RESOURCE MANAGEMENT GUIDE

Martin State Forest	Compartment 1	Tract 5
Alex Gust	Date: 1/22/2021	Tract Acres 83
Management Cycle End Year 2041	Management Cycle Length 20 Years	

Location
This tract, also known as 6360105, is located in the vicinity of Bear Hill and is often referred to as "Bear Hill" by property staff and local public users despite being east of the actual Bear Hill topographic feature. The specific location is Sections 9, 10, and 15, T 4 N, R 3W Martin County, IN. The tract is about two miles northeast of Trinity Springs, Indiana.

General Description
This tract consists of 83 acres which is all forested. Within the tract most of the acreage is oak-hickory forest type with a small portion in the lower areas being mixed hardwood. Also, within the tract there are slopes of every aspect with most of them being workable except the bluffs in the northern edge of the tract.

History
This tract was acquired in a land transfer with the U.S. Forest Service in October 1968. This transaction is recorded in Deed Record Book 102, pages 418-420. The Forest Service had acquired the land in September 1940 from Kenneth and Pansy Nicholson in a transaction recorded in Deed Record Book 81, page unknown.

Old management files show this tract as having been two individual tracts at one time, tracts 1 and 2. Tract 1 was the forty-acre square in the northwest corner and tract 2 was the east half, containing 44 acres. An inventory by Erickson completed on tract 1 in December 1968 indicated an average of 1,710 bd.ft. per acre with an average DBH of 8-16 inches. Basal area averaged 120 square feet per acre. The red and white oak groups accounted for 77 percent of the volume; the red oak group having 800 bd.ft. per acre and the white oak group having 510 bd.ft. per acre. The narrative indicated that 30 percent of the plots observed fire damage to trees. It also recommended a light thinning, "…followed, as soon as volume permits, by an intermediate cut to release the crop trees." No old management files were located for tract 2.

At some point, the two tracts were merged into the present tract 5. An inventory by Hahn, probably completed in the early 1970s, indicated 441,056 bd.ft. was present on the tract, averaging 5,728 bd.ft. per acre. Of this volume, 139,755 bd.ft. was tallied as harvest stock. Hahn's management recommendations included a harvest in the east half of the tract, followed by timber stand improvement (TSI), and then a harvest in the west half of the tract in approximately twenty years. His narrative also mentions a few, very old signs of past cutting and no evidence of past fire.

A harvest was conducted in 1973, with 113,330 bd.ft. being removed on 49 acres. This harvest occurred in the southern portion of the tract and on the east side of the main ridge in the north portion of the tract. Post-harvest TSI was planned to follow the harvest and is assumed to have been completed.

Another inventory was conducted in 2002 by Jim Lauck. This inventory estimated the growing stock to be 2,863 bd.ft. per acre and the harvest stock to be 2,271 bd. ft. per acre. A harvest followed the inventory in 2004. The harvest included most of tract 5 and tract 6. An estimated 1,680 bd.ft. per acre were marked on 46 acres in tract 5. Tim Moffatt of Shoals purchased the timber for $0.47 per bd.ft.

The last inventory completed in this tract was in June 2012 by Abe Bear. The inventory showed indicated 9,300 bd.ft per acres but most areas still had gaps in the canopy and allowed to grow until the next inventory. Bear also noted that the regeneration openings created during the 2004 harvest were dominated by yellow poplar and contain a lot of brambles and should be evaluated within five years for vine control and any thinning needed. He also noted there is a portion along the north edge of the tract that is steep bluffs which is too steep for any logging to occur and the timber in this area will be left to buffer the geologic feature.

Landscape Context

Land in the area is primarily used for timber production. Land level enough to be used for agriculture is generally open and planted to row crops, hay, or pastured. The closest residential areas are the burg of Trinity Springs to the southwest and the hamlets of Indian Springs and Cale to the northwest. Area south of the tract that was sold by Kimball is currently still used for timber production.

Topography, Geology and Hydrology

Two ridges dominate the topography of this tract. They join to form one ridge near the north property line where the section line intersects the property line. From this point one ridge runs south to the interior corner. The other ridge runs west southwest from the junction toward the western property line. The ridge crosses onto private property midway between the north and south property lines. The northwest corner of the tract is very steep, rocky and almost impassable. The eastern facing slope on the east side of the tract also contains some steep bluff areas. Otherwise, the topography is very workable.

The northwest corner of the tract is drained by Sulfur Creek, the remainder of the tract drains into Indian Creek.

Buffers and best management practices (BMPs) will be implemented during and following any management activities to minimize any impacts to these features within the tract.

Soils
Most of the soils within this tract is Wellston Tipsaw Adyeville complex, 18 to 70 percent slopes and Wellston silt loam, 6 to 12 percent slopes. A small part in the southern portion of the tract is Gatchel loam, 1 to 3 percent slopes, occasionally
Floods, very brief duration

WpfG – Wellston Tipsaw Adyeville complex, 18 to 70 percent slopes- 65.4 Acres
This severe sloping, moderately deep, moderate to excessively drained soils is on side slopes. Equipment limitations and erosion hazards should be considered when planning management activities.

WhfC2 - Wellston silt loam, 6 to 12 percent slopes- 15.6 Acres
This moderately sloping, well drained soils is on narrow ridgetops and on side slopes of the uplands. Well suited for trees. The soil has a site index of 81 for red oak and 90 for yellow poplar.

Gatchel loam, 1 to 3 percent slopes – 2 Acres
This is a nearly level, excessively deep, well drained flood plan soil. Soil is occasionally flooded, very brief duration, and be taken into management plan consideration. No site index was present for this soil.

Access
This tract has good access via gated fire lane 1B through tract 6 southeast of tract 5 to Bear Hill Road. This fire lane is in good shape and accessible to the bottom of the ridge by vehicle but there is a portion of the fire lane to the top of the ridge which is less suited for vehicle access. This fire lane will need some additional stone and grading to keep it accessible.

Boundary
Beginning at a steel post marking a Section corner (NW corner of section 15 T4N R3W), the property line goes west ¼ mile. Bits of old fencing and Kimball painted trees were found along this line. The line turns north at a heavy wooden fence post. The property line runs north for ¼ mile with fence present all the way to the northwest corner. An outhouse is present at the northwest corner. Some records indicate that there is survey pin just west of the outhouse indicating that it is on the State property. No such pin was found at the time of inventory. The property line turns east for about 3/8 mile. This line is marked by several survey pins ("Floyd" and "Curry") and a bit of old fence but is difficult to follow due to the steep slopes. The northeast corner was not obviously marked. The northern stretch of the eastern line was not well defined either. Fencing was present along the southern portion of the eastern line. The interior corner on the east line was found and marked with pink ribbon. The line turns east to intersect with a drainage. Here the property line becomes a tract line and runs up the drainage to the southwest, crosses the fire lane at a saddle, and follows another drainage southwest to the property line. At the western property line, the line turns north, again marked by Kimball paint to

the point of beginning. Kimball paint fount was old and faded along with the orange paint marked by Bear and needs remarked.

Ecological Considerations
Wildlife use this tract heavily and many species were observed during the inventory. Those observed were eastern wild turkey, deer, squirrels, chipmunks, songbirds, hawks, vultures, and a few rabbits. The rock bluffs and outcrops provide unique wildlife habitat and will be maintained as they are. There are numerous mast-producing trees on the tract, especially hard mast. Several den trees or potential den trees were observed during the inventory.

Snags	Maintenance Level	Inventory	Above Maintenance level
5"+ DBH	332	346	14
9"+ DBH	249	193	-56
19"+DBH	41.5	51	9

A snag inventory was conducted along with the timber inventory, and it showed to be above maintenance level for snags < 9" and those 19" and above. For snags between 9 and 18" DBH they are a little below the maintenance level. 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 tract is predominantly an oak-hickory community with some mixed hardwood areas in the lower portions by ephemeral drainages.

The oak-hickory community overstory is mostly white oak with a good representation of species from the red oak group (e.g., red, black, and scarlet) and some hickories (e.g., shagbark and pignut.) Mid story in this community has a good mix of white oak and pignut hickory with some black oak and shagbark hickory present as well. Openings created in the 2004 harvest are dominated by yellow poplar with briers beneath. Throughout the tract there are some oak saplings but mostly dominated by red and sugar maple, American beech, and white ash. The non-woody community is a mixture of species commonly associated with this forest type which includes but not limited to, green brier, viburnum, and blackberry.

For the mixed hardwood community, the overstory is mostly yellow poplar with American beech, red and sugar maple, some oak (e.g, white, black, and red) and pignut

hickory mixed in. In the midstory it is mostly red and sugar maple, American beech, and blackgum with a few pignut hickory and white oaks. For the understory it is almost exclusively sugar maple and American beech with some red maple, white ash, and blackgum. The non-woody community of the stand is a mixture of species commonly associated with this forest type which includes but not limited to, spicebush, viburnum, and various species of grasses.

Recreation
There are no recreational improvements within this tract. Recreational use is mostly hunting (e.g., deer, turkey, squirrel, mushrooms, etc.).

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
Forest Condition
A current forest resource inventory was completed on 01/05/2021 by Forester Alex Gust. A summary of the estimate tract inventory results is below.

This tract can be split into two different cover types with most of the tract being classified as oak-hickory with some areas of mixed hardwood.

Oak-Hickory-67 Acres

Tract Summary Data (Trees > 14" DBH)

Species	# Sawtimber Trees	Estimated Total Bd. Ft.
White Oak	1,784	403,450
Black Oak	391	121,140
Northern Red Oak	168	55,210
Pignut Hickory	189	39,020
Yellow Poplar	140	37,010
Scarlet Oak	32	13,150
Sugar Maple	50	11,870
Blackgum	42	4,720
Red Maple	13	3,540
Shagbark Hickory	13	3,050
Total	**2,822**	**692,160**

Inventory analysis for this stand shows an estimated total volume of 692,160 bd.ft. with an estimated 122,275 - 236,845 bd.ft. of potential volume to be removed. For the midstory it is predominantly white oak and hickory (e.g., pignut and shagbark) with a few black/red oaks throughout. Some sugar and red maple are present in the midstory as well. The understory is dominated by red and sugar maple and American beech. There are

some oak and hickory saplings present but far fewer and more scattered. With the canopy now closed and crowns compressed the midstory oak and hickory are starting to slowly decline. This tract also has experienced blowdown of red and black oaks in some locations within the last couple of years. This portion of the tract could benefit from an improvement harvest to release midstory oak and hickory, and to capture mortality in the larger black oaks which are declining. The harvest would focus on poor quality, damaged, low vigor, poor health, and salvage of blowdown. Prior to or shortly following the harvest this area would further benefit from the use of prescribed fire to improve oak seed germination and reduce the amount of maple and beech saplings over the entire area focusing mainly on areas identified to have potential for oak and hickory regeneration.

Mixed Hardwood-16 Acres

Tract Summary Data (Trees > 14" DBH)

Species	# Sawtimber Trees	Total Bd. Ft.
Yellow Poplar	95	37,010
White Oak	74	23,760
Red Maple	123	19,040
Black Oak	32	13,470
American Beech	55	9,420
Sugar Maple	46	8,100
Northern Red Oak	20	5,420
Shagbark Hickory	8	3,210
Pignut Hickory	8	2,730
Bitternut Hickory	16	1,600
Total	**477**	**123,760**

Inventory analysis of this cover type shows an estimated total volume of 123,760 bd.ft. with an estimated 12,800 - 26,960 bd.ft of potential volume to be removed. For the midstory it is predominantly yellow poplar, red and sugar maple, American beech and blackgum. The understory is almost exclusively red and sugar maple and American beech with some white ash present. Most of this cover type has low quality maple and beech and low basel area (BA) that were identified in the inventory to be good sites for regeneration openings. The goal of these openings would be to promote species that are less shade tolerant. These group and patch-cut openings would be established when the improvement harvest is conducted. With these openings, some of the denser areas will also be marked for an improvement harvest focusing on poor quality, damaged, low vigor, and poor health trees to improve the health of the stand and to release the better-quality trees from competition.

The whole tract would benefit from some post-harvest TSI which would focus on releasing future crop trees from competition and complete openings that were established during the harvest. TSI would focus on removing poor form/vigor stems thus releasing the better quality and healthier saplings in the midstory and understory. TSI would also help with increasing the snag numbers in the 9-19" DBH to make the numbers meet the maintenance level for wildlife habitat.

Summary Tract Silvicultural Prescription and Proposed Activities

Both cover types would benefit from an improvement harvest with some areas using group or patch-cut openings or an oak shelterwood to promote less shade tolerant species. The estimated removal is 135,075-263,805 bd.ft.. Prior to a harvest, some TSI should be completed to treat vines present in the mixed hardwood cover type and openings established during the last harvest. Within two years following the harvest, TSI should be conducted to complete openings and reduce the understory in any oak shelterwood areas to increase light penetration to the ground layer. Starting within two years following post-harvest TSI a prescribed fire regime should be established to reduce the understory and improve oak seed germination to promote species which require light and contact with bare mineral soil for seed germination. Between 3-5 years following the harvest a walkthrough of the tract should occur to review openings and shelterwoods for established regeneration and invasive species. Between 8-12 years following the post-harvest TSI openings should be monitored for additional TSI needs.

Annually, the fire lane should be maintained for continued accessibility.

In 2041 this tract will need to be inventoried and a new management guide developed.

Soils/Hydrology: Management activities conducted on this tract will abide by division BMP standards to minimize the impacts of the management on soils and hydrology.

Wildlife: Activities prescribed for this tract will maintain habitat for wildlife and even enhance habitat for some species that require a range of forested habitat for example closed canopy and early successional through management. Also, for bats the number of snags will likely increase with the TSI and prescribed fire within the tract.

Recreation: Access within the tract will be suspended during management activities that could pose a risk of injury to the public. Overall, with the management planned on this tract it will enhance hunting opportunities due to improving crown spacing which will increase hard mast production. Early successional habitat created will provide suitable foraging, refuge, and nesting habitat for a broad range of game and non-game wildlife.

Proposed Management Activity	*Proposed Date*
Pre- Harvest TSI	Summer 2021
Timber Harvest	2023-2026
Post-Harvest TSI Including Invasives	1-2 Years after Harvest
Start Fire Regime	At least 1Year after TSI
Regeneration opening monitoring	3 years post-harvest-2041
Inventory and Write new Guide	2040-2042