

**Resource Management Guides  
Pike State Forest  
30-day Public Comment Period (July 1, 2024 – July 30, 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 Pike State Forest.

Compartment 12 Tract 7

**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.

**Pike State Forest**

Tract Acreage: 192

Forester: **Evan McDivitt**

Management Cycle End Year: 2041

Compartment: **12** Tract: **07**Forest Acreage: **65**Date: **10/9/2021**

Management Cycle Length: 20 Years

**Location**

Compartment 12 Tract 7 (C12T7), also identified as 6311207, is in Pike County, Indiana, Sections 12,13, & 14, T2S, R7W, Marion Township.

**General Description**

C12T7 contains 130 acres of floodplain forest composed of a combination of bottomland oak-hickory and bottomland mixed hardwoods. Almost 63 acres of the tract is in unforested buttonbush and other open, unstocked wetland. Ecotone areas immediately surrounding the wetland are sparse to densely covered with trees but still contain herbaceous and shrubby wetland features underneath the tree canopy. Numerous standing dead trees, or snags, exist in this ecotone suggesting the area has become wetter over the past 30 years or so. This has most likely occurred due in part to beaver activity in the area, alteration in hydrology from past drainage and subsequent abandonment of drainage structures, as well as landscape alterations from coal mining and reclamation activities in the recent past.

**History**

- 1935 – Land acquisition from Board of Commissioners of Pike County (north and east section of tract).
- 2006 – Land acquisition from Jame C. Ellis (southwestern section of tract, part of a larger acquisition).
- 2009 – Land acquisition from James C. Ellis (40 acres northern section of tract)

**Resource Management History**

A survey of this tract on Indiana Geological and Water Survey's Indiana Historical Aerial Photo Index (IHAPI) shows land cover development in this tract from 1937 to 1978. A 1937 aerial photo shows much of the northern and central part of the present-day tract contained forest canopy. The railroad bed is visible to delineate the western boundary of the tract in this photo. The southern portion of the tract appears to have been in open field at that time. A narrow strip of forest also appears in the southeastern portion of this tract. A 1949 aerial photo documents the presence of extensive mining and spoils areas upstream from this tract. Vegetation and land use appear to remain the same. It appears from 1954 through 1966 aerial photos, the field was beginning to grow in with shrubs and trees.

In 1966 property forester L. A. Crayden noted approximately 30 acres of land damaged in this tract. His note states, "nine acres of this area was timbered and it is now all dead. Another three acres of timbered land is damaged. Most of the larger trees in this damaged area are dead. The remaining acreage is a semi-open brush area."

The office tract file documents a salvage sale conducted in 1967 on approximately 40 acres of the southern portion. This was a salvage clearcut to harvest acid mine flooded timber which was

apparently causing the dominant trees to decline and die. Sale volume totaled 219,560 bd.ft. Doyle and was sold for \$3,160.00 to Newton Planing Mill in Taswell.

Forester Rick Burgeson conducted an inventory in 1971 which encompassed approximately 97.2 acres of what is now C12T7. In the 40-acre portion, he found that most of the area had been clearcut with only a few stems remaining scattered through the area. He noted forest type had been pin oak-sweetgum. He noted stumps measuring 18-28 inches in diameter that had been part of the salvage harvest. In the clearcut area, he recommended planting red maple, sweetgum, and cottonwood. He also recommended testing for mine contamination before any planting occurred. To the south of this, he found a sapling size river birch stand across approximately 57.2 acres. He noted this area supported little more than river birch and brush thickets and that potential for this area was, "severely limited by the high-water table and frequent flooding from the Patoka River."

In 1976 property manager Steve Brandsasse conducted a follow up soil sample from the salvage sale harvest area of 1967. Test results showed soils had an average pH of 4.7 indicating soils and water on the surface were acid. It was concluded this was a condition created by flooding with acid water from area mines. Regular monitoring was prescribed in this area to check for tree mortality due to acidity.

A 1978 IHAPI aerial photo shows what appears to be young tree growth in the southern portion of the tract with the northern portion remaining visibly unchanged. Lack of detail in aerial photographs makes it challenging to document increasingly wet conditions in the eastern and central portion of this tract. At some point the increased presence of permanent standing water possibly coupled with increasing soil acidity from the acid mine drainage seems to have caused a shift from floodplain forest to open and semi open buttonbush wetland in specific areas in the tract.

A forest inventory was completed by forest technician Amy Zillmer in 2007. An estimated 5,909 bd.ft. per acre total volume and 3,609 bd.ft. per acre harvest volume across 136 acres.

A forest inventory was completed by forester Evan McDivitt in 2021. An estimated 6,969 bd.ft. per acre total volume across 192 acres.

### **Landscape Context**

This tract lies within the Southern Bottomlands Section of the Southern Bottomlands Natural Region. The entire tract lies within the Boonville Hills portion of the Southern Hills and Lowlands physiographic province. Additionally, the entire tract lies within the Green River-Southern Wabash Lowlands part of the Interior River Valleys and Hills ecoregion. Pre-settlement land cover for this tract has been classified as *Quercus-Carya* vegetation type. Water from this tract drains into the Patoka River watershed. Hardwoods dominate the tract with non-forested wetlands noted in a few locations. Areas within a one-mile radius of this tract contain additional portions of Pike State Forest as well as areas with deciduous forest, abandoned and reclaimed mine land, and the floodplain and channel of the Patoka River, as well as a portion of the Patoka River National Wildlife Refuge.

## **Topography, Geology, and Hydrology**

A majority of this tract is flat bottomland with elevation differing by only a couple feet (approximately 428-432 ft.) from one location to another. Elevation ranges from a high of 450 feet along the western boundary, where bottomland begins transitioning to upland, to a low of 424 feet in the Patoka River which makes up a part of the north-northwest boundary. There is an intermittent stream which meanders through the tract from southwest to northeast. There are various swampy wetlands in which there is standing water all year long. There is an abandoned drainage ditch from a time when this area was in agricultural production which has likely influenced hydrology significantly in this tract. Water from this tract drains into the Patoka River watershed. The Patoka River is a meandering and underfit river; that is, a relatively small river compared to the large valley in which it flows. This meandering nature of the river, over long periods, has created a diversity of sites where slight differences in elevation, drainage and seasonal inundation correspond to different plant communities being situated on each site. The Patoka River experiences times with highly turbid water flow and other times with relatively clear flowing water. This is most likely due to upstream agricultural land use and erosion taking place. During saturating rain events, surface water runoff feeds sediment-laden water into the Patoka River. However, during other times when primarily ground water is feeding into the river, the water is much clearer. This tract undergoes seasonal flooding. Upland soils in this tract are derived from underlying shale and sandstone bedrock with scattered loess over residuum in parts whereas bottomland soils are formed from silty alluvium. Bottomland soils and hydrology here have apparently been affected by upstream mine land and its effect on acidification of water and soils.

## **Soils**

***Belknap silt loam, frequently flooded (Bg); (96.3 acres);*** Consists of very deep, somewhat poorly drained soils formed in acid, silty alluvium in swells on flood plains. It is frequently flooded. Duration of flood can be brief to long. Depth to top of a seasonally high water table ranges 12-36 inches. This soil typically is composed of 5% sand, 79% silt, and 16% clay, moist bulk density ranges 1.4-1.55 g/cc, saturated hydraulic conductivity ranges 1.41-14.11 micro m/sec, available water capacity ranges 0.2-0.24 in/in, linear extensibility ranges 0.4-2.2%, and organic matter ranges 0-3% throughout available rooting depth. Soil pH ranges 4.5-7.3. It is somewhat suited for growing black walnut. Site index is 90 for yellow poplar, 100 for eastern cottonwood, and 90 for pin oak. Other species to manage here include: sweetgum, red maple, and American sycamore. Belknap is poorly suited for log yard/haul road construction, well suited for mechanical and hand planting, moderately suited for harvest equipment operability, and is well suited for mechanical site preparation. Potential erosion hazard is slight and soil rutting hazard is severe for this soil type.

***Bonnie silt loam, ponded (Bp); (58.5 acres);*** Consists of deep, poorly drained, moderately slowly permeable soils on bottom land. These soils formed in silty alluvial sediments. Slopes range from 0-2%. Frequently has standing water in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration. Water table can be 2 feet above the surface to a depth of 6 inches below the surface. This soil typically is composed of 9-10% sand, 66-73% silt, and 18-24% clay, moist bulk density ranges 1.30-1.55 g/cc, saturated hydraulic conductivity ranges 1.41-14.11 micro m/sec, available water capacity ranges 0.14-0.25 in/in, linear extensibility ranges 0-2.9%, and organic matter ranges 0-3%

throughout available rooting depth. Soil pH ranges 4.5-7.3. It is unsuitable for growing black walnut. Site index is 90 for pin oak and 100 for eastern cottonwood where not too wet. Other species to manage here include: sweet gum, red maple, and river birch. Bonnie is poorly suited for log yard/haul road construction, moderately suited for mechanical and hand planting, and is poorly suited for harvest equipment operability. Potential erosion hazard is slight and soil rutting hazard is severe for this soil type.

***Bonnie silt loam, frequently flooded (Bo); (25.2 acres);*** Consists of deep, poorly drained, moderately slowly permeable soils on bottom land. These soils formed in silty alluvial sediments. Slopes range from 0-2%. It is frequently flooded. Duration of flood can be brief to long. Depth to top of a seasonally high water table ranges 6-12 inches. This soil typically is composed of 8% sand, 69-72% silt, and 20-23% clay, moist bulk density ranges 1.32-1.45 g/cc, saturated hydraulic conductivity ranges 1.41-14.11 micro m/sec, available water capacity ranges 0.21-0.25 in/in, linear extensibility ranges 1-2.7%, and organic matter ranges 0-3% throughout available rooting depth. Soil pH ranges 4.5-7.3. It is unsuitable for growing black walnut. Site index is 90 for pin oak and 100 for eastern cottonwood. Other species to manage here include: sweet gum, cherrybark oak, and American sycamore. Bonnie is poorly suited for log yard/haul road construction, well suited for mechanical and hand planting, moderately suited for harvest equipment operability, and is well suited for mechanical site preparation. Potential erosion hazard is slight and soil rutting hazard is severe for this soil type.

***Steff silt loam, frequently flooded (Sf); (12.0 acres);*** Consists of deep, moderately well drained, moderately permeable soils on flood plains. These soils formed in acid, silty alluvium. Slopes range 0-2%. These soils exist on swells adjacent to stream channels and are flooded for brief periods in winter and spring. Steff soils have a seasonal high water table at 18-36 inches during winter and spring. This soil typically is composed of 13-16% sand, 65-72% silt, and 15-19% clay, moist bulk density ranges 1.35-1.49 g/cc, saturated hydraulic conductivity ranges 4.23-14.11 micro m/sec, available water capacity ranges 0.21-0.25 in/in, linear extensibility ranges 0.4-2.5%, and organic matter ranges 0.1-3% throughout available rooting depth. Soil pH ranges 4.5-7.3. This soil is moderately suited for growing black walnut. Site index is 80 for northern red oak, 82 for American sycamore, 100 for sweetgum, 120 for eastern cottonwood, and 102 for yellow poplar. Other species to manage here include: bitternut hickory, shagbark hickory, bur oak, and red maple. Steff is poorly suited for log yard/haul road construction, well suited for mechanical and hand planting, moderately suited for harvest equipment operability, and is well suited for mechanical site preparation. Potential erosion hazard is slight and soil rutting hazard is severe for this soil type.

### **Access**

Access is gained through Fire Lane 10, approximately 1.25 miles from the starting point at the county road. There are no fire lanes inside the tract.

### **Boundary**

The entire western boundary of this tract follows an abandoned railroad bed (the Augusta – Hartwell Junction line) which is currently owned by Norfolk Southern. At the point of intersection with the Patoka River, old railroad bridge pilings can still be seen emerging from the river. At this point, the Patoka River becomes the tract boundary extending north and then east.

As the river turns southeast the boundary becomes a straight line travelling due south. The boundary turns east at this corner and meets with the drainage ditch. At this corner, the boundary turns south. The abandoned drainage ditch comprises a large portion of the eastern tract boundary. The southeast corner is submerged in open wetland. New areas added to this tract after State acquisition have not been surveyed and there is little boundary evidence in office files. Due to ponding and wetness of the site, complete traversing and marking of boundaries is impractical. A professional survey is recommended when feasible.

### **Ecological Considerations**

The Division of Forestry has developed compartment level guidelines for important wildlife structural habitat features such as snags and legacy trees. Snags are standing dead or nearly dead trees. Snags provide value to a stand in the form of habitat features for foraging activity, den sites, decomposers, bird perching, and bat roosting. Snags eventually contribute to the future pool of downed woody material, which provides habitat for many ground-dwelling species and contributes to healthy soils. Legacy trees are live trees of a certain species and diameter class, that have potential future value to various wildlife species, if retained in the stand.

Current assessments indicate the abundance of these habitat features meet or exceed recommended maintenance levels. Due to the large area subject to flooding and poor tree growth, tract level legacy trees are lower than maintenance level. However, these levels are based on compartment and likely meeting or exceeding within the compartment.

Invasive and exotic species are widespread throughout southern Indiana on private and public land. Each species has a history of introduction, successful colonization of sites and dispersal. Aside from being very successful in out-competing native plants on a variety of forest sites, an additional reason for their success may be because the current forest sites are using resources inefficiently. There are niches open and available and invasive species aggressively take advantage. The land making up C12T7 had historical land uses involving clearing land for agriculture and/or pasture, probably as early as the mid-1800s to the 1940s. Many adjacent lands on the landscape also experienced similar disturbances, whether from agriculture or coal mining. Erosion and degradation in the early 1900s would have further affected patterns of native shrub and herb abundance, distribution, and dispersal. The culmination of site degradation, invasive species introduction, and presence of a vacuum in the resource niche, combined with increasing deer densities during the time this forest was initiating and reorganizing, have all contributed to the presence of invasive, exotic species in C12T7. Japanese stiltgrass, Phragmites, winter creeper, and multi-flora rose were observed throughout the tract at various densities. These and other invasives, such as Autumn olive, bush honeysuckle, Japanese honeysuckle, tree of heaven, and *Paulownia* should be treated as part of a regular invasive species control program. Control options include foliar spraying with herbicide, cut-stump with herbicide, and basal spraying with herbicide. All pesticides used on state forest will follow certification standards. In addition, emerald ash borer (*Agilus planipennis*) exists in the region, producing complete mortality in overstory ash. For this reason, it is recommended ash trees be included in regularly prescribed timber harvesting, so value is not lost to mortality. Conversely, young healthy ash showing no sign of decline should remain for potential resistant features.

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.

### **Recreation**

Likely recreational activities on this tract include hunting. Currently, there are no developed recreation trails within this tract. Impacts to recreation by management prescribed in this guide may include increased accessibility due to skid trails and changes in wildlife movements. For example, one year after a timber harvest whitetail deer will change their movement to follow skid trails to facilitate movement through the forest. Within five years however, skid trails will be thick with herbaceous and woody vegetation and this change will likely shift ease of movement towards other areas outside skid trails.

### **Cultural**

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

### **Tract Subdivision Description and Silvicultural Prescription**

***Bottomland Hardwoods (105.8 estimated acres):*** Bottomland mixed hardwoods are found in the northern part of the tract along the Patoka River, on the periphery of the unstocked wetland areas, in the central portion of the tract and in the southwest portion. Species composition varies some with moisture level of immediate site. On the more elevated bottomland sites overstory species include red maple, pin oak, sweetgum, American sycamore, and various bottomland oaks and hickories. Little tulip poplar is found on bottomland hardwood sites as it can tolerate only the most elevated portions of this tract. The wettest mixed hardwood sites contain red maple-sweetgum canopy and almost pure stands of red maple on other sites. Adding to the diversity of mixed hardwood sites in this tract, there is some early successional forest here containing young developing trees where canopy is dominated by river birch, red maple, sweetgum, black willow, and the occasional pin oak. Understory shrub and herbaceous composition varies as well. In more elevated areas pawpaw, spicebush, and hazelnut are more abundant. In wetter and lower areas possumhaw, blackhaw and other shrubs can be found and in some wetter areas lizard tail, greys sedge, and various ferns dominate an open herbaceous understory layer which indicate a wetter site than places where these species are absent or minor components.

***Bottomland Oak-Hickory (23.5 estimated acres):*** Bottomland oak-hickory is found in a small pocket in the north along the Patoka River, a little on the east central portion of the tract, and some along the flat portion in the west-central portion along the intermittent stream that travels from southwest to northeast through the tract. There are two main types of bottomland oak-hickory canopy found here. On the slightly more elevated sites is found a mixture of shagbark hickory, pin oak, red maple, swamp chestnut oak, swamp white oak, Shumard oak, bur oak, and other species. On the wetter and flatter depressions is found almost a pure association of pin oak with a few other species. Poletimber in these bottomland oak hickory associations generally consists of shagbark hickory, red maple, American elm, swamp chestnut oak, and swamp white

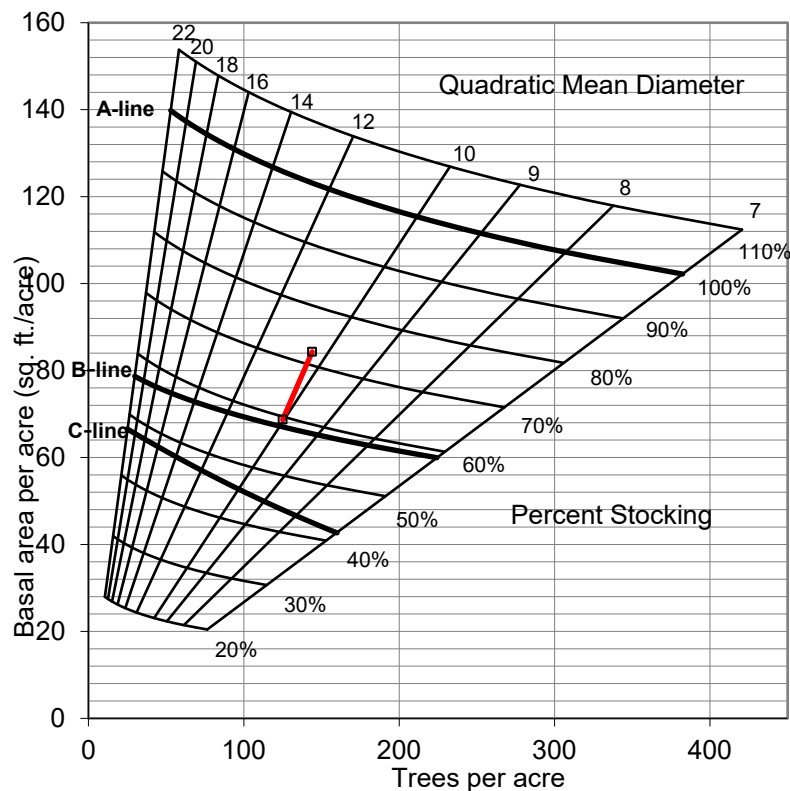
oak. Understory saplings found growing here include sweetgum, ironwood, pawpaw, shagbark hickory, blackgum, and various other tree species.

**Unstocked Wetland (62.7 estimated acres):** Unstocked, open wetland areas are found in the northern portion and throughout parts of the southwestern and southeastern parts of the tract. There is an abandoned drainage ditch that travels from the Patoka River southeast for a stretch and then it turns due south, forming the eastern boundary of this tract. The ditch has been dammed at several locations by beaver. In the southern portion the ditch has filled in with sediment and other debris and contains standing water. A majority of this unstocked wetland is currently composed of buttonbush swamp containing standing water year-round. Most likely due to beaver activity, the periphery contains many standing snags which indicate the water table has risen and encroached on neighboring forestland. Transition areas were classified as mixed hardwoods where there was still a canopy of live trees even though stocking is declining in these areas and in the future they may become part of the unstocked wetland area.

### Tract Summary Data

Total Trees/Ac. = <b>144 Trees/Ac.</b>	Overall % Stocking Hardwoods = <b>72%</b>
Basal Area = <b>84.3 Sq. Ft./Ac.</b>	Harvestable Trees = <b>19 Trees/Ac.</b>
Present Volume = <b>5,792 Bd. Ft./Ac.</b>	

**Figure 3. Gingrich Stocking Level Chart for C12T7.**



The stocking level is indicated by the chart provided above in Figure 3. The tract's forest resource is composed of 2 different stratum.



### **Bottomland Hardwoods Stratum**

There are large areas of mixed bottomland hardwoods throughout this tract. Most of the areas are impractical for timber harvest due to soil conditions and difficult access for harvesting equipment. However, approximately in the middle of the tract, beginning along the western boundary and extending eastward along the north side of the intermittent stream, there is an area suitable for timber harvest. Much of this area is overstocked. A majority of overstory trees are red and silver maple, sycamore, sweetgum, and green ash. Oftentimes these trees have poor form and are in poor health being at risk of mortality. A thinning and improvement harvest is recommended here. Areas of poor stocking, extensive mortality, or where there is presence of adequate desirable advanced regeneration should be considered for a group selection opening. Given the ability of bottomland sites in C12T7, particularly on Belknap soils, to support a high stocking of excellent quality bottomland species such as pin, swamp chestnut, Shumard, swamp white, cherrybark, and bur oak as well as hickories, any large opening could be replanted with these species and tended for the first 8-10 years performing post-harvest TSI to nurture establishment and dominance of planted trees.

Additionally, after improvement harvest removing basal area and allowing sunlight to penetrate to the forest floor, enrichment planting could be performed in areas to promote desirable oak and hickory advanced regeneration and to make way for eventual creation of a new cohort of bottomland oak-hickory forest.

### **Bottomland Oak-Hickory Stratum**

The bottomland oak-hickory timber type tends to provide a very significant contribution to wildlife, timber resource, and value. The retention of species in this stratum is important to the Division's long-term timber management objectives.

Single tree selection cuttings are prescribed in bottomland areas containing many pin, Shumard, swamp chestnut, swamp white, and hickories to release these trees when appropriate and to remove mature to over-mature trees and any trees in poor health or having poor form. These improvement cuttings may enable release of bottomland oaks and encourage desirable bottomland species regeneration occurring in the understory. The result may yield an increase in timber and wildlife diversity. Group openings should be considered in areas with poor stocking and those having a high concentration of trees with poor form, low quality, or of undesirable species.

Given the ability of bottomland sites in C12T7, particularly on Belknap soils, to support a high stocking of excellent quality bottomland species such as pin, swamp chestnut, Shumard, swamp white, cherrybark, and bur oak as well as hickories, any openings could be replanted with these species and tended for the first 8-10 years performing post-harvest timber stand improvement (TSI) to nurture establishment and dominance of planted trees. Additionally, after improvement harvest removing basal area and allowing sunlight to penetrate to the forest floor, enrichment planting could be performed in areas to promote desirable oak and hickory advanced regeneration and to make way for eventual creation of a new cohort of bottomland oak-hickory forest.

Post harvest TSI could be performed to release crop trees and complete any openings with a focus mainly on the portion of the tract practical for harvesting.

### **Summary Tract Silvicultural Prescription and Proposed Activities**

Based on this information, a managed timber harvest containing approximately 150,000-200,000 board feet on approximately 65 acres in the central portion of the tract is prescribed within the next 5 years. This timber harvest could be combined with neighboring C12T6, if practicable. Yarding would be in the neighboring tract (C12T6) on top of the hill along Fire Lane 10. Postharvest TSI should be performed along with invasives follow-up in any openings created. A regeneration review should be conducted three years after harvest. The tract should be re-inventoried in 15-20 years. During timber harvest appropriate forestry best management practices will be used for watershed protection.

### **Proposed Activities Listing**

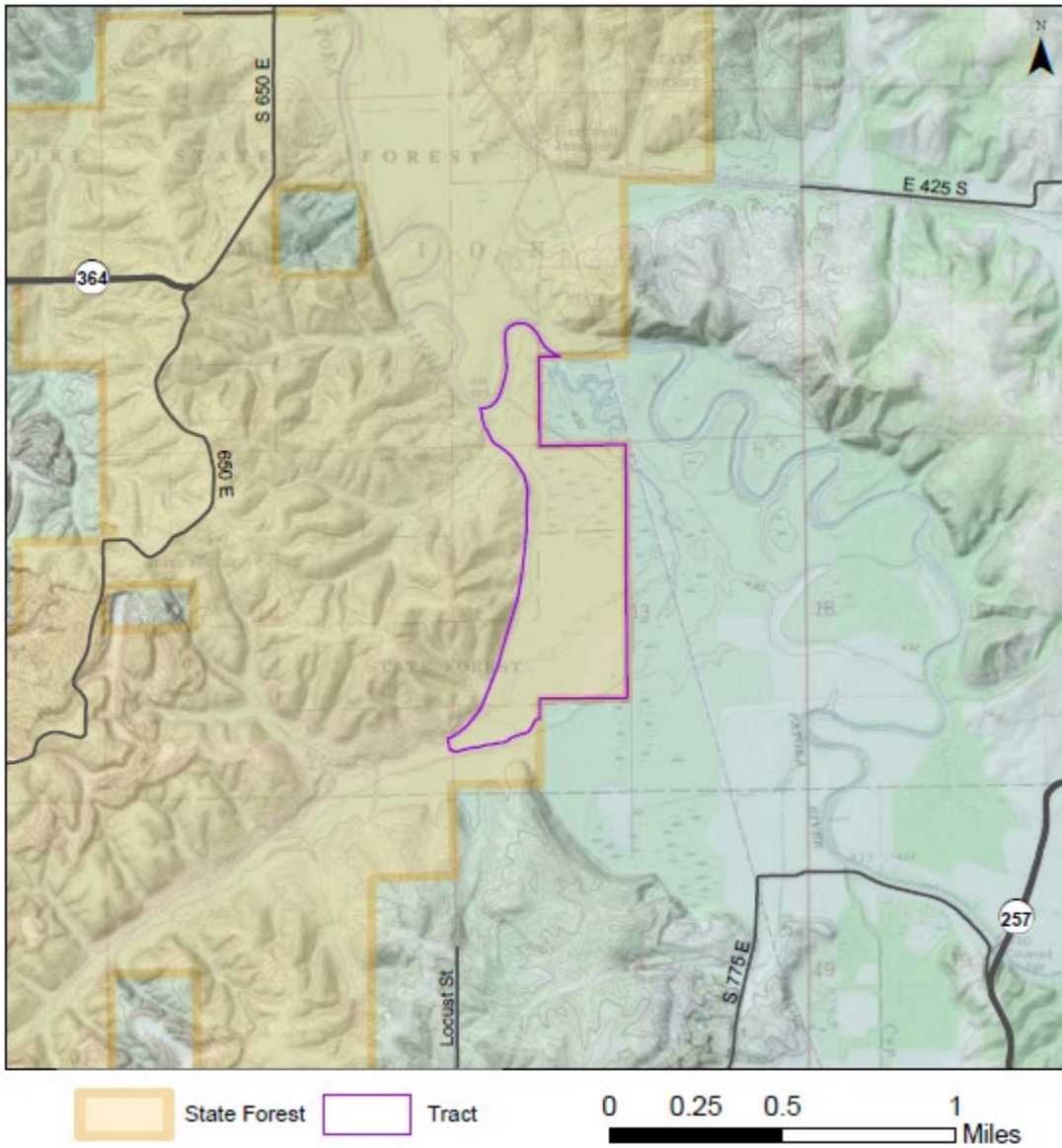
#### **Proposed Management Activity**

Pre-harvest invasive species work  
Timber harvest  
Post-harvest timber stand improvement  
3-year regeneration opening review  
Next forest inventory

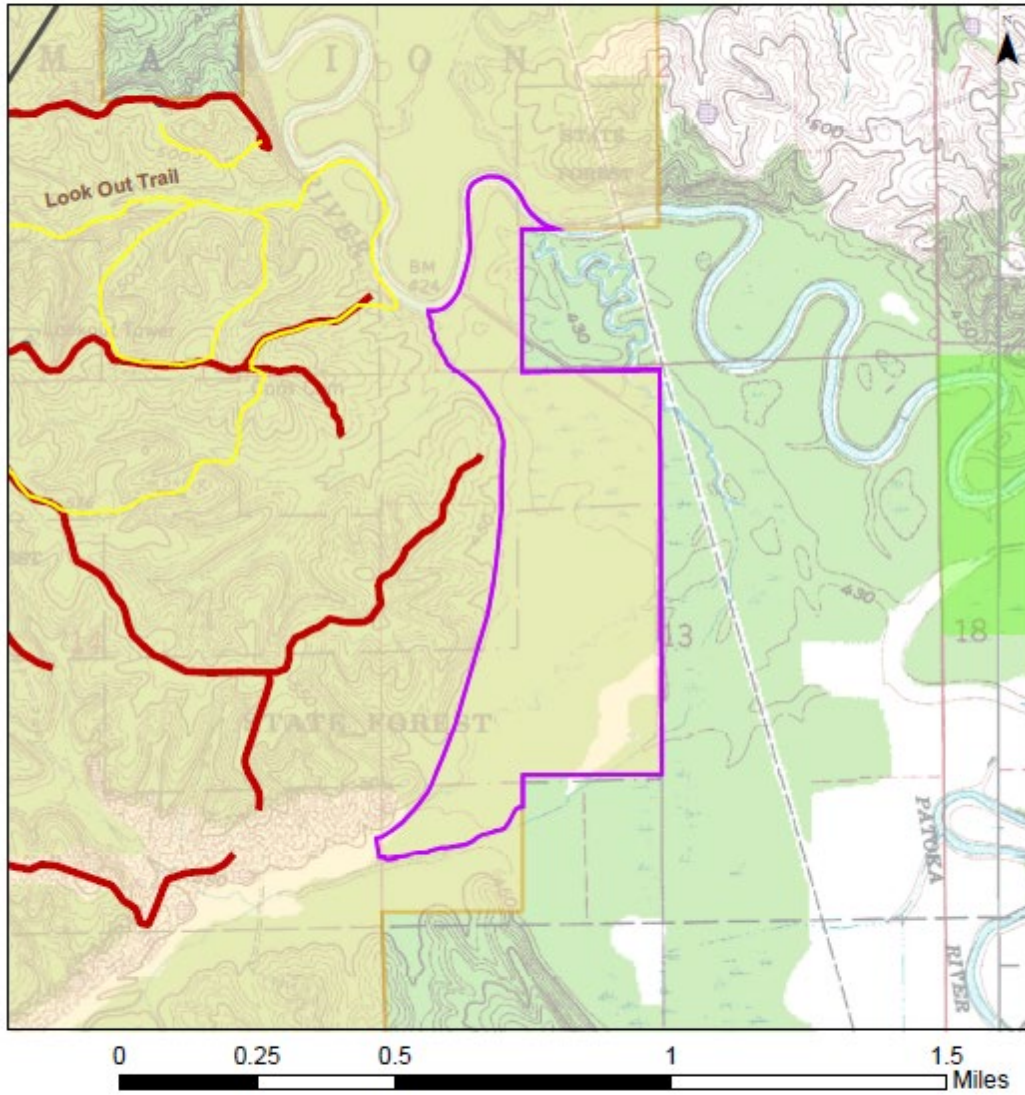
#### **Proposed Period**

2022-2024  
2024-2027  
within 2 years of harvest  
3 years following harvest  
2041

# Pike State Forest Location Map Compartment 12 Tract 7



# Pike State Forest Compartment 12 Tract 7 Tract Map



- Recreation Trail
- Fire Lane
- Tract boundary
- Nature Preserve
- State Forest

# Ferdinand-Pike State Forest Compartment 12 Tract 7 Cover Types Map

