

---

---

**Demonstration Sites of Best Management Practices:  
A Manual for the Upper Etowah River Alliance**

Michael Bien  
Jehan El-Jourbagy  
Liv LiaBraaten  
Shana Udvardy

December 4, 2001

The Environmental Law Practicum: Etowah Initiative  
Offered in coordination with the University of Georgia School of Law  
and the Institute of Ecology

---

---

## Demonstration Sites of Best Management Practices: A Manual for the Upper Etowah River Alliance Organization

---

### Contents

i.	<b>Introduction</b>	<b>3</b>
ii.	<b>Background</b>	<b>4</b>
iii.	<b>Best Management Practices</b>	<b>5</b>
	• <i>Case Study 1: Chattahoochee National Forest</i>	<b>8</b>
	• <i>Case Study 2: Boling Park</i>	<b>10</b>
iv.	<b>Education: The Take-Home Message</b>	<b>12</b>
v.	<b>Key Successes, Lessons Learned and Recommendations</b>	<b>14</b>
vi.	<b>Appendix</b>	
	1. <b>Case Study Contacts</b>	<b>16</b>
	2. <b>Project Strategic Planning Stages</b>	<b>17</b>
	3. <b><i>Case Study 1: Chattahoochee National Forest</i></b>	
	1. <b>Streambank Restoration Plant List</b>	<b>18</b>
	2. <b>NEPA Compliance Guidelines</b>	<b>19</b>
	3. <b>Proposal Letter for NEPA Compliance</b>	<b>20</b>
	4. <b>Example Action Plan</b>	<b>21</b>
	5. <b>Interpretive Signs</b>	<b>30</b>
	6. <b>Budget</b>	<b>31</b>
	4. <b><i>Case Study 2: Constructed Wetland</i></b>	
	1. <b>Wetland Plant List</b>	<b>32</b>
	2. <b>Wetland Landscape Design</b>	<b>33</b>
	3. <b>“How to Make a Constructed Wetland</b>	<b>34</b>
	4. <b>Budget</b>	<b>35</b>
	5. <b>Interpretive Sign Information</b>	
	1. <b>Competitive Interpretive Sign Companies</b>	<b>36</b>
	2. <b>Comparison of Sign Materials</b>	<b>37</b>
	3. <b>Guidelines for In-House Graphic Design, File Preparation</b>	<b>38</b>
	6. <b>Trail Restoration: A Comparison of Surfaces</b>	<b>39</b>
	7. <b>BMP Power Point Presentation</b>	<b>40</b>
	8. <b>Annotated Bibliography</b>	<b>41</b>

## Introduction

---

This manual serves as a guide to develop Best Management Practice (BMP) demonstration sites along the Upper Etowah River and is for the Upper Etowah River Alliance (UERA), their counterparts and our successors under the CWA grant. The manual features two case studies that provide examples for future demonstration sites. The two case studies include:

- Streambank vegetation and access path restoration at two campsites in the Chattahoochee National Forest and
- A constructed wetland and streambank restoration demonstration at Boling Green Park in Canton, GA.

The objective of this manual is to provide explicit and comprehensive guidelines for developing non-point source reduction BMP demonstration sites in the Upper Etowah River area. Although there is a wide range of possible BMPs demonstration sites (agricultural, industrial, etc.), we believe this manual will provide helpful tools and resources for the UERA and future UGA student taking part in the Environmental Law Practicum, which is an Upper Etowah Initiative course offered through the Institute of Ecology.

We hope to focus the reader's attention on how to achieve the objectives of BMP demonstration sites proactively, that is, how to select appropriate sites as well as provide monitoring ideas and positive educational messages. Additionally, we hope this manual serves as a working model for the coordination and organization of future demonstration sites.

Our efforts are part of a larger, long-term project funded by a grant secured by the UERA and thus we hope that this document will help those who follow in our footsteps. In this regard, we have included a number of documents in the appendix which may not be critical to the text, but hopefully may serve as useful resources for future groups.

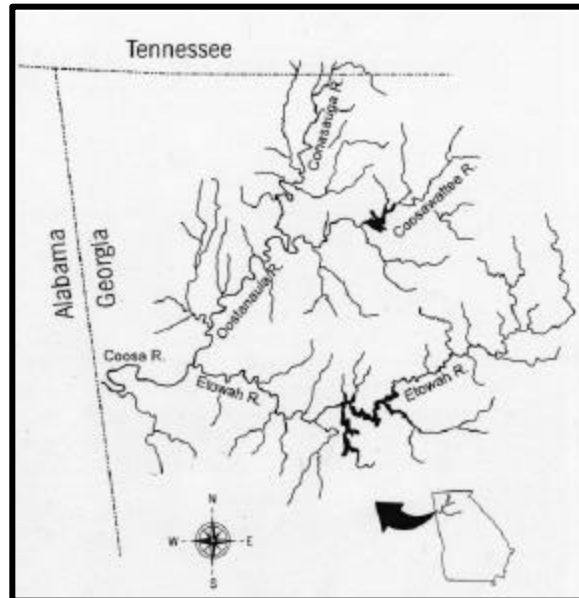
This manual has been developed by University of Georgia graduate students in the School of Law and the Institute of Ecology for the Environmental Law Practicum. The authors suggest to the reader that this is a working document and any comments or suggestions for improvement are welcome. Comments may be directed to: Candace Stoughton, [candace@yahoo.com](mailto:candace@yahoo.com) or [cstoughton@tnc.org](mailto:cstoughton@tnc.org).

This document is available on-line at UGA's Institute of Ecology's Outreach Office website at [http://outreach.ecology.uga.edu/etowah/fall2001\\_demonstration.html](http://outreach.ecology.uga.edu/etowah/fall2001_demonstration.html)

## Background

---

The headwaters of the Etowah River are near Dahlonega, Georgia. The river flows west southwest for 140 miles to Rome, Georgia, where it forms the Coosa River at its juncture with the Oostanaula River.



**Figure 1.** Map of Upper Etowah River

This project manual is funded by a grant pursuant to Section 319 (Nonpoint source Control Program) of the Clean Water Act (CWA) to develop demonstration sites for controlling nonpoint source (NPS) pollution in the Upper Etowah River. NPS pollution in the watershed falls into the following categories: agriculture, forestry, urban runoff, habitat modification and highway runoff. One of the main objectives of the project is to document changes in public knowledge and attitude. The project vision is to use a “holistic approach of demonstrations, public education and monitoring” to remove systematically from the list of impaired streams tributaries and sections of the main stem of the Upper Etowah. Our main tasks included:

- Identifying Best Management Practices to feature at one or more sites;
- Securing the sites;
- Drafting legal documents necessary to secure sites and develop partnerships;
- Developing a budget for the sites and assist in securing matching funding;
- Developing site plans;
- Developing a method of site monitoring; and
- Developing the educational materials that will accompany the sites.

## Best Management Practices

---

Best Management Practices (BMPs) are environmentally responsible methods of addressing NPS pollution in an effort to control to our surface waters. Much energy is being focused on NPS pollution as it continues to present the Nation with the number one source of water quality problems (Harbert and Droszcz 2000). There are many types of BMPs that fall within the agriculture, forestry, urban runoff, habitat modification and highway runoff categories. Habitat modification is the primary nonpoint source at Case Study 1 and urban runoff is the main problem at Case Study 2. The habitat modification at Case Study 1 has caused erosion and sedimentation. While the urban runoff occurring at Case Study 2 has caused increased pollutants from parking lots, there has also been an increase peak flow due to low infiltration, and an increase in sediments to the stream. The effects from each of the case studies will be briefly discussed below.

### **The Science Behind Case Study 1:**

#### *Erosion and Sedimentation Due to Habitat Modification*

When referring to sediments in streams there are three types:

- suspended load (suspended in the water);
- bed load (rolling or bouncing along the bottom); and
- bed material (stationary on the bed).

Sediment plays a major role in the transport and fate of pollutants and so is clearly a concern in water quality management. Toxic chemicals may become attached, or adsorbed, to sediment particles and then transported to and deposited in other areas. These pollutants may later be released into the environment. Erosion is the driving force behind sedimentation in streams. The difference between natural and human caused erosion is the time scale. Human generated erosion happens at a faster pace, hours and days compared to millennia from natural processes.

The sediment in streams increases the affect of toxic chemicals and their affect on aquatic life and their habitat. In addition, sedimentation incurs costs to society in the areas of water supply, agriculture and energy supply (these are discussed in greater detail under the Take Home Message section).

Toxic chemicals are able to attach and bind to the sediments which can be transported long distances and remain in the system for long periods. This is particularly a problem in the southeast where the fine clay soils stay suspended in the water column much longer than other soils.

## **Best Management Practices (Cont.)**

---

Sedimentation (bedload, suspended load, and bed material) in streams is particularly stressful and harmful to aquatic life (Environment Canada 2001):

- Suspended sediments in the water column increase turbidity and thus decrease light penetration. This affects fish feeding and schooling practices, and can lead to reduced survival.
- Suspended sediment in high concentrations irritates the gills of fish, and can cause death.
- Sediment can destroy the protective mucous covering the eyes and scales of fish, making them more susceptible to infection and disease.
- Sediment particles absorb warmth from the sun and thus increase water temperature. This can stress some species of fish.
- Suspended sediment in high concentrations can dislodge plants, invertebrates, and insects in the stream bed. This affects the food source of fish, and can result in smaller and fewer fish.
- Settling sediments can bury and suffocate fish eggs.
- Sediment particles can carry toxic agricultural and industrial compounds. If these are released in the habitat they can cause abnormalities or death in the fish.

## Best Management Practices (Cont.)

---

### The Science Behind Case Study 2:

*Increase in Pollutants and in Peak Flows due to Runoff from Impervious Surfaces*

Stormwater pollution occurs when rainfall runs over land, picks up pollutants, and deposits them into rivers lakes and coastal waters, or introduces them into ground water. In urban areas, rain falling on imperivious surfaces is transported directly into natural waters through storm drains or drainage ditches. Urban runoff from several surfaces includes:

- city streets
- parking lots
- sidewalks
- storm sewers
- lawns
- golf courses
- building sites

When water passes over the above surfaces, the runoff transports sediments, nutrients, heavy metals, petroleum products, and pathogens. The effects of this form of NPS pollution can result in beach closures, destroyed habitat, unsafe drinking water, fish kills, and many other severe environmental and human health problems. Each year the United States spends millions of dollars to restore and protect the areas damaged by NPS pollutants

## **Best Management Practice**

### *Case Study 1: Chattahoochee National Forest*

---

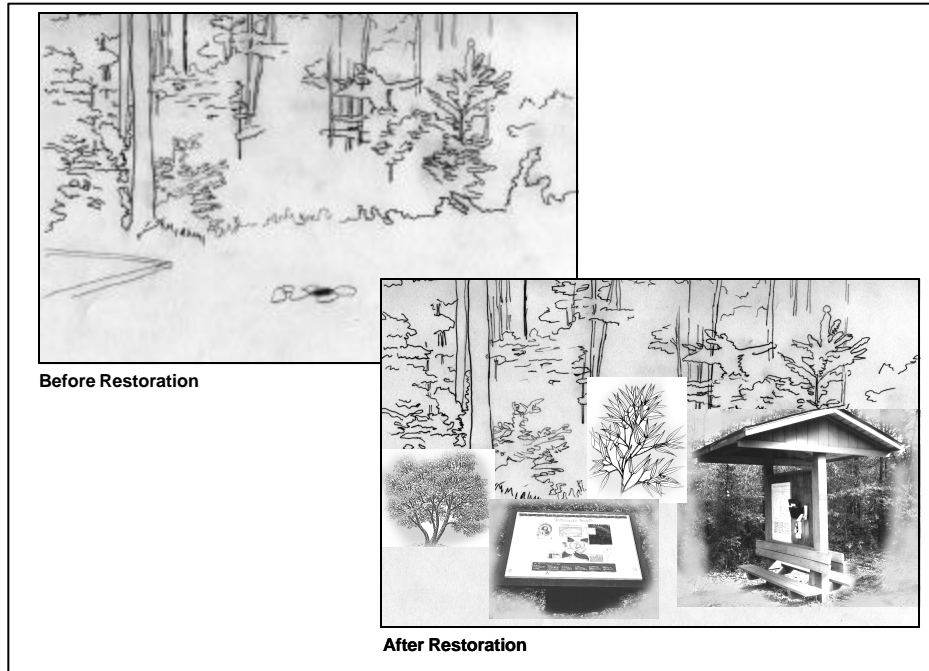
---

The Chattahoochee National Forest demonstration site is located in the headwaters of the Upper Etowah River watershed in Lumpkin county. This is an important site as it represents a limited area within the Etowah watershed of low threat and high levels of biodiversity (diversity of plant and animals) and / or endemism (native plant and animal species). In addition, the headwaters provide goods and services including our drinking water supply, recreation and biodiversity.

The demonstration lies within a campsite along Ward Creek just northwest of Dahlonega between Camps Merrill and Waseega. The objectives for this demonstration site include 1) education, 2) networking 3) change in attitude, 4) improve stream corridor, and 5) monitor effectiveness.

The Ward Creek campsite has been impacted by high visitation from vistors to the area. The riparian vegetation has been trampled and degraded, the earth compacted, and the trail to the creek eroded. The goal is to restore the riparian area by planting native grasses, shrubs and trees and to restore the access path to Ward Creek. The highly compacted soil decrease the amount of infiltration and increases runoff to the stream which carries sediments along with it. Sedimentation is the leading non-point source pollution in the United States. It is harmful to the living organisms in a stream because it lowers light availability and covers habitat. The destruction of the riparian vegetation will increase the amount of sunlight, causing an increase in water temperature that can be harmful to the aquatic organisms. In addition, the lack of vegetation will have an effect on the nutrient availability for the aquatic organisms due to the limited amount of leaf litter entering the stream.

The justification for these restoration practices is to slow down the chain of event linkages between a small disturbance in the headwaters to a larger disturbance downstream.



**Figure 2.** Ward Creek Campsite, Chattahoochee National Forest.

**Figure 3.** Access Path to Ward Creek, Chattahoochee National Forest.



A constructed wetland is traditionally defined as "...saturated substrates, emergent and submergent vegetation, animal life, and water that simulates natural wetlands for human use and benefits." After a rain event, runoff is temporarily stored in a shallow pool of water comprising a portion or the entirety of the wetland. Bacteria, fungi, and actinomycetes decompose natural and pollutant biodegradable materials. The products of this process are generally carbon dioxide and water. Resulting effluent generally exhibits low pH and low dissolved oxygen. Vegetation in a constructed wetland provides oxygen to aerobic decomposers, and incorporates nitrogen and phosphorus these microbes generate. Wetland plants also incorporate certain pollutants present in the runoff, filter sediments, and biodegrade carbon-containing materials. Although constructed wetlands are commonly created to mitigate stormwater pollution, more studies of their internal processes will improve project design, operation, and maintenance.



## Best Management Practices

### *Case Study 2: Boling Park*

To prepare for the installation, our group assumed the responsibilities of establishing and coordinating a network of collaborators, and contributing to the process of designing a site plan. Our efforts included:

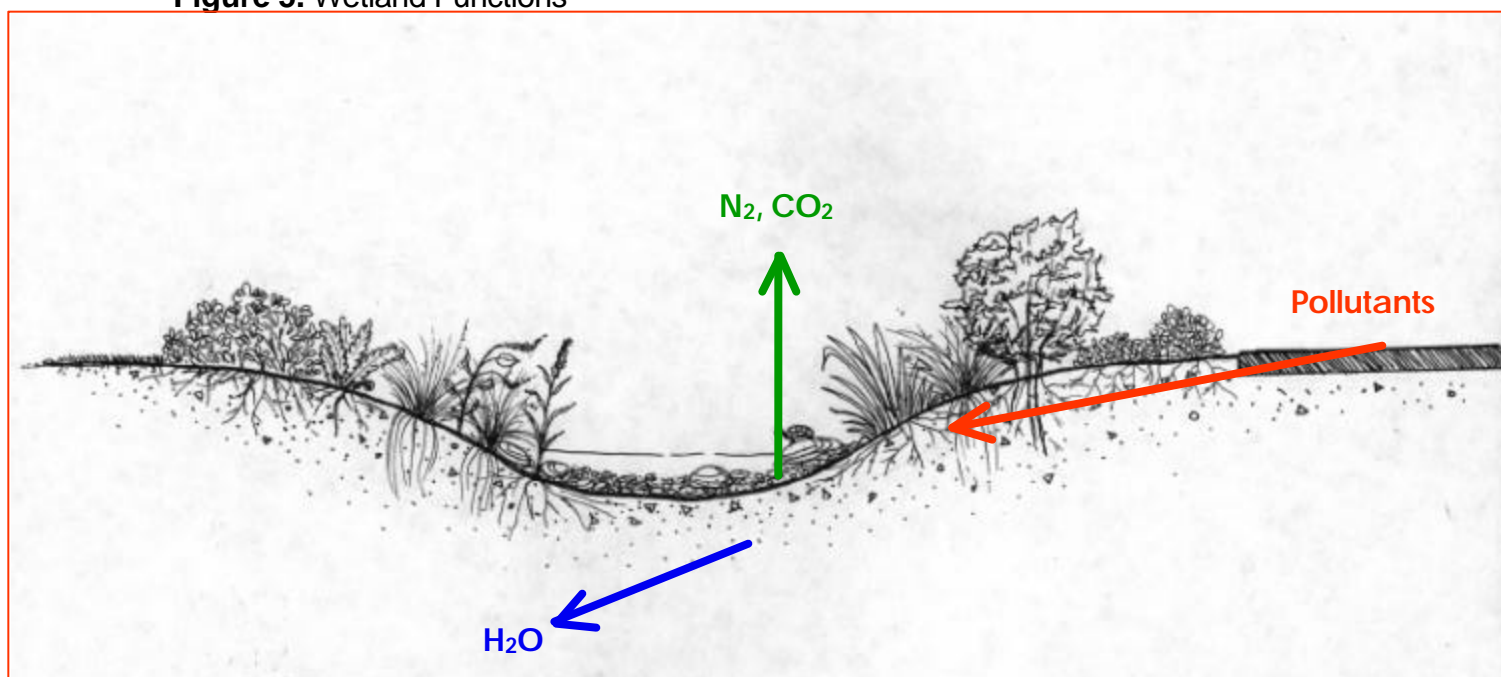
#### *Project Management/Coordination*

1. Establishing a relationship with Cherokee County Recreation and Parks Authority
2. Maintaining communication with Candace Stoughton, Etowah Alliance
3. Establishing a network of nurseries and landscape contractors local to Canton
4. Providing knowledge and technical assistance

#### *Design/Planning*

1. Make qualitative and quantitative observations of site, including special dimensions, orientation, topography, hydrology, vegetation, physical characteristics, human use
2. Participate in the planning process with project designer through meetings, brainstorming sessions and plan designs

**Figure 5.** Wetland Functions



## Education: The “Take-Home” Message

---

The challenge for those designing and constructing demonstration sites for BMPs is to out-compete the surrounding environment and recreation that the visitor(s) came to see and do. Therefore, in order for the demonstration site to be effective, the sign must communicate the “take-home” message both succinctly and dramatically. Most importantly, the message must relate to the visitor and what he/she came to see or experience (Trapp & Zimmerman 1992). Once it is known who the visitors are to the site in question, one may move on to creating an effective message. Trapp & Zimmerman (1992) suggest seven ways in which to do this:

- Say it visually. Use photos and drawings to help tell the story.
- Graphics should do more than duplicate what can be seen. They should reveal hidden meanings and ideas.
- Use a message pyramid: develop a descending order of message importance. This can be expressed as the 3-30-3 rule. Visitors can receive a message in three seconds, thirty seconds, or three minutes.
- Keep the message short! Use short sentences, short paragraphs. Use a readability scale such as Flesch test to help eliminate wordy phrases and paragraphs.
- Use concrete nouns and active verbs.
- Relate to the visitor's experience. Use personal pronouns, personal language, and familiar terms.
- Illustrate with metaphors, analogies, quotes, and real examples.

We wish to pose the question “Why do we Care”? We know of many reasons of why we care. One specific message we hope to relate to our BMP Demonstration site visitors is that their involvement in BMPs will help to save costs to society by lowering the need to remove sediments from behind reservoirs and from the turbines of dams and by maintaining the needed upper soil layer in agricultural areas. In each of these cases, implementing BMPs is the easiest and least expensive and most beneficial way of preventing sedimentation in our streams and rivers.

Additionally, their involvement will help to protect the aquatic life and their habitat. The principal causes of declining fish populations in the Southeast are due to habitat perturbations such as loss of forested stream cover. The riparian vegetation provides shade which maintains cool water temperatures, nutrients from fallen leaves and woody material, woody material for habitat, bank stabilization among other benefits. Perhaps the visitor may have an affinity for fly fishing or simply like fish. If not, we

## Education: The “Take-Home” Message (Cont.)

---

hope to make the impact by stressing that the highest diversity of freshwater fauna is found right here in Georgia in the Appalachian Mountains and Interior Plateau (Walsh et al. 1995). According to Wash et al. (1995) the Southeast has about 485 species of native freshwater fishes in 27 families. However, there are a large number of these that are not fairing to well. Approximately 21% of almost 300 species of minnows and darters are imperiled in the southeast (Walsh et al. 1995). Walsh et al (1995) state

“The most insidious threat to southeastern fishes is sedimentation and siltation resulting from poor land’use patterns that eliminate suitable habitat required by many bottom’dwelling species. Cumulative effects of physical habitat modifications have caused widespread fragmentation of many fish populations in the Southeast, presenting difficult challenges for those trying to reverse and restore diminished fish stocks.”

However, aquatic fauna can be resilient, that is they are able to recover from adverse conditions if restoration and conservation practices work to bring back natural conditions on a long term basis. The BMP demonstration sites are part of this important initiative to educate and take part in restoring a section of the Etowah River.

## Key Successes, Lessons Learned and Recommendations For the Future

---

### Key Successes

#### *Case Study 1: Chattahoochee National Forest*

- Plant List, BMP suggestions
- Sign Company
- Sign Design
- Sample Action Plan

#### *Case Study 2: Boling Park*

- Design of Constructed Wetland
- Coordinating all efforts in preparation for installation

#### *General*

- Participation in selection of plant species to be included in the project
- Locating, selecting and coordinating plant suppliers, landscape contractors, and volunteer labor sources local to the site
- Maintaining communication with Cherokee County Recreation and Parks Authority

### Lessons Learned

It is important to get a good working dynamic going in the beginning of the project. Specifically, this means that a common vision and objective are reached not only between the graduate students, but also between the counterparts. Given this, however, it is necessary to be flexible in the goals and objectives that are set in the beginning as many things may change that are out of your control. For example, in the Case Study 1 (USFS, Chattahoochee National Forest) we found that we had to be flexible with our expected outcomes due to the NEPA regulation which is a 30 day process (Appendix 3.2)

## **Key Successes, Lessons Learned and Recommendations For the Future**

---

There are essential points regarding the 319 grant which are important to remember when designing the future collaborations and plans for the demonstration sites:

1. The 60/40 Rule
  - a. 60% of the funds are provided by the grant and 40% must be matching funds (i.e. provided by counterpart) (see Appendix 3.5 and 4.3)
2. Federal matching funds do not count.
3. Recreational activities can not be addressed under the grant.

### **Recommendations for the Future**

With this manual as a prototype, it appears that the logical direction for the next group of graduate students in the Environmental Law Practicum is to develop a scoping document of future demonstration sites. The document would provide tentative sites for each of the BMP categories, a GIS map with these localities and a contact list of future counterparts. In this way, the UERA will have a good framework to prioritize funding so as to maintain a balance of BMP categories.

Additional recommendations include:

- NEPA Compliance Guidelines
- Contact local volunteer organizations early in process to increase and volunteer time base
- Determine the timeframe of the people being worked with
- Assess the parameters of the grant (ex: campsites and recreation are not included)

## Appendix 1: Case Study Contacts

### Case Study 1: Chattahoochee National Forest

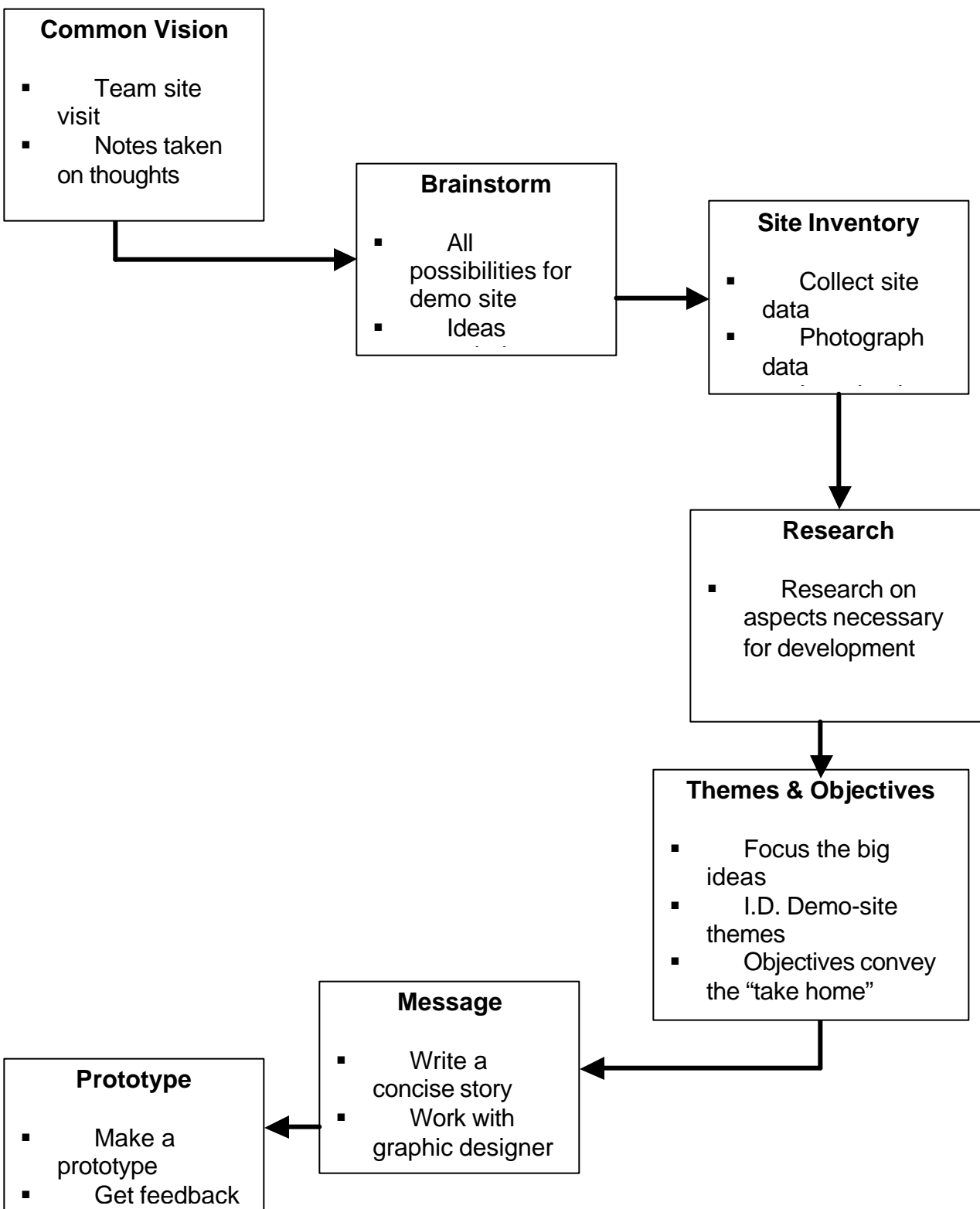
Organization	Contact	Address	Phone	E-Mail / website
<b>Trout Unlimited</b>	Larry Vigil, Council Chairman	4450 Oklahoma Way, Kennesaw, GA 30152	770-429-0570 (H), 404-584- 7057 (W); 404-688-0700 (Fax)	lvflyfish@mind spring.com
<b>UERA</b>	Candace Stoughton, Program Manager	341 East Main Street, Canton, GA 30114	77-704-7280	www.etowahri ver.org
<b>USFS</b>	Jim Wentworth, Central Zone Biologist	Brasstown Ranger District, Chattahoochee-Oconee National Forest	706-745-6928	jwentworth@fs .fed.us
<b>UGA – Institute of Ecology Office of Outreach</b>	Beth Gavrilles	Institute of Ecology, University of Georgia, 30602	706-583-0463	bethgav@arch es.uga.edu

### Case Study 2. Boling Park, Canton, GA.

Organization	Contact	Address	Phone	E-Mail / website
<b>Cherokee County Recreation and Parks Authority</b>	Keith Hammond, Director	7545 N. Main Street	770-924-7768	akeithhammond@aol.com
<b>UERA</b>	Candace Stoughton, Program Manager	341 East Main Street, Canton, GA 30114	770-704-7280	www.etowahriver.org
<b>Project Designer</b>	Laura Hall-Gabriel	225 Oglethorpe, Athens, GA	706-208-1549	lhg225@aol.com
<b>UGA – Institute of Ecology Office of Outreach</b>	Beth Gavrilles	Institute of Ecology, University of Georgia, 30602	706-583-0463	bethgav@arches.uga.edu

## Appendix 2: Project Strategic Planning Stages

---



### **Appendix 3.1: Chattahoochee National Forest**

#### *Streambank Restoration Plant List*

---

#### **For semi-shaded situations, where erosion control is needed:**

##### Grasses

*Chasmanthium latifolium* (River Oats, or Upland Sea Oats)

*Elymus hystrix* (Bottlebrush Grass)

*Elymus virginicus* ( Virginia Wildrye)

*Arundinaria gigantea* (River Cane) This gets tall: 6'-8', and might not be desirable

#### **For sunny areas that are periodically wet:**

*Andropogon glomeratus* (Woolly Broomsedge)

*Panicum virgatum* (Switchgrass)

*Andropogon virginicus* (Broomsedge)

#### **Shrubs for streambank or slightly upland from streamside:**

*Cornus amomum* (Silky dogwood)

*Cephalanthus occidentalis* (Buttonbush)

*Alnus serrulata* (Alder)

*Ilex decidua* (Deciduous Holly)

*Asimina triloba* (Dwarf pawpaw)

*Vaccinium corymbosum* (Highbush blueberry)

#### **Ferns for moist areas (shade to semi-shade)**

*Osmunda cinnamomea* (Cinnamon Fern)

*Onoclea sensibilis* (Sensitive Fern)

*Woodwardia areolata* (Netted Chain Fern)

*Osmunda regalis* (Royal fern)

#### **For upland areas around campsites:**

*Vaccinium vacillans* (Lowbush blueberry)

#### **Trees for floodplain:**

*Betula nigra* (River birch)

*Salix nigra* (Black willow)

*Carpinus caroliniana* (*Musclewood*)

## **Appendix 3.2: Chattahoochee National Forest**

### *NEPA Compliance Guidelines*

---

#### Discussion

When working on small projects, such as bank stabilizations and campsite rehabilitations, the United States Forest Service (USFS) generally does not have to deal with the lengthy procedures involved in satisfying the National Environment Policy Act (NEPA). Instead, the USFS meets minimal requirements. NEPA often involves a lot of paperwork, and for small projects, the paper work takes longer than the actual implementation of the project. For this reason, there are certain categorical exclusions pertaining to certain projects. In the case of timber sales or administrative site construction, full-blown NEPA analysis must be completed.

#### Steps to take for smaller projects

1. Write a proposal describing the intended project work.
2. Send proposal letter to thirty public services organizations for public comment.
3. Thirty days is generally given as a comment period.
4. After receiving comments, the USFS (in this case) then determines whether or not the project will impact the environment or wildlife in any detrimental ways. Generally, the USFS must make sure that the project will not violate the Endangered Species Act and the provision pertaining to antiquities and archaeological sites. These studies may be done during the thirty-day comment period.
5. USFS prepares a decision memo that contains the findings. The decision memo tends to be about six to seven pages in length when addressing smaller projects.

### **Appendix 3.3: Chattahoochee National Forest**

#### *Proposal Letter for NEPA Compliance*

---

**File Code:** 2300/2500/1950

**Date:**

Dear Forest User:

I am inviting you to comment on the following actions proposed to take place on the Toccoa Ranger District. These actions would take place on National Forest lands in the vicinity of Camp Frank Merrill and Camp Wahsega in Lumpkin County, Georgia. We are proposing to implement Best Management Practices (BMP's) pursuant to Section 319(h) of the Clean Water Act. The BMP's include rehabilitating two campsites, constructing a permanent path to the Etowah near the bridge on FS road 28-1 (locally know as the Montgomery Creek Bridge), and stabilizing the riverbank just upstream of the Montgomery Bridge.

The purpose of the campsite rehabilitations is to create an ecologically sound buffer zone next to Ward Creek and the Etowah; furthermore, by providing lamp poles and information on proper trash disposal and responsible camping. The trees and surrounding vegetation will recover following extensive use from previous visitors. Permanent paths to the water are needed at the Ward Creek Campsite, the Etowah River Campsite and near Montgomery Bridge because of erosion from repetitive stress from visitors walking down to the creek/river. The purpose of the bank stabilization is to prevent the erosion of the nearby road and degradation of the Etowah Darter habitat due to increasing sedimentation. The Etowah Darter is a fish species federally listed as endangered under the Endangered Species Act.

The camp rehabilitation activities will involve a group of Forest Service employees and/or volunteers to:

1. Move tent pads to a sustainable distance from Ward Creek and the Etowah River;
2. Construct designated bark chip paths to the river/creek;
3. Construct designated parking areas for the camp sites (using porous pavement or bark chips);
4. Install lamp poles and interpretative signs;
5. Stabilize river banks using root wads;
6. Place fallen logs to block overused access points to the river.

We are currently in the process of determining the significant environmental issues and public concerns. You can help us in completing our analysis by providing comments on this proposal. Your comments should be as specific as possible and contain the following information: your name and address, the project name (Ward Creek/Etowah River Rehabilitation), and specific comments along with supporting reasons you believe your comments should be considered by the Deciding Official.

Environmental concerns already being considered by the planning team include protection of water quality, protection of archaeological resources, protection of sensitive and endangered plant and animal species, and maintaining the established Visual Quality Objectives.

We would appreciate any written comments back by Monday, December 3, 2001, or you may call our office in Blue Ridge. Please direct any calls to our District Resource Officer, Becky Bruce. Thank you for your time and interest in management activities on the Toccoa Ranger District, Chattahoochee National Forest.

Sincerely,

/s/ Cassius M. Cash  
CASSIUS M. CASH  
District Ranger

Enclosure

cc: John Petrick, S.O.  
Carolyn Hoffman, S.O.  
Rick Semingson, Toccoa  
Becky Bruce, Toccoa  
Jim Wentworth, Brasstown

## **Appendix 3.4: Chattahoochee National Forest**

### *Example Action Plan*

---

# **UNITED STATES FOREST SERVICE DEMONSTRATION SITE ACTION PLAN**

## **Background**

The following plan is collaboration between the Environmental Law Practicum and the United States Forest Service. This is an example of an action plan to implement best management practices. However, since the grant requires that recreation may not be included in site selection and site development, we cannot officially use the campsites as a BMP demonstration site. Fortunately, the paths and riverbanks along the campsites may constitute grant-targeted sites, and thus we will focus on the path stabilizations and riverbank vegetation while also incorporating campsite remediation techniques. This is by no means an exhaustive list of implementation strategies.

## **Target Publics for Chattahoochee National Forest:**

Local Boy scouts  
USFS  
Upper Etowah River Alliance  
Trout Unlimited

## **Demonstration Site I: Ward Creek Campsite**

### ***Need***

The Ward Creek camping ground suffers from overuse along the creek bank. There are two tent pads that are only two to four meters away from the stream. The tent pads need to be moved away from the creek to allow for a larger riparian buffer zone. Also, because there is not a designated place to park, there has been overuse of spaces accessible by vehicles. In order to revegetate these areas, cars need to be redirected to an appropriate parking site. Because of irresponsible campers, trees are damaged from nails and lantern heat and trash also litters the area. Besides erosion from the driveway, the path from the creek is also eroded and probably needs creative path stabilization methods employed. Furthermore, Orchard Grass, an invasive grass, is all over the camping area, and this should be replaced by a native species.

## Appendix 3.4: Chattahoochee National Forest

### *Example Action Plan*

#### **Strategy I: Relocate Tent Pads (move away from Creek)**

<b>Materials Needed</b>
Hand tools
Vegetation from the forest
Landscaping poles or Cross-ties (16' on a side)
Steel rebar
Pea gravel
Soil and bark chips

#### **Best Management Practice: Campsite Rest**

##### Implementation Strategy

- Block off the areas to the campsites to prevent overuse until the area is revegetated.

#### **Best Management Practice: See Relocation below**

##### **Present Method: Relocation**

- Using hand tools (shovels, rakes, etc.), dig level surface in the ground to place the crosstie borders.
- Anchor timbers with three feet pieces of rebar
- Fill in tend pad with pea gravel using a rubber tired farm tractor

#### **Strategy II: Interpretative Sign / Education (flip sign)**

<b>Materials Needed</b>
Sign
Signpost
Information for Sign

#### **Best Management Practice**

Acquire sign from environmentally friendly company and place so that it is noticeable, yet non-intrusive. The sign should include straight-forward and positive messages and should be built to last.

- Contact sign makers
- Get price quote
- Habitat information
- Ecology (exotic v. indigenous species)
- Pavement information

## Appendix 3.4: Chattahoochee National Forest

### *Example Action Plan*

- Before and after pictures
- Simplified map
- Contact information
- Indigenous plants and animals
- How to use the bathroom in the woods
- Pack it in; pack it out

#### **Present Method**

- Mount sign to post
- Using hand auger or post hole diggers, place post in ground

### **Strategy III: Rehabilitate Surrounding Area**

#### **Materials Needed**

Lamp poles  
 Trash cans  
 Vegetation from the forest (potentially heaps of dirt or fallen branches)  
 Seed  
 Fertilizer  
 Shrubs

#### **Best Management Practice: Streambank Vegetation**

- Using handtools, plant Silky dogwood, Buttonbush, Alder, Deciduous Holly, Dwarf pawpaw and Highbush blueberry along the streambank or slightly upland from the streamside.
- To control erosion and in semi-shaded areas, plant River Oats, Bottlebrush Grass, Virginia Wildrye or River Cane

#### **Best Management Practice: Campsite Rehabilitation**

- Designate Trash sites
- Revegetate the old tent pads using lowbush blueberry for the upland areas around campsites.
- Block of area for cars using natural elemtns
  - Potentially: Porous pavement for parking area (for two or three cars) – 10 percent over normal pavement price
- Replace non-native grasses with River Oats, Bottlebrush Grass, Virginia Wildrye or River Cane
- For sunny areas that are periodically wet, plant Woolly Broomsedge, Switchgrass and Broomsedge

## Appendix 3.4: Chattahoochee National Forest

### *Example Action Plan*

---

#### Present Method

- Restrict vehicular access to defined area away from stream using large rocks, logs or posts
- Scarify bare ground with hand tools (fire rakes)
- Apply see, fertilizer and mulch to all exposed soils
- Plant native tree/shrubs (suggest orchard grass) along streamside area
- Plant native tree/shrubs along road banks in the vicinity of the project

### Strategy IV: Path Stabilization

#### Materials Needed

Bark chips  
Pilings  
Tools  
Pea gravel  
Landscape timbers/Native Logs/Cross-Ties  
Revegetation (grasses, shrubs, trees)

#### Best Management Practice: Path Stabilization

- See Present Method below

#### Present Method

- Delineate path using landscape timbers or logs
- If necessary, build steps down to the creek using cross-ties
- Surface path with pea gravel or bark mulch

### Strategy V: Monitoring

#### Best Management Practice

- To assess public opinion, install a demonstration book at the site
- Once a year, conduct a focus group of people who have visited the stie
- To assess water quality, a representative from the United States Forest Service should check sedimentation on a monthly basis as well as observe any changes in bank degradation.

## Appendix 3.4: Chattahoochee National Forest

### *Example Action Plan*

## Demonstration Site II: Etowah River Campsite

### Need

Like the Camp Creek campsite, the campsite at the Etowah River has also suffered from misuse along the river's edge. Tent pads were situated on the uphill side of the stream, but after USFS noticed damage, the tend pads were removed. The damage from those tend pads is still visible under a very tranquil setting of Hemlock trees, so this area probably needs to be blocked off with nonintrusive materials. Also, trees are being damaged by heat from lanterns as well as nails being driven into the barks. Unfortunately, the ground has been littered with toilet paper.

### Strategy I: Rehabilitate old campsite

#### *Materials*

Logs or other forest materials (potentially heaps of dirt)

Revegetation (grasses, shrubs and trees)

Planting tools

#### **Best Management Practice: Streambank Vegetation**

- Using handtools, plant Silky dogwood, Buttonbush, Alder, Deciduous Holly, Dwarf pawpaw and Highbush blueberry along the streambank or slightly upland from the streamside.
- To control erosion and in semi-shaded areas, plant River Oats, Bottlebrush Grass, Virginia Wildrye or River Cane

#### **Best Management Practice: Campsite Rehabilitation**

- Revegetate the old tent pads using lowbush blueberry for the upland areas around campsites.
- Block of area for cars using natural elemtns
  - Potentially: Porous pavement for parking area (for two or three cars) – 10 percent over normal pavement price
- Replace non-native grasses with River Oats, Bottlebrush Grass, Virginia Wildrye or River Cane
- For sunny areas that are periodically wet, plant Woolly Broomsedge, Switchgrass and Broomsedge

#### **Present Method**

- Restrict vehicular access to defined area away from stream using large rocks, logs or posts
- Scarify bare ground with hand tools (fire rakes)

### Appendix 3.4: Chattahoochee National Forest

#### *Example Action Plan*

- 
- Apply see, fertilizer and mulch to all exposed soils
  - Plant native tree/shrubs (suggest orchard grass) along streamside area
  - Plant native tree/shrubs along road banks in the vicinity of the project

### Strategy II: Interpretative Sign / Education

<p style="text-align: center;"><b>Materials</b> Sign Sign post Information for Sign</p>
---

#### Best Management Practice

Acquire sign from environmentally friendly company and place so that it is noticeable, yet non-intrusive. The sign should include straight-forward and positive messages and should be built to last.

- Contact sign makers
- Get price quote
- Habitat information
- Ecology (exotic v. indigenous species)
- Pavement information
- Before and after pictures
- Simplified map
- Contact information
- Indigenous plants and animals
- How to use the bathroom in the woods
- Pack it in; pack it out

#### Present Method

- Mount sign to post  
Using hand auger or post hole diggers, place post in ground

### Strategy III: Rehabilitate Surrounding Area

<p style="text-align: center;"><b>Materials</b> Lamp poles Trash Cans Hand tools Revegetation (shrubs, trees and grasses)</p>
---

## Appendix 3.4: Chattahoochee National Forest

### *Example Action Plan*

#### **Best Management Practice: Vegetate with Native Grasses**

- Remove the Orchard grass and replace with River Oats or U pland Sea Oats
- Other native plants for erosion control include Bottlebrush Grass
- Virginia Wildrye
- In areas with less traffic, River Cane is useful

#### **Strategy IV: Path Stabilization**

##### **Best Management Practice: Path Stabilization**

- See Present Method below

##### **Present Method**

- Delineate path using landscape timbers or logs
- If necessary, build steps down to the creek using cross-ties
- Surface path with pea gravel or bark mulch

## **Demonstration Site III: Bank Stabilization**

### ***Need***

Because of dock sticking out into the Etowah River, the waters have sped up at that site and thus cut at a downstream site. The severe down cutting is endangering a road that is between Montgomery Creek Bridge and the fishing site.

#### **Strategy I: Education**

<p><b>Materials</b></p> <p>Signs</p> <p>Signposts</p> <p>Tools</p> <p>Information for Signs</p>
---

##### **Best Management Practice**

Acquire sign from environmentally friendly company and place so that it is noticeable, yet non-intrusive. The sign should include straight-forward and positive messages and should be built to last.

### Appendix 3.4: Chattahoochee National Forest

#### *Example Action Plan*

- Contact sign makers
- Get price quote
- Habitat information
- Ecology (exotic v. indigenous species)
- Pavement information
- Before and after pictures
- Simplified map
- Contact information
- Indigenous plants and animals
- How to use the bathroom in the woods
- Pack it in; pack it out

#### **Present Method**

- Mount sign to post
- Using hand auger or post hole diggers, place post in ground

### **Strategy II: NEPA**

#### **Materials**

Information from site  
 Proposal Letter  
 List of species (plants and animals)  
 Antiquities

### **Strategy III: Fill stream bank**

#### **Materials**

Moving equipment  
 Fill material from forest  
 Tree root wads  
 Large rock  
 Seed  
 Mulch

#### **Present Method**

- Using a backhoe on top of the bank, dig in tree root wads into the bank to stabilize and fill in void.
- Place large rock and soil in void to reestablish bank.
- Seed and mulch exposed soils

## Appendix 3.4: Chattahoochee National Forest

### *Example Action Plan*

---

#### **Alternative to Strategy III: Relocate fishing landing to redirect flow of water**

<p><b>Materials</b></p> <p>Moving equipment</p> <p>Shovels</p> <p>Dumpsite (for materials from landing)</p>
---

**Present Method**

- Using a backhoe, dig out area behind existing retaining wall
- Construct new retaining wall using crossties or by pouring concrete
- Once new retaining wall is in place, remove existing logs
- Purpose: to use the existing logs to reduce run-off into the river during the installation of the new retaining wall.
- When the new wall is in place, a wheel-chair accessible fishing platform would be added
- The area leading down to the bank would be graveled or hardened with some other material to reduce sedimentation.

**Appendix 3.5: Chattahoochee National Forest**  
*Interpretive Signs*

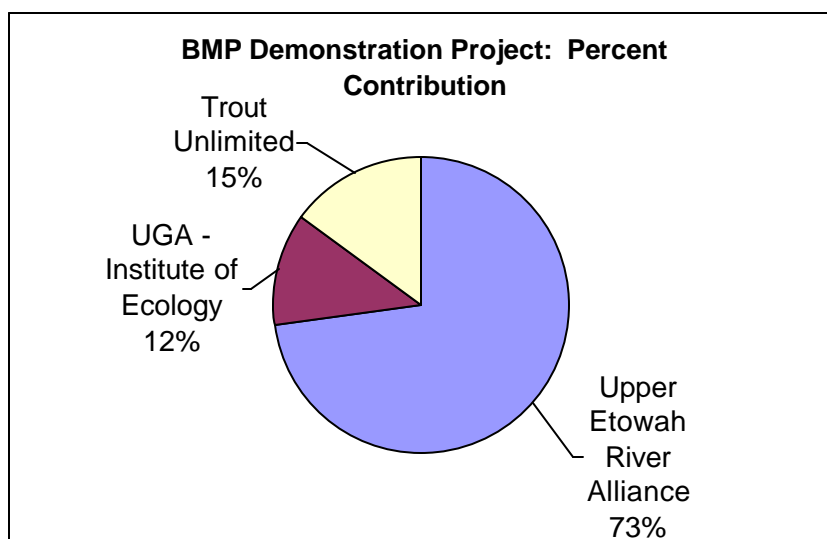
---

**PLEASE SEE FOLLOWING PAGES (3.5-1 – 3.5-4) TO VIEW  
THE INTERPRETIVE SIGN PROTOTYPES**

### Appendix 3.6: Chattahoochee National Forest

#### Budget

BMP Budget for the Chattahoochee National Forest Service			
Project	Upper Etowah River Alliance	UGA - Institute of Ecology	Trout Unlimited
<b>Path restoration</b>			
1 Soil and Bark chips	\$200.00	\$0.00	\$0.00
2 Railroad ties/pilings	\$150.00	\$0.00	\$0.00
3 Rebar	\$25.00	\$0.00	\$0.00
4 Vegetation from the forest	\$0.00	\$0.00	\$0.00
5 Seed,fertilizer, mulch hay	\$150.00	\$0.00	\$0.00
6 Labor	\$0.00	\$198.00	\$700.00
<b>Subtotal:</b>	<b>\$525.00</b>	<b>\$198.00</b>	<b>\$700.00</b>
<b>Path restoration total:</b>	<b>\$1,423.00</b>		
<b>Stream Bank Re-Vegetation</b>			
1 Soil	\$0.00	\$0.00	\$0.00
2 Vegetation from the forest	\$0.00	\$0.00	\$0.00
3 Seed,fertilizer, mulch hay	\$200.00	\$0.00	\$0.00
4 Labor	\$0.00	\$198.00	\$520.00
<b>Subtotal:</b>	<b>\$200.00</b>	<b>\$198.00</b>	<b>\$520.00</b>
<b>Revegetation Total</b>	<b>\$918.00</b>		
<b>Interpretative Sign - flip box design</b>			
1 Design	\$0.00	\$132.00	\$0.00
2 Layout	\$0.00	\$132.00	\$0.00
3 Interpretative panel - laminate	\$770.00	\$0.00	\$0.00
4 Pedestal for panel	\$220.00	\$0.00	\$0.00
5 Labor	\$0.00	\$0.00	\$100.00
<b>Subtotal:</b>	<b>\$990.00</b>	<b>\$264.00</b>	<b>\$100.00</b>
<b>Interpretative sign total:</b>	<b>\$1,354.00</b>		
<b>Collaborator's total contribution</b>	<b>\$1,715.00</b>	<b>\$660.00</b>	<b>\$1,320.00</b>
<b>Total Cost</b>	<b>\$3,695.00</b>		



## **Appendix 4.1: Boling Park**

### *Wetland Plant List*

---

#### **Trees**

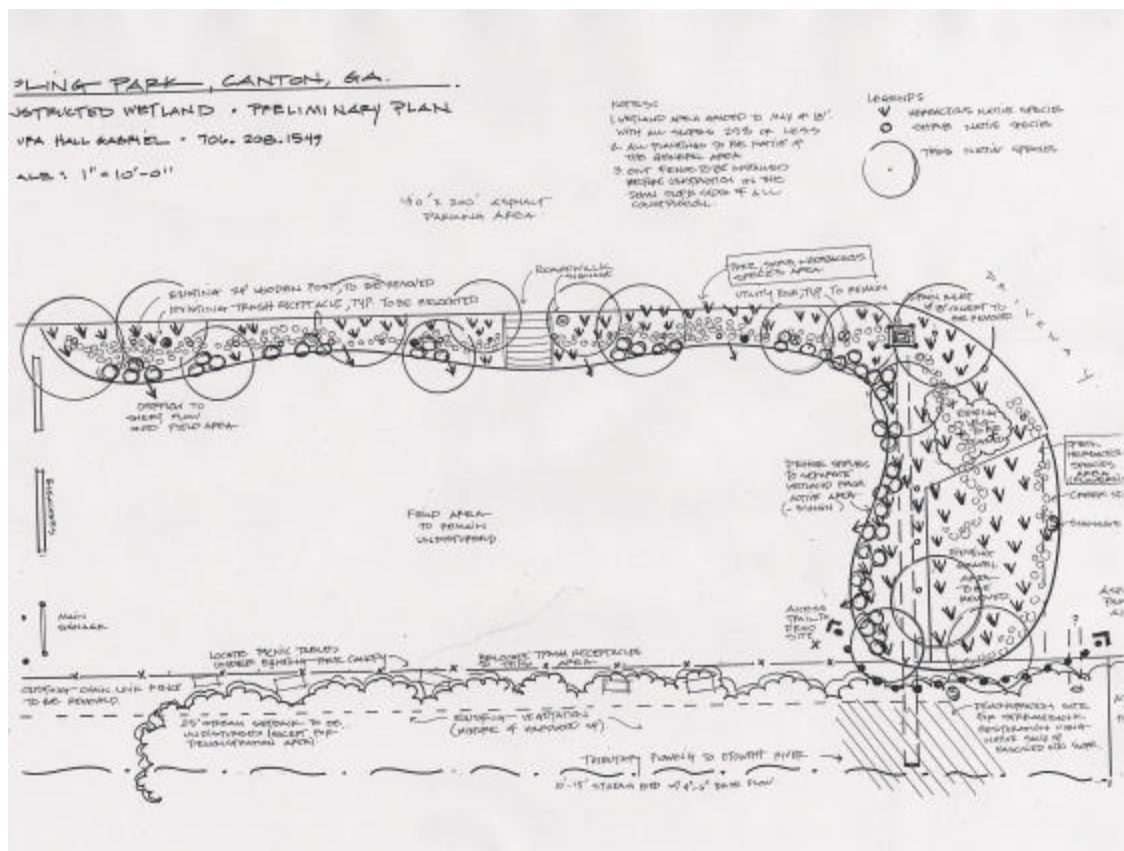
*Green Ash*  
*Black Gum*  
*Ironwood*  
*Sweet Bay Magnolia*  
*Swamp Chestnut Oak*  
*Silky Dogwood*  
*Silverbell*

#### **Shrubs**

*Beauty Bush*  
*Elderberry*  
*Virginia Sweet Spire*  
*Possum Haw*  
*St. John's Wort Shrub*  
*Strawberry Bush*  
*Sweet Shrub*  
*Winterberry*

#### **Herbaceous**

*New England Astor*  
*Blazing Star*  
*Cardinal Flower*  
*Evening Primrose*  
*Georgia Basil*  
*Swamp Hibiscus*  
*Blue Iris*  
*Copper Iris*  
*Ironwood*  
*Joe Pye Weed*  
*Lizard Tail*  
*Swamp Milkweed*  
*Pathrush*



### Appendix 4.3: Boling Park

#### *“How to make a Constructed Wetland or Rain Garden”*

---

Wetlands and rain gardens involve the use of bioretention to maximize the removal of pollutants from draining water before it returns to a stream, lake, etc. Bioretention is the practice of combining physical, biological and chemical processes to remove pollutants from the water.

A good location for a wetland or rain garden is wherever water runoff gathers or is deposited, like next to a hard surface such a sidewalk or driveway or under house gutters. The landscape of the wetland is designed to have a dip or swale at the center of the receiving area to collect rain and snowmelt. The best plants to use are hardy, native species that thrive without chemical fertilizers or pesticides and can tolerate extremes in temperature or wetness. These ideally include shrubs, grasses, wildflowers, and even trees. The less “turf,” the better.

The size of the wetland is calculated according to the area of rain water it serves; the area of drainage it provides. The size of a rain garden should be 5% to 7% of the drainage area multiplied by the crop “c” coefficient or the ground cover type (i.e., 3/10 acre draining needs a 600 square foot (15 X 40) garden. The goal is to have the water drain within 3 days. Six inches has generally been found to be a good depth. Any longer period of standing water could result in the proliferation of mosquito/insect breeding as well as odors. If the rainwater collection area is too large in proportion to the wetland capacity, small culverts and/or swales may be used transfer water from one rain garden to another that has additional capacity.

The wetland function is carried out of a number of soil layers, which serve different purposes. A wetland needs a spongy, litter layer on top that soaks up water and allows it to penetrate the soil slowly. Additionally, it needs a mulchy organic layer that will provide a good environment for decomposition and also remove metals. Shredded hardwood is recommended. The layer of planting soil ought to be made up of about 20% leaf mulch, 50% sandy soil, and 30% top soil. This mixture may also include clay particles, which will absorb heavy metals, hydrocarbons and other pollutants. Rain gardens also need a grass buffer area to slow water as it enters the wetland and to filter some of the particulate carried by the water.

Successful examples of rain garden implementation on large scales are:

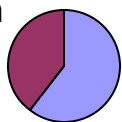
- St. Paul: An existing parking lot’s impervious surfaces were reduced by 17%.
- Somerset, Prince George’s County, MD: Each home has a 300-400 sq ft rain garden that combines grass, shrubs, and trees. This provides a functional ground cover, middle story, and canopy. Each of these rain gardens cost approximately \$500; \$150 for the excavation and \$350 for the plants.
- Fairfax County, VA: Riparian buffers and streamside forests at Difficult Run.

## Appendix 4.4: Boling Park

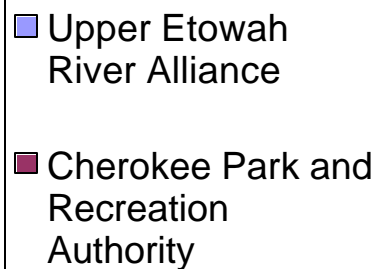
### Budget

Project	Upper Etowah River Alliance	Cherokee Park and Recreation Authority
<b>Wetland Construction</b>		
1 Plants	\$2,100.00	\$840.00
2 Stone	\$1,020.00	\$408.00
3 Grading	\$900.00	\$360.00
4 Pipe Removal	\$240.00	\$96.00
5 Signage	\$600.00	\$240.00
6 Design	\$840.00	\$336.00
7 Contingency	\$540.00	\$216.00
<b>Subtotal:</b>	<b>\$6,000.00</b>	<b>\$4,000.00</b>

Cherokee  
Park and  
Recreation  
Authority  
40%



Upper  
Etowah  
River  
Alliance  
60%



## Appendix 5.1: Interpretive Sign Information

### *Competitive Interpretive Sign Companies*

Company	Contact	Phone	Fax	Address	Website	Comments
/Zone, Imaging by Wilsonart Inter- national	Scott McCallum, Director Sales Marketing, scottm@izone imaging.com	254-207- 3551	254-207- 3562	2400 Wilson Place, Temple, TX 76503	<a href="http://www.izon&lt;br/&gt;eimaging.&lt;br/&gt;com">www.izon eimaging. com</a>	Scott was very helpful. /zone has a professional promotional pamphlet with good info on prep and costs.
Wilderness Graphics, Inc.	<a href="mailto:wildernessgraphics@nettally.com">wildernessgra phics@nettall y.com</a>	850-224- 6414	850-561- 3943	P.O. Box 1635, Tallahassee , Florida 32302	<a href="http://www.wilde&lt;br/&gt;rnessgrap&lt;br/&gt;hics.com">www.wilde rnessgrap hics.com</a>	A simple and straight forward Co., 25 yrs in business.
FOLIA	John VanHorn	450-264- 6122	450-264- 6066	58 York Huntingdon, QC, Canada JOS 1HO	<a href="http://www.folia.&lt;br/&gt;ca">www.folia. ca</a>	Professional, John is much more helpful than Alex Vinetti
Southern Custom Exhibits	Gmorrow@hi waay.net	1'888'378 '9115	256'835'93 83	1416 Commerce Boulevard, Anniston, Alabama 36207	<a href="http://www.sout&lt;br/&gt;herncusto&lt;br/&gt;mexhibits.&lt;br/&gt;com">www.sout herncusto mexhibits. com</a>	

## Appendix 5.2: Interpretive Sign Information

### *Comparison of Sign Materials*

Material	Best Uses	Advantages	Disadvantages
<b>Fiberglass Embedment</b>	<ul style="list-style-type: none"> <li>Detailed graphics</li> <li>Cost effective where many duplicates are needed</li> </ul>	<ul style="list-style-type: none"> <li>Durable</li> <li>Resistant to weather and vandalism</li> <li>Graphic detail</li> <li>Colors</li> <li>Photos can be embedded directly</li> </ul>	<ul style="list-style-type: none"> <li>Doesn't accept photos well</li> <li>Colors subject to fading</li> <li>Requires framing &amp; backing</li> <li>Easily scratched but can be buffed with wax.</li> </ul>
<b>Metal-Micro Imaging</b>	<ul style="list-style-type: none"> <li>Historical interpretation</li> <li>Commemorative plaques</li> <li>Trail markers</li> <li>Wayside exhibits</li> </ul>	<ul style="list-style-type: none"> <li>Very durable</li> <li>Requires no framing</li> <li>Vandal resistant</li> <li>Reproduces Black and white photos well</li> </ul>	<ul style="list-style-type: none"> <li>Limited to two colors per sign</li> <li>Multiple copies do not reduces cost</li> </ul>
<b>Porcelain Enamel</b>	Where colorful & detailed graphics are needed for high use areas	<ul style="list-style-type: none"> <li>Able to reproduce high resolution photographs and line art</li> <li>Vivid colors, no fade</li> <li>Little maintenance</li> </ul>	<ul style="list-style-type: none"> <li>More expensive than others</li> <li>Requires framing or backing</li> <li>Can chip and rust</li> </ul>
<b>High-Pressure Laminate</b>	Where colorful and detailed graphics are needed (interior and exterior)	<ul style="list-style-type: none"> <li>UV resistant</li> <li>Graffiti can be cleaned off with Mineral spirits.</li> </ul>	<ul style="list-style-type: none"> <li>Could be expensive if you do not do your own graphics</li> </ul>

### Appendix 5.3: Interpretive Sign Information

#### *Guidelines for In-House Graphic Design, File Preparation*

<b>Save Time &amp; Money</b>	This table is meant to save the demonstration site project coordinator time by clearly stating the guidelines needed for preparing an electric file for the graphic design department of the interpretive sign company. Often some of the company representatives are clear on what they need and you will end up wasting a lot of time going back and forth. It is better to put a little extra time into the package you will mail and get it right the first time!
<b>General File Setup</b>	<ul style="list-style-type: none"> <li>▪ Use common computer ware such as CD Roms and Zip or Jazz Disks. Usually, it is not feasible to use 3.5" diskettes because of the size limitation.</li> <li>▪ Label your disks with your name, phone number, software used (including version) and a list of all disk contents (helpful hint: you can print the computer screen image of the disk contents). It is helpful to provide the final dimensions of the graphics and photos and the thickness of the sign.</li> <li>▪ It is helpful to include print out of all images and layers in files at a scaled size showing percentage of scale.</li> <li>▪ A color proof is helpful</li> <li>▪ Be sure to save all changes on the file you give to the graphics company.</li> </ul>
<b>Graphics File Setup</b>	<ul style="list-style-type: none"> <li>▪ Include all linked photos and files on the disk (do not embed graphics), including screen and printer fonts.</li> <li>▪ Setup document exactly as it is to be output ( do not create spot color in CMYK)</li> <li>▪ Use only Postscript fonts when possible, and do not use style attributes, such as "bold" or "italic" from the pulldown menu. Use actual fonts with bold or italic in their name.</li> <li>▪ Use EPS and TIFF formats only. PICT, JPEG, and GIF files are not for printed output!</li> <li>▪ Be sure to link to, and include originals on your disk. Include a folder on your disk with the fonts used.</li> <li>▪ For color bitmap graphics (Photoshop, etc.) use CMYK file setup, not RGB.</li> </ul>
<b>Scanning Images</b>	Minimum default scanning resolution is 200 Dots Per Inch (DPI) at full output size, although 300 DPI is recommended.
<b>Proofing Files</b>	It is helpful to send laser color prints that exactly match your file with hand written instructions marked on them.

## Appendix 6: Trail Restoration, A Comparison of Surfaces

(Trapp and Zimmerman 1992)

Surface	Applications	Advantages	Disadvantages	Suggestions
<b>Paving Stones</b>	Heavy Use	Allows water for infiltration. Attractive surface	Installation labor intensive. Expensive	Use mechanical vibrator to set stones.
<b>Gravel</b>	Heavy Use	Inexpensive. Allows for water infiltration	Noisy. Not good for wildlife observation trails.	Weeds invade if not applied in deep layer.
<b>Woodchips</b>	Medium Use	Natural appearance. Easy application.	Can become soggy in poorly drained areas. Requires replenishment.	Hardwood chips are most desirable. Avoid material with sharp and angular chunks due to dull chipping machines.
<b>Shredded Bark</b>	Low/Medium Use	Visually appealing/natural, soft surface.	Breaks down quickly. Only available near saw mills.	Effective in dry areas – preferred by runners and joggers.
<b>Natural Surface</b>	Wilderness/Low Use	Minimal maintenance	Can easily degenerate into fragments and braided trails.	Use markers and maps.

## **Appendix 7: BMP Power Point Presentation**

---

**PLEASE SEE THE FOLLOWING PAGES (7-1 – 7-6) TO VIEW  
THE BMP POWER POINT PRESENTATION**

## Appendix 8: Annotated Bibliography

---

1. Baxter, A. et al. 1999. **An Aquatic Safe Harbor Program for the Upper Etowah River**. A report for the Etowah Initiative. University of Georgia, Athens, GA.  
 This report by former UGA, Environmental Law Practicum students is a useful tool for detailed information on the Safe Harbor Program (private landholders agree to maintain habitat beneficial to federally listed species), Etowah River watershed natural history (particularly the aquatic fauna), the endangered species act, and information on baseline requirements (i.e. riparian buffers, sediment, etc.) and conservation easements.
2. Correll, Dave. 2001. **Vegetated Stream Riparian Zones: Their Effects on Stream Nutrients, Sediments, and Toxic Substances**. 10<sup>th</sup> Edition. Sustainable Florida Ecosystems, Inc. Crystal River, FL.  
 This is a comprehensive annotated bibliography (780 references!) on world literature on vegetated stream riparian zone water quality effects. It includes buffer strip research (forest, grass and herbaceous) and studies on water quality of inputs, the hyporheic zone, and the floodplain. A few types of studies were excluded (e.g. large woody debris and application of municipal sewage and industrial/mining effluent to riparian zones). The author includes a useful list of codes to identify the aspects of each study.
3. Rice, Frederick H. 2000. **Signs that Sell**. Michigan State University Extension, Tourism Educational Materials #33719792.  
 Although this document (available on the web) is not specifically geared towards trail interpretative signs, it gives invaluable information on how to make a successful sign. Rice does not leave any details out. Useful items include: how to attract the readers attention; how much information to include; types of signs; graphic design tips; and lettering.
4. Tabata, Raymond and Kuehn, Diane. 2000. **South Maui Coastal Heritage Corridor**. Legacy: The Magazine of the National Association For Interpretation, V 11, No. 5, pp. 16-22.  
 Although this article is specifically related to the South Maui Coastal Heritage Corridor, I found the information on theme development interesting and helpful. More than anything, it's great to know that there is a magazine dealing with current issues on interpretative signs! Additionally, the magazine is a useful resource to get information on the most competitive interpretative sign/exhibit companies.
5. Trapp, S. and Zimmerman, R. 1992. **Signs, Trails, and Wayside Exhibits: Connecting People and Places**. Interpreter's Handbook Series. UW-SP Foundation Press, Inc., University of Wisconsin, Stevens Point.

## Appendix 8: Annotated Bibliography (cont.)

---

This is an indispensable book for anyone involved in an interpretative sign project. It has colorful photographs of sign styles, graphics, comparison between styles, stands and more. Chapter 4: "The Message" is an excellent tool to help prevent any potential sign flops/pitfalls! The last chapter "Resources" has many useful tools including measuring readability, books and sign companies.

6. Harbert, H. and Droszcz, M. 2000. **Georgia Adopt-A-Stream: Getting to Know Your Watershed**. Department of Natural Resources, Environmental Protection Division.

This is one of a series of three documents produced by EPD's Department of Natural Resources (the other two include: Biological and Chemical stream monitoring and visual stream survey). It is an excellent source of information on watershed ecology, the quality of surface water in Georgia, the important law and programs and how to get started to register and survey your watershed. The indices include more detailed information on the aforementioned items.

7. **The Green Lane™**, Environment Canada's World Wide Web site.

[http://www.ec.gc.ca/envpriorities/cleanwater\\_e.htm](http://www.ec.gc.ca/envpriorities/cleanwater_e.htm)

Although this is a Canadian website, it is a good additional resource for straight information on stream ecology.

8. Walsh, J.S. et al. 1995. **Southeastern Freshwater Fishes**. In LaRoe, E.T. et al. Eds., *Our Living Resources—A Report to the Nation on the Distribution, Abundance and Health of U.S. Plants, Animals, and Ecosystems*. U.S. Department of the Interior, National Biological Service. Washington, D.C. 530p.

This is a critical document on the biology and the status of the freshwater fishes in the southeast. Look on the web for this under the Florida-Caribbean Science Center, US Geological Survey.

9. Gagnon, Stuart. 2001. **Constructed Wetlands and Water Quality Improvement (II): 118 citations from the Agricola Database**, January 1997 - June 2000. Water Quality Information Center, National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture.

This is an electronic document that is meant to be a source of recent information on constructed wetlands. It provides useful synopsis of each article. A total of 118 citations are given. See the following website:

<http://www.nal.usda.gov/wqic/Bibliographies/conwet2.html>.

10. Department of Agriculture. 1998. **Stream Corridor Restoration - Principles, Processes, Practices**. Department of Agriculture, Washington, DC.; Environmental Protection Agency, Washington, DC.; Tennessee Valley Authority, Chattanooga.; Federal Emergency Management Agency, Washington, DC.; Department of Commerce, Washington, DC. 618 pp. NTIS Order Number: PB98-158348INZ.

This is a technical report published by fifteen Federal agencies. This is a nice, basic document for information on stream corridors and restoration. Chapter 3, “Disturbances Affecting Stream Corridors” is particularly useful for straight forward information geared towards the general public.

11. Benz, G.W. and Collins, D.E. 1997. **Aquatic Fauna in Peril: The Southeastern Perspective.** Special Publication 1, Southeast Aquatic Reserch Institute, Lenxz Design & Communications, Decatur, GA, 554p.

Chapter 16 “Status and Restoration of the Etowah River, an Imperiled Southern Appalachian Ecosystem” by Burkhead et al. is a particularly critical chapter for anyone interested in conservation of the Etowah River. This chapter had excellent maps and species lists.

12. Internet websites – constructed wetland information:  
EPA Office of Wetlands, Oceans and Watersheds. <http://www.epa.gov/owow/>.  
EPA Office of Water website contains extensive information and educational material on a variety of water-related issues. Links to wetland-specific information.