



Ecostream Conference

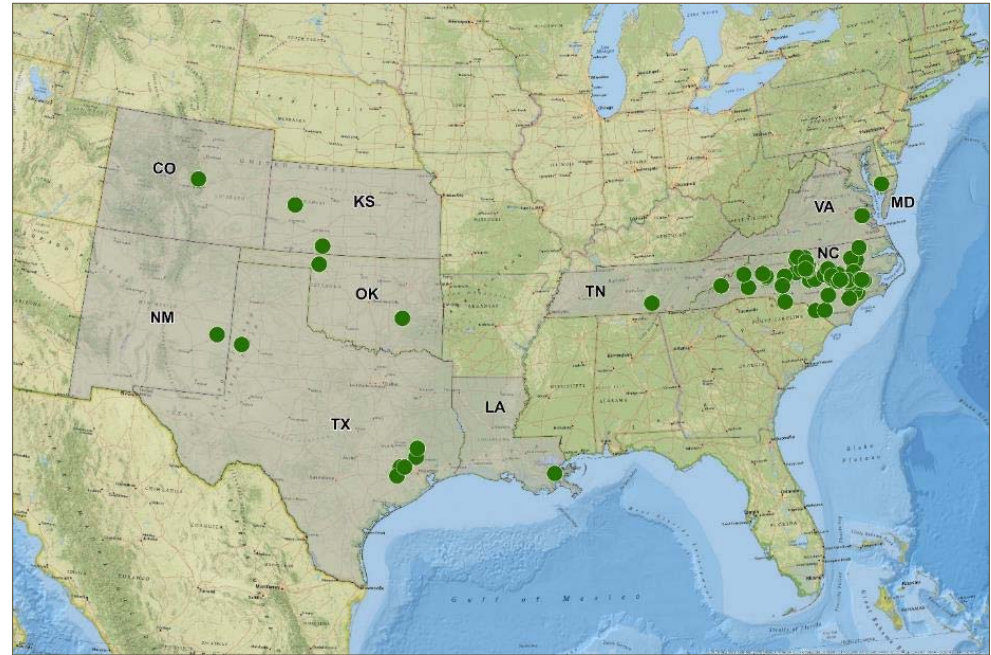
Milburnie Dam Removal

Asheville, NC
August 14, 2018



Restoration Systems

- North Carolina's first mitigation company
- 20th Anniversary, May 19
- Established 70+ mitigation sites
- 115,000+ acres of wetlands and prairies
- 75+ miles of creeks, streams, rivers and bayous.
- Planted more than 2,000,000 trees
- Three dam removals for mitigation

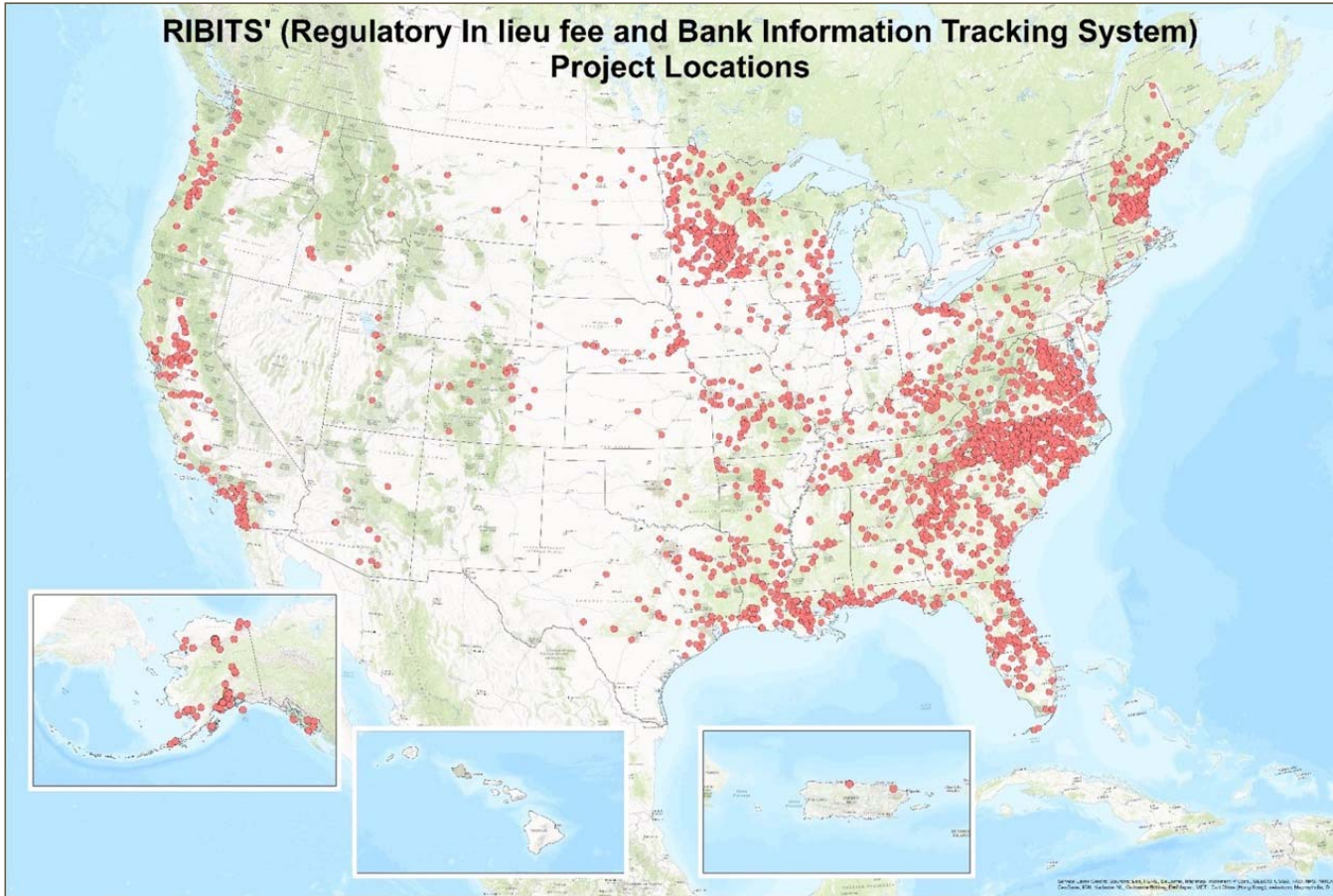


Wetland and Stream mitigation

- NC undisputed national leader in mitigating streams
- Wilmington District, agencies and good science led the way in early 90's
- 2008 Mitigation Rule required stream mitigation nationally
- Only mitigation method used today is “Natural Channel Design”

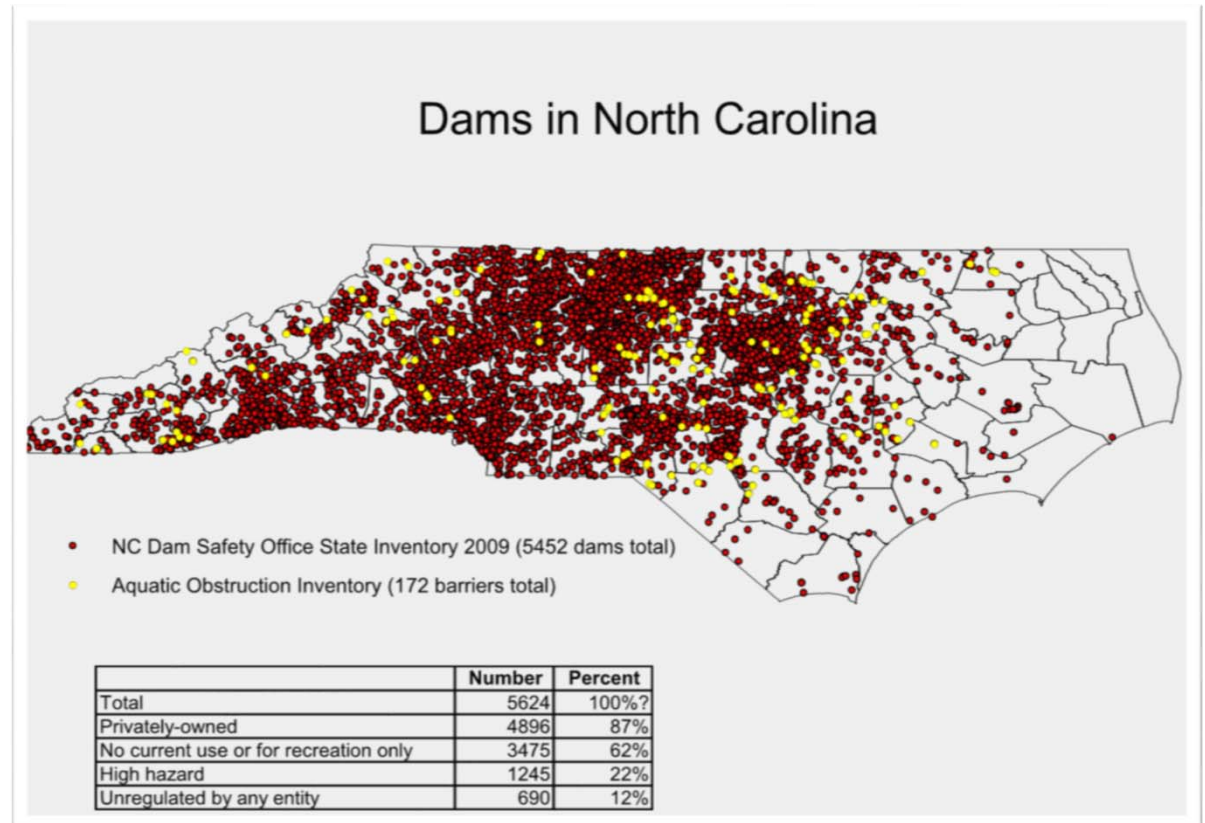


**RIBITS' (Regulatory In lieu fee and Bank Information Tracking System)
Project Locations**



State of Dams

- Officially, there are ~5,424 dams in NC (NC Dam Safety)
- 87% privately owned
- 62% have no current economic use
- High Hazard, 1,245 (22%)
- ~250 regulated dams per dam safety employee



02/05/02 TUE 17:10 FAX 1 919 856 4556
NCDOT/P&E BRANCH

USFWS-RALEIGH, NC

Fax: 919-733-9794

Feb 26 '02 12:14 P.02

0002

856-4556



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

February 25, 2002

Memo To: Dam Removal Task Force
From: Dave Schiller *DAS*
Subject: Minutes of Meeting

The Dam Removal Task Force met on February 21, 2002 in the Transportation Building in Raleigh. Those in attendance were: John Dorney, NCDWQ; Cathy Brittingham, NCDOT; Dave Tumpy, USACE; John Alderman, NCWRC; Mike Wicker, USFWS; David Cox, NCWRC; Mike Street, NCDOT; Ron Sechler, USNMFS; and Dave Schiller, NCDOT.



NC Dam Removal Task Force

Table 1. Preliminary Dam Prioritization through Rankings of Environmental Advantages of Dam Removal. These ratings have been performed by agency representatives involved in the Dam Removal Task Force of North Carolina.

| Dam | Threatened & Endangered Species Value | | | | Water Quality Value | | | | Anadromous Fish Value | | | | Mean of Means | |
|------------------------|---------------------------------------|-----|-------|------|---------------------|-------|-----|------|-----------------------|-------|------|-------|---------------|------|
| | NCWRC | NHP | USFWS | Mean | DWQ-Pen | DWQ-D | EPA | Mean | NCMFS | NCWRC | NMFS | USFWS | | Mean |
| Lowell | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 3.5 | 3.8 | 3.0 | 5.0 | 3.0 | 3.0 | 3.5 | 3.75 |
| Lock & Dam #2 | 3.0 | 3.0 | 4.0 | 3.3 | 1.0 | | 4.0 | 2.5 | 4.0 | 4.0 | 5.0 | 5.0 | 4.5 | 3.44 |
| Lock & Dam #3 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | | 4.0 | 2.5 | 4.0 | 3.0 | 5.0 | 5.0 | 4.3 | 3.25 |
| Carbonton Dam | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | | 4.0 | 4.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.5 | 3.17 |
| Atkinson's Millpond | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | | 4.0 | 3.5 | 2.0 | 4.0 | 1.0 | 1.0 | 2.0 | 3.17 |
| Fishing Creek Millpond | 4.0 | 4.0 | 5.0 | 4.3 | 3.0 | | 3.5 | 3.3 | 3.0 | 0.0 | 2.0 | 2.0 | 1.8 | 3.11 |
| Buckhorn | 3.0 | 3.0 | 4.0 | 3.3 | 2.0 | | 3.5 | 2.8 | 2.0 | 2.0 | 4.0 | 4.0 | 3.0 | 3.03 |
| Rocky Mount Millpond | 3.0 | 3.0 | 1.0 | 2.3 | 4.0 | | 4.5 | 4.3 | 2.0 | 1.0 | 2.0 | 2.0 | 1.8 | 2.78 |
| Milburnie | 1.0 | 1.0 | 2.0 | 1.3 | 0.0 | | 4.6 | 2.3 | 2.0 | 5.0 | 5.0 | 5.0 | 4.3 | 2.63 |
| Wiggins Millpond | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | | 4.5 | 3.8 | 2.0 | 3.0 | 2.0 | 2.0 | 2.3 | 2.33 |
| Hoggards Mill | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | | 3.5 | 3.3 | 4.0 | 5.0 | 2.0 | 2.0 | 3.3 | 2.17 |

DRTF agencies include U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (ACE), U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), N.C. Division of Water Quality (DWQ), N.C. Wildlife Resources Commission (WRC), N.C. Division of Marine Fisheries (DMF), N.C. Division of Coastal Management (DCM), and the N.C. Natural Heritage Program (NHP)

NC Dam Removal Task Force Dam Removal Priorities

Dam

~~Lowell~~

~~Lock & Dam #2~~

~~Lock & Dam #3~~

Carbonton Dam

~~Atkinson's Millpond~~

~~Fishing Creek Millpond~~

Buckhorn

Rocky Mount Millpond

Milburnie

Wiggins Millpond

Hoggards Mill

NC Dam Removal Task Force Dam Removal Priorities

Dam

~~Lowell~~

~~Lock & Dam #2~~

~~Lock & Dam #3~~

~~Carbonton Dam~~

~~Atkinson's Millpond~~

~~Fishing Creek Millpond~~

Buckhorn

Rocky Mount Millpond

Milburnie

Wiggins Millpond

Hoggards Mill

NC Dam Removal Task Force Dam Removal Priorities

Dam

~~Lowell~~

~~Lock & Dam #2~~

~~Lock & Dam #3~~

~~Carbonton Dam~~

~~Atkinson's Millpond~~

~~Fishing Creek Millpond~~

Buckhorn

Rocky Mount Millpond

~~Milburnie~~

Wiggins Millpond

Hoggards Mill



“Traditional” Stream Mitigation by Natural Channel Design

USACE SOP

Mitigation credit awarded based on monitoring over seven years of *subjective and inferred* functional improvements to chemical, physical and biological:

Geophysical stability

Vegetation survival



Dam Removal Mitigation using the NC Guidelines

Issued in two brief windows

2004 – 2005

2008 – 2010

Mitigation Credit awarded based on monitoring over seven years of *objective and measured functional improvement* in four categories:

Water Quality

Appropriate Aquatic Community (Insect, Fish, Mussels)

Rare, Endangered And Threatened Aquatic Species

Anadromous Fish

AFTER MILBURNIE DAM REMOVAL

As a Mitigation Bank, the project will receive close attention and extensive monitoring for years to come. "Credits" are only released upon successful monitoring of the improved ecology of the project area behind the dam.

FOR THE NEXT SEVEN YEARS MONITORING WILL BE CONDUCTED AS FOLLOWS:

MONITORING SCHEDULE FOR MILBURNIE DAM MITIGATION BANK

| Monitoring Category | Monitoring Years | | | | | | |
|---------------------|------------------|-----|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Mussels | - | - | - | + | - | + | +/- |
| Fishes | + | + | +/- | +/- | +/- | +/- | +/- |
| Aquatic Insects | - | + | - | +/- | - | +/- | +/- |
| Anadromous Fish | + | +/- | +/- | +/- | +/- | +/- | +/- |
| Scientific Research | + | + | + | + | + | + | + |
| Wetland Hydrology | + | + | + | + | - | - | - |
| Channel Geometry | + | + | + | + | + | + | + |
| Vegetation | + | + | + | - | + | - | + |

+ = Monitoring planned; - = Monitoring not planned;

+/- = Monitoring may proceed if performance standards are not met



During this period and into perpetuity the site will be permanently protected by conservation easement to be held by Sound Rivers, a Neuse River non-profit advocacy and protection organization.



Dam Removal vs. Natural Channel Design

- Direct ecological measurements \ Indirect proxies
- Discreet opportunities \ Unlimited locations
- Strategic \ Random
- Universally praised \ Somewhat controversial
- Permanent \ Questionable time frame
- Far reaching benefits \ localized benefits
- Enormous recreation \ Very little
- Public Safety benefits \ None

Reasons for 2005 & 2010 guideline retractions?

Hearsay Warning! Nothing in writing from USACE

No “buffers” protected

Dam removals would displace Natural Channel Design

Improvements too large > 30k linear feet

Too many credits

Drains incidental wetlands

Too much \$\$\$ could be made

Permanently Protected Buffers?

Appropriate for NCD

- Small scale channels
- Project features vulnerable to crossing and culverts
- Vegetation vulnerable
- Need protection from farming
- Buffers assumed to provide WQ benefits
- Feasible since few landowners

Inappropriate for dam removals

- Large scale channels (4th or 5th order river)
- Large rivers never culverted and rarely newly bridged
- New buffer created by lowered river levels
- Infeasible since landowners in the hundreds (240 at Carbonton and 170 at Milburnie)

Too many credits?

- Should be celebrated!
- These are better credits rivers – not creeks – restored
- Least expensive credits ever sold
- Carbonton and Milburnie exceptional (96,000 and 39,000 credits)
- No other dams known to be on this scale

Wetlands?

Milburnie and the White House CEQ

- Associated wetlands are impounded by dam
- Endless delay and angst over their fate
- Obama White House CEQ intervened
- Created new Nationwide Permit #53 to address
- Corps issued #53 but denied mitigation waiver
- RS responsible to potentially mitigate 15.5 acres
- Maintain \$1.2 million surety bond for five years

Pending National Dam Removal RGL

- Announced at the Mitigation Banking Conference in May
- One of two pending National Regulatory Guidance Letters
- Somehow came out of a cabinet meeting
- White House OMB call last Wednesday
- Content unclear but strongly supportive

NC potential national leader in dam removal for mitigation



GREENWIRE THE LEADER IN ENERGY AND ENVIRONMENT NEWS

SEARCH: enter keyword

<< Back to Greenwire index page.

INFRASTRUCTURE
Clean Water Act may offer 'magic key' for dam removal
Jeremy P. Jacobs, E&E News reporter • Published: Monday, December 11, 2017

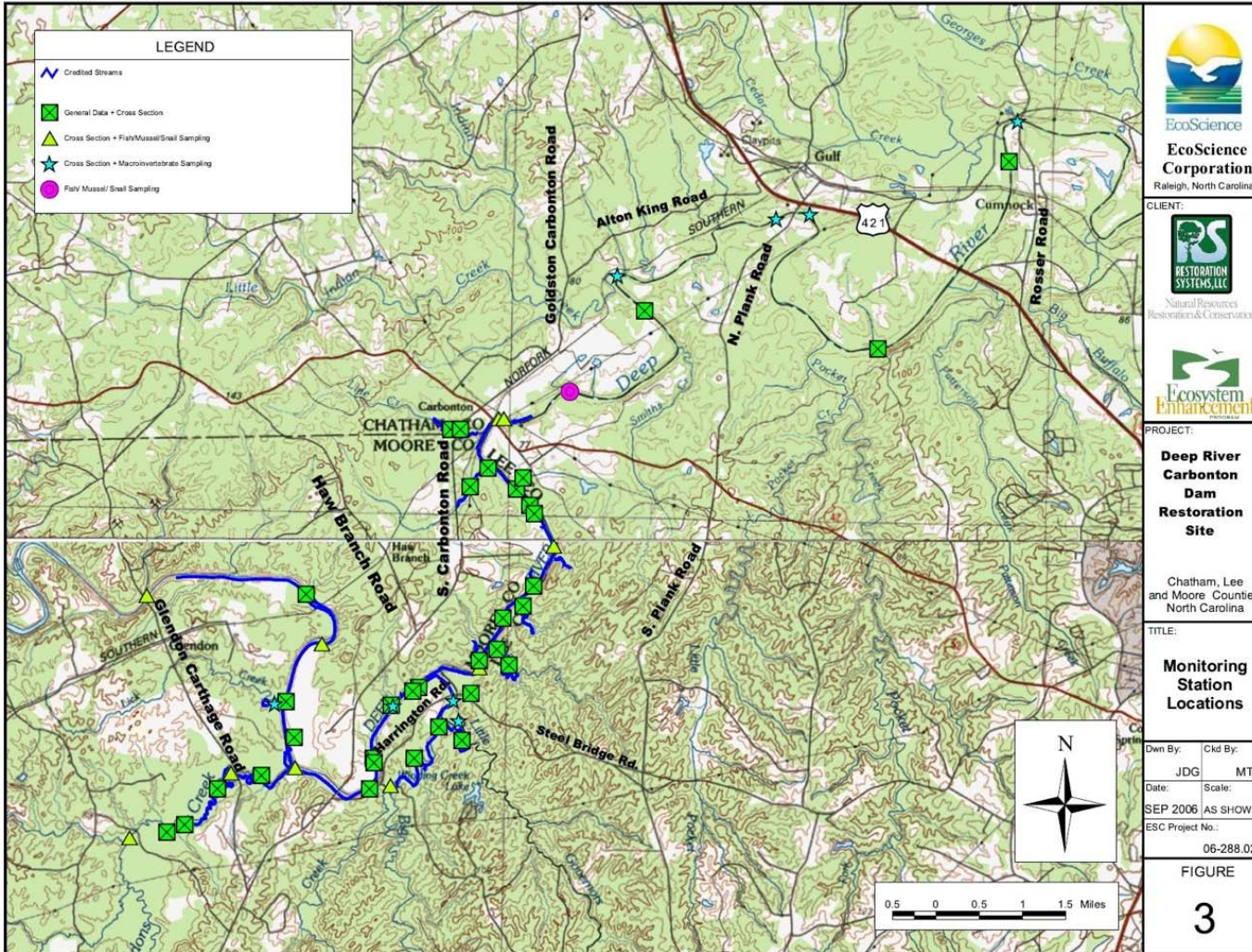
An aerial photograph showing the demolition of the Milburnie Dam on the Neuse River. Heavy machinery, including excavators and a truck, is visible on the debris field. The river flows through the site, and the surrounding area is wooded with some autumn-colored trees.

An environmental mitigation firm, Restoration Systems, is tearing down the Milburnie Dam on the Neuse River outside Raleigh, N.C. The company will turn a profit on the credits it sells from the removal, and advocates say their model could fund dam removals across the country. Restoration Systems

The logo for Restoration Systems LLC features the letters 'RS' in a stylized font inside a green square, with the text 'RESTORATION SYSTEMS LLC' below it.

Carbonton Dam, Deep River





LEGEND

- Credited Streams
- General Data + Cross Section
- Cross Section + Fish/Mussel/Snail Sampling
- Cross Section + Macroinvertebrate Sampling
- Fish/Mussel/Snail Sampling



EcoScience Corporation
Raleigh, North Carolina

CLIENT:



RESTORATION SYSTEMS, LLC
Natural Resources
Restoration & Conservation

PROJECT:



Ecosystem Enhancement

**Deep River
Caribontion
Dam
Restoration
Site**

Chatham, Lee
and Moore Counties,
North Carolina

TITLE:
**Monitoring
Station
Locations**

| | |
|------------------|----------|
| Drawn By: | Clk By: |
| JDG | MTC |
| Date: | Scale: |
| SEP 2006 | AS SHOWN |
| ESC Project No.: | |
| 06-288.02 | |

FIGURE
3



Cape Fear Shiner success story on Deep Could be significant part of delisting!

Dam removal good news for endangered fish

September 10, 2007 / in Press (RS in the News) / by RS

Dam removal good news for endangered fish

■ The Cape Fear Shiner is re-emerging less than two years after an old dam near Carbonton came tumbling down.

By TARY WIREBACK
Staff Writer

CARBONTON — The Cape Fear Shiner is a yellowish minnow with black stripes, pointed fins and a hard-luck past.

But with the help of an environmental firm that has offices in Greensboro, the fish that seldom exceeds two inches in length is becoming one of North Carolina's biggest ecological success stories.

Biologists working for Restoration Systems have found the endangered species in a 10-mile stretch of the Deep River it hadn't inhabited in 85 years or perhaps even longer, thanks to the removal of an old dam near Carbonton in southern Chatham County.

"The speed at which this recovery has taken place is what stands out," said Adam Riggsbee, an environmental scientist



Courtesy of Restoration Systems
The Cape Fear Shiner is a tiny, yellow and black minnow that was unknown until 1971.

with the company, which has headquarters in Raleigh and a branch in Greensboro.

Restoration Systems coordinated demolition of the dam through early 2006 in partnership with the N.C. Ecosystem Enhancement Program. It continues to monitor 58 sites along the Deep River as part of the

See Fish, Page A5

Fish

Continued from Page A1

project, keeping track of what happens to a once-impounded river when returned to its free-flowing state.

"The project has brought life into what had been a desolate, lifeless stretch of river," said company co-owner George Howard.

"Unfortunately, it's such a lonely part of the world, not many people get to see it," said Howard, a Greensboro native. "That is truly a wonderful thing to see."

You can think of the tiny yellow and black minnow as a sort of river's canary that chirps, a harbinger for the health and restored state of the river that surrounds it.

The tiny minnow was unknown to science until 1971, when it was identified in a very limited range that included small reaches of the river and Deep River to just five counties — Randolph, Chatham, Lee, Moore and Blount.

By September 1997, it already had been placed on the



The old dam near Carbonton in Chatham County was removed in early 2006. The site had hosted several dams throughout the 19th century.

federal Endangered Species List because of its dwindling habitat.

The minnow used water of decent quality flowing in shallow depths over gravel, stone and boulder bottoms.

The dam that was demolished was a small, hydroelectric operation built in 1921 and shut down in June 2004. But the site, near the line between Chatham and Lee counties,

had hosted a series of dams stretching back into the 19th century.

So biologists couldn't be sure how long free-flowing waters of Cape Fear Shiner had been supported by one dam or another and the 10-mile stretch of hatched up water, too deep and slow for the minnow's liking.

Meanwhile, on either side of the dam, the isolated populations of Cape Fear Shiner were

dividing. Restoring the stream produced results several as they had previous better than anyone had been willing to hope, Rippsbee said.

"If you growth the habitat, the theory is that you should get the species back to place," he said. "That's exactly what has happened here in less than two years. The river responded very quickly and an old fish key species."

Last year when Rippsbee brought the minnow to the site along the newly reconstructed stretch of Deep River above the former dam, he found no Cape Fear Shiner.

But he did not see a lot of the riffled habitat starting to form, the faster and shallower water over a rocky bottom that is home to the little minnow.

"This year, we picked up numerous Cape Fear Shiner at multiple sites throughout that 10-mile section," said Rippsbee of the Lenoir County, an environmental consulting firm that is helping Restoration Systems with its follow-up duties.

Meanwhile, on either side of the dam, the isolated populations of Cape Fear Shiner were

report, documenting the abandoned shiner's return. But as a sign of improving water quality and habitat restored, it is welcome news, said Tad Dege of the state's ecosystem enhancement program.

"Assessing it's scientific, it represents a win-win situation for what our program is designed to do," said Dege, whose agency has supervised about 700 such projects statewide since its creation four years ago.

Restoration Systems works on such projects on the dam with state and federal officials to provide "mitigation credits."

The credits are bought by public and private agencies to offset environmental damage done by such developments as new dams, roads or neighborhoods in the same region.

Among other things, credits from restoring the dam at Carbonton allowed the state Department of Transportation to build or expand a number of roads in this part of the state.

Contact Tary Wireback at 252-738-4646 or twireback@news-record.com

NEWS & RECORD, Monday, September 10, 2007 A5

CARBONTON — The Cape Fear Shiner

is a yellowish minnow with black stripes, pointed fins and a hard-luck past.



Lowell Mill Dam, Little River



Milburnie, Neuse River







Neuse River Dam Removal Chronology



Milburnie Removal Timelapse



















2018 Milburnie Dam Removal Anadromous Fish Monitoring
April 25 – May 1, 2018

American Shad (*Alosa sp.*) caught on the Neuse River at the tail race of the Falls Lake Dam



EJ Stern GoPro Video



Kevin Thomas



Mike Goddard



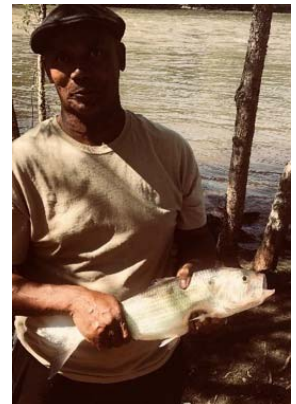
Chris Gardner



Kevin Thomas

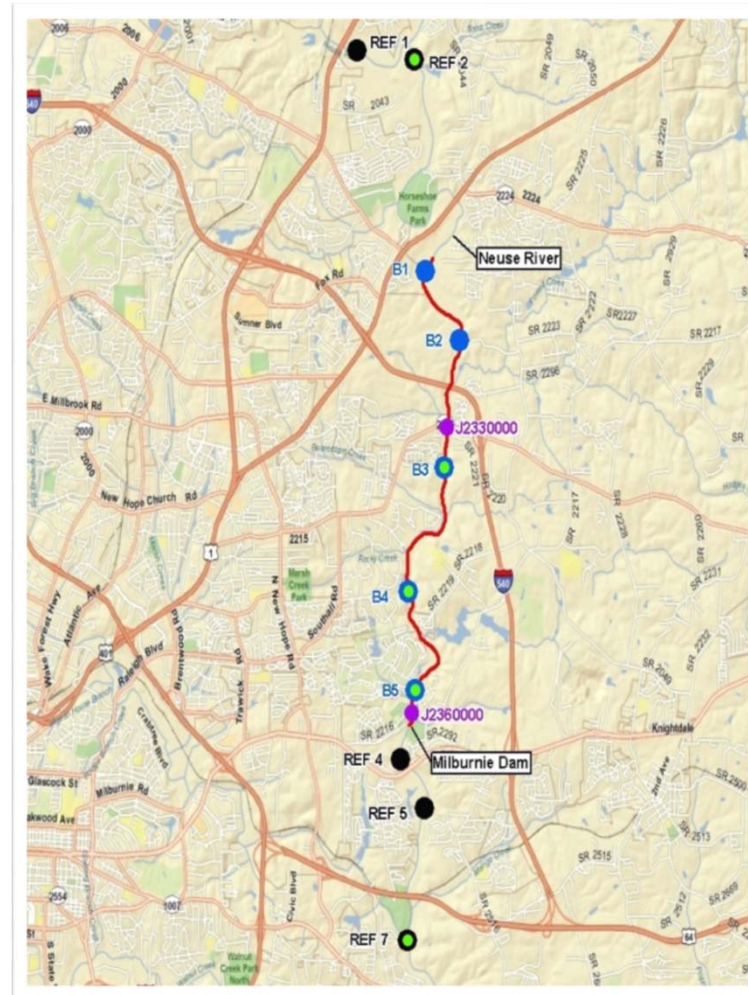


Tyler Tschopp

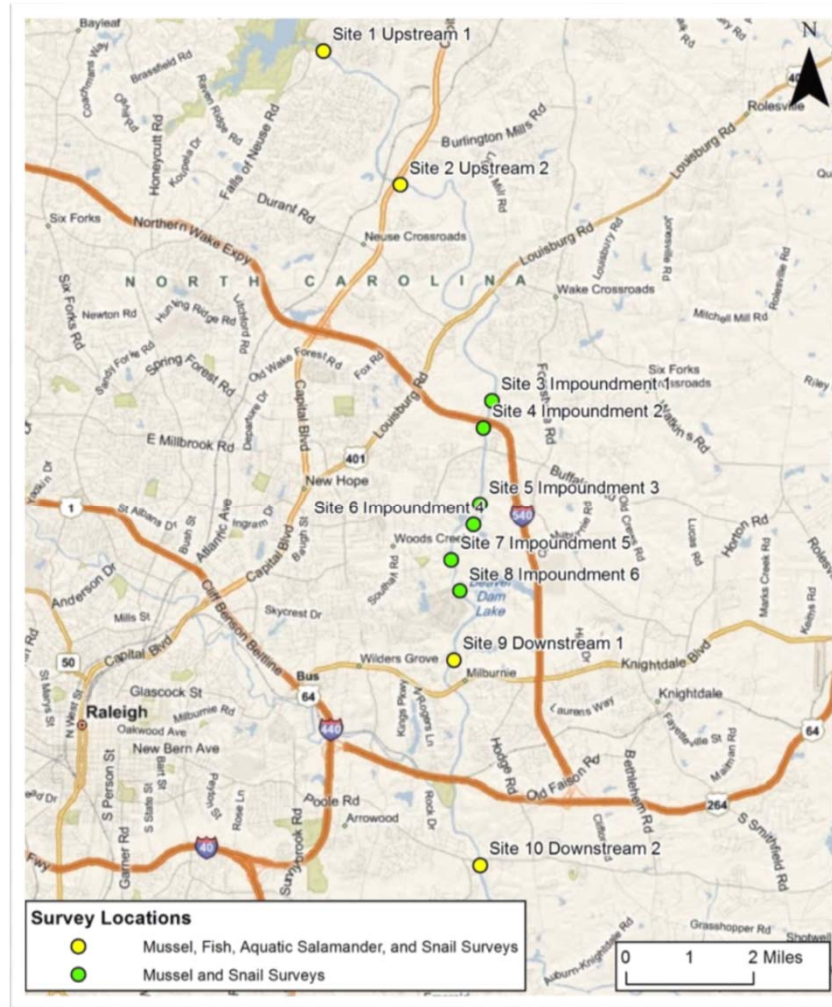


Stacy Gilmore

Water Quality and Benthic Surveys

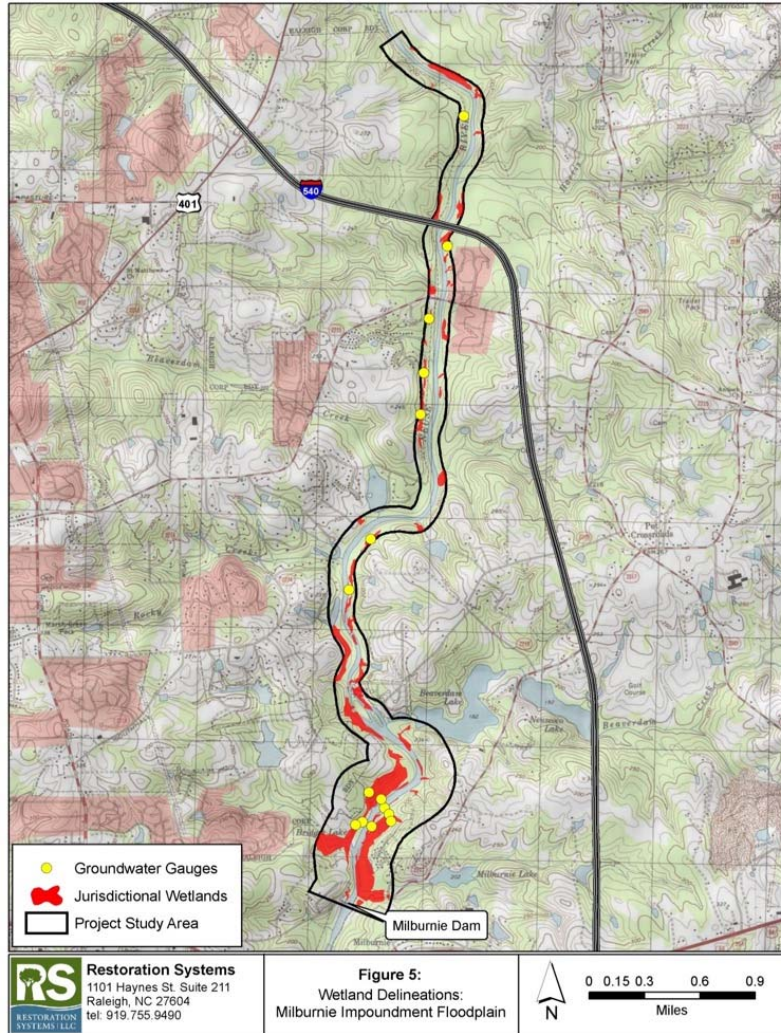


Biological Survey Locations





The
Catena
Group



RS Restoration Systems
1101 Haynes St. Suite 211
Raleigh, NC 27604
tel. 919.755.9490

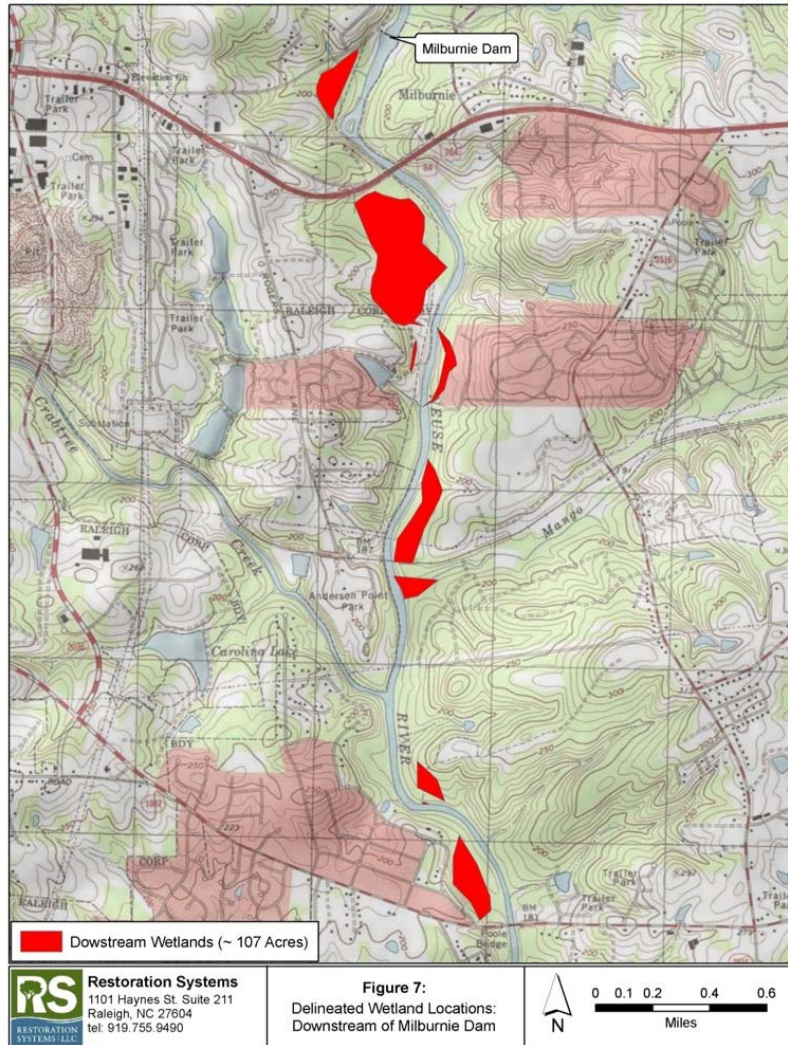
Figure 5:
Wetland Delineations:
Milburnie Impoundment Floodplain





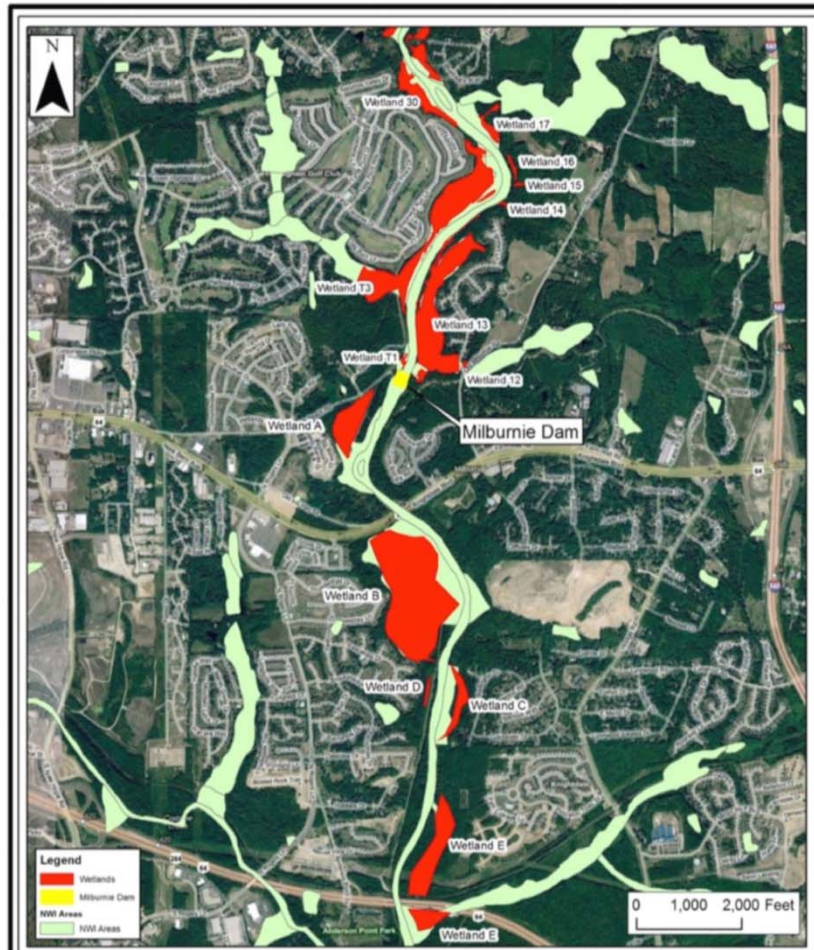
RS Restoration Systems
 1101 Haynes St. Suite 211
 Raleigh, NC 27604
 tel: 919.755.9490





RS Restoration Systems
 1101 Haynes St. Suite 211
 Raleigh, NC 27604
 tel. 919.755.9490





The
Catena
Group

Milburnie Wetlands
Downstream Wetland Investigations
 Aerial Orthophotography
 Source: Bing Maps
 Wake County, North Carolina

Date: February 2011
 Scale: As Shown
 Job No.: 2146

Figure
2



The Lowell Dam Wetlands >200 acres



Removed 2005 no mitigation required



February 28, 2005

Intermittent Open Water Wetland



April 28, 2005





July 13, 2005 Natural Vegetated Wetland

Discussion & Questions

Thank you &
invitation



Join Restoration Systems, Sound Rivers & American Rivers
for the 1st Annual Raleigh River Fest
Saturday May 19th from 12pm -3pm
at the new Milburnie Falls
20 Raleigh Beach Road



Parking Locations: Milburnie Park at 5407 Allen Drive, along Raleigh Beach Road
and parking area off Lock Raven Parkway

\$5 per person

****All proceeds donated to Sound Rivers****

For more info please visit:
www.milburniedam.com
facebook.com/RestorationSystems.com
or call Tiffani at 919.334.9123



USGS 8-DIGIT CATALOGING UNITS- NORTH CAROLINA

