National Showcase Watersheds

- Duck Creek Watershed, AK
- Big Nance Creek Watershed, AL
- Gila River Corridor Recovery Project, AZ/NM
- Suwannee River Watershed, GA/FL
- Bear Creek Watershed, IA
- Sun River Basin, MT
- Blackfoot Watershed, MT
- Carson River Watershed, NV
- McCoy Creek Watershed, OR
- Lititz Run Watershed Alliance, PA
- White River Partnership, VT
- Duwamish-Green River Watershed, WA

National Showcase Watersheds

Case Study Watersheds

Only 12 applicants were selected for showcasing, but the applications from many more watersheds also demonstrated their accomplishments in restoration. These watersheds, listed below, are being recognized as Case Study Watersheds. For more on successful restoration projects around the nation, visit the Restoration Projects Inventory site.

AK	North Fork Bradfield River Watershed Restoration, Tongass National Forest
AL	Choccolocoo Creek Watershed
AZ	Upper Verde River Adaptive Management Project, Prescott National Forest
CA	Pine Creek Watershed Restoration, Lassen National Forest
CA	Deer Creek Watershed Stewardship Program, Lassen National Forest
CA	Big Flat Meadow Restoration, Plumas National Forest
CA	Lower Tuolumne
CA	Indian Creek
CO	Bonanza Mining Area CERCLA Project, San Juan/Rio Grande National Forests
CO	Alamosa River Watershed Project
CT	Norwalk River Watershed Initiative, Fairfield County
CT, NY	Norwalk River Watershed Initiative
GA	Soque River Restoration Project, Habersham County
IA	Chichauqua Bottoms Greenbelt
IA	Iowa River Corridor
ID	O'Hara Creek Watershed Restoration, Nez Perce National Forest
ID	Salmon River at Challis
ID	Squaw Creek Cost Share Road Decommissioning and Watershed Restoration, Clearwater National Forest
IL	Illinois River Basin
MO	McKenzie Creek Watershed
MT	Big Spring Creek
NC	Mitchell River Watershed Coalition
NC	Little Tennessee River
ND	Pembina River Floodplain Restoration
NE	South Table Creek, Otoe County

NM	Bluewater Creek Watershed, Cibola National Forest
NM	Comanche Creek Watershed, Carson National Forest
NM	Santa Fe Watershed, Santa Fe National Forest
NV	Carson River
OH	Loramie Valley Alliance Watershed Project
OR	Big Marsh Restoration Project, Deschutes National Forest
OR	Soda Creek Stream Restoration, Deschutes National Forest
OR	Williams Prairie Wild and Scenic/North Fork Crooked River Channel Restoration Project, Ochoco National Forest
SD	Jennings/Smith Restoration Project
TN	Coker Creek Project
UT	Upper Provo River Restoration, Wasatch-Cache National Forest
VA	Kingstowne Stream Restoration
WA	Asotin Creek
WA	Tolt River Basin, King County
WA	Tucannon River
WI	Whitewater River Watershed
WI	Plum Creek EQIP Watershed
WV	Knapp Creek Watershed
WY	Jackson Hole, Wyoming Environmental Restoration Project, Teton County

National Showcase Watersheds

Partners and Related Links

Partners

- Environmental Protection Agency - EPA
- U.S. Department of Agriculture -USDA
- Natural Resources Conservation Service
- USDA Forest Service
- U.S. Army Corp of Engineers - USACE
- Bureau of Land Management - BLM
- Fish and Wildlife Service - FWS
- Tennessee Valley Authority - TVA
- National Oceanic and Atmospheric Administration - NOAA
- Bureau of Reclamation - USBR

Related Links

- Stream Corridor Restoration Handbook
- Watershed Information Network
- Cleanwater.gov
- American Heritage Rivers
- Inventory of Watershed Training Courses
- Restoration and Watershed Management Training

    - Watershed Academy Web
    - Stream Corridor Restoration
    - Course: Working at a Watershed Level
    - Curriculum Plan: Working at a Watershed Level
    - Course: Framework for Stream Corridor Restoration
    - Curriculum Plan: Framework for Stream Corridor Restoration
- Research
    - Stream Corridor Restoration Research
    - USDA Forest Service Research
    - EPA Ecological Restoration Research
- Technical Information
    - Watershed Information Network (WIN)
    - Watershed Technology Electronic Catalog
    - Stream Notes

How to order copies of Stream Corridor Restoration: Principles, Processes, and Practices

Stream Corridor Restoration: Principles, Processes, and Practices is available in paper copy or CD-ROM from NTIS. The paper edition is $71 ($142 outside the U.S., Canada or Mexico); order number PB98-158348KNU. The CD-ROM version is $60 ($90 outside the U.S., Canada, or Mexico); order number PB98- 502487KNU. To order, call the NTIS Sales Desk at 1-800-553-NTIS (6847), or 703-605-6000. Online ordering is available at http://www.ntis.gov. Order via e-mail: orders@ntis.fedworld.gov. Fax order to 703-605-6900.

National Showcase Watersheds

About the National Showcase Watersheds:

In 1998 and 1999, a committee of federal agency experts in watershed-based restoration of stream corridors wrote and published an interagency manual on stream corridor restoration. At the same time, a growing interest in restoration and watershed protection resulted in government initiatives to promote restoration projects. As part of these initiatives, this federal restoration committee was directed to showcase the application of stream corridor restoration technology in 12 demonstration projects.

Nominations for showcase projects were accepted during 1998, and final selections were made in early 1999. The 12 sites were selected for their ability to showcase the application of stream corridor restoration technology and for improving the community, the environment, and water quality.

The selected projects represent a variety of geographic locations and conditions, a balance of management and design, strong local, tribal and state leadership, public and private land use mix, and partnerships in stream corridor restoration. This website celebrates these successful projects as examples of accomplishments through restoration.

The showcase watershed projects and their states are:

Duck Creek, AK
Big Nance Creek Watershed, AL
Gila River Corridor Recovery Project, AZ/NM
Suwanee River Watershed, GA/FL
Bear Creek Watershed, IA
Sun River Basin, MT
Blackfoot Watershed, MT
Carson River Watershed, NV
McCoy Creek Watershed, OR
Lititz Run Watershed Alliance, PA
White River Partnership Watershed Restoration Project, VT
Duwamish-Green River Watershed, WA

National Showcase Watersheds

Bear Creek Watershed

The Bear Creek Restoration Project has merged university R&D with landowner cooperation in developing a stream restoration approach that has broad scale applicability to agricultural watersheds in the Midwest. Major components include a multi-species riparian buffer, soil bioengineering and grade control technologies for streambank stabilization, constructed wetlands to intercept and process nonpoint source pollutants in agricultural drainage tile water, and rotational grazing systems that limit livestock access to the stream channel.

- Project Description
- Location

- Links
- Contact Information

- Other links about the Bear Creek Watershed

  Bear Creek Watershed Website:
  http://www.ag.iastate.edu/departments/forestry/res/riparian.html

National Showcase Watersheds

Links for Bear Creek

Visit the Bear Creek Website at:
http://www.buffer.forestry.iastate.edu/

Other related links:
http://www.nrcs.usda.gov/technical/stream_restoration/
(see p. 8-80 thru 82)

National Showcase Watersheds

Bear Creek Watershed Project Description
Story/Hamilton Counties, Iowa

Figure 1.
Bear Creek Before Restoration

Figure 2.
Bear Creek After Restoration

A challenge for resource managers in modified agricultural landscapes is the development and implementation of restoration-based management approaches that complement and build upon traditional soil and water conservation and pollution control efforts. The goal of the Bear Creek Watershed Project is to contribute to a management approach for the environmental enhancement of intensively modified agricultural watersheds in the Midwest. An explicit goal is to develop a riparian management system that has broad scale applicability to watersheds in the Midwestern agroecosystem.

This is being accomplished by designing a system with several components, each of which can be modified to fit local landscape conditions and landowner

objectives. The riparian management system (Figure 3) consists of three major components: 1) a multi-species riparian buffer (Figure 4), 2) soil bioengineering and grade control technologies for streambank stabilization (Figure 5), and 3) constructed wetlands (Figure 6) to intercept and process nonpoint source pollutants in agricultural drainage tile water. In addition, rotational grazing systems that limit livestock access to the stream channel are being demonstrated.

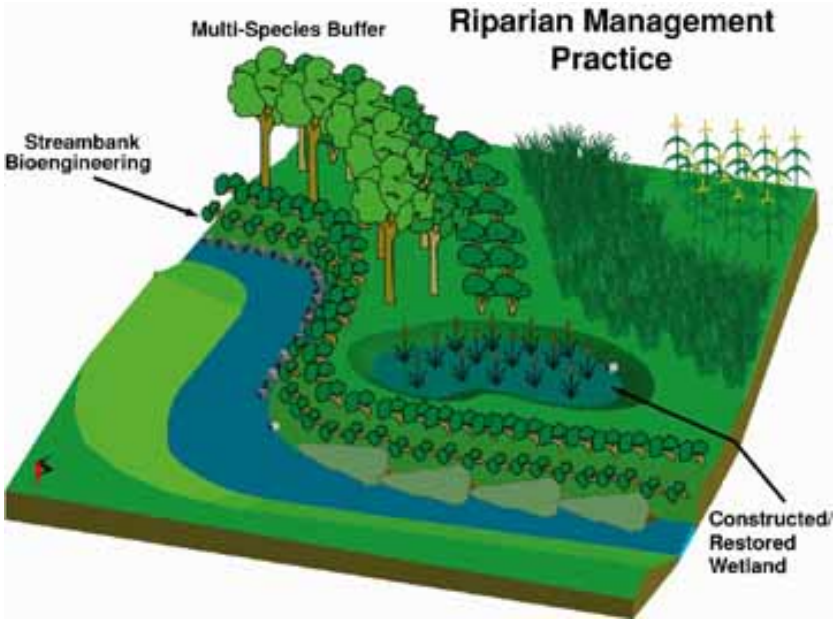

Figure 3. *Riparian management system*

Figure 4.
Multi-species riparian buffer

Figure 5.
Streambanks stabilized through bioengineering

The objectives of these components are to intercept eroding soil and agricultural chemicals from adjacent crop fields, slow floodwaters, stabilize streambanks, improve wildlife habitat, and provide alternative, marketable products. Additionally, such systems may improve local aquatic systems by restoring ecological functions associated with the riparian zone by modifying the flow regime through reduced discharge extremes, improving structural habitat, and restoring energy relationships through addition of organic matter and reduction in temperature and dissolved oxygen extremes.

Restoration efforts in the Bear Creek watershed began in 1990 and have focused on the upper half of the watershed. This work was initiated along a 3/5-mi. length of Bear Creek on the Ron and Sandy Risdal farm. The buffer system subsequently has been established along an additional nearly 5-mi. of

Bear Creek on five farms upstream from this original site.

Figure 6. *Constructed wetlands help filter agricultural runoff*

The Bear Creek Watershed Project is managed by Iowa State University's Department of Forestry through the Agroecology Issue Team of the Leopold Center for Sustainable Agriculture. Funding has come from the Leopold Center, U.S. Department of Agriculture, U. S. Environmental Protection Agency, U.S. Geological Survey, Iowa Department of Natural Resources and Pheasants Forever.

Figure 7.
Stream channel measurements are key to design

Bear Creek Website
http://www.ag.iastate.edu/departments/forestry/res/riparian.html

National Showcase Watersheds

Contacts - Bear Creek Watershed

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National Showcase Watersheds

Location - Bear Creek Watershed

The Bear Creek Watershed is located in Hamilton and Story Counties near Ames, Iowa, in the Western Corn Belt Plains Ecoregion. The watershed area is approximately 30 square miles.

National Showcase Watersheds

Big Nance Watershed

The Big Nance Watershed demonstrates local residents working with partner agencies to conserve natural resources and restore stream corridor values in this 194 square mile cotton producing, agricultural watershed.

National Showcase Watersheds

Contacts
Big Nance Creek

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- for technical information on riparian corridor restoration

Billy Frost, NRCS District Conservationist
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- for conservation practices planning and application

Randy Roach, U.S. Fish and Wildlife Service
334-441-5181
- for information about the Partners for Fish and Wildlife project in Big Nance

Allison Newell, Alabama Water Watch Coordinator
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- for information on citizen volunteer monitoring activities

Steve Foster, Alabama Dept. of Environmental Management, Field Operations Services
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- for information about Big Nance water quality monitoring and 319 project implementation

Gerald Talbert, Campaign Coordinator
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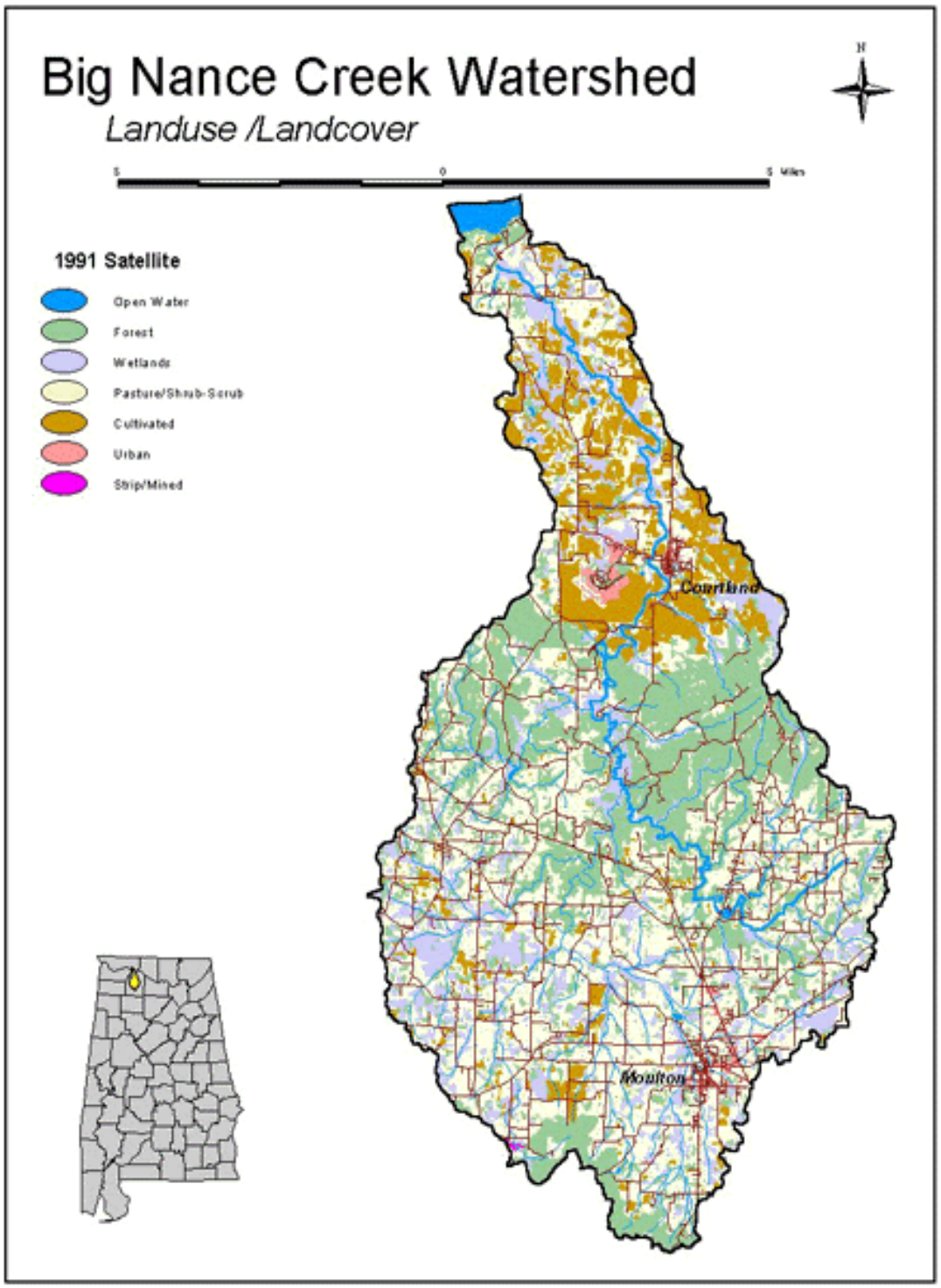
- for information about the Southeast Conservation Buffer Campaign

National Showcase Watersheds

Location
Big Nance Creek

Big Nance Creek Watershed is located in the northwest corner of Alabama. Land use and cover is characteristic of the Tennessee River Valley interior low plateau physiographic province. The headwaters of Big Nance Creek originate from steep forested slopes and pastures passing through a forested ridge in the middle section of the watershed and then entering the gently rolling-to-level landscape of the lower cultivated areas. While wetlands are scattered throughout the watershed, they are concentrated along the floodplain and sinkhole/karst topography of the lower end of the watershed.



Big Nance Creek Watershed land use and land cover (ERDAS, 1991)

Streams are characteristic of this province: cool water streams in the headwaters, with high gradient forested streams transitioning to the low gradient warm water mainstem and tributary streams near the confluence with the Tennessee River. Historically, Big Nance has a record of darters and freshwater mussels common to that portion of the Tennessee River drainage. Under present-day conditions, these are considered migrants if present at all. Habitat losses and environmental stressors are cited as reasons for the depressed condition of the aquatic resource. The Index of Biological Integrity rates Big Nance and its major tributaries (Clean and Muddy Fork Creeks) as "poor to fair."

National Showcase Watersheds

Project Sites
Big Nance Creek

Wetland in cotton fields

Karst topography in the lower Big Nance Watershed, including wetlands and sinks in cotton fields. Field filter strips and buffers show in the background.

Streambank and wetland restoration

Aerial view of 250-acre corridor restoration site while in livestock production.

Before restoration – close up view of eroding streambank (1998).

After restoration – view of streambank one year later (1999) after installing streambank bioengineering; planting native trees, shrubs, and grasses; and restoring wetland water regime with control structures.

National Showcase Watersheds

The Plan
Big Nance Creek

An aerial inventory

Volunteer water quality monitors

Implementation of conservation treatments

Education and outreach

The Big Nance partnership follows a plan of action that builds on early individual efforts to improve the land and water. By emphasizing comprehensive monitoring and assessment, implementation of conservation practices, and education/outreach for community leaders, the Big Nance initiative is providing the tools for achieving coordinated restoration throughout the watershed. Several elements of the Clean Water Action Plan support the implementation of the partnership plans for the Big Nance Creek Watershed. It is a targeted Unified Watershed Assessment Watershed. New public-private partnerships have also been formed, and the effort will showcase stream corridor restoration.

An aerial inventory (low altitude color infrared photography) will provide a database from which to identify critical stream segments or subwatersheds in need of targeted stream corridor restoration/remediation. Streamside conditions (banks and vegetative cover) will be assessed for all perennial and intermittent streams in the watershed. The inventory also includes land use and sources of nonpoint pollution such as nutrients, sediment, and pathogens. Along with input from local citizens, the aerial inventory database will be used to develop criteria for a total maximum daily load watershed model.

Volunteer water quality monitors will be trained to conduct monitoring for nutrient loading, fecal coliform levels, and basic water quality parameters at selected locations within the Big Nance Creek watershed. This volunteer monitoring work, conducted by Alabama Water Watch, will complement the water quality monitoring planned by ADEM and biological surveys by TVA and the Geological Survey of Alabama.

Implementation of conservation treatments on the landscape for pasture and cropland management will be done by landowners with the assistance of the NRCS as part of the CWAP implementation grant. The grant includes $600,000 (federal) and $400,000 (non-federal) and calls for the hiring of a watershed coordinator to assist, oversee, and report on project implementation. The on-the-ground practices target streamside restoration, grazing management on pasturelands, erosion and nutrient runoff controls on croplands, and animal waste (nutrient) management. Additionally, TVA is providing stream corridor conservation incentives ($80,000) to complement USDA Conservation Reserve Program funding and the CWAP implementation grant in an effort to encourage stream corridor restoration (on damaged segments) and protection (on undisturbed segments) on both pasture and cropland sites. The Southeast Conservation Buffer Campaign and Quail Unlimited will be working with the Lawrence County SWCD to design a local promotional campaign on the value of conservation buffers, as well as an on-the-ground demonstration project. All stream corridor projects will follow guidelines and recommendations in the interagency stream restoration workgroup's handbook *Stream Corridor Restoration: Principles, Practices, and Processes.* Technical consultation will be provided by a member of the interagency workgroup.

Education and outreach will include the participation of Big Nance Creek county and municipal officials in Project NEMO (Nonpoint source Education of Municipal Officials). This special project, which was patterned after a model developed by the state of Connecticut, will be used in three targeted watersheds in Alabama.

The Big Nance partnership plan of action will evolve as new information is gathered, participation increases, and additional resources are identified. The partners, with the help of the new watershed coordinator, will amend the implementation plan accordingly.

National Showcase Watersheds

Links
Big Nance Creek

- Southeast region, U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program
http://www.fws.gov/southeast/

- Alabama Department of Environmental Management
http://www.adem.state.al.us

- Alabama Soil and Water Conservation Committee
http://swcc.state.al.us/

- Alabama Water Watch
http://www.auburn.edu/aww

- Natural Resources Conservation Service, Alabama
http://www.al.nrcs.usda.gov/

National Showcase Watersheds

Partners
Big Nance Creek

Teamwork is essential to the success of watershed improvement projects. Big Nance community leaders have assembled a working partnership between local, state, and Federal agencies, organizations, and individuals. All the necessary ingredients for success are in place: local leadership, technology support, and a partnership-based decision- making process.

Watershed Residents

The attitudes of private landowners are central to making a difference in any watershed. Naturally, the success of a riparian corridor restoration project is dependent upon their buy-in. After all, these individuals are being asked to change their modes of operation or to provide in-kind or out-of-pocket expenses. Their belief and conviction that they can do something to make their operation environmentally-friendly or to leave a legacy to their children is the key to successful restoration. This short list does not reflect all those who have done things to better Big Nance, but does represent an effort to acknowledge past and potential partners for watershed changes:

Jimmy Blythe, cotton farmer
J. D. Steadman, cattleman
Larkin Martin, cotton farmer
Bill Rogers, cattleman
Wayne and Derrick Rutherford, poultry operators

Local Government

Local government agencies provide the grassroots leadership and informed decision-making necessary to guide and assist watershed restoration efforts. The Conservation District serves as

the local sponsor to submit and administer grants; they also provide guidance and serve as a means to gauge local receptiveness to the plans of action proposed by various resource management agencies. Public works departments often provide in-kind assistance for jobs that require heavy equipment or intensive labor.

Lawrence County Soil and Water Conservation District
Lawrence County Public Works Department
Lawrence County Board of Supervisors
Tennessee Valley Resource Conservation and Development Council (RC&D)

State Government

Alabama Department of Environmental Management
- Administers Section 319h funds, state water quality programs, and water quality monitoring

Alabama Game and Fish Division
- Maintains records on fisheries resources

Alabama Soil and Water Committee
- Provides technical and administrative support to local districts; a partner in the USFWS project

Geological Survey of Alabama
- Conducts stream biological monitoring

Alabama Water Watch
- Citizen water quality monitoring program

Alabama Department of Agriculture and Industries
- Administers pesticides collection/management

Alabama Department of Public Health
- Program responsibility for septic system management

Public Organizations

Ducks Unlimited
- Provides volunteers for stream corridor and wetland restoration projects

Southeast Conservation Buffer Campaign
- Provides promotional materials and support for stream buffers in the Southeastern U.S. (a regional campaign of the National Conservation Buffer Initiative)

Federal Government

U.S. Fish and Wildlife Service
Provides project funding and support through the Partners for Fish and Wildlife program

Natural Resources Conservation Service
Provides technical support to local district for CWAP project implementation

Farm Services Agency
Administers farm conservation practices programs for Farm Bill and other USDA conservation programs

Tennessee Valley Authority

Supports local watershed improvement efforts by providing technical and financial assistance for stream corridor restoration/protection projects

Partnership Plan

National Showcase Watersheds

Big Nance Creek:
Stream Restoration in Cotton Country

Project Description

Cotton is still "king" in Lawrence County. This rural area in the northwest corner of Alabama is the second biggest producer in the state. Located in the fertile Tennessee River Valley, the area has been in agricultural production for over 180 years. In addition to cotton, the local economy is dependent primarily on livestock and poultry production.

Encompassing 194 square miles, the Big Nance Creek Watershed was rated by a local advisory group as the most degraded watershed in the county. In 1996, Alabama listed 16.9 miles of Big Nance Creek as non-supporting of state water quality standards for fish and wildlife. The primary problem is polluted run-off that contains sediment, pesticides, and nutrients. The area received numerous citizen complaints and experienced a number of documented fish kills. One of three priority watersheds targeted by Alabama's Clean Water Action Plan (CWAP), Big Nance is an

ideal location in which to demonstrate riparian restoration and landscape conservation on land devoted to cropland, livestock, and poultry production. With CWAP implementation funding forthcoming, all the elements are now in place for significant progress.

Local leadership and landowner interest in restoring Big Nance Creek has attracted new alliances and partnerships inconceivable just a few years ago. This includes a riparian and wetland restoration project to restore an oxbow lake and floodplain formerly in livestock production. The U.S. Fish and Wildlife Service, USDA/NRCS, Alabama Soil and Water Committee, and Ducks Unlimited worked with a private landowner to plant native hardwood trees, stabilize the streambank using bioengineering techniques, and construct dikes for water regulation to restore a wetland. Assistance for the implementation of these measures was provided through the Wetland Reserve Program and the Partners for Fish and Wildlife Program. Additionally, no-till cotton production relatively new to this watershed is now catching on after one of the larger producers took the initiative to try the practice and to stick with it. He used grassed filter borders, restored wetlands in his fields, and left a forested buffer on his property adjoining Big Nance Creek. This demonstrated conservation ethic, as well as the documented resource need, is drawing much-needed attention to the watershed. Local residents are working with the partner agencies to set goals for improving resource conditions that reflect the community's ownership of the watershed restoration process.

The centerpiece of this restoration is a $1M CWAP implementation grant (via Section 319h funding) which will build on traditional conservation practices that address livestock grazing management on pastureland, nutrient management plans for poultry operations, and land treatments for cropland run-off. Other agencies and organizations are kicking in to complement these efforts by providing technical and financial assistance designed to specifically target the stream corridor. The combination of landscape/stream buffer conservation and restoration on a watershed scale is the focus of this watershed project. The Big Nance Creek story is all about the people who live and work there. Along with their neighbors, they're doing what it takes to make their watershed better.

National Showcase Watersheds

Portraits of the People
Big Nance Creek

Photos and quotes from individuals involved in restoring Big Nance Creek

"I guess you could call me a satisfied customer. I've been practicing conservation tillage for several years now, back when few people around here were. I farm close to 4,500 acres: mostly no-till cotton, some no-till soybeans, and I've got about 500 acres in pasture. All the conservation practices I've adopted on my land - I've restored some wetlands in my fields, put in some grassed filter borders, and left a buffer around the part of my property that runs next to Big Nance Creek - have worked well and are helping the environment. It's a win-win situation: I've been able to reduce soil loss, improve water quality, and have seen a good return on my investment. That's the key to getting other farmers on board: show them that adopting conservation practices can be profitable for their operations. Farmers are just naturally skeptical folks; we have to see something work before we'll try it. After witnessing the success I've had, a lot of my neighbors have expressed interest in adopting similar practices. I think the new cost-share incentives are going to make it possible for them to really get on board. And that's when we'll start to see some results. When all of us do what's right for the land and water - no matter how far we are from the creek - conditions in the whole watershed will really start to improve."

JIMMY BLYTHE, *No-till cotton farmer*

"There's real reason to be optimistic about chances for long-term success here in the Big Nance Creek Watershed. The people here are easy to work with, and are generally receptive to new ideas. The local District has a good track record of getting things done. With the cooperation of all the various agencies and the funding now in place, all the ingredients are there: the time is right to be able to show some real accomplishments. My role will be helping to provide the technical assistance needed to implement these conservation practices: giving people solutions they can use to correct problems on their land. I'd have to say that the most satisfying part of this job is working with the local farmers. It's very rewarding to be a part of the process from beginning to end - seeing the results when they've been able to take steps to improve their land. And there's nothing much prettier than a cotton field in full bloom!"

BILLY FROST, *District Conservationist, NRCS*

"I can't tell you how excited we are about this initiative. The Soil and Water Conservation District is proud to be in a leadership role in carrying out a plan to improve farmland in Lawrence County. Instead of paying for studies, this grant money is going to help folks put conservation practices *on the ground* - they're going to be able to see results from this. People who make their livelihood from agriculture typically take a great deal of pride in their farming heritage, and that's certainly true here in the Big Nance Creek Watershed. My family has been farming here in Northwest Alabama for three generations; my daddy left this land to me, and I want to be able to pass it down to future generations in better shape than when I got it. I believe area farmers are going to respond to this opportunity to improve their land. We're just starting to get the ball rolling, and momentum will really pick up when we hire a watershed

coordinator. Bottom line? It's going to make a real difference to farmers in our area."

JAMES GLENN, *Chairman, Lawrence County Soil and Water Conservation District*

"To make real progress, you've got to get to the root of the problem - not just treat the symptom. It won't work to simply stabilize a failing streambank, and then think you've fixed the situation. You've got to try to figure out why the bank is washing out, and then look for a way to address the source of the problem. That's what I'll be helping to do in the Big Nance Creek Watershed. One of my tasks will be to recommend native plants that can be used effectively to establish riparian buffers. Depending upon the site, certain species work better than others - or they may provide additional benefits, such as habitat or food for wildlife. My initial impression is that, while there are some serious problems on Big Nance, there is also reason to be encouraged. About a dozen miles of riparian buffers have already been established, and there's been a marked increase in the use of conservation tillage. We'll be looking for demonstration sites for some of these practices, so that others can learn from seeing a project put on the ground. We're going to have an excellent opportunity to show some important linkages between these local projects and the overall goals of the Clean Water Action Plan."

KEN KELLY, *Technical consultant, TVA*

National Showcase Watersheds

White River Partnership

- Project Description
- Location
- Partners
- Links
- Contact Information

- Other links about the White River Partners
  - Mission Statement
  - Projects
    - Carpenter Lands
    - Liberty Hill Farm
    - River Bend

National Showcase Watersheds

Mission
White River Partnership

To help local communities to balance the long-term cultural, economic and environmental health of the watershed through active citizen participation

Purposes

- To assure that the resource be sustainable as a source of economic opportunity and employment for present and future generations
- To promote, protect, conserve, and enhance the resource as a healthy ecosystem
- To identify' common goals of landowners, river users, and communities, and to engage decision makers to reach these goals.
- To inform and educate the general public, river users and others on the importance of working together to wisely use the resource for the benefit of all.
- To serve as a clearing house for information and ideas

Vision

The White River Watershed is a place of natural beauty, forest and agricultural productivity, and environmental integrity whose residents strive to balance cultural, economic and environmental health. Citizens, businesses and government collaborate to make informed, responsible decisions that improve and protect the cultural, economic and environmental qualities of the watershed for present and future generations.

Guiding Principles

- FUN
- The WRP's primary tool for resolving difficult issues is dialogue. Mutual understanding strengthens communities, relationships and partnerships
- The WRP recognizes needs, concerns and opportunities come from and are validated by community members through active citizen participation.
- The WRP values diversity. All people are welcome, respected and encouraged to participate; the more individuals, organizations and agencies we have engaged the greater our opportunities for creative solutions.
- The WRP encourages responsible and sustainable resource use while respecting individual property rights.
- The WRP believes in a collaborative approach to achieving our vision. We combine the viewpoints and resources of all interested parties to reach common goals.
- Building consensus is key to reaching our vision. While consensus often takes more effort and time, the result is stronger relationships and lasting decisions.
- The WRP does not seek to influence legislation.

The Partnership has used several methods to engage citizens and communities in watershed restoration efforts and education: public forums to identify issues, visions and next steps; "Explore Your Watershed" lecture and field day series; "Adopt-A-Salmon Family" classroom watershed education curriculum; "PaddleFest" recreational canoe race and celebration; Eco-Heritage tourism initiative; River Cleanups; and river restoration projects demonstrating natural channel design principles.

National Showcase Watersheds

Project Description
Who and What Is the White River Partnership

The White River Watershed is 454,000 acres covering all or part of 21 towns in central Vermont. Land ownership is 84% private, 5% municipal and state lands, and 11% National Forest. The 56-mile long White River is free flowing; 84% forested; 7% in agricultural use; and only 5% developed. The White is an important river in the Connecticut River Atlantic Salmon Restoration Program; a Special Focus Area of the Conte National Fish and Wildlife Refuge; and a major tributary to an American Heritage River (Connecticut River).

In 1996 the White River Partnership formed as a locally led and community driven collaborative between local communities, citizens, conservation groups and federal and state agencies. The mission of the Partnership is to help local communities balance long-term cultural, economic and environmental health of the watershed through active citizen participation.

The White River Partnership's goal is to restore river corridors and habitats through a collaborative process of public involvement, issue identification, desired future condition identification, and restoration action plan development and implementation. In 1997, the Partnership established an inter-agency Technical Team to bring the latest science to the restoration effort. A variety of tools have been used to evaluate the condition of the river corridor with an ongoing assessment of watershed health through a cooperative project with agency partners.

Habitat restoration practices used to date include: restoration of large woody material by placement, riparian management and buffer establishment; bioengineering to stabilize banks; livestock exclusion and alternate water sources; rock and log vanes; rock armoring (riprap) combined with bioengineering; and tree and rootwad revetment systems.

National Showcase Watersheds

Contacts In the White River Partnership

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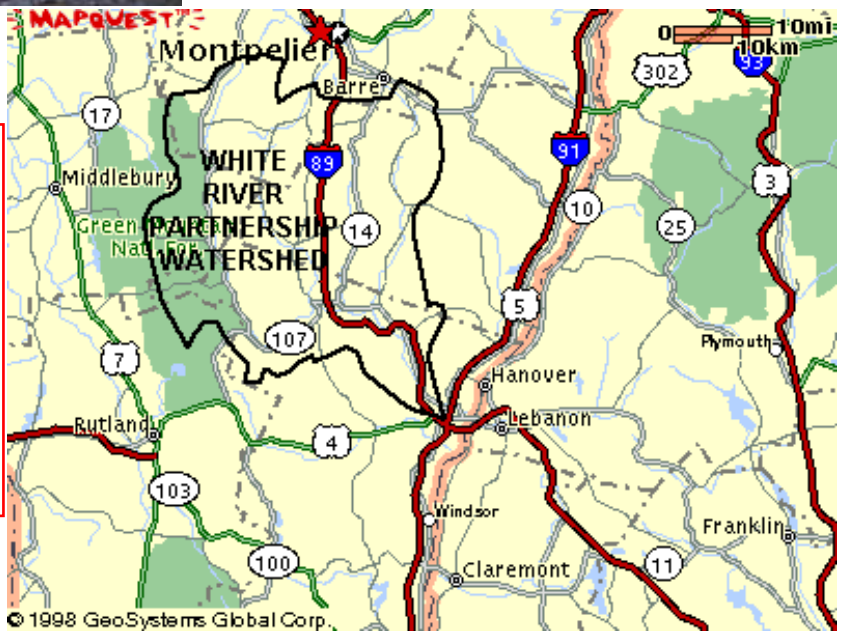
Phone: 241-3774
E-Mail: mcihael.kline@anrmail.anr.state.vt.us

National Showcase Watersheds

Location of the White River Partnership

White River Partnership Watershed
Restoration Project VT
US Forest Service
Green Mountain National Forest
Rochester Ranger Station
RR 2, Box 35
Rochester, VT 05767

locator image of watershed



National Showcase Watersheds

Partners In the White River Partnership

LOCAL ORGANIZATION & GOVERNMENT		
	White River Partnership	**An action oriented organization including people who work, recreate and do business in the White River Watershed; including teachers, farmers, fishing guides, artist, engineers, innkeepers, builders, business owners, retirees, etc. - who help to identify issues, craft visions and take action**
	South Royalton	**A community of 2,800 that provides funding, equipment and volunteers to stabilize river banks on the White River**
	Rochester	**A community of 1,000 that provides finical support and volunteer labor to landowners wishing to restore stream corridors and fish habitat.**
	Granville	**A community of 200 that provides leadership and funding for landowners to restore river corridors**

	White River Natural Resources Conservation District	**Provides finical assistance for river corridor restoration through the Natural Resources Conservation Service and donation of equipment and materials for the White River Partnership's watershed education initiative**
CONSERVATION GROUPS		
	Upper Valley Chapter of Trout Unlimited	**Providing leadership and funding that sparked the creation of the Partnership and continuous support through volunteer members serving on working groups and steering committees.**
	Green Mountain Fly Tiers	**A dedicated group of Vermont anglers providing funding and volunteer labor for fish habitat restoration.**
	Quebec Labrador Foundation	**Providing organizational leadership during the formation of the Partnership.**
	River Watch Network	**Technical advisors on water quality monitoring in the watershed.**
	National Wildlife Foundation	**Leadership in crafting the initial concepts and principles of the White River Partnership and continuous service on steering committees.**
STATE AGENCIES & COMMISSIONS		
	Two-Rivers Regional Planning Commission	**Providing technical and planning support for the White River Partnership and the communities of the White River watershed.**
	VT Dept. of Environ. Conservation	**Proving leadership, technical assistance and project grants for the implementation of river corridor restoration projects.**
	VT/NH Connecticut River Joint Commission	**Provides support and partnership grants to implement riparian restoration projects on the White River.**
	Vermont Fish and Wildlife Dept.	**Service on White River Partnership's inter-agency Technical Team**
	Vermont Agency of Transportation	**Working the White River Partnership, towns and landowners to minimize impacts and enhance river habitat adjacent to transportation corridors.**
FEDERAL AGENCIES		
	US Fish and Wildlife	**Service on the White River Partnership Technical Team and provides financial and technical support through the Conte National Fish and Wildlife Refuge and the Partners for Fish, Wildlife Program, and the White River National Fish Hatchery**
	US Forest Service	**Leadership, funding and support in the creation of the White River Partnership; service on White River Partnership Technical Team; and provides financial support for coordination and outreach of the Partnership through the Green Mountain National Forest and Northeastern Area State & Private Forestry.**
	US Environmental Protection Agency	**Financial support and labor for stream corridor project implementation through the Vermont Unit**

Natural Resources Conservation Service	**Leadership and support in creating the White River Partnership; and technical and financial support for project implementation; and service on the White River Partnership Technical Team.**
Federal Emergency Management Agency	**Providing funding, coordination and project documentation through a Project Impact grant to the Two-Rivers Regional Planning Commission.**
Army Corps of Engineers	**Providing technical assistant and facilitation of Clean Water Act permitting processes**

National Showcase Watersheds

Contacts In the White River Partnership

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National Showcase Watersheds

Links In the White River Partnership

- Vermont NRCS
http://vt.nrcs.usda.gov/index.htm

National Showcase Watersheds

Carpenter Lands Project

Location: South Royalton Stream

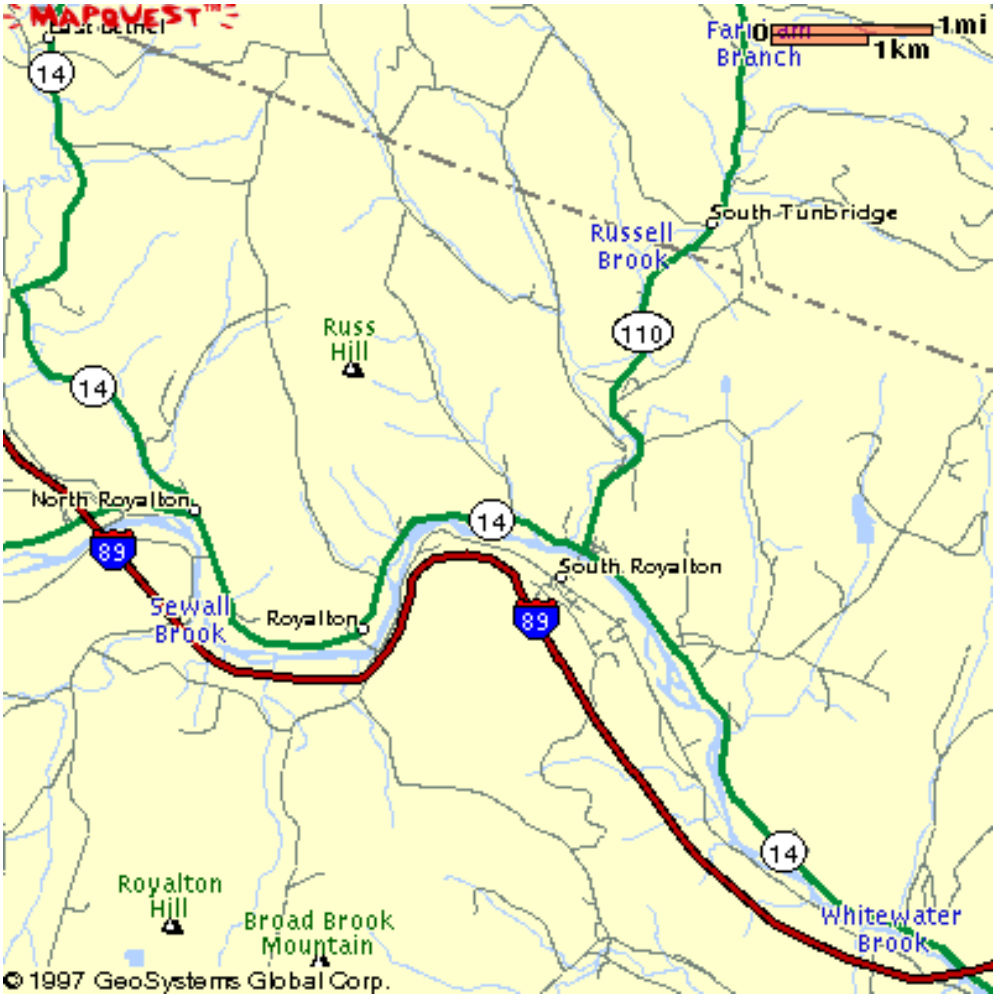
Name: White River, Main Stem

Land Ownership: Municipal

Land Use: Recreation

Project Length: 800 feet

Riparian Width: 25 feet



Problem Statement: **Excessive bank erosion**
Lack of riparian habitat

Restoration Techniques Used: **Brush layers with geogrid fabric**
Live stakes
Riparian forest/shrub planting

Bank erosion and lack of riparian vegetation

Backhoe excavating bench for brush layer installation

Installation of brush layers with geofabric

Brush layers after first growing season

National Showcase Watersheds

Liberty Hill Farm Project

Location: Rochester, Vermont

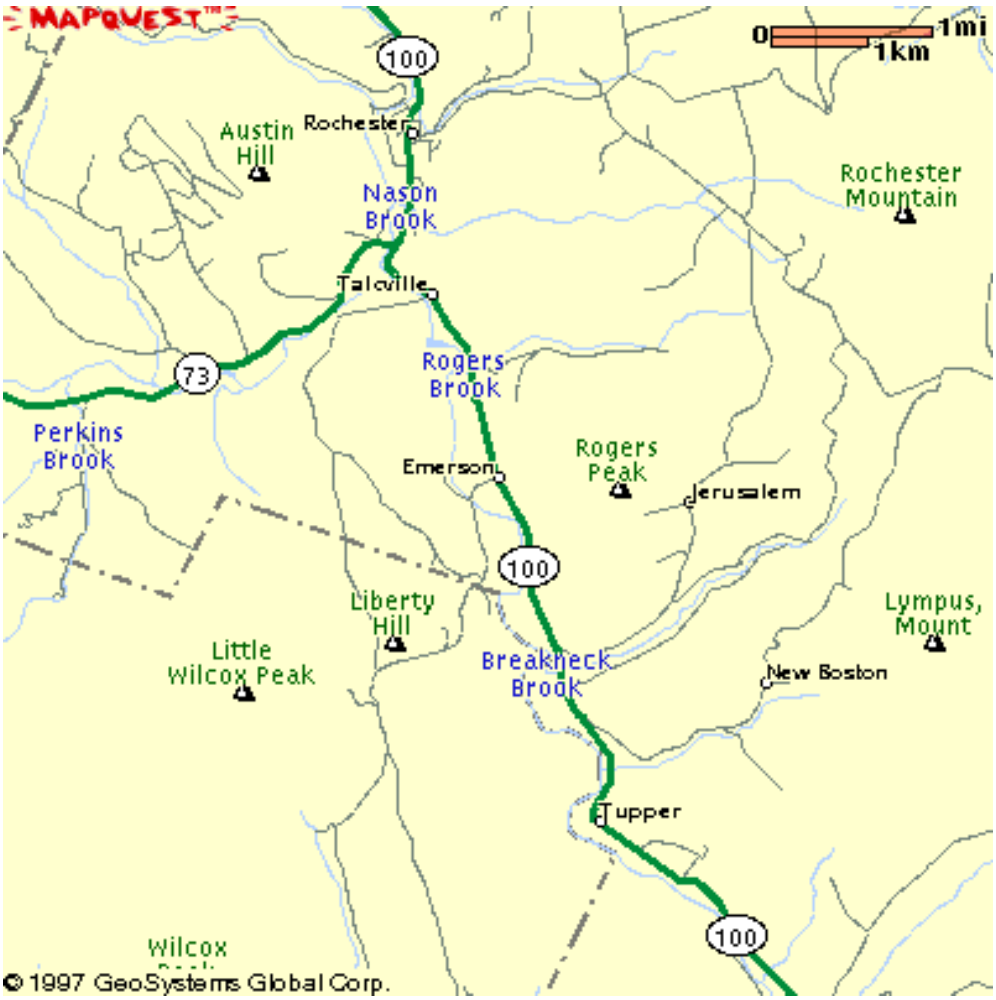
Name: White River

Land Ownership: Private

Land Use: Agriculture

Project Length: 450 feet

Riparian Width: 25 feet



Problem Statement:	**Bank erosion**
	No riparian habitat
	Cattle Access
Restoration Techniques Used:	**Tree revetments**
	Fencing
	Riparian planting

Slumping bank with livestock grazing to top of bank

Installation of tree revetments

Tree revetments stabilizing toe of bank after 1 year

Tree revetments stabilizing toe of bank after 1 year

Livestock exclusion from riparian area after 1 year

National Showcase Watersheds

River Bend Project

Location: Rochester, Vermont

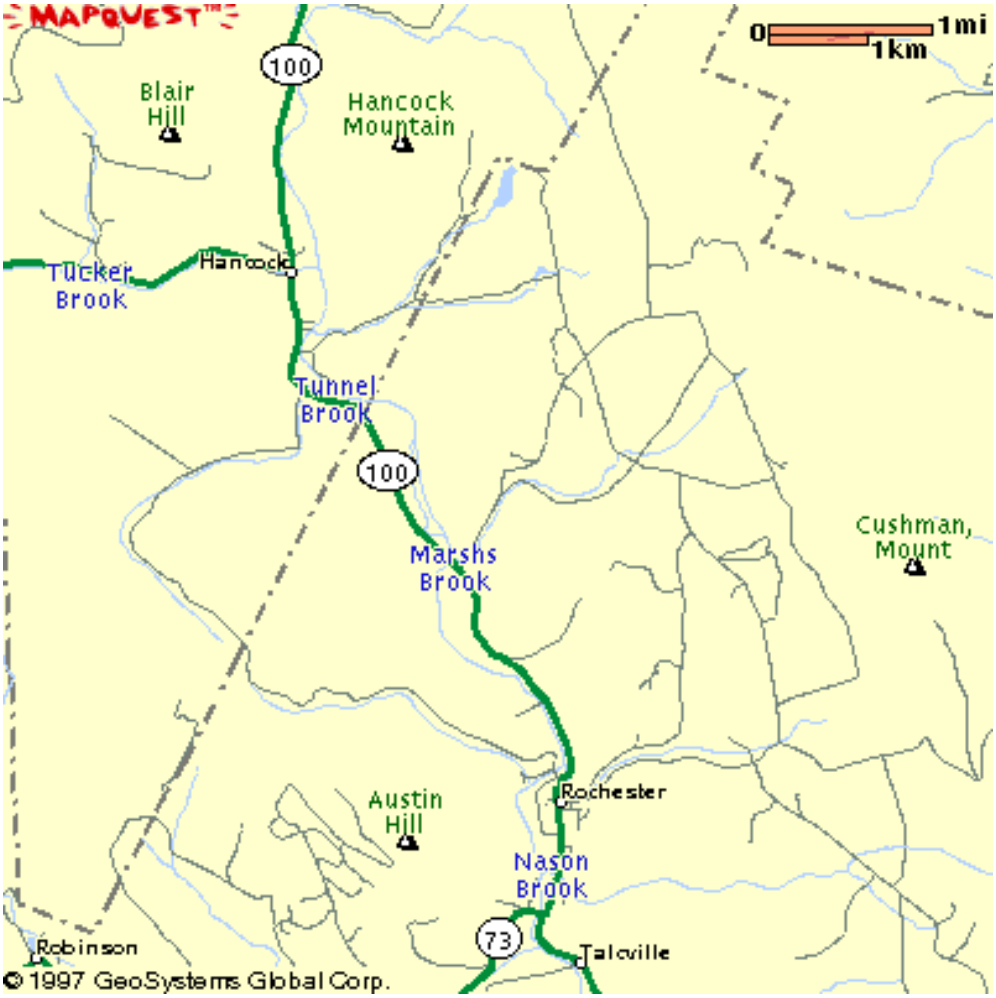
Name: White River

Land Ownership: US Forest Service

Land Use: Agriculture and recreation

Project Length: 300 feet

Riparian Width: 50 feet



Problem Statement:	**Excessive bank erosion**
	Lack riparian habitat
	Poor in-stream habitat diversity
Restoration Techniques Used:	**Rock revetment**
	Brush Layers
	Riparian planting
	Boulder clusters
	Installation of large woody debris (rootwads)

Slumping bank before treatment

Rock revetment with brush layers, coir fabric and live stakes immediately after installation

Close-up of rock revetment with brush layers

Project after 2 years

Down stream immediately after installation

Down stream view - willows have overgrown rock revetment

National Showcase Watersheds

Events
Blackfoot Challenge

September 22, 1999 - The Blackfoot Challenge is sponsoring a Leafy Spurge Weed Tour and Barbeque. It will provide an up-close look at dealing with noxious weeds where surface water or high water tables restrict the use of herbicides. Weed control and prevention measures that can be used for plants like leafy spurge, toadflax, spotted knapweed, and others will be discussed. More information can be obtained from the Blackfoot Challenge at http://www.epa.gov/owow/showcase/blackfoot/contacts.html.

For more specific information of restoration projects see website:
http://www.r6.fws.gov/pfw/montana/mt6.htm

National Showcase Watersheds

Blackfoot Watershed

- Project Description
- Location
- Partners
- Links
- Contact Information

- Other links about the Blackfoot Watershed

  Blackfoot Watershed Restoration Projects

National Showcase Watersheds

Location
Blackfoot Challenge

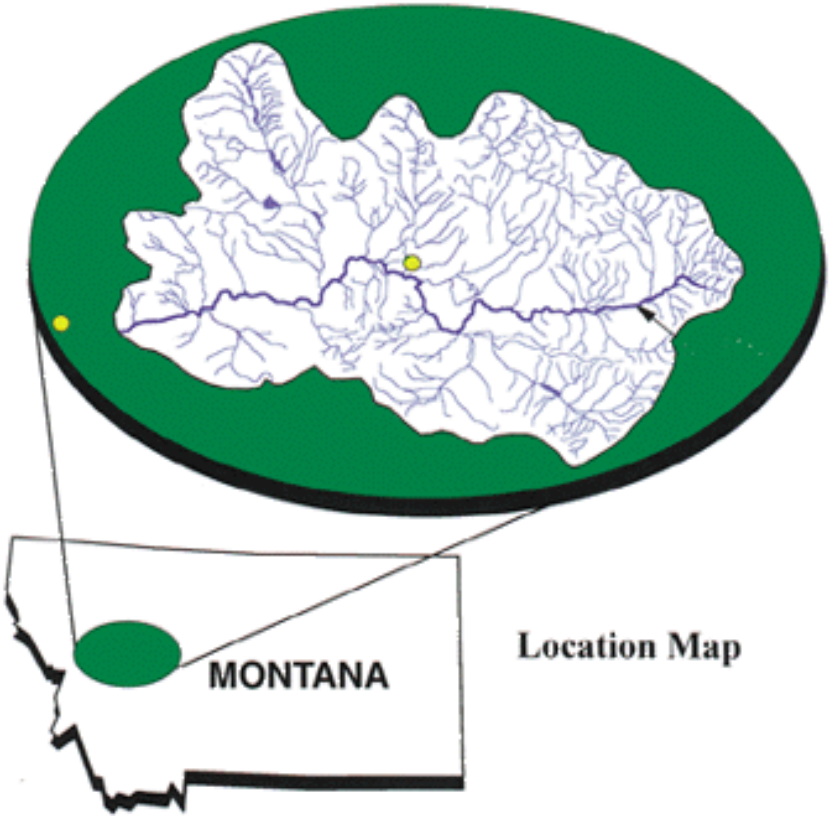
What is special about the Blackfoot Valley?

The Blackfoot River headwaters atop the Continental Divide at Roger's Pass and empties into the Clark fork River east of Missoula, Montana. In its 132 mile journey, the river runs through some of the most productive fish and wildlife habitat in the Northern Rocky Mountains. The valley floor contains glaciated wetland complexes, native scrub/shrub riparian areas and blue ribbon trout streams. Mountain ranges, National Forests, and the Bob Marshall and Scapegoat Wilderness Areas surround the valley.

Blackfoot River Ecosystem

The Blackfoot River is 132 miles long.
The Blackfoot Watershed consists of 1.5 million acres.

- 53% Federal ownership
- 20% Corporate timber holdings
- 20% Privately-owned ranches
- 7% State land



Location Map

For more specific information of restoration projects see website:
http://www.r6.fws.gov/pfw/montana/mt6.htm

National Showcase Watersheds

Links
Blackfoot Challenge

Weed Management - http://www.mt.blm.gov/bdo/pages/blackfoot.html

For more specific information of restoration projects see website:
http://www.r6.fws.gov/pfw/montana/mt6.htm

National Showcase Watersheds

Partners
Blackfoot Challenge

What are some of the organizations that are involved?

- Numerous private landowners
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- U.S. Forest Service
- U.S. Natural Resources Conservation Service
- U.S. Environmental Protection Agency
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources á á& Conservation
- Montana Department of Environmental Quality
- University of Montana
- Plum Creek Timber Company
- McDonald Gold Project
- Montana Department of Agriculture
- Bouma Post and Pole
- Trout Unlimited
- The Montana Nature Conservancy
- Montana Land Reliance
- Montana Department of Transportation
- North Powell, Missoula and Lewis &

Clark Conservation District
- Powell, Missoula and Lewis & Clark County Commission
- Ducks Unlimited
- National Fish and Wildlife Foundation
- Rocky Mountain Elk Foundation
- Montana Riparian Association
- Montana State University
- North Powell County Weed Control District
- Numerous private foundations
- Montana Department of Commerce-Travel Montana
- The Montana Watercourse
- MSU Extension Service

For more specific information of restoration projects see website:
http://www.r6.fws.gov/pfw/montana/mt6.htm

National Showcase Watersheds

Project Description
Blackfoot Challenge

What is it?

The Blackfoot Challenge is a "grass roots" group which has organized to coordinate management of the Blackfoot River, its tributaries, and adjacent lands. While the group has no formal membership, it consists of numerous private landowners, federal and state agency representatives, local government officials and several corporate landowners. The group is organized through a series of committees.

The mission of the Blackfoot Challenge is to coordinate efforts that will enhance, conserve and protect the natural resources and rural lifestyle of the Blackfoot River Valley for present and future generations. The Challenge supports environmentally responsible resource stewardship through the cooperation of public and private interests.

The Blackfoot Challenge was formally chartered in 1993, though active concern for the valley predates the charter. For example, private landowners in the Blackfoot Valley were instrumental in bringing conservation easement legislation, walk-in hunting areas and recreation corridor management to Montana in the late 1970s.

What is special about the Blackfoot Valley?

The Blackfoot River headwaters atop the Continental Divide at Roger's Pass and empties into the Clark fork River east of Missoula, Montana. In its 132 mile journey, the river runs through some of the most productive fish and wildlife habitat in the Northern Rocky Mountains. The valley floor contains glaciated wetland complexes, native scrub/shrub riparian areas and blue ribbon trout streams. Mountain ranges, National Forests, and the Bob Marshall and Scapegoat Wilderness Areas surround the valley.

The valley's unique habitat

Diversity supports a wide variety of fish and wildlife species. Prairie wetland complexes attract a large number of breeding and migratory birds, including sandhill cranes and black terns. The tributary streams to the Blackfoot River provide crucial spawning and rearing habitat for the federally listed bull trout and the westslope cutthroat trout. The valley is at the southern edge of

the Northern Continental Divide Ecosystem which supports the largest population of Grizzly bears in the lower 48 states. The Blackfoot Valley has kept its biological diversity thanks mostly to the ranchers that manage the valley floor. There are approximately 2,500 households and seven separate communities in the Blackfoot.

The Blackfoot Challenge has focused its efforts on several program activities over the past few years:

1. Education:
   The Blackfoot Challenge considers resource education as one of our primary roles and responsibilities. Below is a sample of education activities sponsored by the Challenge.

   Weed Management - The Challenge's weed education plan that was developed in 1997 provided a mechanism to focus specific components of a multi-resource education plan on a widely diverse population both within the Blackfoot Valley and to visitors. The Challenge annually sponsors three weed management workshops and two tours, in addition to the individual contacts and training assistance provided by our Weed Management Coordinator. The Challenge also sponsors an annual weed calendar contest for youth in seven schools in the watershed.

   Water education for teachers (WET) - Project WET Montana is a resource education project administered by MT State University. The award winning program instructs teachers how to blend water resource education activities into their existing curriculums. The Blackfoot Challenge sponsored the first Project WET workshop in the Blackfoot in 1997. The workshop was attended by teachers representing six schools in the Blackfoot Valley and several resource organizations outside the Blackfoot. In 1998, the Challenge hosted a five-day watershed tour to provide the participants on-the-ground instructions in weed management, stream restoration, riparian management, abandoned mine reclamation, active mining, bull trout restoration, timber management, wetland restorations and conservation easements.

   Alternative Ranch Income - One of the goals of the Blackfoot Challenge is to preserve the rural lifestyle of the Blackfoot Valley that is so important to its residents. The threat of subdivision, in particular, and urban encroachment are of utmost concern. To provide our membership tools to combat such threats, the Challenge initiated a series of tours and workshops that provided information on sources of alternative income that could be produced from existing agricultural lands and maintain them in their existing status. Workshops focused on watchable wildlife/eco-tourism, guest ranching and conservation easements.

   Threatened and Endangered Species - Recent additional agency focus on threatened and endangered species has raised the awareness of the management of such species in the Blackfoot. The Challenge sponsored membership meetings that provided a great deal of information on the management of grizzly bears and wolves in the Blackfoot Watershed. In addition, fisheries experts provided insight into the listing of bull trout and the possible listing of westslope cutthroat trout on the endangered species list. With the help of the

Blackfoot Challenge, management strategies are currently being developed for the management of these species in the Blackfoot Basin.

2. Weed Management:
   The purpose of the weed management project is to coordinate management of noxious weeds on 350,000 acres in the Blackfoot Valley. In order to effectively manage an area of this size, we broke the valley up into seven different Weed Management Areas (WMA). The Middle Blackfoot WMA was the first area formed in 1996, three more areas were added in 1997, 1998 & 1999, and an additional WMA will be added annually through 2002. A weed Management Coordinator was hired to delineate ownership within each WMA and work with the individual landowners on mapping noxious weeds, providing information on the different weeds, coordinating control measures, and grant writing. To date over 120,000 acres have been treated and over one million dollars secured for noxious weed management.

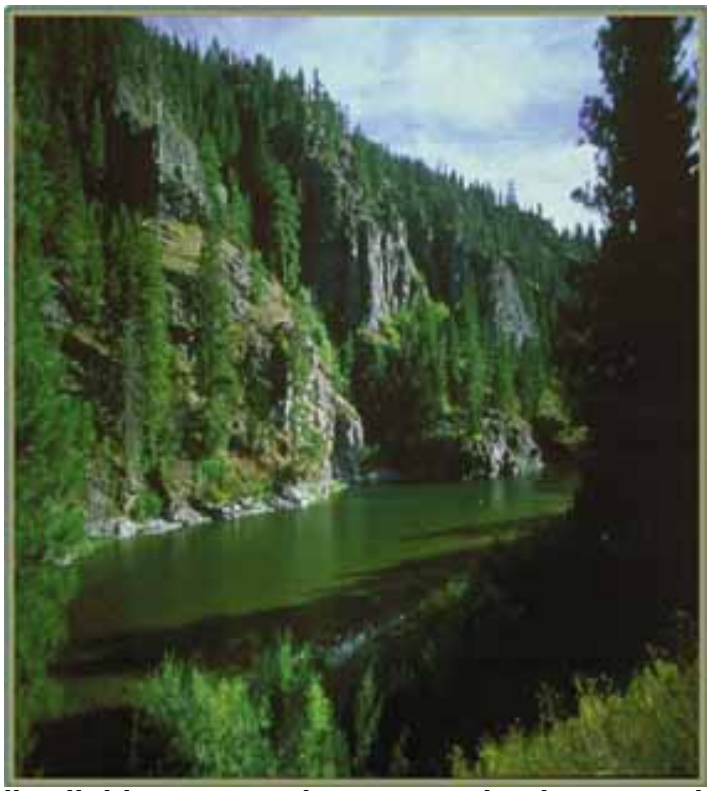
   For more specific information on Weed Management see website:
   http://www.mt.blm.gov/bdo/pages/blackfoot.html

3. Habitat Restoration And Protection:
   In 1988, concern over declining fish populations in the Blackfoot River prompted basin-wide evaluation of fish populations and their habitats. Fishery evaluations reported declines throughout the Blackfoot and the lower reaches of its tributaries. These studies specifically revealed the decline of native westslope cutthroat trout and bull trout. Landscape level impacts to the fishery include: poor water quality, altered stream channels and contaminated sediments related to past mining activities; riparian degradation related to past riparian grazing practices; irrigation related impacts including reduced instream flows, poor upstream fish passage and entrainment of out-migrant fish to irrigation ditches; poor riparian timber harvest practices; wetland drainage and associated sod-busting; subdivision and over-exploitation of the fishery.

   In 1990, efforts have shifted from fishery and habitat inventories to restoration and project monitoring. Fishery restoration has expanded from working on individual projects to a basin-wide approach, working with multiple landowners. Since then, the restoration program has expanded beyond fishery specific issues to a broad level of landscape restoration and protection relying on expertise of several agencies and conservation groups in cooperation with private landowners. Some of the accomplishments include:

   - over 300 miles of fish passage barrier removal
   - 32 miles of instream restoration
   - 51 miles of riparian restoration
   - 2,100 acres of wetlands restored
   - 2,300 acres of native grasslands restored
   - 54,500 acres of perpetual conservation easements secured
   - 13 self-cleaning fish screens installed on irrigation ditches
   - numerous feedlots removed from streams

For more specific information of restoration projects see website:
http://www.r6.fws.gov/pfw/montana/mt6.htm



"Eventually all things merge into one and a river runs through it"
Norman Maclean

National Showcase Watersheds

Contacts
Blackfoot Challenge

Jim Stutzman
Greg Neudecker
Benton Lake National Wildlife Refuge
922 Bootlegger Trail
Great Falls, MT 59404
(406) 727-7400

For more specific information of restoration projects see website:
http://www.r6.fws.gov/pfw/montana/mt6.htm

National Showcase Watersheds

Carson River

- Project Description
- Location
- Partners
- Links
- Contact Information

- Other links about the Carson River
  - Carson River Damages
  - Projects: Making a Difference
  - People: Making a Difference

National Showcase Watersheds

Project Description
Carson River Watershed

Originating within the eastern slopes of the Sierra Nevada Mountains, the Carson River Watershed extends out into the high desert of Nevada. Its 2.5 million acres stretch across five counties in two states. Wilderness, recreation, agriculture, and commercial enterprise make up part of this mosaic of public, private, and tribal lands. This area is home to a diverse range of ecological communities as well as the state's capitol, a US Navy Airbase, and smaller towns and communities.

Starting in 1990, local landowners and agencies undertook efforts to address local concerns on the river including loss of agricultural lands, erosion and sedimentation. Working in and through local conservation districts, county governments, Western Nevada RC&D, and the NRCS, community led restoration groups were developed and river planning better integrated into local planning efforts. Each community has developed plans to conserve and create sustainable watershed conditions in their counties. These community groups have come together to create a united vision and mission for watershed restoration. Over 70 districts, councils, service clubs, ranch organizations, environmental organizations, schools, youth groups, churches, county, state, and federal agencies have joined forces to conserve this watershed.

The CRMP groups working on the river have completed 10 miles of stream restoration through 30 projects, utilizing 15 different bioengineering and structural technologies. All restoration is science-based, working off a 110 mile fluvial geomorphology analysis and using a variety of monitoring techniques to plan and evaluate projects. In 1996 bioengineering training reached out to ranchers; and in 1998, the national and local experts worked in conjunction with conservation districts and other agencies to host a 2-day bioengineering workshop with 110 participants. Programs to protect the floodplain and agricultural lands from development are currently underway to help integrate upland restoration with stream corridor restoration.

Started in 1995, the annual "Conserve the Carson River Workday" Project promotes community

involvement on the ground. In four years, 2,500 participants contributed 22,000 hours to plant and protect riparian vegetation, remove litter, and hand release trout. Our "Trout in the Classroom Program" allows local students to learn about watershed conditions and the value of water quality by raising threatened Lahontan Cutthroat Trout for later release. The Dayton Valley Conservation District's "River Wranglers" also provides environmental education and opportunities for students to learn about water quality, watershed function, and assist with river restoration projects.

Tours for US Senators Bryan and Reid continue to bring federal representatives to communities in the watershed to better understand local conditions and restoration efforts. In 1997, state legislators introduced and passed five bills supporting stream corridor restoration and state wide disaster relief. In 1998, the Western Nevada RC&D and the Cooperative Extension initiated a series of three "Carson River Conferences." Over 350 members from local organizations and agencies worked on issues related to diversions and river restoration as well as management of both the floodplain and upland watershed. These conferences led to the development of the "Integrated Watershed Coordination Committee," a citizen and interagency group created to coordinate watershed management through the Carson Water Subconservancy District.

Through collaborative efforts, local grass roots organizations work together with agencies and county governments, and landowners to develop watershed plans that protect, conserve and enhance resources. Planning is approached on a comprehensive and holistic basis and includes: stream corridor restoration; water quality and quantity; grazing; timber issues, riparian habitat, municipal water planning; recreation and public access; and protection of floodplains and open spaces. Implementation of strategies is possible through diverse funding sources, and innovative use of local resources, which allows us to leverage and multiply state or federal funding opportunities.

National Showcase Watersheds

Carson River Damages

1997 Carson River Flood Damages

1997 Carson River Flooding

National Showcase Watersheds

Contacts
Carson River Watershed Coordinating Committee Group E-mail and/or Web Site

NAME	ORGANIZATION	E-MAIL	WEB-ADDRESS
Jim Smitherman	Nevada Division of Environmental Protection	jsmither@ndep.carson_city.nv.us	
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Caryn Huntt	Bureau of Reclamation	chuntt@mp.usbr.gov	
Terri Pereira	Lahonton Valley Conservation District	Terri.Periera@nv.usda.gov	http://www.lahontan.org

John Capurro	USDA-NRCS	John.Capurro@nv.usda.gov	
Keith Rugg	Carson Valley Conservation District	rkrugg@aol.com	
Kevin Piper	Dayton Valley Conservation District	mcrcrmp@gateway.net	
Ed Skudlar	Nevada Water Planning	eskudlar@govmail.state.nv.us	
Edwin James	Carson Water Subconservancy	cwsd@earthlink.net	
Steve R. Lewis	Nevada Cooperative Extension		www.nce.unr.edu
Kay Bennitt	Carson City Supervisor	Kaleben@ibm.net	
Daniel A. Kaffer	Western Nevada RC&D/NRCS	mcrcrmp@gateway.net"	
Bob Milz	Lyon County Commissioner	Mcrcrmp@gateway.net	
Jacque Etchegoyhen	Douglas County Commissioner	Jexe@aol.com	
Mark Kimbrough	State Parks	Wshoezephyr@aol.com	
Diane Doonan	Washoe Tribes of NV & CA		

National Showcase Watersheds

Links
Carson River

There are no links at this time.

National Showcase Watersheds

Location
Carson River Watershed

National Showcase Watersheds

Partners
Lower Carson River
Coordinated Resource Management Project

The Carson River downstream of Lahontan Dam has not been maintained for many years. There are debris, sediment, weed, and erosion problems in many areas along with potential flooding problems. As a result, Lahontan Conservation District submitted a proposal to the Western Nevada Resource Conservation & Development (RC&D) in 1987 to help begin a "Clearing and Snagging Project." Meetings began with participation from agencies and groups such as State of Nevada, Truckee-Carson Irrigation District, Bureau of Reclamation, Natural Resources Conservation Service (NRCS), U.S. Fish & Wildlife Service, Nevada Cooperative Extension, U. S. Army Corps of Engineers, U.S. Environmental Protection Agency, City of Fallon, landowners, and others.

In 1988, the RC&D submitted a request to the Army Corps of Engineers (Corps) on behalf of Lahontan Conservation District to consider the potential for a flood control project on the lower Carson River. A reconnaissance investigation report was released by the Corps in 1991 indicating that "there is no Federal interest in a potential solution that can solve local and regional flood control problems. No further action should be taken under this authority at this time."

As a result, Lahontan Conservation District took the lead and the project became the Lower Carson River Coordinated Resource Management Project (CRMP). The first step taken was to invite Frank Reckendorf, NRCS Sedimentation Geologist, to the area for an evaluation of the channel capacity of the lower Carson River. Frank made recommendations regarding which areas should be targeted first for debris and sediment removal.

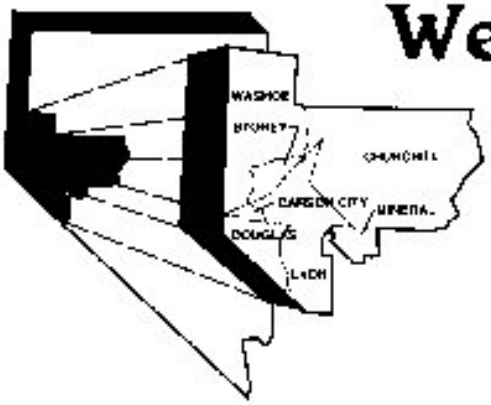
Funding was received from RC&D, State of Nevada Division of Water Resources, and the Carson Truckee Water Conservancy District to hire a half-time project coordinator. Terri Pereira

began in July, 1994, as an employee of Lahontan Conservation District. Five grants have been obtained since the initial funding was expended.

In January, 1995, the first sediment removal projects were begun. A thousand cubic yards of sediment were removed from each of three sites which were identified by the sedimentation geologist to be the most constrictive areas of the channel. The sediment was taken off-site due to the levels of mercury determined by previous tests.

Debris removal has been accomplished on approximately 10 miles of riverbank. Prisoners from a minimum security prison used chainsaws to remove, cut, and stack wood above the high water line. At times, landowners had to use chains and a loader to pull large, water-logged trees from the channel. The debris removal is an ongoing project.

Nine bank stabilization projects have been completed to date. A technique called willow matting has been used in the majority of the projects and has been successful. The projects all required bank reconstruction with a dozer prior to revegetation or placement of riprap. Engineering help has been provided by Natural Resources Conservation Service. For more information, please contact Terri Pereira at (775) 423-5124, ext. 101 or e-mail her at Terri.Pereira@nv.usda.gov.



Western Nevada
Resource Conservation & Development, Inc.
P.O. Box 3543
Carson City, Nevada 89702

(702) 883-2292

National Showcase Watersheds

People: Making a Difference
Carson River

Fernley High School Volunteers

Silver Springs Elementary School Volunteers

Legislative Tour, Carson River, 1998 Nevada Senators and Assemblymen

Carson River Legislative Tour: Overview of Floodplain and Discussion of EQIP Program

Washoe Tribal Chairman and Local Ranchers Discuss River Restoration and Watershed Management on the Carson River

National Showcase Watersheds

Projects: Making a Difference
Carson River

Coconut Fabric (Coir) Erosion Control Placement, with willow root ball planting and seeding, Carson River, 1998

BEFORE
Stream Bank Erosion Damages, Glancy Ranch, 1998

AFTER
Stream Bank Erosion Repair Using Soil Bioengineering System: juniper tree revetments, willow root wad plantings, Coir Fabrics, verticle willow bundles, brush mattress, and peak stone dikes

Placing dormant willow cuttings for soil bioengineered bank stabilization

12 gauge smooth wire being installed to secure dormant willow cuttings

AFTER
Ft. Churchill Carson River Project site: Fernley High School volunteers placing dormant willow cuttings

Vortex rock weirs under construction, Carson River, 1999

Vortex rock weirs,completed installation, Carson River, 1999

Vortex rock weirs,completed installation, Carson River, 1999

National Showcase Watersheds

Carson River

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National Showcase Watersheds

Location - Duck Creek Watershed

Duck Creek is located near Juneau, Alaska in the Mendenhall Valley, a watershed that drains several streams into one of only a few major estuarine wetlands in Southeast Alaska. The Mendenhall Wetlands encompass approximately 4,000 acres of tidal marsh that support an abundance and variety of flora and fauna. Duck Creek is a small stream over 3 miles in length that flows south through the middle of the heavily populated Valley and enters the Mendenhall River and Wetlands directly upstream of the Juneau International Airport runway. Based on descriptions from early residents, the stream originally had numerous beaver ponds and clear water that flowed year-round. Presently the stream varies from about 5 to 15 feet in width and from a few inches to several feet in depth. Duck Creek has two main tributaries: East Fork and El Camino; combined with the main stream, these drain approximately 1080 acres (1.7 mi2).

Area photograph of Duck Creek meandering through Mendenhall Valley in the capital of Alaska, Juneau.

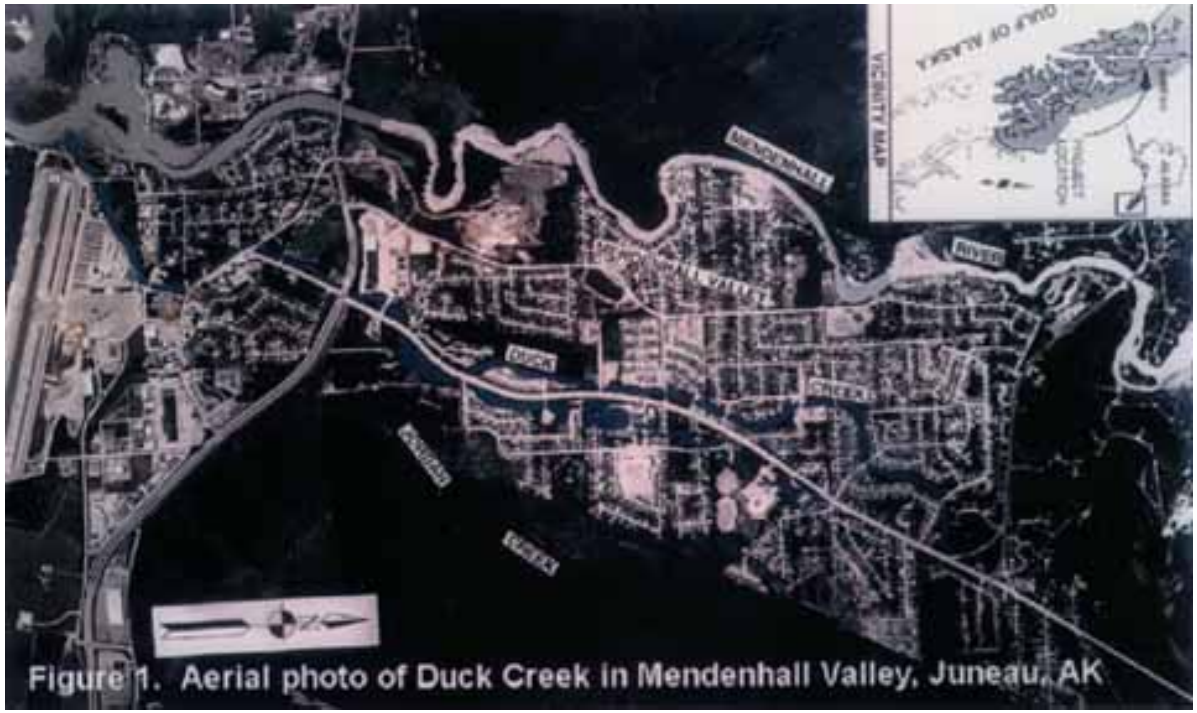

Figure 1. Aerial photo of Duck Creek in Mendenhall Valley, Juneau, AK

National Showcase Watersheds

Duck Creek Watershed

- Project Description
- Location
- Partners
- Links
- Contact Information

- Other links about the Duck Creek Watershed
  - Partnerships at Work: Photo Gallery
  - Culvert Before and After Photo Gallery

National Showcase Watersheds

Duck Creek Watershed Photo Gallery - People at Work

Duck Creek Advisory Group with cub scouts from Juneau on a field trip along Duck Creek.

Americorps volunteers used water pumps and a suction dredge to remove fine sediment (sand) from spawning habitat of coho salmon.

Americorps volunteers installed wood log structures, sand bags, jute matting, and planted willow stakes to improve the riparian corridor, reconfigure the stream banks and channel and improve the sinuosity of this reach of Duck Creek in order to improve salmon spawning habitat.

Americorps volunteers also used shovels and grates to manually remove fine sediment from degraded stream bed in order to improve spawning habitat.

In areas along the stream where the riparian zone is very narrow or nonexistent, snow fences have been built to reduce the amount of snow and sand from entering the stream. Americorps volunteers have assisted in the installation and evaluation of these fences.

Americorps volunteers collected native aquatic plants from the Duck Creek watershed for planting in the newly created stormwater wetland.

National Showcase Watersheds

Project Description- Duck Creek Watershed

Duck Creek is a small anadromous fish stream located in an old outwash channel of the Mendenhall Glacier, in the center of the most populated residential area of Alaska's capital, Juneau. Adversely affected by urban development, Duck Creek currently is listed by the Alaska Department of Environmental Conservation as impaired because of urban runoff, water quality limitations and habitat modifications resulting from inadequate stewardship. Duck Creek has been an important salmon stream, providing salmon for commercial, sport and subsistence fisheries and feed for the early fur farms in the Valley. The chum salmon, that once numbered 10,000, are now extinct and the coho salmon have been reduced to a fraction of their previous abundance. Despite its impairment, the watershed still provides the community with beneficial and often essential resources such as drainage and flood control, fish and wildlife habitat, recreation, aquatic education, open space, and aesthetic values. Duck Creek is somewhat unique because if supports a large overwintering population of coho salmon juveniles which migrate into the stream each fall from the estuarine wetlands to take advantage of the warm groundwater and extensive pond habitat. From this overwintering population about 2000-4000 smolts are produced each year that provide returning mature fish to a variety of users.

Chum salmon utilize small groundwater-fed streams like Duck Creek throughout their range. The native run of chums that once numbered 10,000 are now extinct in Duck Creek.

Because of the substantial loss of aquatic resources in the watershed, the Duck Creek Watershed Management Plan recommends several restoration projects that will achieve community benefits beyond the statutory environmental standards in addition to the application of Best Management Practices and new policies to prevent further degradation. Several restoration projects have been implemented through "early windows of opportunity" in order to realize cost-savings and partnership opportunities.

A number of revegetation projects have been completed with the help of Southeast Alaska Guidance Association (SAGA). SAGA serves as a key partner in acquiring and planting willow stakes and marsh vegetation, and seeding areas with grass. Those efforts have included streambank revegetation and channel modification at Stephen Richards Drive and Nancy Street crossing replacement sites, revegetation of a CBJ constructed ditch near St. Brendan's Episcopal Church, and revegetation of the riparian zone at Taku Blvd., the site of the pilot study described below.

A pilot study was conducted to determine the feasibility of restoring salmon spawning habitat by reconfiguring the stream channel, removing fine sediment, and increasing dissolved oxygen levels. Prior disturbances to the stream had removed most of the woody debris that provides natural structural diversity and the stream channel widened, became shallow, and had little turbulence. Some coho salmon spawn in this reach and it contains potentially the best spawning habitat remaining in the stream. Suction dredges were used to remove fine inorganic and organic sediment from the streambed, the channel was constricted, and rock and wood structures were used to facilitate interchange between surface and intragravel water.

A stormwater treatment marsh (i.e., wetland) was created from a 2-acre borrow pit near the Church of the Nazarene on the East Fork of Duck Creek. The purpose of creating the wetland was to improve water quality and fish habitat using aquatic plants to filter the heavy load of suspended sediment and iron floc that exist in the pond and main channel downstream. In addition, the fill material used to create the wetland also served as a cap over the source of iron-

rich groundwater coming into the pond.

The project serves as a model for what can be accomplished through community-based partnerships. The project was developed as part of a CBJ plan to install a stormwater drainage system in a subdivision near the East Fork of Duck Creek. The stormwater project was to generate about 20,000 cubic yards of fill material that would require disposal. A nearby dredge pond excavated in the1940-50s to build roads had become a source of poor water quality and contributed to high mortality of over-wintering coho salmon, and was selected as a restoration site by DCAG. A cooperative partnership was developed between CBJ, Arete Construction, Howell Construction, the Church of the Nazarene, and NMFS to use fill material from the storm drain project to convert this dredge pond into a wetland. Besides being more aesthetically pleasing and improving habitat for rearing salmon and waterfowl, the wetland reduced the risk of children falling in the deep, steep-banked dredge pond. The site was filled in April 1998. Native plants obtained from Duck Creek and the Dredge Lake area were then planted by volunteers from SAGA Youth Corps.

In addition to the specific projects mentioned above, during the past 5 years, improvements were made on stream crossings. and an experimental "snow fence" designed to limit plowing of snow and road sand into Duck Creek was installed on the Nancy Street Crossing, but has not yet been evaluated for effectiveness. More stream crossings and installation of "snow fences" are planned for the future.

National Showcase Watersheds

Culvert Before and After Photo Gallery

Examples of the stream crossings on Duck Creek using culverts of inappropriate size and placement.

Photo coming soon
Bottomless arch culverts are being used to replace poorly designed crossings along Duck Creek. Americorps volunteers are placing jute matting on the streambank in the process of revegetating this site following installation of a 17 foot wide arch.

National Showcase Watersheds

Links in the Duck Creek Watershed

Alaska Department of Transportation and Public Facilities, Preliminary Design and Environmental Section
University of Alaska Southeast
Landscape Alaska
Goldbelt, Inc.
Gastineau Guiding
Coastal America Partnership
Trout Unlimited, Juneau Chapter
Southeast Alaska Guidance Association
Discovery Foundation
City and Borough of Juneau

Specific Interests

U.S. Fish and Wildlife Service Partners For Fish and Wildlife Program Voluntary Habitat Restoration with Private Landowners
Streambank Revegetation and Protection: A Guide for Alaska
Best Management Practices (BMPs) for Nonpoint Source Pollution Control
Natural Resources Conservation Service Technical References
Office of Water Publications
Institute of Arctic Biology
USDA Forest Service, Water and Air Management

National Showcase Watersheds

Partners in the Duck Creek Watershed

In 1993, the Dusk Creek Advisory Group (DCAG) was formed to coordinate activities for planning, initiating, and implementing a program of restoring water quality and anadromous fish habitat in Duck Creek. The Advisory Group provided education and facilities work with over 25 organizations including the City and Borough of Juneau, State and Federal agencies, private businesses, conservation organizations, and homeowners in the design of restoration projects and pollution control activities throughout the watershed. The DCAG holds monthly meetings, publishes a newsletter, and recently completed a Duck Creek Watershed Management Plan that uses a watershed approach to focus on enforcement, management, and restoration. A science-based approach is used by the DCAG to accomplish and evaluate its restoration efforts and to ensure that Duck Creek will be an effective demonstration site for developing restoration technology.

Public Organizations
Duck Creek Homeowners
Juneau Trout Unlimited
Southeast Alaska Guidance Association (SAGA)
Mendenhall Watershed Partnership

Small Businesses
Gastineau Guiding
Discovery Foundation
Hanna Construction

Local Government
City and Borough of Juneau
Southeast Conference
Juneau Public Schools

State Government

Alaska Department of Environmental Conservation, Division of Water
Alaska Department of Fish and Game -Habitat Division
Alaska Department of Natural Resources, Division of Land, Mining, and Water
Alaska Department of Transportation and Public Facilities
Alaska Governors Office, Division of Governmental Coordination

Federal Government

National Marine Fisheries Service (Alaska Region and Auke Bay Laboratory)
U.S. Fish and Wildlife Service
Environmental Protection Agency - EPA
U.S. Geological Survey
Federal Highway Administration
U.S. Army Corp of Engineers - USACE
U.S. Forest Service
USDA, Natural Resource Conservation Service

National Showcase Watersheds

Contacts In Duck Creek Watershed

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Mendenhall Watershed Partnership
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EPA United States Environmental Protection Agency
Office of Water

Duck Creek Watershed Photo Gallery

People

Duck Creek Advisory Group with cub scouts from Juneau on a field trip along Duck Creek.

Files dc-30: Americorps volunteers used water pumps

and a suction dredge to remove fine sediment (sand) from spawning habitat of coho salmon.

File dc-35: Americorps volunteers also used shovels and grates to manually remove fine sediment from degraded stream bed in order to improve spawning habitat.

File dc-37: Americorps volunteers installed wood log structures, sand bags, jute matting, and planted willow stakes to improve the riparian corridor, reconfigure the stream banks and channel and improve the sinuosity of this reach of Duck Creek in order to improve salmon spawning habitat.

File dc-40: In areas along the stream where the riparian zone is very narrow or nonexistent, snow fences have been built to reduce the amount of snow and sand from entering the stream. Americorps volunteers have assisted in the installation and evaluation of these fences.

File dc-46: Americorps volunteers collected native aquatic plants from the Duck Creek watershed for planting in the newly created stormwater wetland.

National Showcase Watersheds

Contacts
Green/Duwamish River Ecosystem Restoration

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National Showcase Watersheds

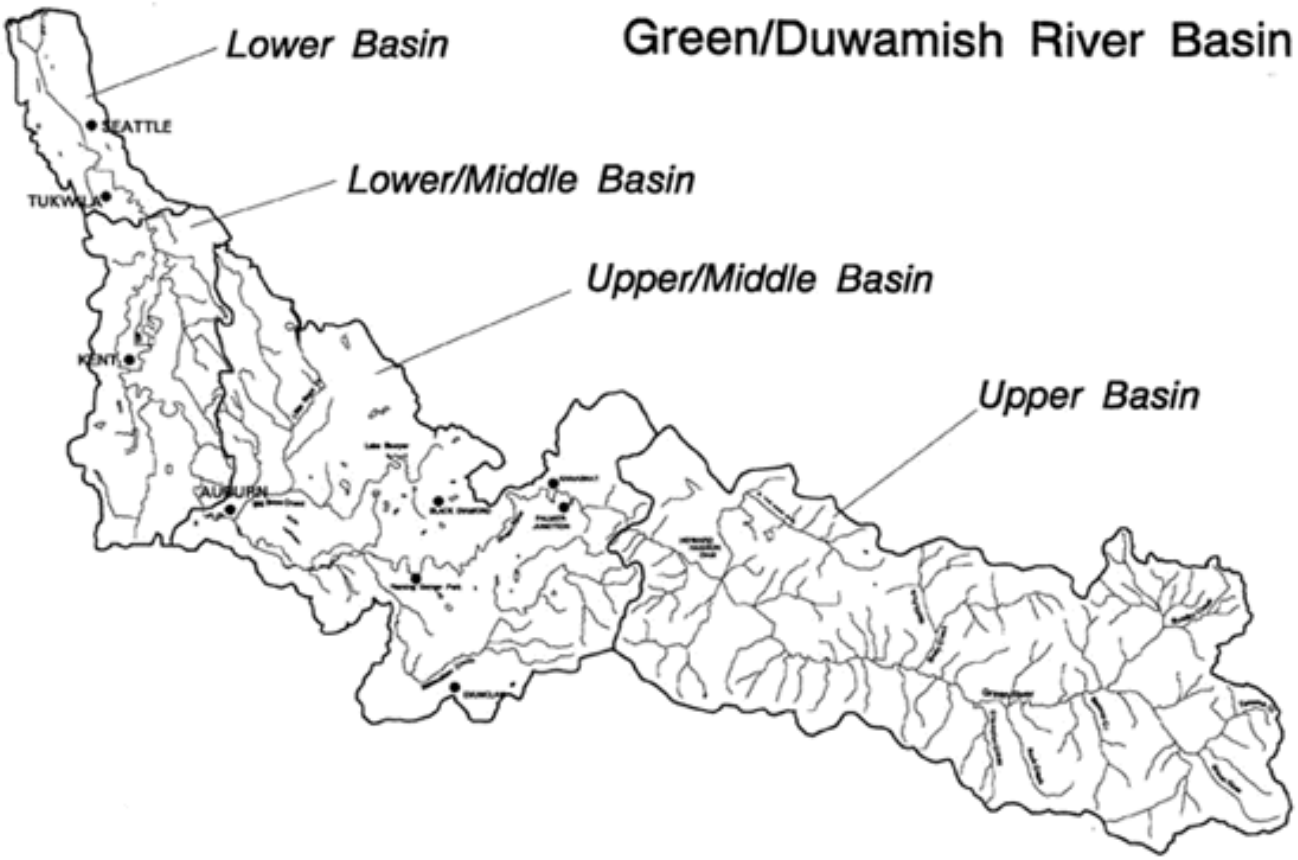
Links
Green/Duwamish River Ecosystem Restoration

- Seattle District, USA Corps of Engineers homepage

National Showcase Watersheds

Location
Green/Duwamish River Ecosystem Restoration

The Green/Duwamish basin is located in the southeast portion of the Puget Sound Basin and includes the watershed and tributaries associated with the Green and Duwamish Rivers. The basin includes 483 square miles and is centered approximately 30 miles east of Tacoma and 35 miles north of Mount Rainier. It lies entirely within the boundaries of King County in Washington state.



The Green River originates in the Cascade Range south of Stampede Pass at an elevation of about 4,500 feet and flows northwest 90.5 miles to Elliot Bay. The highest elevation in the basin is at 5,750 feet on Blowout Mountain on the Cascade divide. The river system flows through two ecosystems.

The upper Green River Basin lies primarily in the boundaries of the Mt. Baker-Snoqualmie National Forest and has been extensively logged. Howard Hanson Dam is located at river mile 64.5. The primary authorized use of the dam is flood control. Three secondary uses are also authorized: augmentation of summer low flows in the Green River, irrigation, and water supply. Four and one-half miles downstream is Tacoma's diversion dam where the city withdraws a maximum of 113 cubic feet/ second of water from the river for municipal uses.

The middle Green River and lower Green/Duwamish Basin lie within the Puget Lowland ecoregion which is characterized by open hills and flat lands of glacial and lacustrine deposits. The southern portion of the middle Green River basin has been developed primarily for agricultural use and much of the original forests and riparian zones have been cleared for pasture. The floodplain of the river in this area has been constrained locally with levees to protect bridges, roads and homes. In the northern portion of the middle basin the river enters an increasingly urban environment of the cities of Auburn, Renton and Kent.

Lower Basin tidal marsh rehabilitation project.

The lower Green/Duwamish Basin begins at Fort Kent Park near Tukwila, Wash., at approximately river mile 11. Here the Green River is commonly referred to as the Duwamish River as it flows northward into the Duwamish estuary at Elliot Bay. The river has levees on both sides and is increasingly channelized as it passes through Tukwila. By the time the river passes through the industrialized areas of south Seattle, it is completely contained in the Duwamish Waterway.

Major tributaries to the Green/Duwamish River include Sunday Creek, Smay Creek and the North Fork, upstream of Howard Hanson Dam, and Newaukum Creek, Soos Creek and Mill Creek below HHD.

Middle basin stream rehabilitation site.

National Showcase Watersheds

Partners
Green/Duwamish River Ecosystem Restoration

Major Contributors and participants in the Green/Duwamish Ecosystem Restoration Study include:

- U.S. Army Corps of Engineers - Seattle District
- U.S. Fish and Wildlife Service
- U.S. Forest Service - North Bend Ranger District
- U.S. Geological Survey
- Washington Department of Fish and Wildlife
- Washington Department of Natural Resources
- King County
- Muckleshoot Indian Tribe
- Suquamish Indian Tribe
- Trout Unlimited
- Tacoma Public Utilities
- Plum Creek Timber Company
- The Green River Alliance
- The Duwamish Coalition
- City of Algona
- City of Auburn
- City of Black Diamond
- City of Burien
- City of Covington
- City of DesMoines
- City of Enumclaw
- City of Federal Way
- City of Kent
- City of Lake Sawyer

- City of Lake Youngs
- City of Pacific
- City of Renton
- City of SeaTac
- City of Seattle
- City of Tukwila
- Friends of the Duwamish
- Elliot Bay Panel

People working.

National Showcase Watersheds

Project Description
Green/Duwamish River Ecosystem Restoration

> *"We have examined the valley of the Duwamish River and find it a fine country. There is plenty of room for one thousand travelers. Come at once."*
>
> *Seattle: Past to Present,* Roger Sale, University of Washington Press, 1976.

One of the first pioneers wrote these words to his family in the mid-1800s. A fine country indeed the Green/Duwamish River valley was among the first areas of Puget Sound extensively settled by Euro-American immigrants.

Porter Levee side channel site.

The early settlers encountered a vigorous native culture that had lived in the valley and along the shores of the estuary for centuries: fishing, hunting, cultivating, and gathering foodstuffs. The new inhabitants immediately set about altering the landscape to fit their particular needs, and the results of those alterations loom large in the present life of the river.

The Green/Duwamish River watershed has one of the most altered hydrological ecosystems in the Puget Sound basin. To date, 97 percent of the river's estuary has been filled, 70 percent of the flows of its former watershed have been diverted out of the basin and about 90 percent of the once-extensive floodplain is

no longer flooded on a regular basis.

Historically, the Cedar, Black and White Rivers all joined the Green/Duwamish River. In 1907 the White River was permanently diverted into the Puyallup River, causing the loss of over 50 percent of the river flow. The Black River was the outlet channel of Lake Washington and the Cedar River. When the Lake Washington Ship Canal and Hiram Chittenden Locks were built in 1916, Lake Washington was lowered nine feet, and the Black River was cut off from the Duwamish. The Cedar River was redirected to Lake Washington, disconnecting it as well. Now the Green River becomes the Duwamish at the historic confluence of the Green and Black.

The river today is still an important producer of fish and wildlife resources, especially anadromous fish. But plant and animal populations continue to decline due to increasing human activities within the watershed. While it is not likely these resources can be returned to their original extent, ecosystem restoration opportunities exist that would maintain and improve existing conditions. Without restorative action, the fish and wildlife resources of the Green/ Duwamish River will continue to decline and/or disappear.

Codaga Farm tidal marsh site.

The overall restoration effort includes ecosystem restoration projects that have been implemented historically in the Green River Basin using local, state and federal talent and funding. It also includes proposed restoration that has been recommended in the Howard Hanson Dam Additional Water Supply Project where construction will begin in 2001, and the entire Green/ Duwamish River Ecosystem Restoration that is in the study phase. The combination of the Green/ Duwamish and Howard Hanson programs would include between 70 to 80 restoration sites that would be implemented basin wide. All of these elements are been coordinated to represent a true ecosystem restoration process for the Green/Duwamish River Basin.

Upper basin culvert replacement for fish passage site.

Upper basin existing side channel.

The projects that have been implemented or are in the planning stage include:

- Fish blockage removal
- Restoration of estuarine marshes
- Side channel construction
- Levee remove/setback
- Wetland creation
- Levee/bank habitat enhancement
- Tributary restoration
- Protection of unique habitats
- Stream flow/release modification
- Low flow augmentation
- Gravel nourishment
- Nearshore (salt water) habitat restoration
- Large wood debris placement
- Up and downstream fish passage at Howard Hanson Dam
- Stream rehabilitation

Projects completed in 1999

- Hamm Creek Habitat Restoration Project
  This project provided an estimated 6 acres of valuable estuarine habitat along the Duwamish River to better support critical life stages of imporant salmon species.
- Puget Creek Habitat Restoration Project
  The project restored a former estuary along the Duwamish River, providing habitat that is productive to fish and wildlife. These types of habitats are critical to several species proposed for listing under the Endangered Species Act (Chinook salmon, steelhead and sea-run cutthroat trout).
- Porter Levee Restoration Project
  The levee is designed to direct river currents away from an adjacent road and farmland

and not as a flood control levee. The project will restore flow into and out of two existing former river meanders/side channels and provide off-channel habitat similar to the side channel habitat that existed prior to the construction of Howard Hanson Dam.

National Showcase Watersheds

Green/Duwamish River Ecosystem Restoration

- Project Description
- Location
- Partners
- Links
- Contact Information

National Showcase Watersheds

Links in Gila River Watershed

There are currently no links available.

National Showcase Watersheds

Location

The Gila River Basin above the San Carlos Lake is located in the southern portion of eastern Arizona and western New Mexico. It is one of the few free flowing river systms in the southwest and as such is unique. Large changes in altitude and the southwest location of the system result in a high diversity of flora and fauna in the area.

National Showcase Watersheds

Partners in the Gila River Watershed

Public and private organizations supported aspects of the projects within the demonstration area. All support the concept of stream corridor restoration.

Public Organizations
Arizona Department of Environmental Quality
EPA Region IX
EPA Region VI
Gila Monster
Grant Soil and Water Conservation District
Natural Resources Conservation Service
New Mexico Environment Department
New Mexico Riparian Council
New Mexico State University
Northern Arizona University
University of New Mexico
University of Arizona
Western New Mexico University

Private Organizations
Gila Fly Fishers
Gila Rod and Gun Club
Gila Watch
Lower Gila Watershed Citizens Advisory Group
Mesilla Valley Fly Fishers
New Mexico Trout Unlimited
New Mexico Wilderness Society
Phelps Dodge Mining Company
San Carlos/Safford/Duncan Advisory Council (Arizona)

The Nature Conservancy
Upper Gila River Watershed Alliance
Upper Gila Watershed Citizens Advisory Group

National Showcase Watersheds

Project Description - Gila River Watershed

The Gila River basin, above San Carlos Lake in Arizona, is located in the southern portions of eastern Arizona and western New Mexico. Merging of the Chihuahuan, Sonoran and Southern Rocky Mountain eco-regions within the watershed and the vertical change from desert shrub to the sub-alpine vegetation types results in a highly diverse and unique ecosystem. In addition, the river is relatively unique in the southwest as it has a mostly unimpeded flow (only a few relatively small irrigation diversions present). Habitat within the watershed supports a number of federally listed species which include spikedace, loach minnow, southwestern willow flycatcher with critical habitat, peregine falcon, bald eagle and Mexican spotted owl. The State of New Mexico listed species include Roundtail chub, speckled dace, longfin dace, Sonoran sucker, Desert sucker, Hot springs snail and Gila springs snail.

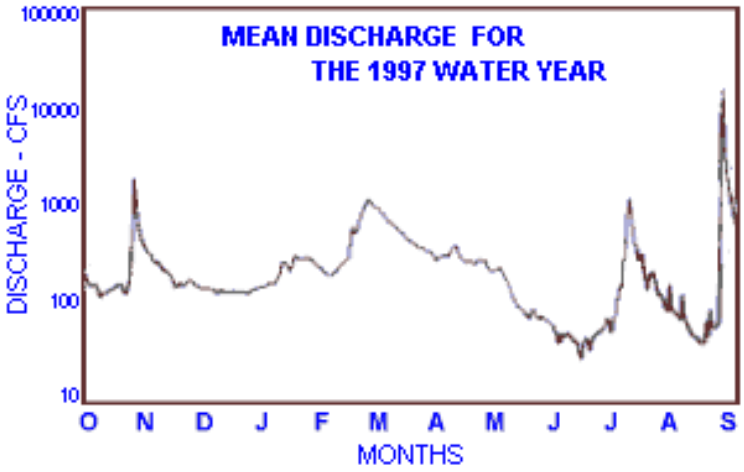
Portions of the basin have been degraded over time through past fire management, logging and domestic grazing practices. These activities altered the natural sediment transport and flow discharge regime, flood plain function and stability in the fluvial morphology of the Gila River. This in turn affected to some degree water quality, species diversity and population stability.

The USDA Forest Service and public and private organizations have undertaken projects to improve the riparian and terrestrial ecosystems within the 1.4 million acres the Forest Service manages. This area of the basin is important to the system as a whole as it forms the head waters of the Gila River. Approximately 0.5 million acres of the area lies in the Congressionally designated Gila and Aldo Leopold Wilderness areas. The maximum elevation of these headwaters is approximately 10,700 feet.

Projects undertaken will restore, in time, key ecological functions that work towards reestablishing our best estimate of properly functioning ecosystems that comprise the project area. These projects largely work towards improving conditions in the uplands and riparian areas of the catchment.

River characteristics.

The 1997 hydrograph for the Gila River at Gila, N.M. demonstrates the 'flashiness' of the system. In September the flow at this USGS gauge went from 75 cfs to over 18,000 cfs within a 24 hour period. Approximately ten inches of rain were recorded in the watershed on the 20th of September of 1997.



The aerial photograph (right) displays a typical meander pattern for the Gila River in a project area in the Burro Mountains. There is evidence that many reaches of the Gila would produce 'C' channels (Rosgen Stream Classification System) where the channel has access to a sufficiently wide flood plain.

Management strategies and practices.

Occurrence of both Wilderness and non-wilderness areas in the catchment necessitate the use of a number of different management strategies. The major elements, practices and technologies included in the Gila River Recovery Project include the following:

The re-introducion and use of fire

Within the 500,000 acres of designated Wilderness, prescribed and wildland fire managed for resource benefits (formerly called prescribed natural fire, or PNF) will form the primary initiating element of change. Fire will also be used outside the wilderness, in conjunction with other management practices. Fire is the only practical tool available to managers to improve upland watershed condition realizing that woody vegetation has proliferated at the expense of herbaceous vegetation throughout all vegetation types, in part, because of past fire suppression.

Improved livestock management

Improved livestock management has and will continue to be used as a main strategy for

improving conditions within range allotments. Every livestock grazing allotment in the watershed has been studied, in conjunction with the US Fish and Wildlife Service under Section 7 of the Endangered Species Act, for ongoing grazing. Most grazing allotments have been analyzed under the NEPA process and will implement an improved management and monitoring system. These management systems are more sensitive to water quality, watershed and riparian condition.

Additionally, permitted livestock have been excluded from the riparian/flood plain associated with the Gila River and major tributaries within the project area, through forest management actions. This has been accomplished by fencing and closing of some allotments to livestock grazing.

Better off-road vehicle management

Off-road vehicle use has been eliminated in key areas within the project area. In the future, it is very likely that more areas will be scrutinized for this activity as the road/ORV issue is elevated.

Use of bioengineering techniques

Bioengineering techniques have been used successfully in various projects within the management area. Several projects within the Gila River Bird Management Area demonstrate successful bioengineering techniques. It is envisioned that bioengineering techniques will figure prominently in many recovery projects in the future.

Before and after photographs.

Before rehabilitation

This 1972 photograph of the Gila River in the Burro Mountain area is typical of reaches along this stretch of the river. The area was utilized extensively by relatively high densities of livestock throughout the year as was much of the catchment watershed. Note that many areas of the flood plain do not support woody riparian vegetation.

During rehabilitation

The 1992 photograph shows how healthy riparian vegetation traps sediment. Sediment in the photograph is primarily ash from fire activity within the watershed. Ash forms part of the nutrient recycling process within the watershed, while sediment builds the floodplain. Watershed improvement in the Gila River catchment is very dependent on the Agency's ability to reintroduce managed fire into the ecosystem.

Taken in 1996 (same as above), this photograph shows, visible changes in the area that resulted from year-long grazing being reduced to seasonal grazing in 1978 and the active management of livestock within the riparian area in 1996. Currently, no livestock grazing is permitted within the riparian area and upland grazing is seasonal and s monitored to comply with utilization standards. In addition, the area is closed to off-road vehicle use. Planted and natural recruitment of woody riparian vegetation has created a more stable flood plain which is less susceptible to damage.

Measurements of Success.

A new species of macroinvertebrate has been observed this past year in Black Canyon (a tributary to the East Fork of the Black River). This species was observed from biotic condition index monitoring conducted as part of the monitoring in conjunction with the Diamond Bar Allotment. This rare species of stonefly is believed to be a manifestation of improved conditions.

Monitoring of Southwestern Willow Flycatcher in the lower part of the Gila River indicates that breeding numbers are up and habitat for the bird can be created in as few as two years by planting native woody riparian species.

Floodplain rebuilding and stabilization along the Gila River in the project area demonstrates that sediments and ash can be trapped and used onsite rather than lost downstream. This is done by controlling impacts (livestock grazing, ORV use and system roads) and planting native woody riparian woody species in the floodplain.

National Showcase Watersheds

Gila River Watershed

The Gila River Basin above San Carlos Lake (located in the southern portion of eastern Arizona and western New Mexico) is a unique and diverse free flowing system. Portions of the basin have been degraded by past land uses such as fire, logging and grazing activities. The USDA Forest Service, with the support of other public and private organizations, implemented a number of strategies to restore the upper 1.4 million acres of watershed under Forest Service management. Strategies include the reintroduction of fire, improved livestock management, control of off-road vehicles and the use of bioengeneering techniques. Implementation of the strategies was dependent on wilderness or non-wilderness designation of the project area. The occurrence of a rare stonefly macroinvertebrate, an increase in the number of endangered Southwestern Willow Flycatchers and the stabilization of the Gila River floodplain demonstrate the success of the project.

The Gila River Watershed is a Case Study Watershed that demonstrates the application of stream corridor restoration technology. It was identified during the process of selecting National Showcase Watersheds for the Clean Water Action Plan's Action Item #61.

- Project description
- Location
- Partners
- Links
- Contact Information

National Showcase Watersheds

Contacts in Gila River Watershed

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National Showcase Watersheds

Lititz Run Watershed

The Lititz Run Watershed Restoration Project has engaged citizens, scientists, and local and state government agencies as local watershed alliance partners in a coordinated set of 15 restoration projects in key locations throughout the watershed. This community is improving its water quality through a comprehensive long-term watershed management strategy that combined techniques in natural resource management, land use planning, education and community involvement in addressing non-point source pollution.

- Project Description
- Location
- Partners
- Links
- Contact Information

- Other links about the Lititz Run Watershed
    - History of Lititz Run Restoration
    - Project List:
        - Santo Domingo Water Quality Facility
        - Lititz Run Riparian Park
        - Millport Conservancy
        - Baum Farm
        - Water Street - Lititz Borough/Farmer's First Bank

National Showcase Watersheds

History of Lititz Run Watershed Restoration

1992	Restoration - Ed Hess Farm	Installed 100 feet of streambank fencing, bank stabilization , regrading, and reseeding.
1993	Restoration - Ed Hess Farm	Additional bank stabilization with rock and regrading. Instream habitat devices - Christmas tree deflectors, jack dams.
	Restoration - Banta Wetland Farm	Shrub and tree plantings
1994	Grant - National Trout Unlimited	Embrace A Stream Program Amount - $5000
	Award - PA Trout	The Pennsylvania Trout best project award.
	Restoration - Art Hess Farm	Initiate work, 1000 linear feet of stream - bank stabilization with rock, fish cover structures, re- grading, and re-seeding. Stone walls built around a spring and rechanneled water discharge away from a manure storage area.

	Donation - Bilren Excavating	300 dump truck loads of rock stockpiled along the stream for future use.
	Restoration - Ed Hess Farm	2800 linear feet of streambank improvements - stabilizing with rock, mud sills, deflectors, tree plantings, regrading, reseeding, and tree and shrub plantings.
	Public Relations - Call of the Outdoors	Local television program feature.
	Community - LMHS Volunteers	Ten students from Lancaster Mennonite High School volunteered for two stream improvement work days.
	Proposal Submitted - Bioengineering	LandStudies, Inc. submitted a proposal for a 350 foot bioengineering project in Lititz Borough.
	Township Coordination	Watershed Planning discussions initiate with Lititz Borough and Warwick Township.
	Public Relations - TU Magazine	Feature article National Trout Unlimited magazine.
1995	Grant - Embrace a Stream	$5000 - Embrace A Stream Award - Trout Unlimited
	Award - Diamond Spring	$500 - Diamond Spring Water Quality Award
	Restoration - Wenrich Farm	500 linear feet of stream improvements - bank stabilization, mud sills, cattle crossings, tree plantings, retention basins, and re-seeding.

Restoration - Millport Conservancy	800 linear feet of stream improvements - rock and deflector installation, regrading, riparian buffer plantings, and reseeding. Mill Pond problem solving, coordination with PA Department of the Environment. Maintenance - Selective mowing and trimming was performed throughout the riparian plantings.
Restoration - John Ving Farm	1000 linear feet of stream improvements; 1400
Restoration - Smucker Farm	1400 linear feet steam improvements - rock and deflector installation, stream bank fencing, tree plantings, instream fish structures, cattle water access ramps, and regrading.
Restoration - Ed Hess Farm	Stream Improvements - instream deflectors and tree plantings.
Restoration - Art Hess Farm	Stream Improvements - instream deflectors and tree plantings.
Public Relations - Cable Network	Feature on Berks County Cable TV.
Public Relations - TU National	Second National Trout Unlimited feature
Planning - Lititz Run Riparian Park	Lititz Run Riparian Park concept (by LandStudies, Inc.) presented to Warwick Township and Warwick High School.
Community - Eagle Scout Project	Eagle Scouts install 350 trees in the linear park. WarwickTownship and Chesapeake Bay Foundation (CBF) participates.
Restoration - Tshudy Property	300 feet of rock bank stabilization, 40 feet of biolog and tree planting

	Donation - Greenleaf Nursery	450 five gallon potted trees from Greenleaf Nursery for riparian plantings along Lititz Run.
1996	Grant - Embrace a Stream	$5000 - Embrace A Stream award - Trout Unlimited
	Restoration - Smucker Farm	Ag BMP's - planting trees, barnyard improvements.
	Mitigation Credits/ Restoration	$5000 to create 0.02 acre wetland mitigation Bog Turtle habitat.
	Donation - Waterfowl USA	$2500 - Waterfowl USA -Lancaster Chapter - Ag runoff/wetland/habitat in riparian area.
	Restoration - Millport Conservancy	Tree plantings and bank stabilization on the stream. Pheasants Forever planted a six acre field adjacent to the creek in warm season grasses.
	Community - Warwick High School	2000 seedlings were planted with student labor. Warwick High School coordinates hands on learning by growing plants from seedlings for replanting the following year on Millport Conservancy property.
	Restoration/Ag BMP - Jake King	800 linear feet of stream improvements - rock stabilization, regrading, reseeding, and streambank fencing, cattle crossings, access areas, and tree plantings.
	Restoration - Banta Wetland Farm	Stream improvements - instream jack dams, bank stabilization, tree plantings, and the installation of a 3 acre warm season grass plot.
	Grant - Warwick Township	$4,200 from Warwick Township for Lititz Run Riparian Park.

Grant - Pledged	Lititz Sportmans Association - Lititz Run Riparian Park.
Public Outreach	Presentation Board of The Lititz Run Watershed - prepared by LandStudies, Inc.
Education - Workshop	Land use planning/Conservation workshop held at Millport Conservancy and organized by LandStudies, Inc. 12 local cosponsors with proceeds to watershed planning efforts.
Public Outreach - Warwick High School	Presentation Board exhibit at Open house for students and parents.
Grant Confirmed - EPA 319	EPA 319 Grant administered by Pennsylvania Department of Environmental Protection (PADEP) in the amount of $243,000 for planning and implementation in 1998 and 1999. In-kind dollars and cash donated from numerous groups and organizations.
Government Coordination	Presentation at the Chesapeake Bay Local Government Advisory Committee, Harrisburg.
Restoration - Lititz Run Riparian Park	5 acre Lititz Run Riparian Park Constructed.
Mitigation - Bog Turtle Habitat Creation	0.2 acre Bog Turtle habitat created at Millport Conservancy.
Government Coordination - EPA	County representative and LandStudies, Inc. present project EPA Region 3 in Philadelphia.
Government Coordination - EPA	LandStudies presents project to EPA watershed planning conference and watershed tour is conducted. Community participates in tour.

1997	Restoration - Santo Domingo Park	Planning of Linear riparian park along Santo Domingo Creek with construction in the fall of 1997.
	Restoration - Millport Conservancy	Stream improvements ongoing at Millport Conservancy. Coordinated by Donegal Chapter of Trout Unlimited.
	Government Coordination	James Seif, Secretary of PA Department of Environmental Protection makes announcement of the Chesapeake Bay Partner Awards at Lititz Springs Park. Lititz Borough and Warwick Township are both award winners.
	International Education	Japanese delegation tours watershed as part of Pennsylvania visit coordinated by Brubaker Agronomics.
	Restoration - Bioengineering Project	Bioengineering project completed in downtown Lititz. Financial sponsors of project Borough of Lititz and Farmer's First Bank. Design and construction management by LandStudies.
	Awards - Chesapeake Bay Partner	Lititz Borough (Gold) and Warwick Township are recognized by Chesapeake Bay Program as a "Chesapeake Bay Partner Community".
	Grant - Rivers Conservation	Rivers Conservation Watershed Planning Grant awarded to Donegal Chapter of Trout Unlimited - $25,000. Management of grant by LandStudies.
	Lititz Run Watershed Alliance	The Lititz Run Watershed Alliance was founded.

1998	Restoration - Bioengineering Project	Bioengineering project that stabilized 300 linear feet of Lititz Run streambank on the McKennon Property, Borough of Lititz. Financial sponsors of the project by the Borough of Lititz. Design and construction management by LandStudies.
	Planning Seminar	An educational seminar was held at the Millport Conservancy, sponsored by the Local Government Advisory Council. Local planners, engineers, and municipal officials took part in the event and meet with planning experts from throughout the Chesapeake Bay Region. The seminar produced recommendations for how to improve the sustainability and livability of the Lititz Run watershed community.
	Watershed Tour	Pennsylvania Recreation and Parks Society (PRPS) attended a watershed tour as part of their annual conference.
	Volunteer Work- Trout Unlimited	Members of Donegal Chapter of Trout Unlimited volunteer to install native plant material in downtown Lititz, and to install netting to protect new planting from the local duck population.
	Comprehensive Strategic Planning	A year long joint planning effort was undertaken by the Borough of Lititz and Warwick Township to address a long-term planning strategy. The funding for this planning effort was provided by Lancaster County Planning Department.
	Environmental Education Day	The Warwick School District sponsored a first annual environmental education day at locations throughout the watershed. Students learned about their local watershed, the stressors on water quality, the aquatic food chain and worked in a native plant nursery.

Remote Sensing / Satellite Imagery	LandStudies participated in an remote sensing course for land planners at Penn State University. Imagery from the watershed was classified to examine land use change over the last 10 years. This data can be used to identify important resource areas throughout the watershed.
Water Quality Facility Completed	The Santo Domingo Water Quality Facility was constructed during the fall. The Santo Domingo Creek is the largest contributor of nutrients and sediment to the Lititz Run. This facility was designed to provides a two step stormwater treatment. The facility's forebay will allow sediment to settle out of suspension, while a divers 3.5 acre wetland will uptake nutrients. This facility is expected to greatly improve the water quality of the Lititz Run while providing improved wildlife habitat and an amenity to the local residents.
Dam Removal	To improve fish passage, an dam structure was removed on Lititz Run adjacent to the Riparian Park. The 1.5' high structure was removed and replaced with a stepped stone structure that will restore a natural stream riffle sequence.
Project Planning	Conceptual plans have been prepared and permitting is underway for the Millport dam removal / stream restoration project. The Millport mill pond is large and shallow and contributes significantly toward the thermal pollution of the stream. The dam removal and stream restoration project is expected to greatly improve aquatic habitat in the lower reaches of the Lititz Run.

	Baum Farm	Agricultural BMPs were installed on the Baum Farm during the fall of 1998. BMPs used include: Stream Fencing / Forested Riparian Buffer Plantings, Livestock Stream Crossings, Manure Storage Facility Construction, and installation of Barnyard Spouting and Gutters. The project comprehensively addressed both the needs of the farmer and the natural resource.
	Public Outreach	The Lititz Run Watershed Alliance is currently working on producing an educational brochure and video of the local watershed.
	Lititz Run Watershed Booklet	An educational Booklet entitled "The Lititz Run Watershed - - a community improving its water quality" is to be printed early in 1999. The booklet includes three sections: Watershed Inventory, Watershed Analysis and Watershed Plan. The Watershed Plan makes specific recommendations on how water quality can be improved throughout the watershed. Funding for the project was provided by DCNR's Rivers Conservation Watershed Planning Grant. The booklet was designed and written by LandStudies.
1999	Wellhead Protection Ordinance	This ordinance includes natural resource management and planning coordinated with local, county, and state officials.

Natural Resource Compensation Receiving Areas (NRCRA)	These areas are opportunities within the watershed for restoration projects. The areas have been designated and quantified by their optimum potential based on existing conditions and land use. The NRCRA's can be used as receiving areas for negotiations or regulatory compliance, or conflict resolutions tools. NRCRA's identified include wetland creation and enhancements, forested riparian buffers, streambank restoration, agricultural best management practices, and warm season grass meadows.
Tax incentive - Forested Riparian Buffers	A comprehensive evaluation of a 35 foot buffer on both sides of all stream corridors within the watershed were identified, mapped, and quantified by their recorded tax assessment based on Lancaster County values. This was done in cooperation with Lancaster County GIS Department. Values were quantified on a 2,5,10, 20 year amortization schedule.
Watershed Restoration Permit (State/Federal)	A watershed restoration permit was approved for 14000 linear feet of stream restoration utilizing Natural Channel Design and fluvial gemorphologic principles.
Chesapeake Bay Program - Living Resources Committee Tour	LRWA hosted a tour for this group to view ongoing and proposed restoration projects.

Restoration - Cedar to Water Street (900 ft)	A collaborative effort between Lititz Borough and Farmer's First Bank funded this project. Natural channel Design techniques were incorporated. A created wetland is proposed in this location to treat run offoff from an adjacent parking lot prior to entering the stream. Boulders required for restoration efforts were donated by a local developer. Labor and equipment was donated by Lititz Borough.
Restoration - Wynfield Industrial	Park Approximately 15 acres of commercial land owned by 7 companies is being prepared for a warm season grass meadow and forested riparian buffer along the headwaters of the Santo Domingo Creek.
Restoration - Warwick High Hockey Club	Approximately 1 mile of stream corridor was planted by this group with supervision provided by Donegal Trout Unlimited.
Monitoring	Millersville University and Warwick High School continue to monitor the 9 stations for macroinvertebrates and water parameters.

National Showcase Watersheds

Contacts
Lititz Run Watershed

Lititz Run Watershed Alliance

The Lititz Run Watershed Alliance is a group made up of individuals, businesses, farmers, non-profit conservation organizations and local, state and federal government representatives who have joined together and are committed to a comprehensive approach to continual water quality improvement within the Lititz Run Watershed.

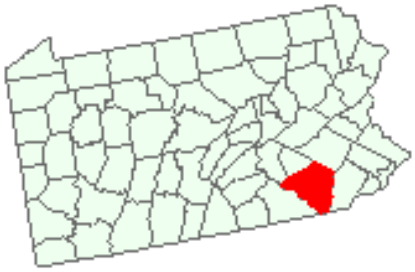
LRWA Address:
PO Box 308
Lititz PA 17543

LandStudies

Mark Gutshall
LandStudies, Inc. (Watershed Mgt Consultant for Lititz Run Watershed Alliance)
6 South Broad Street
Lititz, PA 17543
Phone: 717-627-4440
Fax: 717-627-4660
mark@landstudies.com

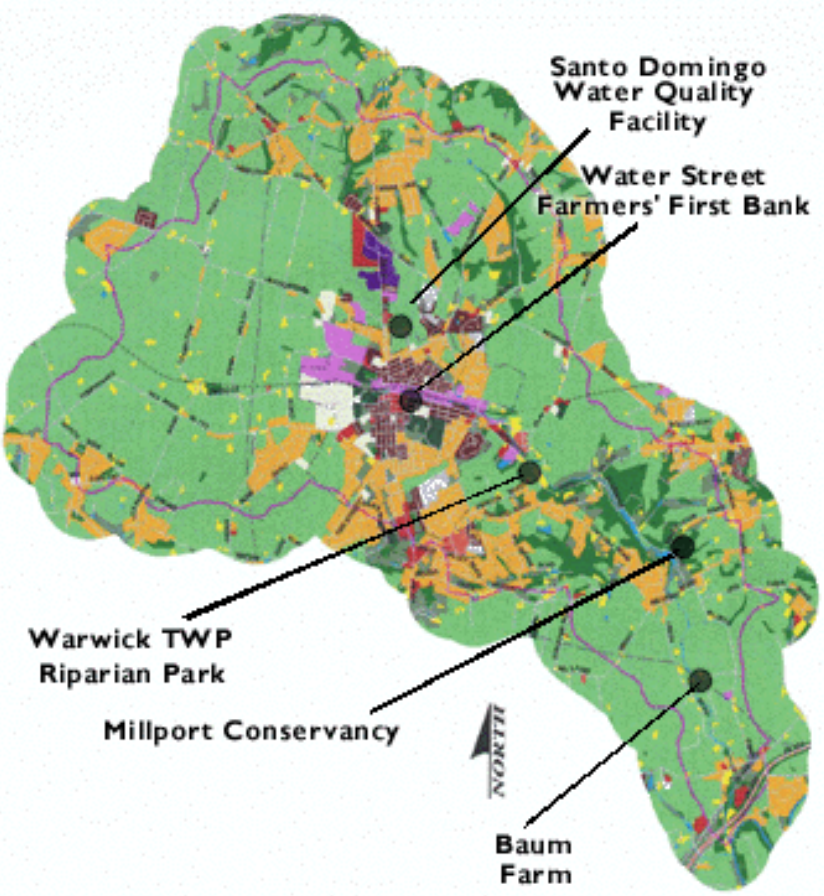
National Showcase Watersheds

Location
Lititz Run Watershed



The Lititz Run Watershed is in the Central Appalachian Broadleaf Forest, lower piedmont physiographic province of the Northeastern US. Lititz Run is a third order pastoral limestone stream with its main source of water bubbling out of the Lititz Spring Park in downtown Lititz, PA. Its major tributary is an intermittent stream (Santo Domingo) that supplies most of the sediment load as it is situated in a agricultural dominated landscape. Much of the watershed is unforested with the exception of several mature forest patches scattered in the headwaters and on the main stem. Although now a mixed surburban / urban / rural watershed, this was a rural, agricultural area 20 years ago. Suburban development has substantially increased in last 20 years, and agriculture is still a very large element of the watershed and the County. Lancaster County has some of the most productive, non-irrigated farmland in the United States.

Lititz Run Watershed Map



The Lititz Run Watershed showing project area locations (click on dots to browse example project summaries and photographs)

National Showcase Watersheds

Millport Conservancy Comprehensive Restoration
Lititz Run Watershed

Warm Season Grass Meadow

Dam Removal to restore fish passage and eliminate thermal pollution source

Abstract

Project name/location: Millport Conservancy Comprehensive Restoration

Comments: The Conservancy is committed to ecological restoration of the 40 acre property.

Principal Funding Organization: Pennsylvania Department of Environmental Protection / EPA 319

Partnerships in Completion:

- Donegal Chapter of Trout Unlimited
- Pennsylvania Fish and Boat Commission
- Pennsylvania Dept. of Env. Protection
- Lancaster County Conservation District
- United States Env. Protection Agency
- Chesapeake Bay Program
- Alliance for Chesapeake Bay
- Chesapeake Bay Foundation
- Millersville University
- Millport Conservancy
- Pheasants Forever
- United States Fish and Wildlife Service - Partners For Wildlife
- LandStudies, Inc.
- Project Steward or Contact Person: Mark Gutshall; LandStudies, Inc.

Funding & Construction:

Name: Mr. Mike Sherman, Pennsylvania Department of Environmental Protection Type Organization: State Government

Address:Rachel Carson State Office Bldg. P.O. Box 8775, Harrisburg, PA 17105-8554
Telephone: 717-787-5267
Fax: 717-787-9549

Website Link/E-mail: http://www.dep.state.pa.us

Total Funding Required: $200,000
Additional Funding needed: $100,000
Beginning Date of Project: 1996
Beginning Date of Construction: 1996
Ending Date of Construction: 2000
Size of Project: Approximately 20 acres
Area of Wetland: 5 acres
Area of Warm Season Meadow: 15 acres
Length of Stream Corridor: 1 mile

Project Purpose & Implementation

Restoration Goals/Objectives

- Dam Removal / Restoration of Fish Passage
- Reduced Thermal Pollution
- Stabilization of Pond Sediment
- Created Wetlands
- Restored Warm Season Grass Meadows
- Restoration of stream channel
- Improve Aquatic Habitat
- Streambank Stabilization
- Restoration of Native Plant Communities
- Exotic and Invasive Weed Control
- Restore Stream's access to Floodplain

Project Characteristics and Land Use

Project is located in the middle section of the watershed and serves as an important wildlife habitat and open space area for the community. The Conservancy's property is zoned conservation land. A masterplan for the entire conservancy was prepared to address natural resource restoration and land management.

Lessons Learned

Regulatory agencies need to implement a permitting process that expedities comprehensive restoration projects by avoiding piecemeal permitting requirements regardless of the amount of funding secured.

National Showcase Watersheds

Partners in the Watershed Effort
Lititz Run Watershed

Partner	Role
Lititz Run Watershed Alliance http://www.landstudies.com/LRWA.html	Citizens group dedicated to improving water quality.
LandStudies, Inc	Professional Watershed Management Consulting
Lancaster County Conservation District	Agricultural Coordination
Donegal Chapter of Trout Unlimited http://www.patrout.org	Water/Land Conservation/In-kind Labor
PA Dept. of Env. Protection	Water Resource Data (Existing)
Penn State Extension	Water Resource Data / Education
Natural Resource Conservation Service	Personnel and technical resource/Agricultura l lands
Lancaster County Planning Commission (Water Resource Division)	Personnel and technical resources
Lancaster County GIS Department	Resource Mapping
Lancaster Farmland Trust	Opportunity for receiving areas

Lancaster County Conservancy	Easement coordination
Municipalities	Local coordination
Warwick School District	Data Collection / Environmental Education
Warwick Township Millersville University	Local gover nment coordi nation Data Collection / Education Outreach
Chesapeake Bay Foundation	Youth Education Facilitation
Alliance for Chesapeake Bay	Water Quality / Education
Millport Conservancy	Natural areas management
Brubaker Agronomic Consulting Service	Nutrient management plans
League of Woman Voters	Water Quality Background/County Presence
Borough of Lititz	Community and governmental involvement and leadership

National Showcase Watersheds

Partners in the Watershed Effort
Lititz Run Watershed

Partner Name:	**LandStudies, Inc.**
Participation:	Watershed Management and Project Coordination for the Lititz Run Watershed Restoration is provided by LandStudies, Inc. The firm provided technical, planning, permitting, design and administrative management for all aspects of the watershed restoration. LandStudies also served as the catalyst for the formation of the watershed organization, the Lititz Run Watershed Alliance (LRWA). LandStudies is an environmental land planning and consulting firm providing conservation related services to public, private and non-profit organizations. Since 1989, LandStudies has provided Restoration, Planning, Installation and Consulting services for projects throughout central and southcentral Pennsylvania.
Contact Information:	Mark Gutshall, 717-627-4440
Website/email:	http://www.landstudies.com; mark@landstudies.com

Partner Name:	**Pennsylvania Department of Environmental Protection (PADEP), Bureau of Watershed Conservation.**

Participation: The PADEP, Bureau of Watershed Conservation has provided funding for restoration of the Lititz Run Watershed. Through a Clean Water Act Section #319 Grant, PADEP has committed $243,000 to:

- Reduce nutrient pollution associated with five dairy farms in the watershed
- Reduce sedimentation problems associated with Santo Domingo Tributary
- Reduce nutrient load and thermal pollution by restoring a wetland area and stream channel in place of Mill Pond.
- Create GIS Database and mapping for natural resource management of the Lititz Run Watershed.
- Provide education and public outreach to the community.
- Establish forested riparian corridors along two miles of Lititz Run and its headwater tributaries.

Contact Information: Fran Koch, PADEP, 717-783-2289

Website: http://www.dep.state.pa.us

Partner Name: Donegal Chapter of Trout Unlimited

Participation: Donegal Chapter of TU was the organization that helped initiate the Lititz Run Watershed Restoration Effort. Members were working 10 years ago with local land owners to stabilize streambanks and improve instream aquatic habitat. Their early efforts raised people's consciousness of the importance of clean water and caused others to become interested in undertaking a more comprehensive approach to watershed planning. TU members continue to play an important role in the ongoing restoration effort by providing volunteer labor and technical expertise.

Contact Information: Bob Kutz, 717-393-0478

Website Information: bobkutz@desupernet.net

Partner name: Borough of Lititz

Participation: The commitment to the restoration of the Lititz Run Watershed by the Borough of Lititz has been flourishing, particularly, throughout the course of the last decade. Beginning in 1990, Lititz Borough Council established the 7-member Flood Control Advisory Committee to perform periodic inspections of watershed areas and to recommend projects for stream restoration. The committee meets bimonthly and, since their inception, has annually recommended Lititz Run Watershed improvement projects to the Lititz Borough Council for approval, ie. bank stabilization, stream restoration, bioengineering, riparian plantings, etc. Business adjacent to the Lititz Run Watershed have also followed the Borough's lead in initiating stream restoration projects.

In 1992, when volunteers from Trout Unlimited began intensive restoration projects in the surrounding municipality (Warwick township) it became apparent to the elected officials of both the Borough and the Township, that there were a multitude of benefits to working together for the welfare of the entire Lititz Run Watershed. With the onset of matching grants for both municipalities, restoration projects in the Borough and the Township began to occur simultaneously and continue to occur to the day.

In June 1997, the Borough of Lititz was recognized as a Chesapeake Bay Partner Community receiving the GOLD Community Status, having reached the highest percentage of benchmarks achievable for efforts made to promote clean water and protect resources.

Contact Information: Sue Barry, Borough Business Manager

Partner Name: **Warwick Township**

Participation: Warwick Township is a member of the Lititz Run Watshed Alliance and is committed to achieving the objectives of the Alliance. Local government can, and must be part of any comprehensive effort to improve a watershed. The Township assists with grants, provides project sites, education and coordination of the watershed projects.

Contact Information: Daniel Zimmerman, 717-626-8900

Partner Name: **Lancaster County County Conservation District (LCCD)**

Participation: The LCCD has been involved with the Lititz Run Watershed Restoration effort by providing landowner contacts, technical design and construction inspection for agricultural operations with the watershed. Best Management Practices installed include Manure Storages, Barnyard Runoff Control, Roof Runoff Management, Waterways, Diversions, Livestock Stream Crossings, Streambank Fencing, Forested Riparian Buffers, Planned Grazing Systems and Cropland Management.

Contact Information:	Jim Saltzman, LCCD, 717-299-5361 Ext. 5
Website/E-mail:	http://pacd.org

Partner Name:	**Lancaster County GIS (Geographic Information Systems) Department**
Participation:	The Lancaster County GIS Department participated in the Warwick Watershed Days. Warwick Watershed Days is a program that the Chesapeake Bay Foundation started to inform Warwick School District 5th graders about their watershed. The GIS department provided maps of Lititz Run for the classroom. On May 14 the Warwick 5th Graders went to various parts of Lititz Run to actually see the stream. The GIS Department set-up a station in the Millport Conservancy. The station demonstrated how GPS (Global Positioning Systems) works. The 5th graders had a hands on demonstrations on how GPS could be used to map objects that are harmful and helpful to the watershed.
Contact Information:	Steve Gochnauer
website:	http://www.co.lancaster.pa.us/GIS.htm

Partner Name:	**Millport Conservancy**
Participation:	The Millport Conservancy is one of the most important remaining natural areas containing the largest contiguous woodland area within the Lititz Run Watershed. The Conservancy has a long standing relationship with Donegal Chapter of Trout Unlimited to implement Stream Improvement Projects in the Millport Conservancy Land Holding. They have undertaken work on a comprehensive restoration and proper management of the entire conservancy landholding. As part of that management/ restoration, they are addressing issues such as forest management, stream corridor management, recreation planning, and wildlife habitat enhancement.
Contact Information:	Logan Myers, 717-626-0487

Partner Name:	**Brubaker Agronomic Consulting Service (BACS)**

Participation:	BACS developed comprehensive Nutrient Management plans for farms within the Lititz Run Watershed. The plans include: • Manure and Fertilizer Management • Gross and Net Nutrient Needs by Crop Group • Manure Application Recommendations • Storm Water Runoff Control • Best Management Practices • Projects BACS has been involved with Levi Smucker Farm, Wayne Baum Farm, David Leid Farm
Contact Information:	Chris Sigmund, 717-859-3276
Website/email:	http://www.brubaker.com; ChrisS@BrubakerAg.com

National Showcase Watersheds

Lititz Run Riparian Park - Warwick Township

Lititz Run Riparian Park - Warwick Township Before

Lititz Run Riparian Park - Warwick Township After

Abstract

Project name/location: Lititz Run Riparian Park - Warwick Township

Comments: This was the first of the environmental restoration projects involving a local government municipality. The project was appealing because it solved a maintenance problem for the township while demonstrating an alternative to lawn turf-grass from an ecological and economical perspective. The project is in a highly visible location and has educational signage explaining the functions of such park features as wetlands and forested riparian buffers.

Principal Funding Organization: Donegal Chapter of Trout Unlimited

Partnerships in Completion:
Warwick Township
Donegal Chapter of Trout Unlimited
Warwick High School
LandStudies, Inc.

Project Steward or Contact Person: Mark Gutshall, LandStudies, Inc

Funding & Construction:

Name: Mr. Greg Wilson
Type Organization: Non-Profit Organization
Address: Lititz, PA
Telephone: 717-859-4770
Website Link/E-mail: Associated with PATROUT @ www.PATrout.org

Total Funding Required: $15,000
Additional Funding needed: N/A
Beginning Date of Project: 1996
Beginning Date of Construction: 1996
Ending Date of Construction: 1997
Size of Project: 6 acres
Area of Wetland: 0.25 acre
Length of Stream Corridor: 600 feet

Project Purpose & Implementation

- Restoration Goals/Objectives
- Reduced maintenance inputs and costs
- Wildlife habitat creation
- Streambank stabilization using bioengineering
- Restoration of native plant communties - forested riparian buffers / Warm season grass meadows

- Aquatic emergent wetland designed to pretreat road runoff before entering stream

Project Characteristics and Land Use

Site is immediately adjacent to a vehicular corridor and receives significant exposure. Project is owned and maintained by local government - Warwick Township. Discharge from the community water treatment facility is adjacent to site. Amish farm adjoins property.

Lessons Learned

Volunteer labor and donated services were necessary for the success of this project. Initial discussions regarding natural resource management were presented with a rendered "proposed" plan. Since this was a visible location, and owned by the Township, it promoted natural landscaping as an acceptable alternative to maintained lawn.

Economic Factors

Reduced maintenance cost for mowing and maintaining lawn.

National Showcase Watersheds

Santo Domingo Project
Lititz Run Watershed

The property before the constructed wetland project.

The created wetland immediately after its construction.
(Image of Landscape Planting Plan)

Abstract:

Project name/location: Santo Domingo Water Quality Facility
Comments: Township owned and maintained. Approximately 100 community volunteers assisting in the installation of plant materials.
Principal Funding Organization: Pennsylvania Department of Environmental Protection - Wetland Replacement Fund
Partnerships in Completion:
Pennsylvania Department of Environmental Protection - Bureau of Watershed Conservation
Warwick Township
Donegal Trout Unlimited
Residents of the community
Alliance for the Chesapeake Bay
Chesapeake Bay Local Government Advisory Committee
Center For Chesapeake Communities
Chesapeake Bay Foundation
United States Environmental Protection Agency - Wetlands Division
Octoraro Native Plant Nurseries
LandStudies, Inc.

Project Steward or Contact Person: Mark Gutshall, LandStudies, Inc.

Funding & Construction:

Name - PADEP - Div. of Wetlands Protection - Mr. Ken Reisinger
Type Organization- State Government
Address: Rachel Carson State Office Bldg. P.O. Box 8775, Harrisburg, PA 17105-8554
Telephone: 717-787-6827
Fax 717-772-5986
Website Link/E-mail: http://www.dep.state.pa.us

Total Funding Required: $130,000
Additional Funding needed: $8,000
Beginning Date of Project: 1997
Beginning Date of Construction: 1998
Ending Date of Construction: 1998
Size of Project: 6 Acres
Area of Wetland: 3 Acres

Project Purpose & Implementation

Restoration Goals/Objectives
Environmental Restoration / Wetland Creation
Improve Water Quality
Create Wildlife habitat and biodiversity
Example of functional open space management / passive recreation

Project Characteristics/Land Use

Project is situated on floodplain and adjacent to active recreational fields and walking trail. It is surrounded by single family residences and townhouses. Buy-in from the land developers were an important aspect of the project since the facility is directly adjacent to new homes being constructed. The facility is considered to be an amenity and a marketing feature for the new development.

Lessons Learned

The timing of permitting and funding need to be synchronized for best results. Design and engineering of community-based projects is more productive with local input and mangement.

National Showcase Watersheds

The Lititz Run Watershed Initiative: A Community Restoring its Water Quality
Lancaster County, PA

Figure 1 and 2
The Lititz Run watershed as seen from the air and on the ground.
Larger aerial photo

The community and lifestyle within the Lititz Run Watershed, Lancaster County (Figure 1) is changing from rural to rural/suburban. Active agricultural enterprises abut residential lands that surround the historic town of Lititz, Pennsylvania. Inherent non-point source (NPS) pollution problems associated with agricultural production exist in Lititz Run (Figure 2). In addition, the degrading effects associated with converting open space to impervious surfaces are occurring as a result of suburban sprawl development.

Non-point source pollution associated with stormwater run-off, erosion and sedimentation, and

nitrogen and phosphorus loading are responsible for the degradation of Lititz Run. This community is improving its water quality through a comprehensive long-term watershed management strategy that combined techniques in natural resource management, land use planning, education and community involvement (Figure 3) in addressing non-point source pollution. A brief list of associated projects (see map and example projects below) includes agricultural management plans throughout the watershed, natural channel design using fluvial geomorphology, planning and construction of a regional water quality facility, creation of GIS database and mapping of mitigation banking sites and water quality monitoring data, streambank stabilization and establishment of forested riparian buffers along the stream; along with public educational material such as a brochure and video about the watershed as well as a watershed education booklet (1999 rivers conservation plan).

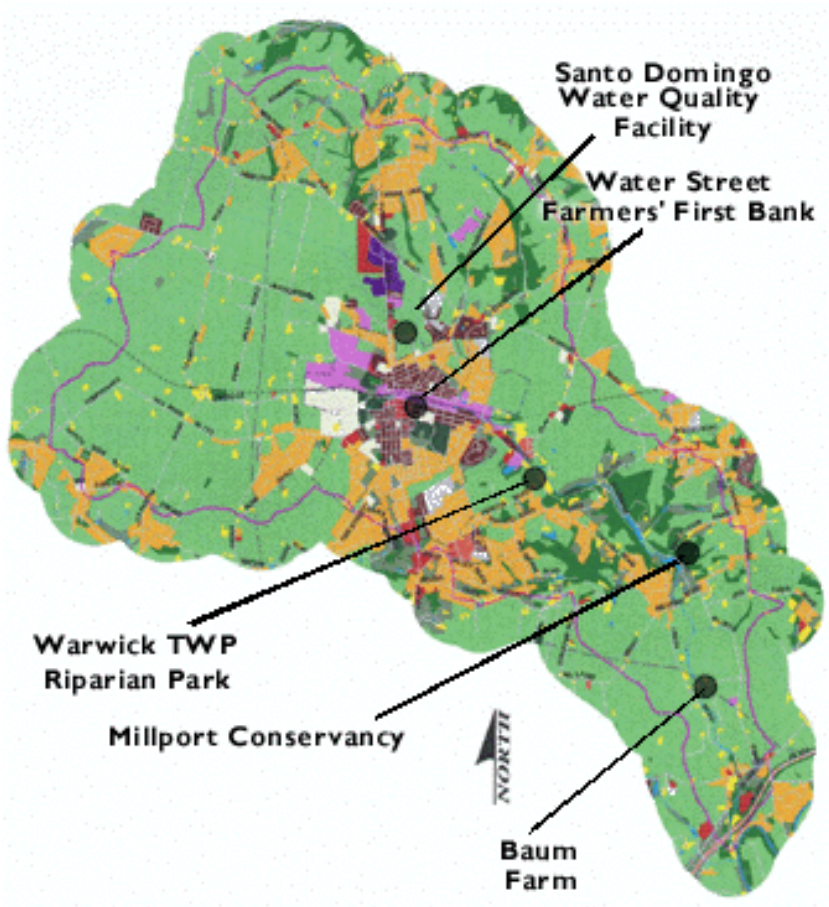
Figure 3.
Volunteers create a wetland near Lititz Run to help filter pollutants from runoff.

This has been the first

Lititz Run Watershed Alliance

effort of this type in the area. The success of the initiative is evident through the formation of an active community group and receipt of over $400,000 in grants and donations for improving the watershed. A group of 15 - 20 community residents have gathered monthly over the past two years to discuss watershed issues. This group known as The Lititz Run Watershed Alliance (LRWA) has been very instrumental in soliciting input, support and involvement from citizens, businesses, non-profit affiliations, farmers, and local, county, state and federal governments. With over sixteen individual projects installed or in planning stages (see Figure 5 below), the initiative is showing results that are both tangible and intangible. Tangible results include improvement in water quality as demonstrated in the monitoring program established by faculty and students from the local high school, sighting of a Black Crowned Night Heron at the created wetland of the regional water quality facility, improved wildlife habitat along a restored section of a stream, and the revegetated banks of Lititz Run. Intangible results include the aesthetic beauty of the wetlands and increased community awareness of natural resource issues. The initiative's success will resound throughout the community for years to come as the momentum builds and the planning efforts it was designed to initiate start to take shape.

Lititz Run Watershed Map



The Lititz Run Watershed showing project area locations (click on dots to browse example project summaries and photographs)

National Showcase Watersheds

Baum Farm
Lititz Run Watershed

Baum Farm Before

Baum Farm After

Abstract

Project name/location: Baum Farm - Agricultural Best Management Practices
Comments: Dairy farmer improving water quality while improving efficiency of his farming operation

Principal Funding Organization: Chesapeake Bay Program

Partnerships in Completion:
Pennsylvania Department of Environmental Protection / EPA 319
Lancaster County Conservation District
Donegal Chapter of Trout Unlimited
United States Fish and Wildlife Service - Partners for Wildlife
Chesapeake Bay Foundation

Project Steward or Contact Person: Jim Saltsman - Lancaster County Conservation District

Funding & Construction:

Name: Don Robinson, Administrator
Type Organization: County Government
Address: 1383 Arcadia Road Rm 6 Lancaster, PA 17601
Telephone:717-299-5361
Fax: 717-299-9459

Total Funding Required: $40,000
Additional Funding needed: N/A
Beginning Date of Project: 1998
Beginning Date of Construction: 1998
Ending Date of Construction: 1999
Length of Stream Corridor: 1200 feet

Project Purpose & Implementation

Restoration Goals/Objectives

- Improve water quality by Reduce Nutrient Runoff
- Restore stream channel geometry
- Stabilize streambanks
- Stream Fencing with Designated Cattle Crossings
- Covered Manure Stacking Facility
- Separation of rain water from Barnyard Runoff
- Install Drainage System for Barnyard and Paddock Area

Project Characteristics and Land Use

Dairy farm is located in the lower reaches of watershed and is surrounded by a mix of Amish, Mennonite and 'English' Farms.

Lessons Learned

Be persistent with your message. It took this landowner 4 years before he committed to the project. Farmers upstream and downstream from him restored their streams 3-5 years prior to this project.

National Showcase Watersheds

Water Street - Lititz Borough/Farmer's First Bank
Lititz Run Watershed

Water Street Before: Lititz Run is wide and shallow with poor aquatic habitat

Water Street After: Rock structures were placed to narrow the stream channel, improve aquatic habitat and give high water better access to floodplain

Abstract

Project name/location: Cedar - Water Street - Stream Restoration

Comments: Collaboration between Farmer's First Bank and Lititz Borough

Principal Funding Organization: Farmer's First Bank

Partnerships in Completion:

- Farmer's First Bank
- Lititz Borough
- LandStudies, Inc.

Project Steward or Contact Person: Mark Gutshall; LandStudies, Inc.

Funding & Construction:

Name: Mr. Bill Belden, President Farmers First Bank
Type Organization: Private Lending Institution
Address: 24 N. Cedar St. Lititz, PA 17543
Telephone: 717-626-4721

Website Link/email: http://www.ffb.com

Total Funding Required: $38,000
Additional Funding needed: N/A
Beginning Date of Project: 1999
Beginning Date of Construction: 1999
Ending Date of Construction: 1999

Area of Wetland: 0.20 acres
Length of Stream Corridor: 900 ft.

Project Purpose & Implementation

Restoration Goals/Objectives

- Restore Stream channel using natural channel design and fluvial geomorphology principles
- Create wetland for filtration and treatment from parking lot runoff.
- Streambank Stabilization
- Natural Plantings to improve the Aesthetic and Environmental Qualities of this urban area.

Project Characteristics and Land Use

- Degraded Stream Channel with eroding Streambanks
- Poor In-Stream Habitat
- Urban Setting in Lititz Borough

Lessons Learned

Inform local businesses of the overall objectives of the watershed plan. Present ideas and opportunities and market your plan to the business community.

National Showcase Watersheds

Links
Lititz Run Watershed

Visit the LandStudies Website:
http://www.landstudies.com

Visit the Lititz Run Watershed Alliance Website:
http://www.landstudies.com/LRWA.html

Other related links:

Partner Name: Pennsylvania Department of Environmental Protection (PADEP), Bureau of Watershed Conservation.	**Website:** http://www.dep.state.pa.us
Partner Name: Donegal Chapter of Trout Unlimited http://www.patrout.org	**Website Information:** bobkutz@desupernet.net
Partner Name: Lancaster County County Conservation District (LCCD)	**Website/E-mail:** http://pacd.org
Partner Name: Lancaster County GIS (Geographic Information Systems) Department	**Website:** http://www.co.lancaster.pa.us/GIS.htm

Partner Name:	**Website/email:**
Brubaker Agronomic Consulting Service (BACS)	http://www.brubaker.com ChrisS@BrubakerAg.com

National Showcase Watersheds

Links in the McCoy Creek Restoration Project

There are no links available at this time.

National Showcase Watersheds

Location - McCoy CreekWatershed

McCoy Meadows is in Northeastern Oregon, Union County, Near the city of LeGrande, Oregon. McCoy Creek is a tributary of the Grande Ronde River, which is connected to the Snake River system and ultimately the Columbia River. The ecological setting is riparian-wet meadow/rural farm-forest/Blue Mountains Physiographic Region.

National Showcase Watersheds

Partnerships in the McCoy Creek Restoration Project

A broad watershed partnership of landowners, local, state, tribal and federal agencies, area schools, and citizen volunteers have contributed to both the project and to its extension into much of the larger watershed. Project cooperators include Grande Ronde Model Watershed Program, USFS La Grande Ranger District and Region 6 Office, ODFW, ODEQ, USEPA, Union Soil and Water Conservation District, Union County, Confederated Tribes of the Umatilla Indian Reservation, Natural Resources Conservation Service (USDA/NRCS), and the landowners. The Grande Ronde Model Watershed Program represents the communities in Union and Wallowa Counties.

Partners and Innovative Agreements:

- Landowner in-kind staffing, weed control funding, groundwater monitoring data collection.
- ODEQ CWA 319, funding, staff, resources.
- USEPA CWA 319, funding staff, resources.
- CTUIR, funding, staff, resources.
- NRCS, funding, staff, resources, Wetlands Reserve Program.
- USFS in-kind staffing, resources.
- ODFW, funding, staff, resources.
- BPA rate payer funding.
- Union County, in-kind construction staff, equipment.
- Grande Ronde Model Watershed funding, staffing.
- Oregon Parks Dept., in-kind contribution of whole cottonwood tree.
- Union Soil and Water Conservation District, staffing.

National Showcase Watersheds

McCoy Creek Watershed

The McCoy Meadows Restoration Project reconnected a channelized reach of McCoy Creek to its former meandering channel and wet meadow, bringing about dramatic improvements in water temperature and flow that may help increase salmon populations. The project's main partners included private ranch landowners, Indian tribes, a local watershed program, and local, state and federal agencies.

National Showcase Watersheds

Project Description- McCoy CreekWatershed

McCoy Meadows Ranch Restoration Project
McCoy Creek Watershed
Union County, Oregon

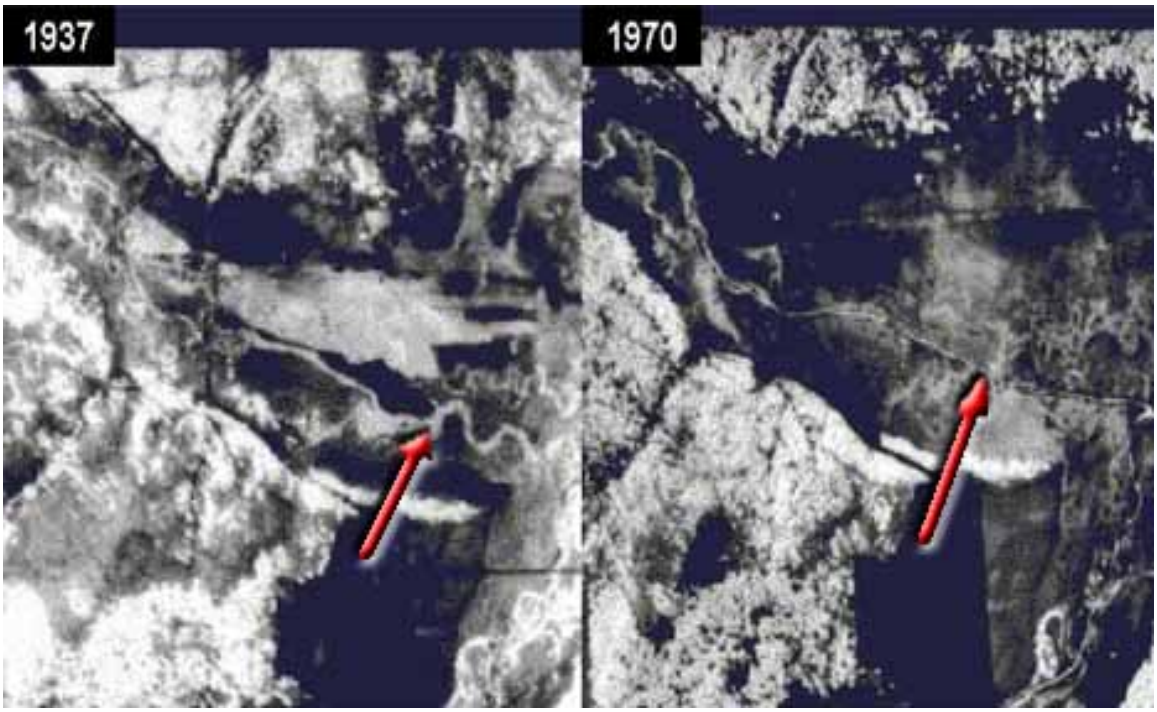


Figure 1: Aerial photographs of McCoy Meadows show the original, meandering channel in 1937 (left) and the straight, ditched channel (right) which existed until the stream restoration project. Reconnecting to original meanders solved water temperature and flow problems by reconnecting the stream to cooler ground water.

Objectives: The McCoy Meadows Ranch Restoration Project is scoped, planned and

implemented around the landowner-directed objectives of entire floodplain and stream channel restoration. The entire meadow complex is included within the project scope and has been exclosure fenced. Project objectives include water quality improvement, beaver protection and expansion, native meadow and grassland plant restoration, fish habitat improvement, reconnection of stream to floodplain, improved groundwater input, increase stream channel sinuosity and noxious weed reduction and control. The project is linked to other efforts in the subwatershed ongoing or planned by the US Forest Service, Union County and other private landowners.

Planning/Implementation: An intensive, interagency resource planning document analyzed four alternatives ranging from "no action" to "relocate the stream out of the ditch and into the historic meander channel in one field season". Based upon planning team recommendations and their own objectives, landowners chose alternative 3 "Return McCoy Creek to Historic Stream Channels Over 3-5 Years". The Plan divides the meadow into two nearly equal-size halves. In 1997 the upper meadow stream relocation project was implemented. Channel relocation in the lower meadow will be implemented in 1999 and 2000.

The Plan identifies the following management elements and analyzes each under each project alternative:

- Diversion structure installment (divert stream from ditch to old channel).
- Instream habitat installment in stabilized old meander channel. Wetlands increase opportunities for stream to overflow onto meadow- floodplain.
- McCoy Creek Road Crossing replace two culverts (an existing structure that severely constricts the channel and plugs-up in spring runoff causing substantial alteration to hydrology of meadow) with open span bridge.
- Revegetation utilize native species and "follow the water" to reestablish floodplain vegetation.
- Beaver colonization/large wood additions.
- Fish Passage.

Figure 2: McCoy Creek flows again through the marshy vegetation lining the edges of its original channel.

Landscape/Watershed Approach: A truly rare opportunity, McCoy Meadows Ranch Restoration Project is a landowner directed project that incorporates holistic resource management principles at a watershed scale. Projects are underway to remove a draw-bottom road from a USFS reach of McIntyre Creek and to restore most of the private land between upstream USFS land and the downstream McCoy Meadows Ranch Restoration

Project. The USFS, La Grande Ranger District has prioritized the McCoy and Meadow Creek subwatersheds for watershed assessments and restoration. Most USFS livestock grazing has been removed or is managed away from riparian areas.

Figure 3: Woody debris was built into the design for McCoy Creek restoration to improve Salmon habitat.

Virtually the entire 2,500 acre ranch is included in this restoration project. In the low-gradient meadow portion of the ranch the Oregon Dept. of Fish and Wildlife - Bonneville Power Administration (ODFW-BPA) livestock exclosure fence was moved from a narrow corridor along the ditch to the outer perimeter of the meadow-so that it now includes all of the floodplain in the upper meadow. Remnant water diversion structures ranch-wide have been corrected to improve flood-plain infliltration. Most of the ranch has been surveyed for cultural resources. Upland lodgepole pine forests have contributed trees for stream-channel restoration. A livestock grazing strategy for the 2,500 acre ranch has been produced by the Natural Resources Conservation Service.

Results: The project resulted in immediate and significant stream temperature reduction due to shallow ground water reconnection. The project is a rare and unique, on-the-ground demonstration of flood plain restoration and resulting water quality improvement. Floodplain vegetation potential is extremely high and is anticipated to be dramatic visual example of riparian vegetation recovery.

Figure 4: Wetlands and stream channels form complex habitats in McCoy Meadows.

Partnerships: A broad watershed partnership of landowners, local, state, tribal and federal agencies, area schools, and citizen volunteers have contributed to both the project and to its extension into much of the larger watershed. Project cooperators include Grande Ronde Model Watershed Program, US Forest Service (USFS) La Grande Ranger District

and Region 6 Office, ODFW, Oregon Dept of Environmental Quality (ODEQ), US Environmental Protection Agency (USEPA), Union Soil and Water Conservation District, Union County, Confederated Tribes of the Umatilla Indian Reservation, Natural Resources Conservation Service (USDA/NRCS), and the landowners. The Grande Ronde Model Watershed Program represents the communities in Union and Wallowa Counties.

Figure 5: Late winter and spring flooding recharges McCoy Meadows ground water, later to provide sustained, cool flow in McCoy Creek through the hot and dry summer.

McCoy Meadows Ranch Restoration Project is part of a large network of private lands surrounded by National Forest. The USFS La Grande Ranger District and Regional Office are project cooperators and recently completed planning and design for the new bridge construction on the ranch. This contribution was linked to the USFS planning and design work to relocate a drawbottom road on private and USFS lands immediately upstream of the McCoy Meadows Ranch Restoration Project on McIntyre Creek. Other private landowners upstream on McCoy Creek have implemented a large floodplain restoration project with Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and other cooperators. In part, the success of the McCoy Meadows Ranch Restoration Project is a result of a close and effective working relationship among agency staff, landowners and contractors.

An example of innovative partnership is the work and funding needed to design and construct the new open span bridge over McCoy Creek. The bridge is funded through a combination of BPA, Grande Ronde Model Watershed and ODEQ 319 funds. Planning and design was completed through in-kind services of USFS. Construction will be provided by in-kind contribution from Union County. CTUIR generated the grant funding, is overseeing the project, and is administering the contracts.

Challenges the project faced: Significant roadblocks encountered by the project included the time required to complete technical assessments and planning, and limited funding and staffing resources. Each has been overcome by spreading the responsibility for project components among a number of project cooperators and funding sources. For instance stream channel morphology and hydrology is contributed primarily by an outside contractor and the NRCS. Water quality monitoring is coordinated by ODEQ. EPA provides technical assistance and develops ESA consultation products and conducts the consultation. ODFW provides technical assistance, state 404 lead, and does all riparian fence construction and maintenance. CTUIR contributes project staff lead and technical assistance and oversees project coordination. Funding is provided by ODEQ, USEPA,

CTUIR, ODFW, and NRCS.

Figure 6: Signs of Beaver in McCoy Meadows indicate another restoration objective that is being met.

National Showcase Watersheds

Contacts - McCoy CreekWatershed

Rick George
Confederated Tribes of the Umatilla Indian Reservation
P.O. Box 638
Pendleton, Oregon 97801
Phone:(541)-276-3449
Fax: (541)276-0540
Email: AFARROW@UCINET.COM

National Showcase Watersheds

Contact information
Sun River Watershed

Name of Project or Watershed:	Sun River Watershed
Location (state, county):	Montana, Cascade, Lewis & Clark & Teton Counties
Bureau of Rec state contact	Sean Keeney
Affiliation:	U.S. Bureau of Reclamation
Restoration Project Leader, name	Alan Rollo
Mailing Address: Line 1:	808 52nd St So
City: State: Zipcode:	Great Falls, Montana
Phone: Fax: Email:	(406) 727-3741 arollo@mcn.net

Physiographic Area or Major Land Use Area:

Drainage Area Size (acres):	1.4 million acres
Planning Area Size (acres) (if different from watershed area):	same

National Showcase Watersheds

Sun River Watershed

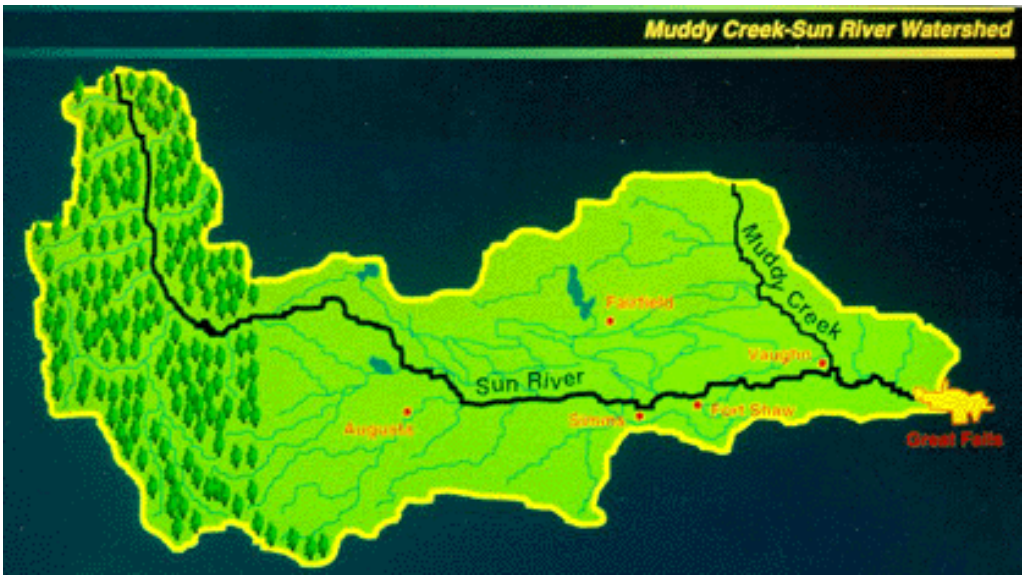
- Project Description
- Location
- Partners
- Links
- Contact Information

- Other links about the Sun River Watershed
  - Outreach Programs

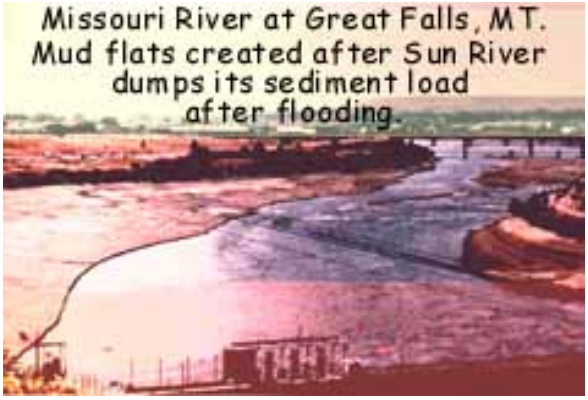
National Showcase Watersheds

Project Description
Sun River Watershed

The Sun River Watershed is truly a spectacular area from where it forms along the east slopes of the magnificent Rocky Mountain Front through the plains to its confluence with the historical Missouri River at Great Falls. The area is home to one of the most diverse group of wildlife species in the North America. From Bighorn Sheep, goats, Elk, Whitetail deer, Mule deer to eagles and falcons to Brown and Rainbow trout. This watershed is more beautiful than any word can describe and needs the continued labors of this positive watershed effort.



Unfortunately this area is also home of one of the worst non-point source pollution problems in Montana. That's why the Sun River Watershed has embarked on an ambitious non-traditional way of resolving local natural resource problems. ALL group and individuals who are interested in this watershed effort are participating in the ideas and ways to accomplish a win-win solution.



The primary goals of this Sun River Watershed project are to 1) Reduce irrigation return flows and erosion on Sun River and tributaries 2) Improve land management through improved riparian/ upland habitat and Best Management Practices, 3)Information & Education and coordination of project goals, 4) Monitoring program to document project improvements. The goals fit into the bigger plan of the watershed effort which are to:

1. Maintain and/or improve a viable agriculture economy
2. Control noxious weed infestations in the Sun River Watershed
3. Reduce the sediment loads into the Sun and Missouri Rivers
4. Improve the overall water quality of the Sun River
5. Improve the flows in the Sun River
6. Improve the fisheries of the Sun River
7. Ensure effective subdivision planning

The major elements of this project are to use **all known and new workable ideas** to stabilize and improve the 110 mile Sun River and its tributaries in the watershed. The Montana 1997 303d list includes both agriculture and hydromodification as the primary cause for sediment and nutrient nonpoint source pollution on the Sun River. These problems contribute to the Sun River only partially supporting the beneficial uses of fisheries, aquatic life, swimming, and recreation. Non-supporting uses on portions of the Sun River and its tributaries include aquatic life, swimming, cold water fishery, warm water fishery and recreation. The following description lays out this watershed facts along with past and current efforts.

KEY SUN RIVER WATERSHED FACTS

- Sun River is a major tributary of the Missouri River located in North Central Montana
- The basin is about 110 miles long and 30 miles wide
- Drains 2,200 square miles of the east slope of the Rocky Mountains
- Elevations range from 9,000 feet to 3,350 feet
- USGS watershed hydrology unit number is 10030104, which is the Sun River Basin boundary
- The watershed lies in two major land resource areas identified by NRCS as, 52 (Brown Glaciated Plain) and 46 (Northern Rocky Mountain Foothills)
- Basin was formed by glacial activity in the Pleistocene Era. The majority of the irrigated area was developed on a portion of the watershed where distinct terrace formations prevail consisting of shallow topsoil overlaying 15-20 foot thick gravel glacial deposit underlain by the impervious Colorado Shale formation
- Watershed area is made up of several land uses and diversified agriculture; with about 35% cropland, 35% forested, 28% rangeland and 2% urban. Cropland is both irrigated and dryland with over 75% in dryland cropping system of small grains. The rangeland is predominantly on the west end of the watershed but there is native rangeland and pastureland interspersed with the irrigated and dryland crop. Overall, land management is fair to good with room for improvements on land cover, irrigation efficiency, soil tilth, and cropping rotation.
- It is estimated that there are over 8,000 acres of wetlands which include prairie potholes, artificial wetlands, wetland refuge areas, frequently flooded areas along stream corridors and natural closed basins.
- Is approximately 113,700 acres of prime farmland (irrigated), 33,400 acres of prime farmland (if-irrigated), and 10,300 acres of farmland with state-wide importance.
- Primary source of irrigated waters is from the Sun River controlled at the headwaters by Gibson Dam. Gibson Reservoir has a usable capacity of 105,000 acre feet. Water is diverted to two off-stream storage facilities Pushkin and Willow Creek Reservoirs. Pushkin has usable capacity of 32,050 acre feet and willow Creek has usable capacity of 32,300 acre feet.
- Threatened and endangered species that reside in the watershed include the black-footed ferret, grizzly bear, and gray wolf. The bald eagle and peregrine falcon migrate through this watershed but generally do not breed in this area. Some other wildlife found in the area include: deer, elk, antelope, rabbit, coyote, fox, sharptail grouse, hungarian partridge, and pheasant.

Rural, Urban, Other Land Use Patterns

LAND USE	TOTAL ACRES	PERCENT OF WATERSHED
Forested	480,000	34.
Cropland	400,000	28.4
Rangeland	400,000	28.4
Hayland/ pastureland	100,000	7.1
Wildlife	20,000	1.4
Farmsteads	3,200	.2
Urban	3,000	.2
Transportation	1,800	.15
Total	1,408,000	

Ownership and land patterns are (in acres):

US Forest Service	484,352
MT State Lands	98,560
US BoR	17,920
US BLM	5,120
US F&W	160
GID irrigated area	83,000
Broken O irrigated area	17,000
FSID irrigated area	10,000
Sun River Ditch Company irrigated area	3,200
Rocky Reef irrigated area	500
Urban	3,000
Private property	799,048

Past Activities

Sun River Basin - Muddy Creek Watershed Phase I of an EPA 319 grant began in 1994 with the primary goals to address the severe erosion problem of Muddy Creek and to start expanding the teamwork into the entire Sun River Basin. To date under this project, there have been 13 drop structures (slides) and over 400 barbs installed which helped reduce the erosion in Muddy Creek by 75%. Stream corridor fencing, off-stream waters, tree planting, and improved land management practices have also been implemented on Muddy Creek. A TMDL plan for Muddy Creek has been submitted to Montana Department of Environmental Quality (DEQ) and U.S. Environmental Protection Agency (EPA) for review and approval.

Sun River Basin Phase II which began in 1996, started an aggressive basin wide resource assessment and BMP implementation program. The primary goals of Phase II were project coordination, GIS mapping, erosion control, and water quality and quantity improvements. The following goals have been attained: 1) extensive project coordination obtaining over $2 million in additional grants, in-kind services, and local support; 2) assessment on over 140 miles of streams in the basin; 3) erosion control benefitting over 40 miles of streams; 4)improved upland land management practices on 20,000 acres through EQIP and other programs; 5) volunteer participation in tree planting, matt laying, fence building, and erosion control, 6) GIS mapping of soils, land use, land ownership, and land management, 7) weed control through biological and chemical treatment, 8) fishery monitoring and improvements, and 9) improved communication and information dissemination between key players.

Current Activities

The current Phase III proposal will continue this proactive watershed approach on this 1.4 million acre basin. While progress can be seen on-the-ground in the Sun River Basin resolving natural resource problems, there is a need to carry on this massive effort. Key project areas addressed during the initial phases and are continuing through proposed Phase III include, but are not limited to the following: Muddy Creek, Duck Creek, Big Coulee, Mill Coulee, Willow Creek, Elk Creek, Sun River from Simms to Fort Shaw, Sun River from Sun River to Vaughn, and other segments of the Sun River. The watershed continues to have major problems with poor land use practices, irrigation return flows mobilizing chemicals and causing erosion, and stream erosion which has already added tons of sediment to the Sun and Missouri Rivers. Solutions to these problems need to continue to be addressed if we are to actually restore the severely impaired fisheries, recreational potential, swimming, property values, safe drinking water, and general aesthetics of the basin. Bioengineering techniques will continue to be used on all streams to reduce erosion and improve stream health. A TMDL plan for the Sun River is being compiled for submittal to DEQ. This Phase III proposal must continue to prevent loss of agency and/or public support.

The Sun River Watershed project is currently working to improve land management through improved riparian/upland habitat and Best Management Practices to improve water quality. The new farm bill EQIP program will be utilized to work with producers on land management improvements on riparian and upland areas.

The BoR will take the lead role addressing the water conservation and management in the Sun River Watershed with it's two projects, Greenfields and Fort Shaw Irrigation Districts. NRCS will continue to work with private landowners to enhance their operations. Ongoing land surveys and

photo monitoring will document changes as they occur. GID and FSID will enhance their irrigation efficiency to reduce the return flows into the Sun River. The USFWS will assist landowners in the establishment of improved wildlife management areas. The Partners for Wildlife program has had a very successful program in Montana working with landowners on a voluntary basis to enhance wildlife habitat. The Fort Shaw and Greenfields Irrigation District's Water Conservation/Management Plans will be integrated with this watershed project to prevent duplication and ensure best use of resources. The Medicine River Canoe Club has adopted the Sun River as a stream. They will make efforts to keep streambanks and access sites clean (like the adopt-a-road program). Ground- water monitoring in the Fairfield area will be conducted by the Montana Department of Agriculture and Bureau of Mines. Freezeout Lake water quality monitoring will be conducted by Montana Fish, Wildlife & Parks. Volunteer water quality monitoring program will assist with water quality monitoring.

Monitoring program to document improvements. Water quality and quantity monitoring, photo documentation, GIS mapping, and fish counts will be utilized to gage effectiveness of BMP implementation. This data will be used to modify BMPs where appropriate.

The Sun River/Muddy Creek project went into full gear in 1994. Since that time several key monitoring components have been established:

1. Ongoing water quality and quantity monitoring at the Muddy Creek Vaughn station. The flows over the last 15 years have dropped approximately 35%. The sediment load has been reduced by 75%.
2. Additional gauging stations have been installed on Muddy Creek, Sun River, Elk Creek, Adobe Creek, and FSID headworks. This will improve water quantity and quality evaluation in the Sun River Basin.
3. A Sun River Basin water budget is under way.
4. Photo points and monitoring sites have been established at key locations to monitor changes over time.

The monitoring plan detailed below will be used to implement the following strategies:

Monitoring Objective #1. Evaluate effectiveness of completed channel restoration projects and best management practices which have been implemented to improve water quality in the Sun River, Muddy Creek, Mill Coulee, Duck Creek, Big Coulee and Elk Creek from tasks listed in this plan.

Monitoring Objective #2: Facilitate nonpoint source identification as part of a TMDL plan for the Sun River drainage. Ongoing monitoring by Bureau of Reclamation, USGS, FSID, GID and volunteers will continue with the Sun River Watershed Phase III plan.

Task 1: Additional GIS mapping will be conducted in the Sun River Watershed to refine currently existing land uses. The data will be utilized to refine nonpoint pollution source delineation and areas of improvements.
Task 2: Agrimet weather monitoring data will continue to be utilized to maximize water conservation in the Sun River drainage.
Task 3:USGS, Reclamation, GID, FSID, and other gauging stations on Muddy Creek, Sun River tributaries and the Sun River will be utilized to monitor flows and water quality improvements from stream restoration projects, on-farm practices and irrigation districts infrastructure improvements.
Task 4: Additional riparian assessment and photo points will be utilized to document changes in stream restoration and habitat alterations.
Task 5: Total suspended sediments will continue to be monitored on Muddy Creek and Sun River to evaluate trends.
Task 6: Siltation will be monitored with Wolman peeble counts in conjunction with cross sections established at all water quality monitoring stations.
Task 7: Temperature and nutrient data will continue to be collected at USGS gauging stations and additional sites on key tributaries to evaluate trends.
Task 8: Selenium and specific conductance will be continued to be monitored in the Adobe Creek Basin to evaluate trends

All projects are evaluated on a ease of use and implementation process. During each project phase landowners are included in the effort to evaluate ease of task accomplishment and willingness to accept proposed ideas. Before and after photos, tours and workshops help players participate in demonstration efforts. The projects must be usable and easy to pass on to others to be actually accomplished.

OUTREACH PROGRAMS

Web site is at:
http://water.montana.edu/databases/watershed_groups/index.taf?Loc=GROUP&Table_uidi=39
This part of the Montana watershed home page making it easily accessible to a large group of individuals

Newsletters: are quarterly or as key changes take place. Articles are also placed in local newspapers and conservation district newsletters to keep the general public aware of current activities.

Fact sheets: Are accomplished as needed on specific topics and issues such as irrigation water management

Technical reports: Several have already been accomplished, especially by the Bureau of Reclamation.

Field trips with legislators and landowners occur approximately once a year

Other: Slide shows have been put togther to show at special events and group meetings to keep people involved with current activities.

Local Support -- The great strength of this effort

Agencies, groups, stakeholders, organizations, and local governments that support or sponsor the project.

Senator Max Baucus, Montana
Senator Conrad Burns, Montana
Congressman Rick Hill, Montana
Cascade County Conservation District
Lewis & Clark County Conservation District
Cascade County
Teton County Conservation District
U.S. Bureau of Reclamation
U.S. Bureau of Land Management
US Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Service
USDA Natural Resources Conservation Service
State Legislators
FSA Committees in Cascade, Teton, Lewis & Clark
Montana Department of Agriculture
Montana Department of Environmental Quality
Montana Department of Natural Resources and Conservation
Montana Department of Fish, Wildlife and Parks
Montana Bureau of Mines and Geology
Russell Country Sportsman Association
Sun River Ditch Company
Rocky Reef Ditch Company
Sun Prairie Water & Sewer District
MSU Extension Service
Greenfields Irrigation District
Fort Shaw Irrigation District
Broken O Ranch
City of Great Falls
City of Fairfield
Medicine River Canoe Club
Montana Power Company
Missouri River Flyfishers
Missouri Breaks Audubon Chapter
Muddy Creek Task Force
Vaughn Water & Sewer District
Vaughn Dike Board
Sun Prairie Water District

Broken 'O' Ranch

This is true grass roots project with anyone and everyone participating and helping to resolve the many complex problems. TEAMWORK has been and will continue to be the key to resolving the issues that have been considered the priorities of this watershed effort. We have pictures, maps, and groups all documenting the worth of this watershed to be considered as a showcase. The project would be able to step in immediately to demonstrate to the world how teamwork is effective and how new innovative ideas are not impossible to accomplish.

National Showcase Watersheds

Partners
Sun River Watershed

Local Support -- The great strength of this effort

Agencies, groups, stakeholders, organizations, and local governments that support or sponsor the project.

Senator Max Baucus, Montana
Senator Conrad Burns, Montana
Congressman Rick Hill, Montana
Cascade County Conservation District
Lewis & Clark County Conservation District
Cascade County
Teton County Conservation District
U.S. Bureau of Reclamation
U.S. Bureau of Land Management
US Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Service
USDA Natural Resources Conservation Service
State Legislators
FSA Committees in Cascade, Teton, Lewis & Clark
Montana Department of Agriculture

MSU Extension Service
Greenfields Irrigation District
Fort Shaw Irrigation District
Broken O Ranch

City of Great Falls
City of Fairfield
Medicine River Canoe Club
Montana Power Company
Missouri River Flyfishers
Missouri Breaks Audubon Chapter
Muddy Creek Task Force

Montana Department of Environmental Quality
Montana Department of Natural Resources and Conservation
Montana Department of Fish, Wildlife and Parks
Montana Bureau of Mines and Geology
Russell Country Sportsman Association
Sun River Ditch Company
Rocky Reef Ditch Company
Sun Prairie Water & Sewer District
Broken 'O' Ranch
Vaughn Water & Sewer District
Vaughn Dike Board
Sun Prairie Water District

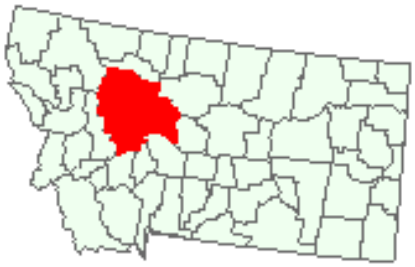
National Showcase Watersheds

Links
Sun River Watershed

Web site is at:
http://water.montana.edu/watersheds/oldgroups/edit.asp?Title=Sun%20River%20Watershed

National Showcase Watersheds

Location
Sun River Watershed



Name of Project or Watershed:	Sun River Watershed
Location (state, county):	Montana, Cascade, Lewis & Clark & Teton Counties
Bureau of Rec state contact	Sean Keeney
Affiliation:	U.S. Bureau of Reclamation
Restoration Project Leader, name	Alan Rollo
Mailing Address: Line 1:	808 52nd St So
City: State: Zipcode:	Great Falls, Montana
Phone: Fax: Email:	(406) 727-3741 arollo@mcn.net

Physiographic Area or Major Land Use Area:

Drainage Area Size (acres):	1.4 million acres
Planning Area Size (acres) (if different from watershed area):	same

National Showcase Watersheds

Outreach Programs
Sun River Watershed

Web site is at:
http://water.montana.edu/watersheds/oldgroups/edit.asp?Title=Sun%20River%20Watershed
This part of the Montana watershed home page making it easily accessible to a large group of individuals

Newsletters: are quarterly or as key changes take place. Articles are also placed in local newspapers and conservation district newsletters to keep the general public aware of current activities.

Fact sheets: Are accomplished as needed on specific topics and issues such as irrigation water management

Technical reports: Several have already been accomplished, especially by the Bureau of Reclamation.

Field trips with legislators and landowners occur approximately once a year

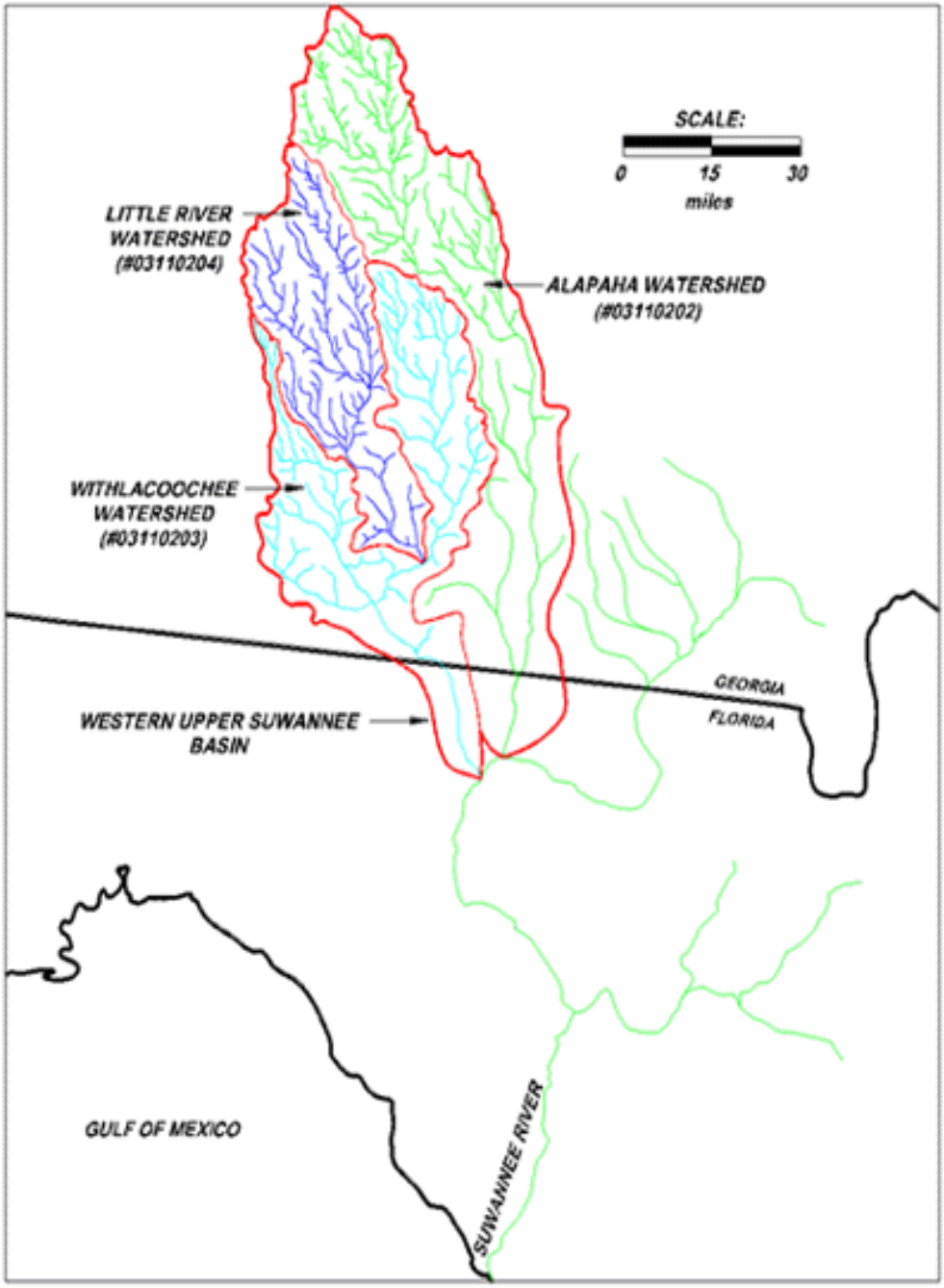
Other: Slide shows have been put togther to show at special events and group meetings to keep people involved with current activities.

National Showcase Watersheds

Project Description
Suwannee River Watershed

The Suwannee River Basin is the center for much of the riparian forest buffer research and demonstration in the Southeastern Coastal Plain. The main approaches for stream corridor restoration and protection in the basin are riparian forest buffer restoration on agricultural lands in the headwaters areas and land acquisition along main channels in the downstream areas. Forest buffers on agricultural lands involve demonstration, research, and monitoring of the effects of restoration and management efforts. Downstream areas in Florida are being acquired and managed through the Suwannee River Water Management District Save Our Rivers program.

Map of Western Upper Suwannee River (Withlacoochee, Alapaha, Little Rivers)



Restoration, Assessment, and Monitoring sites in Western Upper Suwannee

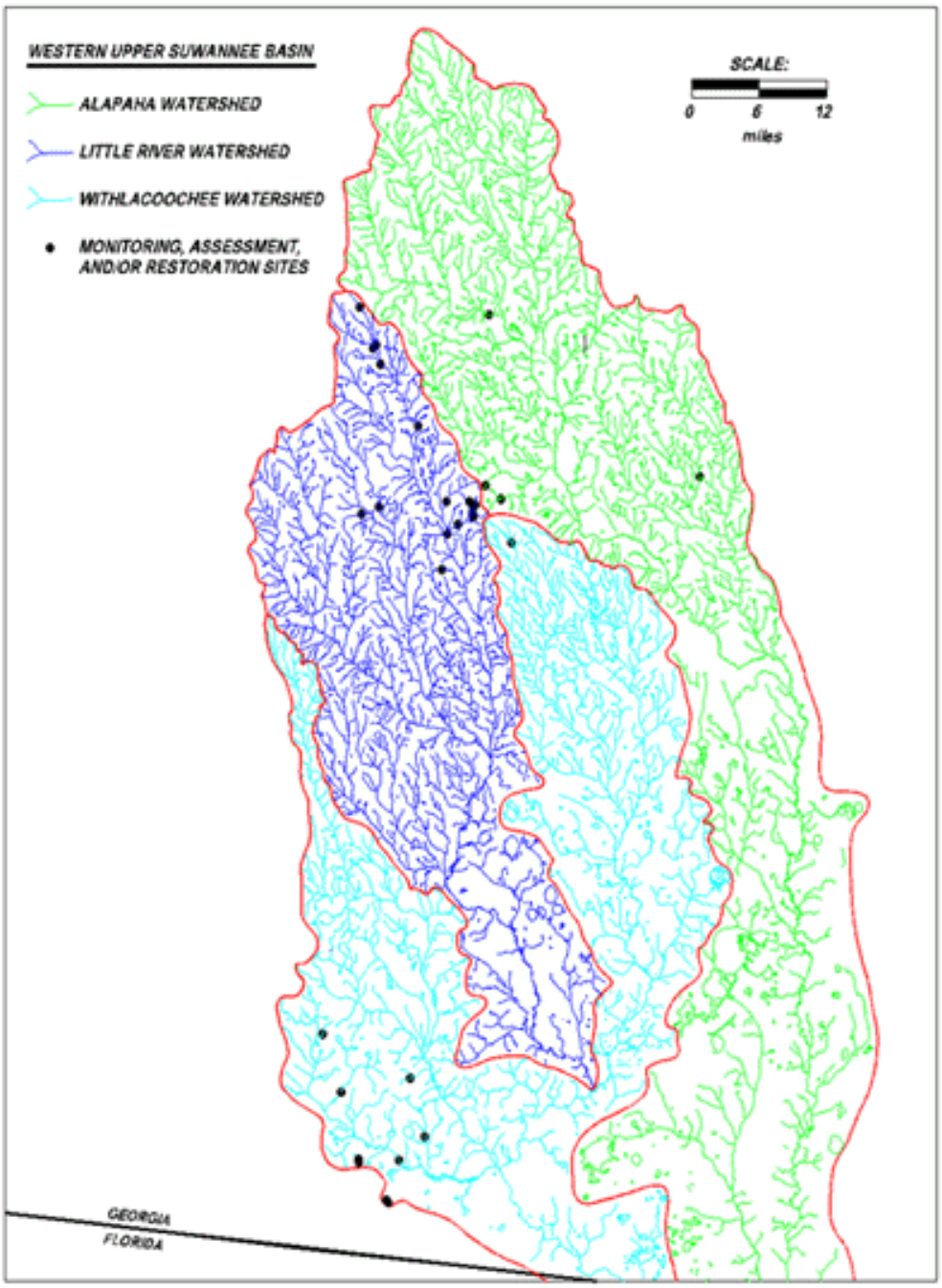


Figure 4 - Map of lower Suwannee River Suwannee River Watershed

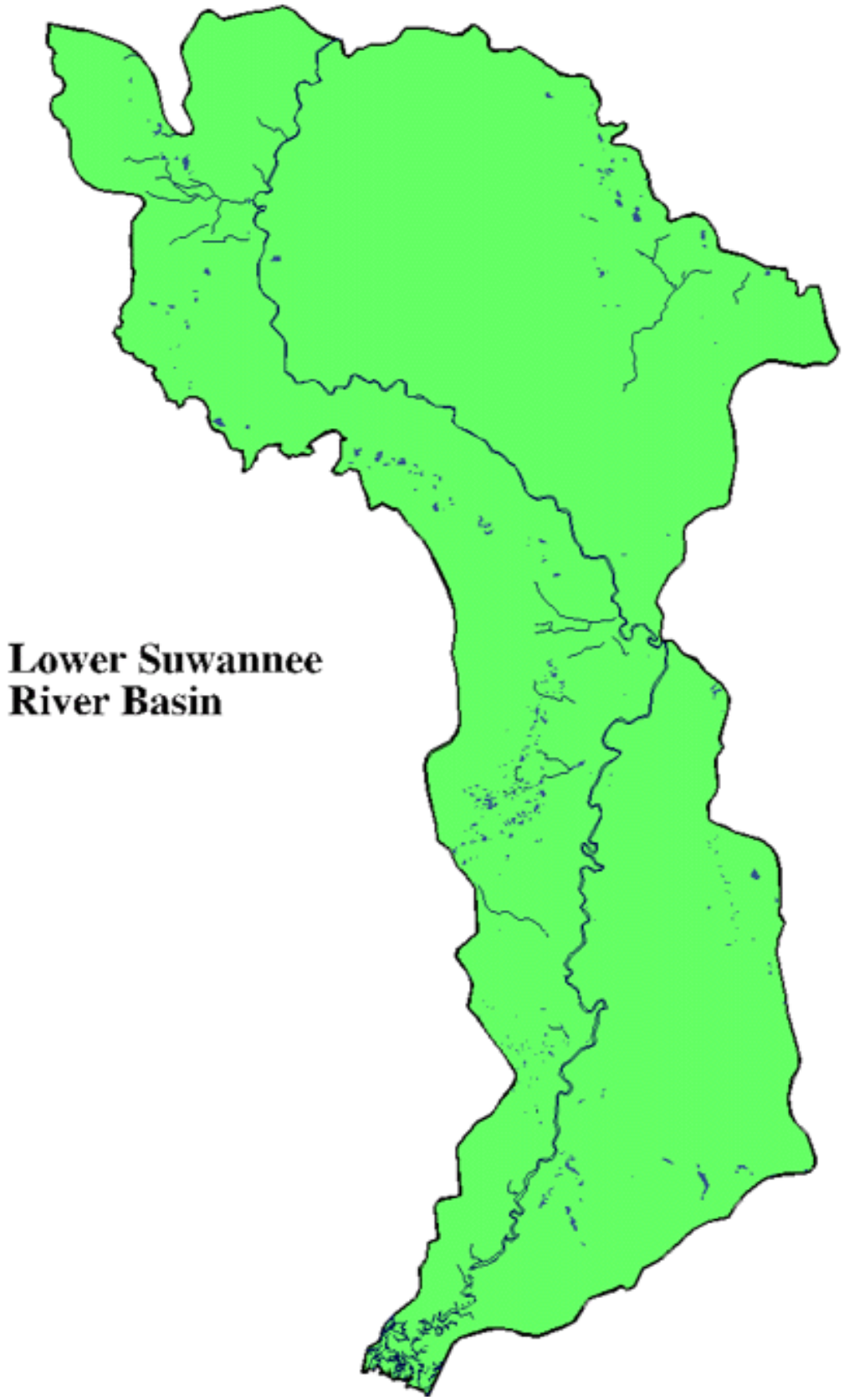


Figure 12- Piscola Creek aerial photo
Suwanee River Watershed

National Showcase Watersheds

Partners
Suwannee River Watershed

Riparian Restoration and Management in the Western Upper Suwannee River

More is known about the functions of riparian ecosystems in stream corridor restoration from the southeastern coastal plain than in many parts of the world. The stream corridor restoration, assessment, and monitoring projects completed, ongoing, and planned in the WUSRB are based on the research results from the past twenty years on these stream ecosystems and their associated riparian zones. The University of Georgia and the USDA-ARS Southeast Watershed Research Laboratory are applying and extending the results of the research.

Stream corridor and riparian management has been used in demonstration, research, and education programs with an integrated watershed approach which takes into account the types of pollutant sources, especially animal agriculture. Much of the ongoing work involves use of riparian buffers and assessment of possible effects of riparian buffers adjacent to either non-confinement or confinement animal production facilities. Among the completed or ongoing projects are: 1) Restoration of a riparian forest wetland to control agricultural nonpoint source pollution from a liquid manure application site (Figure 11); 2) Improving water quality in the Piscola Creek Watershed (a major tributary of the Withlacoochee River in southern Georgia) (Figure 12, Piscola Creek aerial photo); 3) Assessing the need for riparian restoration in the Little River Watershed (Figure 13, Land use in the 30 m riparian zone of Little River Watershed); 4) management of a riparian forest buffer in an agricultural watershed (Figure 14, below).

Figure 14: Gibbs Farm aerial photo

Participation in the PL566 project in Piscola Creek Watershed has been excellent and has been focused on getting swine operations out of streamside areas and into confinement facilities (Figure 15, right). The efforts in the western headwaters of the Suwannee River are all voluntary, incentive based projects. Most restoration demonstration, assessment, and research has been done on agricultural lands, especially in conjunction with two CWA 319 projects and a PL 566 Small Watershed Project. Other implementation strategies for urban areas will become more important in the future.

Figure 15: Riparian hog picture

Suwannee River Water Management District Save Our Rivers Program

Florida's land and water resources are forever linked. To protect our rivers, lakes, streams and underground water supplies, we must properly manage the lands around them (Figure 16, right). The Suwannee River Water Management District's land acquisition and management efforts known as Save Our Rivers is authorized by Section 373.59 of the

Florida Statutes. The SRWMD acquires lands to: provide natural storage areas for flood waters; reduce loss of life and property due to floods; protect ground and surface water resources of the region; protect natural systems associated with floodplain ecosystems (Figure 17, below). The District currently owns and protects 101,758 acres of river frontage and wetlands. The district has acquires 63% of the river frontage in the Upper Suwannee River Basin (Figure 18, map of land acquisitions). These lands are acquired and protected specifically for water resource purposes. This plan identifies an additional 115,000 acres of riverine, wetland, and natural system resources as suitable for acquisition. To some, this may sound like a sizable amount of land. In reality, once the District has completed its planned acquisitions, it will own only three percent of the total land area within its boundaries.

Figure 16: Spring on river

Figure 17: Floodplain on main channel

Suwannee Basin Interagency Alliance

A coalition of representatives from regional, state, and federal agencies have laid the ground work for natural resource protection within the Suwannee River Basin (Figure 19, right). The Suwannee Basin Interagency Alliance was

formed to promote communication and cooperation between the neighboring states for safeguarding the water resources of the entire Suwannee River basin. Leading the effort are the Suwannee River Water Management District (SRWMD), Georgia Environmental Protection Division (GAEPD), U.S. Fish and Wildlife Service (Okefenokee National Wildlife Refuge), and Florida Department of Environmental Protection (DEP).

Figure 19: Picture of Suwannee River

The Alliance does not have authority to formulate policy or form interstate compacts, but operates in a planning and advisory capacity. By sharing information and resources, the two states will reduce duplication of efforts and stretch the limited funds each has available for water resource activities.

The GAEPD and SRWMD are working together to establish similar water quality monitoring networks in the Suwannee River basin. Data collection in Florida and Georgia is underway (Figure 20, right). The Alliance hosts semi-annual public meetings, alternating between sites in Florida and Georgia. It also publishes a semi-annual newsletter, the Suwannee River Network.

Figure 20: Picture of stream monitoring station

National Showcase Watersheds

Location
Suwannee River Watershed

The Watershed

The Suwannee River is a major aquatic resource beginning in the Coastal Plain of Georgia and flowing through much of north Florida before emptying into the eastern Gulf of Mexico (Figure 1, a map of the Suwanee River Basin. Figure 2, below). The basin stretches over 9,950 square miles from near Cordele, Georgia to near Cedar Key, Florida. The average annual rainfall in the basin is about 45 inches in Georgia and about 56 inches in Florida. The basin is in a warm, humid sub-tropical region and is one of the largest drainage basins completely within the Coastal Plain of the U.S.

Figure 2: picture of stream

The headwaters of the Suwannee are in two very different areas of Georgia. The eastern headwaters are primarily in the Okeefenokee Swamp, a National Wildlife Refuge and Wilderness area. The portion of the eastern Upper

Suwannee River outside the Wildlife Refuge is an area with wide expanses of swampland, little agriculture, and little urban development. The western headwaters are quite different. The western upper Suwannee River drained by the Alapaha, Withlacoochee, and Little Rivers (Figures 3a, Map of Western Upper Suwannee River (Withlacoochee, Alapaha, Little Rivers) & 3b, Restoration, Assessment, and Monitoring sites in Western Upper Suwannee) has less swampland, much more agriculture, and more small cities. The Lower Suwannee River is downstream of the confluence of the Withlacoochee and Suwannee (Figure 4, Map of lower Suwannee River). This section of the river flows to the Gulf of Mexico and along it course receives major springs (Figure 5, at the right) emanating from the Floridan aquifer. The lower Suwannee also receives the Santa Fe River; a major tributary that is itself fed by many springs (Figure 6, Map of Santa Fe River).

Figure 5: Picture of spring at a river

Land Use

Figure 7: Agriculture picture

Agriculture and forestry are the dominant land use in the watershed. Agriculture (Figure 7, above) makes up about 25% of the land use with forest land making up most of the rest (Figure 8, right). Urban and developed land is only a few percent of the watershed. Some sub-basins have a much higher percentage of agricultural lands with up to 80% row-crop and pasture lands. Agriculture has not had major impacts in riparian areas on the main channels of larger streams (Suwannee, Santa Fe, Alapaha, and

Figure 8: Forestry picture

Withlacoochee). Many of the smaller tributaries have been subject to removal of riparian forest cover, ditching of small streams and conversion to either row-crops or pastures (Figures 9&10, below). Estimates for one sub-basin of the western Upper Suwannee River (Little River) are that 46% of the riparian area within 100 ft of the stream is non-forested (mostly agricultural). On main channels downstream, the main threat to riparian systems has been second home development and unmanaged recreational uses. The major urban areas in the watershed are Lake City, FL (pop. 10,000); Live Oak, FL (pop. 6,300); Moultrie, GA (pop. 14,900); Tifton, GA (pop. 14,200); and Valdosta, GA (pop. 39,800) (1990 census).

Figure 9: Main channel picture with good riparian forest

Figure 10: Small channel with no riparian forest

National Showcase Watersheds

Links
Suwannee River Watershed

USDA-ARS-Southeast Watershed Research Laboratory

Suwannee River Water Management District - Live Oak, FL

University of Georgia

National Showcase Watersheds

Suwannee River Watershed

- Project Description
- Location
- Partners
- Links
- Contact Information

Figure 18- Map of land acquisitions
Suwanee River Watershed

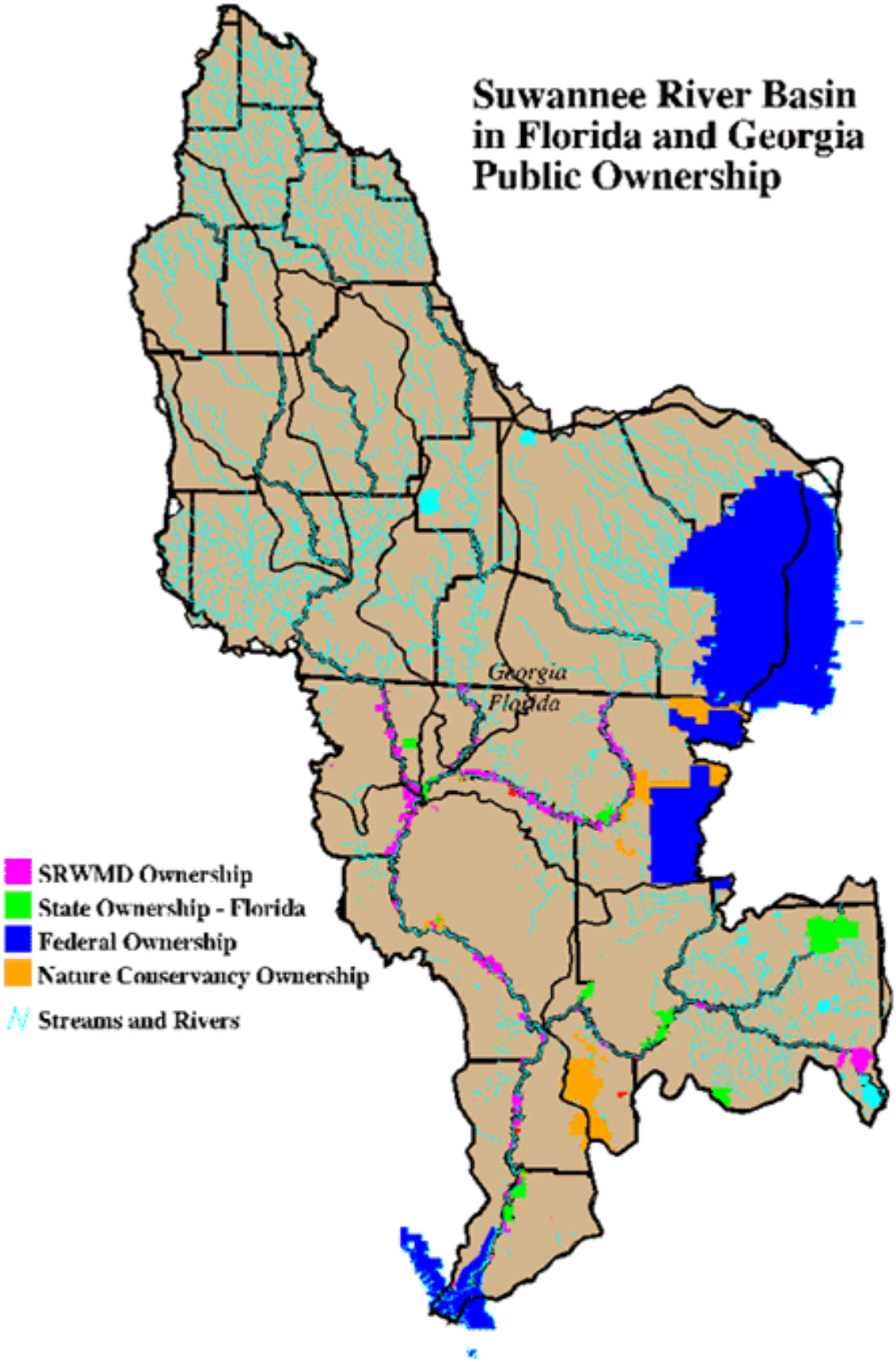


Figure 13 - Land use in the 30 m riparian zone of Little River Watershed
Suwanee River Watershed

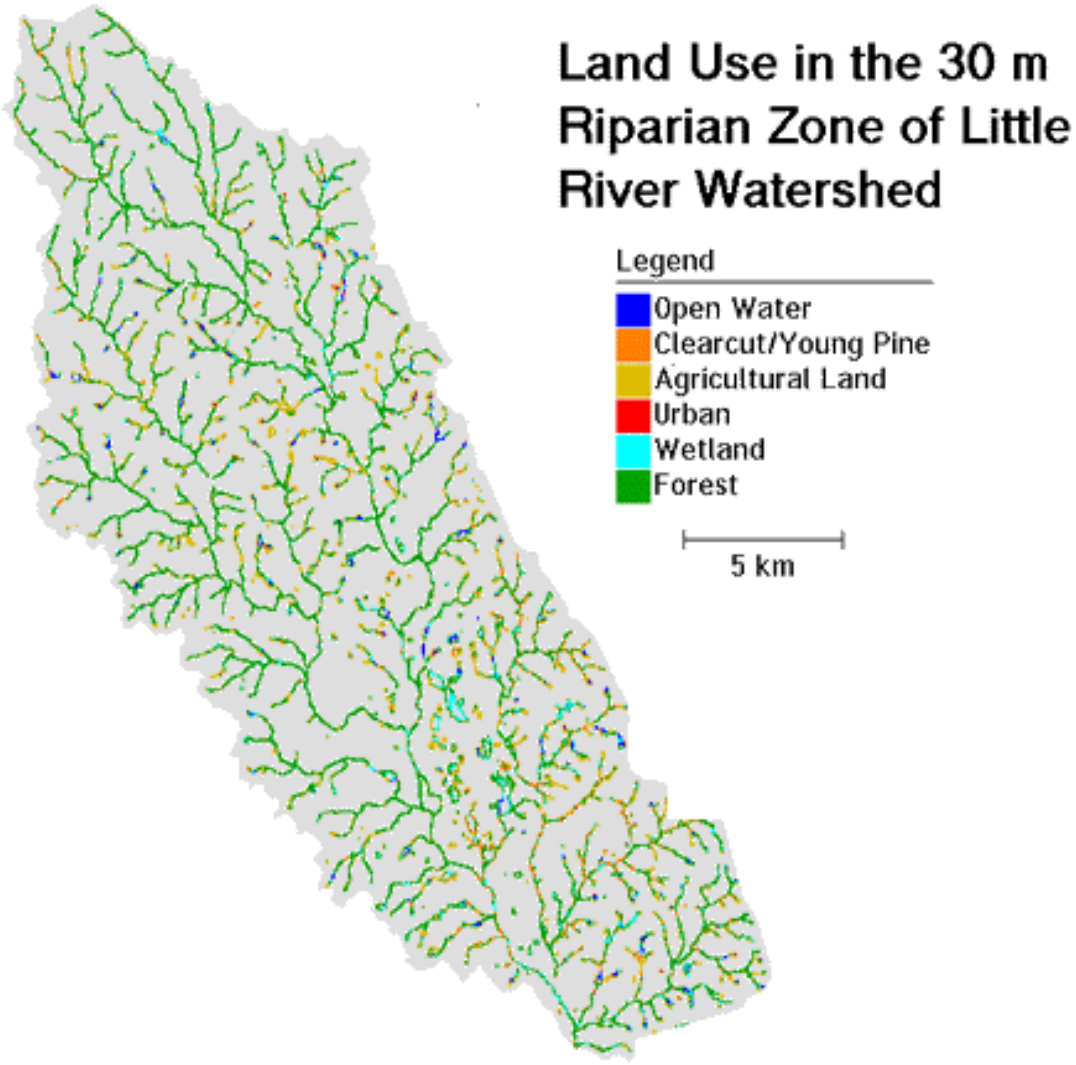


Figure 6 - Map of Santa Fe River
Suwannee River Watershed

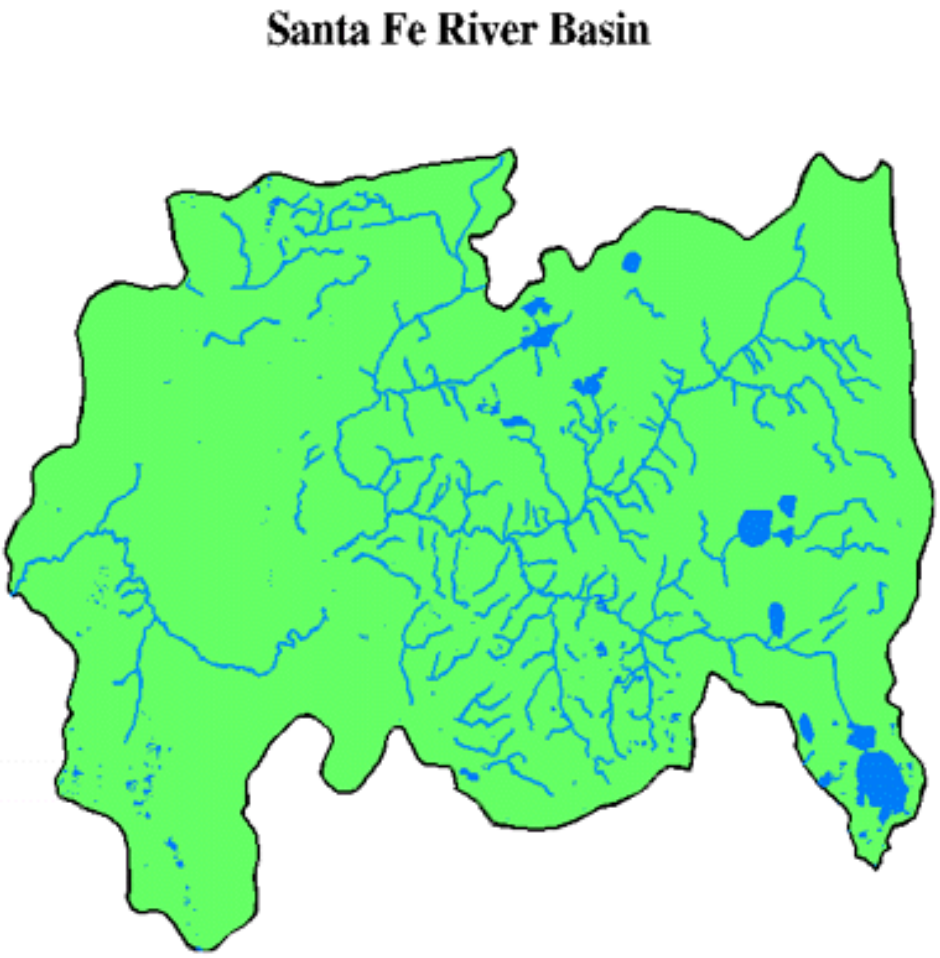
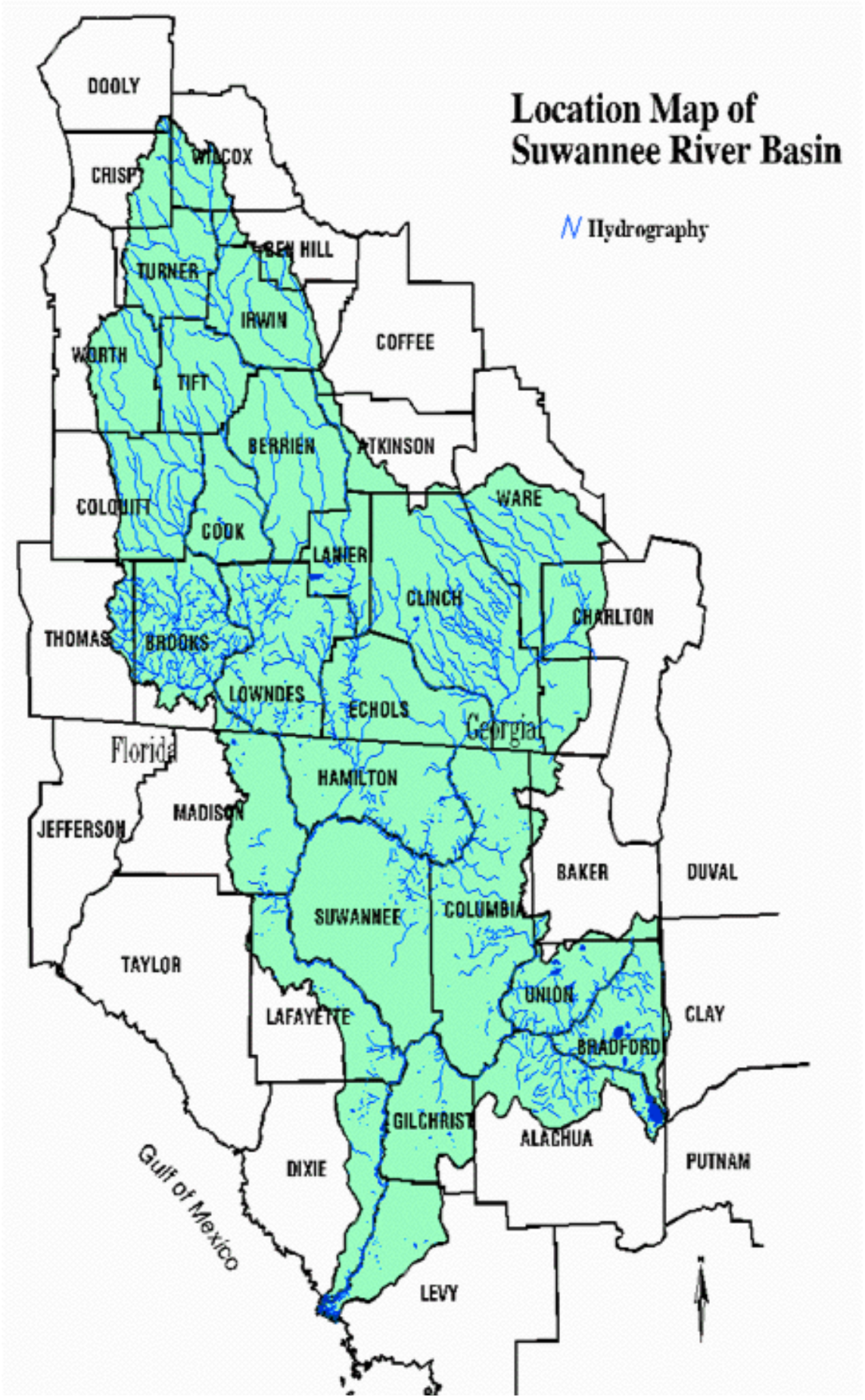


Figure 1 - Map of entire watershed
Suwannee River Watershed



National Showcase Watersheds

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Suwannee River Watershed

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TREE ROW
DIVERSION STRUCTURE
PROPOSED DECIDUOUS TREE
PROPOSED DECIDUOUS TREE
PROPOSED DECIDUOUS TREES
ACCESS ROAD
BOULDERS TYPICAL
PROPOSED WILLOW PLANTING
SAPLING TREES
FUTURE OBSERVATION DECK
ROCK LINING
SPILLWAY
ACCESS ROAD
BAR SCALE
50' 0 50' 100'
LEGEND
MICRO-TOPOGRAPHIC ZONES
ELEVATIONS ABOVE 372.0
AREA A = 2'-3'
AREA B = 0"-6"
ELEVATIONS BELOW 372.0
AREA A = 0"-3"
AREA B = 3"-6"
AREA C = 12"-18"
OPEN WATER AREA TO BE APPROXIMATELY 3' DEEP, OR 3' BELOW THE THE INVERT ELEVATION OF 372.0
EXISTING TREES
PROPOSED TREES
BOULDERS
PROPOSED WILLOW PLANTINGS
Landscape Planting Plan