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Outline



🔥 Part 1. The need for information



🔥 Part 2. Value loss due to damage to residual 'saw log' trees (individual tree scale)

🔥 Part 3. Value loss due to changes in volume and composition (stand/acre scale)

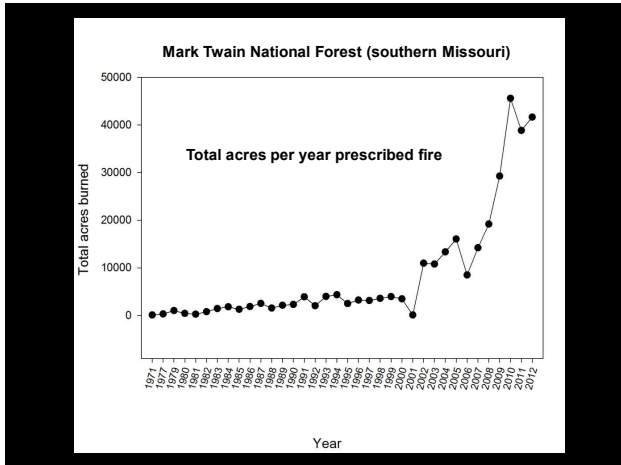


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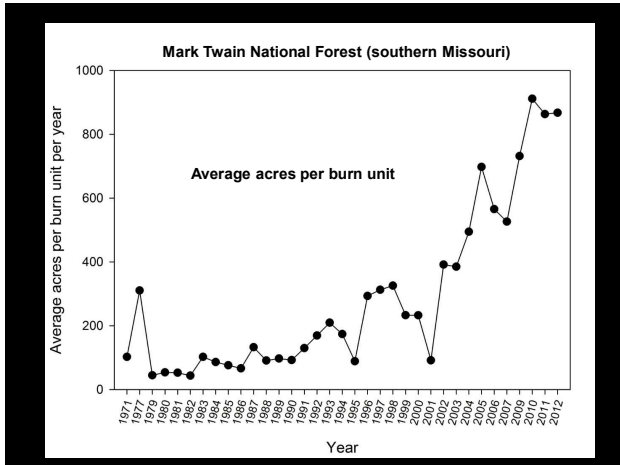
🔥 Part 1. The Information Need



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Paul Nelson, photographed by Tom Nagel, 1985

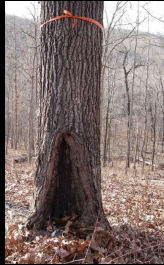
- Prescribed fire use expanded from glades/prairie habitats to forests with mature trees
- Concerns about damage to timber became very prominent
- No scientific / quantitative information existed, just assumptions

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Perceived benefits of prescribed fire management

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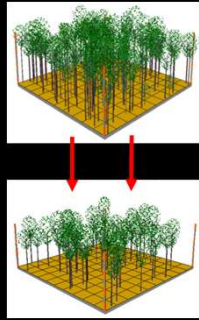
Perceived costs of
prescribed fire
management



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The question:

What is the cost of prescribed fire in terms of timber product value ?



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🔥 Part 2. Value loss due to damage to residual
'saw log' trees (individual tree scale)



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How do fire scars on residual overstory trees affect timber product value??



Tree level effects:

- Fire introduced defect / wood decay



Marschall et al. 2014

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↑ defect =
↓ clear cuttings =
↓ value

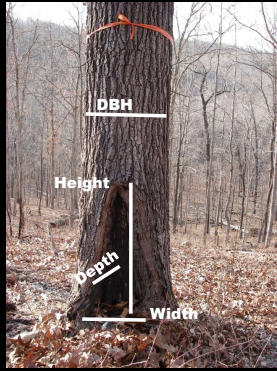


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Marschall et al. 2014

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Methods In the field:

Marschall et al. 2014

- Missouri Ozarks
- 90 trees sampled
- Tree, fire scar, and site information recorded
- Cross section collected from each tree stump



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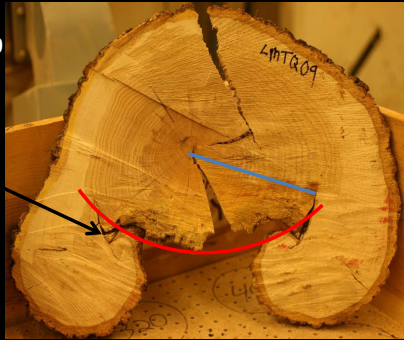
At the lab:

Year of injury: 2000

Scar arc: 14"

Radius when injured: 6.25"

Pith year: 1957



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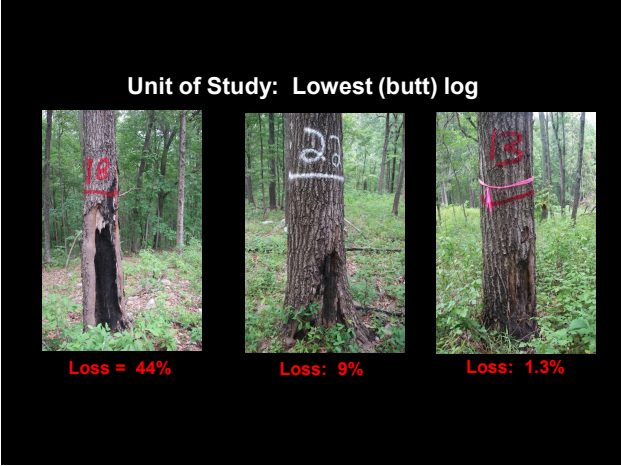
Marschall et al. 2014

- 90 butt logs analyzed
- scarlet, n. red, black oak 'sawlogs'
- 1,300 boards, ~7,800 bf
- varying tree / scar sizes
- ≤ 15 years since fire
- 3 - 4 fires each

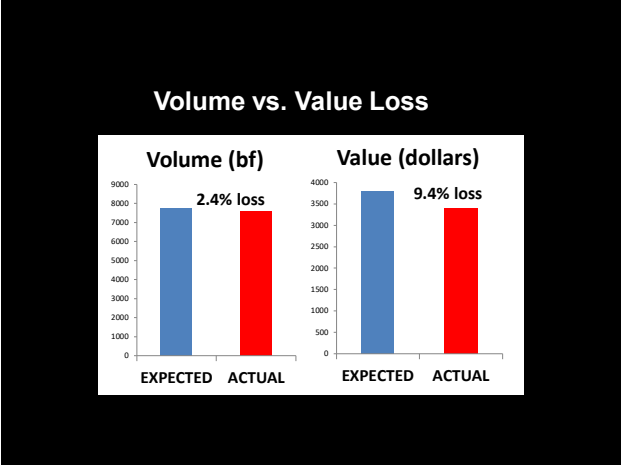
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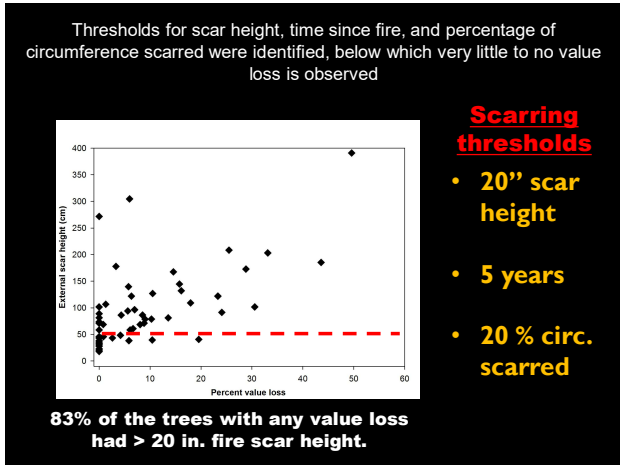
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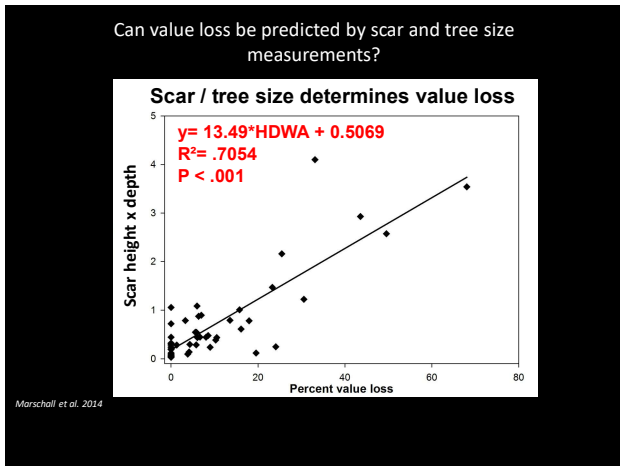
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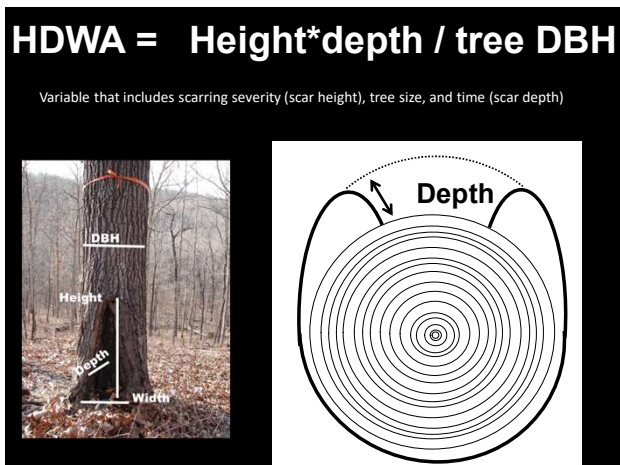
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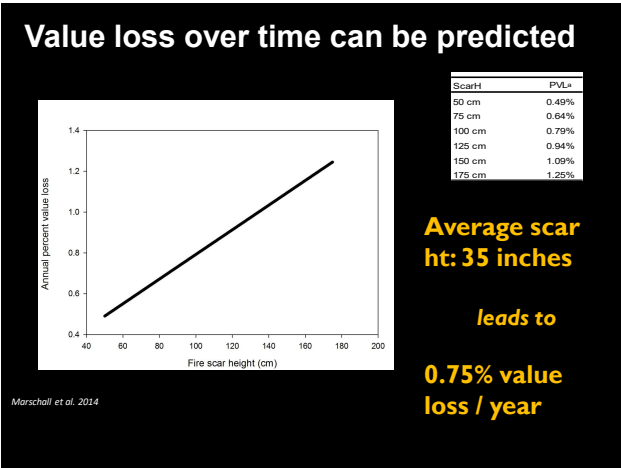
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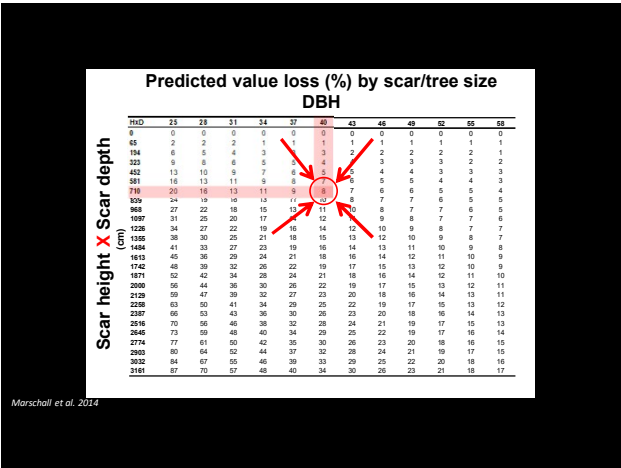
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DBH= 19.7"
scar ht.= 27"
scar dpth. = 5"

Value loss= 8%


- If the 4 'upper' logs present are considered in this tree's value, the value loss is only 4%
- If left standing for 10 more years, expect 6.8% additional value loss
 - 14.8% value loss 25 years post fire injury

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Marshall et al. 2014

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All of the fire scar defect in this tree was contained in the slab material. The fire scar was 110 inches tall, and had occurred 3 years ago. Resulting value loss: 0

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Effects of Seasonal Prescribed Fires on Residual Overstory Trees in Oak-Dominated Shelterwood Stands

Patrick Brown, USDA Forest Service, Southern Research Station, Clinton, MS 39057-0001, and Brent Van Lear, Department of Forest Resources, Clemson University, Clemson, SC 29634-0901

ABSTRACT. Land managers in the Southeastern United States often use prescribed fire to manage oak-dominated shelterwood stands. However, the effects of prescribed fire on residual overstory trees are not well understood. This study examined the effects of seasonal prescribed fires on residual overstory trees in oak-dominated shelterwood stands. The study was conducted in a shelterwood stand in the Southern Piedmont region of the United States. The study area was divided into two treatment groups: a control group and a prescribed fire group. The control group was not burned, while the prescribed fire group was burned in the fall. The study measured the effects of prescribed fire on residual overstory trees in terms of tree mortality, tree growth, and tree health. The results of the study showed that prescribed fire had a significant effect on residual overstory trees. Tree mortality was significantly higher in the prescribed fire group than in the control group. Tree growth was significantly lower in the prescribed fire group than in the control group. Tree health was significantly lower in the prescribed fire group than in the control group. The results of the study suggest that prescribed fire can have negative effects on residual overstory trees in oak-dominated shelterwood stands.

Keywords: prescribed fire, residual overstory trees, oak-dominated shelterwood stands, tree mortality, tree growth, tree health.

Brose and Van Lear, 1999, Effects of Seasonal Prescribed Fires on Residual Overstory Trees in Oak-Dominated Shelterwood Stands, *Southern Journal of Applied Forestry*

- Avoiding jackpots of fuel next to residual overstory trees greatly reduces degree of scarring.
- Directional felling or minor amount of cutting of slash makes significant difference

Scar size matters!

Photo: Craig Harper, University of Tennessee

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Main findings

(limited to: red oak saw logs, ≤ 15 years time since fire)

- Scar size and time matters
 - *little concern if harvesting w/in 5 years
 - *scars less than 20 inches tall, no value loss
 - *directional felling / lopping jackpots beneficial
- Value and volume loss surprising low based on initial appearances
- Value loss can be estimated using tree/scar size information
- Future loss can be predicted and accommodated

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Part 3. Value loss due to changes in volume and composition (stand/acre scale)

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Knapp et al. 2015, 2017

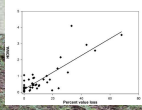


- 60+ years prescribed fire
- annual, periodic (4 yrs), control
- Missouri Ozarks, upland oak site
- Repeated stand measurements over time
- Fire scars tallied / measured

Knapp et al. 2015, 2017

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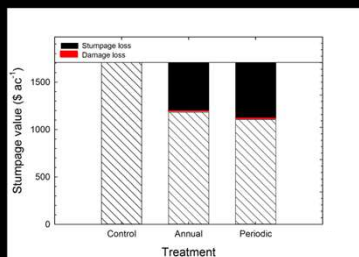
- Stumpage values applied to standing volume data
- Value loss to residuals estimated using Marschall (2014) equation



Knapp et al. 2015, 2017

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Stumpage values



Knapp et al. 2015, 2017

Control
\$1708 per acre

Annual
\$1197 per acre
(-29%)

Periodic
\$1121 per acre
(-34%)

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Main findings

- Long-term, frequent burning affects stand-level values primarily through changes in volume and species composition
- Periodic burning scarred ~55% of overstory trees, compared to ~6% in annually burned
- No recruitment to overstory (not a single tree)

Knapp et al. 2015, 2017

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Major gaps at the time this research concluded:

- Relatively short time length considered (15 yrs), especially considering the long rotations typical in oak management
- Only red oak species considered, what about different tree species of higher value (e.g., white oak)
- Narrow geography (i.e., MO Ozarks)
- Landscape scale not included

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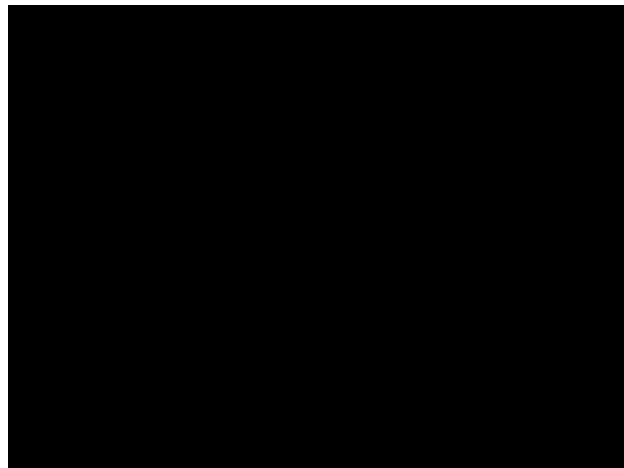
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Thank you!

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