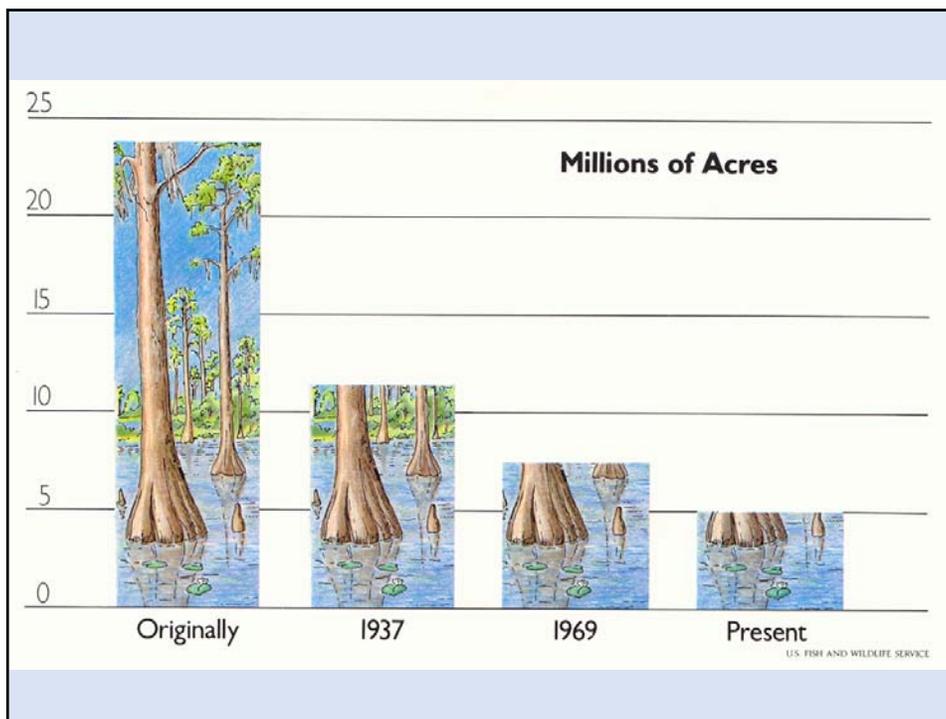


# Bottomland/Swamp Forest Restoration and Artificial Regeneration



**William H. Conner**  
Baruch Institute of Coastal Ecology and Forest Science,  
Clemson University, Georgetown, SC





## What Is Wetland Restoration?

- The National Research Council defines restoration as the "return of an ecosystem to a close approximation of its condition prior to disturbance." Often, restoration requires one or more of the following processes: reconstruction of antecedent physical conditions; chemical adjustment of the soil and water; and biological manipulation, including the reintroduction of absent native flora and fauna.



- The Society for Ecological Restoration defines ecological restoration as "the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices."

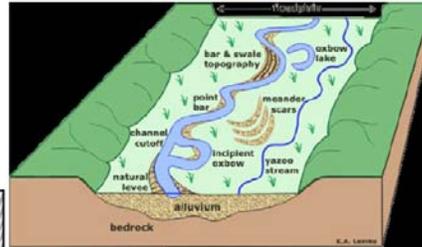
## Bottomland Hardwood Restoration

Where are BLH?



Floodplains of major and minor rivers

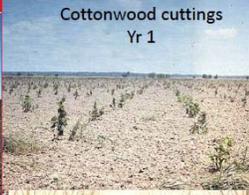
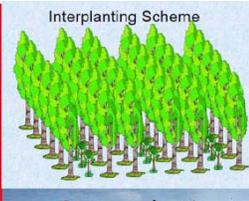
- Rivers in the coastal plain
- Major and Minor bottoms
- Red river bottom—origin in the Mountains or Piedmont
- Black river bottom—origin in the Coastal Plain



## Bottomland Hardwood Restoration

### Strategies

- Passive
- Extensive
- Intensive



## Bottomland Hardwood Restoration

**Seed**

**Cuttings**

**Rooted cuttings**

**Bareroot seedlings**

**Container seedlings**

**RPM oak seedlings**

**Tissue cultured seedlings**

**Target Plant Concept: Planting stock quality is Based on field performance and driven by:**

- Morphology
- Physiology
- Genetics

## AMERICAN RELEAF

Planted more than 40 million trees in all 50 states through more than 800 different projects.

<http://www.americanforests.org/discover-american-forests/our-work/american-releaf/>

- More than half of U.S. drinking water originates in forests.
- More than 5 million terrestrial species depend on forests for their survival.
- Rivers and watersheds in our national forests provide habitat for more than 550 rare, threatened and endangered aquatic species.
- One mature tree absorbs carbon dioxide at a rate of 48 pounds per year.
- In one year, an acre of forest can absorb twice the CO<sub>2</sub> produced by the average car's annual mileage.
- Two mature trees provide enough oxygen for one person to breathe over the course of a year.
- Forests are the largest forms of carbon storage, or sinks, in the U.S.
- In one day, one large tree can absorb up to 100 gallons of water and release it into the air, cooling the surrounding area.
- 100 million mature trees growing around residences in the U.S. can save about \$2 billion annually in energy costs.



The Nature Conservancy  
Protecting nature. Preserving life.

## Mississippi Bottomland Hardwoods

Plant a Billion rees

<http://www.plantabillion.org/mississippi-bottomland-hardwood/>

## Swamp Restoration

Early settlers recognized value of cypress (rot-resistant, strong, easily worked) and established trade as early as 1700.





## The future?

“Swamp lands with all the cypress cut out are of indefinite value. They are considered mostly unproductive at present and are being held chiefly for their potential value for agriculture after draining and clearing.”

*Mattoon 1915*

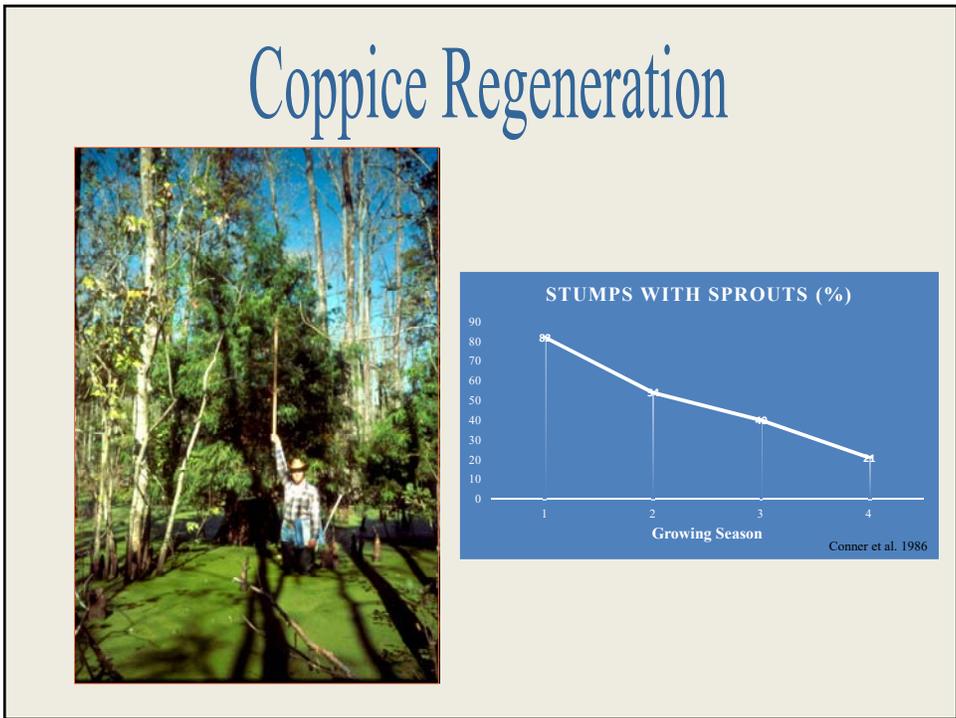
“...in cutting the timber from the land they have taken the first step toward putting it in position to perform its true function - agriculture.”

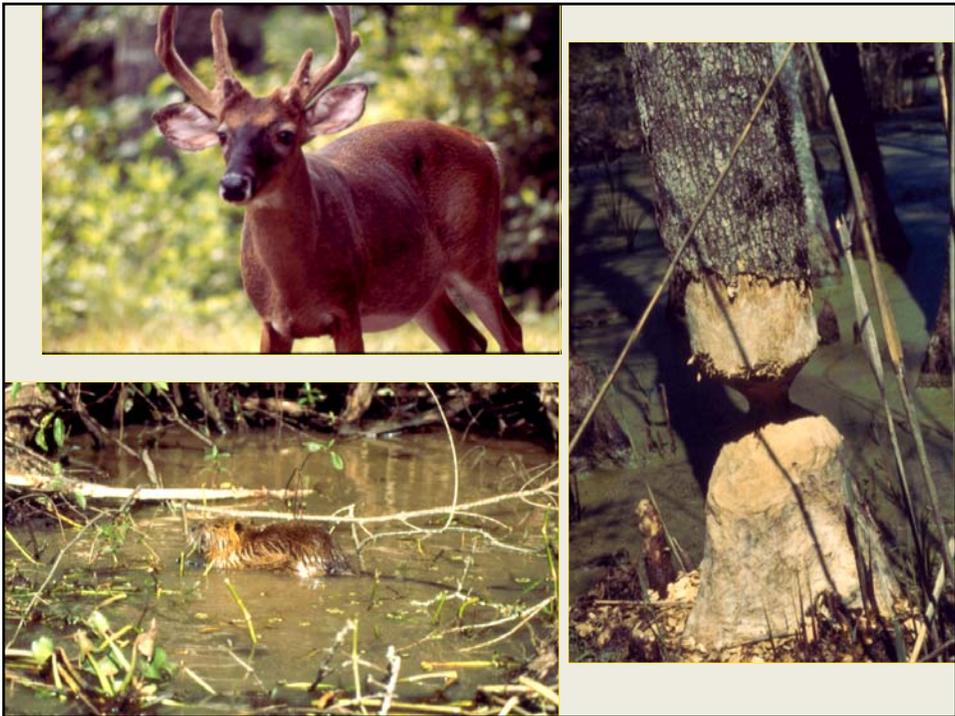
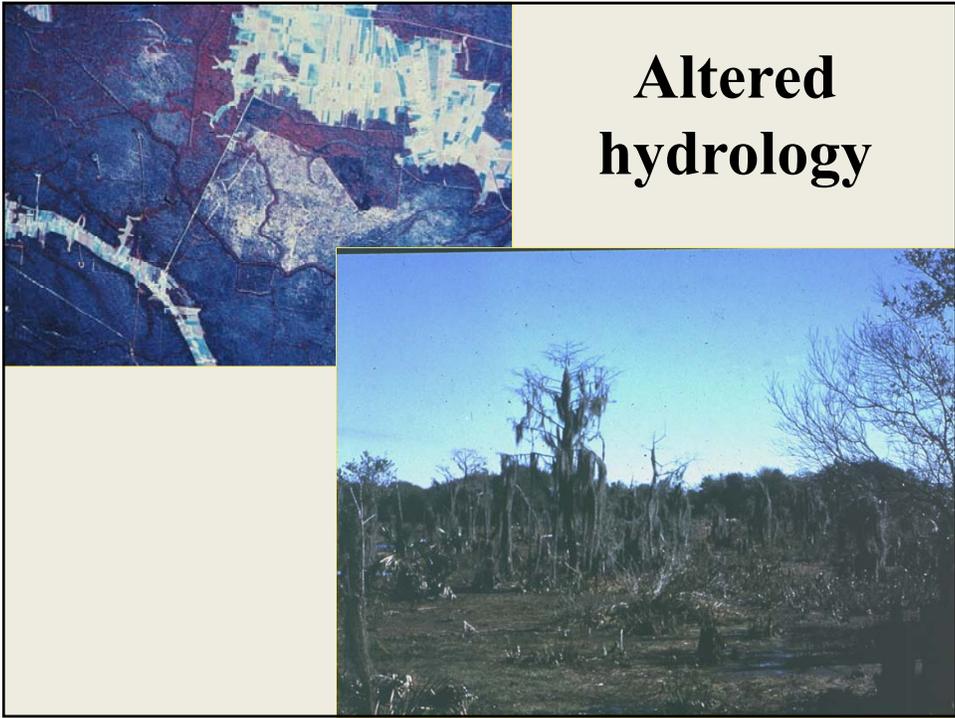
*Norgress 1947*

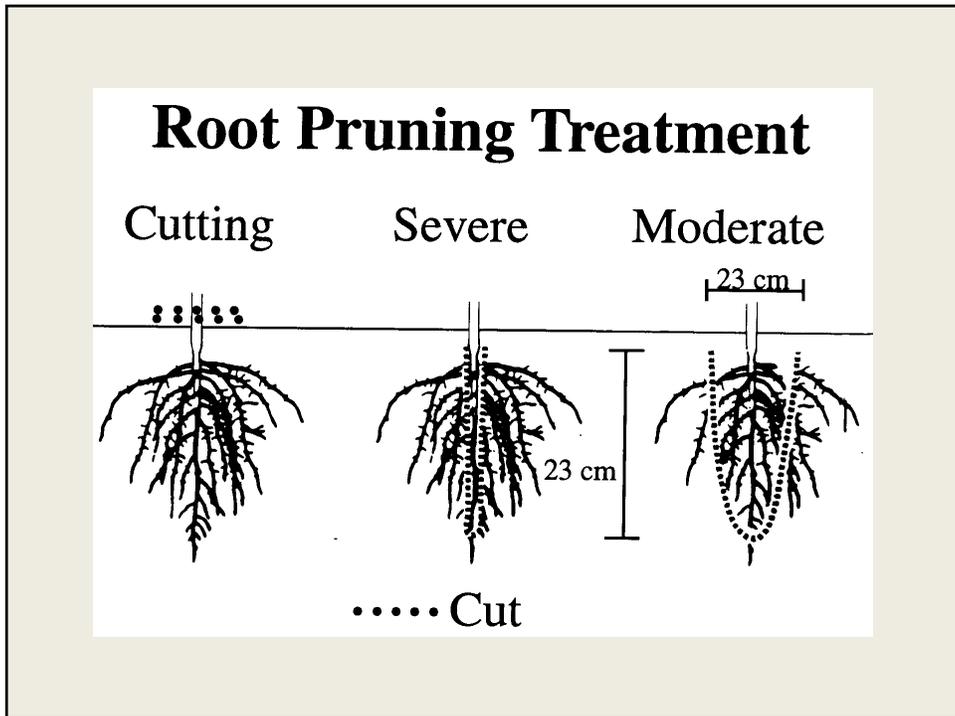
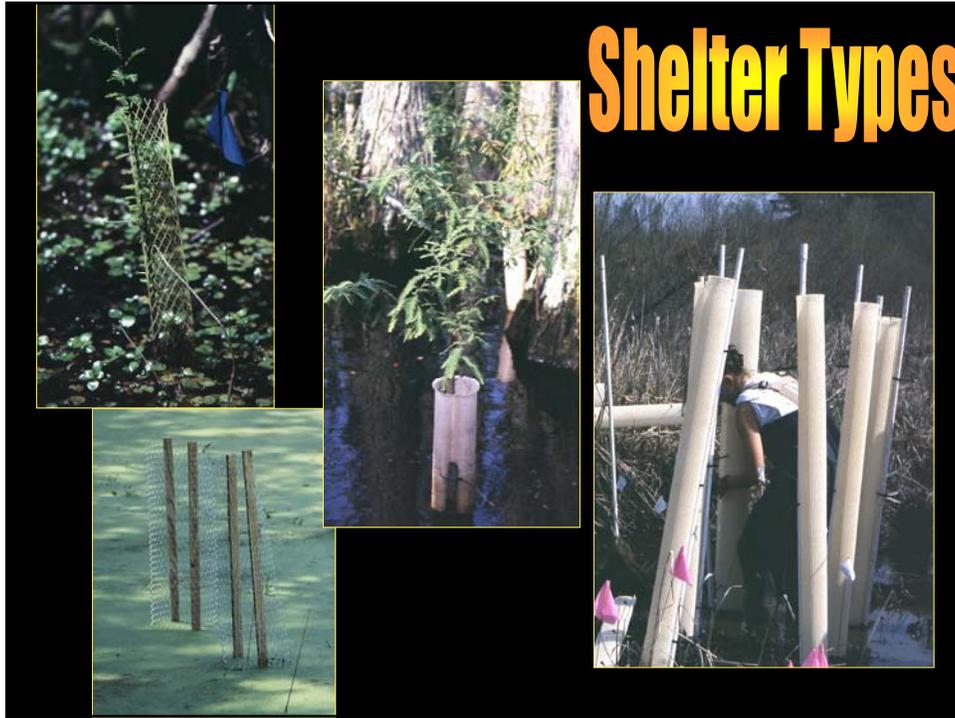
“The cypress industry is gone forever. A resource has been removed, and it is not likely to be regenerated because of the problems of reforestation and management of cypress in the swamps.”

*Mancil 1972*









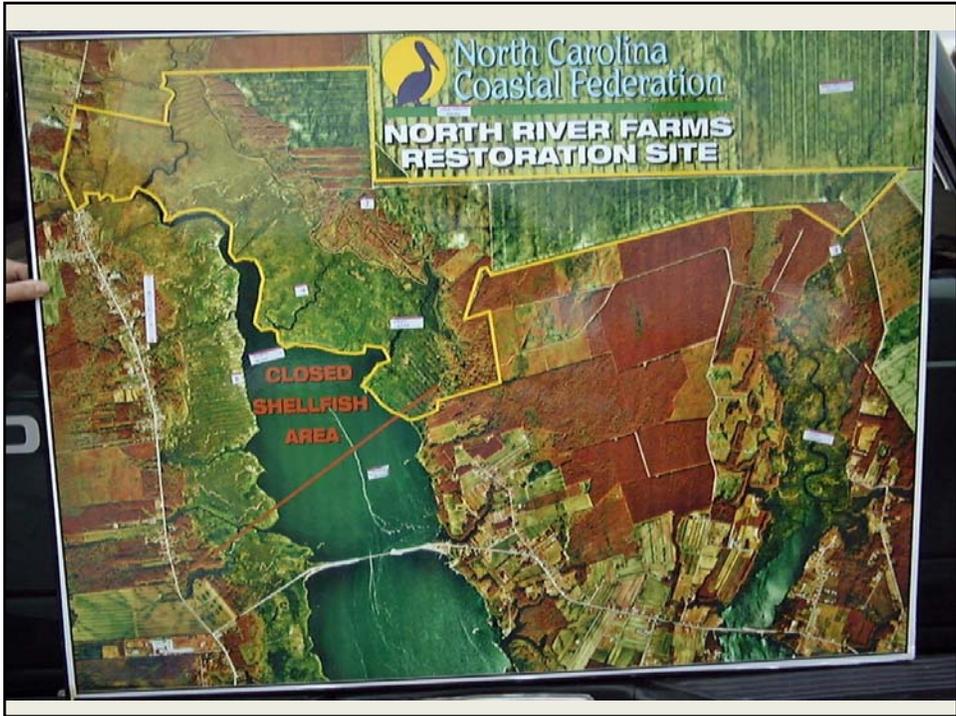
Planting is done by grasping the seedling at the root collar and gently pushing the seedling into the soft sediment until the hand hits the soil surface.



## *Percent survival of pruned seedlings*

	Cutting	Severe	Moderate
Green Ash	0	0	0
Water Tupelo	13	78	100
Baldcypress	33	90-100	100







## Coastal Forest Restoration Challenges



## Artificial Regeneration on Salt-influenced Sites






Coastal Protection and Restoration Authority

**NEWS RELEASE**  
September 5, 2017

**CPRA Announces \$28.6 Million Awarded for Four Coastal Protection and Restoration Projects**

**Hydrologic Restoration & Vegetative Planting in Des Allemands Swamp**

In order to increase the health of the Lac des Allemands Swamp ecosystem, a contract of \$519,562 has been awarded *to minimize the loss of both marsh and a declining cypress forest, as well as reduce swamp submergence, increase regrowth of young trees, increase swamp productivity*, improve drainage and increase water quality. Through the CWPPRA program, the CPRA and the federal sponsor, EPA, are taking action to **restore 2,400 acres** of wetlands within St. James Parish. Once constructed, the project will increase water flow into the swamp by cutting gaps in the spoil bank, breaching internal impediments, and reestablishing natural channels. Native vegetation will also be planted at the site.

The project area is located west of Lac des Allemands, east of LA Highway 20, and south of the town of South Vacherie. According to LSU researchers, the swamp has been deteriorating because it has been impounded and isolated by roads, canals and spoil banks, and no longer receives replenishing Bayou Chevreuil water.




Coastal Protection and Restoration Authority

**NEWS RELEASE**  
September 19, 2017

**RESTORE Council awards \$14.2 million grant for Gulf-wide Restoration to Louisiana for River Reintroduction Project**

**Mississippi River Reintroduction into Maurepas Swamp**

The Louisiana Coastal Protection and Restoration Authority (CPRA) has been awarded a \$14.2 million grant from the Gulf Coast Ecosystem Restoration Council (RESTORE Council) to complete engineering and design activities for the Mississippi River Reintroduction into Maurepas Swamp.

The River Reintroduction into Maurepas Swamp project is being designed to construct a 2,000 cubic feet per second gated structure in the Mississippi River and five miles of conveyance channel near Garyville to reconnect the river to the swamp and improve the health and longevity of this ecosystem. This project will be the *first dedicated river diversion project into the forested wetlands of Louisiana designed specifically for swamp forest restoration*, with the goal being to reduce or minimize loss of swamp forest habitat in the project area through the reintroduction of Mississippi River water...restoring and enhancing a approximately 45,220 acres of forested wetland.

# COASTAL WETLANDS PLANNING, PROTECTION AND RESTORATION ACT

## RESTORING COASTAL LOUISIANA SINCE 1990 Volunteers Needed for Swamp Forest Restoration in Maurepas



[The Lake Pontchartrain Basin Foundation](#) is partnering with the Restore the Earth Foundation to restore swamp forest on the on the Maurepas Landbridge. Swamp forests are very important habitats for wildlife and provide storm surge protection for nearby communities.

**When:** October 10<sup>th</sup> and October 17<sup>th</sup>  
8 am to 3 pm, Lunch Provided

## 250 years after Washington drained it, feds soak a swamp

AP Photo/Steve Helber



SUFFOLK, Va. (AP) — This is a story about a future president who tried to drain a swamp, and government workers who are making it wet again. By returning the habitat to its natural state, they just might keep the Great Dismal Swamp from heating up the planet. George Washington's slaves started logging it, 254 years ago. Now much of the cypress and cedar is gone. The seemingly impenetrable swamp had been dismissed as a deadly morass where explorers vanished and runaway slaves escaped. Today, scientists have discovered that the swamp's peat soil is a vital piece of the climate change puzzle, able to either contain or release a greenhouse gas that causes global warming.

Now the U.S. Fish and Wildlife Service is trying to undo the damage by gradually "rewetting" the swamp. Refuge manager Chris Lowie and his staff are slowly raising the water table in the swamp's remaining 113,000 acres by capturing and rechanneling rainfall in the vast network of ditches that scar the land. Aluminum pipes and wooden boards now control water levels in about a third of the refuge.

<https://apnews.com/4279f688a7f4476e9664de5372b9decb/250-years-after-Washington-drained-it,-feds-soak-a-swamp>

## Acknowledgments

- The Belle W. Baruch Foundation
- Clemson University Public Services Activities
- USGS: Wetland and Aquatic Research Center
  - Climate and Land Use Change R&D
- USEPA
- USFS
- Field technicians/students



## Questions?



Lenson

1-2

Frog pioneers