

ACADEMY SPEAKER SERIES A CALIFORNIA STREAMS SEMINAR

Date & Time: July 23, 2007, 9:00 a.m. – 4:00 p.m.

**Location: Cal/EPA Bldg., 1001 I Street, Sacramento
Byron Sher Auditorium**

Presentations and Speakers

9:15 a.m. - Presentation 1: The Science and Practice of River Restoration – Dr. Desiree Tullos – Oregon State University In the ever-evolving science and practice of river restoration, a discouraging history and uncertain future around manipulating water and ecosystems dominate debates about this management practice the Western US. To move these debates forward, well-informed and interdisciplinary efforts are needed for understanding the current status of river restoration and planning for future sustainability of river ecosystems.

In this talk, I will (1) present definitions, history, and current trends of river restoration across the US, (2) focus on issues in restoration specific to western US, including dam removal, channel reconfiguration, and environmental flows, (3) discuss the opportunities and challenges of performance evaluation of restoration projects, and (4) close with comments regarding river restoration in an inconclusive hydrologic and regulatory future given the pressures of environmental governance and water security.

Desiree Tullos, PhD, is an assistant professor in the Biological and Ecological Engineering Dept. at Oregon State University, where she has been since Sept. 2005. Tullos earned her B.S. in civil engineering from the University of Tennessee (2000) before moving to North Carolina State University for her masters degree in civil engineering (2002) and PhD in Biological and Agricultural Engineering (2005). After a short postdoc at the Chinese Academy of Sciences, Desiree moved to OSU to develop and lead the River Engineering and Restoration lab on campus. Dr. Tullos is the instructor for the graduate-level River Engineering, NonPoint Source Pollution Assessment and Control classes, and the undergraduate Ecological Engineering course. Additionally, she leads seminars on River Restoration, Wetland Restoration, and Environmental Flows and is the director of the Summer Institute in EcoInformatics. Desiree's research program is leading efforts to understand the integrated physical, ecological, and social effects of dam construction and removal both locally (in Oregon) and globally in areas as far as Iceland and China. Other projects in this lab include the study of biogeochemistry of river delta restoration, environmental flows in the Willamette River and in the Pacific Northwest, environmental governance and rural sustainability, stormwater management in rural coastal communities, observing and modeling salmon recovery in urban systems, and effects of modified hydrology on floodplain dynamics. Her research has a strong international component, including

authoring publications, giving presentations, and organizing symposia with international colleagues on a variety of river restoration issues.

10:05 a.m. - PRESENTATION 2: Stream Ecology – from the eye of the Fish and California Stream Ecology – Dr. Lisa Thompson University of California Davis

Wild populations of anadromous fish in California have declined to approximately 10% of historical levels, and much of this decline may be linked to changes in stream habitat and water flows. Recovery of fish populations is dependent upon restoration of habitat and flow regimes, but it can be challenging to determine which efforts will have the greatest benefit. Studies of habitat in which fish have persisted or are absent can provide insight into best management practices that may allow fish distribution to expand, in spite of potential impacts of climate change. I will present results from studies of cold-water fish in wadeable streams in several watersheds in northern and central California: Cow Creek (northern Sacramento River basin), Pine Creek (Lassen County), South Fork American River, and the upper Salinas River (central-coastal California). I will relate fish distribution and habitat use to factors such as temperature, flow regime, water year, large wood (debris), pools, cover, and substrate. Many of these factors also influence the abundance of benthic macroinvertebrates, important food sources for stream fish. Restoration of anadromous fish populations and stream habitat needs to be considered at the watershed scale, incorporating fish passage, seasonal shifts in habitat use due to migration and temperature changes, and inter-annual shifts related to water year.

Lisa Thompson, Ph.D., is a Fisheries Extension Specialist at UC Davis, in the Wildlife, Fish, and Conservation Biology Department, focusing on the adaptive management of anadromous and inland fish populations. She completed her B.Sc. at the University of Toronto, M.Sc. at McGill University in Montreal, Ph.D. at the University of British Columbia, and did her postdoctoral research at the University of California, Santa Barbara. In California she is conducting studies of fish response to environmental factors such as flow and temperature in the South Fork American River, Cow Creek (Sacramento Basin), the Shasta River (Klamath Basin), the Upper Salinas River Basin, and the Eagle Lake watershed. She is a member of the Lower American River FISH Workgroup, which deals with fish populations in the American River near Sacramento. She is Science Advisor to the Shasta-Scott River Watersheds Coho Recovery Team. She is also a member of the NOAA Fisheries South-Central California Coast Technical Recovery Team for steelhead.

10:55 a.m. - Presentation 3: The Importance of Floodplains to Riverine Ecosystems and Flood Management - Chris Bowles, PhD., PWA, Ltd., Sacramento

Floodplains are essential to riverine ecosystem health. They are the “sponges” that support diversity of species within these ecosystems. Internationally, but more specifically in California, floodplains that supported a diverse range of species prior to anthropogenic disturbance have been significantly altered due to levee construction, elimination of flood peaks via regulation and channel bed degradation. As a result, the majority of these ecosystems have either been destroyed or significantly curtailed due to floodplain disconnectivity.

These traditional engineering approaches have also resulted in unsustainable infrastructure for flood management over the long-term.

This presentation will provide an overview of the importance of floodplains for ecosystem and flood management from a physical process perspective. Traditional, single focus approaches to floodplain management must be developed into holistic, multi-objective approaches in order to maximize the potential, not only for our ecosystems, but for more sustainable flood management and planning. Decision makers must understand the extent of functional as opposed to relict floodplains within the system, as well as the importance of ecosystem processes, such as spawning and rearing of native fish, that occur only on lands that are flooded frequently and for relatively long durations. They must also understand the symbiotic benefit of levee setbacks and attenuation of flows for flood management.

A review is given of recent advances in geomorphic and hydrologic science, including:

- A methodology for quantifying the extent of functional floodplain on lowland rivers and streams that have been leveed, regulated, and whose channels have been modified, known as the “floodplain activation flow” or FAF.
- Examples of recently implemented and ongoing levee setback projects on the Bear and Feather Rivers, respectively.
- Decision support tools being developed to identify and prioritize ecologically and hydraulically beneficial floodplains.

Chris Bowles, Ph.D., is a Principal with PWA and is a civil engineer specializing in hydraulics, hydrology, water resources and environmental restoration. He has over twelve years of project management experience on a wide variety of large multi-disciplinary, multi-stakeholder projects such as floodplain restoration, sediment studies, watershed hydrology, river and wetland restoration, in California, Nevada, Washington, Oregon, and Florida, and oversees, including projects in the UK and Central America. Prior to specializing in environmental hydrology, Dr. Bowles worked initially as a land surveyor and latterly as a site construction supervisor. Dr. Bowles opened the Sacramento branch office of PWA in 2001 and since that time has managed or directed numerous projects for local Central Valley, State and Federal clients that have included Sacramento Area Flood Control Agency (SAFCA), Yolo County, Solano County Water Agency, California Department of Fish and Game (CDFG), US Fish and Wildlife Service, the Water Forum, Department of Water Resources, Three Rivers Levee Improvement Authority and the US Army Corps of Engineers. Dr. Bowles regularly gives training courses in hydraulics and hydrology and has recently prepared and delivered courses to the State Water Resources Control Board (and the Regional Boards) and CDFG. Dr. Bowles is focused on providing innovative, environmentally sensitive solutions to impacted watersheds from the Sierras to the Central Valley to achieve the protection, enhancement, and restoration of water dependent ecosystems.

11:45 a.m. – 1:00 p.m. – Lunch Break (on you own)

1:00 p.m. - PRESENTATION 4: Stream Stability: Trees vs. Grass on Stream Banks – Some Geomorphological and Other Considerations – Dr. Stanley W. Trimble UCLA

A contentious element of riparian management is whether trees or grass promote greater stream stability. This review looks first at pre-existing conditions, which would affect the effectiveness of trees or grass in stream bank stability. As part of this process Dr. Trimble will discuss stream morphology; related processes (bank and floodplain scour etc.), hydroclimatology, stream flood regime, and the inherent strength of banks. Within these pre-existing conditions, he will further discuss the advantages and disadvantages of trees vs. grass, and define how these might be incorporated into stream bank protection criteria. Dr. Trimble will discuss how some of features, commonly discussed for stream bank protection recommendations, have been demonstrated, while others are largely intuitive and will require more research before they can be implemented in state or regional policy.

Stanley W. Trimble, Ph.D., is Professor in the Department of Geography at UCLA where he has been since 1975. His interests include historical geography of the environment and especially human impacts on hydrology including soil erosion, stream and valley sedimentation, and stream flow and channel changes. His regional interests are the humid U.S. and western and central Europe. In 1963, Trimble received his B.S. in chemistry from the University of North Alabama. Taking an Army ROTC commission, he spent two years as Intelligence Research Officer and served with the 101st Airborne Division 1964-65. After a year teaching in Europe, he earned the M.A. (1970) and Ph.D. (1973) in Geography at the University of Georgia. Dr. Trimble was a research hydrologist with the US Geological Survey 1973-84, and has been a visiting professor at the Universities of Chicago (1978, 1981, 1990), Vienna (1994, 1999), Oxford (1995), London (University College, 1985), and Durham (1998). He has also taught courses in environmental geology/hydrology for the US Army Corps of Engineers. He was an Editor of CATENA, an Elsevier journal of soils, hydrology and geomorphology (1996-2006), presently is Editor of the DEKKER ENCYCLOPEDIA OF WATER SCIENCE, and a co-author of ENVIRONMENTAL HYDROLOGY. He continues as a hydrologic consultant for several agencies and also owns and manages a 200 acre farm in Tennessee. His research awards include a Fulbright to the United Kingdom and his more than 100 publications are diverse, ranging from several in *Science* to one in *The Journal of Historical Geography*. Trimble served on the National Research Council Committee on Watershed Management (1996-1999) and the Committee on the Mississippi River and the Clean Water Act (2005-). He is the recipient of several honors including the Melvin G. Marcus Distinguished Career Award.

1:50 p.m. - PRESENTATION 5: Riparian areas: Invasive plant species and revegetation along rivers, streams and levees in California – Dr. Gretchen Coffman – Marine Science Institute, University of California, Santa Barbara

Invasion by nonindigenous plant species is one of the greatest threats to streams and riparian ecosystems worldwide. Millions of dollars are spent each year for control and removal of invader species along rivers and streams in California. Revegetation of streams and levees is essential in controlling many invasive species after removal and an integral part

of riparian restoration efforts. This presentation will review the problem of plant invasion in streams and riparian ecosystems. Strategies for control and specific removal methods for the most invasive riparian plants in California, including *Arundo donax*, *Tamarix* spp., and *Eichornia crassipes*, will be discussed. Riparian revegetation approaches and methods will be presented for use in stream restoration and levee stabilization. General cost and timing of invasive plant removal and riparian revegetation will be covered. She will discuss monitoring of removal and revegetation efforts related to performance criteria and application of results within an adaptive management framework. Policies related to invasive species and revegetation of levees will also be covered briefly.

Gretchen Coffman, Ph.D. with the Marine Science Institute at the University of California, Santa Barbara, is a plant ecologist and botanist who has studied wetland and riparian systems for the past 16 years. Since 1991, she has conducted jurisdictional wetland delineations for several consulting firms throughout California, the east coast, the southeast, midwest and Puerto Rico. Recently she completed several large-scale wetland delineations of The Presidio of San Francisco and along the West Shore of Lake Tahoe. Her research focuses on restoration of wetland and riparian restoration in Mediterranean Climate Regions, mainly coastal California. She has worked on wetland classification and various methods for evaluating wetland functions throughout her career. She earned her doctorate from UCLA in Environmental Science; M.A., SFSU/RTC, 1998, Ecology and Systematic Biology; B.A., Colgate University, 1991, Biology.

