



## **Effective Ecological Restoration Monitoring Workshop**

**May 17-18, 2018**

**University of Montana, School of Extended & Lifelong Learning, Missoula, Montana**

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### **LEARNING OBJECTIVE**

Many existing monitoring frameworks generate a low ratio of information to data and are difficult or impossible to implement within available project budgets. This workshop will focus on designing effective programs to monitor ecological restoration in order to guide management actions, inform future planning, and provide feedback about the monitoring program itself. Although several ecosystem types will be discussed, most examples and the field exercise will focus on vegetation.

**WORKSHOP COST:** \$350

**REGISTER at:** <https://www.eventbrite.com/e/effective-ecological-restoration-monitoring-tickets-42179630410>

**REGISTRATION DEADLINE:** May 16, 2018

### **WORKSHOP INSTRUCTORS:**

Cara Nelson, Associate Professor of Restoration Ecology, University of Montana

Tom Parker, Principal Ecologist, Geum Environmental Consulting, Inc.

Amy Sacry, Senior Restoration Ecologist, Geum Environmental Consulting, Inc.

**SER CERP/CERPIT Continuing Education Credits:** 7

### **SCHEDULE OF ACTIVITIES**

#### **Day 1 (Classroom Lectures & Discussion)**

**9:00 – 9:15** Introductions and Introductory Remarks

**9:15 – 9:45** **What's At Stake: The Need for Effective Monitoring Programs**

In this segment, workshop participants will gain an understanding of the importance of monitoring in different regional restoration programs, and how each program's objectives shape the monitoring programs that support them.

**9:45 – 10:15** **Why Monitoring Fails**

In this segment, workshop participants will learn about key elements of successful monitoring programs and common reasons why monitoring programs fail.

**10:15 – 10:30** Break

**10:30 - 12:00    Developing Effective Experimental Designs for Monitoring Restoration**

In this segment, workshop participants will learn how to develop effective monitoring designs to answer specific monitoring questions, such as whether project objectives (performance standards) have been met and whether restoration treatments have had intended or unintended effects. There will be a particular focus on scale issues (spatial and temporal) of monitoring designs.

**12:00 – 1:00    Lunch (on your own)****1:00 – 2:00    Selecting Meaningful Performance Standards and Monitoring Metrics**

In this segment, workshop participants will gain tools to translate their restoration program's objectives into the key questions that drive a monitoring program. Workshop participants will gain an understanding of how to select monitoring metrics that link back to, and provide information about, project objectives. Participants will learn which metrics are better suited to which time frames and scales, and how to develop meaningful performance standards that are based on the selected metrics.

**2:00 – 3:00    Collecting Reliable Data**

In this segment, workshop participants will learn about the importance of collecting reliable data, including common sources of error in field measurements, the effect of this error on ability to detect trends, and how to reduce error in data collection efforts. Methods for developing repeatable measurement instructions will be discussed.

**3:00 – 3:15    Break****3:15 – 4:45    Where the Rubber Meets the Road – Telling a Story with Your Data**

This segment will include case studies describing real world situations where monitoring methods were influenced by the need to tell a story over time, in addition to regulatory or funding requirements. Project types covered will include: the Superfund context where performance standards are pre-determined by a Record of Decision, wetland mitigation where performance standards are included as a permit condition, a multi-year endangered species restoration project funded by Bonneville Power Administration, and a project implemented by a local watershed group with a more flexible set of requirements.

**4:45 – 5:00    Wrap Up****6:00 – 8:00    Social/Networking at Imagine Nation Brewing**

Participants are invited to enjoy local craft beers during which time the subject of monitoring will seem even more incredibly fascinating.

**Day 2 (Field and Data Analysis Exercise)****NOTES:**

- The morning will be a field data-collection exercise. Walking distances will not be far, but wear appropriate footwear. Other details will be provided in advance of the workshop.
- In the afternoon, we will analyze field data. If possible, please bring a laptop with Excel with you. If you do not have one, please let us know as soon as possible as we have a limited number available for participants to use.

**8:30 – 9:00 Introduction to Field Exercise**

The purpose of the field exercise is for workshop participants to test observer error associated with data collection methods and to learn how to calculate the number of plots or samples necessary to detect trends over time.

**9:00 – 11:00 Field Data Collection Round 1**

Workshop participants will complete a round of data collection, applying methods learned on Day 1.

**11:00 – 12:00 Assessing Measurement Error and Determining Sample Sizes**

Workshop participants will learn how to use simple math to assess measurement error and determine appropriate sample sizes for the variables collected earlier in the morning.

**12:00 – 12:30 Working Lunch (sack lunches provided)**

Participants will discuss their observations about sources of error in the sampling exercise and methods to improve the reliability and repeatability of measurements.

**12:30 – 2:30 Field Data Collection Round 2**

Course participants will repeat data collection using improved methods.

**2:30- 3:15 Ensuring Monitoring Data Can Be Used To Tell A Story: Data Management and Storage**

Course participants will learn techniques for organizing and archiving data so it can be analyzed using common data analysis packages, shared with others, and used to detect trends over time and among restoration sites.

**3:15-3:30 Break****3:30 – 4:30 Power Analysis Exercise**

Workshop participants will have an opportunity to apply the analysis methods that they learned in the morning to calculate the amount of error in the first and second round of data collection and to use estimates of error to determine sampling requirements (replication) for detecting trends in different variables (a technique called power analysis). The goal is to have participants will leave the workshop with the tools to assess the number of replicates needed for their own monitoring programs.

**4:30 – 4:45 Workshop Wrap Up**

Workshop participants will have an opportunity to provide feedback on the workshop and ask any follow-up questions.

**BIO-SKETCH: DR. CARA R. NELSON**

Associate Professor, Restoration Ecology

Ecosystem & Conservation Sciences, University of Montana (USA)

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Cara R. Nelson is an Associate Professor in the Department of Ecosystem and Conservation Sciences at University of Montana's Franke College of Forestry and Conservation, Chair of IUCN's Ecological Restoration Thematic Group and past Chair of the Society for Ecological Restoration. Her research focuses on increasing knowledge about ecological processes and their application to restoration of terrestrial ecosystems. Specifically, she and her students study ecosystem responses to abiotic and biotic disturbances, the efficacy and ecological impacts of ecological restoration treatments, and the science behind the selection of native plant materials for repairing degraded ecosystems.

**BIO-SKETCH: THOMAS G. PARKER**

Principal Ecologist

Geum Environmental Consulting, Inc., Hamilton, Montana

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Tom Parker is the Principal Ecologist and President of Geum Environmental Consulting, Inc. He has over 20 years of professional experience including large-scale river restoration, site remediation of mining impacts, wetland design, environmental compliance and permitting, and riparian restoration and management. Tom has been involved in several long-term ecosystem restoration projects where he often takes a lead role in monitoring and adaptive management program development. Tom is familiar with ecosystems and plant communities throughout Montana and Idaho.

**BIO-SKETCH: AMY M. SACRY**

Senior Restoration Ecologist/Biologist

Geum Environmental Consulting, Inc., Hamilton, Montana

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Amy Sacry is a Senior Restoration Ecologist/Biologist and a Vice President of Geum Environmental Consulting, Inc. She has over 15 years of professional experience working in the fields of fisheries and restoration ecology in western Montana. Amy has designed and implemented numerous floodplain, riparian and aquatic habitat restoration, and streambank stabilization projects using a variety of techniques. Amy has developed and implemented floodplain restoration monitoring programs for large-scale floodplain restoration projects and developed monitoring protocols for streambank bioengineering.