Indiana Department of Natural Resources
Division of Forestry
RESOURCE MANAGEMENT GUIDE

Owen-Putnam State Forest	Compartment: 04 Tract: 08
Forester: Bob Lindemuth	Date: 09/20/2021 Acres: 74
Management Cycle End Year: 2041	Management Cycle Length: 20 years

Location

This tract, also known as 6380408, is located in Owen County, Indiana. More specifically, the tract is in section 16, Township 11 North, Range 4 West of Morgan township. This tract lies approximately 0.5 miles southwest of the end of Surber Road's terminus in Rattlesnake Campground. This tract lies approximately 9 miles northwest of the town of Spencer.

General Description

This tract is 74 acres and is dominated by closed-canopy mixed hardwoods, with pockets of oak-hickory on the drier slopes. Approximately 8 acres of this tract are a non-native eastern white pine cover type, planted to stabilize the soil following abandonment of marginal farmland. Due to lack of management, the pine stand is overstocked and deteriorating in health. The overall health of this tract is good, although several pockets of oak mortality were observed. The tract is closed canopy with more open conditions existing closer to the fire lane. A diverse overstory exists, with 18 species of sawtimber size recorded in the inventory. Regeneration is abundant and diverse, consisting of 16 species, but mostly shade tolerant American beech, sugar maple, and bluebeech. An improvement harvest would allow additional light to reach the forest floor promoting regeneration of more shade intolerant species as well as provide more available crown space for future crop trees. It would also capture defective trees that would be susceptible to mortality in the coming years, such as those with rotten butts and crown dieback.

History

- On February 24, 1953 1,332 acres was purchased for $1 from John and Pauline Dowdall. Approximately 38 acres of this purchase eventually became C4T8.
- On May 9, 1959 292 acres was purchased for $5,500 from Charles W & Nettie Dale. Approximately 32 acres of this purchase eventually became C4T8
- On January 25, 1967 110 acres was purchased for $1,833 from Ruthe E Brown. Approximately 4 acres of this purchase eventually became C4T8.
- In 1988, a property wide cruise was done. Data of C4T8 showed there was an estimated 4,296 bd. Ft. per acre and approximately 74% stocked.
- In 2004, an inventory was done and an RMG was developed. Estimated 6,012 bd. Ft./sawtimber per acre. Estimated 2,429 bd. Ft./sawtimber per acre were harvestable.
- In 2005, 622 sawtimber trees and 234 culls were sold to R. Booe & Son Hardwoods for $20,333.00 with an estimated volume of 111,500 bd. Ft. This sale was a salvage sale from a windstorm that occurred in May of 2004. Although the salvage sale was 2 tracts, the data expressed here was only from compartment 4 tract 8.

Landscape Context
This tract lies in a rural, primarily forested area with scattered agriculture and residences. The residences are primarily to the southwest of the tract. To the east of this tract lies compartment 4 tract 12 and compartment 4 tract 13 of Owen-Putnam State Forest, extending for approximately 0.4 miles. To the north lies compartment 4 tract 7 of Owen-Putnam State Forest. To the south of this tract lies compartment 4 tract 9 of Owen-Putnam State Forest. To the west of this tract lies compartment 4 tract 2 and private property. There are no anticipated land use changes to the surrounding area in the near future.

Topography, Geology, and Hydrology
The topography is gently rolling throughout the tract with various aspects. In the southern portion of the tract is a relatively flat creek bottom.

The geology of the tract consists of 9 different soil series, all silt loams. Parent materials are diverse and include loess over loamy lacustrine deposits, loess over loamy residuum, loess over loamy till, loamy colluvium and/or clayey residuum, thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale, loamy alluvium, and fine-silty loess over clayey residuum weathered from shale over loamy residuum weathered from sandstone and shale.

A mapped intermittent stream drains the entire tract and forms the southern boundary of the tract. It flows from the east to the west where it eventually flows into Jordan Creek. Small, ephemeral drainages drain into this stream. During any management activities tops will be removed from the stream.

Soils
OmkC3- Otwell silt loam, 6 to 12 percent slopes, severely eroded
This moderately sloping, deep, well drained and moderately well drained soil is on side slopes on lacustrine terraces. The soil is fairly well suited to trees. Windthrow hazards and seedling mortality are concerns that should be considered when planning management activities. This soil has a site index of 65 for white oak.

PryB- Potawatomi silt loam, 1 to 3 percent slopes
This gently sloping, deep, moderately well drained soil is found on ridgetops in the uplands. It is well suited to trees. Equipment limitations and seedling mortality are concerns that should be considered when planning management activities. This soil has a site index of 80 for white oak and 93 for yellow poplar.

SneD5- Solsberry silt loam, 12 to 18 percent slopes, gullied
This strongly sloping, deep, moderately well drained soil is on the side slopes of the uplands. It is well suited to trees. Erosion hazards, equipment limitations, and windthrow hazards are management concerns that should be considered during planning and implementation of Best Management Practices for Water Quality. This soil has a site index of 80 for northern red oak.

TtaG- Tulip-Tipsaw complex, 25 to 60 percent slopes
This moderately and very steep, moderately deep to deep, well drained complex is found on sideslopes in the uplands. It is suited to trees. Erosion hazards, equipment limitations, and seedling mortality are management concerns that should be considered when planning sale layout and implementing Best Management Practices for Water Quality. Tulip has a site index of 80 for northern red oak and 95 for yellow poplar and Tipsaw has a site index of 70 for northern red and black oak.

TtcE- Tulip-Wellston-Adyeville silt loams, 18 to 25 percent slopes
This strongly sloping to steep, deep, well drained complex is found on sideslopes in the uplands. It is suited to trees. Erosion hazards, equipment limitations, windthrow hazards, and seedling mortality are management concerns that should be considered when planning sale layout and implementing Best Management Practices for Water Quality. Tulip has a site index of 80 for northern red oak and 95 for yellow poplar, Wellston has a site index of 81 for northern red oak and 90 for yellow poplar, and Adyeville has a site index of 64 for northern red oak.

WhfD2- Wellston silt loam, 12 to 18 percent slopes, eroded
This strongly sloping, well drained soil is on narrow ridgetops and on side slopes of the uplands. It is well suited to trees. This soil has a site index of 71 for northern red oak and 90 for yellow poplar.

WpuAV- Wirt silt loam, 0 to 2 percent slopes, frequently flooded, very brief duration
This nearly level, deep, well drained soil is found on natural levees and floodplain steps on flood plains. It is well suited to trees. Equipment limitation and seedling mortality are management concerns that should be considered when planning management activities. This soil has a site index of 105 for yellow poplar.

ZamC3- Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, severely eroded
This moderately sloping, deep, moderately well drained or well drained soil is on side slopes adjacent to drainage ways in the uplands. It is well suited to trees and has a site index of 69 for white oak and 90 for yellow poplar.

ZapD3- Zanesville, soft bedrock substratum-Tulip silt loams, 12 to 18 percent slopes, severely eroded
This strongly sloping, deep, moderately well drained soil is on narrow side slopes in the uplands. It is fairly well suited to trees. A fragipan is present that can limit rooting depth. Erosion hazards and equipment limitations are main concerns that should be considered when planning management activities. This soil has a site index of 69 for white oak and 90 for yellow poplar.

Access
From the end of Surber Road in Rattlesnake Campground, continue west down an unnamed fire lane approximately 0.5 miles to access this tract. The tract is located on the south side of the fire lane. Access within the tract is good, utilizing existing skid trails. An existing log yard and skid trails will be utilized for management activities.

Boundary
The northern boundary of this tract is the previously mentioned fire lane. The eastern boundary of this tract is a ridgeline heading to the southwest. The southern boundary of this tract is a mapped, intermittent stream. The western boundary of this tract is a straight line, following a ridge top on the northern end and serving as the state forest boundary where it borders private property on the southern end. The state forest boundary line was identified using field evidence such as corner stones or rebar and GPS handheld units when no field evidence was identified. Property lines are typically painted with orange paint or flagged when there is a lack of evidence.

Ecological Considerations
A diverse assortment of wildlife resources are found on this tract. This provides habitat for a variety of wildlife species. Habitat includes:

- Scattered Oak-Hickory canopy
- Contiguous Mixed Hardwood canopy
- Closed pine canopy

Hard mast trees such as oaks, hickories, and American beech provide a food source to both game and non-game species.

Forest wildlife species depend on live trees for shelter, escape cover, roosting, and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate) food resource. The retention of live trees within various diameter classes is of particular concern to habitat specialists.

The Division of Forestry has developed compartment level guidelines for important wildlife structural habitat features known as snags. Snags are standing dead or dying 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. Downed woody debris provides habitat for many species and contributes to healthy soils.

Snags (All Species)	Maintenance Level	Inventory	Available Above Maintenance
Snag 5"+ DBH	296	708	412
Snag 9"+ DBH	222	346	124
Snag 19"+ DBH	37	132	95

Inventory data for compartment 4 tract 8 shows that snags 5”+, 9”+, and 19”+ exceed maintenance levels. The prescribed management will maintain or enhance the relative abundance of these features.

Most of this tract is of the dry-mesic forest community type, with some isolated, more mesic sites located along lower slopes, and some floodplain along the stream. The dry-mesic upland forest community has moderate soil moisture with trees growing well, however the canopy is usually more open than in mesic forests. It is one of the most prevalent forest communities in Indiana. It occurs on slopes throughout the state. The dominant plants in this community are the

white oak (*Quercus alba*), northern red oak (*Quercus rubra*), and black oak (*Quercus velutina*). Characteristic plants in this community are the shagbark hickory (*Carya ovata*), mockernut hickory (*Carya tomentosa*), flowering dogwood (*Cornus florida*), hophornbeam (*Ostrya virginiana*), and blackhaw (*Viburnum prunifolium*). Characteristic animals in this community are the broad-headed skink (*Eumeces laticeps*), white-footed mouse (*Peromyscus leucopus*), and eastern chipmunk (*Tamias striatus*).

Exotic/invasive species multiflora rose (*Rosa multiflora*), autumn olive (*Eleagnus umbellata*), Japanese stiltgrass (*Microstegium vimineum*), and Japanese barberry (*Berberis thunbergii*) are present in and around this tract in patches of light to moderate densities. These species commonly occur throughout the county. Treatment efforts should be taken on a situational approach during preharvest or post-harvest TSI.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened, or Endangered communities were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

Recreation

Recreational use of this tract is light, consisting of hunting, horseback riding, and mountain bike riding. The blue trail (Bridle Loop Trail) runs through this tract, but it is not as heavily used as the southern portions of the trail system, which consists of the orange (Pleasant Grove Trail) and the red (Sandstone Bluff Trail). The Bridle Loop trail is the only multiple use trail because it also allows mountain biking. The blue trail splits in the southern end of the tract and runs to the northeast and northwest. The northeast portion of the trail approximately forms the eastern boundary of the tract, while the northwest portion of the trail runs up a ridge, approximating the western boundary of the tract in the northwest corner.

During any management activity, specifically a timber harvest, access to this tract will be restricted due to safety concerns. The trail will be closed during weekdays Monday morning through Friday night. Signs will be posted at the horse campground, all three locations where the trail enters the tract, trailheads, as well as advertised on Owen-Putnam State Forest advisories located on the Division of Forestry webpage. The horse trail will only be used as a skid trail as a last resort and crossings will be minimized. During active management operations tops will be removed from the horse trail daily. Following the management activity, the tract will be reopened to public use.

Cultural

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

Tract Subdivision Description and Silvicultural Prescription

Forest Condition

A current forest resource inventory was completed on 08/12/2021 by Forester Bob Lindemuth. A summary of the estimated tract inventory results are located in the table below.

Tract Summary Data (trees >14"DBH):

Species	# Sawtimber Trees	Total Bd. Ft
Yellow Poplar	962	361,110
Eastern White Pine	659	159,400
Northern Red Oak	265	90,960
White Oak	136	62,890
Black Oak	229	54,230
Pignut Hickory	100	34,700
Red Maple	255	33,950
American Sycamore	48	19,490
Sugar Maple	87	18,610
Shagbark Hickory	57	18,200
Basswood	76	15,160
Blackgum	91	13,120
Black Walnut	70	12,070
White Ash	15	8,300
Chinkapin Oak	23	7,200
Sassafras	51	4,820
Red Elm	45	3,170
Black Locust	28	2,700
TRACT TOTALS	3,197	920,080

Mixed Hardwoods (67 acres)

This cover type is characterized by the diverse species composition. This stand type is 91% of the total tract and is ~96% stocked with 179 trees per acre and an average basal area of 113.6 ft^2 per acre. The dominant species in the overstory is yellow poplar (44%), which contains 4,722 bd. ft. per acre. Other abundant species in the overstory include northern red oak (12%), white oak (8%), black oak (7%), and red maple (4%). The midstory (pole sized timber) consists of primarily sugar maple (24%), yellow poplar (13%), pignut hickory (9%), red maple (9%), white oak (7%), eastern white pine (7%), and black walnut (6%). The understory is primarily American beech (25%), sugar maple (11%), bluebeech (10%), pawpaw (8%), pignut hickory (8%), black cherry (6%), and yellow poplar (6%).

The recommended management activity is to conduct an improvement harvest, utilizing single tree and group selection or patch cut openings. This activity will target poorly formed individuals, trees declining in health, and trees with a small live crown. This will give the healthier trees with good form and larger live crowns more available resources above and below ground. Where conditions warrant, group selection may be utilized to regenerate shade intolerant species and create young forest habitat. When possible, selection should favor releasing desired future crop trees.

The top species for removal in this stand are yellow poplar, northern red oak, eastern white pine, and American Sycamore. The harvest volume for this stand is estimated at 3,000 to 4,500 bd. ft. per acre of the total 10,817 bd. ft. per acre. Following the timber harvest, timber stand improvement (TSI) should be conducted to complete the silvicultural prescription. TSI will concentrate on completion of regeneration openings, crop tree release, and reduction of problematic vines.

Desired Future Condition
The objective for this cover type is to provide for multiple economic and ecological services, specifically a quality hardwood timber stand dominated by mid- and late-seral species, while providing diverse habitat structure, hard mast, and mid to late-seral habitat for wildlife.

Eastern White Pine (7 acres)
This cover type is eastern white pine and comprises 9% of the tract acreage. It currently contains 336 trees per acre, a basal area of 301.5 ft^2 per acre and is overstocked. This stand is dominated by sawtimber-sized eastern white pine (81%), containing 24,815 bd. ft. per acre and a small amount of yellow poplar (16%), with a volume of 4,786 bd. ft. per acre, and red maple (3%), with a volume of 966 bd. ft. per acre. The midstory consists of suppressed eastern white pine and yellow poplar. The understory consists of American beech (25%), eastern white pine (25%), pignut hickory (25%), and sassafras (25%).

The recommended management activity is to conduct a harvest utilizing group selection openings and single tree selection. Group selection openings will target primarily where the pine areas are thick. There is no native pine to this area of Indiana. Group selection openings help aid in the regeneration of shade intolerant species as well as create young forest habitat, a forest type that is not commonly found in Indiana. Single tree selection may be used as well in areas where a group selection harvest isn't necessary due to the volume of pine. Single tree selection should favor future crop trees with good form, good health, and a good live crown ratio.

The top species for removal in this stand are eastern white pine and yellow poplar. The harvest volume for this stand is estimated at 27,000 to 29,000 bd. ft. per acre of the total 30,567 bd. ft. per acre. This harvest volume is rather high but considering the overstocked nature of the large non-native eastern white pine trees, the removal of these large group selections will encourage native hardwood regeneration. Following the timber harvest, timber stand improvement (TSI) should be conducted to complete the silvicultural prescription. TSI will concentrate on completion of regeneration openings, crop tree release, and reduction of problematic vines.

Desired Future Condition
The objective for this cover type is to transition from non-native pine to high-quality native hardwoods. This will provide for early successional habitat, a habitat type that is sorely lacking in Indiana.

Summary Tract Silvicultural Prescription and Proposed Activities
The proposed management activity is to conduct an improvement harvest to promote the overall health, vigor, resiliency, and quality of the stand. This improvement harvest will utilize single tree and group selection or patch-cut silviculture. The purpose of single tree selection is to remove trees with poor form and health, drought stressed or wind damaged trees to promote a healthier growing forest. It will also target declining ash from emerald ash borer, mature and over mature trees where present, and other intermediate trees needed to release residual crop trees. Young, vigorous ash will be retained for possible resistant features. Group selection will be used to target groups of trees that fit the above description growing together.

Within two years of the timber harvest, a TSI operation should follow to release crop trees that were not adequately released during the harvest and complete regeneration openings. Additionally, TSI should be utilized to control targeted invasive species in the stand and deaden a small percentage of low value trees to create snags for wildlife.

A fire regime in this stand is also recommended. A prescribed fire would reduce fuel loads, discourage shade tolerant species like beech and maple, and promote oak regeneration. Oaks are likely to resprout after a fire, whereas thin-barked species like beech and maple are not.

During and after completion of the proposed management activity best management practices (BMP's) will be implemented to minimize soil erosion. This tract should receive another inventory and management guide 20 years following the completion of the timber harvest.

Effect of Prescription on Tract Properties:
Landscape: Landscape forest patterns will remain similar to the current situation due to this tract being kept in a forested condition.

Soils: The management activities prescribed in this plan should have minimal impact on soils in this tract. Some soil disturbance is likely during harvesting, but this should be confined to landings and main skid trails. These areas will be properly closed out according to Indiana's BMPs to minimize the impact of management activities on soils.

Hydrology: Hydrology should not be permanently affected by management on this tract. Water quality and yield should not be altered if BMPs are followed during harvest. BMP use will be contractually required of management operators and monitored by property foresters.

Wildlife: Snags and coarse woody debris should remain at viable levels in the stratum and should continue to provide habitat. Managing to recruit newly established or released oaks and hickories will help to ensure that this important food source is available into the foreseeable future. Regeneration openings, such as prescribed have been shown to be of less of an issue from nest predators and generalist species as compared to hard edges such as public roadways, utility

corridors and crop field edges. Placement of regeneration openings away from hard edges can minimize these potential impacts. The prescribed activity will promote wildlife diversity and enhance habitat structural components.

Additionally, management activities involving a timber harvest should not affect this habitat long-term from the perspective of any wildlife utilizing it due to the maintenance of a forested habitat on the tract. Creation of regeneration openings will create early successional habitat that will be beneficial to certain groups of wildlife dependent upon this habitat. Likely, early successional habitat created with such management will also benefit a wider segment of wildlife species that preferentially utilize such habitat for feeding and cover more so than later successional stage habitat.

Recreation: Hunting and horseback riding are likely the only forms of recreation within this tract. Hunting would benefit from forest management by improving the health of the residual trees thus promoting an increase in hard mast, understory plant diversity, and young forest habitat. For user safety, hunting and horseback riding within this tract will be temporarily suspended during management activities.

Proposed Activities Listing

Proposed Management Activity	*Proposed Date*
Management Guide	2021
Treat vines and invasive species	2021 - 2022
Mark and Sell Timber Sale	2022 - 2024
Post-harvest Timber Stand Improvement	1-2 years following harvest
Forest Growth and Periodic Monitoring	3 years post-harvest - 2041
Inventory and Revise Management Guide	20 years following harvest

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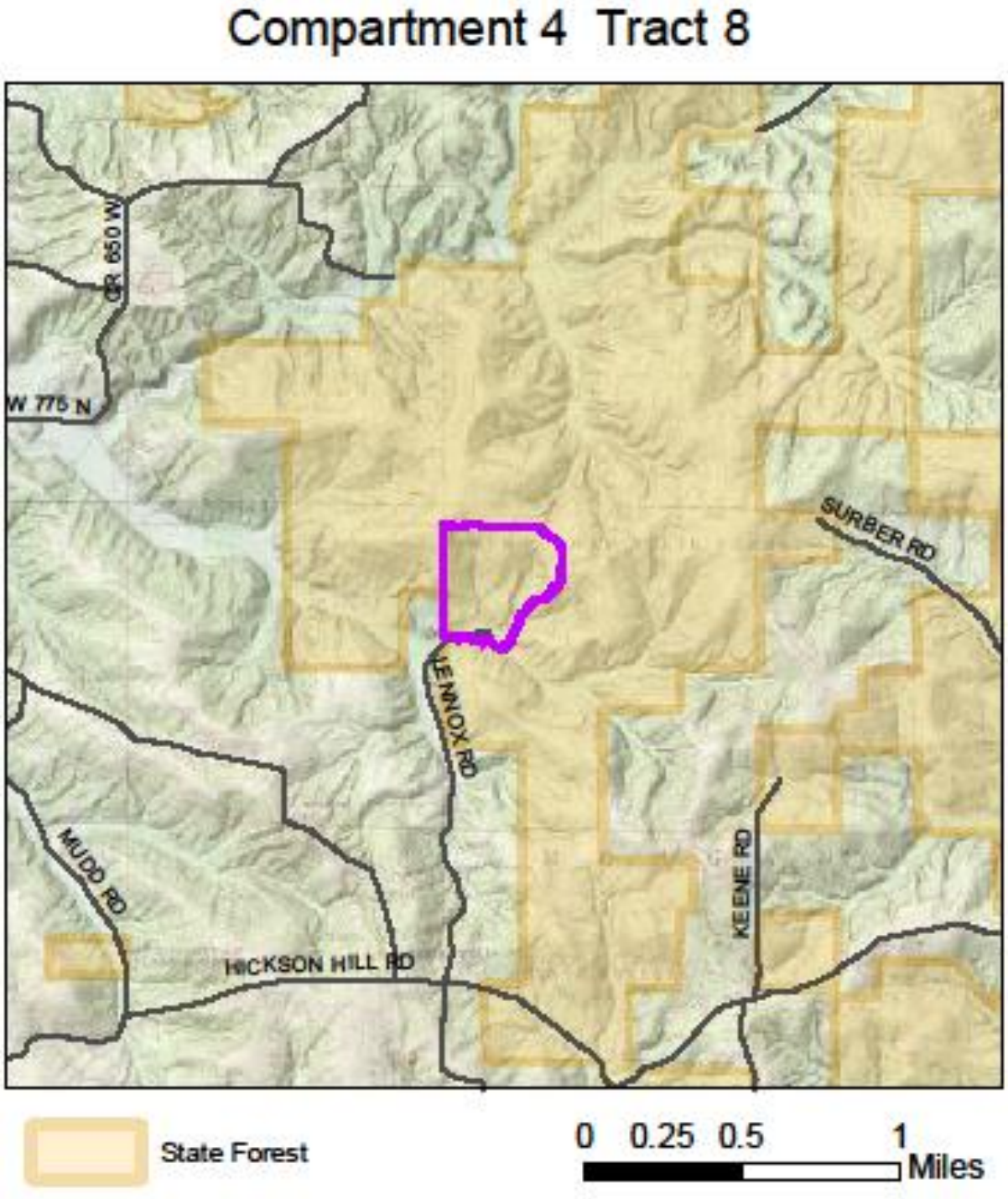
You must indicate the State Forest Name, Compartment Number and Tract Number in the "subject or file reference" line to ensure that your comment receives appropriate consideration. Comments received within 30 days of posting will be considered and posted at http://www.in.gov/dnr/forestry/3634.htm. Note: Some graphics may distort due to compression.

APPENDICIES

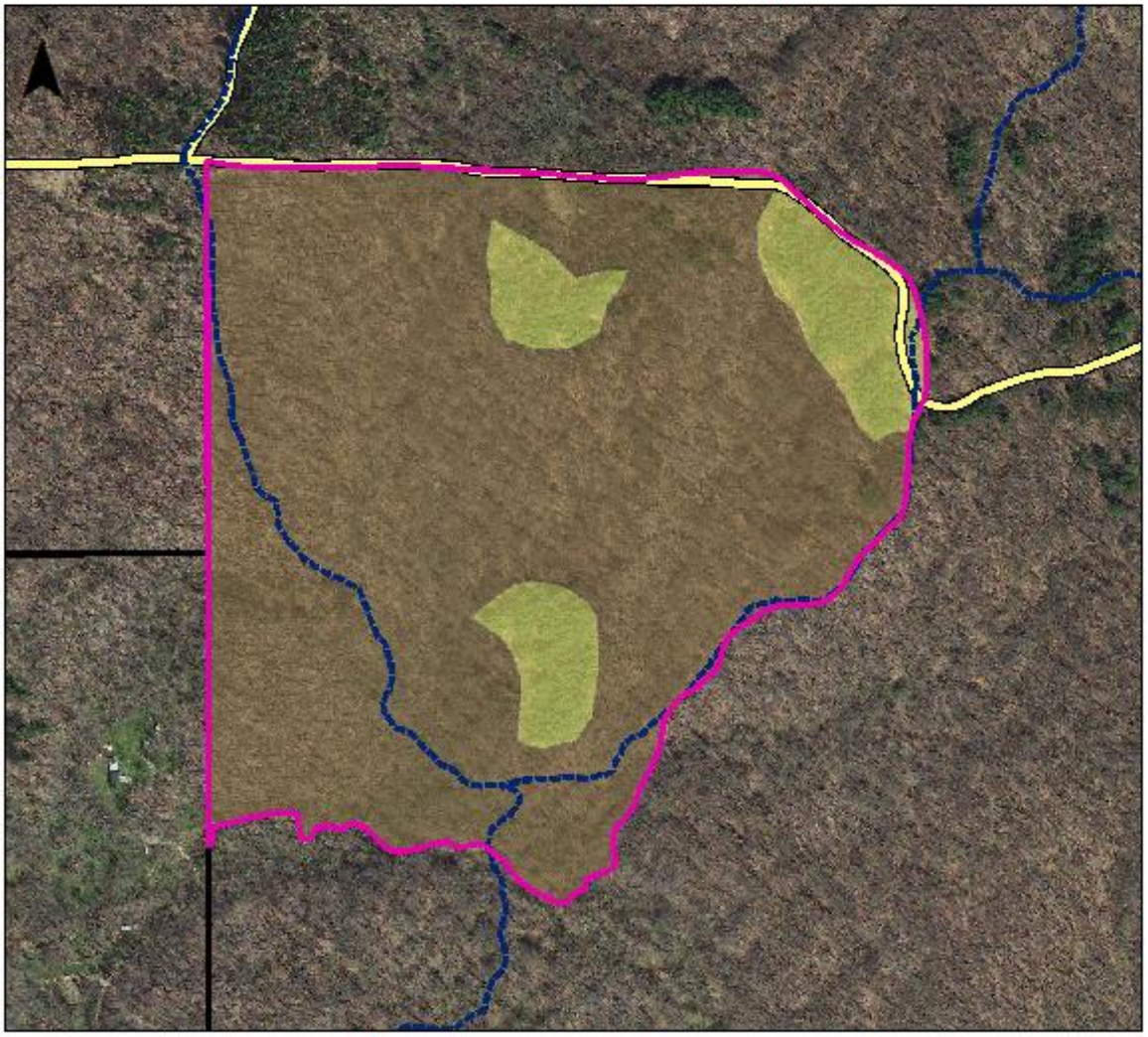
Appendix 1 – Location Map
Appendix 2 – Aerial Cover Types Map

Appendix 1



Appendix 2

Owen-Putnam State Forest
Compartment 4 Tract 8
Cover Type Map



Indiana Department of Natural Resources
Division of Forestry
RESOURCE MANAGEMENT GUIDE

Owen-Putnam State Forest	Compartment: 05 Tract: 08
Forester: Bob Lindemuth	Date: 10/18/2021 Acres: 76
Management Cycle End Year: 2041	Management Cycle Length: 20 years

Location:
The tract, also known as 6380508, is located in Owen County, Indiana. More specifically, the tract is in Section 15, Township 11 North, Range 4 West, Morgan Township. This tract is located on the east side of Keene Road, approximately 8 miles Northwest of Spencer.

General Description:
This tract is 76 acres and is dominated by closed canopy mixed hardwoods, with small pockets of the oak-hickory cover type. There is a diverse mix of 14 species of sawtimber-sized trees, although half of the stand volume is made up of just 4: yellow poplar, sugar maple, pignut hickory, and American beech. The midstory is a mix of 16 species of pole timber-sized trees, mostly sugar maple, sassafras, yellow poplar, and largetooth aspen. The understory is equally diverse with 18 species noted in the inventory. The overall health of the tract is good, although it could benefit from an improvement harvest by harvesting trees in poor health, suppressed, and poorly formed trees, thereby releasing future crop trees.

History

- 84 acres were purchased on January 9, 2014 from Don E. Marsh and Marilyn L. Marsh.
- 76 of the 84 acres that was purchased in 2014 became compartment 5 tract 8.
- In August 2021, the tract was inventoried, and resource management guide writen.

The southernmost and the northeastern portions of the tract show evidence of recent timber harvesting, while the remainder of the tract shows some signs of light harvest activity.

Landscape Context
This tract lies in a rural, primarily forested area with scattered agriculture and residences. Directly to the east of this tract lies the remainder of compartment 5, extending for approximately 0.9 miles. To the north, south, and west lie private, mostly forested property. There are no anticipated future land use changes to the surrounding area.

Topography, Geology, and Hydrology
The topography of this tract is gently rolling side slopes on various aspects, with about 70% of those aspects being southern. Two ridgetops occurring directly to the north and south of the tract.

The geology of the tract consists of 12 different soil series with the majority of the tract composed of the Solsberry silt loam soil series. The parent material of the Solsberry soil series is loess over loamy till. Other soil parent materials within this tract include fine-silty loess over

loamy pedisediment over paleosol till, loess over loamy residuum, loamy colluvium and/or clayey residuum, thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale, loamy alluvium, and loess over loamy residuum over shale.
There is one mapped intermittent stream in this tract, which originates to the west of the tract and flows from the west to the east into a private lake that was dammed up. Several scattered, ephemeral drainages also occur in this tract. During any management activities tops will be removed from the intermittent stream and best management practices (BMPs) for riparian areas will be followed.

Soils

AloB2- Ava silt loam, 2 to 6 percent slopes, eroded
This gently sloping, deep, moderately well drained is on knolls and narrow ridgetops and on sideslopes along drainage ways in the uplands. It is well suited to trees and has a site index of 75 for white oak and 90 for yellow poplar.

CkkB2- Cincinnati silt loam, 2 to 6 percent slopes, eroded
This gently sloping, deep, well-drained soil is on side slopes in the uplands. It is well suited for trees. This soil has a site index of 80 for northern red oak.

HepG- Hickory-Adyeville complex, 35 to 60 percent slopes
This very steep, deep, well-drained soil is on dissected till plains over interbedded shale, siltstone, and sandstone. It is fairly well suited to trees. Erosion hazards and equipment limitations are main management concerns due to slopes. Consideration should be given during sale planning and implementation of Best Management Practices for Water Quality This soil has a site index of 85 for white oak and 95 for yellow poplar.

HeuE- Hickory-Wellston silt loams, 18 to 25 percent slopes
This moderately steep, deep, well-drained soil is on dissected till plains over interbedded shale, siltstone, and sandstone. It is well suited to trees. Erosion hazards and equipment limitations are main management concerns due to slopes. Consideration should be given during sale planning and implementation of Best Management Practices for Water Quality This soil has a site index of 85 for white oak and 95 for yellow poplar.

PryB- Potawatomi silt loam, 1 to 3 percent slopes
This gently sloping, deep, moderately well drained soil is found on ridgetops in the uplands. It is well suited to trees. Equipment limitations and seedling mortality are concerns that should be considered when planning management activities. This soil has a site index of 80 for white oak and 93 for yellow poplar.

SneC2- Solsberry silt loam, 6 to 12 percent slopes, eroded
This moderately sloping, deep, moderately well drained soil is on the side slopes of the uplands. It is well suited to trees. Windthrow hazards are a concern that should be considered during management planning. This soil has a site index of 80 for northern red oak.

SneC3- Solsberry silt loam, 6 to 12 percent slopes, severely eroded

This moderately sloping, deep, moderately well drained soil is on the side slopes of the uplands. It is well suited to trees. Windthrow hazards are a concern that should be considered during management planning. This soil has a site index of 80 for northern red oak.

SneD2- Solsberry silt loam, 12 to 18 percent slopes, eroded
This strongly sloping, deep, moderately well drained soil is on the side slopes of the uplands. It is well suited to trees. Erosion hazards, equipment limitations, and windthrow hazards are management concerns that should be considered during planning and implementation of Best Management Practices for Water Quality. This soil has a site index of 80 for northern red oak.

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TtaG- Tulip-Tipsaw complex, 25 to 60 percent slopes
This moderately and very steep, moderately deep to deep, well drained complex is found on sideslopes in the uplands. It is suited to trees. Erosion hazards, equipment limitations, and seedling mortality are management concerns that should be considered when planning sale layout and implementing Best Management Practices for Water Quality. Tulip has a site index of 80 for northern red oak and 95 for yellow poplar and Tipsaw has a site index of 70 for northern red and black oak.

WhfD2- Wellston silt loam, 12 to 18 percent slopes, eroded
This strongly sloping, well-drained soil is on narrow ridgetops and on side slopes of the uplands. It is well suited to trees. This soil has a site index of 71 for northern red oak and 90 for yellow poplar.

WpuAV- Wirt silt loam, 0 to 2 percent slopes, frequently flooded, very brief duration
This nearly level, deep, well-drained soil is found on natural levees and floodplain steps on flood plains. It is well suited to trees. Equipment limitation and seedling mortality are management concerns that should be considered when planning management activities. This soil has a site index of 105 for yellow poplar.

ZamC3- Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, severely eroded
This moderately sloping, deep, moderately well drained or well-drained soil is on side slopes adjacent to drainage ways in the uplands. It is well suited to trees and has a site index of 69 for white oak and 90 for yellow poplar.

Access
To access the tract from Spencer, Indiana travel west on State Road 46 to Fish Creek Road. Travel north on Fish Creek Road to Hale Hill Road. Turn right onto Hale Hill Road and turn immediately left onto Keene Road. The tract begins after approximately 0.3 miles on the eastern side of Keene Road. Access within the tract is good with existing skid trails already established.

Boundary
Private property borders this tract along the northern, southern, and western boundaries. The western boundary follows Keene Road, agricultural land, and hardwood forest. The northern boundary line follows agricultural land and hardwood forest. Part of the eastern boundary line follows an ephemeral drainage to the south and separates C5T8 from C5T4, while the other section of eastern boundary is a state forest property line. The state forest boundary line was identified using field evidence such as corner stones or rebar and GPS handheld units when no field evidence was identified. Property lines are typically painted with orange paint or flagged when there is a lack of evidence.

Ecological Considerations
A diverse assortment of wildlife resources are found in this tract. This provides habitat for a variety of wildlife species. Habitat includes:

- Scattered oak-hickory canopy
- Contiguous mixed hardwood canopy
- An intermittent and several ephemeral streams

Hard mast trees such as oaks, hickories, and American beech provide a food source to both game and non-game species. Forest wildlife species depend on live trees for shelter, escape cover, roosting, and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate) food resource. The retention of live trees within various diameter classes is of particular concern to habitat specialists.

The Division of Forestry has developed compartment level guidelines for important wildlife structural habitat features known as snags. Snags are standing dead or dying 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. Downed woody debris provides habitat for many species and contributes to healthy soils.

Snags (All Species)	Maintenance Level	Inventory	Available Above Maintenance
Snag 5"+ DBH	304	200	-104
Snag 9"+ DBH	228	200	-28
Snag 19"+ DBH	38	0	-38

Inventory data for compartment 5 tract 8 shows that snags 5”+, 9”+, and 19”+ are below target maintenance levels.

It is important to note that these are compartment guidelines and that even though the estimated tract data does not quite meet all target levels, it is likely that suitable levels are present for these habitat features in the surrounding landscape. The prescribed management will maintain or enhance the relative abundance of these features.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened, or Endangered communities were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

Communities
This plant community is typical of southern and eastern aspect slopes of Owen County. Understory diversity consists of many shrubs and small non-commercial trees such as bluebeech/American hornbeam, flowering dogwood, greenbrier, hophornbeam, ironwood, pawpaw, spicebush, and blackhaw.

Exotic/invasive species multiflora rose, autumn olive, Japanese spirea, and Japanese stiltgrass are present in and around this tract in patches of light to moderate densities. These species commonly occur throughout the county. Control measures can be taken during post-harvest timber stand improvement (TSI), to treat problem occurrences before their populations expand.

Recreation
Recreational use of this tract is low. There are no recreation trails or parking lots near or within this tract. If there is any recreational use of this tract, it would likely be hunting from adjacent private landowners or access from Keene Road. During any management activity, specifically a timber harvest, access to this tract will be restricted due to safety concerns. Following the management activity, the tract will be reopened to public use.

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

Tract Subdivision Description and Silvicultural Prescription
Forest Condition
A current forest resource inventory was completed on 08/05/2021 by Forester Bob Lindemuth. A summary of the estimated tract inventory results are located in the table below.

Tract Summary Data (trees >14"DBH):

Species	# Sawtimber Trees	Total Bd. Ft
Yellow Poplar	231	57,532
Sugar Maple	380	52,516
Pignut Hickory	183	40,280
American Beech	140	38,684
Northern Red Oak	103	28,120
White Oak	113	21,508
Sassafras	162	20,976
Red Maple	62	18,316
Largetooth Aspen	63	17,176
Shagbark Hickory	89	13,756
American Sycamore	7	5,092
Black Cherry	37	3,800
White Ash	42	3,040
Blackgum	12	2,736
TRACT TOTALS	1,624	323,532

Mixed Hardwoods (76 acres)
This cover type is characterized by the diverse species composition. This cover type covers the entire tract and is 72% stocked with 186 trees per acre and an average basal area of 87.6 ft^2 per acre. The stand volume is currently estimated at 4,257 bd. ft. per acre.The dominant species is yellow poplar (18%), followed by sugar maple (16%), pignut hickory (12%), American beech (12%), northern red oak (9%), white oak (7%), red maple (6%), sassafras (6%), and largetooth aspen (5%). The midstory (pole sized timber) consists of primarily sugar maple (16%), sassafras (15%), tulip poplar (15%), largetooth aspen (11%), black cherry (11%), American beech (8%), black locust (6%), and red maple (5%).

This stand has areas of higher quality sugar maple and American beech. Within the stand there are areas of over mature yellow poplar, sugar maple with rot or hollowness, likely originating from sugar maple borer damage, and areas of problematic vines.

The portion of this stand south of the mapped intermittent stream (24 acres) was relatively low in volume, consisting of mainly sawtimber to pole-size largetooth aspen, and pole-sized black cherry and black locust. It appears to have been heavily harvested before state acquisition. Management recommendations for this area would be TSI only.

The recommended management activity for the remainder of the tract is to conduct an improvement harvest, utilizing single tree and group selection. This activity will target poorly formed individuals, trees declining in health, and trees with a small live crown. This will give the healthier trees with good form and larger live crowns more available resources above and below ground. Where conditions warrant, group selection may be utilized to regenerate shade intolerant species and create young forest habitat. When possible, selection should favor releasing desired future crop trees.

The top species for removal in this stand are sugar maple, yellow poplar, largetooth aspen, and American beech. The harvest volume for this stand is estimated at 1,000 to 1,750 bd. ft. per acre. This harvest will also allow pole-sized oak and hickory to be released, further increasing their percentage of canopy cover. Following the timber harvest, TSI should be conducted to complete the silvicultural prescription. TSI will concentrate on completion of regeneration openings, crop tree release, and reduction of problem vines.

Desired Future Condition
The objective for this cover type is to provide for multiple economic and ecological services, specifically a quality hardwood timber stand dominated by mid- and late-seral species, while providing diverse habitat structure, hard mast, and mid to late-seral habitat for wildlife.

Summary Tract Silvicultural Prescription and Proposed Activities
The proposed management activity is to conduct an improvement harvest to promote the overall health, vigor, resiliency, and quality of the stand. This improvement harvest will utilize single tree and group selection or patch-cut silviculture. The purpose of single tree selection is to remove trees with poor form and health, drought stressed or wind damaged trees to promote a healthier growing forest. It will also target declining ash from Emerald ash borer, mature and over mature trees where present, and other intermediate trees needed to release residual crop

trees. Young, vigorous ash will be retained for possible resistant features. Group selection will be used to target groups of trees that fit the above description growing together.

Within two years of the timber harvest, a TSI operation should follow to release crop trees that were not adequately released during the harvest and complete regeneration openings. Additionally, TSI should be utilized to control targeted invasive species in the stand and deaden a small percentage of low value trees to create snags for wildlife.

A prescribed fire regime in this stand is also recommended in the more oak-hickory dominated portions of the tract. In these areas, the overstory is dominated by oaks and hickories, while the regeneration present is mostly sugar maple and beech. A prescribed fire of low to moderate intensity would reduce fuel loads, prepare a more receptive seedbed to those trees that prefer mineral soil, discourage and reduce the presence of shade tolerant species like beech and maple, and promote oak and hickory regeneration. Thick-barked species like oak are likely to survive a prescribed burn, while thin-barked species such as beech and maple are not. Dormant season prescribed burning have shown to be a cost-effective tool to regenerate oak-hickory forest types throughout the Central and Eastern United States.

During and after completion of the proposed management activity best management practices (BMP's) will be implemented to minimize soil erosion. This tract should receive another inventory and management guide 20 years following the completion of the timber harvest.

Effect of Prescription on Tract Properties:
Landscape: Landscape forest patterns will remain similar to the current situation due to this tract being kept in a forested condition.

Soils: The management activities prescribed in this plan should have minimal impact on soils in this tract. Some soil disturbance is likely during harvesting, but this should be confined to landings and main skid trails. These areas will be properly closed out according to Indiana's BMPs to minimize the impact of management activities on soils.

Hydrology: Hydrology should not be permanently affected by management on this tract. Water quality and yield should not be altered if BMPs are followed during harvest. BMP use will be contractually required of management operators and monitored by property foresters.

Wildlife: Snags and coarse woody debris should remain at viable levels in the stratum and should continue to provide habitat. Managing to recruit newly established or released oaks and hickories will help to ensure that this important food source is available into the foreseeable future. Regeneration openings, such as prescribed have been shown to be of less of an issue from nest predators and generalist species as compared to hard edges such as public roadways, utility corridors and crop field edges. Placement of regeneration openings away from hard edges can minimize these potential impacts. The prescribed activity will promote wildlife diversity and enhance habitat structural components.

Additionally, management activities involving a timber harvest should not affect this habitat long-term from the perspective of any wildlife utilizing it due to the maintenance of a forested habitat

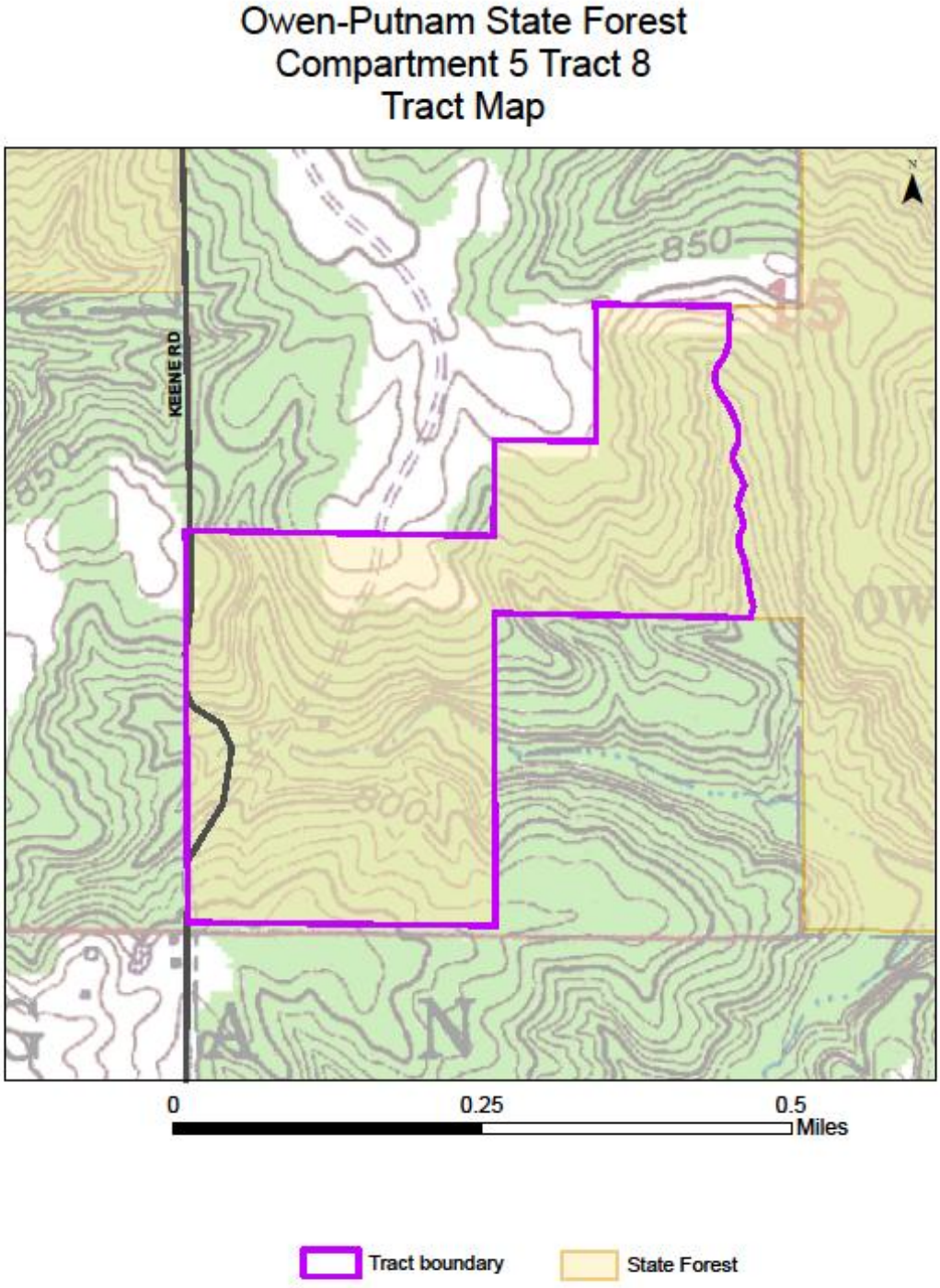
on the tract. Creation of regeneration openings will create early successional habitat that will be beneficial to certain groups of wildlife dependent upon this habitat. Likely, early successional habitat created with such management will also benefit a wider segment of wildlife species that preferentially utilize such habitat for feeding and cover more so than later successional stage habitat.

Recreation: Hunting by locals through private property access or Keene Road would likely be the only recreation within this tract due to limited public access. Hunting would benefit from forest management by improving the health of the residual trees thus promoting an increase in hard mast, understory plant diversity, and young forest habitat. For user safety, hunting access to this tract may be temporarily restricted during management activities.

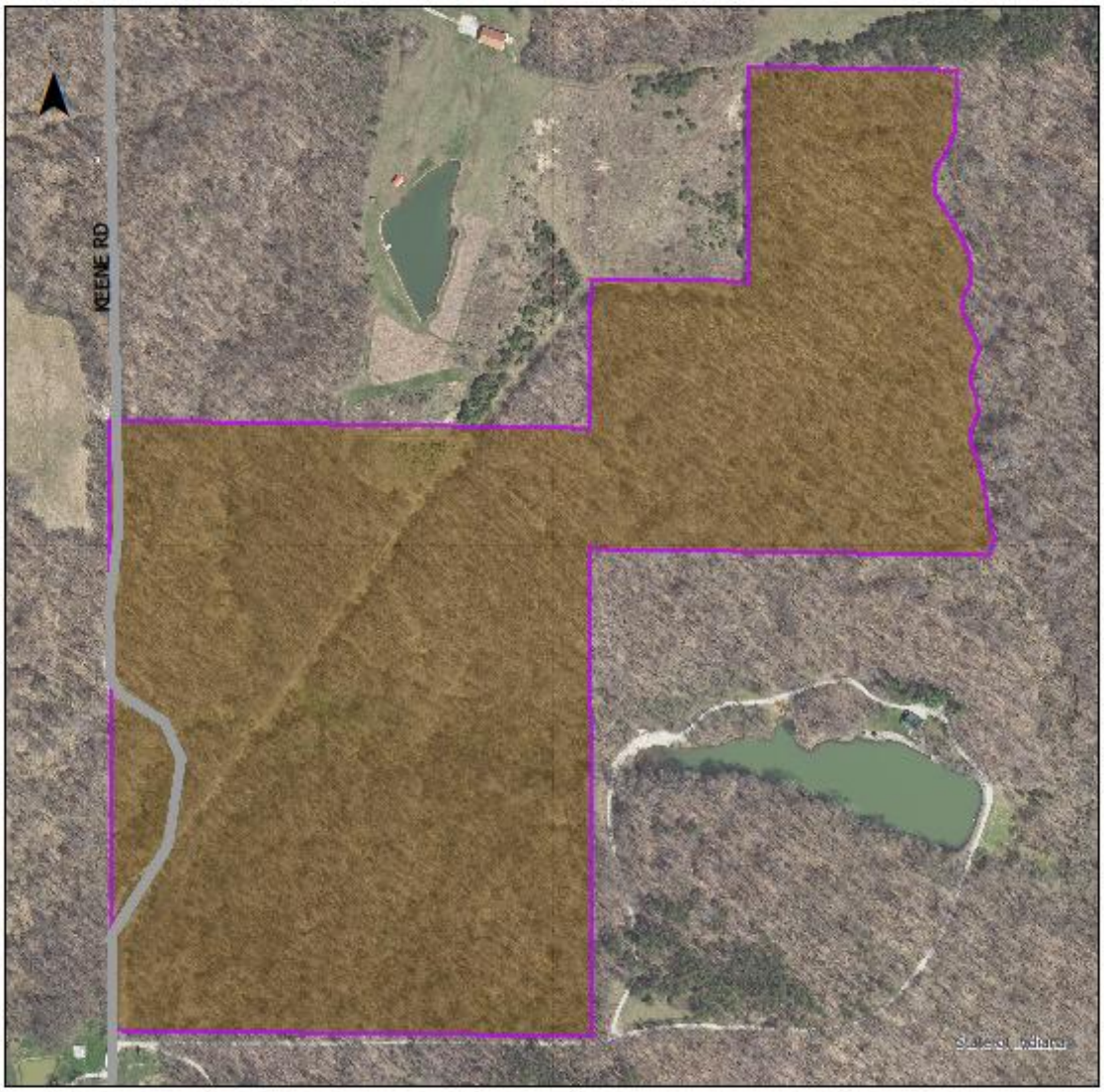
Proposed Activities Listing

Proposed Management Activity	*Proposed Date*
Management Guide	2021-2022
Treat vines and invasive plants	2022-2023+
Mark and Sell Timber Sale	2023-2027
prescribe fire	2024-2028+
Post-harvest Timber Stand Improvement	1-2 years after harvest
Forest Growth and Periodic Monitoring	3 years post-harvest
Inventory and Management Guide	20 years after

Tract Location Map



Owen-Putnam State Forest
Compartment 5 Tract 8
Cover Types Map



Public roads
Tract Boundary
Mixed Hardwoods

0 0.13 0.25 Miles