

**Resource Management Guides
Mountain Tea State Forest
30-day Public Comment Period (October 16 – November 14, 2024)**

The Indiana State Forest system consists of approximately 160,251 acres of primarily forested land distributed across the state. These lands are managed under the principle that we're stewards of this land for the future. This work is guided through legislation and comprehensive scientific national and international forest certification standards which are independently audited to help insure long-term forest health, resiliency, and sustainability.

Resource management guides (RMGs) are developed to provide long-term, scientific forest management planning tailored to each forest compartment (300-1,000 acres in size) and tract (10 - 300 acres in size). There are 1,590 tracts across the state forest system statewide. Annually, 50-100 tracts are reviewed, and these guides are developed based on current assessments. Through science-based management practices, we prescribe management actions on select tracts every 15-25 year, diversifying the forested landscape and sustaining ecosystems.

The RMGs listed below and contained in this document are part of the properties annually scheduled forest inventories under review for Mountain Tea State Forest.

Prescribed Fire RMG – Mountain Tea Compartment 3, Tracts 1, 2, 3, & 11

To submit a comment on this document, go to:

<https://www.in.gov/dnr/forestry/state-forest-management/public-comment/submit/>

You must indicate the State Forest Name, Compartment number and Tract number in the "subject or file reference" line to ensure that your comment receives appropriate consideration. Comments received within 30 days of posting will be considered and review posted at:

<https://www.in.gov/dnr/forestry/state-forest-management/public-comment/>

Note: Some graphics may distort due to compression.

Indiana Department of Natural Resources
Division of Forestry
Prescribed Fire
Resource Management Guide

| | | |
|----------------------------------|---------------------------------|------------------------------|
| Mountain Tea State Forest | Compartment: 16 | Tract(s): 4, 6, 9, 11 |
| Forester: Cole Jones | Date: September 11, 2024 | Acres: 168 |

Overview

Fire has been present on the landscape since the arrival of the first peoples in North America. Native Americans commonly used fire to influence their landscape to help with agriculture, hunting, and ease of travel. Throughout early settlement and into the 1900s, fire was viewed as an enemy of nature and was extinguished wherever it was found. It is now realized that many of the natural systems in Indiana evolved with fire and require it to thrive, especially oak-hickory forests. The landscape of southern Indiana has been oak-hickory dominated for approximately 4,000 years.

Without fire or other appropriate interventions, many of the oak-hickory dominated areas in our state forests are under threat to convert to other forest types due to an aging overstory combined with a mid-story and understory that are filled with other, usually shade tolerant species. These trees consist primarily of American beech, sugar maple, and red maple with lesser amounts of ironwood, musclewood, blackgum, and sassafras. The ecological benefits of oak-hickory forests are immense, and the conversion of these forests to other types would be catastrophic.

One of the major factors associated with successful oak regeneration is light intensity. The shaded conditions described above are too extreme for oak establishment. Conversely, too much light from the canopy is also detrimental, as it will allow faster growing species like yellow-poplar to quickly overtop newly established oak seedlings.

When using prescribed fire as a tool for oak regeneration one of the primary objectives is to increase diffuse (scattered) light levels while minimizing canopy gaps. It is believed that oak will become established under the moderate light conditions this would create, while more shade intolerant species will not receive sufficient light for competitive growth.

Controlling fire intensity is critical to accomplishing these goals. The fire needs to be hot enough to kill the shade tolerant species dominant in the midstory and understory, but not so intense as to kill overstory trees. Experienced professionals at Fire Headquarters (FHQ) will develop a complex burn plan tailored to meet these objectives. There are a multitude of components and considerations that must be addressed when developing a burn plan, including but not limited to; weather conditions, smoke dispersal, fuel models, terrain, personnel assignments, ignition and holding plans, communications, contingency plans, and safety.

In addition to creating optimal light conditions, prescribed fire reduces leaf litter to provide conditions more favorable for the establishment of not only oak and hickory, but the herbaceous

and shrub layers that were traditionally associated with them. Fire also releases nutrients being held in dead plant matter and can lower fuel loads to help minimize the risk of uncontrolled wildfires.

Location

The proposed prescribed burn area is in Brown County, Indiana, Hamblen Township, Section 7–T9N–R4E. It is approximately 6.4 miles east of Nashville, Indiana and located at the end of Pumpkin Ridge Road.

General Description

The burn area resides almost exactly in the center of Mountain Tea State Forest. The area consists of dry to mesic oak-hickory forests, dominated particularly by chestnut oak on top of the ridges and white, red, and black oak on the slopes. Pignut and shagbark hickories are common as well. A timber harvest was conducted in tract 9 in 2016, utilizing single tree and group selection methods within the burn area. However, a 1.4 acre opening resides within the burn area and is currently new growth of shade intolerant species like yellow-poplar and black cherry. The understory throughout most of the tract is composed of shade tolerant species such as blackgum, sugar maple, red maple, and beech. Other assorted native species are present in the understory but not as common.

A prescribed fire was conducted in tract 9 in 2020 with the intention of killing shade tolerant species in the understory and burning off leaf litter to help recruit new oak and hickory seedlings. Since the burn in tract 9, increased oak regeneration has been observed. However, many larger saplings and small pole size shade tolerant trees survived. Without fire or other management, the forest will transition from an oak-hickory dominated forest to a maple-beech dominated forest.

General Discussion & Prescription

Tract 9, the eastern most tract in the burn area, was burned in the fall of 2020. The burn successfully controlled small (1-2” diameter) shade tolerant species in the understory and removed the thick layer of leaf litter, thus allowing acorns to take root in bare soil. This resulted in an increase in oak regeneration throughout the burn area, particularly on south facing slopes. However, the regeneration from the first burn has waned. There are a few explanations for this.

Multiple studies have recommended frequent/repeated use of prescribed fire to increase oak and hickory regeneration. Typically, single prescribed burns will not reduce enough competition for oak and hickory regeneration to succeed (Arthur et al. 1998; Holzmüller et al. 2008). In another study, white oak and hickories were observed to have higher seedling densities in burned stands but were unlikely to advance above the seedling layer in the absence of additional burning (Holzmüller et al. 2009).

A second factor effecting the persistence of oak-hickory seedling density is the size of the shade tolerant species. Decades of fire suppression have allowed many of these understory and midstory competitors to reach sizes where they are resistant to low intensity fires. As previously

mentioned, one of the main goals when using fire as an oak regeneration tool is to create the proper light conditions. Like much of the forestland in southern Indiana, Mountain Tea State Forest is oak-hickory dominated in the overstory but lacks the oak-hickory regeneration necessary to maintain this forest type. Continuous Forest Inventory (CFI) data collected by the Division of Forestry supports these observations.

| Species Group | Sapling | Pole | Small Saw | Large Saw |
|------------------------|----------------|-------------|------------------|------------------|
| Oak-Hickory | 0.00% | 12.08% | 56.94% | 71.77% |
| Beech-Maple | 63.89% | 69.87% | 26.38% | 9.13% |
| Yellow-Poplar | 0.00% | 0.00% | 8.33% | 10.76% |
| Mixed Hardwoods | 21.53% | 16.52% | 5.55% | 2.08% |
| Conifers | 0.00% | 1.51% | 2.78% | 6.25% |
| Non Commercial | 14.58% | 0.00% | 0.00% | 0.00% |

The conundrum we face is that in order to eliminate the larger cohorts in the understory and midstory layers we need to use higher intensity fires. However, in doing so we risk severely damaging or killing larger overstory trees, and this is not our objective. Too much of this will result in excessive light reaching the forest floor and stimulating growth for fast growing competitors like yellow-poplar, sycamore, sassafras, etc. An effective solution for this situation is to carry out a forest stand improvement (FSI) operation which targets this particular cohort. Below is a list of effective mechanical and chemical methods that can be used. All trees should be treated with an appropriate herbicide to prevent resprouting.

1. Cut with brush cutter – *best for sapling size*
2. Cut with chainsaw – *best for pole size and larger*
3. Girdle – *ideal for medium pole size and larger*
4. Basal Bark Application – *ideal for sapling size and small poles*

A combination of the silvicultural treatments described above, and repeated burns are prescribed for the area. A 3 to 7 year burn frequency is recommended. Oak and hickory regeneration assessments will be made periodically and burn frequency recommendations will be adjusted accordingly. The FSI operation may occur pre or post burn and intensity will vary depending on specific site and stand conditions.

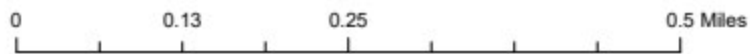
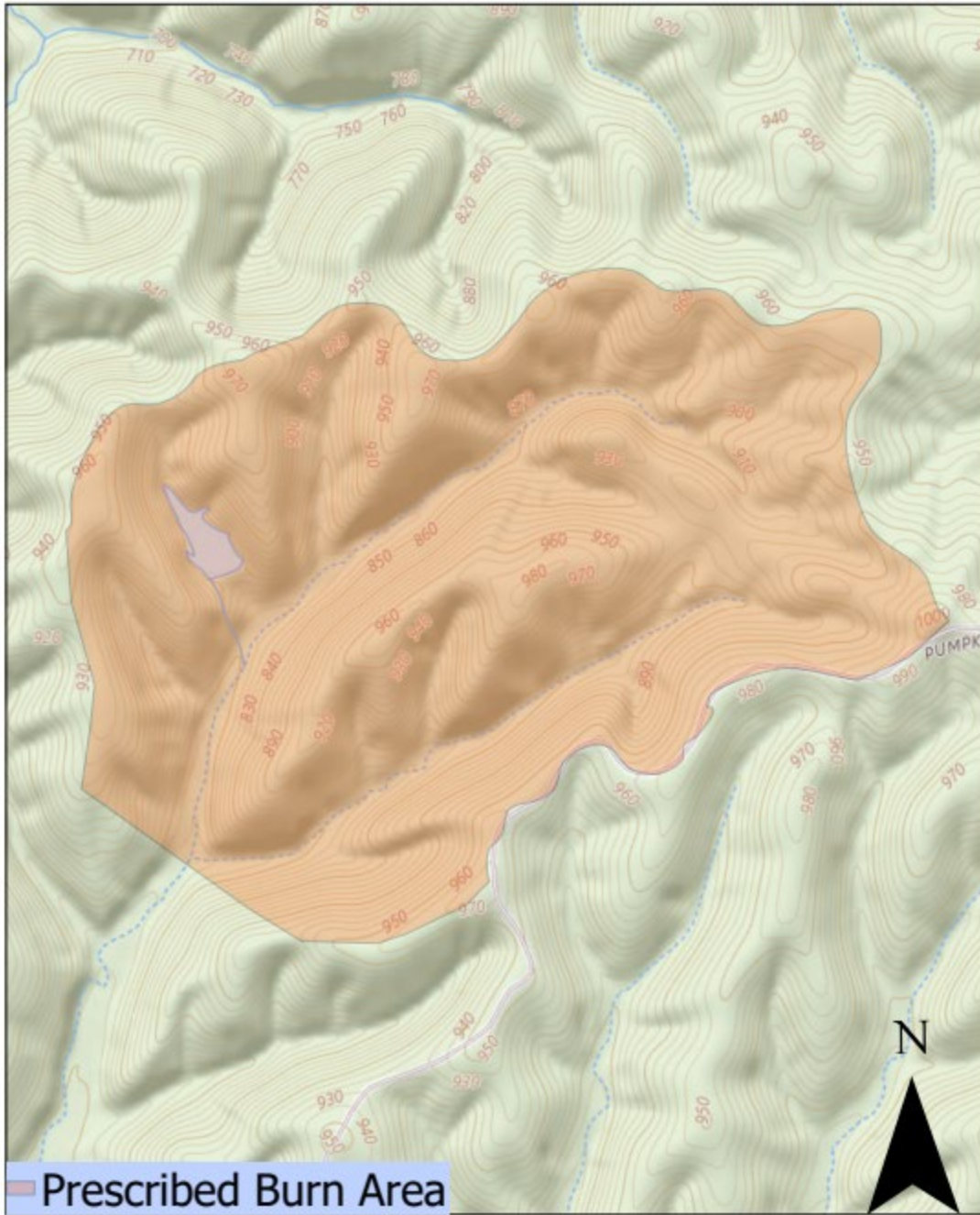
Other Considerations

Mountain Tea State Forest has limited recreational usage, but the existing access roads are occasionally used by hikers and hunters. The small lake on the property can be fished. The property will be closed to public access for the duration of the burn and mop-up period, which is likely to be 1-2 days.

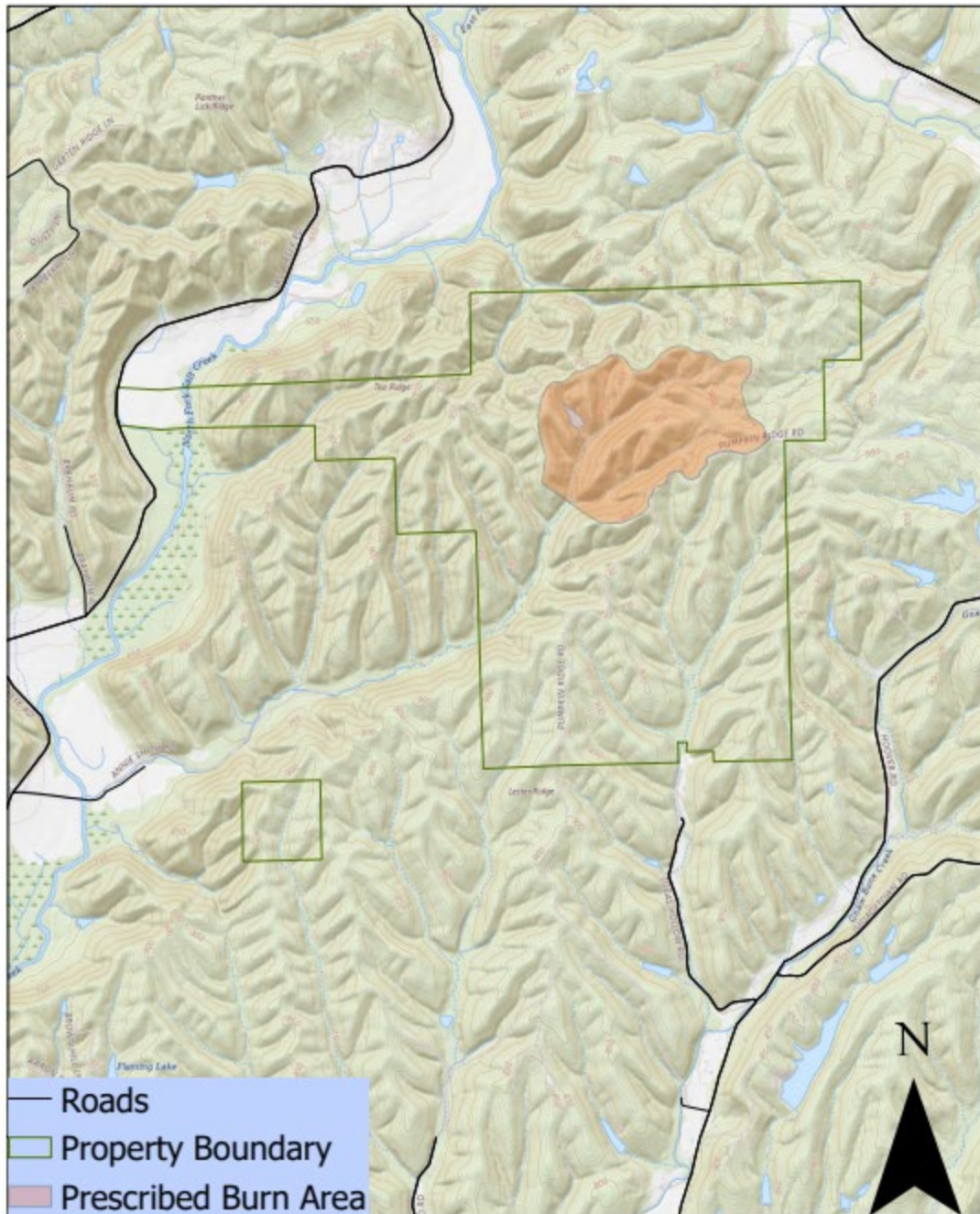
Cultural resources may be present, but their location(s) is protected. Adverse impacts to significant cultural resources will be avoided during any activities.

A formal Ecological Review process, which includes a search of Indiana's Natural Heritage Database, is part of the management planning process. If Rare, Threatened, or Endangered species were found to be associated with this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the population viability of those species or communities.

Mt Tea Burn Area (168 acres)



Mt Tea Burn Area (168 acres)



Literature Cited

1. E.J. Holzmüller , S. Jose , and M.A. Jenkins . 2008. The relationship between fire history and an exotic fungal disease in a deciduous forest. *Oecologia* 155:215–403.
2. E.J. Holzmüller , S. Jose , and M.A. Jenkins . 2009. The Response of Understory Species Composition, Diversity, and Seedling Regeneration to Repeated Burning in Southern Appalachian Oak-Hickory Forests *Natural Areas* 29(3):255–262.