Integrative Wildlife Management

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Integrative Wildlife Management

- Outline
  - What is a Healthy Forest?
  - Limiting Factors in Southern Forests
  - Understanding Disturbance Regimes
  - Stand Structure Basics
  - Wildlife Beneficial Trees
  - Case Studies
    - Bottomlands
    - Uplands

What is a "Healthy Forest"

- Differing Perspectives
  - Human vs. Wildlife

What is a "Healthy Forest"

- *The ability of a forest to maintain and perpetuate a constant high quality supply of environmental benefits, products, and a diverse plant and animal community*

Wildlife as Indicators of Forest Health

- Healthy forests grow healthy wildlife populations
- The absence of wildlife populations is a major indicator of declining forest health
- Use wildlife as a tool… "barometer" of forest health

Limiting Factors in Temperate Forests

Synthesis of the conservation value of the early-successional stage in forests of eastern North America

David I. King [a,*], Scott Schlossberg [b]

[a] USDA Forest Service, Northern Research Station, Amherst, MA, USA
[b] Department of Environmental Conservation, University of Massachusetts Amherst, Amherst, MA, USA

Percent of forest in the seedling-sapling stage of succession (0–19 years post harvest) for states within the Eastern Region of the North American Breeding Bird Survey calculated using Forest Inventory and Analysis data for the most recent survey years (2005–2008), and divided into geographic regions. Also shown are short-term changes for the previous decade of survey data, the period for which data were consistently available, expressed in percent change. Data shown are for productive timberlands only. *Source:* US Forest Service (2006).

Southeast region	Current estimate	Trend (%/year)
Alabama	39.1	−0.38
Arkansas	20.3	0.83
Florida	29.8	−2.45
Georgia	33.9	−1.89
Kentucky	4.44	−5.75
Louisiana	5.99	−16.7
Mississippi	38.1	−1.22
North Carolina	25.5	−2.45
South Carolina	32.3	−2.19
Tennessee	14.1	0.34
Region average	24.3	−3.19

Importance of Early Successional Habitat

The forgotten stage of forest succession: early-successional ecosystems on forest sites

Mark E Swanson[1*], Jerry F Franklin[2], Robert L Beschta[3], Charles M Crisafulli[4], Dominick A DellaSala[5], Richard L Hutto[6], David B Lindenmayer[7], and Frederick J Swanson[8]

- High species diversity (flora & fauna)
  - Complex food webs
  - Large nutrient fluxes
  - High structural complexity
  - High spatial heterogeneity
  - Biological diversity

Case Studies – Integrating Wildlife and Intensive Forest Management

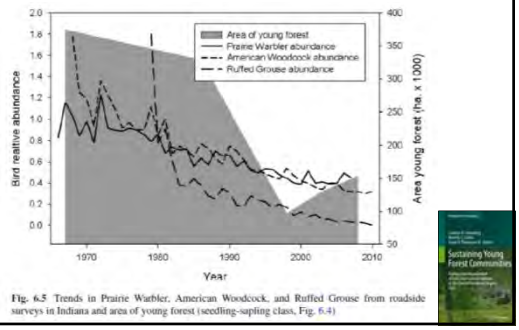
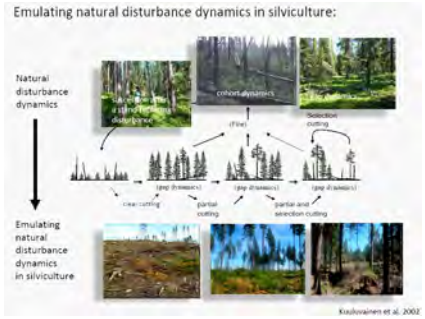


Fig. 6.5 Trends in Prairie Warbler, American Woodcock, and Ruffed Grouse from roadside surveys in Indiana and area of young forest (seedling-sapling class, Fig. 6.4)

Understanding Disturbance Regimes



Understanding Disturbance Regimes

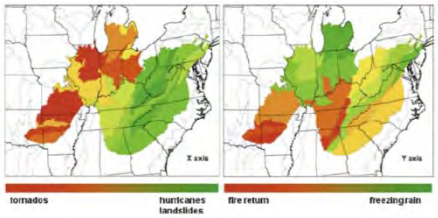


Fig. 3.3 Ecoregions of the Central Hardwood Region color-coded by their PCA scores (*first (X) and second (Y) axes*). First axis scores were positively correlated with tornados and negatively correlated with landslides and hurricanes. Second axis scores were positively correlated with fire return interval and negatively correlated with freezing rain

Understanding Disturbance Regimes

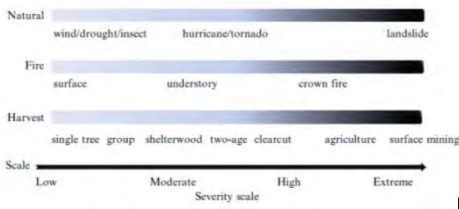


Fig. 7.1 Conceptual diagram of disturbance severity scale for natural and human-induced events

Understanding Disturbance Regimes – Pyric Systems

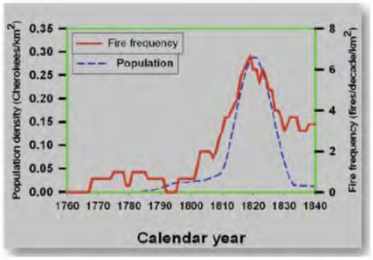
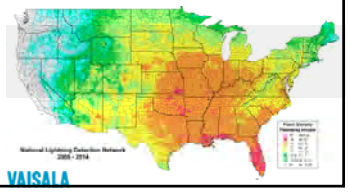


Fig. 4.1 Comparison of Cherokee population density and fire frequency in the Boston Mountains of Arkansas (figure adapted from data in Guyette et al. (2006a))

Understanding Disturbance Regimes – Pyric Systems

- Historic Fire Season
- Across the South and Southern Appalachians
  - Late spring & early summer (Komarek 1964, 1968; Barden and Woods 1974).
  - Native Americans largely responsible for frequent fire regime



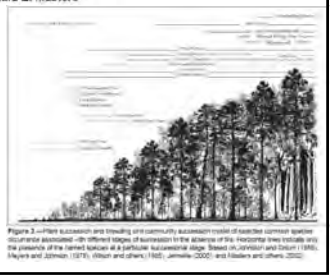
Understanding Disturbance Regimes – Pyric Systems

- *Illustration by L. Thomas*

Understanding Disturbance Regimes – Pyric Systems

THE IMPORTANCE OF SHORTLEAF PINE FOR WILDLIFE AND DIVERSITY IN MIXED OAK-PINE FORESTS AND IN PINE-GRASSLAND WOODLANDS

Ronald E. Masters[1]



Understanding Disturbance Regimes – Pyric Systems

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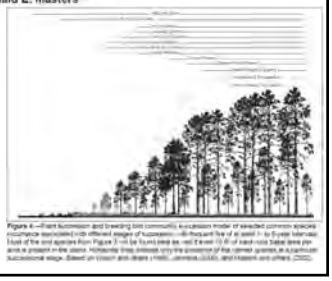


Understanding Disturbance Regimes – Pyric Systems

NB-66
Fire suppression for 40 years

Loblolly-shortleaf

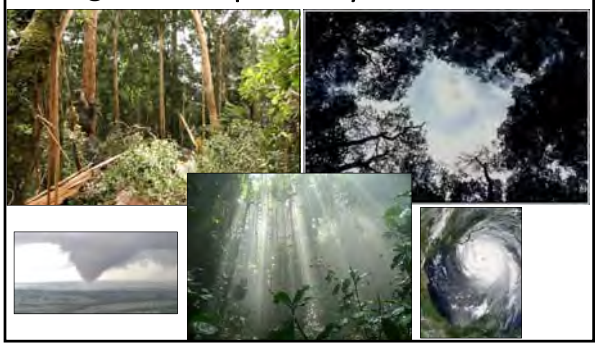
Water oak, sweetgum, pine

TALL TIMBERS

Understanding Disturbance Regimes – Riparian Systems

- Disturbance Regime dictates species composition
  - Flooding
    - Timing
    - Duration
    - Frequency

Understanding Disturbance Regimes – Riparian Systems



Understanding Disturbance Regimes – Riparian Systems

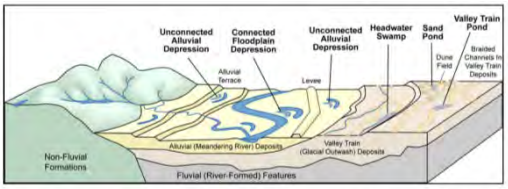


Figure 2. Placement of hydrogeomorphic depressional communities within the Mississippi Alluvial Valley (Adapted from Klimas et al 2004, by Elizabeth Murray, Arkansas Muti-Agency Wetland Planning Team).

Understanding Disturbance Regimes – Riparian Systems

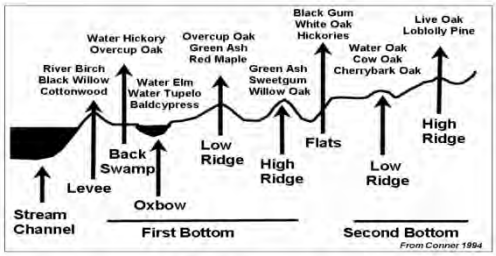


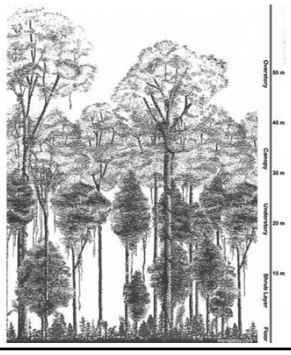
Figure 3. Distribution of tree species along hydrologic gradient (from Conner 1994).

Understanding Disturbance Regimes – Riparian Systems

Cottonwood Front (new land) in major bottoms	Seed tree with site preparation	Eastern cottonwood
	Clearcut	Sycamore, sweet pecan, green ash, boxelder
Black willow Bar (new land) in major bottoms	Seed tree with site preparation	Black willow
	Clearcut	Sugarberry, green ash, baldcypress, American elm, overcup oak, bitter pecan, Nuttall oak
Cypress-water tupelo Swamp in major bottoms; slough in minor bottoms	Group selection	Baldcypress, water tupelo, sometimes green ash, overcup oak, bitter pecan
	Clearcut	Baldcypress, water tupelo, sometimes green ash, overcup oak, bitter pecan, or elm and maple
Elm-sycamore-pecan-sugarberry Front, high ridge in major bottoms	Group selection or clearcut	Sweetgum, red oaks[1], sycamore, sweet pecan, sugarberry, green ash
Elm-ash-sugarberry Wide flats in major bottoms	Clearcut or group selection	Elm, green ash, sugarberry, Nuttall oak, willow oak
Sweetgum-red oaks Ridges in major bottoms; high flats in minor bottoms	Patch clearcut	Sweetgum, red oaks, green ash
	Clearcut	Sweetgum, red oaks, and green ash favored, with sweetgum favored the most
	Shelterwood	Red oaks, sweetgum, green ash
Red oaks-white oaks[2] Second bottoms, high ridges in major bottoms, terrace in minor bottoms	Shelterwood or group selection	Red oaks, white oaks, hickory, green ash, sweetgum, American hornbeam
Overcup oak-bitter pecan Low flats, sloughs in major bottoms; flats in minor bottoms	Group selection	Overcup oak, bitter pecan
	Shelterwood	Overcup oak, bitter pecan, Nuttall oak, green ash

Stand Structure Basics

- **Emergent**
  - A tree grows above the general level of the forest canopy. These trees are exposed to the strongest sun and winds.
- **Canopy**
  - This level forms the roof of the forest with crowns of dominant trees and vegetation.
- **Understory**
  - This level receives little light. Many of these trees tolerate shade and remain at this level; others grow and replace older, fallen trees.



Stand Structure Basics

- Wildlife like Diversity
  - Structural
    - Vertical and Horizontal
  - Species
    - Competing objectives

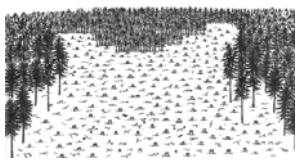
Stand Structure Basics

Table 1. Shade tolerance of common species in southern hardwood forests.

Shade Tolerance Classification		
Intolerant	Intermediate	Tolerant
Black cherry	American elm	American beech
Black locust	Green & white ash	American holly
Black walnut	Hackberry	American hornbeam
Black willow	Hickories[a]	American holly
Eastern cottonwood	Oaks[b]	Blackgum
River birch	Yellow birch	Boxelder
Sassafras		Buckeye
Sweetgum		Eastern redbud
Sycamore		Eastern hophornbeam
Yellow-poplar		Flowering dogwood
		Persimmon
		Red & sugar maple
		Sourwood

Stand Structure Basics

Silvicultural Treatment	Advantages	Disadvantages
Clearcut An even-aged regeneration system in which essentially all the trees in a stand are removed in a single entry. Regeneration may derive from sprouts, advanced regeneration, or seedling reproduction. Shade-intolerant species show fastest initial growth.	(+) Relatively simple to implement operationally (+) Often effective way to "restart" degraded stands with a more desirable species mix (+) Treatment area of 20 acres can balance silvicultural and aesthetic goals	(-) Visual impact (-) Significant alteration to wildlife habitat (-) Potential alteration of hydrologic patterns (-) Great variation in minimum economically-viable clearcut size



Stand Structure Basics

Silvicultural Treatment	Advantages	Disadvantages
Shelterwood cut An even-aged regeneration method that reduces the overstory canopy by approximately 50 percent in the first entry and completely within ten years. The high shade that results favors more shade-tolerant seedlings and sprouts.	(+) Less hydrologic alteration (+) In some systems, can be effective for oak regeneration	(-) Appropriate harvesting equipment and operator care are required to implement treatment with minimal disturbance to the residual stand

A shelterwood harvest in an oak stand has stimulated regeneration.

Photo © Mel Baughman

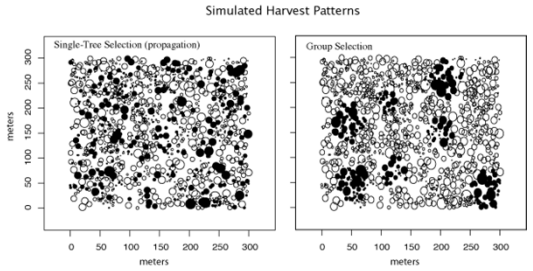
Stand Structure Basics

Silvicultural Treatment	Advantages	Disadvantages
Single-tree selection Removal of individual trees in a stand to provide growing space for uneven-aged regeneration. Favors shade-tolerant species.	(+) Visually non-intrusive (+) Retained forest structure benefits some wildlife species	(-) Very difficult to apply in practice without increasing potential site damage (-) Often results in a selective or diameter-limit cut

Stand Structure Basics

Silvicultural Treatment	Advantages	Disadvantages
Group selection This uneven-aged regeneration treatment involves the removal of desirable and undesirable trees of similar age, size, or species within a 0.25-3.0-acre area. Similar to patch clearcuts, but with smaller holes in the canopy.	(+) Limited visual impact (+) Retained forest structure benefits wildlife	(-) Frequent entries may be impractical to implement and/or damaging to sensitive soils (-) May not favor desired shade-intolerant or mid-tolerant species

Stand Structure Basics

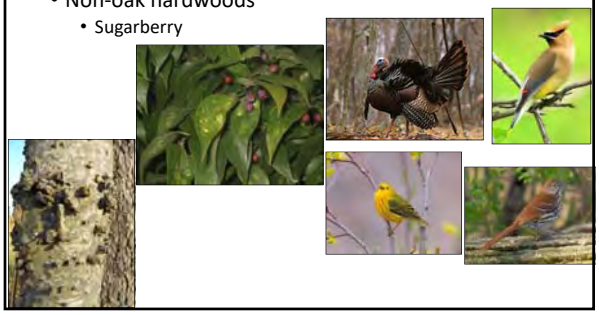


Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Oaks aren't the only wildlife beneficial tree!!

Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Non-oak hardwoods
  - Sugarberry



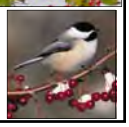
Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Non-oak hardwoods
  - Dogwoods









Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Non-oak hardwoods
  - Black Locust/ Honey Locust





Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Woody Shrubs, Vines, and Semi-woody Plants
  - Blackberry (*Rubus* spp.)
    - Most important group of plants in SE!
      - Deer, Cottontails, numerous songbirds, small mammals
      - Escape/loafing cover



Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Woody Shrubs, Vines, and Semi-woody Plants
  - Greenbrier (*Smilax* spp.)
    - Ruffed Grouse, Wild Turkey, Northern Bobwhite
    - 40+ songbird
    - Preferred deer browse
    - Swamp, Marsh, and Cottontail Rabbits


Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Woody Shrubs, Vines, and Semi-woody Plants
  - Poison Ivy/Poison Oak
    - Good deer browse
    - Numerous songbirds
    - Northern Flicker, Yellow-bellied Sapsucker eat fruit
    - Swamp Rabbit


Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Woody Shrubs, Vines, and Semi-woody Plants
  - Grapes (*Vitis* spp.)
    - Important soft mast
      - Black bear, white-tailed deer, wild turkey, ruffed grouse, raccoon, opossum, gray squirrel, striped skunk
      - Muscadine Grape preferred deer forage
      - Numerous songbirds


Wildlife Beneficial Trees – *"Beyond the Oaks"*

- Woody Shrubs, Vines, and Semi-woody Plants
  - American beautyberry
    - 40+ species of songbirds
    - Medium browse preference for deer
      - Fruit heavily used in November
    - Northern bobwhite, raccoon, opossum, and Armadillo eat fruit


Bottomland Hardwood Management

- Goals
  - Multi-tree species compositions
  - Multi-tree size classes
  - Forest canopy densities that provide for establishment and maintenance of understory and midstory components sufficient to meet habitat needs
  - Creation of forest canopy gaps through tree removal (group selection) to establish release desirable advanced regeneration and internal stand structure

Prepared by the Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group February 2011

Bottomland Hardwood Management

- Quality habitat for priority wildlife species likely requires some sacrifice in timber production and the retention of less healthy trees.
- Even so, **commercially viable, wildlife-oriented silviculture (i.e., Wildlife Forestry)** employing variable retention harvests can be used in conjunction with forest restoration, regeneration, and natural processes to achieve Desired Forest Conditions within bottomland hardwood forests.

Prepared by the Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group February 2011

Bottomland Hardwood Management

- Priority wildlife species favor ***structurally diverse and species rich forests*** which harbor large trees and frequent canopy gaps.
- Distribution and abundance of suitable forest habitat is largely dependent on ***disturbance***.
- Under current conditions however, many former disturbances are spatially and temporally restricted.

Prepared by the Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group February 2011

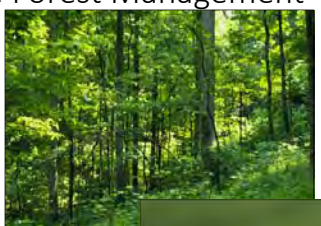
Bottomland Hardwood Management

- Loss of bottomland hardwood forest and fragmentation due to land conversion for agriculture has presumably led to the decline of some songbirds
- In small patches, forest birds are subjected to:
  - (1) more competition with other species
  - (2) increased parasitism from brown-headed cowbirds
  - (3) increased likelihood of predation
  - (4) greater disturbance from human activities
  - (5) increased isolation and inhibition of dispersal

Prepared by the Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group February 2011

Case Studies – Integrating Wildlife and Intensive Forest Management

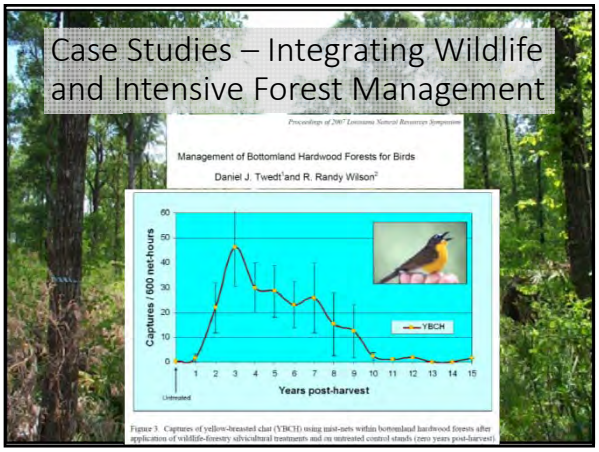
- Many of the priority forest interior songbirds require complex vertical and horizontal structure for nesting and foraging.
- Hamel (2000) suggested that for nest sites and foraging substrates, cerulean warblers need canopy gaps intermixed with dominant, shade-intolerant trees with expansive, long-limbed crowns that overtop large, individual, shade-tolerant trees.



Case Studies – Integrating Wildlife and Intensive Forest Management

- Swainson's warbler habitat is found in canebrakes associated with canopy gaps within bottomland hardwood forests.
- More recent research suggests that this species exploits disturbance gaps that are characterized by high densities of saplings, shrubs, and vines for nest sites in the absence of cane.

Case Studies – Integrating Wildlife and Intensive Forest Management



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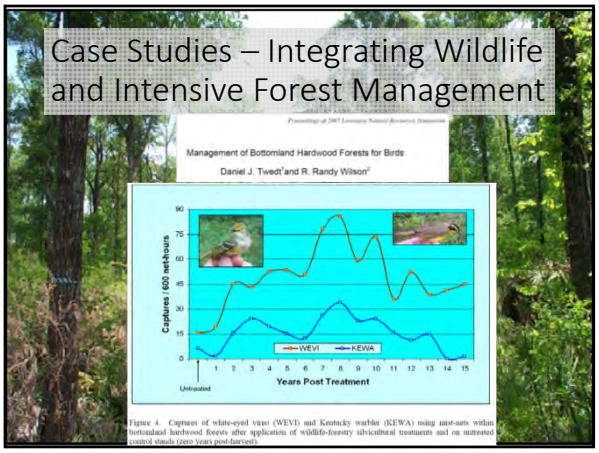


Case Studies – Integrating Wildlife and Intensive Forest Management

Management of Bottomland Hardwood Forests for Birds

Daniel J. Twedt[1] and R. Randy Wilson[2]

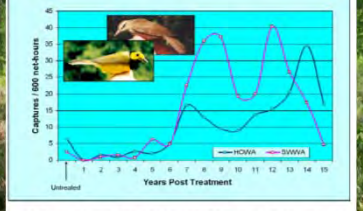


Figure 5. Captures of Swainson's warbler (SWWA) and hooded warbler (HOWA) using mist-nets within bottomland hardwood forests after application of wildlife-forestry silvicultural treatments and on untreated control stands (zero years post-harvest).

Case Studies – Integrating Wildlife and Intensive Forest Management

Management of Bottomland Hardwood Forests for Birds

Daniel J. Twedt[1] and R. Randy Wilson[2]

Table 3. Species that exhibited positive response in abundance following wildlife-forestry silvicultural treatments in bottomland hardwood forests (a = Heltzel and Leberg 2006; b = Twedt et al. 1999; c = Moorman and Gyunn 2001; d = Twedt and Sommershoe [unpublished data] and in upland hardwood forests (e = Thatcher 2007).

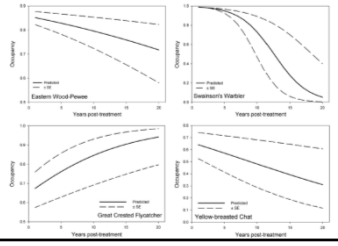
Mourning dove [e]	*Zenaida macroura*
Yellow-billed cuckoo [ad]	*Coccyzus americanus*
Red-headed woodpecker [bd]	*Melanerpes erythrocephalus*
Red-bellied woodpecker [a]	*Melanerpes carolinus*
Eastern wood-pewee [bc]	*Contopus virens*
White-eyed vireo [bc]	*Vireo griseus*
Yellow-throated vireo [e]	*Vireo flavifrons*
Northern parula [c]	*Parula americana*
Kentucky warbler [de]	*Oporornis formosus*
Common yellowthroat [bc]	*Geothlypis trichas*
Yellow-breasted chat [abde]	*Icteria virens*
Eastern towhee [abde]	*Pipilo erythrophthalmus*
Indigo bunting [abcde]	*Passerina cyanea*
Painted bunting [a]	*Passerina ciris*
Brown-headed cowbird [a]	*Molothrus ater*
Orchard oriole [a]	*Icterus spurius*

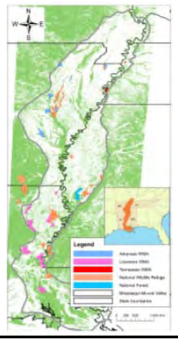
Case Studies – Integrating Wildlife and Intensive Forest Management

Breeding birds in managed forests on public conservation lands in the Mississippi Alluvial Valley

Daniel J. Twedt [a,*], R. Randy Wilson [b]

[a] USGS Patuxent Wildlife Research Center, University of Memphis, Memphis, TN 38152, United States
[b] U.S. Fish and Wildlife Service, 6578 Dogwood View Parkway, Suite B, Jackson, MS 39213, United States





Case Studies – Integrating Wildlife and Intensive Forest Management

Management and Conservation Article

Effects of Wildlife Forestry on Abundance of Breeding Birds in Bottomland Hardwood Forests of Louisiana

JENNIFER L. NORRIS,[1] *School of Renewable Natural Resources, Louisiana State University Agricultural Center, Baton Rouge, LA 70803-6200, USA*
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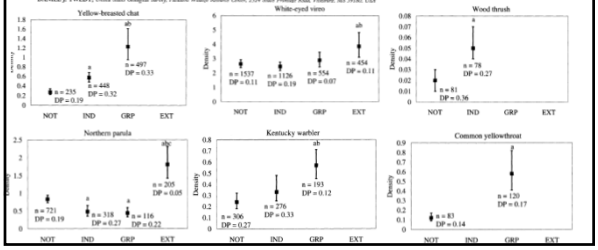
DANIEL J. TWEDT, *United States Geological Survey, Patuxent Wildlife Research Center, 2524 South Frontage Road, Vicksburg, MS 39180, USA*



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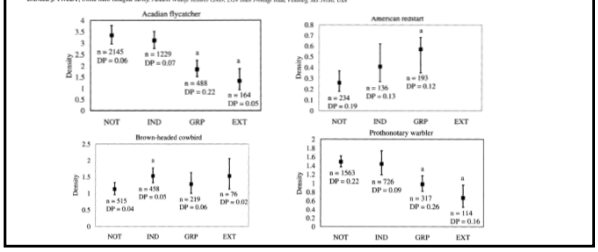
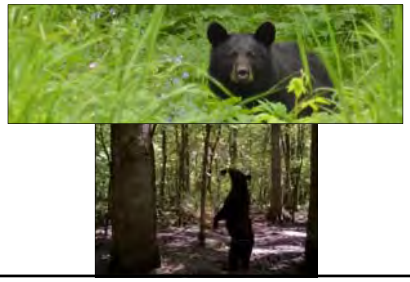


Case Studies – Integrating Wildlife and Intensive Forest Management

- Black bears benefit from diversity in forest species and structure.



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- Black Bear Management

BLACK BEAR Conservation Coalition

Case Studies – Integrating Wildlife and Intensive Forest Management

- Black Bear Management

Key Bottomland Hardwood Plant Species

CANOPY	MID-STORY	UNDER-STORY
Nuttall Oak	Sassafras	Blackberry
Willow Oak	Red Mulberry	Dewberry
Water Oak	Dogwood	Pokeweed
Cherrybark Oak	Persimmon	Elderberry
Overcup Oak	Black Gum	Green Brier
Cow Oak	Mayhaw	Devil's Walking Stick
Live Oak	Switch Cane	French Mulberry
Shumard Oak	Paw Paw	Muscadine
Sweet Pecan	Swamp Holly	Wild Grape
Water Hickory	Winterberry	Poison Ivy
Bald Cypress		Supplejack
Blackgum		
Green Ash		
Water Tupelo		

BLACK BEAR Conservation Coalition

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- Black Bear Management
  - Excavated and natural depressions under tree roots, stumps, and fallen logs are also used as den sites and daybeds, particularly in areas that are not subject to flooding.

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- Black Bear Management
  - Dense understory that limits visibility, such as that provided by cane, palmetto, or thickets of shrubs and saplings, also provide ground den sites and serves as important escape cover.


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- Eastern Wild Turkey Management

Hardwoods are critically important

Promote & retain bottomland hardwoods and mixed pine-hardwood stands

Manage for diversity of mast producers

Let surrounding landscape dictate intensity of management


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Important wild turkey food items. The following items are important foods in the diet of the wild turkey.

Eastern wild turkey:
- acorns of red, white, chestnut, and black oaks; American beech nuts
- fruits of black cherry, wild grape, spicebush
- seeds of white ash, ironwood, water beech, hawthorne, witch hazel, flowering dogwood
- seeds of native grasses and sedges; leaves of Carex spp., Lycopodium spp., evergreen ferns; winter buds of hemlock and hardwoods; fronds of sensitive fern, burdock; chufa
- beetles, other insects, salamanders, snails


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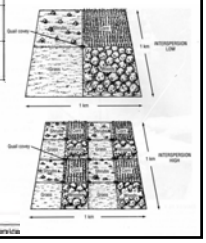
Habitat Component	Management options for increasing Habitat quality or availability
Roosting cover	• Preserve mature ponderosa pine, oak, cottonwood, cypress and other large trees.
Brood habitat	• Maintain scattered openings within mature stands of trees by selectively cutting less valuable or immature trees to create herbaceous understory growth.
Interspersion of habitat components	• Combine above prescriptions to increase interspersion of habitat components and amount of suitable wild turkey habitat.



USDA United States Department of Agriculture
Natural Resources Conservation Service

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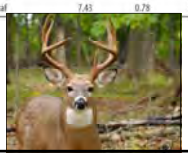
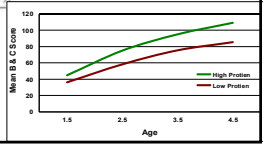
Table 2. Mean crude protein (CP) concentrations ±SE and range in CP across deer forage plants analyzed in nine habitat types in Louisiana during 2012.

Habitat type	CP (%)	SE	Range	Sample size
Swamp Hardwood	11.87	1.50	6.1 – 22.9	26
Upland Hardwood	10.37	0.82	5.8 – 16.4	30
Bottomland Hardwood	10.16	0.69	5.4 – 20.6	79
Southeast Pine-Hardwood	9.47	0.60	5.0 – 16.9	76
Coastal Prairie	9.43	1.30	4.6 – 19.5	21
Coastal Marsh	9.43	1.55	5.6 – 16.0	13
Northwest Pine-Hardwood	8.90	0.44	5.3 – 17.0	134
Longleaf Flatwoods	8.25	1.34	4.7 – 18.4	19
Historic Longleaf	7.43	0.78	3.5 – 12.8	39





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RESEARCH BRIEF

Forage availability for white-tailed deer following silvicultural treatments in hardwood forests

Retention cutting followed with repeated prescribed fire every 2 – 4 years increased forage availability for white-tailed deer, rivaling that available in soybean food plots.

MANAGEMENT IMPLICATIONS

- Reducing forest canopy closure and adding prescribed fire leads to increased available deer forage and higher nutritional carrying capacity
- If merchantable timber is present and a timber harvest is consistent with landowner goals, then a shelterwood harvest followed with prescribed fire can be an effective and economically sound plan to increase available forage for white-tailed deer
- A fire return interval of 3 – 5 years may maintain forage availability, soft/hard mast production, and fawning cover
- If both the deer population and forest are managed, then food plots may not be necessary for appropriate forage availability

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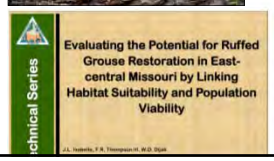
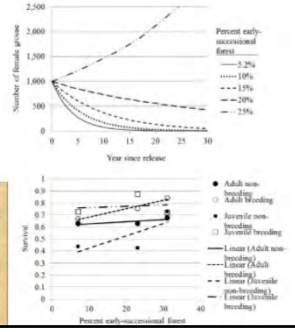


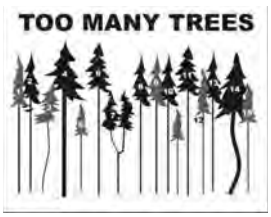


Upland Forest Management

- Thinning
  - Inevitable
  - Risks of not thinning
  - Competing objectives
  - Wildlife response
    - Deer
    - Turkey
    - Quail
    - Songbirds
    - Herpetofauna

Upland Forest Management

- Thinning is managing for forest health AND wildlife enhancement!



Managing Upland Forest for Wildlife

- Thinning
  - Directly influences understory
  - Heavier thin = More sunlight
  - Many beneficial wildlife plants intolerant of shade
- Basal Area
  - Turkey 60-90 ft^2/acre
  - Quail <65 ft^2/acre

Upland Forest Management

Upland Forest Management

- Wildlife Response to Thinning


Upland Forest Management

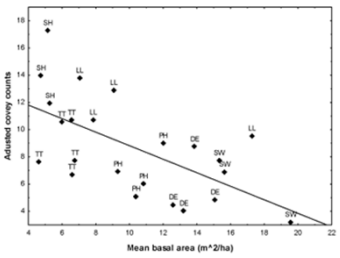
- Wildlife Response to Thinning
  - Increased soft mast production
    - American Beautyberry
    - Blackberry
    - Blueberry
    - Persimmon






Upland Forest Management

- Wildlife Response to Thinning



As tree density INCREASES…

Quail density DECREASES.

Upland Forest Management

- Wildlife Response to Thinning
  - Better bedding cover for fawns
  - Better nesting and brooding habitat for quail and turkeys
  - Better forage for deer
  - Increased plant diversity
  - Increase avian diversity
  - Increased insect diversity

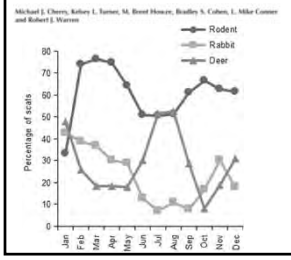


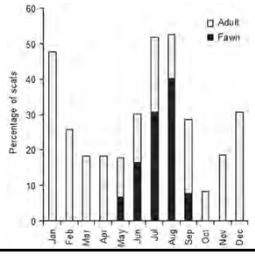
Case Studies – Integrating Wildlife and Intensive Forest Management

Wildlife Biology 22:44–50, 2016
doi: 10.2981/wlb.00144

Coyote diets in a longleaf pine ecosystem

Michael J. Cherry, Kelsey L. Turner, M. Brent Howze, Bradley S. Cohen, L. Mike Conner and Robert J. Warren





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Coyote diets in a longleaf pine ecosystem

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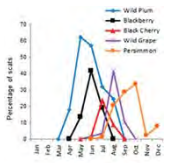
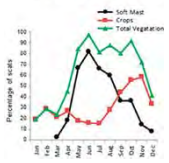
wiregrass dominated ecosystem rely on typically reported prey items, and that the large diversity and abundance of food items on this site was consistent with the hypothesis that this can alleviate the risk of predation on white-tailed deer fawns. Rodent and rabbit occurrence in scats was inversely related to white-tailed deer occurrence in scats during the pup-rearing and pair-bonding season. The occurrence of mesomammals in scats decreased the likelihood of adult white-tailed deer in that same scat. Larger-sized prey

lihood of other items occurring in the same scat. We also found that the occurrence of fruits in a scat decreased the likelihood of fawn white-tailed deer in the same scat. Thus, it seems that soft mast may buffer coyote-induced mortality of white-tailed deer fawns. Across the southeastern USA, there





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Research Article

Coyote Removal, Understory Cover, and Survival of White-Tailed Deer Neonates

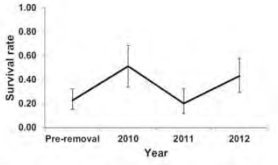

Figure 3. Survival rates (16-wk; 95% CI) of radio-collared white-tailed deer neonates during 2006–2009 (prior to coyote removal) and 2010–2012 (during removal) at the Savannah River Site, South Carolina.

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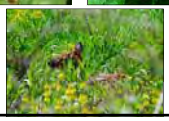
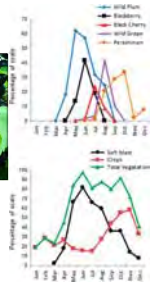
- What is most efficient to manage for?
  - Coyote removal?
  - Cover and food?





Upland Forest Management

- Prescribed Fire
  - Most important tool
  - Natural part of Southern Ecosystems
  - Resets plant succession, controls hardwoods
  - Shapes understory structure and composition
- *** Fire without thinning may not produce desired results

Upland Forest Management

- Prescribed Fire
  - Different historic fire frequencies
  - Timing
  - Frequency
  - Considerations
    - Rainfall
    - Soil productivity
  - Wildlife Response
    - Deer
    - Turkeys
    - Quail
    - Songbirds
    - Herpetafauna

Upland Forest Management

- Prescribed Fire

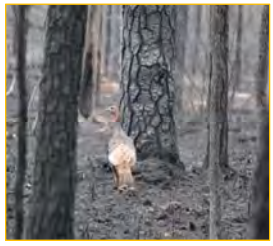
Managing Upland Forest for Wildlife

- Prescribed Fire
  - Timing - depends on goals
    - Dormant Season– better for forb and fruit production
    - Growing Season – better for hardwood control
  - Frequency -
    - 2-3 years depending on rainfall and soil type

Managing Upland Forest for Wildlife

Managing Upland Forest for Wildlife

- Recently burned stands (0-6 months since fire) are highly selected.
- Hens prefer to brood in stands burned 1-2 years prior.
- Hens prefer to nest in stands burned 2-4 years prior.



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Noxubee National Wildlife Refuge Quail Demonstration Area

FALL 2007 – WINTER 2008
- Thin timber to 50-60 ft²/acre
- Commercial hardwood removal
- Leave select mast producing hardwoods

EARLY FALL 2008
- Selective herbicide – skidder applied
- 32 oz/acre of Chopper Gen II

WINTER 2009
- Prescribed burn

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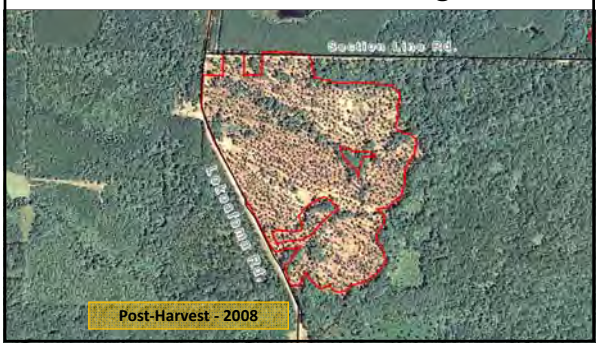
Case Studies – Integrating Wildlife and Intensive Forest Management



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Herbicide Application – Early Fall 2008

Case Studies – Integrating Wildlife and Intensive Forest Management

Prescribed Burn – Winter 2009

Case Studies – Integrating Wildlife and Intensive Forest Management

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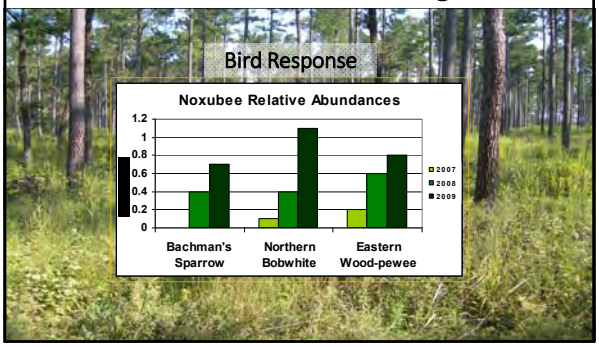

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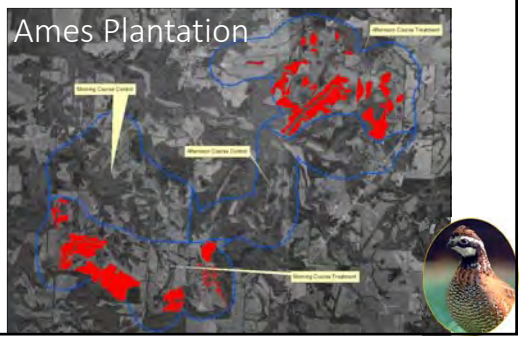

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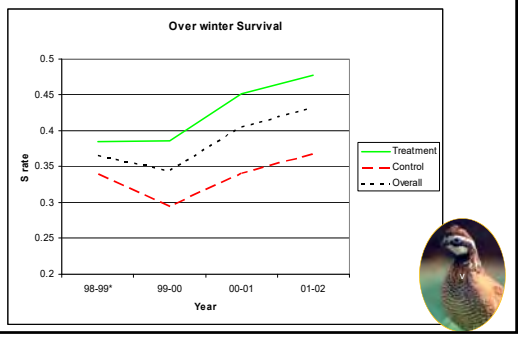

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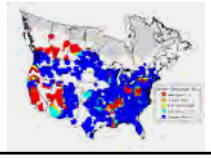
- You can't manage this!



- You can manage this!

Dr. Mark McConnell

Wildlife Outreach Specialist

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