A Framework for Stream Corridor Restoration

Draft Design Document
for the interagency watershed training course

Interagency Watershed Training Cooperative

Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

Draft of 5/1/97

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Preface

The Interagency Watershed Training Cooperative (IWTC) was formed to improve cross-agency cooperation and develop and implement interagency infrastructure for watershed training. The IWTC members share an interest in developing timely, comprehensive and economical watershed training. By sharing scientific expertise, facilities, and other resources, federal agencies can make better use of the resources available for training. By receiving the same basic training, government agencies may improve their ability to communicate and collaborate more effectively on resource management and regulatory issues.

This document marks the beginning of an effort to create an introductory stream corridor restoration course based on principles of ecology, analysis, planning and management that are common across agencies, across governmental and nongovernmental restoration approaches, and across regional as well as local scales. A design team composed of several IWTC members developed this document to represent their consensus on proposed course content and serve as an annotated outline for assigning the creation of course modules in the upcoming course development phase.

A Framework for Stream Corridor Restoration is a short course that will provide a basic but very broad foundation for the use of ecological, social and organizational management principles to guide activities to restore stream corridor condition. The course is structured for a wide variety of audiences typically involved in stream corridor restoration initiatives, ranging from informed citizens to stream restoration practitioners, within and outside the ranks of government. The focus is on learning the key components of a framework and process for supporting an interdisciplinary group involvement approach needed to carry out stream restoration efforts successfully. This Design Team Report outlines six lessons and auxiliary information that will be fleshed out to develop instruction modules and supporting materials for the course. IWTC representatives from six federal agencies developed the first draft of the report, and additional agencies have been invited to join the development phase.

The goal is to begin offering ***A Framework for Stream Corridor Restoration*** in the Spring of 1998. In the interim, specific course modules and supporting materials will be developed, instructors selected, and agency resources identified to sponsor several sessions of the course during 1998 and beyond.

Course Background Information

Overview

This training course provides a framework for supporting an interdisciplinary approach to stream corridor restoration initiatives. Content of the course will build on the foundation provided by a video on Stream Corridor Restoration that will be viewed by participants prior to attending the course. Lessons begin with an introduction to the ecological processes, structure, and functions within a stream corridor and watershed, and follow sequentially through five more main themes: characterization and condition analysis, partnerships, planning and implementation, monitoring, and managing a restoration initiative.

Target Audience

This course is aimed at individuals that are associated with the planning, reviewing, and conducting of stream corridor restoration initiatives. This includes a wide variety of audiences ranging from project directors and managers, to experts and technicians, to citizen volunteers and affected stakeholders. Each participant in a stream corridor restoration initiative plays a different role, offers a different perspective, and brings a unique blend of resources and capabilities to the effort. It is important, therefore, that participants have a common understanding of what they are working together to achieve and how to go about it in an effective and cost-wise manner. The course material is articulated at a level that speaks to all of these participants. Some in the audience may be more challenged by certain technical sections of the course. Similarly, technical experts will be exposed to non-technical aspects of restoration initiatives. The intent will be for everyone in the diverse audience to leave the course having gained general insights to all of the interlocking aspects of stream corridor restoration initiatives, and with particular insights relevant to their individual roles.

Objectives

Upon completion of this training, participants will be able to:

describe the basic characteristics of a stream corridor, the processes that shape it, and natural and manmade disturbances that can influence its condition.

detail key considerations in finding, analyzing and interpreting data relative to beginning the development of a stream corridor restoration activity.

explain the importance of partnerships to restoration initiatives, and summarize key steps in forming and maintaining partnerships to support restoration activities.

describe the general process for planning and implementing stream corridor restoration activities, noting important considerations at each stage of the process.

detail the basic elements of a monitoring approach that will document baseline conditions, evaluate effectiveness of restoration measures, and guide future restoration activities.

describe key considerations in managing a stream corridor restoration initiative.

Prerequisites

Trainees should have attended the introductory watershed course or its equivalent. Some environmental sciences course work or experience may significantly aid trainees. Typically, trainees will have significant experience or training in some of the topics covered and little or none in others.

Duration

Lesson	Time Estimate
I	6 hours
II	6 hours
III	6 hours
IV	6 hours
V	3 hours
VI	3 hours
Total Course	30 hours

Eligibility

No limitations based on course content. However, course sponsors may use eligibility guidelines for individual training sessions to promote attendance by specific parts of the target audience. Preference for specific target audiences, such as (1) Federal, State and Tribal employees directly conducting or managing interagency watershed projects and programs, or (2) members of agencies or organizations supporting the course with funding or other resources, will be determined for each offering of this course on a case-specific basis.

Course Outline

Lesson I: Introduction, and Review of Ecological Processes, Structure and Functions

Lesson II: Characterization and Condition Analyses

Lesson III: Partnerships

Lesson IV: Planning and Design

Lesson V. Monitoring

Lesson VI. Managing a Restoration Initiative

Lesson I: Introduction, and Review of Ecological Processes, Structure and Functions

OBJECTIVE 1: Upon completion of this training, participants will be able to describe the basic characteristics of a stream corridor, the processes that shape it, and natural and manmade disturbances that can influence its condition. Participants will be able to apply their knowledge to draw relationships among natural processes, structure, and functions within a stream corridor and related ecosystems at greater and lessor scales.

A. structure of natural systems at a range of relevant scales:
landscape
- watershed
- stream corridor
- stream
- reach

B. processes: how structure at these scales got that way
- first, something about temporal scales
- climatology
- geomorphology
- hydrology
- biological influences
- human influences

C. linkage of processes, structure, function; important working concepts:
- systems ecology
- inputs, internal processes, outputs
- source, sink, channel
- dynamic equilibrium, mosaic stability
- refugia
- disturbance theory

D. this section transitions to the next module by beginning to discuss agents of change (as compared to properly functioning systems)
- natural and human disturbance types
- range of natural variability
- introducing "condition"

E. *Summary Message*: characteristic ecological structure results from formative processes, and this leads to functions that benefit us and the environment; change and disturbance are constantly present within a natural range of variability, but change of greater magnitude can be severely damaging to condition in the long term, and leads us to the need for restoration.

LESSON LOGISTICS:

TIME: 1 day (This is covered by the watershed course in more detail than needed here)

LEARNING ENVIRONMENT: More lecture than exercises. Videos would be useful. Stop and read a short section here and there to change instruction format.

REFERENCE MATERIALS:

- SCRH Chapter 1, 2, 3
- Watershed course materials could be co-developed (long version for watershed course = 1 day, short version for this course = 2 day of critically important review)

Lesson II: Characterization and Condition Analyses

OBJECTIVE 2: Upon completion of this training, participants will be able to detail key considerations in finding, analyzing, and interpreting data relative to beginning the development of a stream corridor restoration activity.

A. characterization is the description of essential traits; if restoration is being considered, we must characterize the essential features that will help us decide whether, what, and where to restore.

- Relates to defining condition
  - current condition
  - historical condition
  - reference condition
  - desired future condition

B. how to describe: usually describing structure

- develop a simple conceptual model relating processes X structure matrix with functions in the boxes (fig 1); classification labels the elements on the structure axis.

- Developing a sense of reference condition
- classification (why important: reflects structure, way to relate to function and process, leads to understanding of condition)
- land cover example
  - inventory, mapping, sampling, other

C. how to analyze (preliminary – only to the problem ID level):

- indicators and what they mean, how used
- problem identification (relates to reference condition)
- interpret the conceptual model
- stressors, sources, pathways, effects
- determine magnitude of change and expected continued direction of change; whether action is needed to assist recovery
- relating human and natural agents of change to effects on the corridor

D. finding major data bases and data sources

- data pursued is based on what the model told us
- some of the major sources you need and how to get them

E. *Summary Message*: Knowing that stream corridors change sometimes beyond the range of natural variability, we need to characterize the system's structure and function to evaluate whether this has occurred. How we find that out is by comparing a site's characteristics to those of reference sites. To do this comparison we need to classify key attributes of structure, establish relationships between these structural attributes, processes that create and maintain (or change) them, and valued functions in the corridor. A conceptual model illustrates these relationships and allows us to select the general types of indicators that show whether there is a problem. Given this information, we can create a problem formulation statement that begins to apply characterization and condition analysis to the

process of deciding what approach we will take to stream corridor restoration. Major data sources that support these analysis steps are identified throughout the lesson.

PERFORMANCE EXERCISES:

Give the students an example watershed data set to apply characterization and condition analysis to determine the level of need for restoration. They receive topo, land cover, habitat maps, etc. and then view a video of the watershed following along stream corridors, but also showing the broader landscape. After the orientation, the student reviews the given map set and develops a rationale and rules of combining the maps to identify (based on the principles of the course} areas suitable and unsuitable for the different types of restoration practices. Then, on the same maps, the student will identify potential reference sites that would be used to confirm the results from the problem identification activity. Also, the students should list a particular suite of indicators that would be used at the reference sites and stream corridor sites to eventually evaluate the performance of the restoration initiative. *[The latter part of the exercise may need to be conducted after the Monitoring Unit (Lesson V) because that is where the concept of indicators is covered more thoroughly.]*

LOGISTICS:

TIME: 1 day (?)

LEARNING ENVIRONMENT: Combination of lecture, group exercise, video, etc.

REFERENCE MATERIALS:

- SCRH Chapters 3, 4b and 5a
- Some parts of watershed course may be useful but this lesson begins to cover new ground specific to restoration training.

Lesson III: Partnerships

Objective: *Upon completion of this training, participants will be able to explain the importance of partnerships to restoration initiatives, and summarize keys steps in forming and maintaining partnerships to support restoration activities.*

General points that are important

4 Stress the importance of planning, to save money, be effective in addressing the problem, to get people involved in the process (achieve buy-in), to identify roles (who is involved from decision-making, consultants, or administrative or regulatory).

4 Importance of public and stakeholder involvement from the very beginning of the planning process. They should be part of the dialogue and the decision-making process throughout.

4 Instructors identify parts of steps where special attention or participation is needed, all throughout the planning process. People's functions should be identified.

Minimum Topics to Be Covered

A. Getting organized. Stress the importance of forming appropriate partnerships to make the planning process work.

B. Why are partnerships needed?

- Times have changed, the public wants and needs to be involved in the decision-making process, and they are paying for it!
- Legal reasons, such as NEPA, FOIA
- Practical considerations: without partnerships, in many cases, implementation will never happen (provide access, land, monitor, O&M, etc.)

A. Examples of partnerships, spanning the full range

D. How do you identify stakeholders? Identify public/private/legal, etc.

- Federal agency people
  - Interdisciplinary teams, project managers
  - Agency missions, mandates, etc.
- Landowners directly affected or perceived to be affected
- NGO's
- Interest/advocacy groups
- Commodity groups

E. How can agencies be more effective? How can interest groups and others be more effective?

- How to obtain or give information
- Structures for involvement, pro's and con's
- Task forces, work shops, review/working groups, newsletters, etc.

F. Operating rules

- Consensus building
- Voting, negotiation

LOGISTICS:

TIME: This cannot be less than a one-day course.

LEARNING ENVIRONMENT:
Instructor(s)/classroom ?Get IPMP to teach/develop Partnerships part of the course?
Group interaction, role playing, small groups.

PERFORMANCE CRITERIA: Administer a multiple choice test on effective and ineffective partnerships, what not to do, what works, etc. Also through group exercises.

REFERENCES NEEDED:
--Interagency Stream Corridor Restoration Handbook, chapter 4.
--Institute for Participatory Management and Planning: Research, Development, Training, and Publishing in Consent-Building and Management Development Tools for Enhancing the Effectiveness of Publish Officials and other Decision-Makers--Hans and Anna Marie Bleiker (IPMP, PO Box 1937, Monterey, CA 93942-1937, (408) 373-4292)("The Bleiker Life Preserver")
--BLM video, e.g., "If the Mountain Could Speak: A story of Collaboration" (13:16)
--Resolve, Inc., an environmental negotiator/mediator.
--Project Partnership Kit, COE
--Institute for Water Resources, Alternative Dispute Resolution series, Dr. Jerry Priscoli, COE
--Agency Effectiveness, reprinted from Transaction of the 58th North American Wildlife and Natural Resources Conferences (1993), Special Session 4. Strategies for Improving Fish and Wildlife Agency Effectiveness.
--"Watershed Partnerships" EPA watershed academy course materials (two-week course).
--Lesson 6 of the "Watershed Approach" course, under developed.

Lesson IV: Planning and Design

Objective: *Upon completion of this training, participants will be able to describe the general process for planning and implementing stream corridor restoration activities, noting important considerations at each stage of the process.*

General points that are important

4 Emphasize importance of thinking early in the process to avoid problems later, especially when the implementation does not fit because of mistakes early in the process.

4 Provide case studies at the very beginning to look at the planning process. What was done well, what went bad, etc.

4 Emphasize that many institutional planning processes exist. The framework presented here is generic and is not intended to replace others.

4 Planning is a logical process that may require double-backs and iterations, depending on the nature of the restoration need.

Minimum Topics to Be Covered

A. Problem and opportunity identification

- Why is it important to identify problems and opportunities?
  (Emphasize the importance of understanding your environment—characterization and assessment first!)
- Identify the problem, process altered, opportunities
- Analysis of historic, existing, baseline, and future conditions.

B. Developing restoration goals and objectives

- Why is it important to develop restoration goals and objectives?
- How do I tie goals and objectives back to ecological processes?
  - Intuitive approach (reference condition/contrast)
  - Analytical approach (target based on monitoring)

C. Alternative selection and design

- How do I define alternatives, select the right one, and begin the design?
  - Active measures (e.g., stream bank stabilization, channel reconfiguration)
- Passive measures (e.g., agricultural BMPs , fencing off of riparian areas)
- Identify processes for evaluating alternative restoration plans
- Can arrive at same endpoint through variety of paths
- Describe the techniques, procedures, and models to evaluate
- How is the number one alternative selected?
- Appropriateness for specific landuse setting (context)
- Technical feasibility
- Social acceptability and political feasibility
- Legal or regulatory constraints
- Cost effectiveness
- Funding sources, including the nonfederal portions.

- Environmental consequences (examine through risk-based approach)

• How does it become the selected plan?

- Design criteria (including identification of indicators to monitor)
- Technical design (construction specifications/details)

D. Restoration implementation

• How do I build it or get the action on the ground?

- Budgeting, estimating
- Scheduling, timing of work, beginning and end stations, harvesting/stockpiling of materials, etc.
- Construction management, environmental hazard awareness, ingress/egress control, provisions for critical establishment (irrigation, etc.)

E. Restoration monitoring, evaluation, and adaptive management

• Why is monitoring important?
• When is monitoring done? As part of problem identification to determine magnitude, timing, and extent of problem, as well as after implementation to determine effectiveness.
• Concept of adaptive management and how it enters the planning process.
• How do I determine the best way to monitor? Monitoring plan.
• What is adaptive management, why is it important, and show examples of successes and failures.

[Design Team envisions a graphic to use throughout the session showing the cyclical, interconnected nature of each of the major process components listed above in items A-E (i.e., pictoral representation of framework for restoration)]

LOGISTICS:

TIME: This cannot be done is less than one day.

LEARNING ENVIRONMENT:
Instructor/classroom; group interaction; role-playing in small groups
--Prerequisite reading
--Small group break-outs to evaluate existing plan examples
--Provide case studies, especially those that are genuine failures, allow group discussion and analysis, and ultimately provide an understanding of what went wrong.
Case studies: Louisiana CPPRA (Coastal Planning Protection Administration Act), COE Chesapeake Bay Shore Erosion, Cross Florida Canal, Spotted Owl Plan, Kissimmee River, Everglades, Release the wolves in Yellowstone, AAA Triptik, 208 plan, county sewer plan.
--Group exercise to recognize what went wrong, in order to emphasize the importance of the planning process. Possibly use evening session to discuss performance objectives.
--Possibly have students bring two case studies in advance of the course, one that is what they think is a good example of a restoration project, and one that is a bad one. Possibly compact informal poster boards, with photos and one page max write-up. "Good" ones posted on one wall, "bad" ones on another, with students permitted to repost throughout the week as they learn?
-- Computer simulation or restoration scenarios that demonstrate active/passsive techniques - time frame for results; what happens over time frame, under what conditions.

PERFORMANCE CRITERIA: Administer a multiple choice test on effective and ineffective partnerships, what not to do, what works, etc. Also through group exercises.

REFERENCES:

--Interagency Stream Corridor Restoration Handbook, especially chapters 4, 5, and 6, also chapters 2 and 9.
--"Know Your Watershed" resource packages from CTIC.
--"Surf your watershed" by EPA.
--Disk with appropriate URL's for agencies, planning resources, etc., in formats to bring in as book marks for internet browser (Netscape, etc.)
--Each agency should bring a copy of their planning manual. Instructor should know the basic approaches or steps in each.
--Federal agency mandates, missions, policies related to restoration.
--Computer with internet access set up, so that agency home-pages and resources can be readily accessed?
--Other mandates, etc., that

Lesson V. Monitoring

Objective: Upon completion of this training, participants will be able to detail the basic elements of a monitoring approach that will document baseline conditions, evaluate effectiveness of restoration measures, and guide future restoration activities.

A. Overview of types and purposes of monitoring associated with restoration activities
- Baseline characterization monitoring (establishing existing condition)
- Trend monitoring (noting changes over time)
- Assessment monitoring (identifying causes and sources of impairment)
- Validation monitoring (checking assumptions)
- Implementation monitoring (were management measures implemented?)
- Effectiveness monitoring (did management measures achieve objectives?)

B. Steps to Monitoring
- Identify participants (whose involved in monitoring?)
- Define specific purposes and objectives (why should we monitor? what are we concerned about?)
- Identify available monitoring resources and capabilities (who brings what to the initiative?)
- Develop sample design
  - what parameters should we monitor, where, when, and how? (relate to restoration objectives)
    <u>Characteristics of good indicators</u>
    - ♢ sensitive (show change)
    - ♢ measureable
    - ♢ easy to detect/measure
    - ♢ link restoration objectives to management actions
  - what is the best way to allocate resources to collect the data? (relate to resources & capabilities)
- Adopt standardized protocols for monitoring and data management
  - field protocols
  - lab protocols
  - information protocols
- Establish communication strategy
  - document - monitoring plan
  - document - monitoring update results/accomplishments
  - document - sharing of results
- Establish methods for tracking performance and adapting the monitoring plan

LOGISTICS:

TIME: 3-4 hours

LEARNING ENVIRONMENT: Case studies: consider both hypothetical and real.
Have class develop a hypothetical monitoring plan that is evaluated for its effectiveness.

REFERENCES:

Olander (1995) Tom Subirge
Pseudo Replication --- Underwood -- Richard Everett

Before / After control impact reference site above below -- reference needed
USDA Conceptual Framework
Chapter 6 & 9 of the draft stream corridor restoration handbook

Lesson VI. Managing a Restoration Initiative

[Note to Design Team: This unit reflects a number of areas that were brought up during early team discussions of topics that should be covered by the course, but were not addressed by the breakout groups that focused on the lessons described above. These topics will need to be fleshed out if the team thinks they should be covered.]

Objective: Upon completion of this training, participants will be able to describe key considerations in managing a stream corridor restoration initiative.

A.	Important components of administration
1	Identifying and recruiting an interdisciplinary team
1	Managing workloads
1	Maintaining stakeholder involvement
1	Information management
1	Maintaining communication
1	Following adaptive management principles

LOGISTICS:

TIME: 3-4 hours

LEARNING ENVIRONMENT:

REFERENCES:

Appendix A. Breakout Groups for Course Unit Design

TEAM A - MONITORING UNIT AND DESIGN ELEMENTS OF PLANNING UNIT

Rich Everett, U.S. Fish & Wildlife Service
Terry Kaplan-Henry, U.S. Forest Service
Tom Subirge, U.S. Forest Service
Ron Tuttle, Natural Resources Conservation Service

TEAM B - ECOLOGICAL STRUCTURE & FUNCTION, CHARACTERIZATION & ANALYSIS UNITS

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Jack Holcomb, U.S. Forest Service
Don Holley, Natural Resources Conservation Service
Doug Norton, U.S Environmental Protection Agency
Rich Sumner, U.S Environmental Protection Agency
Lynn Townsend, Natural Resources Conservation Service

TEAM C - PLANNING AND PARTNERSHIPS UNITS

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Lee Skaggs, U.S. Army Corps of Engineers
Chris Zabawa, U.S Environmental Protection Agency