

# Mid-Atlantic hardwood silviculture and promoting regeneration for climate adaptation

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# What Regeneration Method is Best?

- Is this the right question?

What is the forest structure?

Site type?

Where is the reproduction coming from?

Drought tolerance/Shade tolerance

What are the interfering factors?



# Forest Management Challenges Moving Forward

- Fragmentation and land-use change
- Shifts in natural disturbance regimes
- Forest diseases and insect pests
- Establishment of nonnative invasive plant species
- Extreme weather events
- Herbivory

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- Voss et al 2012
- Forest Regeneration in WV



# How Many Deer?



	<u>deer/mi<sup>2</sup></u>
Green	<15
yellow	15-30
orange	30-40
red	45+



# Deer Browsing

- Adult deer consumes about 8-10 lbs browse/day
- ~3000 lbs/yr
- Browse is 30-40% of consumption
- Deer consume roughly 900-1200 lbs/yr
- One acre produces about 80 lbs/acre woody browse
- Each deer requires 10-15 acres

# WHAT ARE THE CONCERNS ABOUT REGENERATION?

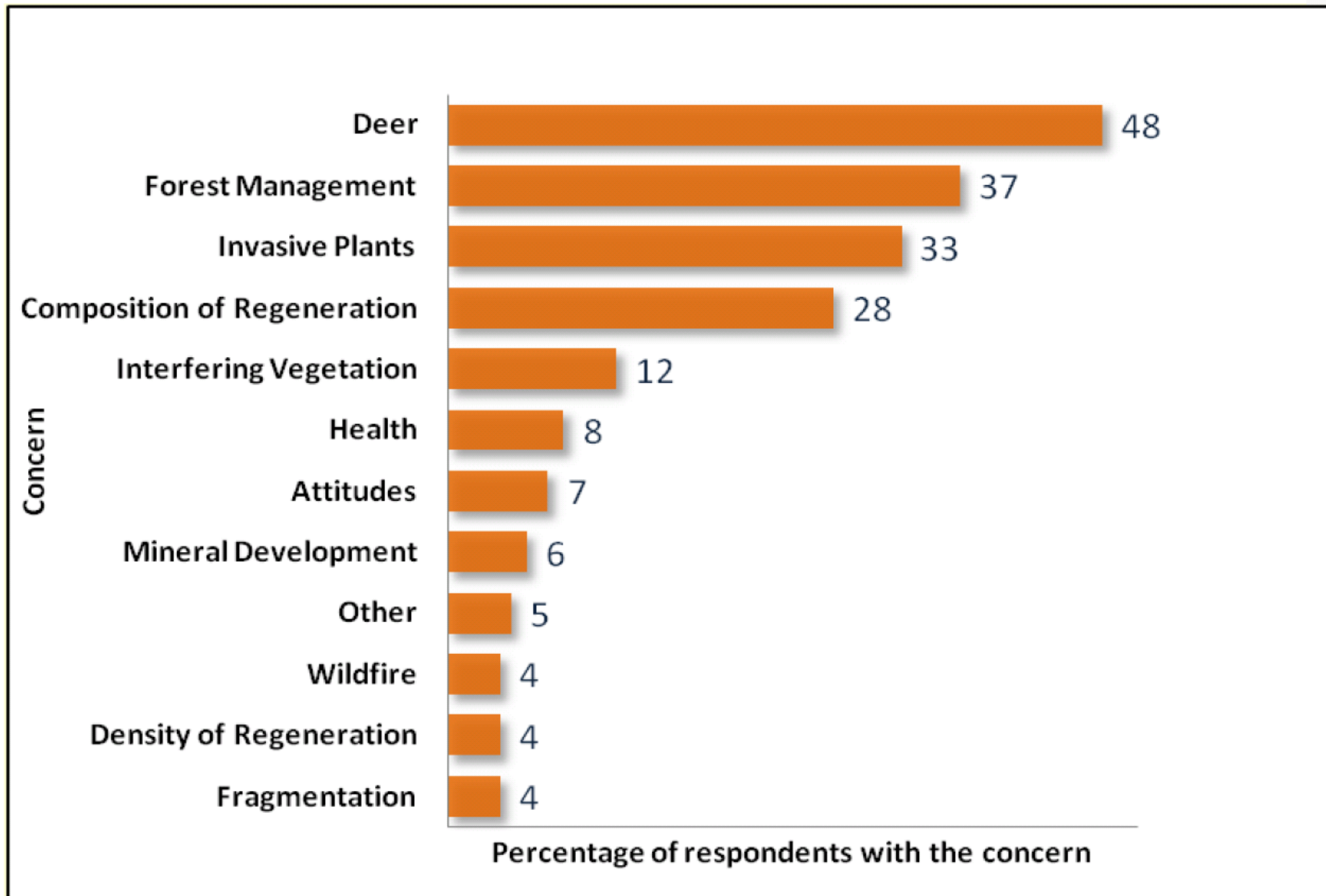


Figure 3. Ranking of 12 main categories of concerns about forest regeneration.

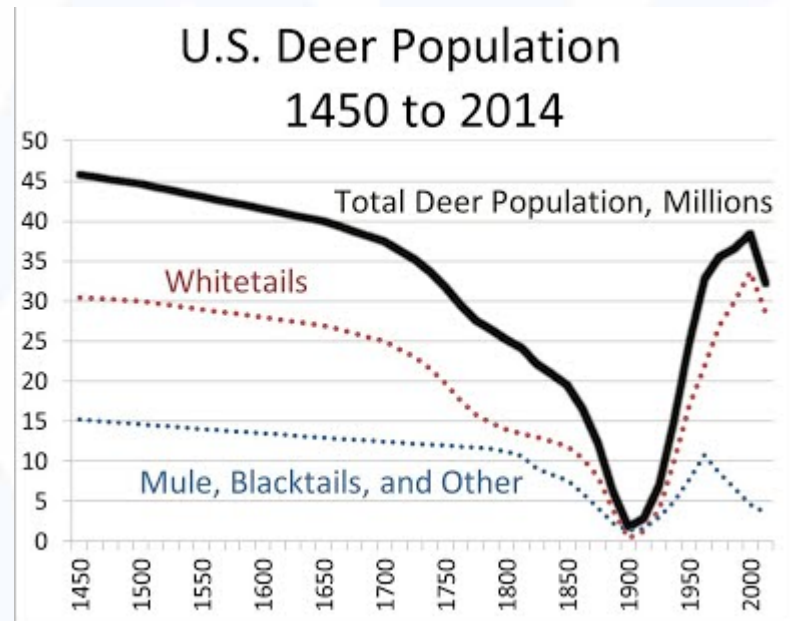
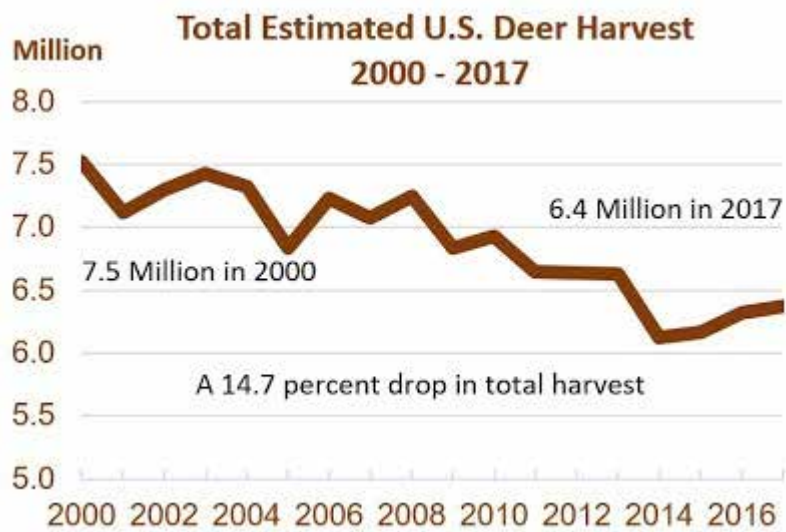
# Management Impacts

- New forests develop from seed, sprouting, or advance reproduction
- Any advanced seedlings?
  - Some species require established seedlings prior to overstory removal
- Non-preferred species/legacy vegetation often considered interference



# Management Impacts

- New forests develop from seed, sprouting, or advance reproduction
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- Non-preferred species/legacy vegetation often considered interference
- Small harvest areas hard to regenerate
- Invest in prevention/mitigation treatments









Stand 1-2 Slash Wall Drone



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# Proactive Approaches to Managing Deer Damage

- Reduce populations prior to regeneration treatments
- Time treatments with other large scale treatments
  - Small openings are difficult to regenerate
- Favor browse tolerant or less preferred species
- Use logging debris as barriers
- Use better seedlings

# Non-Native Plants

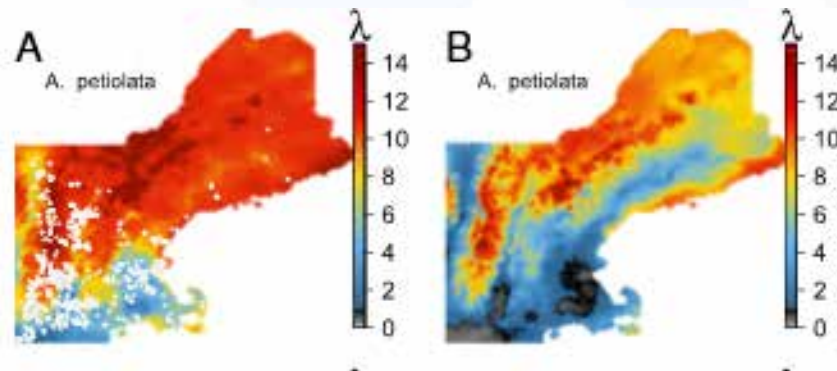
# Usual Suspects?

- J. stiltgrass
- Garlic mustard
- Tree of heaven
- Paulownia
- Honeysuckles
- Barberry
- Autumn olive
- ...



# Non-native Plants

- 80% invasive plants considered low vulnerability to climate change
- Some important ones will decline



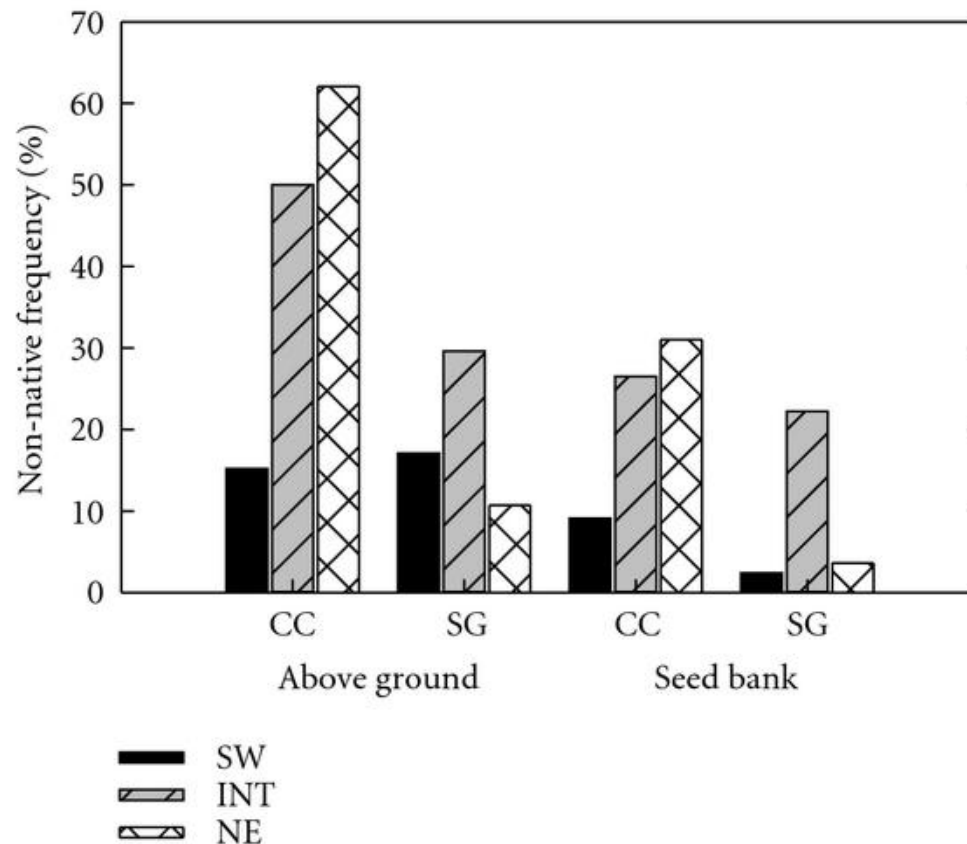
Merow et al. 2017

# Non-native Plants

- Exploitive
- Higher dispersal capacity
- Genetic flexibility
- Increased disturbances (including climate related)
- Lack of natural invasion resistance
- Broad environmental tolerances



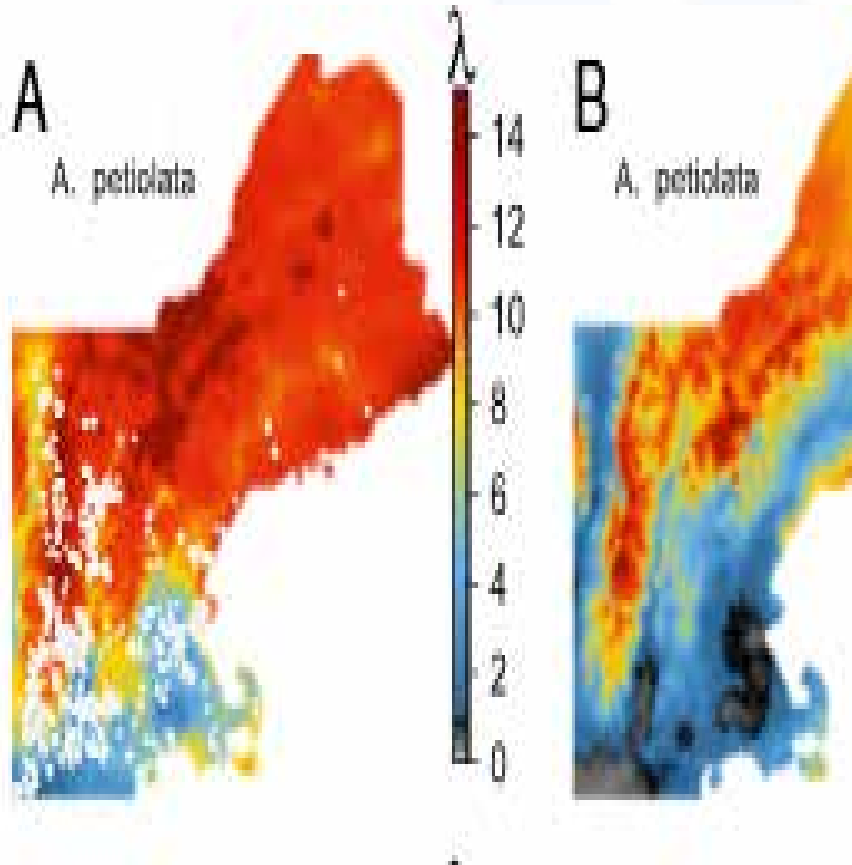
# Clearcuts and Second Growth Stands



# Risks

- Laissez-faire attitude?
- New ones coming!
- Should non-native plants be part of the future?

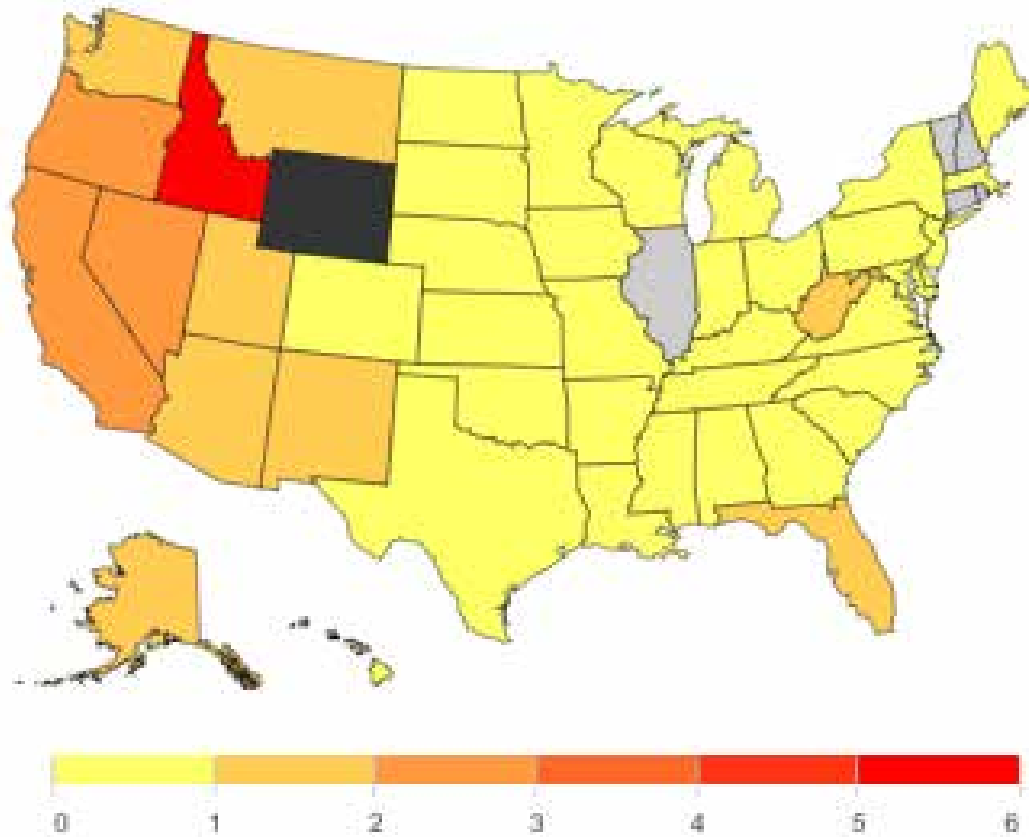
# Prescribed Fire (or lack of)



# Why Important?

- Many of the species considered resilient under future climate projections are favored under a burning regime
  - Oaks
  - Pines

# Percentage of Area Burned Annually







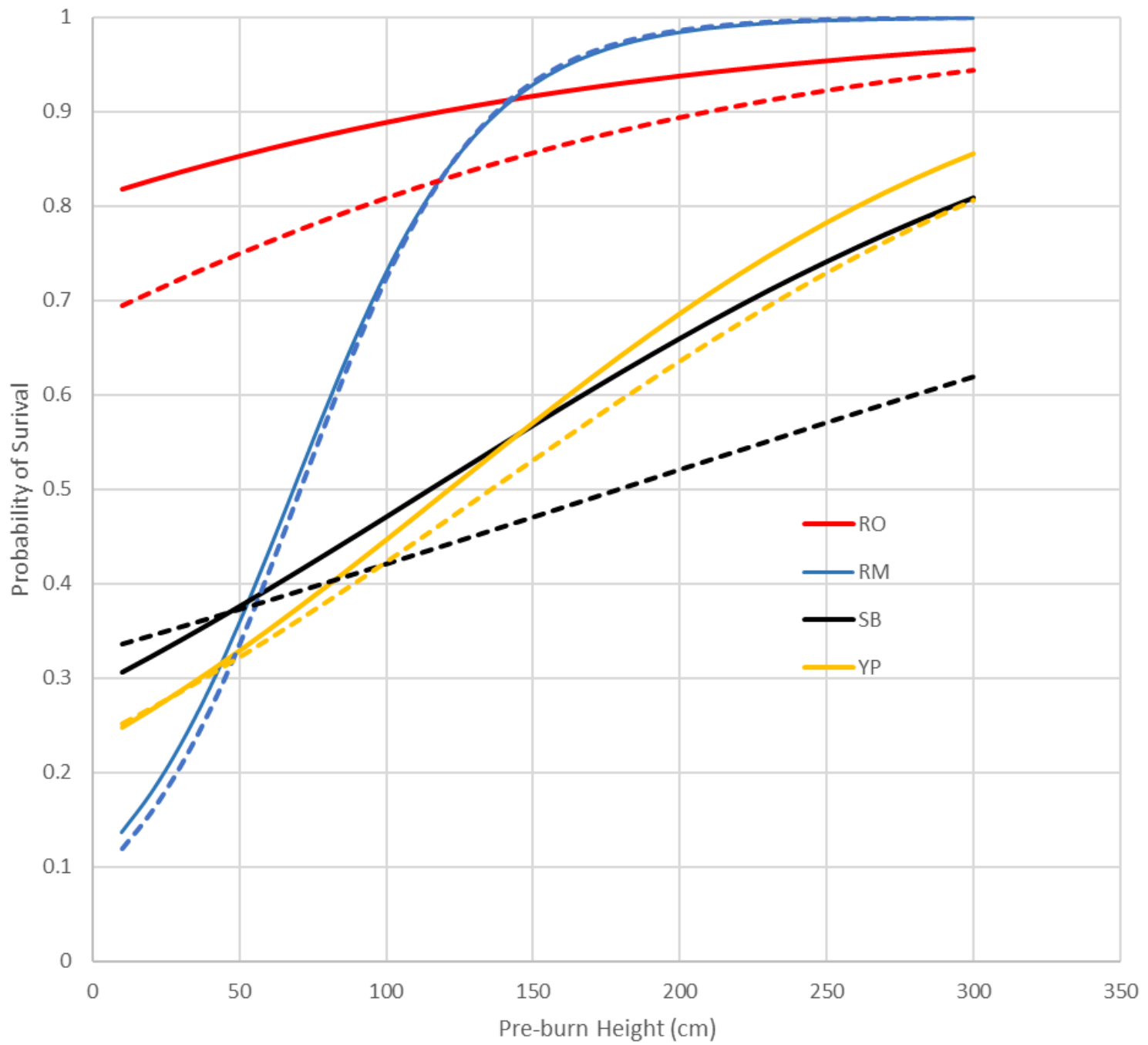


Table 4. Estimated height and diameters two growing seasons after burning.

Species	Pre-Burn Diameter (mm)			Pre-burn Height (cm)		
	10	20	30	100	200	300
RM	6.5	10.7	13.8	100.2	147.2	-
RO	7.7	11.1	13.6	86.2	129.7	163.0
SB	7.8	9.6	11.1	102.7	141.7	171.6
YP	9.6	15.4	19.9	111.1	178.4	230.1

\*Estimated diameter and heights based on square root transformed initial values.

# Are Burn Windows Changing?

- Spring and Fall getting wetter
- Summers drier

# What is the Capacity to Burn?

- Many agencies/landowners resistant to burning
- Laws regarding liability?

# Is Burning Allowed?

## **WEST VIRGINIA CODE: §20-3-5**

- (a) “Forest fire seasons. — March 1 through May 31, and October 1 through December 31 are designated as forest fire seasons. During any fire season, a person may set on fire or cause to be set on fire any forest land, or any grass, grain, stubble, slash, debris, or other inflammable materials only between 5 p.m. and 7 a.m., at which time the fire must be extinguished.”
- (c) A burn permit may be obtained for fires set outside these windows

# Is Burning Allowed?

## **WEST VIRGINIA CODE: §20-3-5A**

- “Prescribed fire” means the controlled application of fire or wildland fuels in wildlife management areas, state forests or federal lands in either the natural or modified state, under specified environmental conditions, which allows the fire to be confined to a predetermined area and produces the fire behavior and fire characteristics necessary to attain planned fire treatment and ecological, silvicultural, and wildlife management objectives.

