



# Restoring an open forest ecosystem in the context of public expectations

## *Part II: Visualizing and modeling preferences for pine barrens treatment practices*

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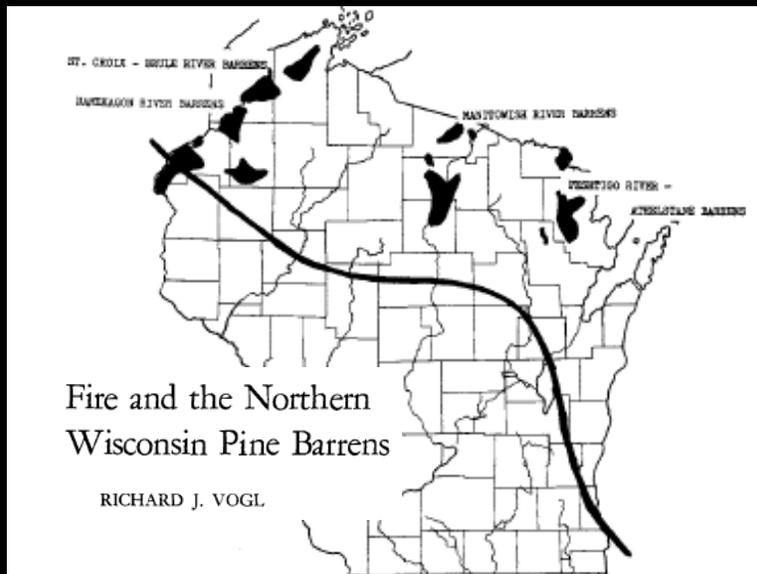
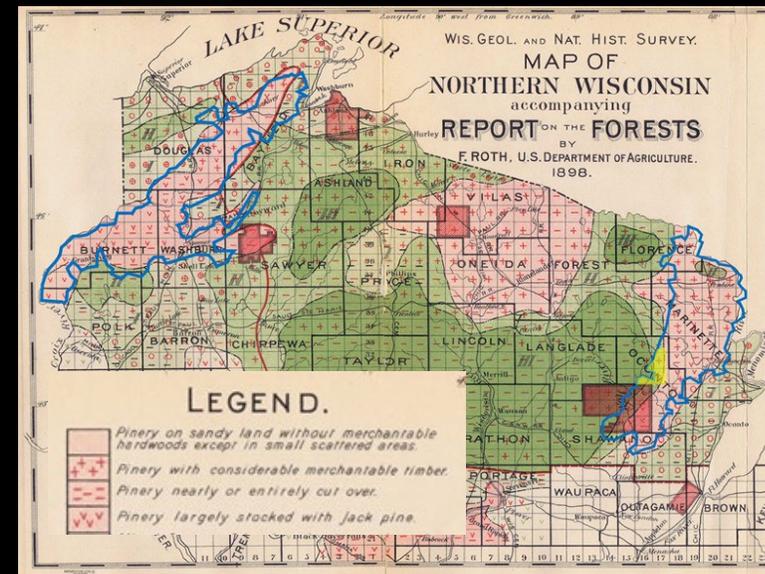
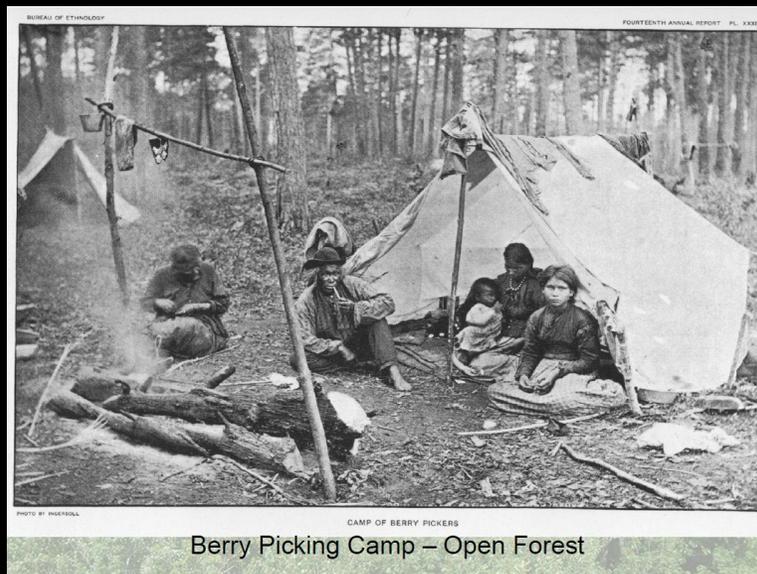
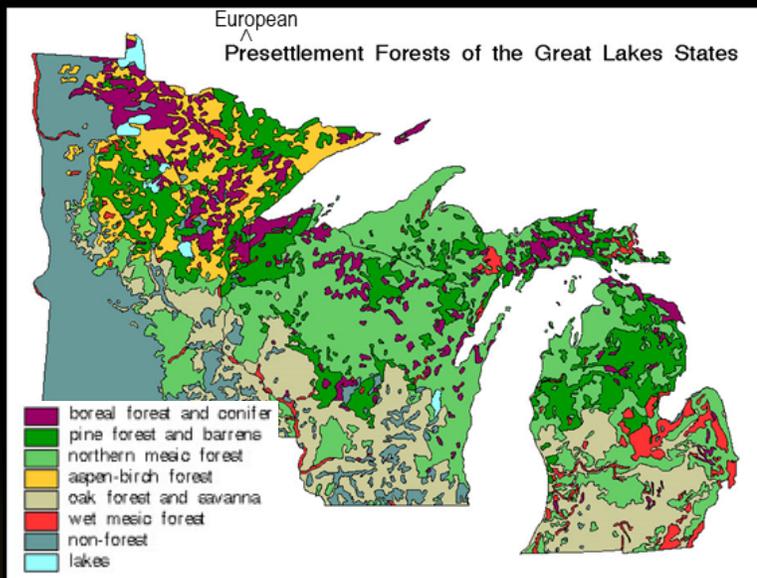
CO-INVESTIGATORS: ARNE ARNBERGER, UNIV. OF NATURAL RESOURCES AND LIFE SCIENCES, VIENNA

INGRID SCHNEIDER, CLAIRE BENTON, AND MIKE DOCKRY, UNIV. OF MINNESOTA

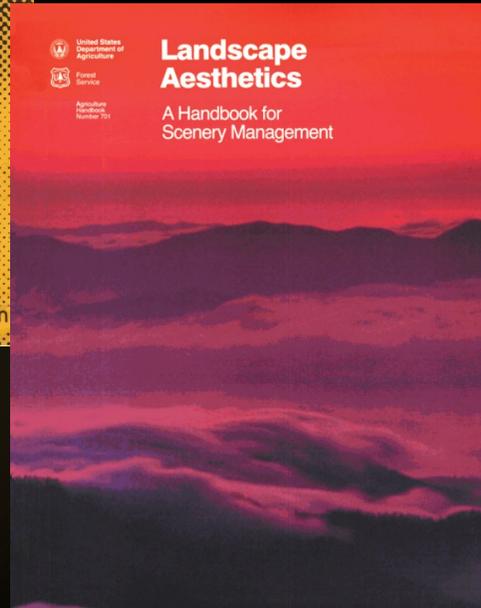
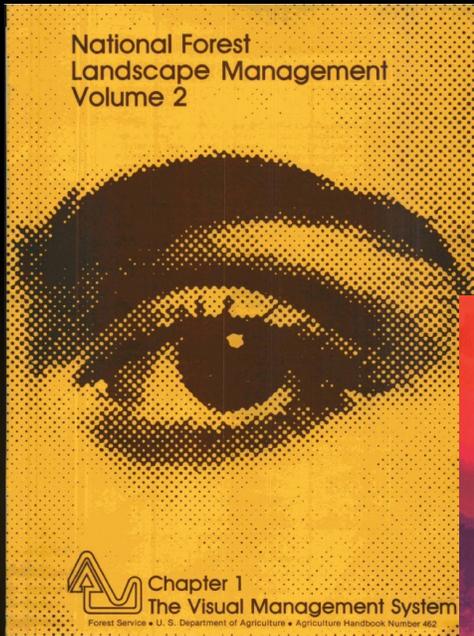
KRISTIN FLORESS, NORTHERN RESEARCH STATION

ANNA HAINES, UNIV. OF WISCONSIN- STEVENS POINT

# Pine barrens landscape management history

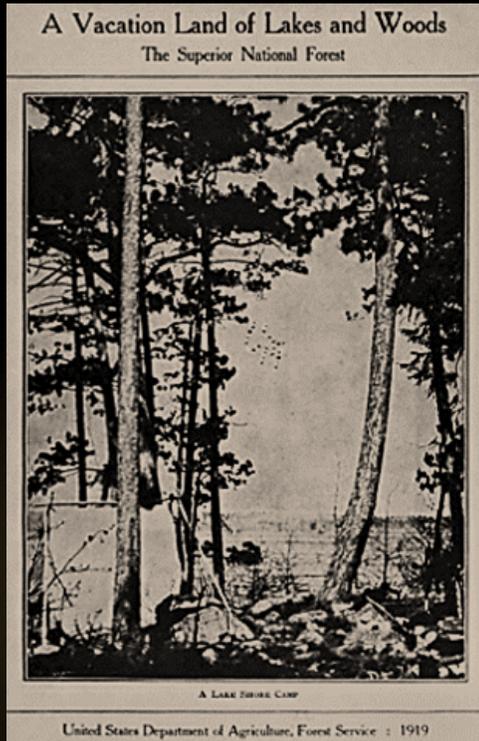


# Visual Landscape Management- forest stand and treatment preferences



- ▶ NEPA, NFMA- develop guidelines for integrating aesthetic values into forest planning and management
- ▶ 2012 Planning Rule- use best available scientific information to maintain scenic character for sustainable recreation
- ▶ Well-established research literature on forest stand and treatment preferences in the context of timber management
- ▶ Little or no information on managing the aesthetics of open forest landscapes such as pine barrens

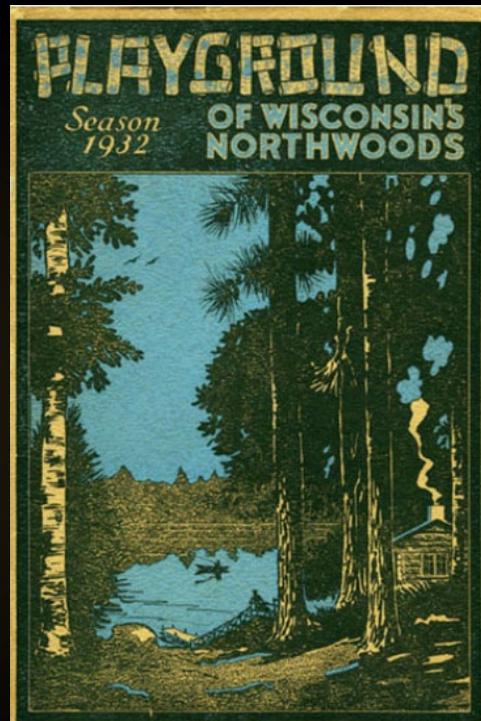
# The “scenic aesthetic” of the Northwoods



Cultivated preference for lake and forest scenery associated with the Northwoods

Research on forest stand and treatment preferences for Northern Hardwoods

- ▶ Continuous canopy of large diameter trees
- ▶ Hardwood species w/conifers & white birch
- ▶ Open understory, lush ground cover
- ▶ Selective thinning, maintain large diam trees
- ▶ Small openings
- ▶ Minimum of standing or downed dead wood



In Shapiro, A. (2013). *The Lure of the North Woods: Cultivating Tourism in the Upper Midwest*. University of Minnesota Press.

e.g., Ribe, R. (1990). A General Model for Understanding the Perception of Scenic Beauty in Northern Hardwood Forests. *Landscape Journal*, 9, 86-101.

# An “ecological aesthetic” pine barrens for managing pine barrens?

“Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful to values as yet uncaptured by language.”

—Aldo Leopold

- ▶ **Landscape design** can provide visual cues to care to interpret ecological function and aid in understanding the beauty of unfamiliar, “scenically challenged” landscapes
- ▶ **Knowledge** about the integrity and diversity of the landscape can lead to “a refined taste in natural objects”



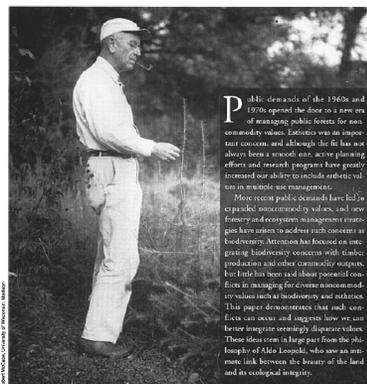
## Messy Ecosystems, Orderly Frames

Joan Iverson Nassauer

Joan Iverson Nassauer, FASLA, is Professor and Head of the Department of Landscape Architecture at the University of Minnesota. Her research focuses on the intersection between landscape perception and landscape ecology. Currently she is experimenting with urban landscape designs that place unfamiliar ecosystems in a familiar cultural context.

**Abstract:** Novel landscape designs that improve ecological quality may be maintained if recognizable landscape language that communicates human intention to care for the landscape is not apparent. A powerful vocabulary for design to improve ecological quality. Eco-ready recognizable to those who are not educated to look for it. Further, many indigenous ecosystems and wildlife habitats violate cultural norms of landscapes. Even to an educated eye, ecological function is sometimes not use cultural values and traditions for the appearance of landscape to function in a recognizable context. I describe several examples of cultural language that provide a cultural context for ecological function, and I demonstrate used in design.

By Paul H. Gobster



Aldo Leopold's

**ECOLOGICAL  
ESTHETIC**

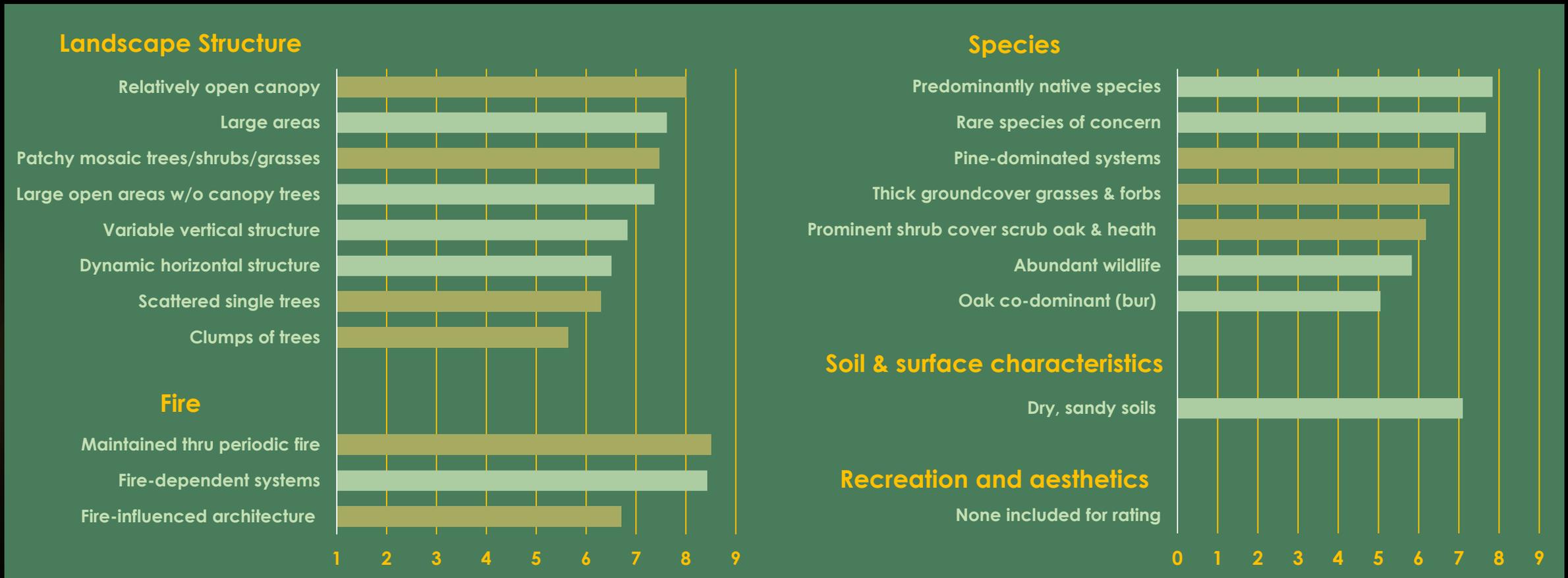
Integrating Esthetic and Biodiversity Values

# Questions for research



- ▶ **Restoration treatment design:** What are the key visual attributes of pine barrens and how can they be manipulated to maximize preferences for pine barrens?
- ▶ **Effects of knowledge:** Are there differences in preferences for pine barrens restoration treatment designs among stakeholders and does knowledge about barrens lead to higher preferences for an ecological aesthetic?

# Step 1: Identify the key attributes of pine barrens landscapes

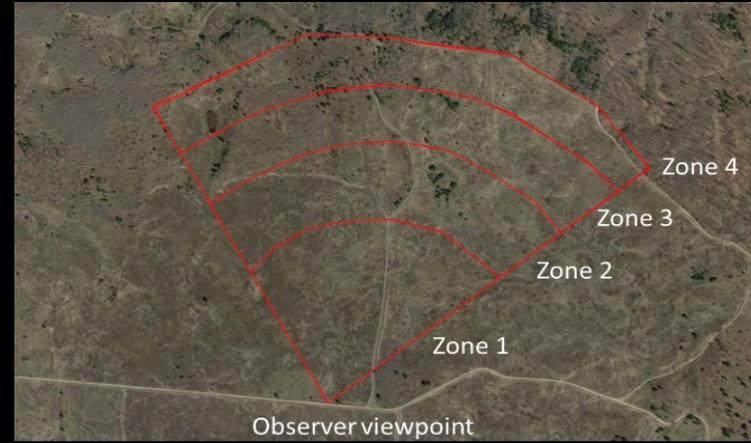


Gobster, P. H., Schneider, I. E., Floress, K. M., Haines, A. L., Arnberger, A., Dockry, M., & Benton, C. (2021). Understanding the key characteristics and challenges of pine barrens restoration: Insights from a Delphi survey of forest land managers and researchers. *Restoration Ecology*, 29(1), e13273, pp. 1-12. <https://doi.org/10.1111/rec.13273>

# Step 2: Select attributes and attribute levels for the discrete choice experiment

Attributes	Attribute levels	Description
<b>Spatial configuration</b>	1) Trees in foreground 2) Trees spread 3) Trees in midground 4) Trees in background; open land 5) Trees in midground & 1% forest cover foreground 6) Trees in background & 1% forest cover foreground	Trees in zones 1+2 Trees in zones 1-4 Trees in zones 2+3 Trees in zones 3+4 Trees in zones 2+3 Trees in zones 3+4
<b>Tree density</b>	1) 5% cover 2) 15% cover 3) 25% cover 4) 35% cover	Typical for Pine Barrens 5-40%, M = 25%
<b>Tree distribution</b>	1) Scattered single trees 2) Clumps of trees 3) Mix	Solitary trees only Clumps of trees only 50% of trees in clumps, 50% solitaires
<b>Fire interval</b>	1) Frequent fire treatments (every 3 yrs.) 2) Occasional fire treatment (every 10 yrs.) 3) Rare fires (every 30 yrs.)	Understory early phase; some burnt areas Understory in between, no burnt areas Understory fully developed, no burnt areas
<b>Shrub density</b>	1) 0% oak shrub layer 2) 5% oak shrub layer 3) 30% oak shrub layer 4) 60% oak shrub layer	Oak shrubs in zones 1+2 (3?) Normal level 1% % of total area cover Double 2% of total area cover
<b>Standing dead trees</b>	1) 0 dead trees 2) 4 dead trees 3) 4 dead trees with blueberries 4) 8 dead trees	Standing dead trees for wildlife 50% in zone 1; in the middle of respective zone; 50% in zone 2; in the middle of respective zone

# Step 3: Prepare landscape visualizations for use in online photo-questionnaire



Attribute	Level	Description
1) Spatial configuration	3	Trees in midground (Zones 2+3)
2) Tree density	2	15%
3) Fire interval	1	Frequent fire treatments (every 3 yrs.)
4) Tree distribution (clumps/single trees)	3	Mix
5) Oak shrub cover	3	30%
6) Standing dead trees & blueberries	2	4 Snag trees



# Step 3: Example of a choice set

Picture 1



Picture 2



Picture 3



Picture 4



# Step 4: Solicit stakeholder participation

## Managing Your Public Forest Lands in Northeastern Wisconsin

Public forests in Northeastern Wisconsin are managed for multiple values. Landowners like you who own property near these public lands have a special interest in how they are managed. This survey will provide information on landowner use and preferences to help improve the management of public forest lands.

Click the arrow in the bottom right to proceed to the survey. Remember, this is best done on a tablet or laptop as you will be viewing and evaluating pictures.

First, a few questions about the property you own in Northeastern Wisconsin. If you own multiple parcels, please respond about the one where you spend the most time.

How long have you owned this property (in years, put 0)

How many acres is this property?

How much time do you spend at this property?

- I live at this property year-round.
- I am a seasonal resident, spending more than 6 months of the year here.
- I am a seasonal resident, spending 3-6 months of the year here.
- I only visit this property (a few days or weeks) a year.
- I do not spend any time at this property.

## Informational Intervention

PLEASE READ THIS DESCRIPTION BEFORE ANSWERING THE NEXT SET OF QUESTIONS

### Restoring the Pine Barrens of Northeastern Wisconsin

A Pine Barrens is a forest type that occurs in dry, sandy regions of the Upper Great Lakes, including land near your property in Northeastern Wisconsin. Periodic fire kept Pine Barrens in their natural state, with scattered pine trees, grassy groundcover, and low shrubs. Historically, Pine Barrens covered more than 2 million acres of Wisconsin, but due to fire suppression and other forestry activities, today only a few thousand acres remain.

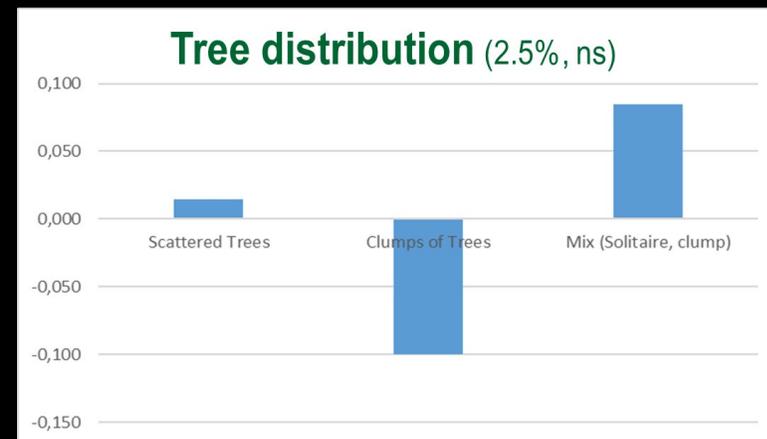
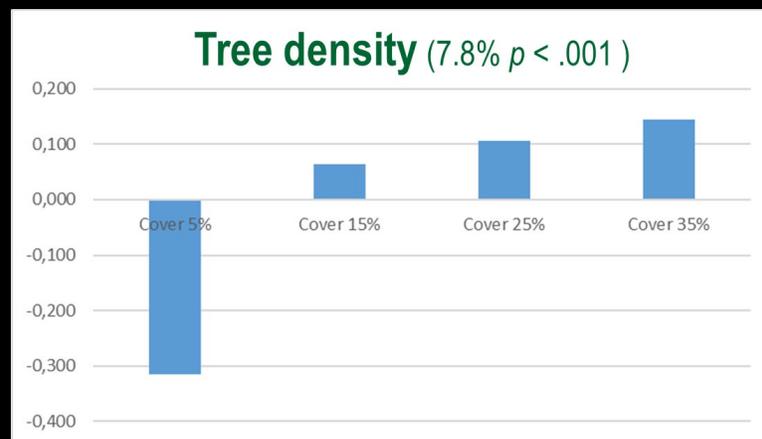
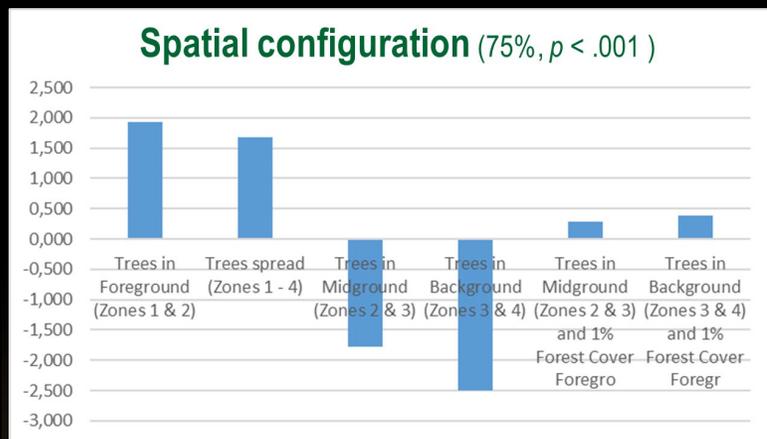
Forest managers are now working to restore additional Pine Barrens on a few public forests in Northeastern Wisconsin by using prescribed burning, cutting brush and timber, and other methods. Their goals are to reduce wildfire risk, improve habitat for plants and animals, and increase recreation like berry-picking, hunting, and wildlife viewing. Periodic burning would have some short-term effects including smoke and blackened areas and there would be a long-term change in the typical "look" of the current landscape such as the one pictured below.

Because of these issues, managers want to know what landowners like you think about different Pine Barrens management options. In the next section, we would like you to view four sets of photos showing different options. In each set, we will ask you to choose which photo you most visually prefer and which ones would be acceptable to you as management options.

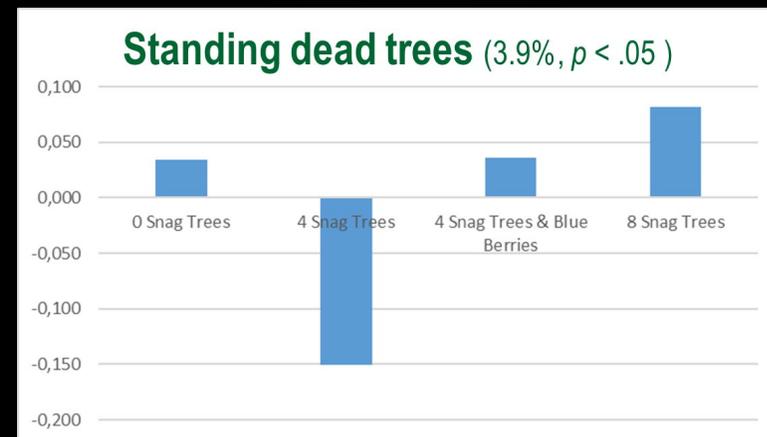
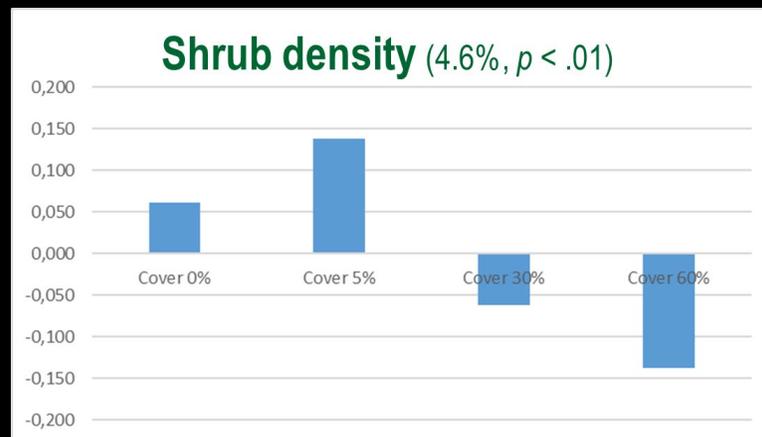
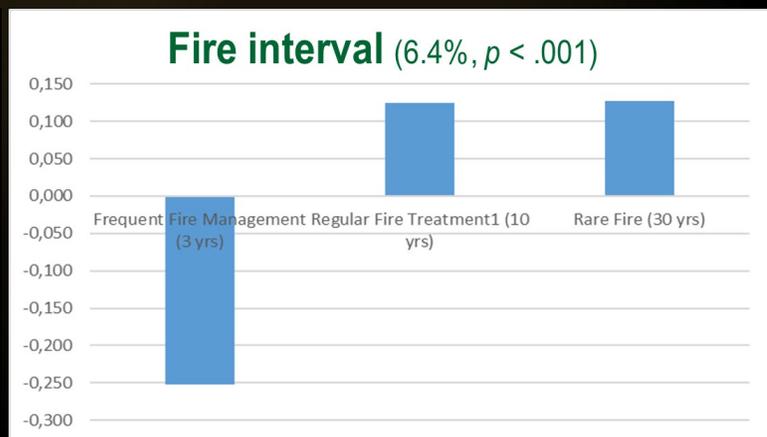
- ▶ Woodland property owners (final N= 547, RR 24%) with property > .1ha within 25km of Lakewood SE Project (Oconto and Marinette Cos.)
- ▶ Visitor survey incomplete due to July 2019 windstorm and 2020 Covid-19
- ▶ DCE plus information intervention, questions on knowledge and experience of pine barrens
- ▶ Other questions on activities, perceptions of mgmt. practices, socio-demographic

# Results: DCE overall model ( $Pseudo R^2 = .28$ )

High  
Low  
Preference



High  
Low  
Preference

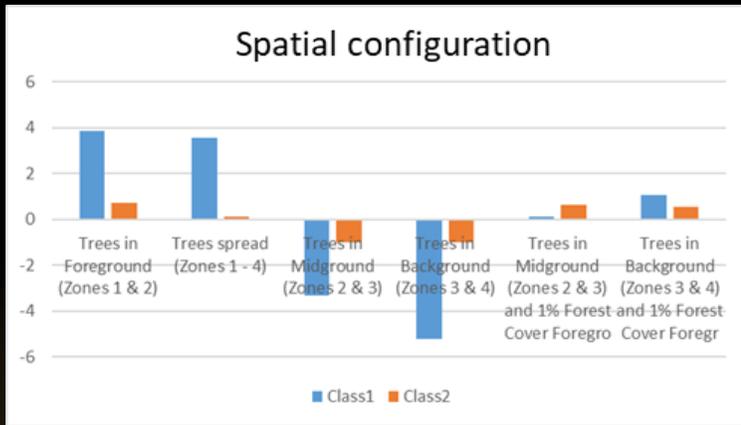


# Results: DCE overall model

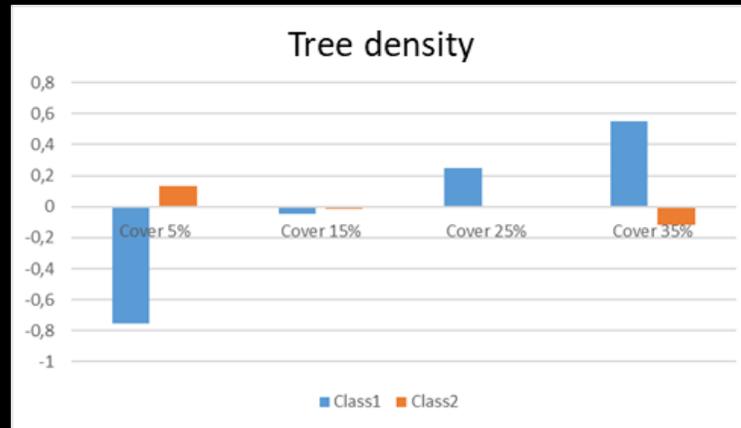


# Results: effects of knowledge and preference heterogeneity (latent class analysis Pseudo $R^2 = .41$ , LC1 = 68%, LC2 = 32%)

High Preference  
Low Preference



$p < .001$ ; relative importance LC1: 76%, LC2: 42%



$p < .001$ ; relative importance LC1: 11%, LC2: 6%

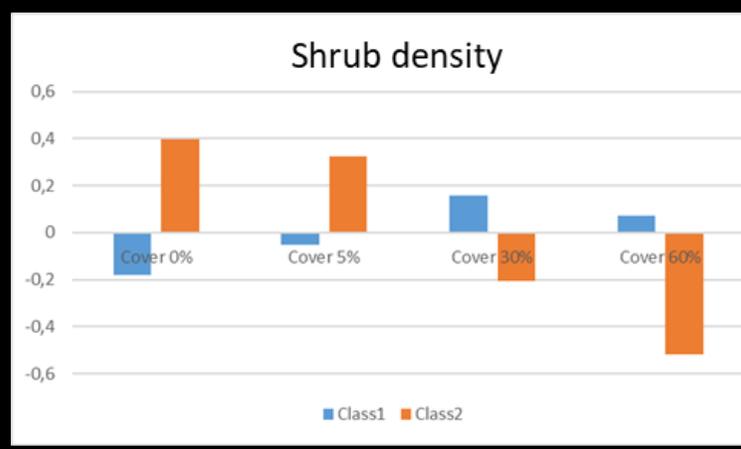


$p < .001$ ; relative importance LC1: 3%, LC2: 22%

High Preference  
Low Preference



$p < .05$ ; relative importance LC1: 4%, LC2: 17%



$p < .05$ ; relative importance LC1: 4%, LC2: 5%



n.s.; relative importance LC1: 2%, LC2: 7%

Results: Latent class segments “scenic aesthetic” (top), ecological aesthetic (bottom)



# Conclusions and management implications



- ▶ Scenic aesthetic is dominant form of appreciation of the Northwoods landscape
- ▶ Some restoration treatments reflect preferences for an ecological aesthetic more aligned with pine barrens structure and function, overall and for some segments of the population
- ▶ Use restoration design to help maximize preference while managing for ecological goals (e.g., leaving trees to frame landscape along roads and trails)
- ▶ Encourage experiential learning through field tours and recreation activities such as berry picking to build appreciation for pine barrens and other “scenically challenged” landscapes



# Thank you!

- ▶ Research Joint Venture Agreement 17-JV-11242309-037 between the USDA Forest Service Northern Research Station and the University of Minnesota.
- ▶ Visualizations: **Tamara Schlagbauer** (University of Natural Resources and Life Sciences Vienna)
- ▶ Assistance and coordination: **John Lampereur** (Chequamegon-Nicolet National Forest), **Brian Sturtevant**, **Deahn Donner-Wright**, and **Heather Jensen** (Northern Research Station)
- ▶ Consultations: **Rob Ribe** (University of Oregon), **Jim Palmer** (Scenic Quality Consultants) **Don Anderson** (StatDesign), **Sanhita Sengupta** (University of Minnesota)