AGENDA

Hydrologic Analysis for Ecosystem Restoration

Objectives: To provide participants with: 1) an understanding of the issues in restoration studies; 2) an overview of Corps policies and analysis methods for riverine ecosystem restoration studies; 3) an understanding of the role and analytical processes of hydrologic engineering required during the conduct of the studies; and 4) insights into the applicability of a range of tools for the various hydrologic analyses necessary in planning and design of these features.
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<th>Time</th>
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<tr>
<td>8:00 – 8:45 a.m.</td>
<td>Welcome, Introductions, and Course Preliminaries</td>
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<td>8:45 – 9:00 a.m.</td>
<td>Break</td>
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<td>9:00 – 10:00 a.m.</td>
<td>1.1 Lecture Corps Policies for River and Ecosystem Restoration – National Perspective</td>
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<td>10:00 – 11:30 a.m.</td>
<td>1.2 Lecture River and Wetland Restoration for Improved Water Management</td>
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<td>11:30 – 12:45 p.m.</td>
<td>Lunch (Ice Breaker)</td>
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<td>12:45 – 1:45 p.m.</td>
<td>1.3 Lecture The Economics of Restoration</td>
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<td>1:45 – 2:00 p.m.</td>
<td>Break</td>
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<td>2:00 – 3:00 p.m.</td>
<td>1.4 Lecture Principles of Restoration Ecology</td>
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<td>3:00 – 5:00 p.m.</td>
<td>1.5 Workshop Wetland Restoration: Performance Measures and Criteria</td>
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Tuesday

8:00 – 9:15 a.m.  2.1 Lecture  **Hydrologic Methods for Ecosystem Restoration Studies including Groundwater-Surface Water Interaction Principles**

Hydrologic principles, analysis methods, and tools relevant to restoration studies will be presented. Emphasis placed on ground/surface water interactions and methods and tools used in their evaluation.

9:15 – 9:30 a.m.  Break

9:30 – 11:15 a.m.  2.2 Workshop  **Statistical Methods for Restoration including a Low Flow Frequency Workshop**

Exceedance probability principles and methods for restoration studies will be described. Included are data collection, analysis techniques and tools for determining critical and nourishing flow conditions. Emphasis is on low-flow analyses. Concludes with a classroom exercise investigating the low flows of a hydrologic time series using a frequency perspective.

11:15 – 12:15 p.m.  2.3 Lecture  **Principles of Geomorphology**

Overview of geomorphic information and analysis required for riverine restoration planning and design. Role of geomorphic information in setting restoration objectives and selecting project alternatives. Stream classification. Selection and use of simple stability assessment procedures.

12:15 – 1:15 p.m.  Class photo, Lunch

1:15 – 2:15 p.m.  2.4 Lecture  **Hydraulic Analysis Methods for Restoration**

An overview of analysis methods and analytical tools for planning and designing ecosystems will be presented. Steady, unsteady and two-dimensional flow applicability and analysis tools will be defined.

2:15 – 3:45 p.m.  2.5 Workshop  **Application of Hydraulic Principles for Stream Restoration**

Workshop details and applies HEC-RAS to a stream restoration problem involving the reintroduction of meanders to a previously channelized stream, establishing a sediment budget, and impacts of a grade control structure in sediment dynamics and channel sizing.

3:45 – 4:00 p.m.  Break

4:00 – 5:00 p.m.  2.6 Lecture  **Intro to the Ecosystem Functions Model (HEC-EFM)**

The EFM is a tool that uses hydrologic and hydraulic input to help make decisions about biological responses. An overview of the Ecosystem Functions Model (EFM) will be presented.
Wednesday

8:00 – 11:30 a.m. 3.1 Field Trip  **Field Trip to the Yolo Bypass Wetlands**

Field trip to Yolo Basin wetland with presentation on the history, features, and hydrologic investigation of the study.

11:30 – 1:30 p.m. Lunch

1:30 – 2:45 p.m. 3.2 Lecture  **Ecosystem Restoration Below Reservoirs**

An overview of considerations of reservoir effects when planning and design of ecosystems will be given. Changes to flow regimes, temperature, sediment transport potential, etc. will be described. Reservoir operations for nourishing and critical/minimum flow conditions will be defined.

2:45 – 3:00 p.m. Break

3:00 – 5:00 p.m. 3.3 Workshop  **Ecosystem Functions Model Workshop**

Workshop investigates a single river site over different time periods and flow regimes. Relationships between hydrology and ecology are developed and tested.
Thursday

8:00 – 8:30 a.m.  4.1 Lecture  **The Nature Conservancy and the Corps**

Introduction to The Nature Conservancy (TNC), explanation of TNC’s interests in and work related to freshwater biodiversity conservation and sustainable water management, and summary of TNC’s collaboration with the Corps in ecosystem restoration.

8:30 – 9:30 a.m.  4.2 Lecture  **The Hydrologic Regime – A Master Variable for River and Stream Ecological Integrity**

The hydrologic regime is a key ecological process which, if maintained within its natural range of variability, helps support healthy freshwater ecosystems. This session will offer some perspectives on freshwater ecosystem health as well as insights on linkages to hydrologic regime.

9:30 – 9:45 a.m.  Break

9:45 – 12:00 p.m.  4.3 Workshop  **Indicators of Hydrologic Alteration (IHA) Software**

Workshop provides an introduction and opportunity to run the newest version (V7) of the Indicators of Hydrologic Alteration (IHA) software, released in February 2005. This statistical software is designed explicitly to analyze and assess changes in daily hydrologic data in ecologically meaningful terms.

12:00 – 1:00 p.m.  Lunch

1:00 – 2:45 p.m.  4.4 Workshop  **Small Group Exercise (Ecosystem Flow Prescriptions) and Discussion**

The class will be divided into small groups for a hands-on exercise in defining ecosystem flow requirements for different ecosystem components and addressing the challenge of developing an integrated flow prescription.

2:45 – 3:00 p.m.  Break

3:00 – 3:30 p.m.  4.5 Lecture  **Ecologically Sustainable Water Management**

Introduction to the six-step ESWM process and its application to ecosystem protection and restoration efforts on specific rivers.

3:30 – 5:00 p.m.  4.6 Lecture  **Using the ESWM Framework to Achieve Ecosystem Restoration through Water Management – Savannah River Case Study**

This session uses the Savannah River case study to illustrate ecosystem restoration efforts through changes in water management, and outlines how engineering tools – including many discussed during the previous two days – are being used to support effective ecosystem restoration.
How will the U.S. Army Corps of Engineer's work in 50 to 100 years differ from what it is today? Society will always demand that our nation's waters be managed to accommodate flood control, navigation, energy production, drinking water supply, irrigation, recreational opportunities, and other uses. Increasingly society demands these services, as well as maintenance of healthy ecosystems and the services they provide. Are there opportunities for Corps projects to integrate new scientific understanding and emerging social demands for ecosystem health? What technical, programmatic, and political challenges and opportunities arise in managing water in a more ecologically sustainable fashion? What particular reforms might be needed to apply such efforts more broadly?