Clark State Forest **Compartment:** 9 **Tract:** 10
Forester: Alwine and Hanners **Date:** August 2021 **Acres:** 164
Management Cycle End Year: 2041 **Management Cycle Length:** 20 years

Location
Compartment 9, tract 10 (6300910) is located in Clark County on the east side of Pixley Knob Road. This is about 3 miles west of Henryville, Indiana. More specifically this tract is in sections 10 and 15, T1N, R6E of Monroe Township.

General Description
This tract is comprised of three cover types: mesic oak-hickory, dry oak-hickory, and mixed hardwoods. White oak and chestnut oak are the dominant overstory species. The regeneration in this tract is primarily oaks, maples, and American beech. Invasive species present include Japanese stilt grass, with some multiflora rose and Japanese honeysuckle, which is concentrated primarily in areas of pine mortality. The long-term forest management goals of this tract are to encourage and promote oak and hickory species.

History

1924 – Land acquired from Mathew and Ida Dunlevy
1927– Land acquired from Robert Grubenmann
1927– Land acquired from Lewis C. and Laura B.
1987– Inventory completed for State Forest Inventory Program
2007– Inventory conducted and Management Guide written by Rudolph
2017– Southwest Boundary marked
2021– Inventory completed by Hanners and Alwine
2022 – Management guide completed by Hanners and Alwine

Landscape Context
The northern half of this tract borders other Clark State Forest tracts, while the southern half borders private land. The private land on the southwest is primarily residential with some small agricultural fields. The private land to the southeast is all forested. Approximately 90% of the land within a mile radius of the tract is forested.

Topography, Geology and Hydrology
This tract has one moderately sloping ridge that runs from the northwest to the southeast corners of the tract. This ridge is comprised of south facing fingers off the larger knob just north of this tract. The slopes coming off the ridge are moderate and lightly sloped toward the two main drainages to the east and west of the main ridge. The most level portion of the tract occurs on the southern edge.

This tract is in the north most section of the Silver Creek watershed. Two intermittent streams pass through this tract: Wrong Branch and Hilltop Run. The two intermittent streams flow into Right Branch Blue Lick Creek which runs into Blue Lick Creek which runs into Silver Creek. The 2022

Best Management Practice field guide will be followed during implementation of forest management activities within this tract to minimize the potential for direct impacts to the watershed.

Soils

BcrAW- Beanblossom silt loam, 1 to 3 percent slopes, rarely flooded, 11 acres

This nearly level, deep, well-drained soil is found along alluvial fans and flood plain. It is well suited to trees. Management planning should consider wet times of year. This soil has not been evaluated for site index.

ComC- Coolville silt loam, 6 to 12 percent slopes, 24.8 acres

This moderately sloping, deep, moderately well-drained soil is on side slopes in the uplands. It is well suited to trees. Erosion hazards are concerns that should be considered during implementation of Best Management Practices for Water Quality. This soil has a site index of 66 for northern red oak.

ConD- Coolville-Rarden complex, 12 to 18 percent slopes, 36.2 acres

These strongly sloping, deep, moderately well-drained soils are found on side slopes in the uplands. It is well suited to trees. Erosion hazards are concerns that should be considered during implementation of Best Management Practices for Water Quality. Coolville has a site index of 66 for northern red oak and Rarden has a site index of 71 for black oak

DbrG- Deam silty clay loam, 20 to 55 percent slopes, 0.1 acres

This moderately to very steep, deep, well-drained soil is on side slopes in the uplands. It is suited to trees. Equipment limitations and erosion hazards are concerns that should be considered during sale layout and implementation of Best Management Practices for Water Quality. This soil has not been evaluated for site index.

GmaG- Gnawbone-Kurtz silt loams, 20 to 60 percent slopes, 79 acres

This moderately to very steep, moderately deep, well-drained complex is found on side. It is well suited to trees. The hazard of erosion and equipment limitations are main management concerns. These should be considered when planning management activities and implementing Best Management Practices for Water Quality. Kurtz has a site index of 60 for northern red oak and Gnawbone has not been evaluated.

PcrB2- Pekin silt loam, 2 to 6 percent slopes, eroded, 2 acres

This gently sloping, deep, moderately well-drained soil is on alluvial terraces. It is well suited to trees and has a site index of 70 for white oak and 85 for yellow poplar.

PcrC2- Pekin silt loam, 6 to 12 percent slopes, eroded, 4.2 acres

This moderately sloping, deep, well-drained soil is found on side slopes adjacent o drainageways on alluvial terraces. It is well suited to trees and has a site index of 70 for white oak and 85 for yellow poplar.

WedB2- Weddel silt loam, 2 to 6 percent slopes, eroded, 6.9 acres
This gently sloping, deep, moderately well-drained soil is found on shoulders and summits in the till plains. It is well suited to trees and has a site index of 65 for white oak and 75 for yellow poplar.

Access
The western boundary of this tract is Pixley Knob Road which provides easy access to enter the tract. Parking is available across the road from this tract at the Pixley Knob Trail Head for the Knobstone Trail. A small section of the Knobstone Trail between mile markers 9 and 10 pass through the northwest corner of the tract.

Boundary
Approximately half of this tract is bordered by other Clark State Forest tracts. Tract 6301011 is to the west, across Pixley Knob Road. Tract 6300909 is to the north, and tract 6300908 is on the northeast border. The southern half of the tract is bounded by private property. A cornerstone at the southwestern boundary corner was found in 2017 when marking boundary lines in this area.

Ecological Considerations
This tract contains diverse vegetation and wildlife resources conducive to providing habitat for a variety of wildlife species. Habitat types include: mesic oak-hickory, dry oak-hickory, and mixed hardwoods.

The Indiana DNR Forestry Division has constructed a set of division level standards for snag tree retention, an important wildlife feature. Snags are standing dead or dying trees. Snags provide value in a forest in the form of habitat features for foraging activity, den sites, decomposers, bird perching, bat roosts, squirrel caches, and stores a wide variety of invertebrates. As time passes, these snags fall and contribute to the nutrient cycling as downed woody debris (DWD). DWD decomposes providing nutrients for remaining and new vegetative growth as well contributing to the complexity of the forest floor.

	Maintenance Level	Inventory	Available Above Maintenance
Snags 5”+	316	1,649	1,333
Snags 9”+	237	1,130	893
Snags 19”+	39.5	122	82

Snags in this tract exceeded maintenance levels for all three size classes.

A variety of invasive species were observed in the tract. Japanese stiltgrass was the most abundant, it was found along many ephemeral streams and in wet flat areas. Multiflora rose and Japanese honeysuckle were also observed and concentrated primarily in areas of pine mortality. A few tall stems (10+ ft) of ailanthus were found and locations recorded. Treating these invasive species to minimize the potential for advancement should be completed prior to a timber harvest. Japanese stiltgrass could be treated where logistically feasible.

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

Recreation in this tract is likely hiking the Knobstone Trail and hunting. The section of Knobstone Trail located within this tract is short and may require the trail to be temporarily rerouted for public safety during active forest management. Once management activities have concluded the trail would return to its original location.

Cultural

This tract was reviewed for cultural sites during the forest resource inventory. 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 management or construction activities.

Tract Subdivision Description and Silvicultural Prescription

The current inventory was completed in the summer of 2021 by foresters Hanners and Alwine. An overview of the inventory results is located in the table below. During the forest inventory, stems 4 inches diameter at breast height (DBH) and greater were measured. Plots were established on a random grid and used a variable radius plot (10 BAF) to tally trees. This tract had 46 plots, about 1 plot every 4 acres. Only trees 11 inches and larger at DBH and merchantable are included in the volume summaries and listed as "Sawtimber Trees."

Species	Sawtimber Trees	Total Bd. Ft.
White oak	2,851	553,079
Chestnut oak	1,029	172,487
Black oak	190	55,342
Sweetgum	247	49,019
Scarlet oak	131	35,616
Virginia pine	188	31,739
Red maple	88	14,260
Yellow-poplar	45	13,698
Pignut hickory	73	11,726
Silver maple	15	4,165
American beech	47	3,453
Total	**4,904**	**944,584**

For the purpose of this guide and the management of this tract, the tract is divided into three cover types based on forest composition they include: mesic oak-hickory, dry oak-hickory, and mixed hardwoods. Below are the cover type descriptions.

Descriptions

Mesic Oak-Hickory – 132 acres

This is a fully stocked cover type with a stocking of 74%. This cover type makes up most of the tract acreage. White oak is the dominant overstory species making up almost 75% of the merchantable volume within the cover type. Chestnut oak, black oak, and scarlet oak make up a large portion of the remainder of the volume within the cover type. The mortality in this cover type was variable. Some areas had relatively low mortality and others had pockets of high mortality. The Virginia pine found in this cover type had a very high rate of mortality from blow down, there was some mortality in the black oak, and there was some residual ash mortality. These areas where overstory mortality was high have mixed regeneration of oaks, maples, and beech. Majority of the regeneration found throughout this tract, was a mixture of maple and beech.

Trees per acre: 90	Percent stocking: 74
Basal area: 83.6	Volume per acre: 6,267

Species	**Volume per acre**
White oak	4,621
Chestnut oak	786
Black oak	375
Scarlet oak	234
Virginia pine	92
Sweetgum	82
American beech	31
Pignut hickory	23
Red maple	23
Total	**6,267**

Dry Oak-Hickory – 17 acres

Similar to the mesic oak-hickory cover type, this is a fully stocked area at 76%. The main difference between these two cover types is the increased basal area, which increases with the overstory dominance of chestnut oak. When compared to white oak, chestnut oak tends to grow in more dense stands and on drier sites. This cover type also had a component of homogenous Virginia pine that was windblown or standing dead. Virginia pine does not self-thin well or establish deep root systems. This makes them susceptible to widespread mortality once part of the area has started to decline. Most of these areas were filled with dense oak regeneration. Other regeneration throughout the cover type included American beech, sugar maple, red maple, ironwood, and sassafras. Some roundleaf greenbrier and lowbush blueberry was present on ridge tops as well. Some invasive species were present close to the ephemerals in this stand, specifically, Japanese stilt grass and Japanese honeysuckle.

Trees per acre: 87	Percent stocking: 76
Basal area: 94.4	Volume per acre: 5,824

Species	Volume per acre
Chestnut oak	2,872
White oak	1,278
Virginia pine	571
Black oak	457
Scarlet oak	322
Yellow-poplar	128
Pignut hickory	196
Total	**5,824**

Mixed Hardwoods – 15 acres

This cover type occurs in the riparian areas of the tract. Mortality in this stand was moderate. Most of the mortality was from Virginia pine blowdown. Sweetgum was the dominant overstory species. Regeneration in this stand was almost exclusively maples and American beech with occasional oak and ironwood regeneration. This cover type had the highest density of Japanese stilt grass.

Trees per acre: 123	Percent stocking: 68
Basal area: 79.1	Volume per acre: 3,208

Species	Volume per acre
Sweetgum	1,738
Red maple	509
Yellow-poplar	432
Virginia pine	203
Silver maple	181
Pignut hickory	146
Total	**3,208**

Prescriptions

Mesic Oak-Hickory

The proposed management for this cover type is to maintain and enhance the oak and hickory species. The overstory is dominated by oak while the regeneration is mostly shade tolerant species with some small pockets of advanced oak regeneration. This cover type is fully stocked and has moderate to relatively high mortality in some areas. The desired future condition is a healthy cover type stocked with oak and hickory species that is being succeeded by oak and hickory species.

A timber harvest is prescribed. The harvest should target declining stems and releasing trees to maintain the oak-hickory cover type. In a majority of this stand, the regeneration is shade tolerant species. These areas should be selectively thinned. In pockets where there is high mortality, small patch cuts could be used to promote regeneration. In areas with existing oak and hickory

regeneration, a shelterwood harvest could be used to improve light to advance saplings and seedlings. Small openings could also be used where the understory is more advanced to release a new cohort of oaks.

Additionally, a midstory removal could be completed to lower the presence of the shade tolerant species while increasing the amount of light for oak and hickory seedlings. This could be done mechanically through chainsaw work, chemically, or through the use of prescribed fire. Prescribed fire would likely be the most cost-effective way to reduce the shade tolerant species. Along with the midstory work, invasive species control could be performed. The post-harvest timber stand improvement (TSI) would remove marked stems remaining post-harvest, treat invasive species, and complete regeneration openings.

Dry oak-hickory
The proposed management for this cover type is similar to that of the mesic oak-hickory stand. The main difference is that chestnut oaks will likely regenerate here rather than white oak. The oak regeneration in this cover type is generally better than that of the mesic-oak-hickory stand, thus harvesting could be more focused on releasing the regeneration already present. The areas of declining Virginia pine will likely be removed to create small regeneration openings. If naturally occurring regeneration is not suitable, an enrichment planting could be an option.

Mixed hardwoods
This cover type has a very different species composition than the oak-hickory cover types. Thus, the desired future condition is a healthy cover type with an overstory composition of predominantly yellow-poplar, hickory, maple, and sweetgum. This area should be harvested with the oak-hickory cover types. In areas with Virginia pine blowdown, the harvest should be light and focus primarily on salvaging these trees. The remaining work in this cover type would focus on releasing desired trees through TSI. Hickories should be given priority in release for their wildlife benefits. Other desired tree species for release would be oaks, yellow-poplar, and maple.

Summary Tract Silvicultural Prescription and Proposed Activities
Overall, the goal for this tract is to promote and sustain the oak-hickory cover types while controlling invasive species. In the first few years of the management cycle, focus will be controlling invasive species preharvest with a focus on minimizing spread to other areas. A timber harvest is prescribed to promote and sustain the cover types that are present. After the harvest is completed, invasive species follow-up and post-harvest TSI will be carried out. TSI will focus on releasing oak and working to reduce the presence of maple, beech, and ironwood regeneration in the oak cover types. A fire regime will be established in the oak cover types to promote a more open midstory. Use of prescribed fire would be post-harvest occurring every 3 - 5years. This tract could be burned with other surrounding tracts to sustain the oak cover types.

<u>Other considerations</u>
Regeneration evaluation – Three to five years after the completion of the timber harvest, a regeneration inspection will be performed. This inspection identifies any regeneration or invasive concerns, addressing them as deemed necessary.

Timber stand improvement (TSI) – If needed, TSI should be performed within two years of timber harvest completion. The objective would be to complete regeneration openings, remove species marked for harvest but not removed or trees inhibiting desirable regeneration objectives, and manage invasive species.

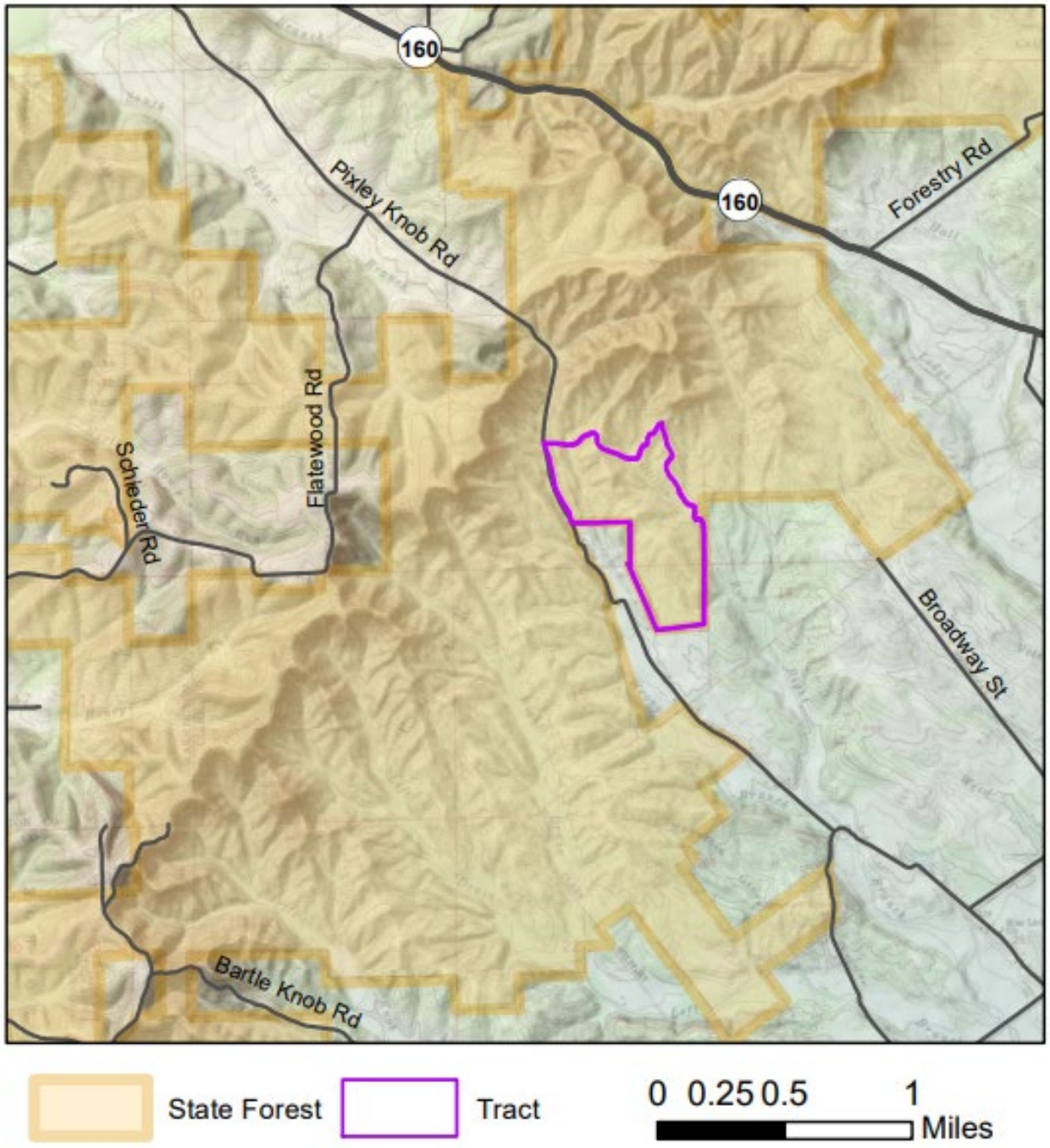
Best management practices (BMP) – During and after completion of the proposed management activity, BMPs will be implemented to minimize soil displacement and protect waterways.

Guide revision – This tract should receive another inventory and a management guide be written 20 years after the completion of this inventory.

Prescribed fire – A regime of prescribed burns may be started within this tract to reduce the abundance of the shade tolerant species in the midstory and to help control invasive species.

Proposed Management Activity	Proposed Date
Invasive species management	2022-2023
Timber harvest	2022-2025
Post-harvest TSI and invasive species management	Within 2 years post-harvest
Post-harvest regeneration inspection	3-5 years post-harvest
Prescribed fire regime	2025+
Re-evaluate tract	2041

Compartment 9 Tract 10



Clark State Forest
Compartment 9 Tract 10
Cover Types Map