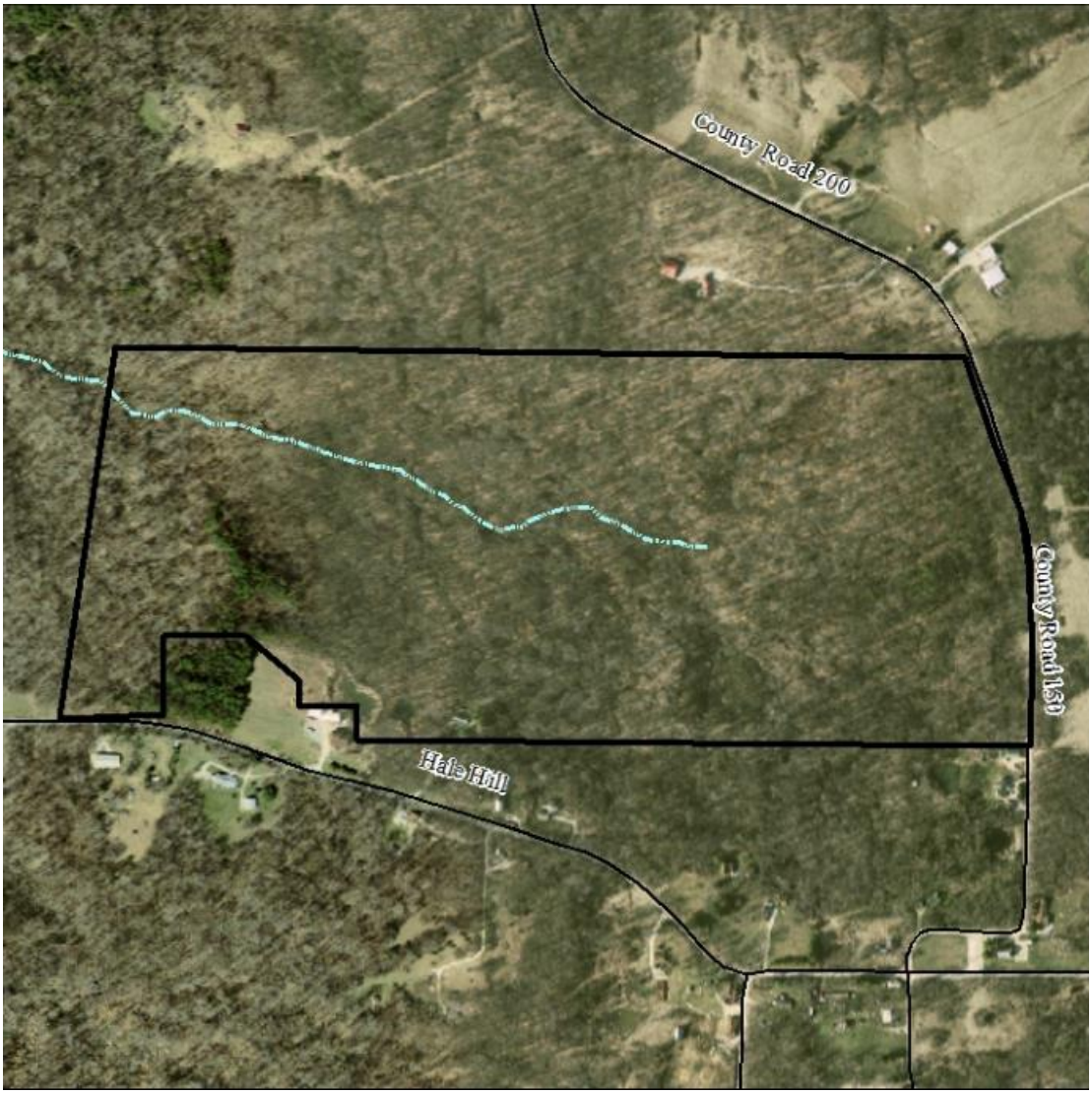
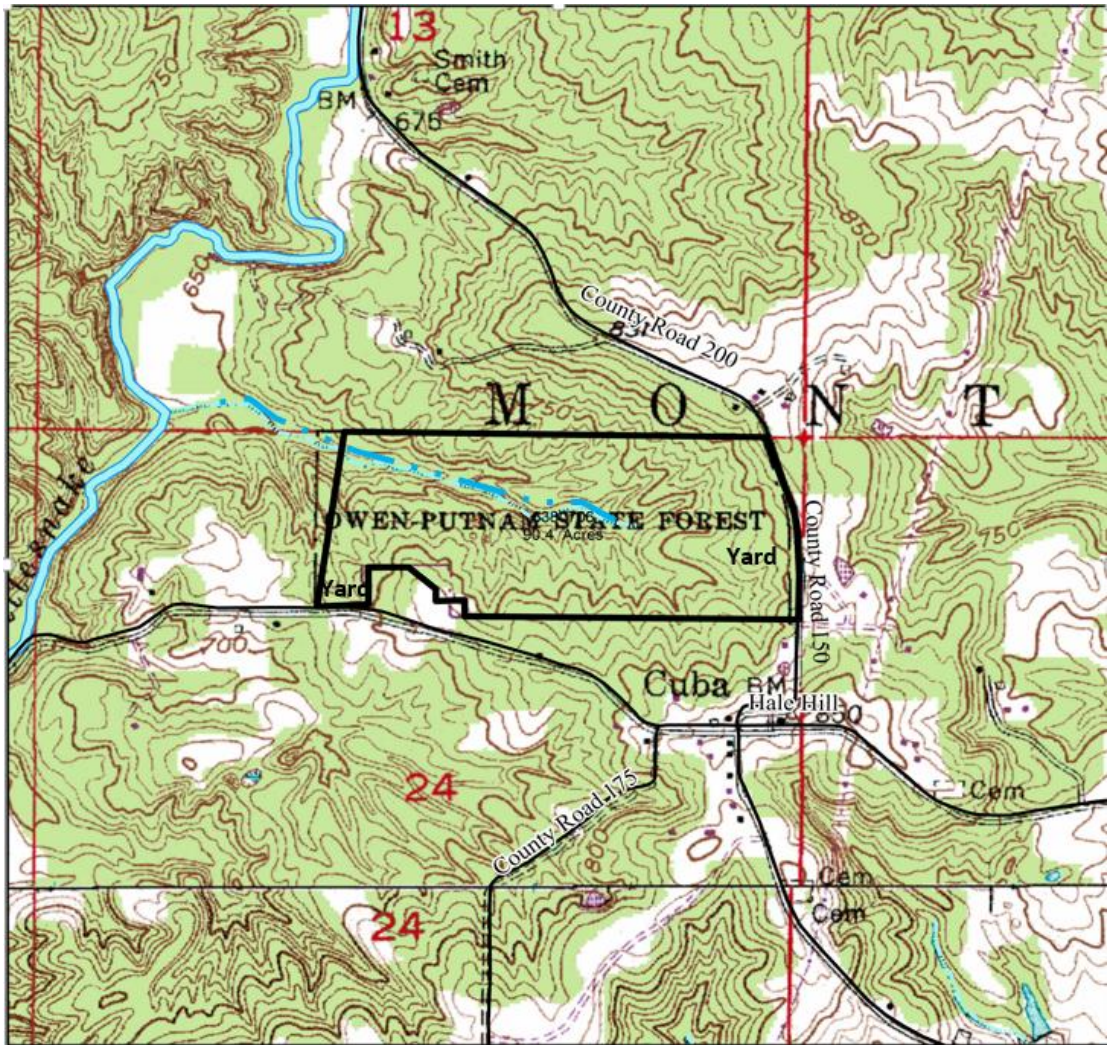
Indiana Department of Natural Resources - Division of Forestry
Resource Management Guide
Owen-Putnam State Forest

State Forest: Owen-Putnam **Compartment:** 7 **Tract:** 6
Forester: R. Duncan **Date:** October 2018
Management Cycle End Year: 2033 **Management Cycle Length:** 15 Years

Location

Compartment 7, tract 6 is located along Old Cuba road, primarily in the northeast quarter of section 24, township 11N, range 4W, Montgomery Township, Owen County. It is approximately 6.0 miles northeast of the forest office.





General Description

This tract is a **91-acre**, sustainably managed, multiple use parcel located within the 551 acres comprising compartment 7 of the Owen-Putnam State Forest. Timber types vary from mixed upland hardwoods, to oak-hickory, to bottomland species including Black Walnut (Juglans nigra). There are pine along the eastern ridge with small patches of pine located along the ridge top on the western edge of the tract near steep drainages. The pine show some decline due to windthrow and overcrowding. The over-story consists of medium to large sawlog sized yellow-poplar, maple, oak, hickory and ash. The quality of merchantable timber is good. However, there is some decline in the poplar due to drought and insect stress. The pole-sized under-story consists mostly of beech, maple, hickory and poplar. This area exhibits good opportunities for multiple use management, including timber management, wildlife management, soil and water conservation and public recreational activities, such as, hunting, hiking, gathering, viewing and interpretation.

History

Owen-Putnam State Forest was established in 1948 with most of its landholdings purchased as smaller non-contiguous tracts in the 50's and 60's. Prior to state ownership, many of the ridge tops in the area were farmed through the 1930's. Sometime in the 1960's many of the severely eroded ridge tops were planted to White and

Virginia pine to stabilize the soil and prevent erosion from previous disturbances such as poor farming practices prior to state ownership. Compartment 7 tract 6 has been managed for many years.

- Timber harvest 1974
- Boundary marking 1985
- Timber inventory 1987
- Timber harvest 1987
- Timber stand improvement, vine control and crop tree release in 1988
- Property wide timber inventory (TIMPIS) in 1989
- Boundary marking 2005
- Timber inventory in 2005
- Timber harvest in 2007
- Timber stand improvement, regeneration opening and crop tree release 2008
- Timber inventory in 2018

Landscape Context

Compartment 7 tract 6 is located in a rural area near the small unincorporated town of Cuba. Generally the area is forested hills and ravines. The private property adjacent to this tract is primarily closed canopy, deciduous, mixed hardwood forests with no industry, little agriculture, with some residences including small fields/pastures and small ponds located primarily along secondary county roads beyond the state forest.

Topography, Geology and Hydrology

This part of Owen-Putnam State Forest falls in the Shawnee Hills Natural Region, Crawford Upland Section. This section is most distinct by its rugged hills with sandstone cliffs and rockhouses. Characteristic soils are the well-drained acidic silt loams of the Wellston-Zanesville-Berks Association. The upper slopes consist of an oak-hickory assortment, with a more mesic component in the coves resembling the mixed mesophytic forest community.
The topography of the area varies from nearly level ground on the ridge top along the eastern edge of the tract to rolling ridges of moderate to steep north and south facing slopes with a riparian zone extending from the northwest corner of the tract toward the west central portion of the tract. There are several open and closed sinkholes scattered throughout the southwest portion of the tract. Water sheds from the north and south through ephemeral drainages into a mapped intermittent stream flowing through the riparian management zone from the west central portion of the tract to the northwest corner of the tract. The soils of the area are generally composed of shallow to moderately deep, frequently flooded to well-drained soils often containing fragipans on nearly level to steep slopes underlain with sandstone, siltstone and shale. These soils occur throughout the Illinoian glaciated areas of the county. In the event of a harvest, the existing haul road and log yards can be utilized. However, care must be taken during the planning and execution of skid trails due to the erosive nature of some soils and the presence of karst features. Best Management Practice (BMP) guidelines will be followed to preserve soil and water quality, including sink hole and riparian buffers where applicable.

Soils

This tract is composed of the following soils: (USDA, NRCS – Soil Survey, Owen County, IN 2005).

<u>HeoE- Hickory silt loam, 18 to 25 percent slopes</u>
This moderately steep, deep, well-drained soil is in the uplands on concave breaks in draws and on side slopes. 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.

HeuF- Hickory-Wellston silt loams, 25 to 35 percent slopes
This moderately steep to steep, deep, well-drained soil is on dissected till plains over interbedded shale, siltstone, and sandstone. It 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.

ZamB2- Zanesville silt loam, soft bedrock substratum, 2 to 6 percent slopes, eroded
This gently sloping, deep, moderately well drained or well-drained soil is on uplands. It is well suited to trees. This soil has a site index of 69 for white oak and 90 for yellow poplar.

ZamC2- Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, 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. This soil has a site index of 69 for white oak and 90 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.

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.

StgD2- Stinesville-Ryker-Grayford silt loams, karst, hilly, eroded
This deep, well drained complex is found on the shoulder and backslopes of sinkholes within the dissected till plains over limestone. It is well suited to trees. Ryker has a site index of 90 for white oak and 98 for yellow poplar and stinesville has a site index of 105 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.

Access

To access the tract from Spencer Indiana, travel west on State Road 46 approximately 1-mile to Rattlesnake road, travel north on Rattlesnake road approximately 6.0-miles to Old Cuba road, travel west on Old Cuba road approximately 1/4 mile to the forest parking lot and access road on the west side of the road. The tract is accessible to the public via the parking lot on Old Cuba road. Management access as well as public recreational access to this tract is good.

Boundary

This tract is a 91-acre stand-alone parcel of the 551 acres composing compartment 7 of the Owen-Putnam State Forest. Private property borders this tract on all sides, with approximate boundary lines having been located and marked with orange paint and flagging. The boundary lines have been marked in years past using various old fence, the county road, and a wood post as evidence.

Wildlife

With the presence of the upland and lowland forest area, which includes oak-hickory, beech-maple, mixed hardwoods, pine, and pockets of herbaceous plants, and an intermittent stream and ephemeral drainages, this tract contains habitat for a variety of wildlife species. Common species or sign observed include eastern gray squirrel (Sciurus carolinensis), fox squirrel (Sciurus niger), eastern chipmunk (Tamias striatus), white-tailed deer (Odocoileus virginianus), wild turkey (Meleagris gallopavo), Virginia opossum (Didelphis virginiana), North American raccoon (Procyon lotor), Eastern box turtle (Terrapene carolina carolina), raptors, songbirds, woodpeckers, toads, frogs and various small stream aquatic life.

Live trees in this tract provide for shelter, escape cover, roosting and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate, bugging) food resource, with the oaks, hickories, walnuts and beech providing hard mast for deer, turkey and squirrel and the cherries providing soft mast for birds. The pine stands provide benefits such as cover, roosts and browse.

Live trees containing cavities in this tract provide nesting and denning opportunities for woodpeckers, songbirds and small mammals and potentially contribute to future snags (standing dead trees).

Snags in this tract provide essential habitat characteristics for foraging activity, nest/den sites, decomposers (e.g., fungi and invertebrates), bird perching and bat roosting, and are important contributors to the future pool of downed woody material.

Rotten logs, crater knolls, and ephemeral streams provide habitat for herptiles and aquatic vertebrates.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species 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.

The proposed management activities for this tract should not significantly alter the relative proportion and availability of habitat/cover types or significantly disrupt travel/dispersal corridors or create isolated habitat units separated from larger units of similar habitat. Nor should the proposed management activities increase the likelihood that specialist interior forest species would be affected by generalist species using forest edge habitats. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to conserve soil and water resources and related forest wildlife habitats, such as springs/seeps, ponds/wetlands and karst features.

Wildlife Habitat Features

According to the data collected during the tract inventory (R. Duncan 2018) and represented in the following table, this tract is well represented with habitat in regards to the density, size and species of live and dead trees essential for consideration of various wildlife habitat needs including habitat specialists such as cavity nesters and species of conservation need like the Indiana bat (Mytolis sodalis) and their suggested habitat requirements.

Legacy trees, as defined by the Management Guidelines for Compartment-Level Wildlife Habitat Features are well represented above the suggested maintenance levels. White oak and shagbark hickory are two species having preferred characteristics for tree roosting bats. Both are relatively abundant in this tract and will be given consideration as habitat. Also, as the tract continues to mature, the number of legacy trees $\geq$ 20" D.B.H. is expected to rise.

Standing dead or dying trees (snags) are well represented in this tract. Snags $\geq$ 5" D.B.H. and $\geq$ 9" D.B.H. in this tract are above the maintenance levels for both classes. However, snags in the $\geq$ 19" D.B.H. class are below the suggested maintenance level. The lack of large diameter snags is often attributable to the overall good health of the forest and the short retention of large standing dead trees. Snags can have short standing times and often become wind thrown.

Legacy trees, snags and cavity trees will be given consideration for retention as habitat for the Indiana bat and other wildlife as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property and the Management Guidelines for Compartment-Level Wildlife Habitat Features. In addition, the girdling of select cull trees could be performed through post harvest timber stand improvement (T.S.I.) to address large diameter snag limitations. It should be noted these are compartment level guidelines and the target snag levels may well be present on the landscape.

Wildlife Habitat Feature Tract Summary

	Maintenance Level	Inventory	Available Above Maintenance
Legacy Trees *			
11"+ DBH	819	2556	1737
20"+ DBH	273	337	64
Snags (all species)			
5"+ DBH	364	1932	1568
9"+ DBH	273	875	602
19"+ DBH	45.5	0	-46

*** Species Include:** AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Communities

Most of this tract is of the dry-mesic upland forest community type, with some isolated more mesic sites located along lower north slopes, and some floodplain along drainages. 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), hop hornbeam (Ostrya virginiana) and black haw (Viburnum prunifolium). Characteristic animals in this community are the broad-headed skink (Eumeces laticeps), white-footed mouse (Peromyscus leucopus) and eastern chipmunk (Tamias striatus).

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.

An exotic/invasive species, multi-flora rose (Rosa multiflora) and autumn olive **(**Elaeagnus umbellata), is present in and around this tract in patches of light to moderate densities. It is also common throughout the county. Control measures can be undertaken during post-harvest T.S.I., to treat problem occurrences before their populations expand.

Recreation

Compartment 7 tract 6 is independent from the rest of compartment 7 and somewhat remote from the general landmass of the Owen-Putnam State Forest and while there are no developed recreation trails, it has good public

access via the parking lot on Old Cuba road, and opportunity exists for multiple use including timber management, wildlife conservation and public activities such as hunting and gathering..

Cultural

This tract is reviewed for cultural sites during the forest resource inventory and planning process. Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted will be avoided during management or construction activities.

Tract Description and Silvicultural Prescription

In 1974 the tract was harvested (Weston Paper& Manufacturing Co.) of ~24,920 Bd. Ft. on 25 acres (996 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 1987 a routine timber inventory was conducted (J. Gagnon). The data estimated the tract to contain 109 Sq. Ft. of total basal area per acre in 345 trees per acre with approximately 5020 Bd. Ft. of total sawtimber per acre.

In 1987 the tract was harvested (Kirkham Hardwoods, Inc.) of ~63,068 Bd. Ft. in 368 trees on 62 acres (1017 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 1988 a timber stand improvement (T.S.I) project was performed to release crop trees across the tract by girdling select trees and cutting grapevines.

In 1989 a property wide inventory (TIMPIS) was conducted, including Compartment 7 tract 6. The data estimated the tract to be 84% stocked with 91 Sq. Ft. of total basal area per acre in 239 trees per acre, containing approximately 4551 Bd. Ft. of total sawtimber per acre.

In 2005 a routine timber inventory was conducted (R. Duncan). The data estimated the tract to be 91% stocked with 107 Sq. Ft. of total basal area per acre in 185 trees per acre and an average tree diameter of 10 inches, containing approximately 7153 Bd. Ft. of total sawtimber per acre.

In 2007 the tract was harvested (R. Booe & Son Hardwoods, Inc.) of ~172,500 Bd. Ft. in 920 trees on 91 acres (1895 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 2008 a timber stand improvement (T.S.I) project was performed to release crop trees across the tract through selective girdling and the creation of a regeneration opening.

In 2018 a routine inventory was conducted (R. Duncan). The data estimated the tract to be 109% stocked with 130 Sq. Ft. of total basal area per acre in 195 trees per acre and an average tree diameter of 11 inches, containing approximately 6977 Bd. Ft. of total sawtimber per acre.

Timber in compartment 7 tract 6 is predominantly closed canopy mixed hardwoods, with some pockets of oak-hickory, and small pine stands. The over-story consists mostly of medium to large sawlog sized poplar, oak, hickory, beech, maple and ash; with eastern white pine (Pinus strobus) comprising approximately 4 acres in the western area of the tract. The quality of merchantable timber is good, except for the declining yellow poplar, with the ridge tops and upper slopes containing more of the mixed hardwoods, and the mid to lower slopes containing more of the oak-hickory. The under-story consists mostly of beech, maple, sassafras, poplar, oak and hickory. Advanced regeneration is represented mostly by beech, maple, ash, sassafras, pawpaw, hickory, cherry, and oak.

The current inventory and stocking level indicates the tract is fully stocked. Some areas of the tract are sufficiently mature and crowded that significant resource stress and competition is taking place and thinning is recommended. Often, there is little groundcover or desired advanced regeneration in these areas due to low light levels and

browse. The remaining less stressed and maturing areas would also benefit from the selective removal of less desirable species and low quality individuals in an effort to improve the overall tract quality and composition.

The recommendation is to perform an intermediate cutting in the form of a thinning and improvement cut, utilizing the single tree and group selection methods within the un-even aged management system. A thinning should be done to reduce competition and mortality amongst the overcrowded timber. An improvement cut should be incorporated to improve the overall species composition and quality of the tract by select harvesting the low quality, damaged, diseased, dying and poorly formed trees as well as thinning of less desirable species, especially the declining yellow-poplar that are competing with the oak and other quality trees such as the hickory and cherry. In addition, ash trees susceptible to Emerald Ash Borer (EAB) will be selected for harvest to utilize their product before they become populated with the insect and decline. However, live, healthy Ash which survive or escape the intense killing wave of EAB will be retained and their growth encouraged through applied management. The two-fold objective is to recruit ash regeneration before EAB induce mortality and then promote the development of EAB survivors.

In some areas, a shelterwood-type situation may be created as trees are removed from the intermediate and understory layers while larger dominant and co-dominant trees (especially where oak is a strong component) are left standing. This will allow more diffuse sunlight to reach the ground and improve the establishment and survival of seedlings.

Group selection openings over less than 10% of the tract may also be created to remove groups of undesirable species or poor quality individuals and to promote regeneration.

In combination, these silvicultural methods will reduce stand density; improve overall growing conditions and timber quality, while encouraging tree species diversity and regeneration of native mixed hardwood species.

The long term objective with the pine stands is a transitioning over the next 2 cycles away from these non-native species and towards a native hardwood mix. This would utilize a combination of group, shelterwood and single tree selection systems as described above.

Management in the form of Timber Stand Improvement (T.S.I.) is prescribed to release preferred, high quality crop trees through the culling of low volume, poorly formed trees and less desirable species, and to encourage regeneration through the creation of canopy gaps and a reduction in understory shade tolerant species. T.S.I. would also look at problem occurrences of multi-flora rose and autumn olive.

Standing dead trees (snags) and cavity trees will be given consideration for retention as habitat for wildlife. Legacy trees, as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property, will be given consideration for retention as habitat for the Indiana Bat. In addition, the girdling of select, larger diameter cull trees could be performed through T.S.I. to address the Management Guidelines for Compartment-Level Wildlife Habitat Features.

The overall goal of this prescription is to improve timber species composition, provide resources for future crop trees through the removal of over-mature and declining trees, and provide a diversity of forest wildlife habitats and structure. The overall prescribed harvest would remove approximately 180,000-250,000 board feet.

The tract is projected to remain in the fully stocked category after the prescribed elective harvest.

The existing haul road, log yard, and skid trail system will be utilized for management activities eliminating the need for any new construction. As with all forest management activities, Best Management Practice (BMP) guidelines will be followed to protect soil and water resources.

Inventory Summary – C7T6

Total Number Trees/Acre: 195 **Average Tree Diameter:** 11.1”
Average Site Index: 90 YEP **Stocking Level:** 109%
Estimated Harvest Volume: 180,000-250,000 bd ft

	Acres		Sq.Ft./Acre
Hardwood Commercial Forest:	87	**Basal Area Sawtimber.**	74.4
Pine Commercial Forest:	4	**Basal Area Poles:**	51.2
Noncommercial Forest:	0	**Basal Area Culls:**	5.0
Permanent Openings:	0	**Sub Merch.**	N/A
Other Use:			
Total:	91	**Total Basal Area:**	130.6

Estimated Tract Volumes for Commercial Forest Area – Bd.Ft. Doyle Rule

Species	Total Volume
Yellow-Poplar	2070
White Oak	1019
Sugar Maple	695
Red Oak	645
Bitternut Hickory	503
Sassafras	321
White Pine	248
Red Maple	217
American Beech	208
White Ash	195
Pignut Hickory	169
American Sycamore	146
Black Oak	132
Black Cherry	118
Largetooth Aspen	71
Basswood	64
Black Walnut	45
Shagbark Hickory	44
Virginia Pine	35
Blackgum	32
Per Acre Total	6977
Tract Total	634,907

Proposed Management Activities

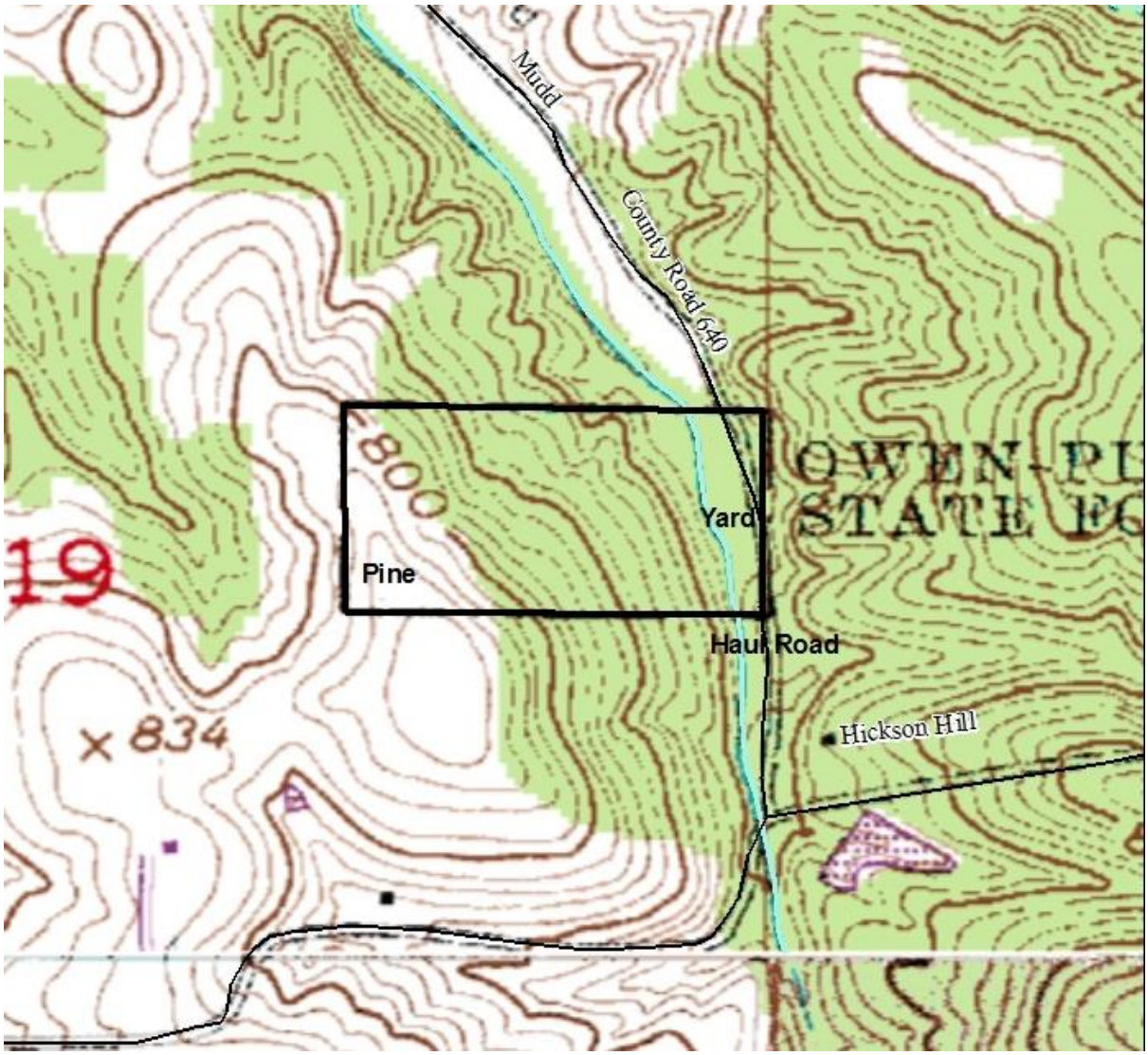
2018 ----------	Timber Inventory
2018 ----------	DHPA Archaeological Clearance Application
2018 ----------	Resource Management Guide
2020-2022 ----	Timber Marking and Sale Layout
2022-2024 ----	Timber Sale/Harvest
2022-2025 ----	Post-Harvest TSI and Exotic/Invasive Control
2025-2028 ----	Regeneration check
2033 ----------	Timber Inventory
2033 ----------	Resource Management Guide

State Forest: Owen-Putnam
Forester: R. Duncan
Management Cycle End Year: 2032

Compartment: 6 **Tract:** 11
Date: September 2017
Management Cycle Length: 15 Years

Location

Compartment 6, tract 11 is located along Mudd road, primarily in the northeast quarter of section 19, township 11N, range 4W, Morgan township, Owen county. It is not adjacent to other state forest property. It is approximately 5 miles northwest of the forest office.



March 2005 Aerial showing Pine stands (boundary approximated)

General Description

This tract is a somewhat isolated, stand-alone 20-acre multiple use parcel, being part of the 701 acres comprising compartment 6 of the Owen-Putnam State Forest. Timber types include primarily closed canopy mixed hardwoods with some oak-hickory, beech-maple and pine. Pine was planted along the ridge top to control erosion from past disturbance prior to state ownership. The over-story consists of medium to large sawlog sized yellow-poplar, oak, hickory, maple and beech with white pine comprising the pine stands. The quality of merchantable timber is good. However, there is some decline in the yellow poplar due to drought and insect stress. The pole-sized under-story consists mostly of maple, sassafras, oak, hickory and beech with white pine representing some of the pole sized understory in the pine stand. This area exhibits good opportunities for multiple use management, including timber management, wildlife management, soil and water conservation and public recreational activities, such as, hunting, gathering, viewing and interpretation.

History

Owen-Putnam State Forest was established in 1948 with most of its landholdings purchased as smaller non-contiguous tracts in the 50's and 60's. Sometime in the 1960's many of the severely eroded ridge tops were planted to pine to stabilize the soil. Compartment 6 tract 11 has been managed for many years.

- Timber inventory in 1984
- Property wide timber inventory (TIMPIS) in 1989
- Timber inventory in 2003
- Timber harvest in 2004
- Timber stand improvement, vine control and crop tree release in 2008
- Timber inventory in 2017

Landscape Context

Compartment 6 tract 11 is located in a rural area. Generally the area is forested hills and ravines. The private property adjacent to this compartment and tract are primarily closed canopy, deciduous, mixed hardwood forests with no industry, little agriculture, and some residences with small fields/pastures and small ponds located primarily along secondary county roads beyond the state forest.

Topography, Geology and Hydrology

This part of Owen-Putnam State Forest falls in the Shawnee Hills Natural Region, Crawford Upland Section. This section is most distinct by its rugged hills with sandstone cliffs and rockhouses. Characteristic soils are the well-drained acidic silt loams of the Wellston-Zanesville-Berks Association. The upper slopes consist of an oak-hickory assortment, with a more mesic component in the coves resembling the mixed mesophytic forest community.

The topography of the area varies from nearly level ground along the ridge top in the west part of the tract to moderately steep east facing slopes. Water sheds primarily east into a perennial stream flowing from north to south along the east edge of the tract. The area is generally comprised of shallow to moderately deep, well-drained soils often containing fragipans, on nearly level to steep slopes. These soils occur throughout the Illinoian glaciated areas of the county. In the event of a harvest, the existing haul road and log yards can be utilized. Care must be taken during the planning and execution of skid trails due to the erosive nature of some soils. Best Management Practice (BMP) guidelines will be followed to preserve soil and water quality.

Soils

This tract is composed of the following soils: (USDA, NRCS – Soil Survey, Owen County, IN 2005).

TtaG- Tulip-Tipsaw complex, 25 to 60 percent slopes, this moderately and very steep, moderately deep to deep, well drained complex is found on side slopes 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.

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.

ZamB2- Zanesville silt loam, soft bedrock substratum, 2 to 6 percent slopes, eroded, this gently sloping, deep, moderately well drained or well-drained soil is on uplands. It is well suited to trees. This soil has a site index of 69 for white oak and 90 for yellow poplar.

NbhAH- Newark silt loam, 0 to 2 percent slopes, frequently flooded, brief duration. This nearly level, deep, somewhat poorly drained soil is found on steps of floodplains. It is well suited to trees. Equipment limitations, seedling mortality, and windthrow hazards are management concerns that should be considered during sale planning and implementation of Best Management Practices for Water Quality. This soil has a site index of 96 for pin oak and 89 for eastern cottonwood.

Access

To access the tract from Spencer Indiana, travel west on State Road 46 approximately 2-miles to Fishcreek road, then travel north on Fishcreek road approximately 4-miles to Atkinsonville road, then travel west on Atkinsonville road 1.5 miles to Mudd road, then travel north on Mudd road about a quarter mile to the log yard on the right side of the road. The tract is accessible to the public via the parking lot along Mudd road. Management access as well as public recreational access to this tract is good.

Boundary

This tract is a 20-acre, sustainably managed, multiple use parcel located within the 701 acres comprising compartment 6 of the Owen-Putnam State Forest. Private property borders this tract on all sides with approximate boundary lines having been located and marked with orange paint and flagging. The boundary lines have been marked and documented in the past.

Wildlife

With the presence of the upland and lowland forest area, which includes oak-hickory, beech-maple, mixed hardwoods, pine, pockets of seasonal grasses and sedges, and ephemeral drainages, and a perennial stream, this tract contains habitat for a variety of wildlife species. Common species or sign observed include Eastern grey squirrel, Eastern fox squirrel, Eastern chipmunks, white-tailed deer, Wild Turkey, Virginia opossum, North American raccoon, Eastern box turtle, raptors, songbirds, woodpeckers, toads, frogs and various small stream aquatic life.

Live trees in this tract provide for shelter, escape cover, roosting and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate, bugging) food resource, with the oaks, hickories, walnuts and beech providing hard mast for deer, turkey and squirrel and the cherries providing soft mast for birds. The pine stands provide benefits such as cover, roosts and browse.

Live trees containing cavities in this tract provide nesting and denning opportunities for woodpeckers, songbirds and small mammals and potentially contribute to future snags (standing dead trees).
Snags in this tract provide essential habitat characteristics for foraging activity, nest/den sites, decomposers (e.g., fungi and invertebrates), bird perching and bat roosting, and are important contributors to the future pool of downed woody material.

Rotten logs, crater knolls, ephemeral streams and the perennial stream provide habitat for herptiles and aquatic vertebrates.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species 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.

The proposed management activities for this tract should not significantly alter the relative proportion and availability of habitat/cover types or significantly disrupt travel/dispersal corridors or create isolated habitat units separated from larger units of similar habitat. Nor should the proposed management activities increase the likelihood that specialist interior forest species would be affected by generalist species using forest edge habitats. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to conserve soil and water resources and related forest wildlife habitats, such as springs/seeps, ponds/wetlands and karst features.

Wildlife Habitat Features

According to the data collected during the tract inventory (R. Duncan 2017) and represented in the following table, this tract is well represented with habitat in regards to the density, size and species of live and dead trees essential for consideration of various wildlife habitat needs including habitat specialists such as cavity nesters and species of conservation need like the Indiana bat (Mytolis sodalis) and their suggested habitat requirements.

Legacy trees, as defined by the Management Guidelines for Compartment-Level Wildlife Habitat Features are well represented above the suggested maintenance levels. White oak and shagbark hickory are two species having preferred characteristics for tree roosting bats. Both are relatively abundant in this tract and will be given consideration as habitat. Also, as the tract continues to mature, the number of legacy trees $\geq$ 20" D.B.H. is expected to rise.

Standing dead or dying trees (snags) are well represented in this tract. Snags in this tract are above the maintenance levels in all size classes, except the 19"+ diameter class where presence is slightly below target levels.

Legacy trees, snags and cavity trees will be given consideration for retention as habitat for the Indiana bat and other wildlife as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property and the Management Guidelines for Compartment-Level Wildlife Habitat Features. In addition, the girdling of select cull trees could be performed through post harvest timber stand improvement (T.S.I.) to address large diameter snag limitations. It should be noted these are compartment level guidelines and the target snag levels may well be present on the landscape.

Wildlife Habitat Feature, Tract Summary

	Maintenance Level	Inventory	Available Above Maintenance
Legacy Trees *			
11"+ DBH	180	394	214
20"+ DBH	60	66	6
Snags (all species)			
5"+ DBH	80	155	75
9"+ DBH	60	155	95
19"+ DBH	10	9	-1

*** Species Include:** AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Communities

Most of this tract is of the dry-mesic upland forest community type, with some isolated more mesic sites located along lower slopes, and some floodplain along drainages and streams. 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), hop hornbeam (Ostrya virginiana) and black haw (Viburnum prunifolium). Characteristic animals in this community are the broad-headed skink (Eumeces laticeps), white-footed mouse (Peromyscus leucopus) and eastern chipmunk (Tamias striatus).

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 communities.

An exotic/invasive species, multi-flora rose (Rosa multiflora), is present in and around this tract in patches of light to moderate densities. It is also common throughout the county. Control measures can be undertaken during post-harvest T.S.I., to treat problem occurrences before their populations expand.

Recreation

While there are no recreation trails on this multiple use tract, it has good public access via the parking lot and fire trail located on Mudd road. Management access to this tract is also good. Hunting and gathering are the primary recreational uses of the tract.

Cultural

This tract is reviewed for cultural sites during the forest resource inventory and planning process. Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted will be avoided during management or construction activities.

Tract Description and Silvicultural Prescription

In 1984 a routine timber inventory was conducted (B. Hahn). The data estimated the tract to contain approximately 3088 Bd. Ft. of total sawtimber per acre with an estimated 1516 Bd. Ft. of harvest sawtimber per acre.

In 1988 a property wide inventory (TIMPIS) was conducted, including Compartment 6 tract 11. The data estimated the tract to be 88% stocked with 103 Sq. Ft. of total basal area per acre in 186 trees per acre, containing approximately 4081 Bd. Ft. of total sawtimber per acre with an estimated 920 Bd. Ft. of harvest sawtimber per acre.

In 2004 the tract was harvested (Timberland Resources, Inc.) of 26,400 Bd. Ft. in 105 trees on 18 acres (1466 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 2004, due to high winds, the tract had a salvage sale of 2,900 Bd. Ft. in 21 trees (Timberland Resources, Inc.).

In 2006 a timber stand improvement (T.S.I) project was performed to release crop trees across the tract by girdling select trees and cutting grapevines.

In 2017 a routine inventory was conducted (R. Duncan). The data estimated the tract to be 94% stocked with 113 Sq. Ft. of total basal area per acre in 157 trees per acre and an average tree diameter of 12.5 inches, containing approximately 6437 Bd. Ft. of total sawtimber per acre with an estimated 1825 Bd. Ft. of harvest sawtimber per acre.

Timber in compartment 6 tract 11 is predominantly closed canopy mixed hardwoods, with some pockets of oak-hickory, and small pine stands. The over-story consists mostly of medium to large sawlog sized poplar, oak, hickory, beech, maple and ash; with white pine comprising approximately 1-acre along the west side of the tract. The quality of merchantable timber is good, except for the declining yellow poplar, with the ridge tops and upper slopes containing more of the mixed hardwoods, and the mid to lower slopes containing more of the oak-hickory. The under-story consists mostly of beech, maple, sassafras, poplar, oak and hickory. Advanced regeneration is represented mostly by beech, maple, ash, sassafras, hickory, cherry, and oak.

The current inventory and stocking level indicates the tract is fully stocked. Some areas of the tract are sufficiently mature and crowded that significant resource stress and competition is taking place and thinning may be beneficial. Often, there is little groundcover or desired advanced regeneration in these areas due to low light levels and browse. The remaining less stressed and maturing areas would likewise benefit from the selective removal of less desirable species and low quality individuals in an effort to improve the overall tract quality and composition.

The recommendation is to perform an intermediate cutting in the form of a thinning and improvement cut, utilizing the single tree and group selection methods within the un-even aged management system. A thinning should be done to reduce competition and mortality amongst the overcrowded timber. An improvement cut should be incorporated to improve the overall species composition and quality of the tract by select harvesting the low quality, damaged, diseased, dying and poorly formed trees as well as thinning of less desirable species, especially the declining yellow-poplar that are competing with the oak and other quality trees such as the hickory and cherry. In addition, ash trees susceptible to Emerald Ash Borer (EAB) will be selected for harvest to utilize their product before they become populated with the insect and decline. However, live, healthy Ash which survive or escape the intense killing wave of EAB will be retained and their growth encouraged through applied management. The two-fold objective is to recruit ash regeneration before EAB induce mortality and then promote the development of EAB survivors.

In some areas, a shelterwood-type situation may be created as trees are removed from the intermediate and understory layers while larger dominant and co-dominant trees (especially where oak is a strong component) are left standing. This will allow more diffuse sunlight to reach the ground and improve the establishment and survival of seedlings.

Hardwood group selection openings over less than 10% of the tract may also be created to remove groups of undesirable species or poor quality individuals and to promote regeneration and early successional habitat.

In combination, these silvicultural methods will reduce stand density; improve overall growing conditions and timber quality, while encouraging tree species diversity and regeneration of native mixed hardwood species.

The long term objective with the pine stands is a transitioning over the next 2 cycles away from these non-native species and towards a native hardwood mix. This would utilize a combination of group, shelterwood and single tree selection systems as described above.

Management in the form of post-harvest Timber Stand Improvement (T.S.I.) is prescribed to release preferred, high quality crop trees through the culling of low volume, poorly formed trees and less desirable species, and to encourage regeneration through the creation of canopy gaps and a reduction in understory shade tolerant species. T.S.I. would also look at problem occurrences of multi-flora rose.

Standing dead trees (snags) and cavity trees will be given consideration for retention as habitat for wildlife. Legacy trees, as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property, will be given consideration for retention as habitat for the Indiana Bat. In addition, the girdling of select, larger diameter cull trees could be performed through T.S.I. to address the Management Guidelines for Compartment-Level Wildlife Habitat Features.

The overall goal of this prescription is to improve timber species composition, provide resources for future crop trees through the removal of over-mature and declining trees, and provide a diversity of forest wildlife habitats and structure. The overall prescribed harvest would remove approximately 25-33% of the standing volume, with an estimated volume: 35,000-42,000 board feet.

The tract is projected to remain in the fully stocked category after the prescribed selective harvest.

The existing haul road, log yard, and skid trail system will be utilized for management activities eliminating the need for any new construction. As with all forest management activities, Best Management Practice (BMP) guidelines will be followed to protect soil and water resources.

Inventory Summary – C6T11

Total Number Trees/Acre: 157 **Average Tree Diameter:** 12.5”
Average Site Index: 90 YEP **Stocking Level:** 94%
Estimated Harvest Volume: 35,000-42,000 bd ft

	Acres		Sq.Ft./Acre
Hardwood Commercial Forest:	18	**Basal Area Sawtimber.**	75.8
Pine Commercial Forest:	**2**	**Basal Area Poles:**	33.7
Noncommercial Forest:	0	**Basal Area Culls:**	2.1
Permanent Openings:	0	**Sub Merch.**	2.0
Other Use:			
Total:	20	**Total Basal Area:**	113.6

Estimated Tract Volumes for Commercial Forest Area – Bd.Ft. Doyle Rule

Species	Total Volume
YEP	1462
REO	990
SAS	552
BIH	468
ZCO	426
SYC	415
WHA	410
PIH	322
SHH	220
SUM	185
WHO	166
BLC	144
BLO	126
AMB	120
REM	85
HAC	83
BLW	80
WHP	61
PIO	54
REE	48
AME	20
Per Acre Total	6437
Tract Total	128,740

Proposed Management Activities

2017 ---------- Timber Inventory
2017 ---------- DHPA Archaeological Clearance Application
2017-19 ---------- Resource Management Guide
2019-20 ------- Timber Marking and Sale Layout
2019-20 ---------- Timber Sale/Harvest
2019-21 ------- Post-Harvest TSI and Exotic/Invasive Control
2032 ---------- Timber Inventory
2032 ---------- Resource Management Guide