

Greentree Reservoir Management



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Hardwood Bottomlands

General Definition

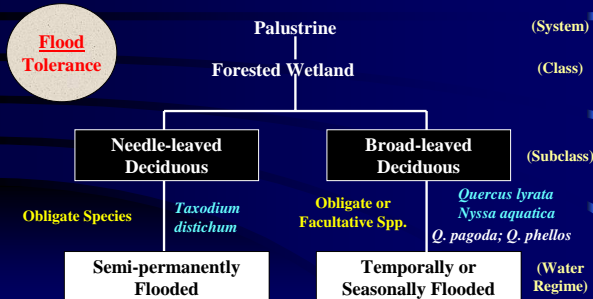
Forested wetlands generally near a river that are periodically flooded during the dormant and growing season by overbank flow.



Oak Species Present

Hardwood Bottomland Forest

Specific Definition: Cowardin et al. 1979



Waterfowl Using Hardwood Bottomlands Throughout Annual Cycle

Cavity Nesters



Winter in Forested Wetlands



Wood duck



Hooded Merganser

Waterfowl Using Hardwood Bottomlands Through Part of the Annual Cycle

Breed/Nest in Forested Wetlands



Black duck



Common Goldeneye



Barrow's GE



Common Merganser



Bufflehead

Waterfowl Using Hardwood Bottomlands Through Part of the Annual Cycle

Often use Forested Wetlands in Winter



Ring-necked Duck



Mallard

Breed/Nest in Grasslands



Gadwall

Incidental Waterfowl Using Hardwood Bottomlands

May use Forested Wetlands in Winter



American Green-winged Teal



Northern Pintail

Breed/Nest in Grasslands

Hardwood Bottomland Functions for Waterfowl



•Foods
(acorns, inverts, and moist-soil seeds)

- Shelter
(climate, predator protection)
- Courtship
- Loafing, Resting
(seclusion)



Hardwood Bottomland Foods



Should Manage for Forest Openings
>1 acre

Aquatic Invertebrates



Other Important Functions of Hardwood Bottomlands

Other Fish & Wildlife:

- Neotropical Migrants (*Emberizidae*)
- Mammals (Mink, Otter)
- Herpetofauna (Snakes, Anurans, Salamanders, Turtles)
- Fish (Catfish, bowfin)
➔ Spawning, Nursery

Timber Production:

CBO & WO

- Valuable Hardwoods (i.e., red oaks) \$620/ha
- Saw Timber or Veneer Logs (\$130/tbf)

Environmental:

- Flood and Erosion Control
- Nutrient Cycling
- Groundwater Recharge

“Wetland Benefits”

Bottomline on Bottomlands

Hardwood bottomlands are critical ecosystems that play an integral role in the function of many ecological and environmental processes!



Dynamic Hydrology of Hardwood Bottomlands



Day 1



Day 5

Natural hydroperiod is characterized by stochastic and ephemeral flooding events

Greentree Reservoir (GTR)

Hardwood bottomland forest enclosed partially or completely by levees containing water control structures

Primary Goal
Wildlife Use

Principal Objectives
•Hydrology
•Tree Composition and Vigor

Secondary Goal
Timber Production

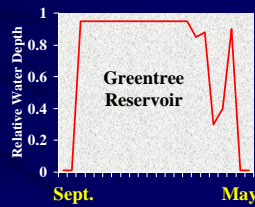
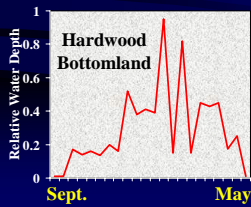
Provide flooded habitat for Waterfowl more Predictably

Traditional GTR Management

(Wigley and Filer 1989)

- Annual Flooding
- Stable Hydrology
- Deep Water (1-m)

(Heitmeyer et al. 1989)



Advent of Greentree Reservoirs (Late 1930s)

Grand Prairie in Stuttgart, Arkansas



Initial Responses

•Increase in Waterfowl Use

•Increase in Viable Acorn Production

•Increase in Radial Tree Growth

~180 GTRs Nationwide

Most in the Southeast

Negative Effects of GTR Management

- Decline in **Waterfowl Use**
- Decrease in Acorn Production
- Decrease in **Radial Tree Growth**
- Mortality of Trees and Reduced Regeneration
- Change in Overstory Trees Species **Composition**

Black Swamp
Controversy in
West Tennessee!

(Broadfoot and Williston 1973,
Newling 1981, Malecki et al. 1983)

Tree Composition Change in Southeastern United States

Cherrybark and Willow Oaks → Overcup Oaks

	Hardwood Bottomland	Greentree Reservoirs	
Overcup Oak	27	58	Young et al. 1995
Cherrybark Oak	49	40	
Willow Oak	65	21	

Relative Comparison of Timber Value of Southeastern Hardwood Bottomland Oaks

Central Mississippi Sawtimber Prices

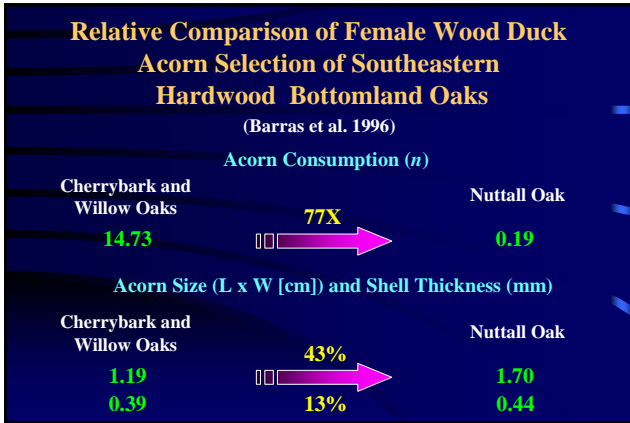
(MS Timber Price Report: 12/98)

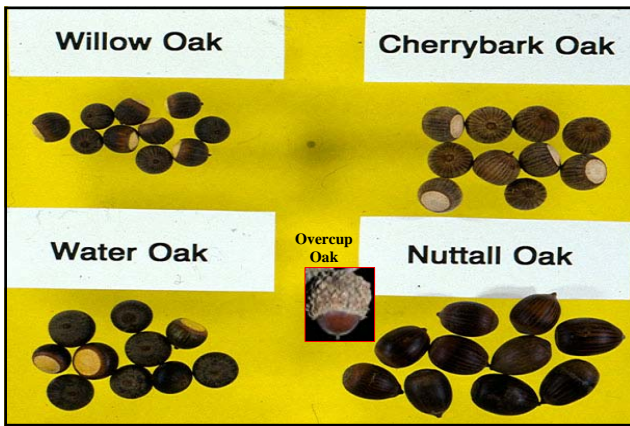
Cherrybark and Willow Oaks (Sawtimber)
\$350/mbf

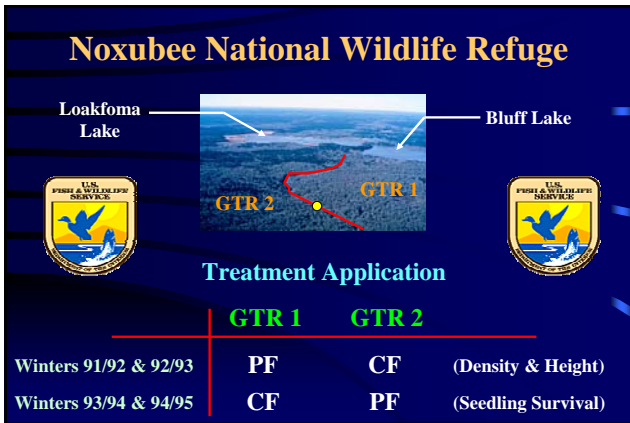
2X →

Overcup Oak (Pulpwood)
\$195/mbf

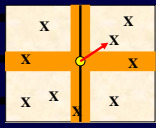








Measuring Response Variables



0.01-ha Plot

Density

Seedlings Enumerated/Species
Two 11.28-m² Belt Transects

October 1993

Winters 91-92
& 92-93

Height

Closest Individual/Species to Plot Center

Percent Canopy

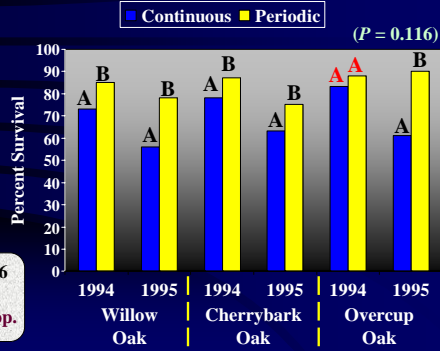
Survival

9 Seedlings/Species Nearest to Plot Center
July 1994 and 1995

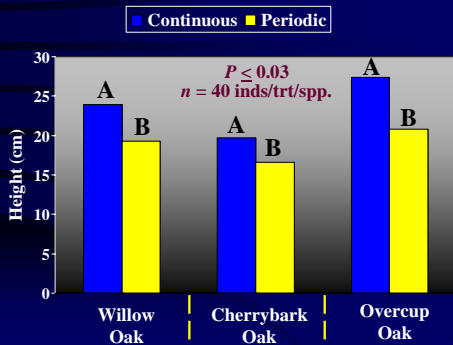
(Winters 93-94 and 94-95)

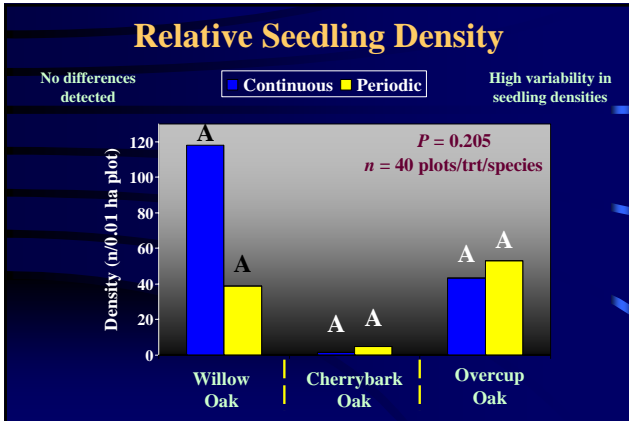


Relative Percent Seedling Survival



Relative Seedling Height





Summary of Seedling Demography Results and Management Recommendation

Flooding GTRs periodically during winter may **increase seedling survival**, but seedling **density** and growth **height** may not be benefited by this strategy

Managers may wish to **flood GTRs periodically** during winter to more closely emulate natural hydroperiods and **enhance survival** of desirable oak seedlings


Potential GTR Management Scheme (Noxubee National Wildlife Refuge)

Emulate Natural Hydrology!!! **3 GTRs** at NNWR

3 Months (December-February)

Sequentially Flood & Drain **1 GTR/month**

Habitat Provided **Continuously** & Flood Duration **Minimized**



Additional MS GTR Results

- **Invertebrate Biomass**
- **Acorn Availability**
- **Waterfowl Use**

Sherman et al. 1995,
Wehrle et al. 1995

Managing Forest Openings

Kaminski et al. 1993

Allows Birds Access to Hardwood Bottomland

Can be managed for moist-soil plants

Used as red oak regeneration sites



Can function as hunting sites!



Possible Locations:

- Natural openings
- Undesirable tree species
- Hunting zones
- Oak restoration

Timber Management Objectives



Matt Gray and Manuel (Maño) Córbet in old growth swamp bloodwood (*Pterocarpus officinalis*) forest, Humacao Wildlife Refuge, Puerto Rico, 1996

