Overstory dynamics in an uncut pine-hardwood stand: lessons from seventy years of passive management

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Productivity of actively managed stands (Good 40—UEA)
Passive management—the Reynolds RNA

Not intended as a “derogatory” label, but simply implies that no traditional silvicultural practices except some degree of stand protection have been implemented on this parcel.

This lack of active management has strongly influenced stand development and current composition, structure, and functionality.

Many ecological lessons can be learned from this example of mature, unmanaged, second-growth pine dominated stand.

Reynolds RNA has 70+ years of data—big advantage of experimental forests.
The R.R. Reynolds Research Natural Area

- Original virgin loblolly & shortleaf pine logged between 1918 and 1920 by the Crossett Lumber Company, then the cutover stand left alone

Railroad logging operation, cutover timber in background
The R.R. Reynolds Research Natural Area

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Mixed pine-hardwood “flatwood” on CEF circa 1936

Reynolds RNA circa 1959
The R.R. Reynolds Research Natural Area

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• In 1934, Crossett Experimental Forest (currently, 680 hectares) was deeded to the US Forest Service for research and demonstration projects

• 32.4 hectares withdrawn by Russ Reynolds in 1937 to act as a no-harvest “control” to compare with the productivity of managed compartments

• Protected from harvesting and fire for 70+ years (minor beetle-related cutting once); officially designated a Research Natural Area in 2005
The R.R. Reynolds Research Natural Area

Give people a “taste” of old-growth…
Loblolly pine 118 cm DBH, 39.6 m tall

...while counseling them about forest dynamics (73 cm DBH loblolly growing on ~90 year old tramline)
Pine basal area over 70+ years of passive management

Decades of BA increase due almost exclusively to individual pine growth, not new recruitment

Includes both loblolly and shortleaf pines

Recent decline due to increased mortality, especially of shortleaf
Current long-term succession of pine-dominated forests

Rapid loss of inverse-J shape structure for pines

Large pines still dominate the stand, but virtually no pine regeneration after canopy closure

Oaks are also declining in abundance—other hardwoods will dominate
Note: this is NOT how the virgin forest looked…
Long-term succession of pine-dominated forests without catastrophic disturbance...
Carbon sequestration in an unmanaged, mature pine-hardwood forest

Protected stands allow us to estimate the volume/biomass of mature pine-dominated areas without active forest management.

Baseline or “business as usual” scenario alternative?

Sequestration in pines vs. hardwoods?
Conclusions

• Stands managed “passively” provide a different perspective on forest ecosystems

• Long-term perspectives possible with permanently established experimental forests hard to replace—e.g., substituting space for time not the same!!

• For specific topics such as C sequestration, stands like the Reynolds RNA can provide baseline information assuming no active management—different option than assuming stands will always be managed for timber…
Questions?