Shortleaf Pine Genetic Resources

Supporting Reforestation & Restoration in the Southern Region

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Third Biennial Shortleaf Conference
Shortleaf Initiative, September 2015

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Talking Points

- ***Background***
  - ***Southwide Shortleaf Genetic Resources Survey***
- ***Forest Service shortleaf genetic resources (seed bank, seed orchards, progeny tests, seed production areas)***
- ***Forest Service Shortleaf reforestation & restoration activities***
- ***Current & future strategies***
- ***Partnerships***

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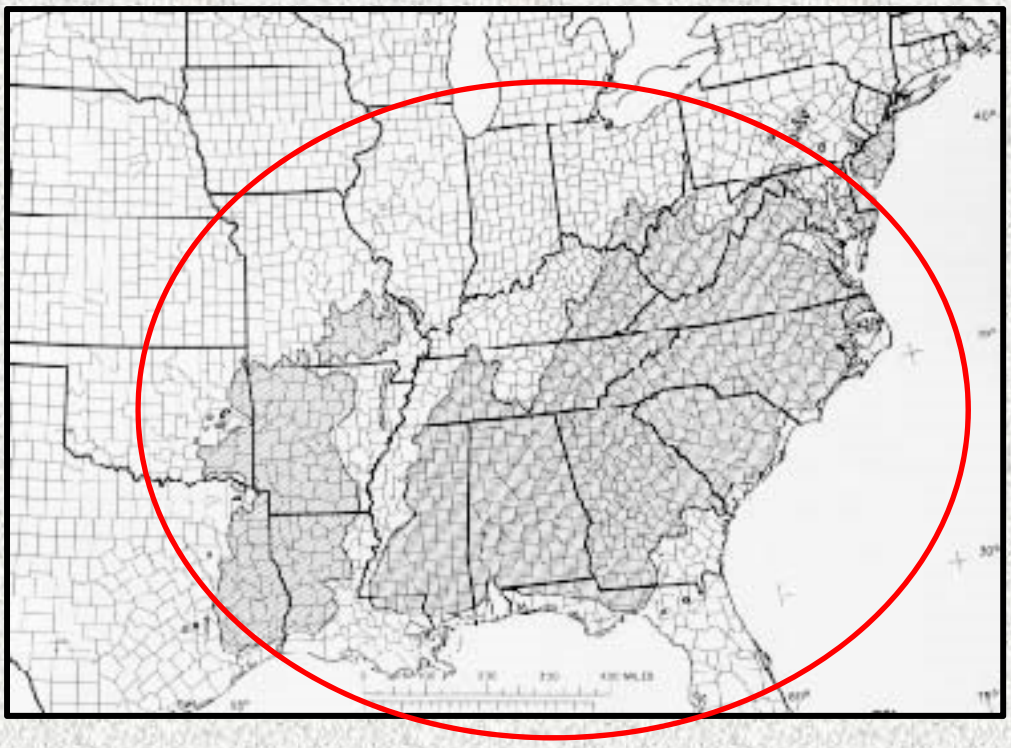
Shortleaf pine

Pinus echinata Mill.

- *Largest range of the 4 major commercial southern pines*
- *Across 22 states*
- *Fire adapted ecosystem, stem crook (re-sprouts after fire)*
- *Cone crop every ~ 5-7 years*
- *Seed shelf life ~15 years*



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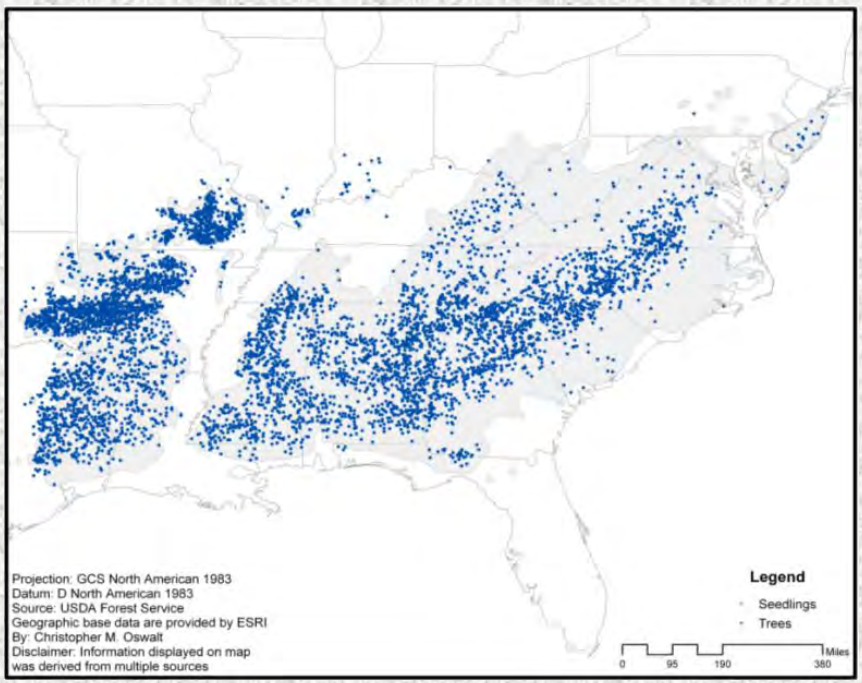
Shortleaf ecosystem

- Imperiled ecosystem, 50% lost over the past 40 years
  - Due to pine beetle outbreaks, lack of fire, changes in forest management practices, changes in land uses
- Hybridization occurrences increasing
- Restoration plan written by FS
  - current version being updated by partners
- Efforts at increased restoration
  - artificial & natural regeneration

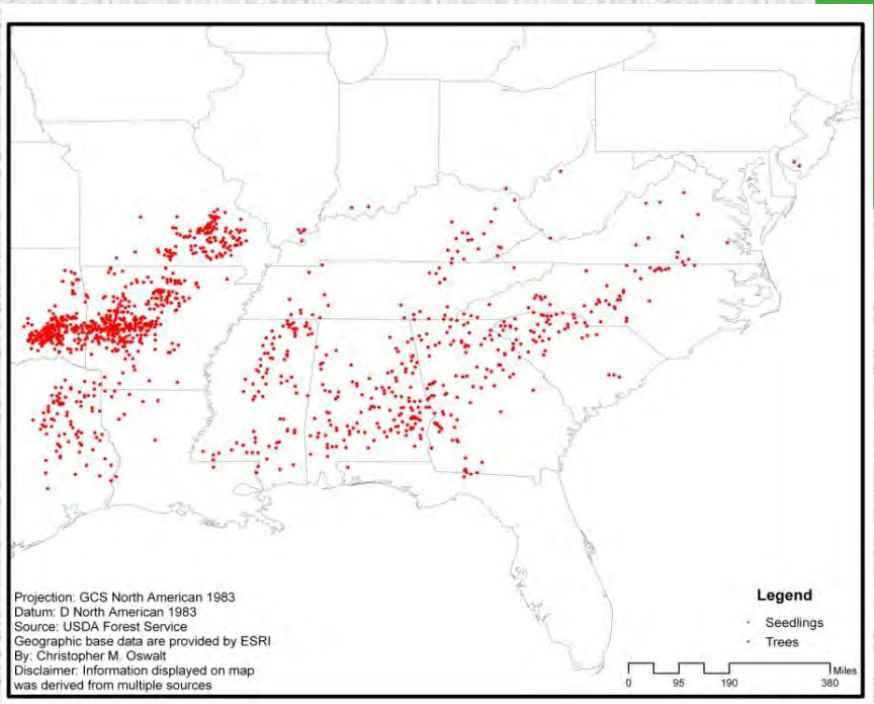
FIA – decline of Shortleaf pine

Oswalt, 2013

1980



2012



Shortleaf Survey, circulated in 2012 & 2015

Will be posted on Shortleaf Initiative website

Statement	Answer		
Seed Orchard Resources	ACRES		
First Generation			
Second Generation			
Advanced Generation			
Seed Production Areas			
Current Orchard Management	YES	NO	
Original orchards retained, not managed, no seed collected			
Orchards retained, not managed, some seed collected			
Orchards retained, limited management, seed collected			
Orchards retained, actively managed, seed collected			
Orchards retained, actively managed, seed collected, additional genetics work underway or planned			
Orchards removed			
New orchards recently established on _____ acres			
Never had shortleaf orchards			
Seed Inventory	POUNDS/ 1st or 2nd GEN SEED?		
Approximate annual seed collection (averaged for last five years) Approximate pounds of seed in storage			
Seed Age			
Program Intentions Next Five Years	YES	NO	
Maintain status quo			
Increase management intensity and seed collection activity			
Discontinue shortleaf efforts, remove orchards			
Mothball orchards for the time being			
Kiln Facility (Write in YES or NO and LOCATION)			

Geographic sources for shortleaf in your program: _____

_____

Geographic area where seed/seedlings are adapted for out-planting: _____

_____

Additional Comments:

Seed orchard acres

Orchard management

Seed inventory

Program intentions

"Genetic Resource & Tree Improvement Capacity: ***This survey is to assess the shortleaf resources available to meet the current and projected demand for genetically improved shortleaf pine seed."***

THANK YOU for responding!

Shortleaf Survey Results

- State agencies own ~ 9 % of orchard resources
  - Oklahoma DF ?
  - Tennessee DF 9 acres
  - Arkansas DF 14 acres
  - Kentucky DF 15 acres
  - Georgia FC 4 acres
  - NC Forest Service 18 ac
- FS owns & manages 91% of all shortleaf resources
- Industry – none *(Plum Creek, Rayonier, Weyerhaeuser)*
- LA Forestry Seed Co., Southern Seed Company – seed only

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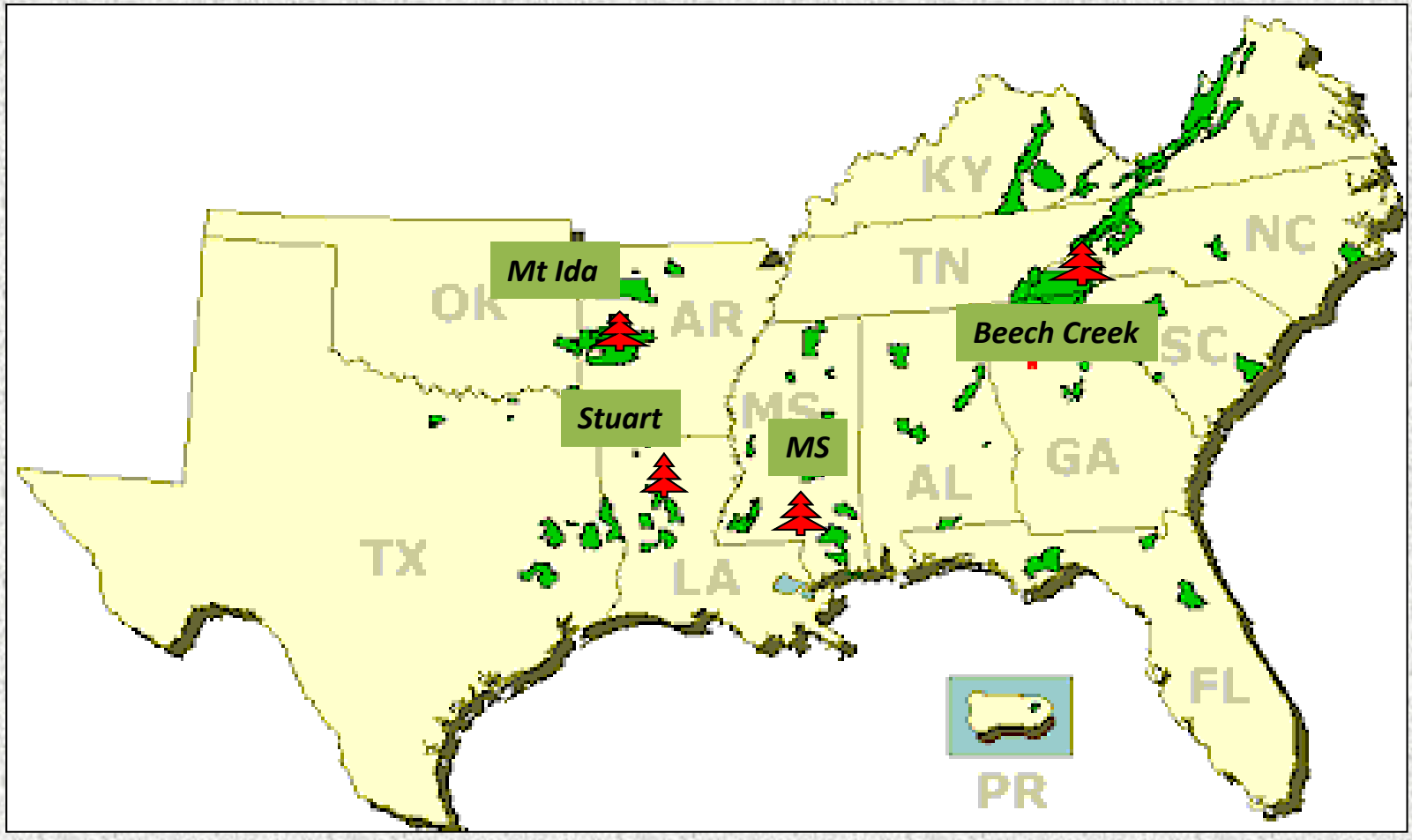
Forest Service Shortleaf genetic resources

Shortleaf seed orchards:

- 505 acres 1st Generation, planted in 1960's
- 27 acres 2nd Generation, planted 1990's
- 0 acres 3rd Generation
- 0 acres Seed Production Area

Shortleaf seed orchards in NC, MS, LA, ARK



Forest Service Shortleaf progeny tests:

- ***155, established 1982 - 1993, resurrected, documented, monumented, silviculture prescriptions written***
- ***Data collection for Appalachian seed zones – tentative FY17, funding dependent***

FS Shortleaf seed inventory:

- **4534 lbs. (90% ARK source)**
- **Collected 1984 – 2014**
- ***Need Appalachian seed***

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Working with NC Forest Service,
Building up 2nd gen orchards,
Using progeny test data,
Graft scion from selections

Anyone else interested?

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START WITH CRITICAL QUESTIONS:

- ***What is the most appropriate genetic material to plant that will grow a healthy, diverse and sustainable forest?***
  - ***50 - 100+ yr. rotations***
- ***Forests need to be resilient***
  - ***Climate change variability's are occurring faster than some tree species ability to respond.***
  - ***Is shortleaf a resilient species?***
  - ***Is it a generalist or specialist?***

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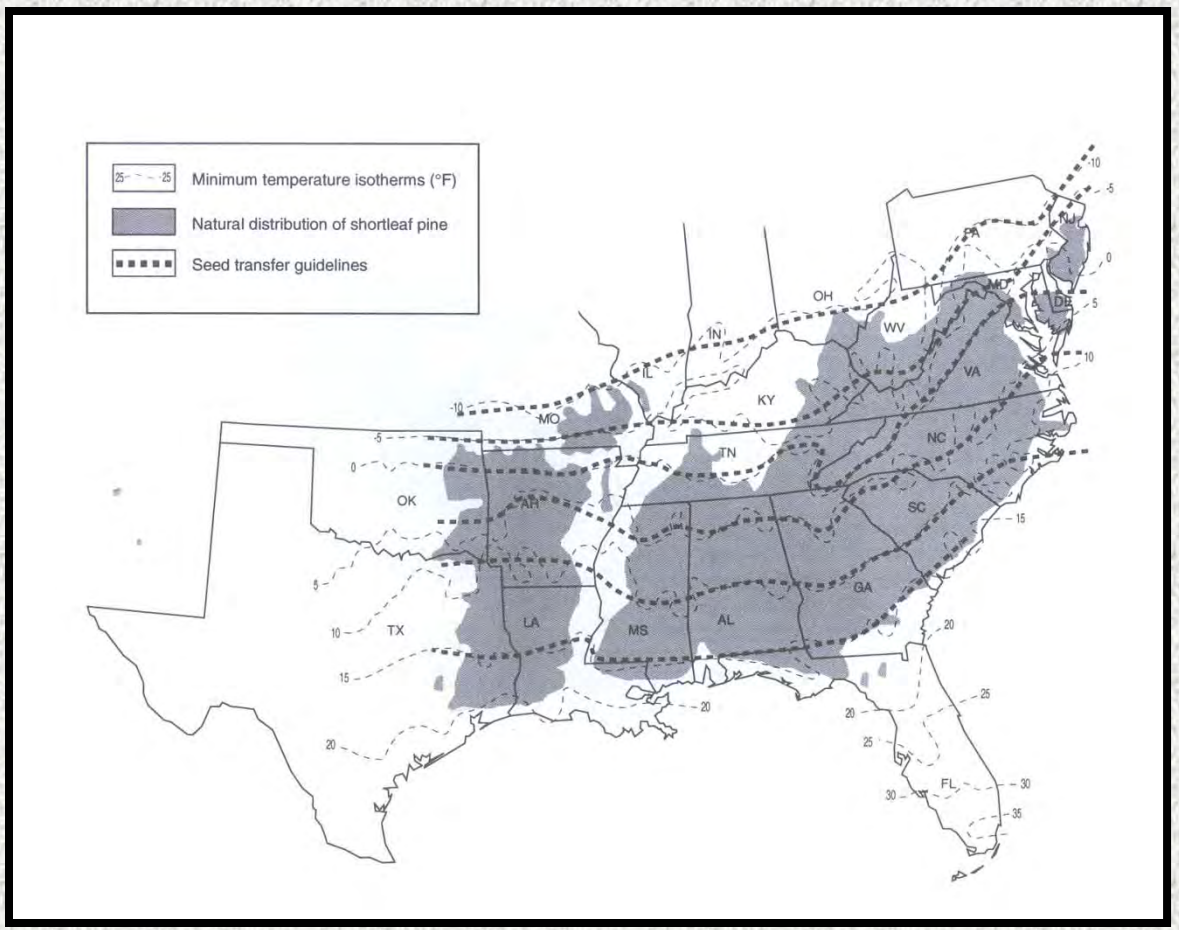
Shortleaf

- Follow seed zone guidelines
- 100 year+ rotation



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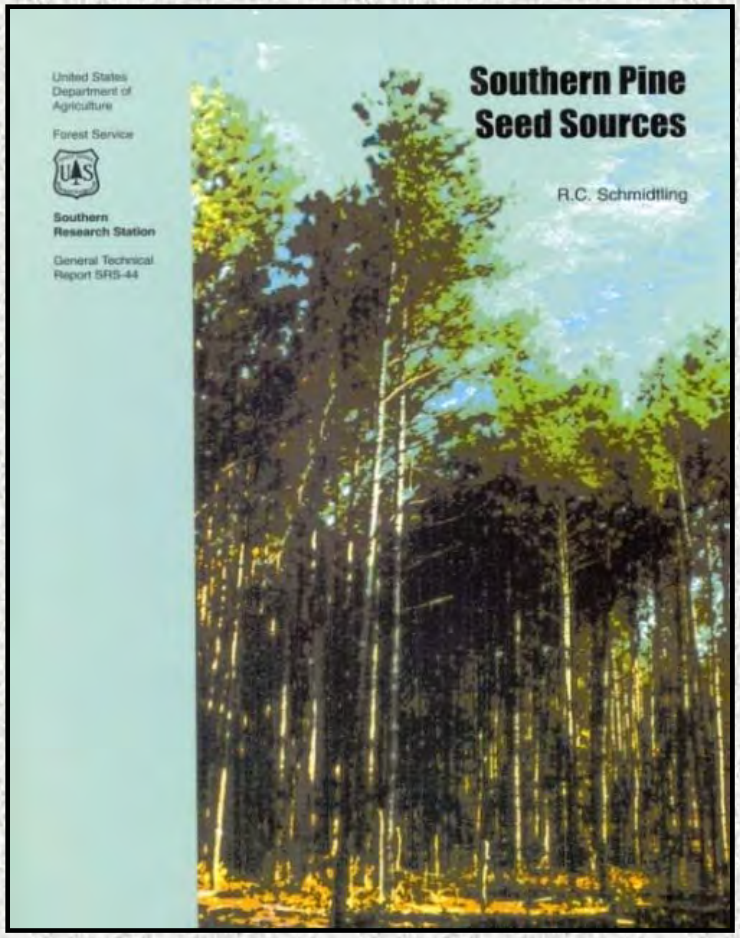

Time for an update?

Developed using past and current genetic information & climatic conditions to designate seed sources & seed zones.

- ***HOWEVER will it be pertinent for future seedling deployment? Under the threat of climate change?***

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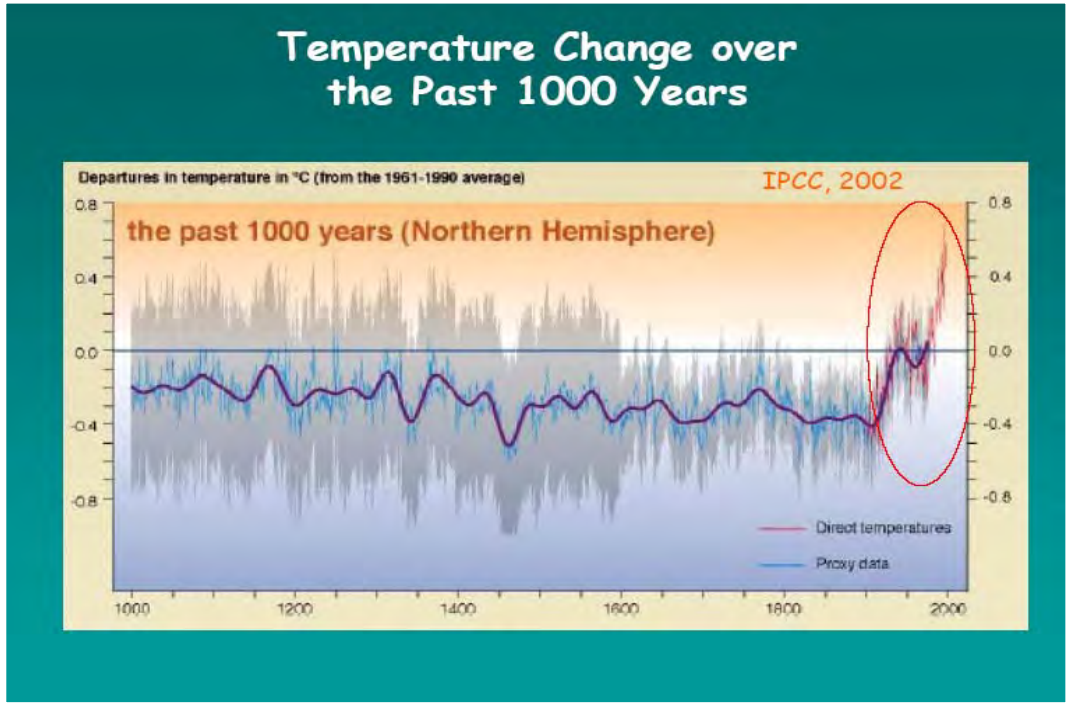
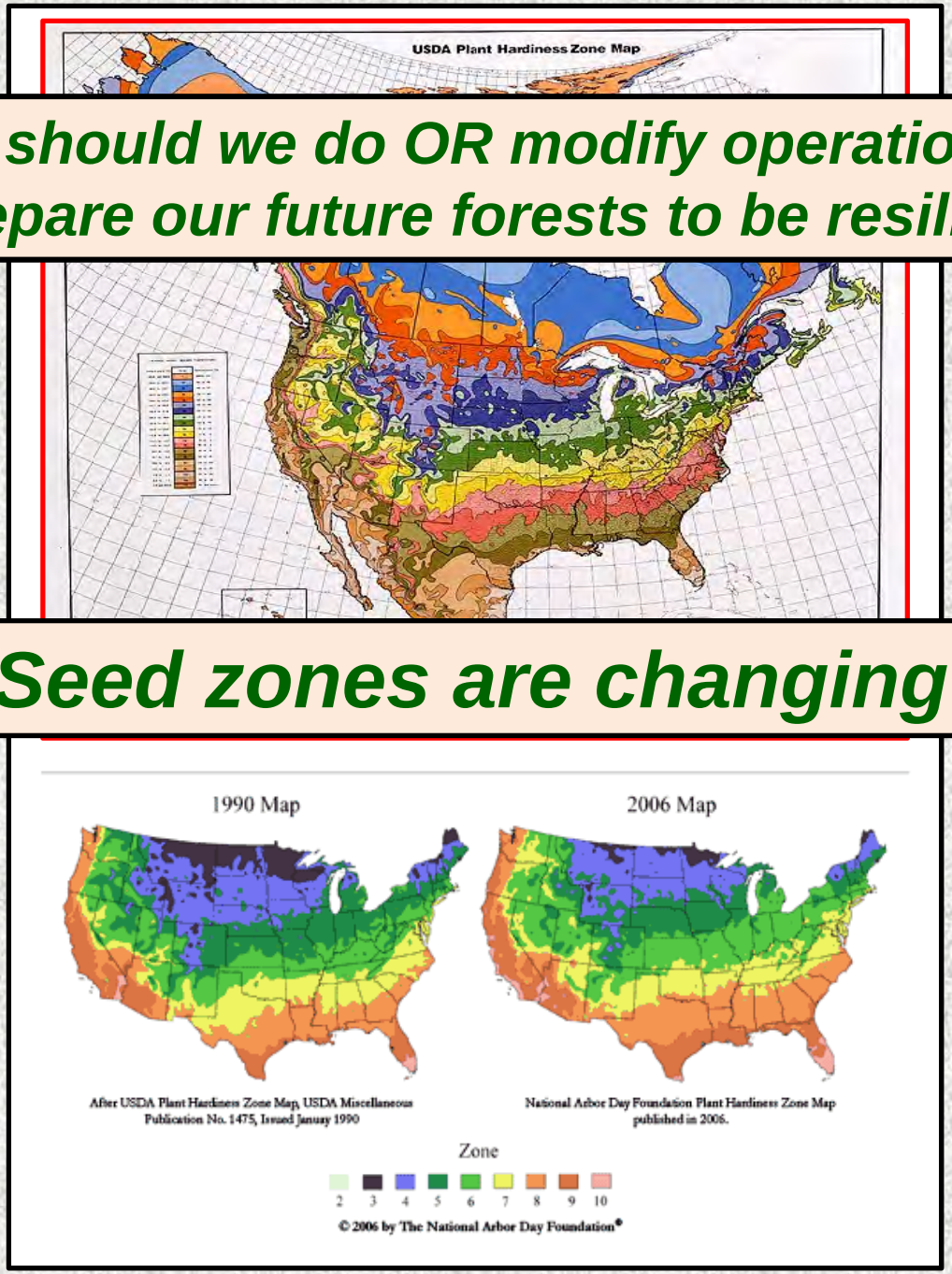
Climate change



- ***What should we do OR modify operationally to prepare our future forests to be resilient?***



Seed zones are changing

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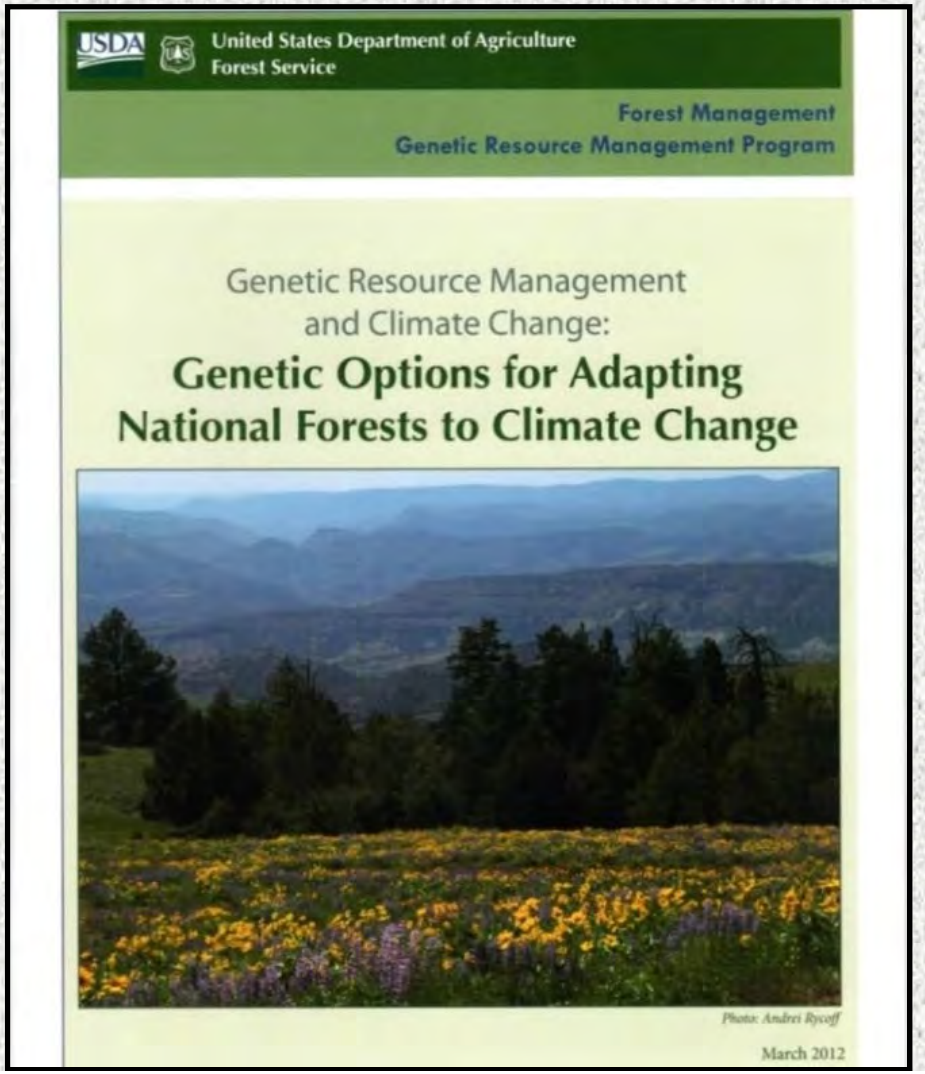
Forest Service
National Guidelines for National Forests
Goals, Principles and Recommendations for Enhancing Forest Resiliency



2012

Planting in the right areas – for now and for the future

- New seed zone development & application
- Mix seed lots from adjacent N/S seed zones, plant in N seed zones, e.g. mix zone 7 & 8 seed, plant in zone 8
- Seed forecasting – is there enough seed?
- Understanding tree physiology & seed biology
- Genecology studies – to understand adaptation
- Assisted migration studies

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Shortleaf x loblolly hybridization

A serious concern:

- *SHL x LOB hybridization study, Oklahoma State U, Stuart & Will, FS provided funding*
- *No adaptive crook to re-sprout after fire*

What we are doing about it:

- *DNA fingerprinting Forest Service orchards to eliminate hybrids (National Genetics Lab "NFGEL")*
- *Cutting down loblolly around the orchard and within the orchard > minimize loblolly pollen cloud*
- *Continue to do prescribed burns to kill hybrids*

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Current Strategies

Seed Need Projections - on a 5-year cycle based on reforestation needs

Forest	Species*	Projected acres to plant per year	No.# seedlings per year **	Seed per pound	Lbs of Seed needed per year	Lbs of viable seed in inventory	# of yrs of stored seed meets planting targets (# yrs worth in storage, collection yr)
Alabama NFs	coastal longleaf	400	240,000	4,500	53	186	3 yrs, '00, '03, '06, '08
	mtn longleaf	500	300,000	4,900	61	967	16 yrs, '00, '03, '04, '06
	shortleaf	100	60,000	41,300	1		
For example:							
Cherokee, TN	shortleaf	800	480,000	41,300	12	0	0 yrs, purge '82
	pitch	100	60,000	48,000	1	0	0 yrs, purge '90
	table mtn pine			28,600			
	Am. Chestnut						
Chatto/Oconee, GA	shortleaf	220	132,000	41,300	3		
	longleaf	110	66,000	4,300	15		
	pitch	100	60,000	45,100	1		
	table mtn pine	125	75,000	34,000	2	1	1/2 yr '05

Plant 1+ million shortleaf seedling annually

Future Strategies
EFETAC

Eastern Forest Environmental Threat Assessment Center

- ***Developing new tree range maps (FORECasts)***
- ***R8 will use for seedling deployment***
- ***R8 will be mixing seed sources in the new planting zones***
- ***Longleaf and Shortleaf – taking risks in small areas***

- ***"Determining Suitable Locations for Seed Transfer under Climate Change, Potter & Hargrove, 2014***

http://www.forestthreats.org/research/projects/project-summaries/assessing-forest-tree-risk

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Partners **- FS R&D, state agencies, universities, nurseries, Shortleaf Initiative group, etc.**

NCGRP
Preserving our Future
National Center for Genetic Resources Preservation

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Same Challenges continue…

- ***LIMITED Resources (people, funding)***
- ***Scarcity of seed for the Appalachian areas***
- ***Need to establish additional 2nd gen. seed orchards for missing seed zones***
  - *Funding is needed*
  - *More partners involved*
  - *Need grafting expertise*
  - *Where to plant to ensure resiliency?*
  - *Data collection & analysis*

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Thanks!

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