

River Health & Restoration Workshops

Offered by the Minnesota DNR River Ecology Unit

Our rivers and streams have been impaired by many factors resulting in poor water quality, lost biodiversity, accentuated flooding and drought, and increased rates of erosion and sedimentation.

As our rivers have become more widely recognized and appreciated as valuable natural resources that need restoration, the responsibility to better understand and properly restore these complex ecosystems takes on great importance. To that end, the Minnesota Department of Natural Resources (DNR) offers a variety of stream related workshops.

The foundation of these workshops is to a) teach the fundamentals of stream science including: fluvial geomorphology, hydrology, connectivity, biology and water quality and to b) educate attendees in reference reach geometry techniques and approaches that ensure long-term health, stability, and resilience.



Our definition of Success:

Implementing projects that reestablish self-sustaining geomorphic and ecological processes that
» *form & maintain quality habitat and*
» *protect or restore biodiversity.*

River Science Series

- » The Fundamentals of River Science: Applied Geomorphology & Ecology
- » River Monitoring & Assessment
- » Restoring River Ecosystems: Design & Application

The Science of Healthy Waters Series

- » The Ditching Dilemma
- » The Dam Dilemma

Diagnosing Streams: Symptoms, Underlying Causes, & Remedies

Our definition of Restoration:

The act of relaxing human constraints on the development of natural patterns of diversity, where restoration measures should not focus on directly recreating natural structures or states but on identifying and reestablishing the conditions under which natural states create themselves (Ebersole et al. 1997, and Frissell et al. 1997 Frissell and Ralph 1998).

Workshops

Find more information on our websites:

[Minnesota DNR - River Ecology Unit](#)
[River Health & Restoration Workshops](#)



General workshop information

- We take requests into consideration when scheduling each year's workshops, so we ask those interested in future workshops to express interest directly to contact on last page.
- Course offerings are limited due to small staff size in addition to field and research responsibilities.
- Beverages, snacks, lunches, and some suppers are included.
- Lodging is not included in the registration fee.
- Fieldwork is required so students need to be prepared to wade in streams and work outside in inclement weather conditions.

Instructors:

Neil Haugerud is a River Ecologist with the DNR River Ecology Unit. He earned his master's degree in Wildlife and Fisheries Sciences from South Dakota State University in 2003. He is experienced in stream biological monitoring, macro-invertebrate identification, reference site selection, and evaluating water quality. Neil's work focuses on project monitoring, river restorations, and geomorphological data analysis and management.

Mark Ellefson is a River Geomorphology GIS Specialist with the DNR River Ecology Unit. He earned his master's degree in Geographic Information Science from the University of Minnesota in 2014. His field experience encompasses fish sampling, bedload and suspended sediment sampling, discharge measurement, terrestrial LiDAR scanning and topographic surveying of stream channels. Mark's work focus is integrating field collected geomorphic data with GIS watershed analysis to better categorize the state's river systems and their geomorphic stability and erosion potential.

Amanda Hillman-Roberts is the Restoration Coordinator with the DNR River Ecology Unit. She earned her master's degree in Environmental Sciences and Resources at Portland State University in 2009. She is experienced in project development, geomorphic monitoring, culvert assessment and working with legislators and funding councils. Her work focuses on identifying, coordinating, prioritizing and funding channel restorations and dam removal/modification projects.

Dr. Amy Childers is a River Ecologist and Outreach Specialist with the DNR River Ecology Unit. She earned her master's degree and doctorate in Chemical Oceanography from the University of Alaska Fairbanks in 2001 and 2005. She has been coordinating and helping instruct these workshops since 2007. Amy's other work focuses on stream science outreach, river restorations, and geomorphic monitoring.

DNR staff Various staff from the River Ecology Unit and Clean Water Legacy Program (both of which are within the Division of Ecological and Water Resources) and the Division of Fisheries instruct in their respective areas of expertise and provide expertise in the field. Recent instructors include Clean Water Legacy Specialists **Jason Vinje, Jon Lore, Brady Swanson, and Karl Koller.**

Diagnosing Streams: Symptoms, Underlying Causes, & Remedies

No prerequisites

This workshop was developed in recognition of the need for additional training and practical experience in diagnosing stream condition and the underlying causes of degraded health. This workshop teaches:

- the fundamentals of river "physiology and anatomy" -- hydrology, fluvial geomorphology, and ecology,
- the underlying causes and the resulting impacts to stream stability, water quality, and biodiversity,
- demonstrations of diagnostic tools, and
- practical experience gained by stepping through real examples including examples brought by attendees.

This workshop can be taken by those with any level of expertise that wants to learn how to identify stream issues and practice diagnosing the causes of underlying causes. 3 days. \$300.

The Science of Healthy Waters Series

No prerequisites

This series is designed for concerned citizens, natural resource professionals, administrators, decision makers... essentially anyone involved in watershed issues including rivers, lakes, and wetlands, water quality, aquatic and terrestrial habitat, land use, flooding and more. These workshops teach the fundamentals of stream function and health, address how streams are affected by a specific issue, and offer opportunities for engaged conversations about improving stream and watershed health.

The workshops in this series address a specific issue related to stream health and include:

- a) the science underlying integrative, system-based watershed management,
- b) the problems, issues, and barriers hampering our ability to protect and restore watershed health, and
- c) alternative approaches for accomplishing goals of clean water, improved fish and wildlife habitat, and reduction of flood damages and erosion.

In recent years we have offered **The Ditching Dilemma** and **The Dam Dilemma**. 3 days. \$300.

River Science Series

This series of workshops teaches the basic functions and processes of streams and rivers; stream classification; field surveying; assessment and monitoring of channel morphology, stability, and sediment transport; and restoration where natural, stable stream reaches are used as templates for design.

This series is designed for natural resource professionals whose work involves rivers and streams as well as those engaged in watershed-wide resource management issues. These workshops are a mix of lectures and field applications where students are required to complete fieldwork, data analysis, and present their findings. The goal of this series is to develop a foundation for work in this field where ongoing fieldwork, project experience and interdisciplinary collaboration will be critical to effective stream restoration.

The Fundamentals of River Science: Applied Geomorphology & Ecology

No prerequisites

Rivers and streams are formed by hydraulic, geomorphic, and biologic processes. This course discusses the fluvial geomorphological processes involved in creating and maintaining a stream's shape and stability, as well as the fundamental hydrology and hydraulics of rivers. We teach the skills necessary to properly determine a stream segment's type and degree of stability that requires the collection of field data needed for classifying streams based on bankfull channel dimensions, sinuosity, entrenchment, and slope. Upon completion of this course, students will have the field and office skills needed to classify a stream reach, greatly facilitating communications and planning among river managers worldwide. Students will also have a firm knowledge of the functions and processes that are critical to a river's health and biodiversity.

5 days. \$1,000

River Monitoring & Assessment

Prerequisite: The Fundamentals of River Science: Applied Geomorphology and Ecology

This workshop is designed to teach natural resource professionals how to assess a stream's condition and stability and how to monitor streams through time.

Concepts taught include: • stream monitoring design and evaluation • sediment transport • channel stability assessment • use of biological indicators • understanding riparian vegetation.

Techniques used include: • geomorphic surveying, • Pfankuch's Stability Rating system • biological sampling • BANCS Model – quantifying channel source sediment contribution • introduction to suspended and bedload sediment sampling methods, FLOWSED and POWERSED • Prediction Level Assessment (PLA) of the Watershed Assessment of River Stability and Sediment Supply (WARSSS) methodology • riparian and channel monitoring techniques.

Students completing this course will be able to quantitatively describe a river's stability and condition through applying industry standard techniques and reporting. These skills provide natural resource professionals the ability to monitor a river's condition over time in a non-subjective manner then apply this knowledge in restoration prioritization.

10 days. \$1,500



Restoring River Ecosystems: Design & Application

Prerequisite: The Fundamentals of River Science: Applied Geomorphology and Ecology

This course will incorporate principles, methods, and tools for holistic stream restoration using natural materials and designs, with an emphasis on re-establishing both geomorphic and ecological processes. Fundamentals of restoration design that will be explained include: 1) diagnosis of underlying problems, 2) incorporation of local reference morphology, geomorphic and ecological processes, and 3) project design and construction techniques. Project types discussed will include re-meandering straightened/ditched channels, dam removal, channel restoration following removal of dams with sediment laden reservoirs, dam conversion to a rapids, fish bypass channels around dams, culvert replacement/remediation, and bank stabilization. In addition to classroom lectures and field observations, students will design a restoration project utilizing collected and provided field data. Students will also test designs in a laboratory stream model. With this course, students will develop their foundation for work in this field that with ongoing fieldwork, project experience and interdisciplinary collaboration will lead to effective stream restoration.

5 days. \$1,000