://www.awra.org/meetings/Portland/Portland.html>

September 6, 2000 - **Salmon Homecoming Forum 2000**, sponsored by the Seattle Aquarium and the North-

west Indian Fish Commission, on the Seattle Waterfront. Call 206-275-4791 for information.

October 23-27, 2000 - **Wood in World Rivers**, Oregon State University, Corvallis OR. The website <http://riverwood.orst.edu> will provide more details.

September-December, 2000 - **CSS Tuesday Morning Seminars**, UW Campus. For a schedule contact Leslie Wall (cssuw@u.washington.edu).

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The Center for Streamside Studies is a joint effort of the College of Forest Resources and the College of Ocean and Fishery Sciences

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In this issue:
Eastside Stream
Temperatures
CMZs
Restoration with a
Biological Focus
Urban Stream
Temperatures