Restoring Hunnicutt Creek

Perspectives and Longitudinal Results from a Campus Project

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CLEMSON
College of AGRICULTURE, FORESTRY AND LIFE SCIENCES

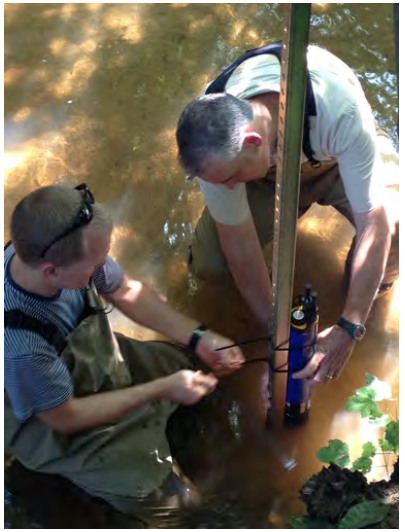
CLEMSON
COOPERATIVE EXTENSION

Project Area

- Hunnicutt Creek Watershed
  - 940 acres
  - Clemson University campus
  - Unique hydrology

Background

- Legacy of opportunistic faculty involvement with Hunnicutt Creek
- Compensatory mitigation opportunity
  - Jan 2012
- Clemson Experiment Station grant
  - $156,000



Hunnicutt Creek Restoration
in progress

Maintaining the natural quality of Clemson University and its riparian corridors by restoring, preserving and protecting its natural systems.

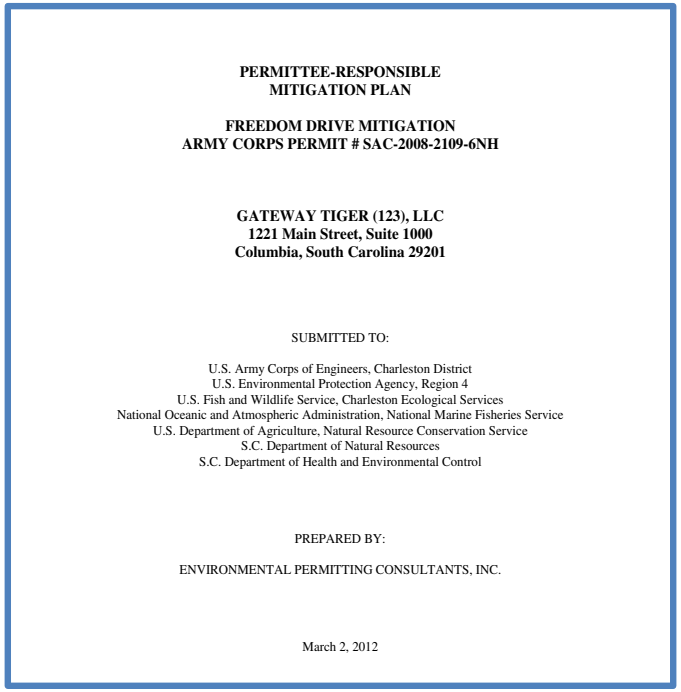
For additional information please visit:
www.clemson.edu/hunnicutt

CLEMSON EXPERIMENT STATION

RIVER WORKS

Mitigation Plan

- Completed by EPC, Inc.
  - Input from CU faculty and staff
- Approved by USACE
  - Jun 2012
- Two phased plan
  - Stream Restoration
  - Wetland Enhancement



PERMITTEE-RESPONSIBLE
MITIGATION PLAN

FREEDOM DRIVE MITIGATION
ARMY CORPS PERMIT # SAC-2008-2109-6NH

GATEWAY TIGER (123), LLC
1221 Main Street, Suite 1000
Columbia, South Carolina 29201

SUBMITTED TO:

U.S. Army Corps of Engineers, Charleston District
U.S. Environmental Protection Agency, Region 4
U.S. Fish and Wildlife Service, Charleston Ecological Services
National Oceanic and Atmospheric Administration, National Marine Fisheries Service
U.S. Department of Agriculture, Natural Resource Conservation Service
S.C. Department of Natural Resources
S.C. Department of Health and Environmental Control

PREPARED BY:

ENVIRONMENTAL PERMITTING CONSULTANTS, INC.

March 2, 2012

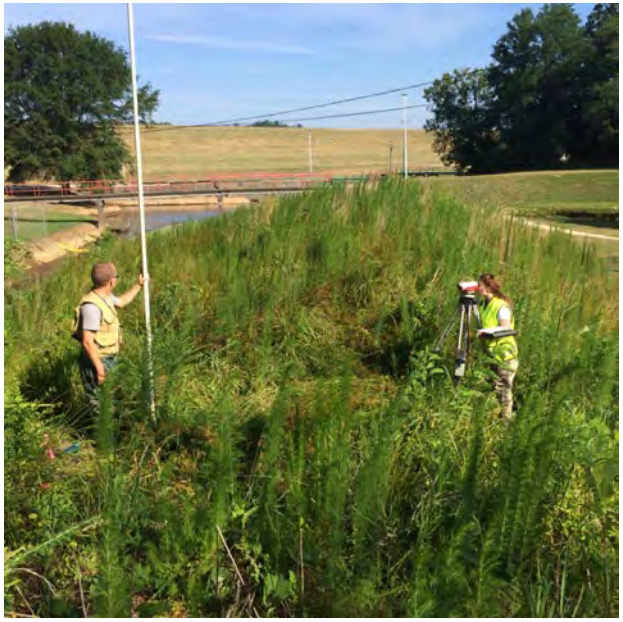
Stream Restoration

- 300 lf of lower Hunnicutt Creek
  - CU Experiment Station Calhoun Field Lab
- Priority 2 Restoration
- Re-establish riparian buffer
  - 75-ft of native vegetation

Success Criteria

- Establish a stable C4 – C5 stream with:
  - Entrenchment ratio greater than 2
  - Width to depth ratio between 11 to 17
  - Sinuosity greater than 1.15
- Cross-section dimensions with less than 15% variation from the as-built conditions
- Bank erosion hazard index (BEHI) overall score below 25

Permittee-Responsible Mitigation Plan - Freedom Drive Mitigation Army Corps Permit #SAC-2008-2109-6NH, 2012.



Stream Channel - Before


KOMATSU


KOMATSU


Rock J-Hook Vanes


ROTO-ROOTER
CAUTION


Before


2014

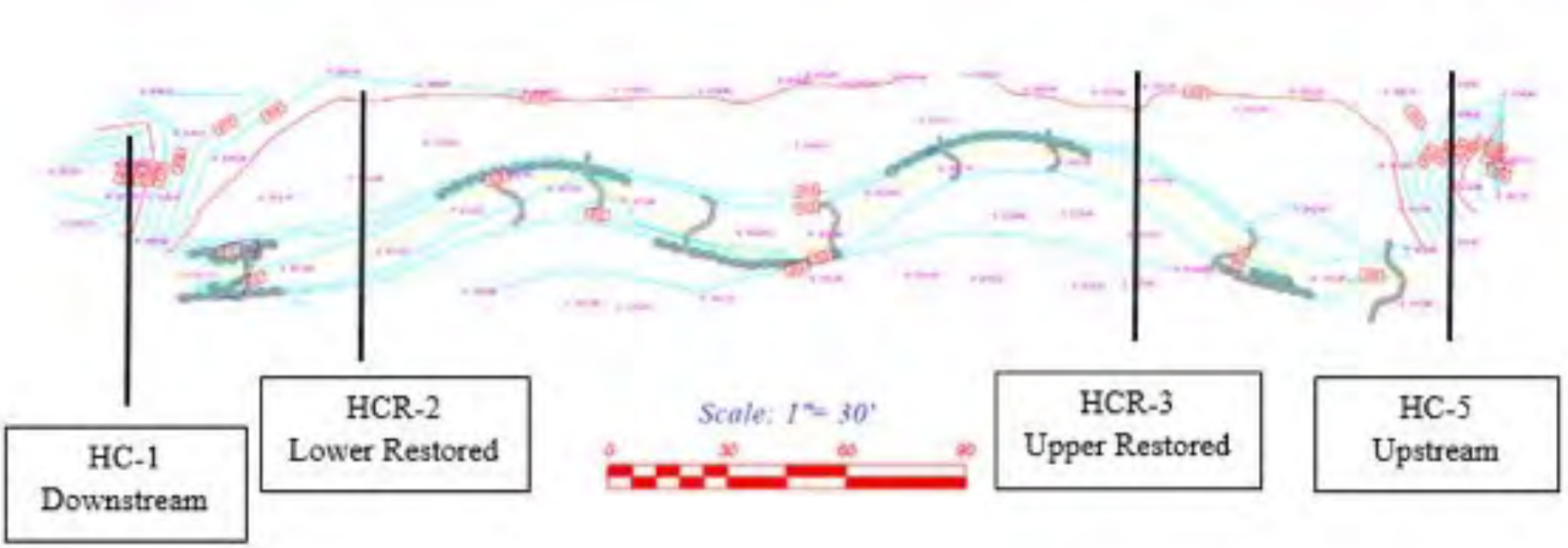

2016

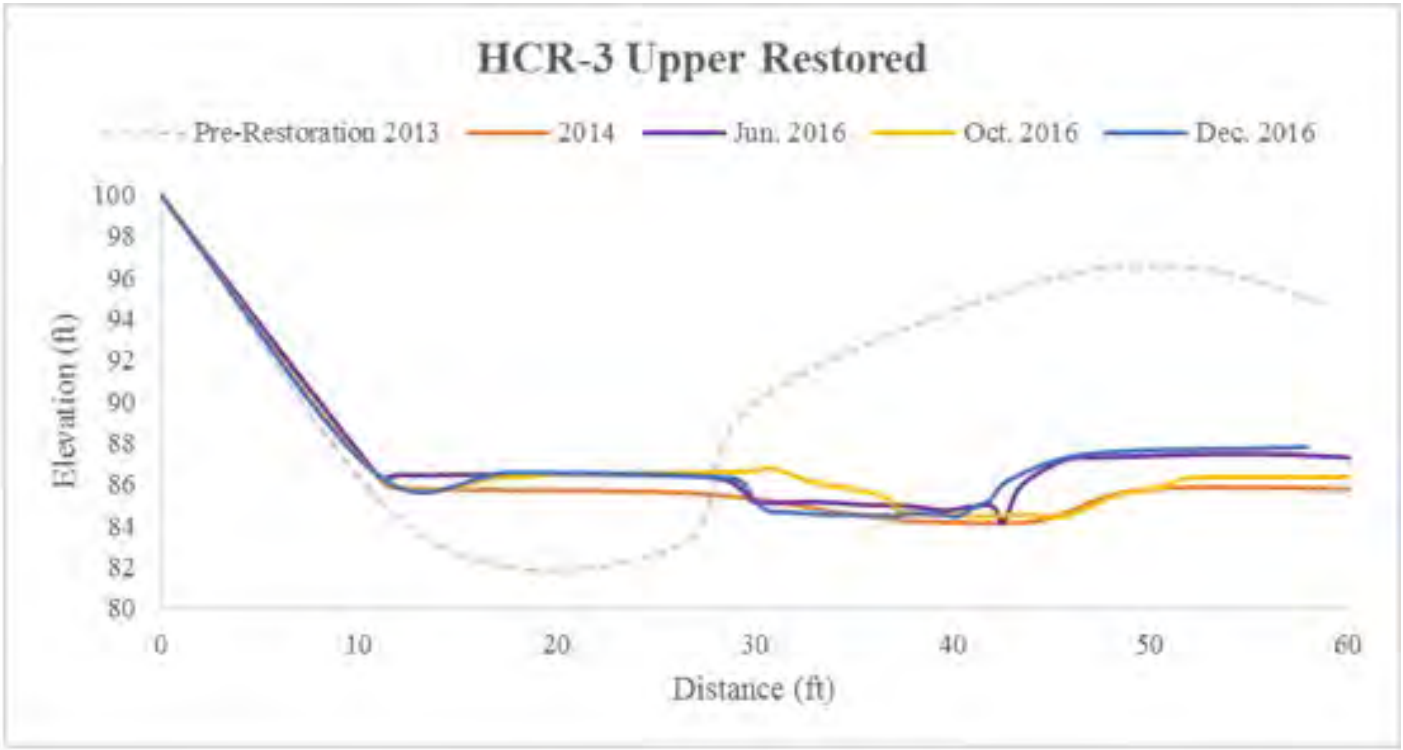

As-Built

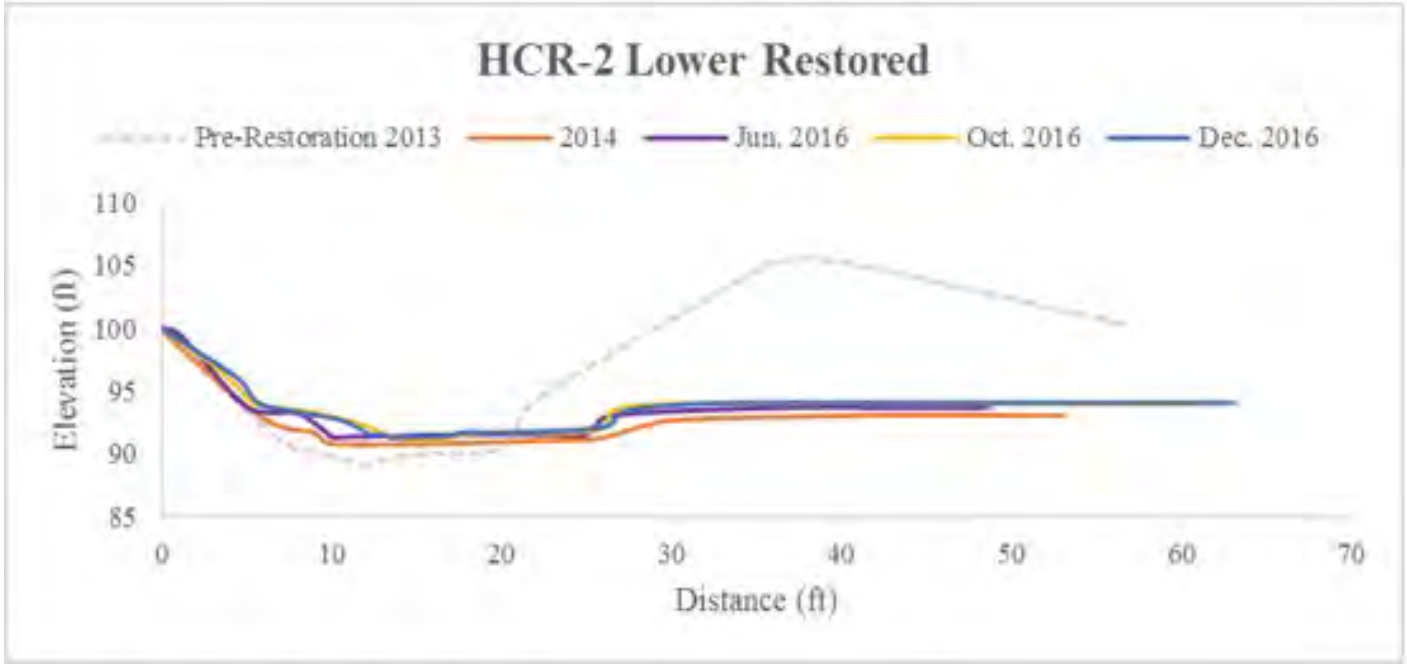

2015


2016

Survey X-Sections




HCR-3 Upper Restored
Pre-Restoration 2013
2014
Jun. 2016
Oct. 2016
Dec. 2016
Elevation (ft)
100
98
96
94
92
90
88
86
84
82
80
0
10
20
30
40
50
60
Distance (ft)

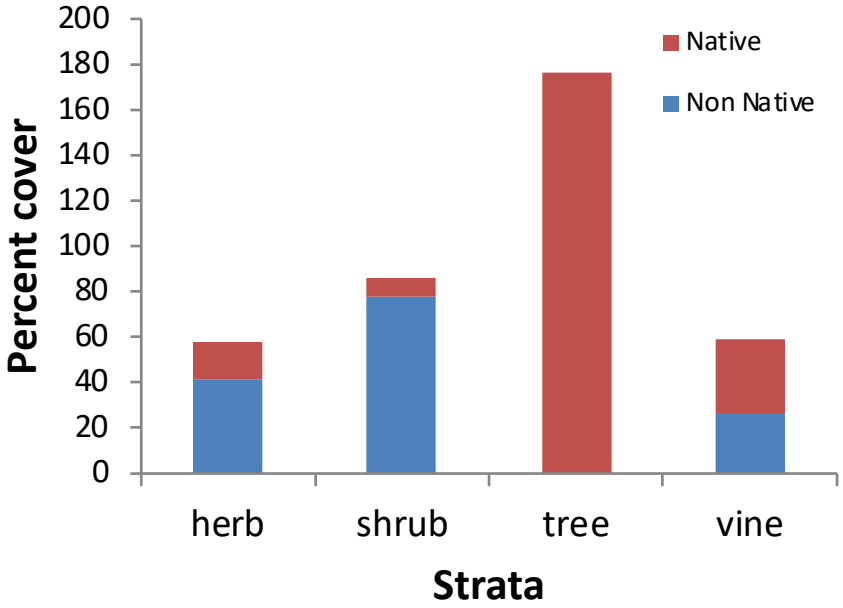

HCR-2 Lower Restored
Pre-Restoration 2013
2014
Jun. 2016
Oct. 2016
Dec. 2016
Elevation (ft)
110
105
100
95
90
85
0
10
20
30
40
50
60
70
Distance (ft)

Classification

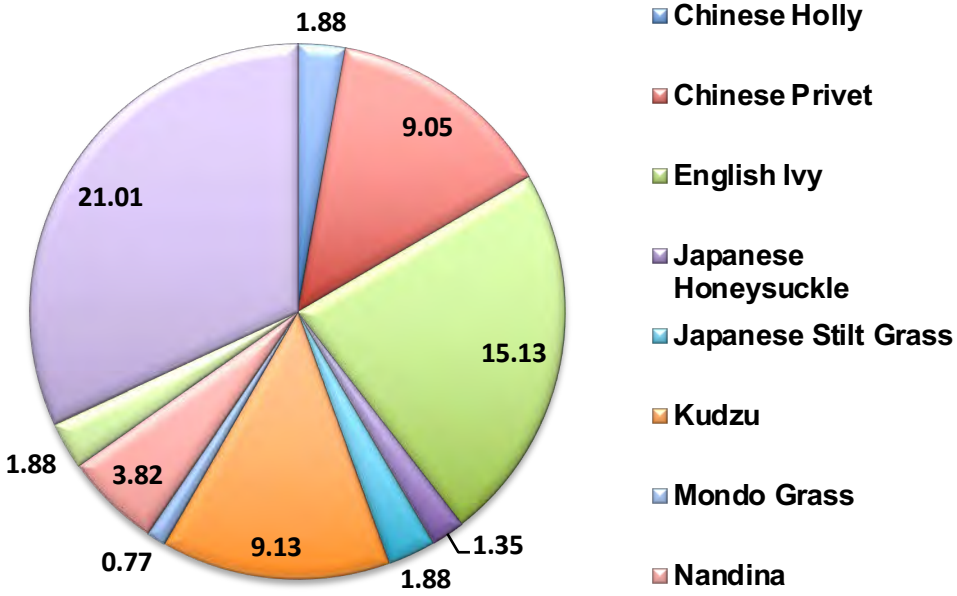
Cross-Section		HCR-3 Upper Restored	HCR-2 Lower Restored
		Rosgen Stream Type	
Date	Pre-Restoration	F5	F5
	Designed	C4 or C5	C4 or C5
	Post-Restoration 2014	C5	C5
	Jun. 2016	C5 or E5	C5 or E5
	Oct. 2016	C5 or E5	C5 or E5
	Dec. 2016	C5	C5 or E5

Vegetation and Control

Reference Site Data



Total Cover of Non-Native Species (%)



Invasive Control

- Obvious need
- “Daylighting” Hunnicutt Creek
- Assess and compare differing invasive management strategies

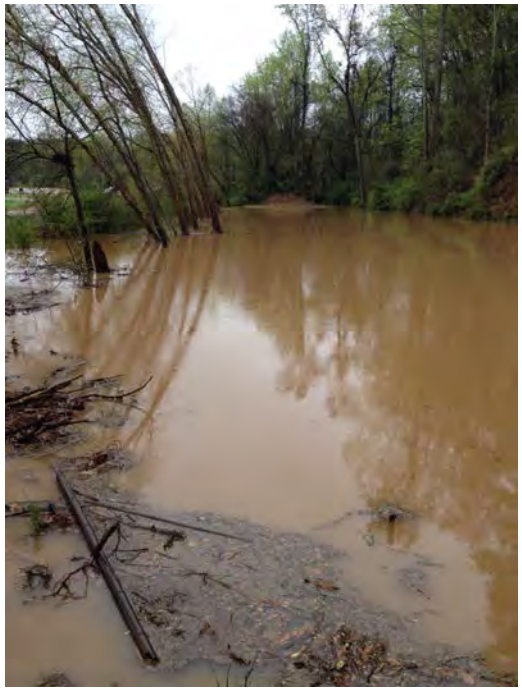
Invasive Control

- Goats = public awareness
- Goats = lots of work & poop
- Best removal technique

  Goats + mechanical + herbicide
- 300+ hours volunteer hours
  - Student groups
  - Boy Scouts

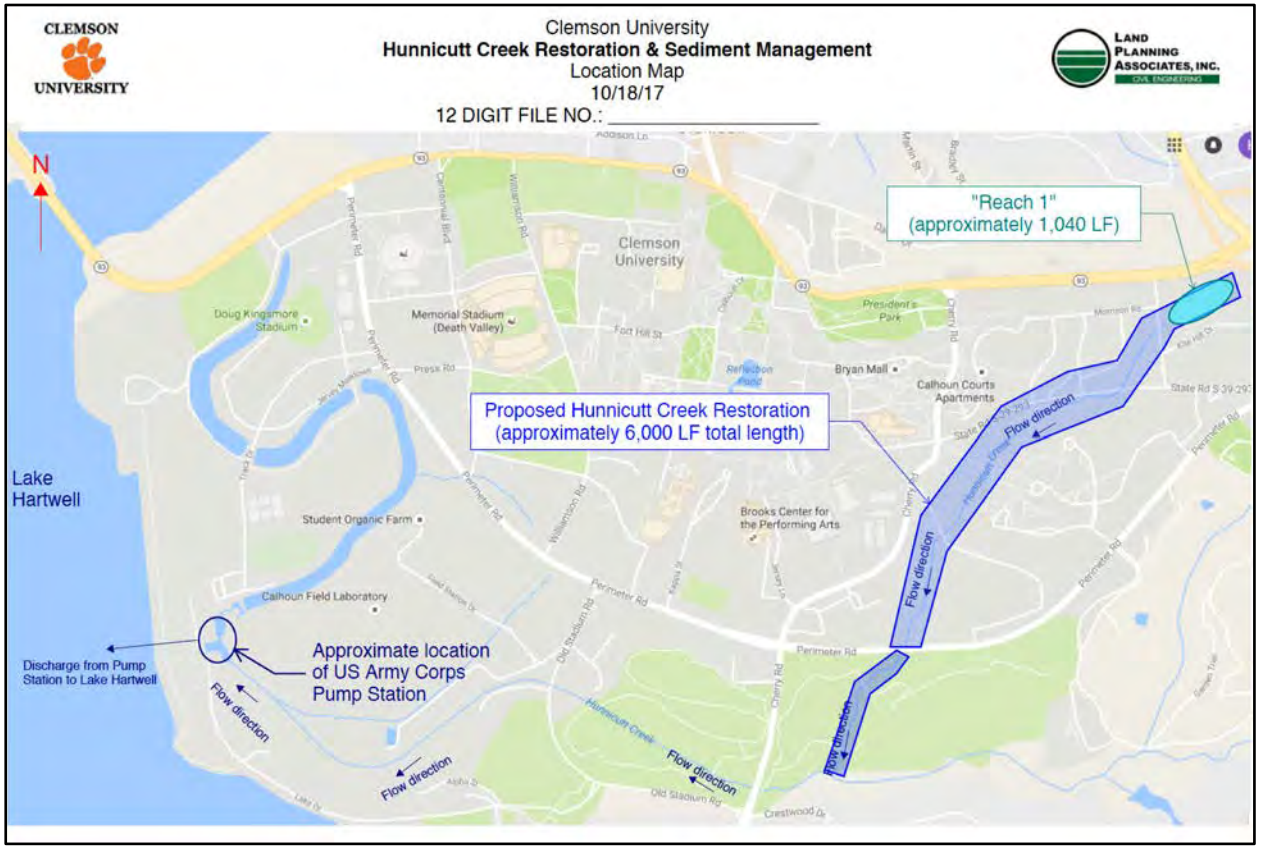
Lessons Learned

- Expect the best; plan for the worst
- Sometimes it's OK to put your foot down!
- Terrific vehicle for education: students, visitors, general public
- Stability in sandy substrate systems can be difficult
- Relax; it's not space exploration!



What's Next?

- Plans for future stream restoration/stabilization on campus
  - 8 separate phases
  - Total of 6,000 LF



What's Next?

- Continue to monitor (lower) restored stream reach
- Invasive species control (vegetative)
- Baseline and continuous monitoring (upper) for proposed restoration activities
  - Physical and biological
  - Instrumentation
- Organize Hunnicutt Creek symposium to provide opportunity for unified collaboration and increased engagement
- Craft approved Watershed Management Plan for HC

Collaborators

Clemson Faculty, Staff, Graduate and Undergraduate Students

- Agricultural Sciences
- Forest and Environmental Sciences
- Environmental Engineering and Earth Science
- Biological Sciences
- Landscape Architecture
- Hunnicutt Research Team
- Creative Inquiry classes
  - Riparian Vegetative Succession
  - Soil and Water Restoration

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