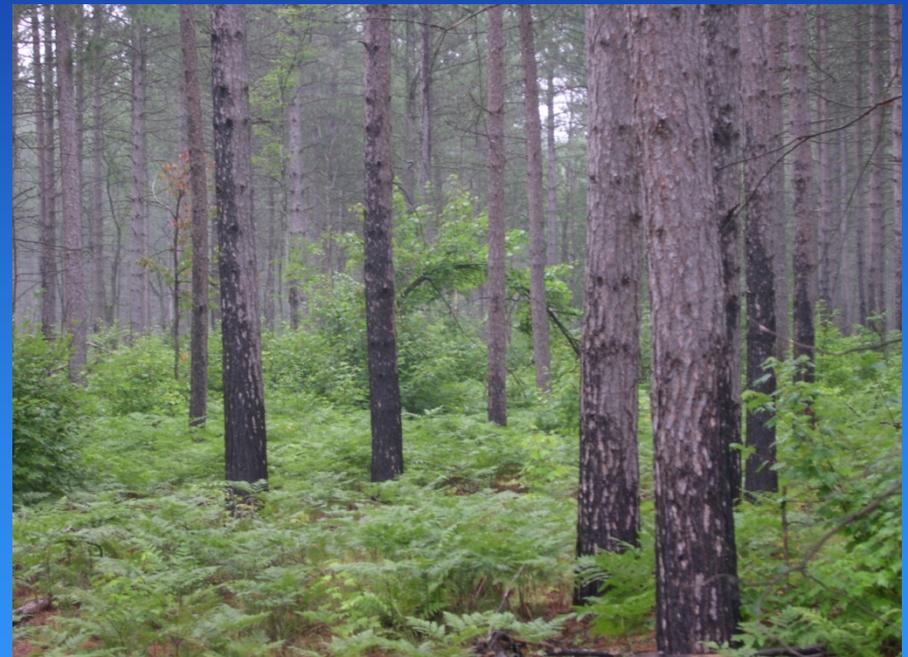




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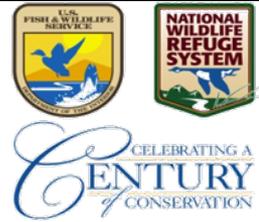
Seney National Wildlife Refuge

Conservation Filters and Ecological Forestry on National Wildlife Refuges



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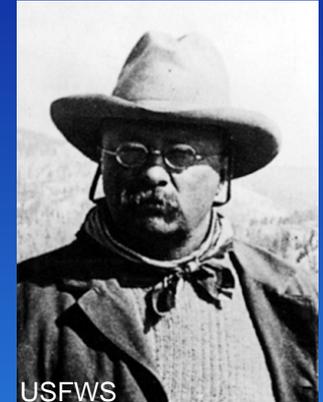


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History: Presidential Leadership

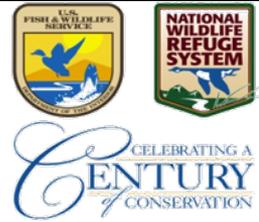
“Wild beasts and birds are by right not the property merely of the people who are alive today, but the property of unknown generations, whose belongings we have no right to squander.”

~Theodore Roosevelt



- On March 14, 1903, President Theodore Roosevelt officially created the 5-acre Pelican Island Bird Reservation and started what became the National Wildlife Refuge System (NWRS),
- Because USFWS has jurisdiction on migratory spp. and Threatened/Endangered spp. habitat management for these “Trust Resources”, tend to emphasized.

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Over A Century Later: The National Wildlife Refuge System



- 544+ refuges,
- Several thousand waterfowl production areas,
- Nearly 95 million acres,
- Includes habitat for over 250 threatened and endangered plants and animals, including forest-dependent species.

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Management Policy

- Only federal lands established specifically for wildlife protection,
- 1997 National Wildlife Refuge System Improvement Act and 2001 Biological Integrity Policy promotes restoration and ecologically-based land management,
- But other land mandates mean different “conservation filters” (Hunter 2005) are used on different lands.



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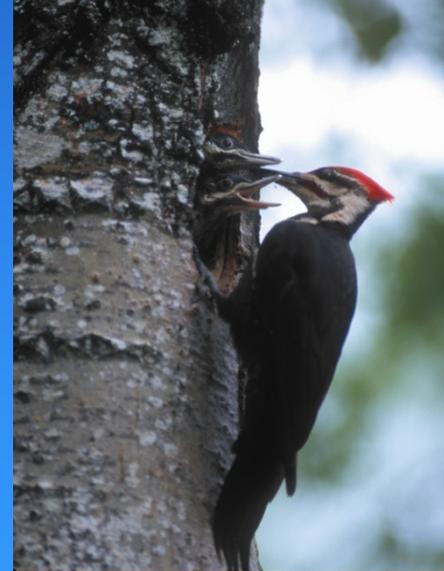
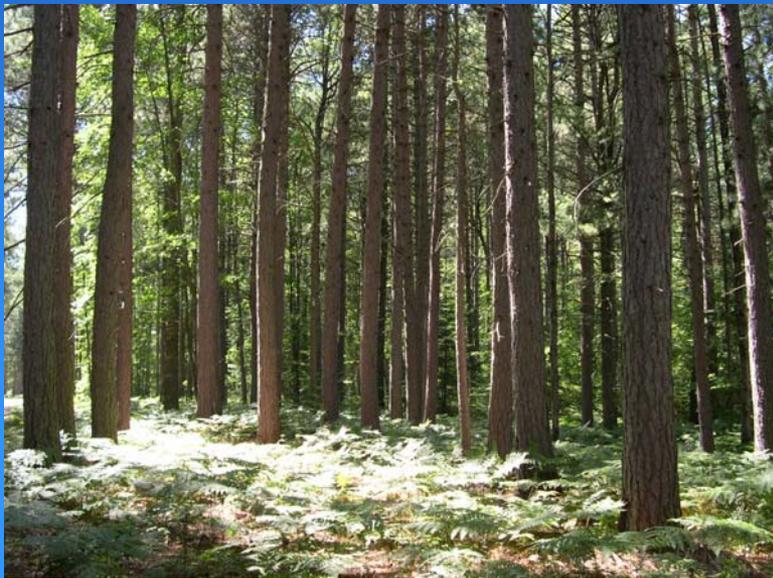


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2001 Biological Integrity Policy

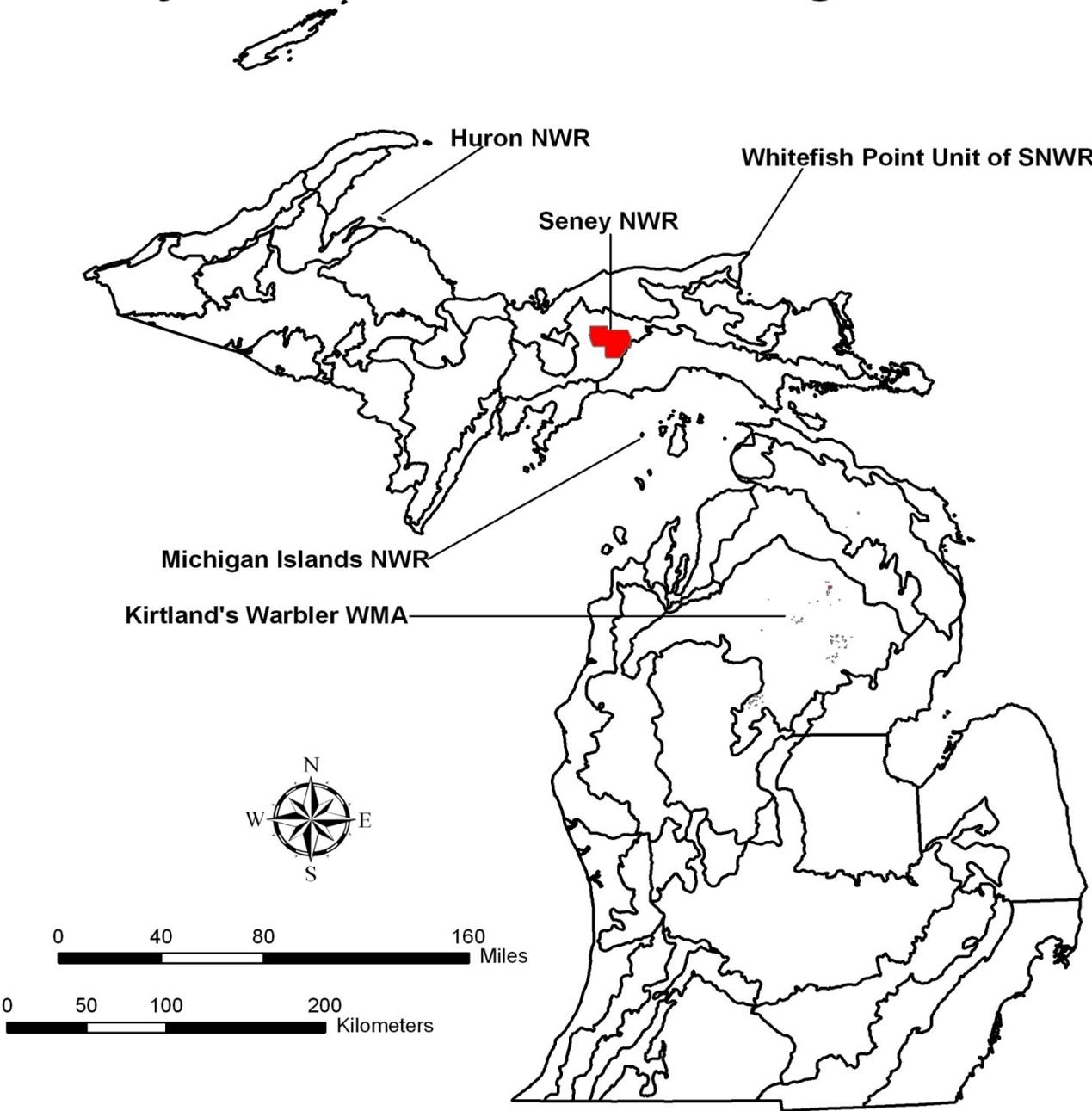
....favoring "management that restores or mimics natural ecosystem processes or function to achieve refuge purposes."

....."the highest measure of biological integrity, diversity, and environmental health (as)...those intact and self-sustaining habitats and wildlife populations that existed during historic conditions."



2001 Bio. Integrity Policy.

Seney NWR and Satellite Refuges in Michigan





Seney National Wildlife Refuge

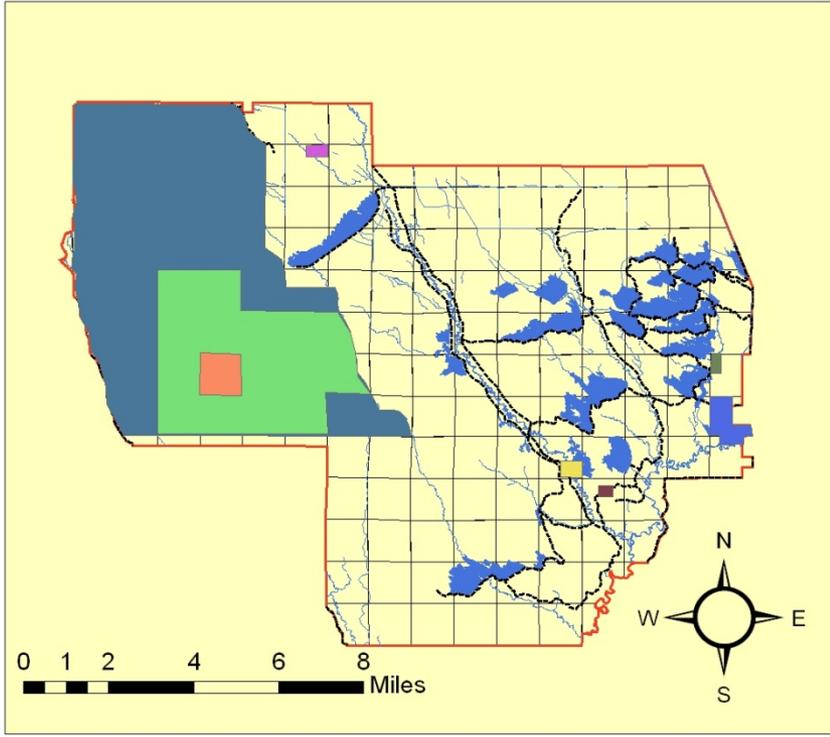
Seney National Wildlife Refuge (SNWR): Coarse and Meso Filter Approaches

Seney National Wildlife Refuge Natural Areas Seney, Michigan

Legend

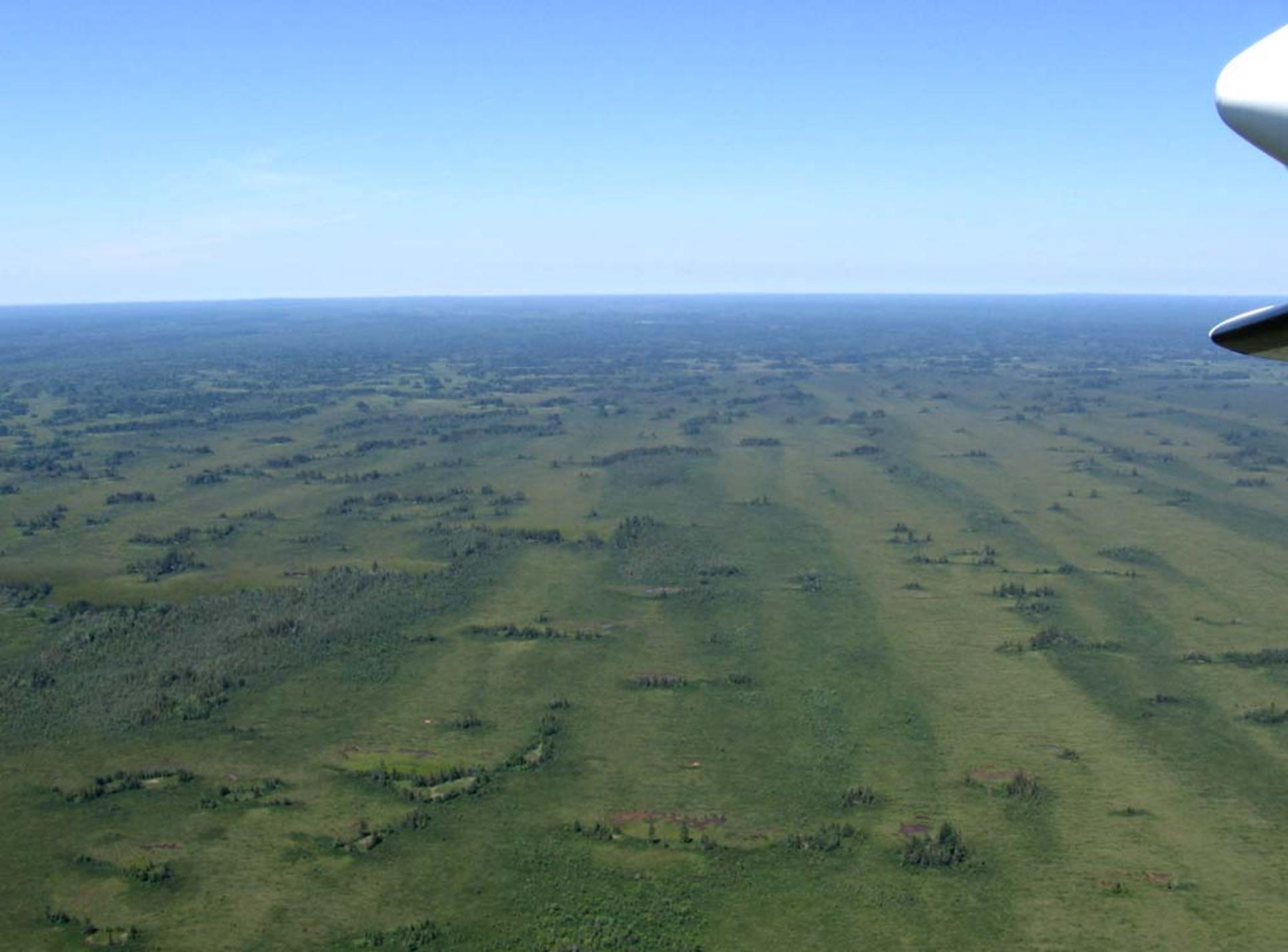
Refuge Natural Areas

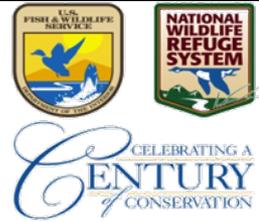
Name	Color
Northern Hardwoods Public Use Natural Area	Dark Red
G-32 Strangmoor Bog RNA	Orange
SAF-15 Red Pine RNA	Yellow
SAF-23 Hemlock RNA	Purple
SAF-25 Sugar Maple-Beech-Yellow Birch RNA	Blue
Seney Wilderness Area	Dark Blue
Strangmoor Bog National Natural Landmark	Light Green
White Pine Public Use Natural Area	Dark Green
Refuge Boundary	Red outline
Refuge Section Lines	Grey outline
Refuge Pools	Blue
Refuge Streams	Light Blue
Refuge Roads	Black dashed line



Map Date: February 2006
 Map Author: RGC, III
 Natural Area information derived from Refuge filing system.
 Other data layers were obtained from the Michigan Spatial Data Library.







Seney National Wildlife Refuge

Chapters in Forest Use on SNWR Lands

- **Exploitation: 1880s – early 1930s**
(i.e., The Great Cutover),
- **Utilitarianism, including Game Management:**
late 1930s – early 1980s (Refuge est. 1935),
- **Landscape ecology-conservation biology-**
restoration ecology: late 1980s – present.

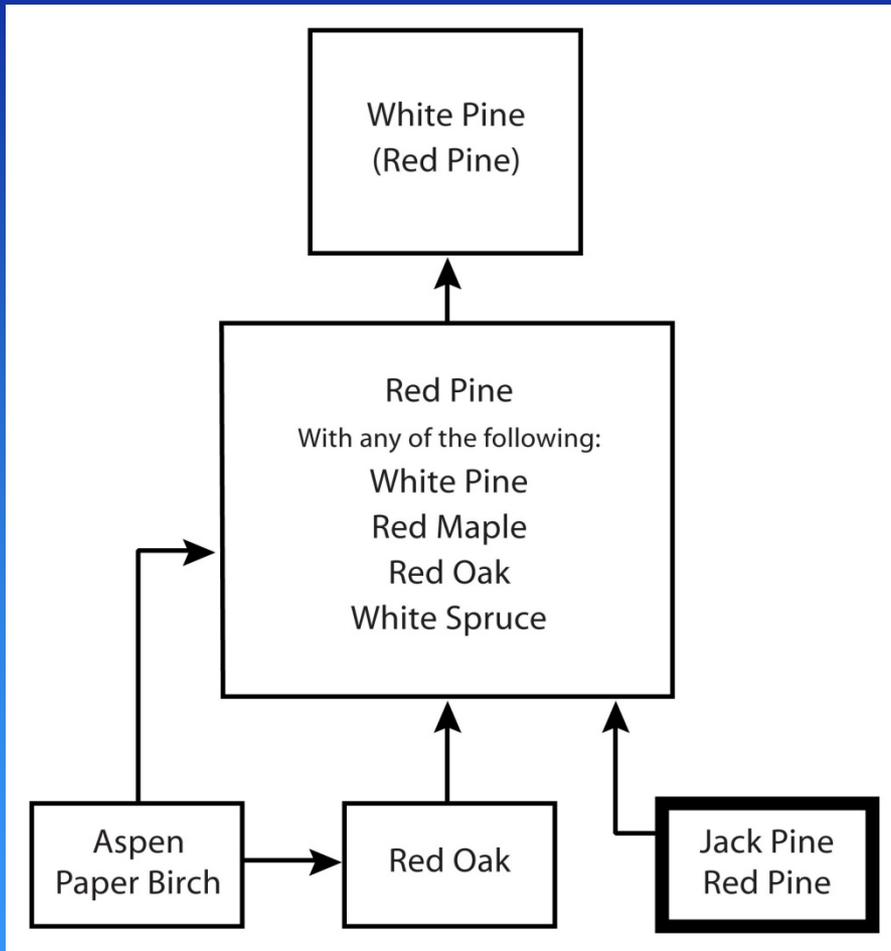




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Evidence to Support SNWR Forest Restoration

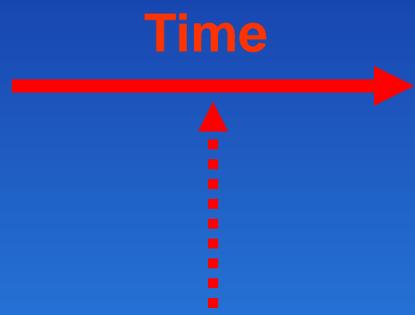
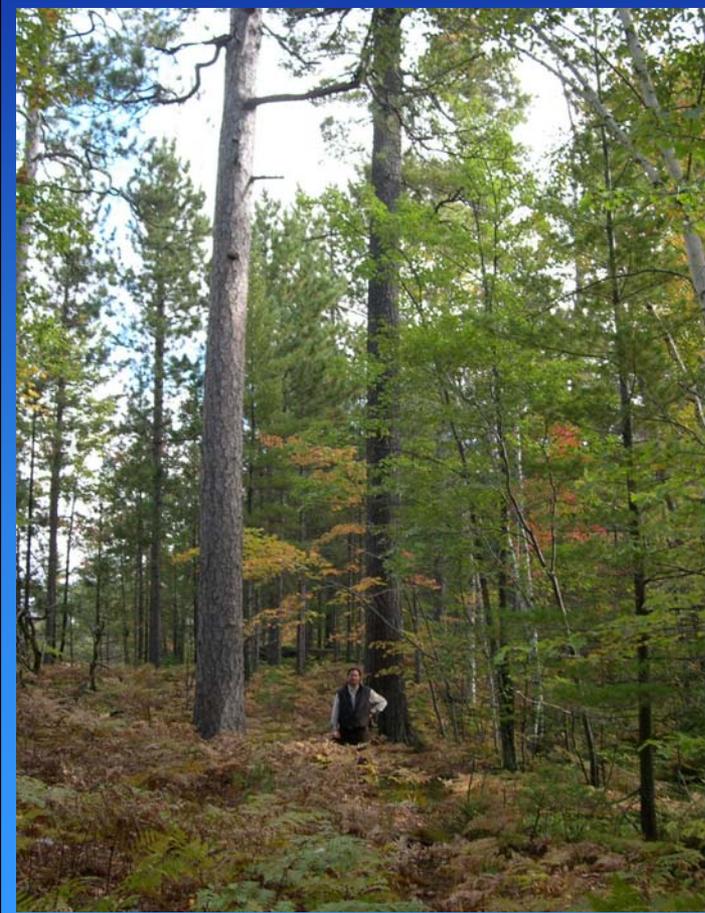
- Soil data/habitat typing,
- Historical stand records (General Land Office notes),
- “Benchmark” reference stands (i.e., “coarse-filter”) in Seney Wilderness Area, Strangmoor Bog NNL, SAF Natural Areas).



Burger and Kotar 2003.

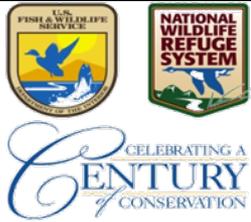
Seney National Wildlife Refuge

Alterations to Mixed-Pine Forests



High-grading
or clear cuts
followed by
fire outside
“natural
range of
variation”

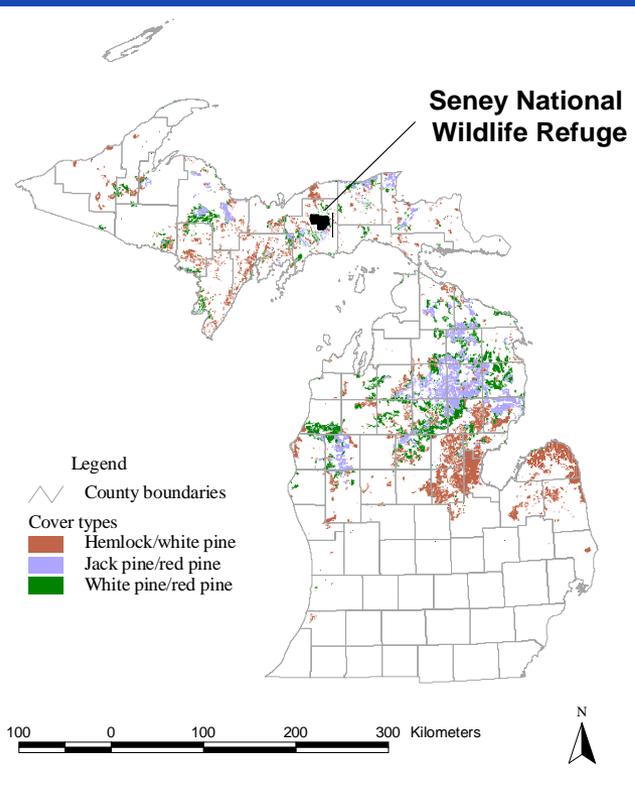




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Research: Restoration-Based Fuel Reduction Recommendations for Mixed-Pine Forests

- Describe fire disturbance history across landforms,
- Compare and contrast stand structure and composition,
- Provide silvicultural recommendations in the context of ecosystem restoration.

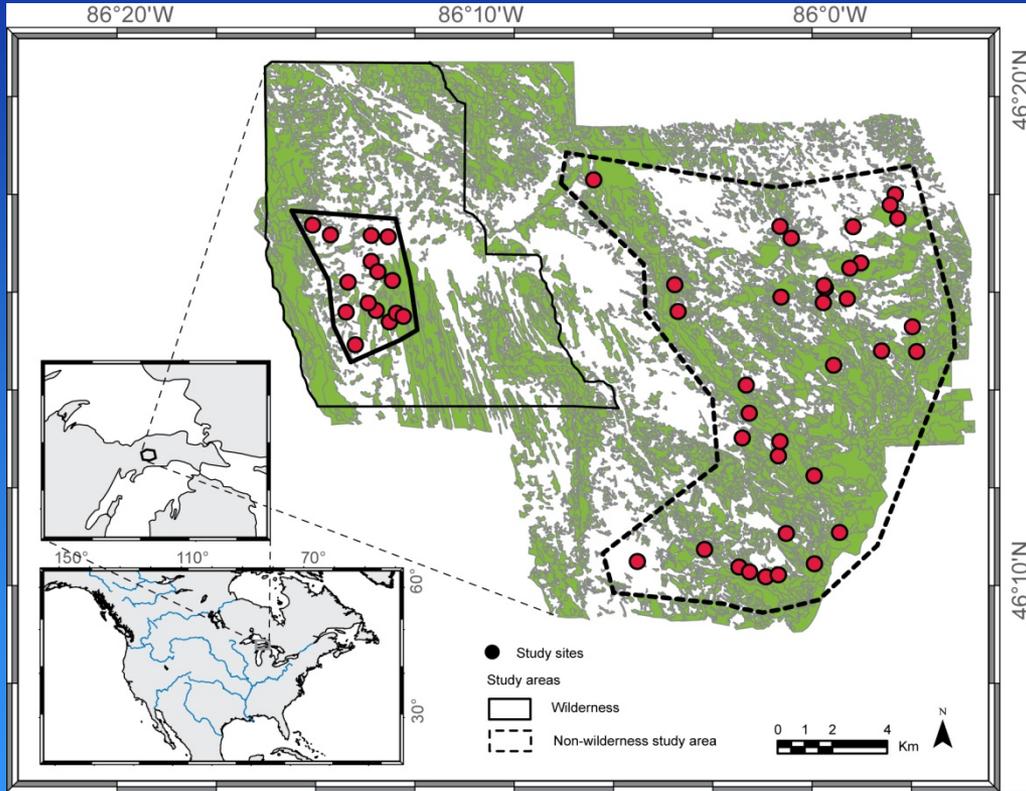




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Methods



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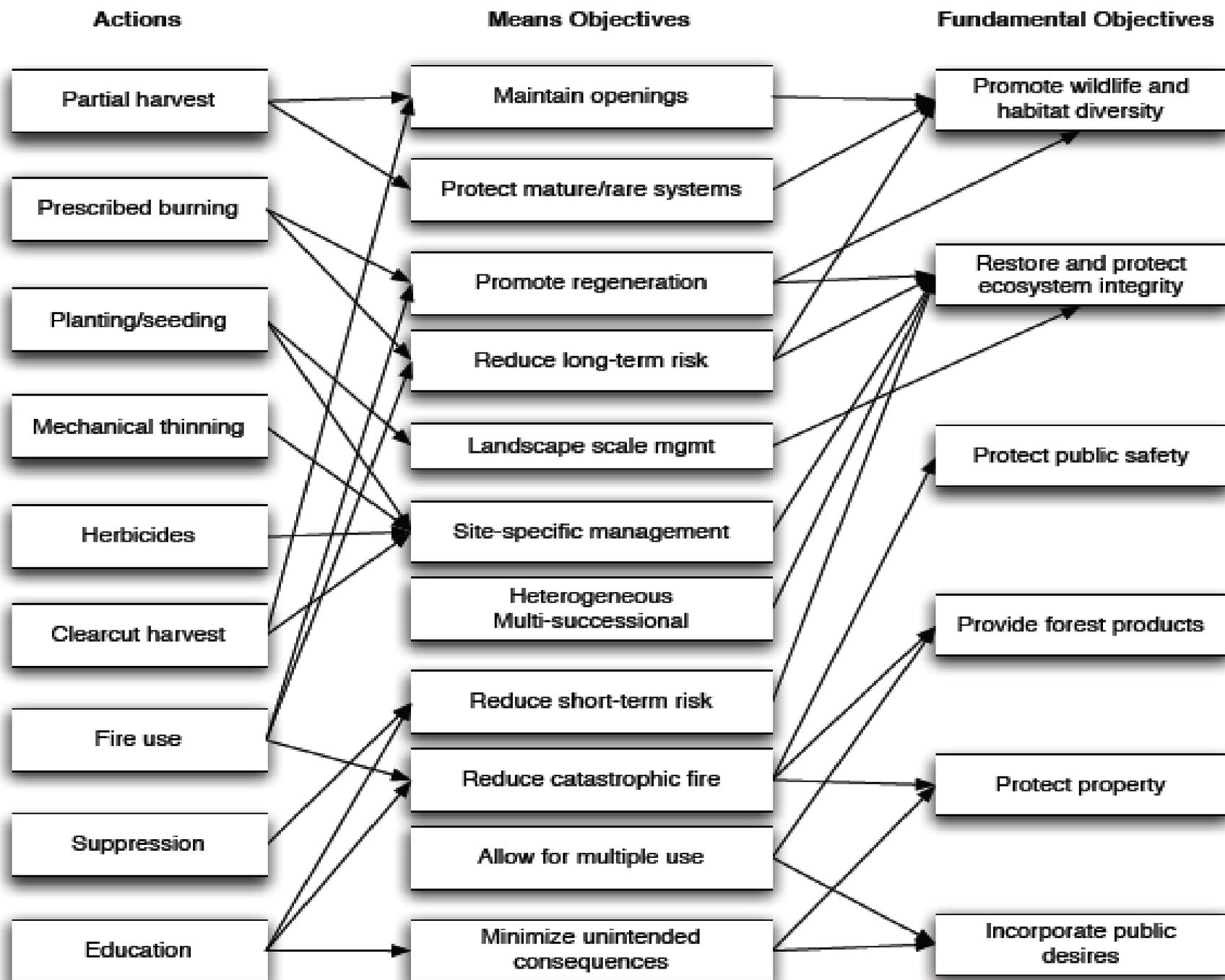
Seney National Wildlife Refuge

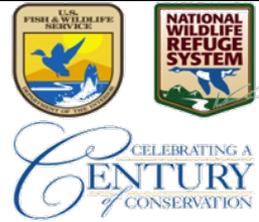
Restoration-Based Findings

- Fire regime: differed among three time periods studied (pre-European, Great Cutover, post-Refuge establishment),
- Earliest fire: 1596
- Fire frequency: 14 – 33 years (Great Cutover fires significantly more frequent),
- FRI of large fire events mean 37 years, range 19 – 73 years (1754, 1791, 1864, 1891, 1910, 1976),
- Seasonality: natural fires occurred in early, mid- and late-season, but large fires were late season events,
- Structural variation: fires affect abundance of red pine (positively) and variability in dbh distributions (negatively), reduce stand spp. diversity by excluding shade-tolerant/fire intolerant spp. (red maple, etc.),

Drobyshev et al. 2008a,b. Can. J. For. Res. and For. Ec. and Mgmt.

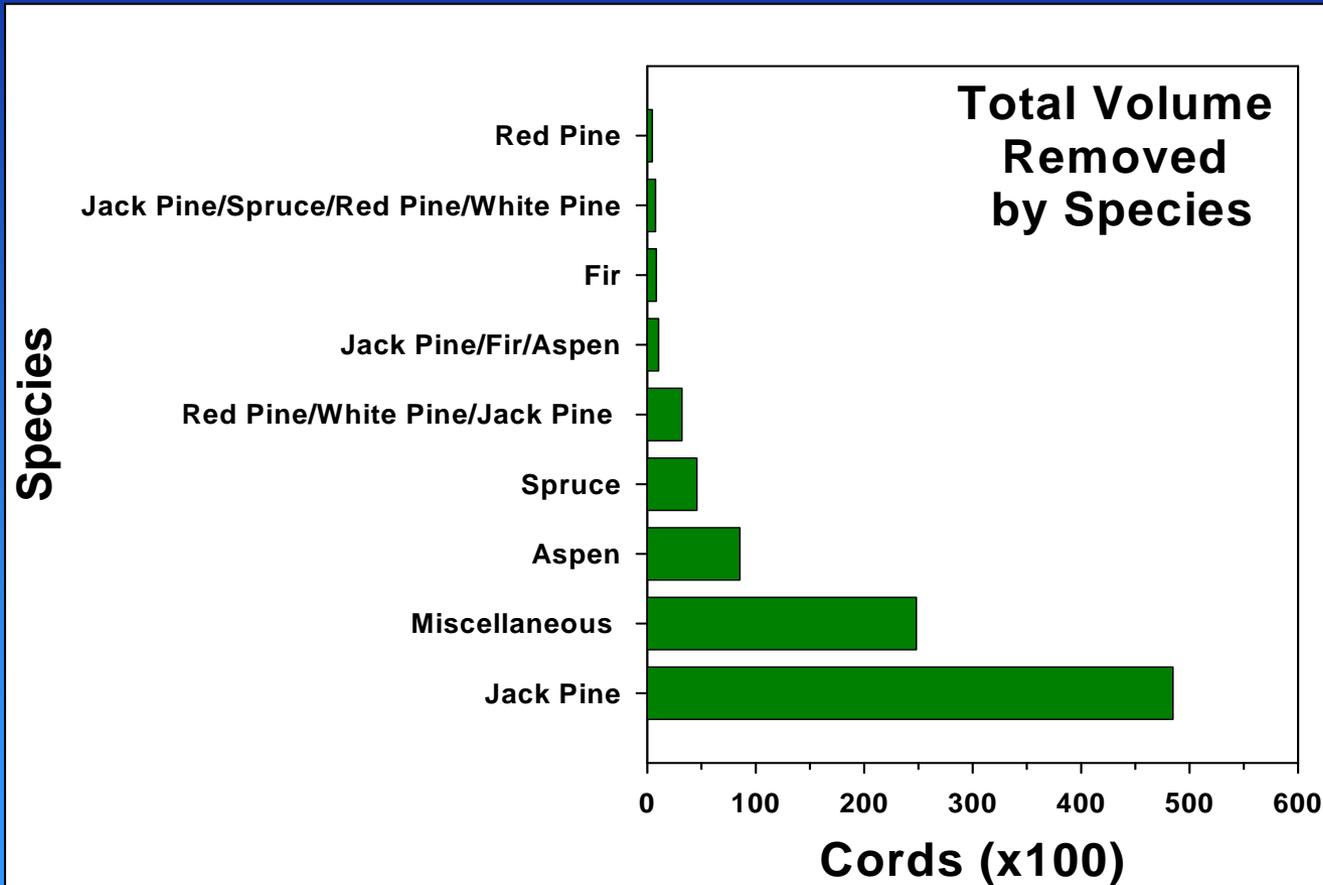
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Restoration-Based Findings



Rist. 2008. M.S. Thesis, OSU.



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Application of Research Findings

Goal: Restore stand composition and structure (“meso-filter”).

Objectives:

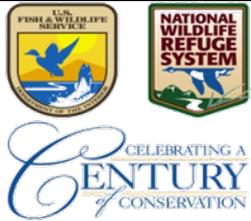
- **Maintain stand-level biodiversity,**
- **Reduce overstory dominance of jack pine by partial harvests,**
- **Shift dominance towards red and white pine and recruit via scarification,**
- **Enhance snag diversity, average size of red and white pine, etc.**



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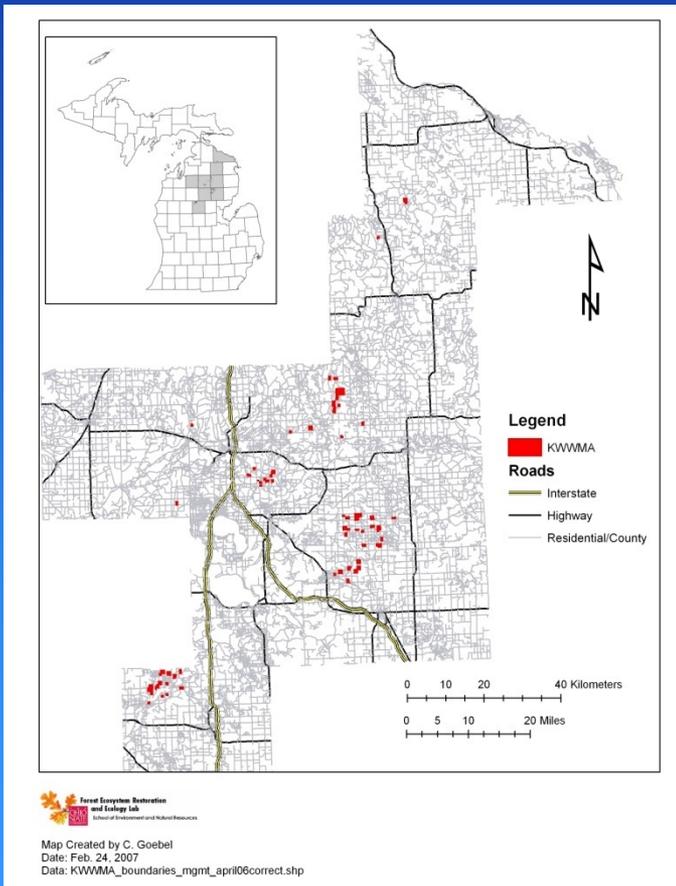


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Kirtland's Warbler Wildlife Management Area (KWWMA): A Shift from Fine to Meso-Filter Approaches



- Re-establish a self-sustaining Kirtland's Warbler (*Dendroica kirtlandii*) population throughout its known range at a minimum level of 1,000 pairs,
- Focus on “fine-filter” management of jack pine (*Pinus banksiana*) habitat and Brown-headed Cowbird (*Molothrus ater*).



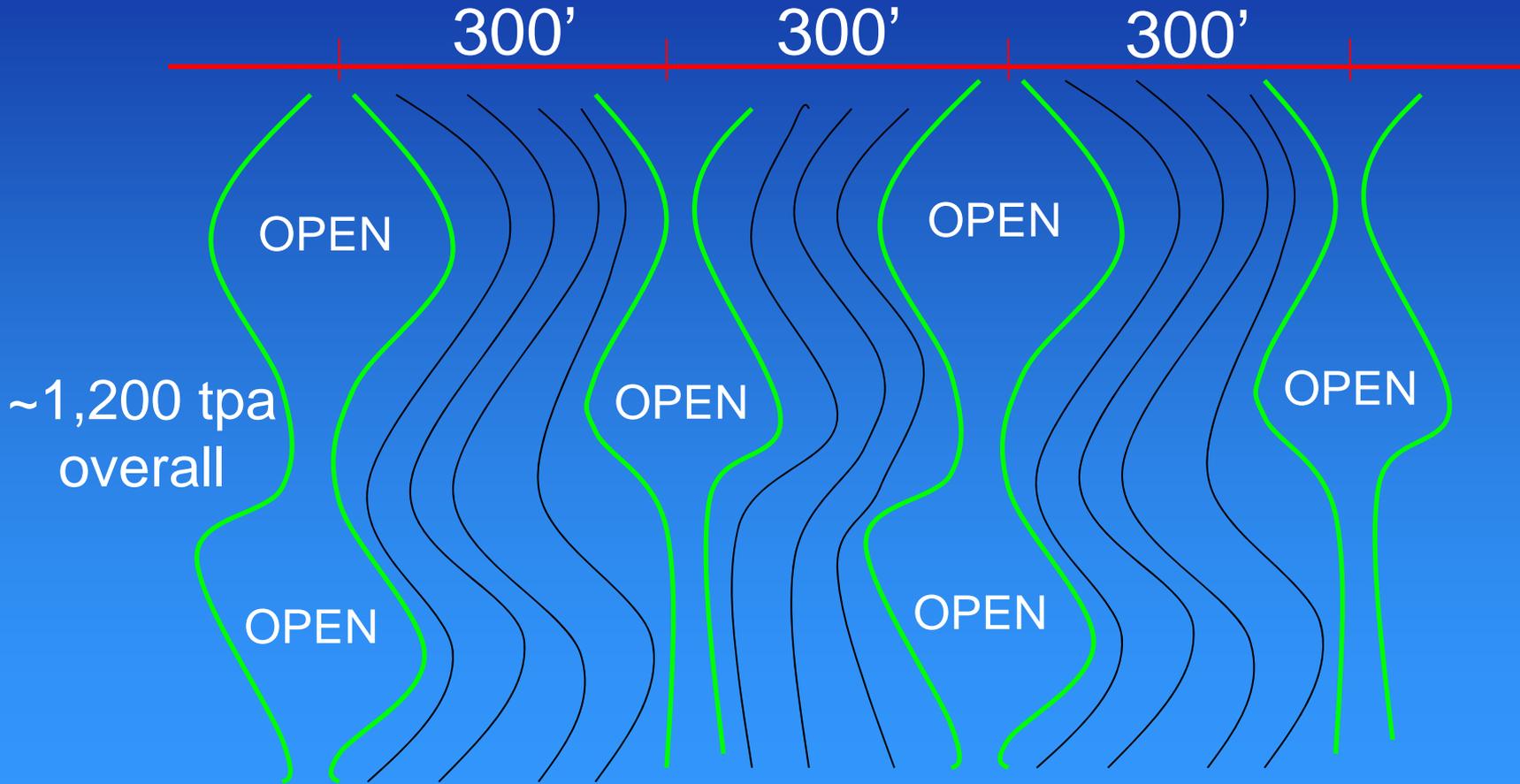




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“Opposing Wave” Pattern of Planting Jack Pine

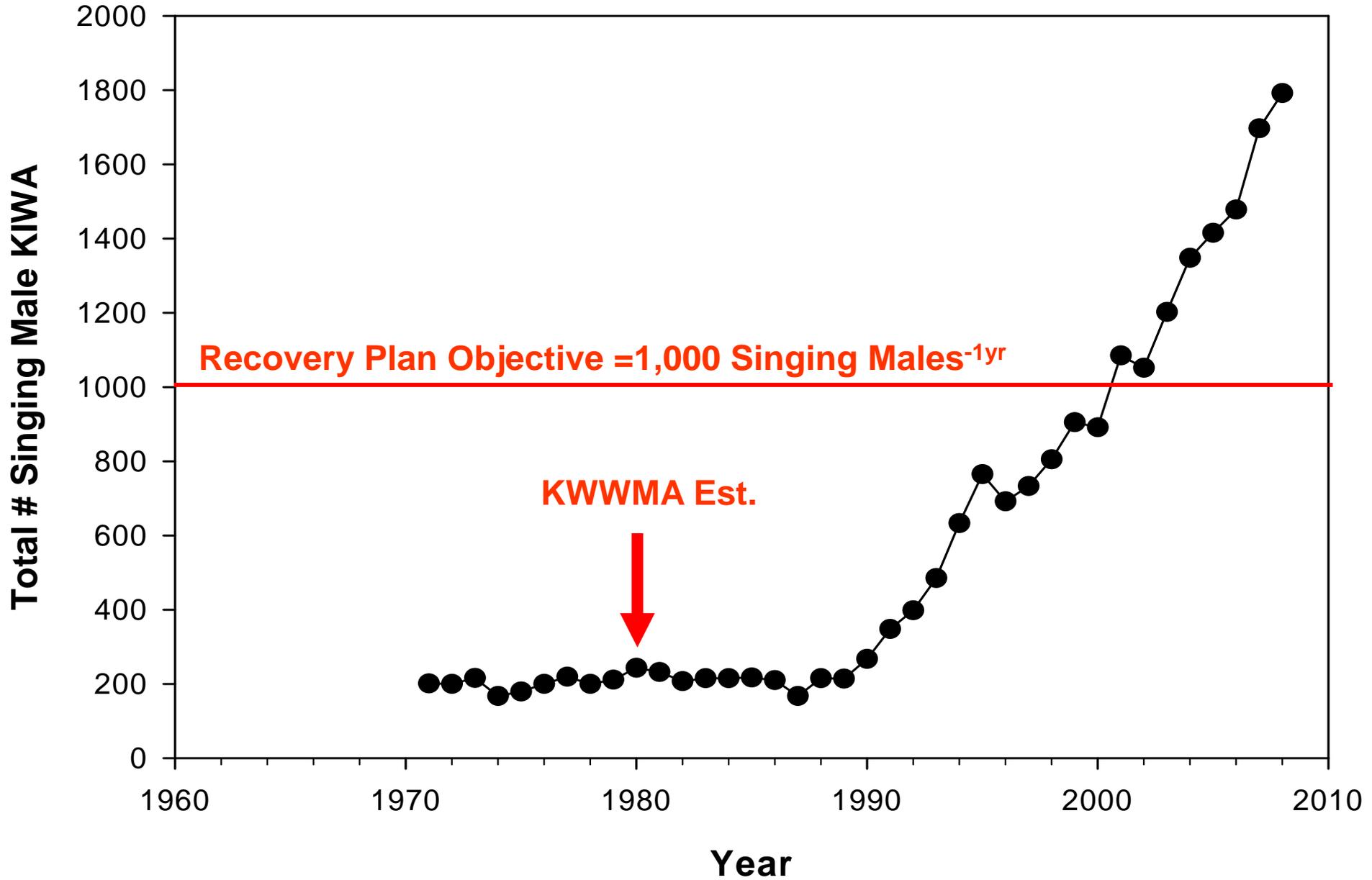


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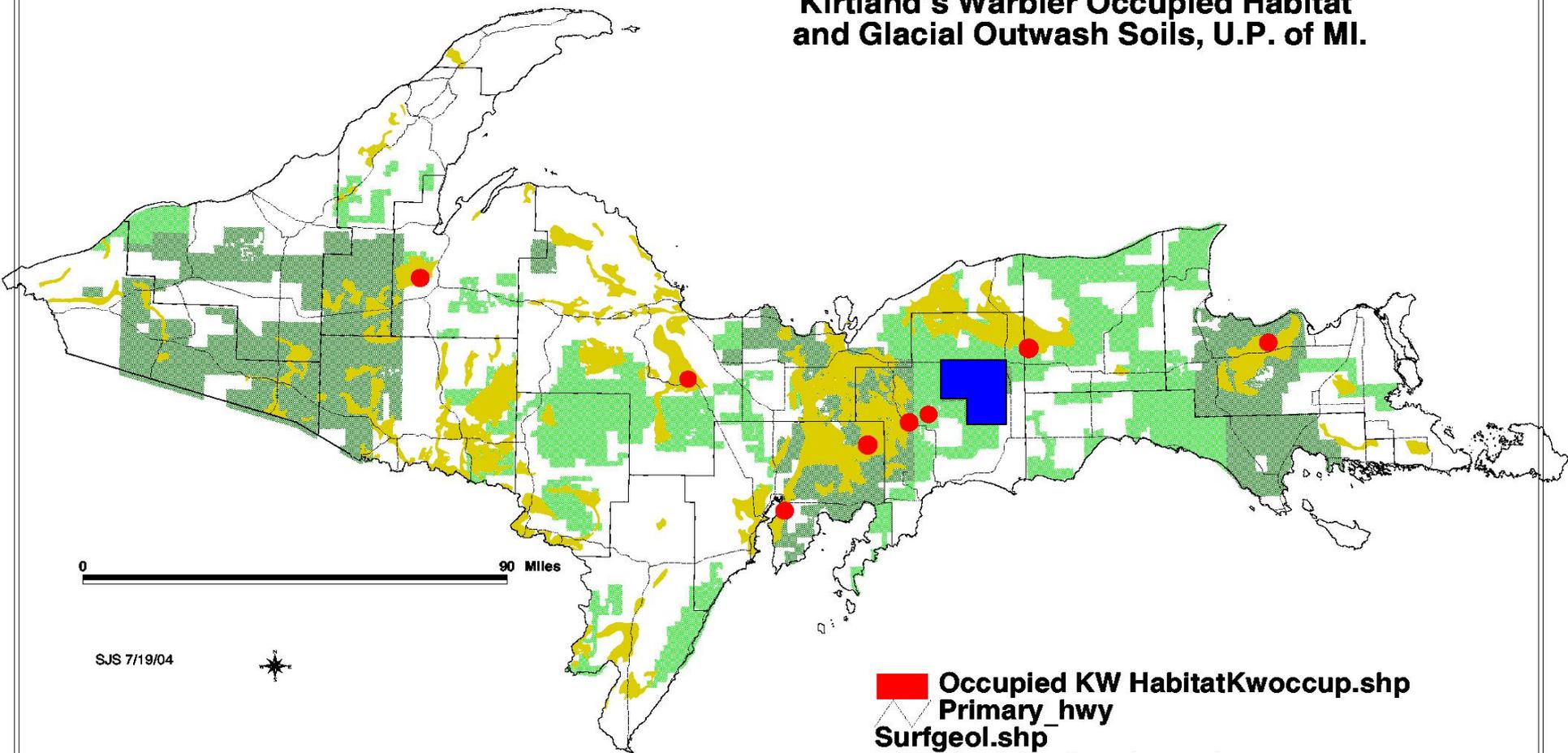




Kirtland's Warbler (KIWA) Annual Census Results: 1971-2008

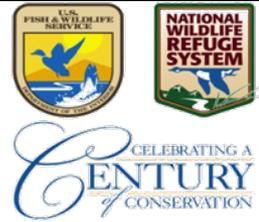


Kirtland's Warbler Occupied Habitat and Glacial Outwash Soils, U.P. of MI.



SJS 7/19/04

-  Occupied KW HabitatKwoccup.shp
-  Primary_hwy
-  Surfgeol.shp
-  glacial outwash sand
-  Allownership
-  STATE
-  USA
-  SENEY NWR



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Habitat Management Across Jack Pine Successional States: Multi-species Implications

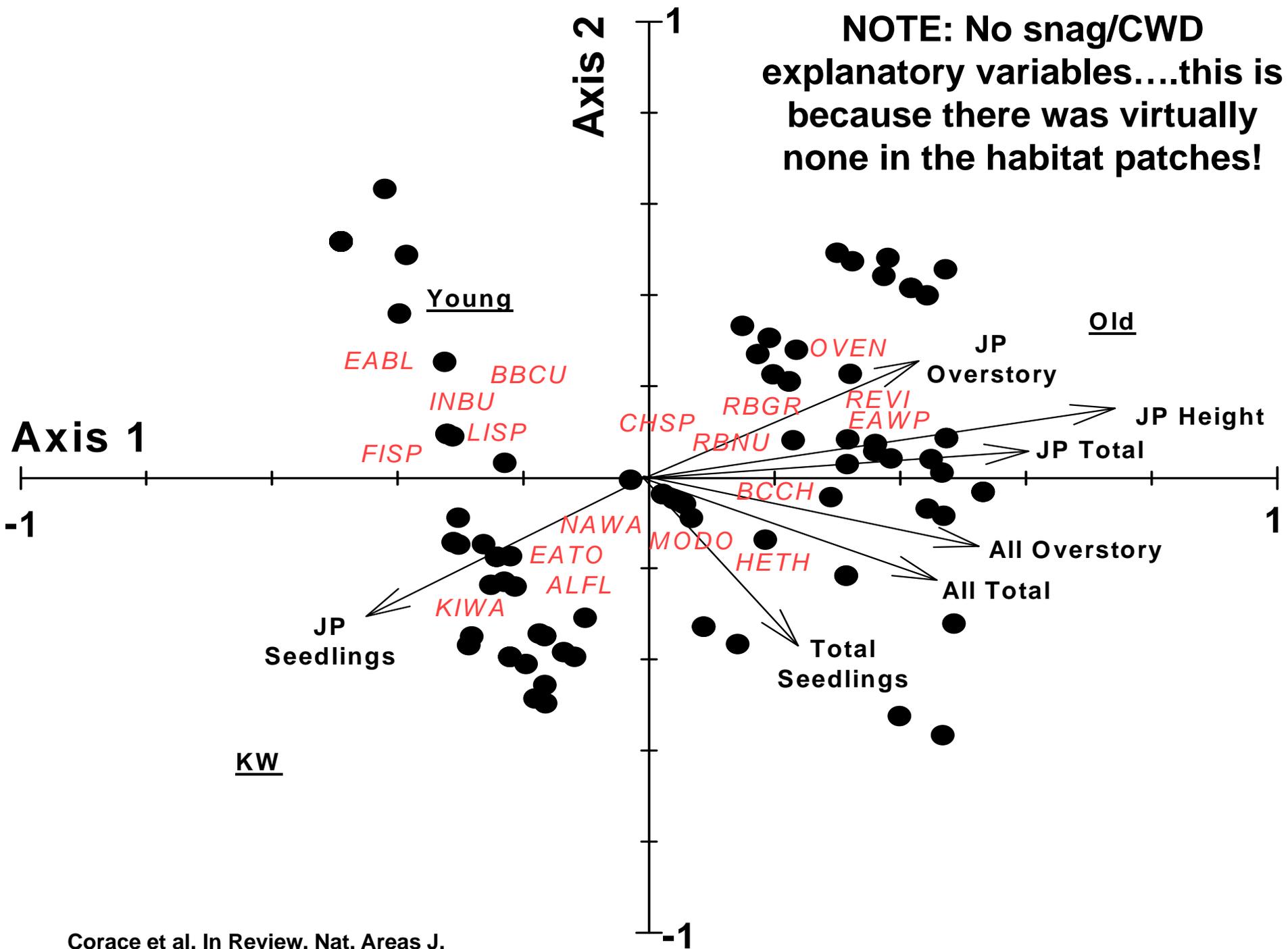


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Table 1. Indicator species for young (< 5 years), KW (5-23 years), and old (> 23 years) jack pine stands at KWWMA.

YOUNG	KW	OLD
Indigo Bunting*** (<i>Passerina cyanea</i>)	Kirtland's Warbler*** (<i>Dendroica kirtlandii</i>)	Eastern Wood-Pewee*** (<i>Sayornis phoebe</i>)
Eastern Bluebird*** (<i>Sialia sialis</i>)	Nashville Warbler*** (<i>Vermivora ruficapilla</i>)	Hermit Thrush*** (<i>Catharus guttatus</i>)
Field Sparrow*** (<i>Spizella pusilla</i>)	Eastern Towhee*** (<i>Pipilo erythrophthalmus</i>)	Ovenbird*** (<i>Seiurus aurocapilla</i>)
Lincoln's Sparrow*** (<i>Melospiza lincolnii</i>)	Brown Thrasher** (<i>Toxostoma rufum</i>)	Rose-breasted Grosbeak*** (<i>Pheucticus ludovicianus</i>)
Black-billed Cuckoo* (<i>Coccyzus erythrophthalmus</i>)	Alder Flycatcher** (<i>Empidonax alnorum</i>)	Red-breasted Nuthatch*** (<i>Sitta vireo</i>)
		Red-eyed Vireo*** (<i>Vireo olivaceus</i>)
		Black-capped Chickadee** (<i>Poecile atricapillus</i>)
		Chipping Sparrow** (<i>Spizella passerina</i>)

* $P \leq 0.05$; ** $P \leq 0.01$; *** $P < 0.001$.





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An Emphasis on Structure: Why?



- Structure (snags) provide important microsites for rarer flora and fauna, and function in nutrient recycling, other processes,
- Sallabanks and Arnett (2005) report the amount, size, and distribution of structure (esp. snags and CWD) to be major limiting variables in biodiversity of managed stands,
- Scott et al. (1977) found 85 North American bird species excavate or use snags for breeding.

• Previous work (Rothstein et al. 2004, Goebel et al. 2007, Spaulding 2008) identified the lack of CWD/snags in managed stands.

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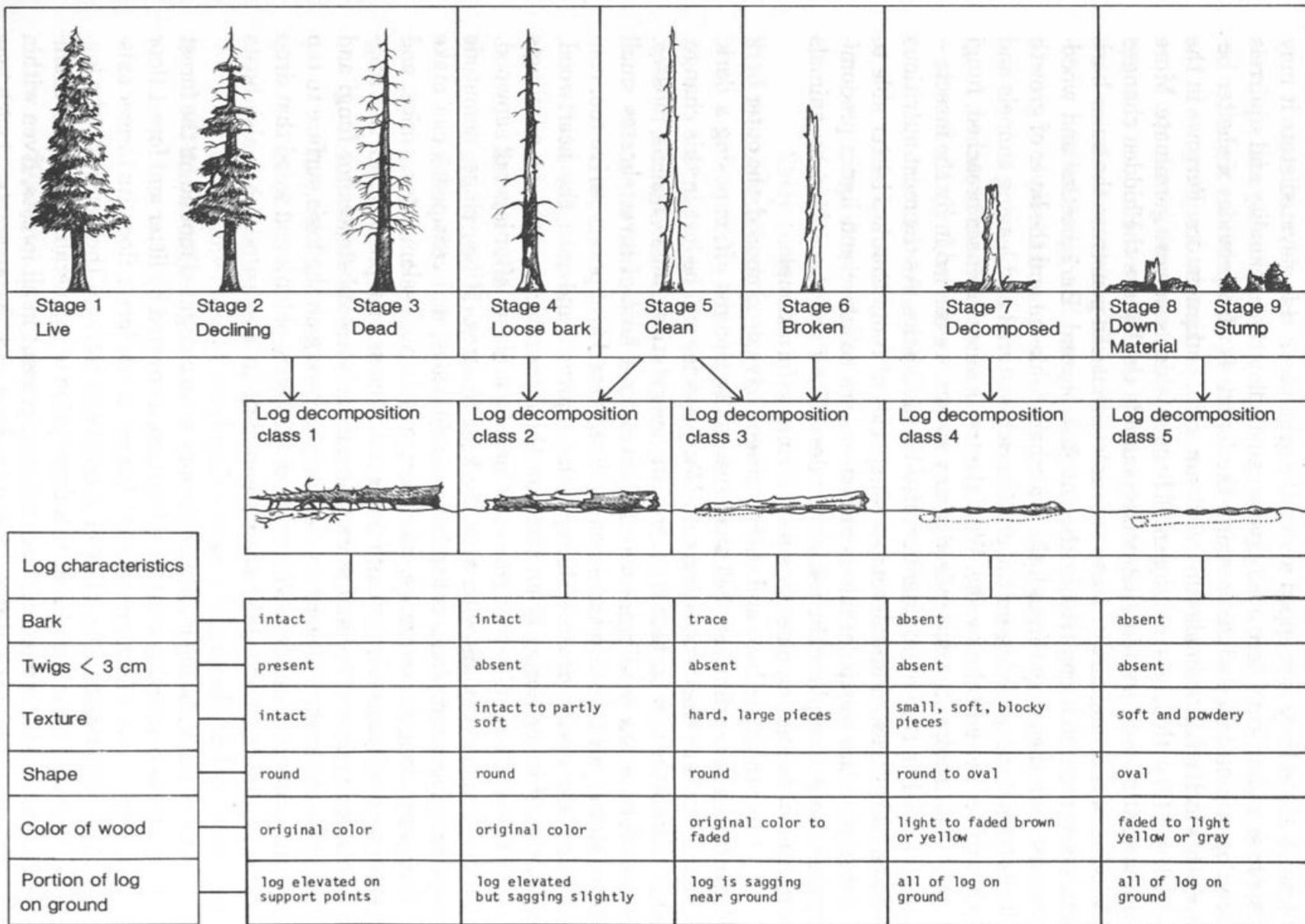


Figure 10.1 and Table 10.2 The gradual decay of snags and logs can readily be seen in many external changes. Note that when a well-decayed snag falls, it enters an advanced stage of log decomposition. (This figure and table are based on a description of the decay of Douglas-fir snags and logs as adapted by Maser et al. 1979, and Thomas et al. 1979c, from Fogel et al. 1973.)

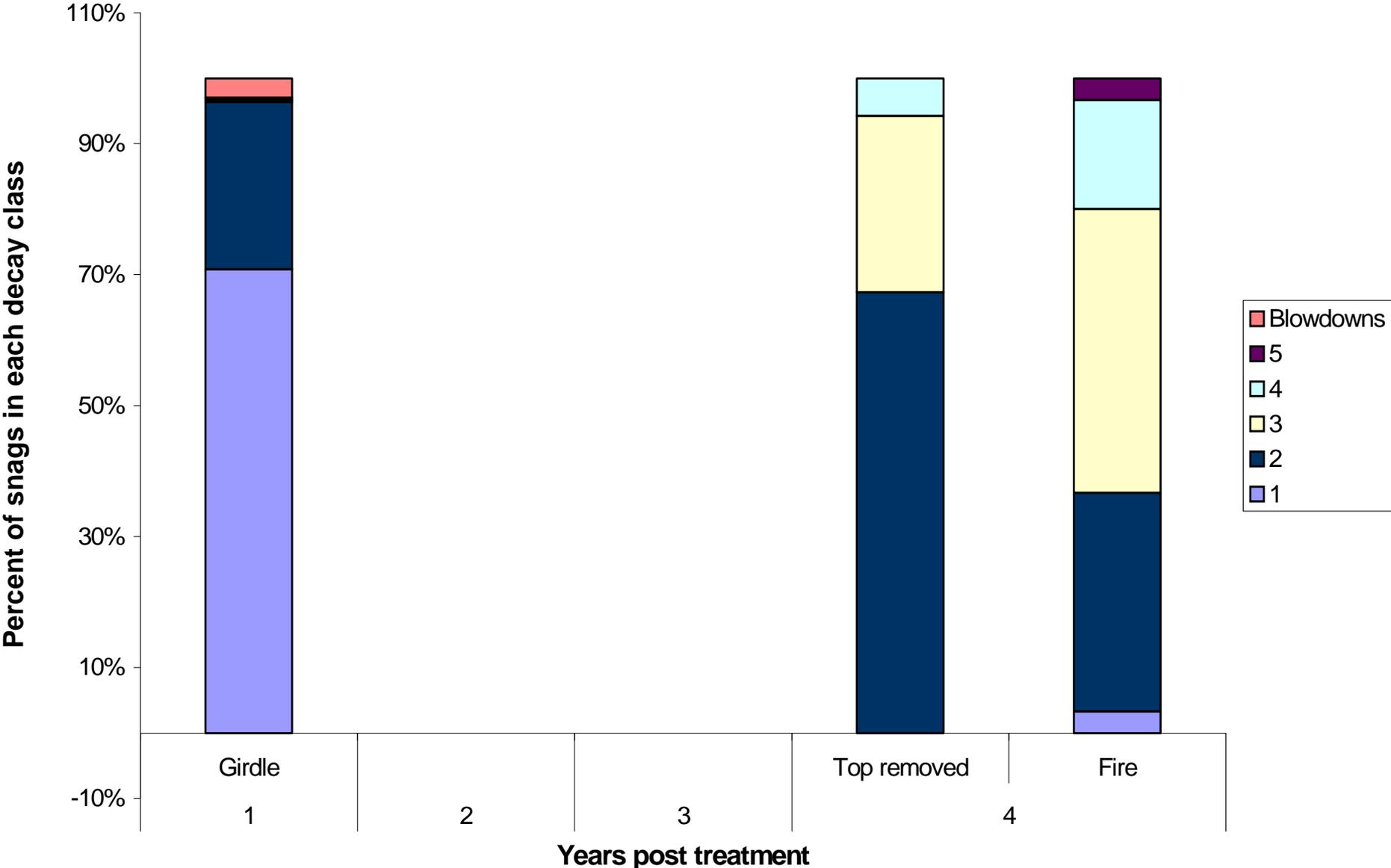


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An Emphasis on Structure: Preliminary Results

- 336 snags inventoried in Fall '06: 165 “natural” and 171 “managed” (i.e., created in Fall '06),
- 52% natural = jack pine, 48% managed = jack pine, most of rest oak spp.,
- Yr-1, “mortality rate” (i.e., % DC > 5) = 13% natural, 28% managed,
- Yr-2, mortality rate = 50% natural, 31% managed,
- Yr-2, 93% of all mortality in managed snags = jack pine, compared to 66% in natural snags,
- Yr-2, 52% of managed snags with mortality <25cm dbh, compared to 19% of managed snags >25 cm with mortality.

Percentage of snags in each decay class versus years post treatment for snags created by girdling (n=107), top removal (n=30), and fire (n=30)





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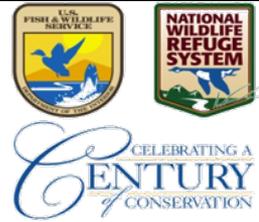
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Ecological Forestry on Other Refuges



Thanks to: Chuck Hunter (USFWS, Atlanta), Jack Culpepper (Carolina Sandhill NWR), Carl Schmidt (Piedmont NWR), Jeff Denman (White River NWR)

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Conservation Filters and Ecological Forestry on National Wildlife Refuges



“A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.”
~Aldo Leopold

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