Indiana Department of Natural Resources

Indiana Department of Natural Resources – Division of Forestry

-Draft-

Resource Management Guides

Clark State Forest

The Indiana State Forest system consists of approximately 158,000 acres of primarily forested land. These lands are managed under the principle of multiple use-multiple benefit to provide forest conservation, goods and services for current and future generations. The management is guided by scientific principles, guiding legislation and comprehensive forest certification standards which are independently audited to help insure long term forest health, resiliency and sustainability.

For management and planning purposes each State Forest is divided into a system of compartments and tracts. In general terms compartments are 500-1,000 acres in size and their subunits (tracts) are 50-200 acres in size. Resource Management Guides (RMGs) are then developed for each tract to guide their management through a 15-25 year management period. There are approximately 1,700 tracts in the State Forest system. During annual planning efforts 50-100 tracts are reviewed and RMGs developed based on current conditions, inventories and assessments.

The RMGs for Compartment 7, Tracts 1, 2, 4, and Compartment 14, Tract 6 contained in this document are part of this year's tracts under review for Clark State Forest.

To submit a comment on this document, go to:
www.in.gov/dnr/forestry/8122.htm

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

Note: Some graphics may distort due to compression.

Clark State Forest
Forester: Bartlett
Tract Acreage: 124
Management Cycle End Year: 2038

Tract: 6300701 (Comp. 7 Tract 1)
Date: August 2018
Forested Acreage: 118
Management Cycle Length: 20 years

Location

Compartment 7 Tract 1 is located in Clark County, Indiana, more specifically Sections 30 and 31, Township 1 North, Range 6 East of Monroe Township. This tract is approximately 2 miles northwest of Henryville, IN, south off of Brownstown Rd.

General Description

The tract is approximately 118 forested acres and contains 4 delineated stands. The west edge of the tract is a planting composed of all small diameter yellow poplar, sweetgum, maples, and black cherry. Just east of the aforementioned stand, there is a planted sugar maple and tulip poplar stand. The trees here are of high quality and merchantable size. There are several low land areas in this tract that hold water. These wet areas are inhabited by yellow poplar, sugar maple, Virginia pine, sweetgum, and American beech. The rest of the tract is an oak-hickory overstory, with the majority of the volume in chestnut and white oak.

History:

1903 – Land acquired
1980 – Inventory/Cruising
1983 – Prime white oak sale (24,350 bf sold)
1987 – Timber harvest (45,548 bf sold)
1989 – Property lines ran (fence posts were set on lines)
2007 – Resource Management Guide
2018 – Inventory/Cruising

Topography, Geology, and Hydrology

The topography present is a collection of long ridges that span the width of the tract. The west portion of the tract has a very manageable slope and the intensity increases toward the east. Although the slope of the ridges increase, there is no topography existing that makes management unfeasible.

Riparian features (lake, intermittent streams, and ephemeral streams) are present on portions of the tract. General riparian management zone (RMZ) guidelines will be implemented in these areas in accordance with the Indiana Logging and Forestry Best Management Practices Field Guide.

Soils

The soils in this area are moderately well and well drained. The bedrock for this area is Mississippian shale and siltstone. The major soils are listed below.

BcrAW - Beanblossom silt loam, 1 to 3 percent slopes, 8.9 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.
BfbC2 - Blocher, soft bedrock substratum-Weddel silt loams, 6 to 12 percent slopes, eroded, 24.8 acres

This moderately sloping, deep, moderately well-drained soil is found on side slopes in the till plains. It is well suited to trees. Erosion hazards are a management concern that should be considered during implementation of Best Management Practices for Water Quality. Blocher has a site index of 76 for northern red oak and 90 for yellow poplar and Weddel has a site index of 70 for northern red oak and 75 for yellow poplar.

ComC - Coolville silt loam, 6 to 12 percent slopes, 8.7 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, 17.7 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, 37.5 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.

StdAQ - Stendal silt loam, 0 to 2 percent slopes, 7.6 acres
This nearly level, deep, somewhat poorly drained soil is on bottom land along small streams. It is well suited to trees. Seasonal wetness limits equipment and should be considered when planning management activities. This soil has a site index of 90 for pin oak and yellow poplar.

WedB2 - Weddel silt loam, 2 to 6 percent slopes, eroded, 13.2 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
There is access to this tract via a fire lane that runs along the entire south border. Within the tract there is no designated access.

Boundary
The tract is adjacent to other Clark State Forest tracts on the south, west, east, and northwest side. The north and northeast portion of the tract is bordered by Brownstown Rd. The Department of Natural Resources' Division of Law Enforcement headquarters is currently housed on Clark State Forest immediately east of this tract in the former DOC complex.

Wildlife
This tract contains diverse vegetation and wildlife resources (age, type, structure) conducive to providing habitat for a variety of wildlife species. Habitat types include: oak-hickory canopy, mixed hardwood canopy, and riparian areas.

A Natural Heritage Database Review was completed for this tract. If Rare, Threatened or Endangered species (RTE's) were identified for this tract, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The Division of Forestry has developed compartment level guidelines for two important wildlife structural habitat features: snags and legacy trees.

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.

Legacy trees are specific tree species that are preferred by the Indiana bat for roost trees.

	Maintenance Level	Inventory	Available Above Maintenance
*Legacy Trees 11"+ DBH	1062	2754	1692
*Legacy Trees 20"+ DBH	354	1096	742
Snag 5"+ DBH	472	329	-143
Snag 9"+ DBH	354	242	-112
Snag 19"+ DBH	59	98	39
*Selected Tree Species: AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO			

Inventory data for Compartment 7 Tract 1 shows that legacy trees and 19"+ snags exceed maintenance levels, while 5"+ and 9"+ snags 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, particularly the 5" and 9" diameter classes.

Exotics
Invasive species were scarce within the tract. If identified, priority should be given to the control of ailanthus, Amur Cork and Amur honeysuckle. Mesic to hydric sites contained some patches of multiflora rose and autumn olive. These should be managed with a situational approach, and their location relative to riparian areas shall be considered when planning their management. Other than the Amur Cork, these species are common throughout the county.

Recreation
Hunting is not permitted within this tract, however there are multiple other recreation uses due to the tract's location. This tract is directly adjacent to the Clark State Forest horse campground and while there are no existing recreation trails in the tract it does provides easy access to foot traffic and foraging. This tract will have an increase in recreational opportunity due to the planned campground expansion in the western 10-15 acres of the tract. This portion of the tract is designated for developed recreation, which may also include limited trail development.

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 Prescription and Proposed Activities
The current forest resource inventory was completed on 2/14/18 by Forester Bartlett. A summary of the estimated tract inventory results are located in the table below.

Tract Summary Data (trees >11"DBH):

Total acres= 118	Overall % stocking= 82%
Total trees per acre= 139	Present volume per acre= 7,515 bd. ft.
Basal area per acre= 98	Harvest volume per acre= 2,000-2300 bd. ft.

Species	# of Sawtimber Trees	Total Bd. Ft.
White Oak	2175	570,150
Sweetgum	706	42,490
Virginia Pine	399	48,634
Yellow Poplar	478	47,198
Chestnut Oak	208	54,560
Sugar Maple	302	42,594
Black Oak	143	29,274
American beech	199	9,880
Northern Red Oak	52	11,628
Pignut Hickory	88	11,080
American sycamore	57	4,070
Black Cherry	55	3,378
Red Maple	41	2,580
Blackgum	70	3,152
Largetooth Aspen	30	1,760
Black Locust	23	1,452
Shagbark Hickory	30	1,430
White Ash	23	1,452
Total:	5,079	886,770

For the purpose of this guide, this tract is divided into four management stratum based on the overstory composition. Below is a general tract description and silvicultural prescription.

Descriptions:
Mature sugar maple and tulip poplar planting – 4 acres
This small planting consist of primarily sugar maple and tulip poplar. The overstory trees have an average DBH of approximately 18 inches.

Basal are per acre (square feet)	120
Trees per acre (>11" DBH)	83

Approximate stocking	91%

Species	Bd. Ft.	Bd. Ft. acre
Black cherry	2,788	697
Sugar maple	20,488	5,122
Yellow poplar	7,360	1,840
Total	30,636	7,659

Small diameter stand – 10 acres

This planted stand consists of primarily: yellow poplar, chestnut oak, black oak, and red maple. The average diameter in the stand is six to eight inches.

Basal are per acre (square feet)	103.9
Trees per acre (>11" DBH)	209
Approximate stocking	92%

Species	Bd. Ft.	Bd. Ft. acre
Yellow poplar	11,140	1,114
Chestnut oak	5,430	543
Black oak	2,720	272
Red maple	2,580	258
Largetooth aspen	1,760	176
Sweetgum	1,570	157
Sugar maple	1,350	135
Black cherry	590	59
Total	27,140	2,714

Bottomlands – 22 acres

The delineated bottomlands contain mainly sweetgum, Virginia pine, and tulip poplar. Access to this area can be complicated due to the intermittent and ephemeral streams. Stocking currently is within the fully stocked B level category with overstory trees ranging predominately in the 12"-24" DBH range for hardwoods and 10"-20" for Virginia Pine.

Basal are per acre (square feet)	93.1
Trees per acre (>11" DBH)	134
Approximate stocking	78%

Species	Bd. Ft.	Bd. Ft. acre
Sweetgum	40,920	1,860
Virginia pine	35,596	1,618
Yellow poplar	20,416	928
White oak	8,778	399
American beech	6,600	300
Sugar maple	6,028	274

Chestnut oak	5,588	254
American sycamore	4,070	185
Black oak	2,200	100
Black locust	1,452	66
White ash	1,452	66
Shagbark hickory	1,430	65
Northern red oak	968	44
Pignut hickory	748	34
Blackgum	528	23
Total	136,752	6,216

Oak-Hickory – 82 acres

The oak-hickory portion of this tract is comparable to other oak-hickory stands on the property. The vast majority of the volume is in white, chestnut, and black oaks. The oaks occupy the ridges and slopes while mixed hardwoods are present in the valleys. Oak regeneration is present in this strata, but the majority of regeneration is of shade tolerant species. Stocking currently is within the fully stocked B level category with overstory trees ranging predominately in the 12”-24” DBH range.

Basal are per acre (square feet)	98.7
Trees per acre (>11”DBH)	128
Approximate stocking	82%

Species	Bd. Ft.	Bd. Ft. acre
White oak	561,372	6,846
Chestnut oak	43,542	531
Black oak	24,354	297
Sugar maple	14,760	180
Virginia pine	13,038	159
Northern red oak	10,660	130
Pignut hickory	10,332	126
Yellow poplar	8,282	101
American beech	3,280	40
Blackgum	2,624	32
Total	692,244	8,442

Prescriptions:

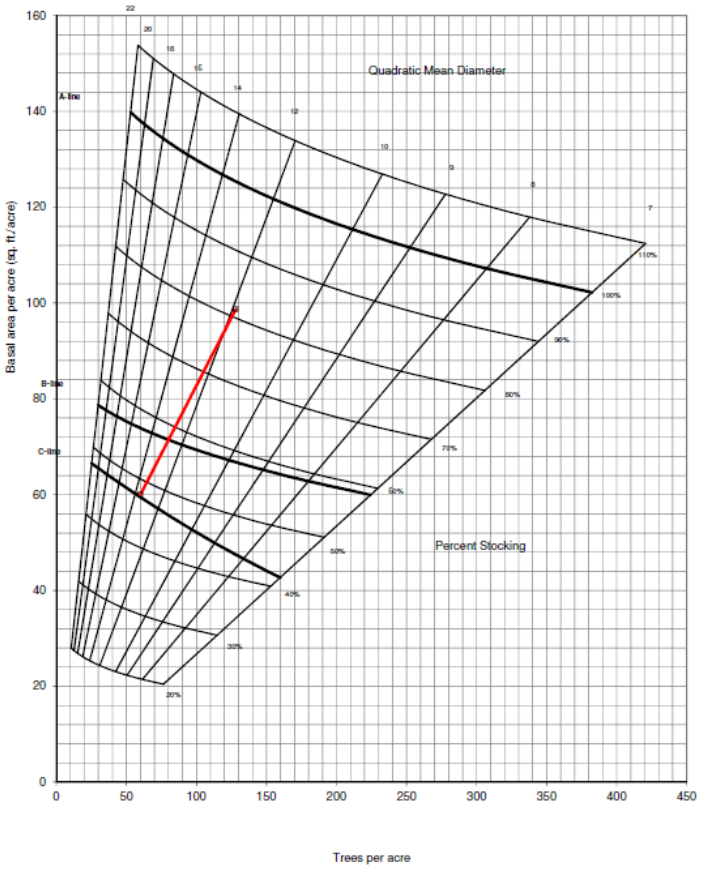
This tract is fully stocked with a stocking of approximately 82 percent. A harvest is recommended for this tract.

Select harvest in the 'sugar maple and yellow poplar planting'; and 'small diameter' stands:

These areas together comprise approximately 14 acres and are within the designated recreation section of the tract trees here will be managed with the primary intent of having a healthy tree and canopy cover within the recreation/campground area. Tree removals are primarily associated with ongoing campground development and hazard tree mitigation. Crop trees are to be favored while thinning. And, in this case crop trees are those with good health and vigor and those with better tolerance for campground settings.

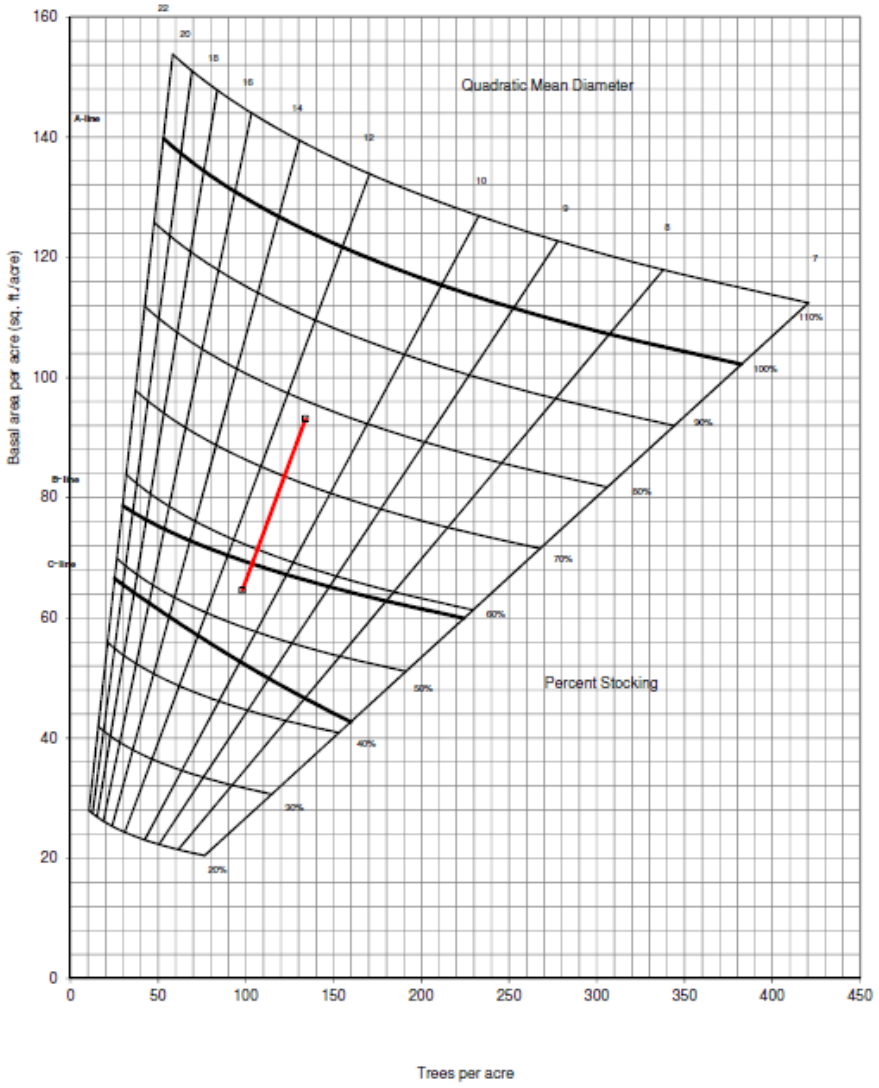
Select harvest and group selections in the oak-hickory strata:

A select harvest is also recommended in the oak-hickory stand. Trees that have been suppressed should be harvested to capture their mortality and provide space for future growing stock. Crop trees should be released with this select harvesting method based on: form, vigor, and tree health. Group selections or regeneration openings should be installed to promote the regeneration of desirable hardwood species. Regeneration opening locations should possess significant decline of overstory trees, ample regeneration, or undesirable growing stock. Approximately 2,300 bd. ft. per acre is recommended to be removed from this strata. Under the prescribed managed harvest stocking between regeneration openings is expected to remain in the fully stocked range. Regeneration openings are expected to occur on less than 5% of the tract under this prescription.



Select harvest in the bottomland strata:

The select harvest in the bottomland strata will focus on the removal of Virginia pine. This area contains white ash that is in serious decline, and this mortality should be captured with this harvest. The only other recommendation in this strata is to harvest trees that are in decline due to over maturity. Indiana Logging and Forestry Best Management Practices should be of high concern in this area. Approximately 1,500 bf. ft. per acre is recommended to be removed from this strata.



Invasive species management: Amur cork, Autumn olive and multiflora rose occurrences within this tract should be treated in an ongoing basis based on their proximity to developed recreation sites and spread potential through recreation users. Foliar spray is sufficient for the majority of the plants present. Those that are too tall for foliar spray shall be treated with either a basal application or treated

with a cut stump method. The problem pockets of multiflora rose within the mixed mesophytic site should be foliar sprayed before other forest management takes place.

Timber stand improvement: Within two years of the timber harvest, TSI is prescribed to complete the regeneration openings, removing understory and overstory trees that are inhibiting oak, hickory and other desired native species regeneration. TSI operations should also release crop trees that were not adequately released during the harvest. TSI via girdling is to be avoided in close proximity to any trails or recreation development.

Best Management Practices: During and after completion of the proposed management activity BMP's will be implemented in order to minimize soil erosion.

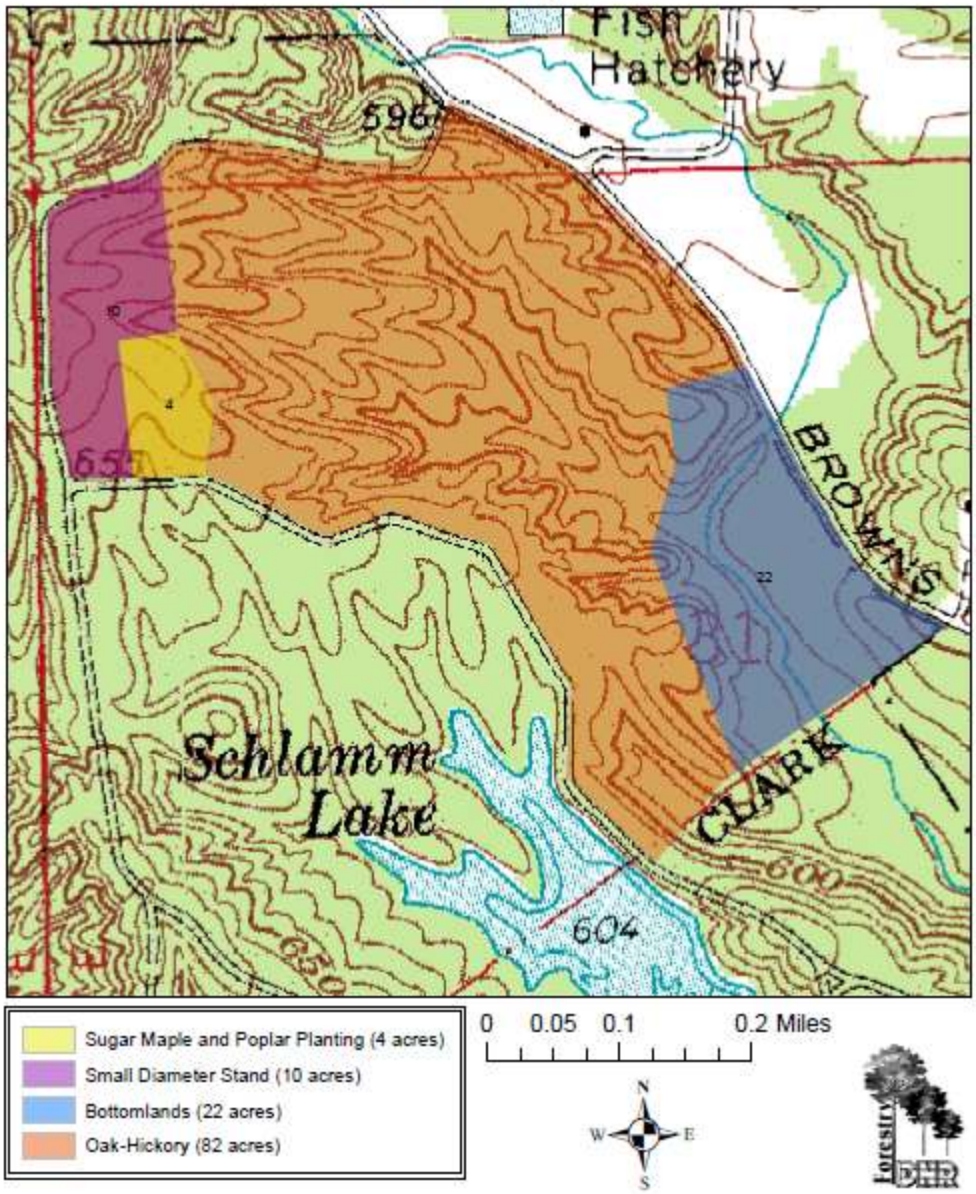
Guide revision: This tract should receive another inventory and management guide 20 years following the completion of the timber harvest.

Future evaluation: Regeneration openings should be evaluated to ensure that they were completed in the harvest. Invasive species should be monitored after the harvest to determine if mitigation is required.

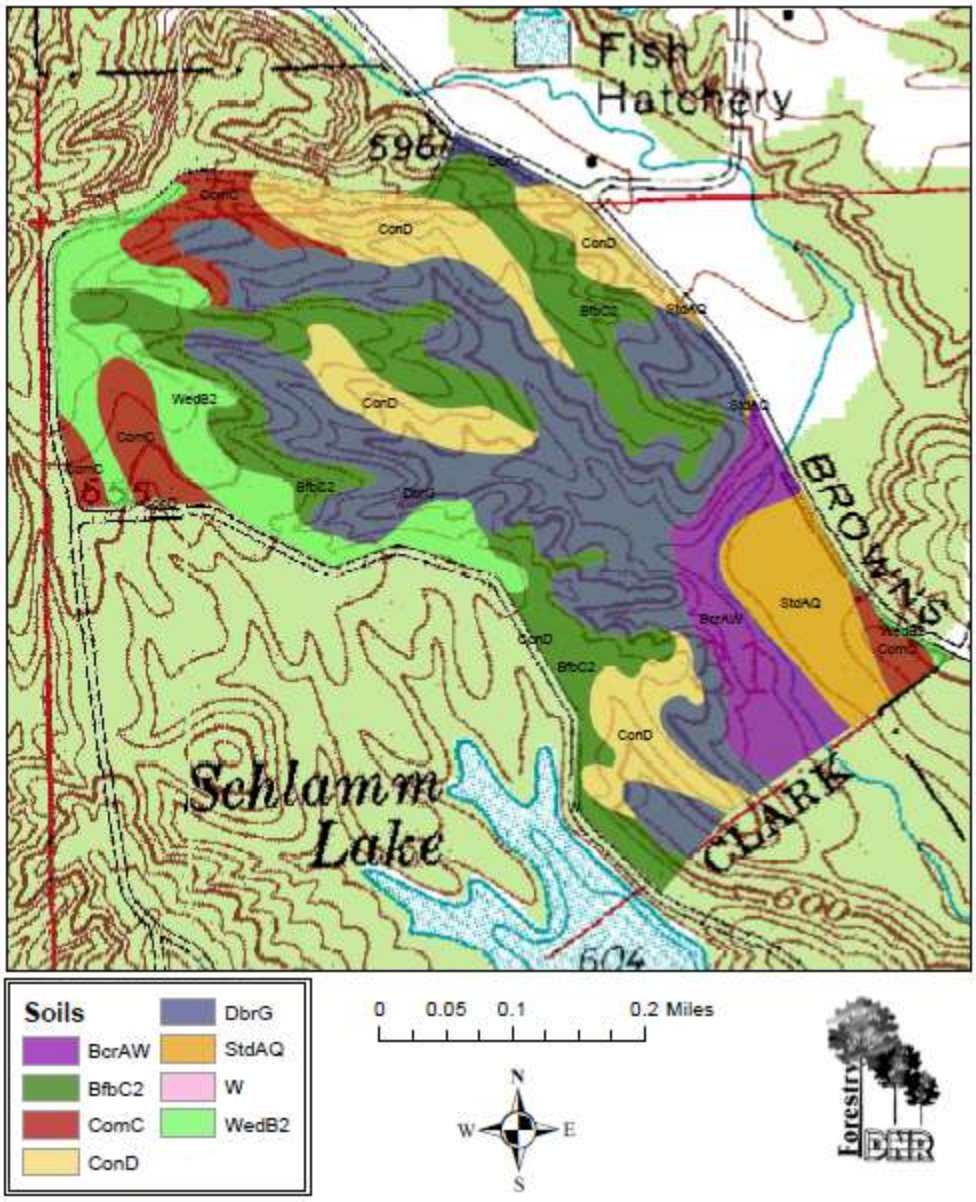
Schedule:

Proposed Activities Listing	*Proposed Date*
Timber marking and sale	2019
Post-harvest timber stand improvement and invasive treatment	2020
Campground development/improvements	2019-2022
Potential interpretive trail development	2020-2025
Inventory and management guide	2038

Clark State Forest
Compartment 7 Tract 1
Stand Map



Clark State Forest
Compartment 7 Tract 1
Soils Map



Clark State Forest
Forester: Bartlett
Tract Acreage: 109
Management Cycle End Year: 2038

Tract: 6300702 (Comp. 7 Tract 2)
Date: July 2018
Forested Acreage: 86
Management Cycle Length: 20 years

Location
Compartment 7 Tract 2 is located in Clark County, Indiana, more specifically Section 31, Township 1 North, Range 6 East of Monroe Township. This tract is approximately 2 miles northwest of Henryville, IN.

General Description
The tract is approximately 86 forested acres, 4 acres of recreations features, and 19 acre Schlamm Lake. The cover types are composed of an oak-hickory forest and a small planted stand. The oak-hickory stands are predominately white and chestnut oak. An approximate 7 acre plantation in the northwest corner consists of: tulip poplar, sweet gum, sugar maple, and Virginia pine.

Past management practices have improved the overall quality of standing trees in the tract and stocking has rebounded. This management seems to have focused on increasing stand quality without much thought on regenerating the next stand, and as a result shade tolerant species have become established in the mid and under-story. The majority of stems in the understory are beech and maple, with oak and hickory regeneration being secondary.

History:
1903 – Acquisition
1983 – Inventory/Cruising
1984 – Prime white oak sale (28,400 bf sold)
1984 – Timber harvest (117,150 bf sold)
1987 – Inventory/Cruising
1988 – Black walnut seed planting near roads
2007 – Resource management guide
2018 – Inventory/Cruising

Topography, Geology, and Hydrology
The southern part of the tract is composed of a gentle, northeast facing slope. The northern portion of the tract contains multiple ephemerals that feed into Schlamm Lake. There is one unmapped intermittent stream that joins Schlamm Lake from the northwest. General riparian management zone (RMZ) guidelines will be implemented in these areas in accordance with the Indiana Logging and Forestry Best Management Practices Field Guide.

The bedrock for this area is Mississippian shale and siltstone.

Soils
The soils in this area are moderately well and well drained. The major soils are listed below.

BfbC2- Blocher, soft bedrock substratum-Weddel silt loams, 6 to 12 percent slopes, eroded, 14.6 acres
This moderately sloping, deep, moderately well-drained soil is found on side slopes in the till plains. It is well suited to trees. Erosion hazards are a management concern that should be considered during

implementation of Best Management Practices for Water Quality. Blocher has a site index of 76 for northern red oak and 90 for yellow poplar and Weddel has a site index of 70 for northern red oak and 75 for yellow poplar.

ComC- Coolville silt loam, 6 to 12 percent slopes, 13.9 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, 45 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, 5.5 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.

WedB2- Weddel silt loam, 2 to 6 percent slopes, eroded, 12.2 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 tract is accessible to the south and west off of Clark State Forest's main road. There is a gated management road just east of the Clark State Forest horse campground that allows access to the entire north side of the tract via fire lane. Access routes within the tract are nonexistent other than remnants of past skid trails.

Boundary

The tract has no adjacent private land ownerships. All boundaries are defined by the presence of roads. A fire lane runs the north boundary, while a paved road surrounds the tract to the south and west. The current Department of Natural Resources' Division of Law Enforcement headquarters occupies a Clark State Forest building on the North side of the tract in the former DoC complex.

Wildlife

This tract contains diverse vegetation and wildlife resources conducive to providing habitat for a variety of wildlife species. Habitat types include: oak-hickory canopy, mixed hardwood canopy, and riparian areas.

A Natural Heritage Database Review was completed for this tract. If Rare, Threatened or Endangered species (RTE's) were identified for this tract, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The Division of Forestry has developed compartment level guidelines for two important wildlife structural habitat features: snags and legacy trees.

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.

Legacy trees are specific tree species that are preferred by the Indiana bat for roost trees.

	Maintenance Level	Inventory	Available Above Maintenance
*Legacy Trees 11"+ DBH	810	2954	2144
*Legacy Trees 20"+ DBH	270	1401	1131
Snag 5"+ DBH	360	629	269
Snag 9"+ DBH	270	390	120
Snag 19"+ DBH	45	71	26
*Selected Tree Species: AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO			

Inventory data for Compartment 7 Tract 2 shows that maintenance levels for all size classes of snags and legacy trees exceed recommendations. The prescribed management will maintain the relative abundance of these features.

Exotic and Invasive Species

Invasive species are of relative low abundance within the tract. The streams that feed into the lake on the west side are occupied with Japanese stiltgrass. This is the only observed area that has significant invasive species. There are scarce pockets of multiflora rose within the plantation near the edges of the tract. These should be managed prior to timber harvest activity in the area to prevent the spread of this species. These species are prevalent throughout the county and while eradication is not feasible, control measures can reduce them to manageable levels on the tract. During forest management, priority should be given to treating Amur cork, ailanthus and bush honeysuckle if they are discovered.

Recreation

Hunting is not permitted within this tract, however there are multiple other recreation uses due to the tract's location and water features. This tract is adjacent to a horse campground, contains picnic tables with parking, and surrounds Schlamm Lake. Fishing, non-motorized, and motorized boating are popular recreation activities within the tract. In the future, this tract will have increased recreational opportunity due to campground improvements currently under development in an adjoining tract. Future interpretive trail development may be a possibility.

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 Prescription and Proposed Activities

The current forest resource inventory was completed on 2/7/18 by Forester Bartlett. A summary of the estimated tract inventory results are located in the table below.

Tract Summary Data (trees >11" DBH) **:**

Total trees per acre = 130 Basal area per acre = 110 sq. ft.

Present volume per acre = 9,790 bd. ft. Harvest volume per acre = 3,000-3,600 bd. ft.

Species	**# of Sawtimber Trees**	**Total Bd. Ft.**	**Bd. Ft. per acre**
White Oak	2,562	617,824	7,184
Chestnut Oak	576	109,822	1,277
Black Oak	178	46,870	545
Pignut Hickory	82	15,394	179
Northern Red Oak	61	14,362	167
Yellow Poplar	63	13,416	156
Red Maple	137	9,202	107
Virginia Pine	45	5,246	61
Sugar Maple	50	3,784	44
Sweetgum	14	3,612	42
Shagbark Hickory	21	2,236	26
Total:	3,789	841,940	9,790

For the purpose of this guide, this tract is divided into four management sections. Below is a general tract description and silvicultural prescription.

Descriptions:

White oak shelterwood – 29 acres

The overstory is mainly medium to large white oak saw timber, with an average DBH of approximately 18-20 inches. This fully stocked area is prescribed for a shelterwood treatment due to the abundance of high quality dominant and codominant white oaks present. Understory regeneration consists of maples, beech, oak, and hickory.

Basal area per acre (square feet)	124.3
Trees per acre (>11" DBH)	130
Approximate stocking	98%

Species	Bd. Ft.	Bd. Ft. acre
White oak	243,513	8,397
Chestnut oak	45,124	1,556
Black oak	12,528	432
Red maple	7,685	265
Pignut hickory	5,742	198
Yellow poplar	2,059	71
Total:	**316,651**	**10,919**

Oak-hickory – 46 acres

The majority of the overstory composition is white, chestnut, and black oak. The timber in this fully stocked stand is mostly within medium to large size classes, with an average DBH of approximately 16-18 inches. Understory regeneration is made up of maples, beech, oaks, and hickory.

Basal area per acre (square feet)	101.8
Trees per acre (>11"DBH)	121
Approximate stocking	82%

Species	Bd. Ft.	Bd. Ft. acre
White oak	355,902	7,737
Chestnut oak	37,674	819
Northern red oak	15,364	334
Black oak	13,754	299
Pignut hickory	9,798	213
Yellow poplar	6,026	131
Sugar maple	4,048	88
Red maple	920	20
Total:	**443,486**	**9,641**

Mixed planting – 7 acres

There is a 7 acre stand of planted sweetgum, Virginia pine, yellow-poplar, and sugar maple in the northwest corner of the tract. Tree diameters in the upper canopy range from 10"-18" DBH.

Basal area per acre (square feet)	122
Trees per acre	202
Approximate stocking	103%

Species	Bd. Ft.	Bd. Ft. acre
Black oak	10,087	1,441
Yellow poplar	6,755	965
Virginia pine	6,454	922
White oak	5,061	723
Sweetgum	4,445	635
Shagbark hickory	2,758	394
Total:	**35,560**	**5,080**

No management – 8 acres

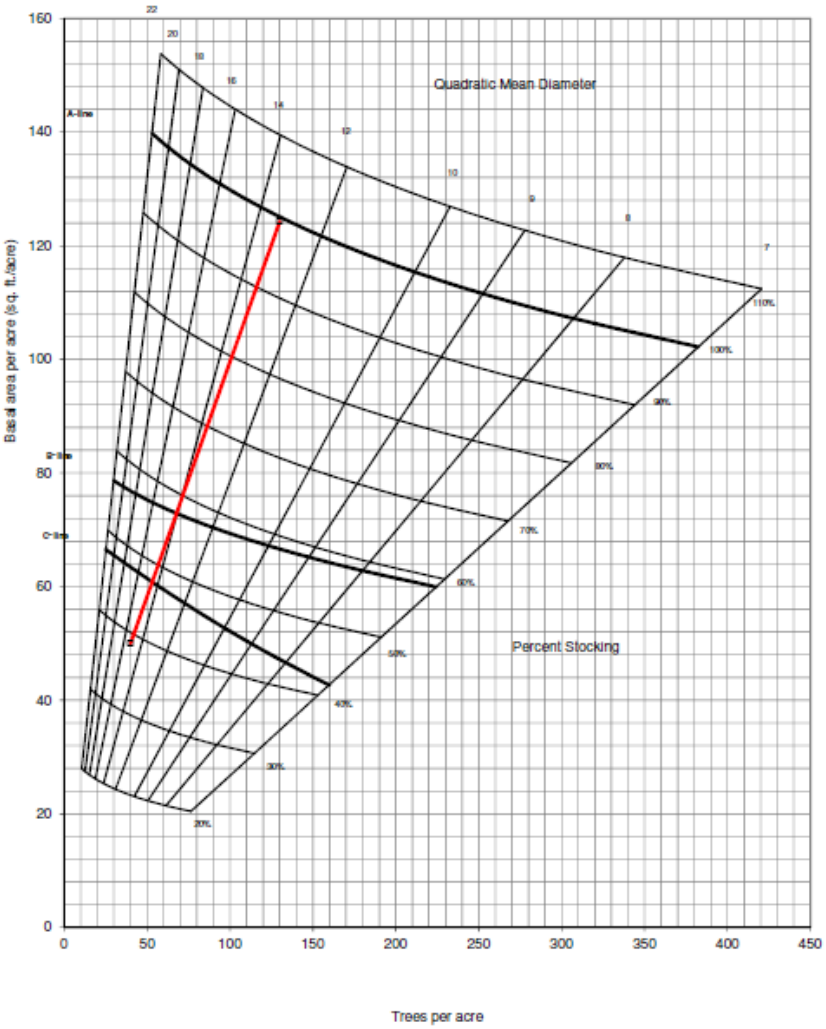
The area of no management includes a boat ramp, parking area, and a small stand of medium to large white oaks with a park like understory. Hazard tree management will occur in this area.

Stand Prescriptions:

This tract is fully stocked with a stocking of approximately 90% and a managed timber harvest is prescribed. The following silvicultural prescriptions are recommended.

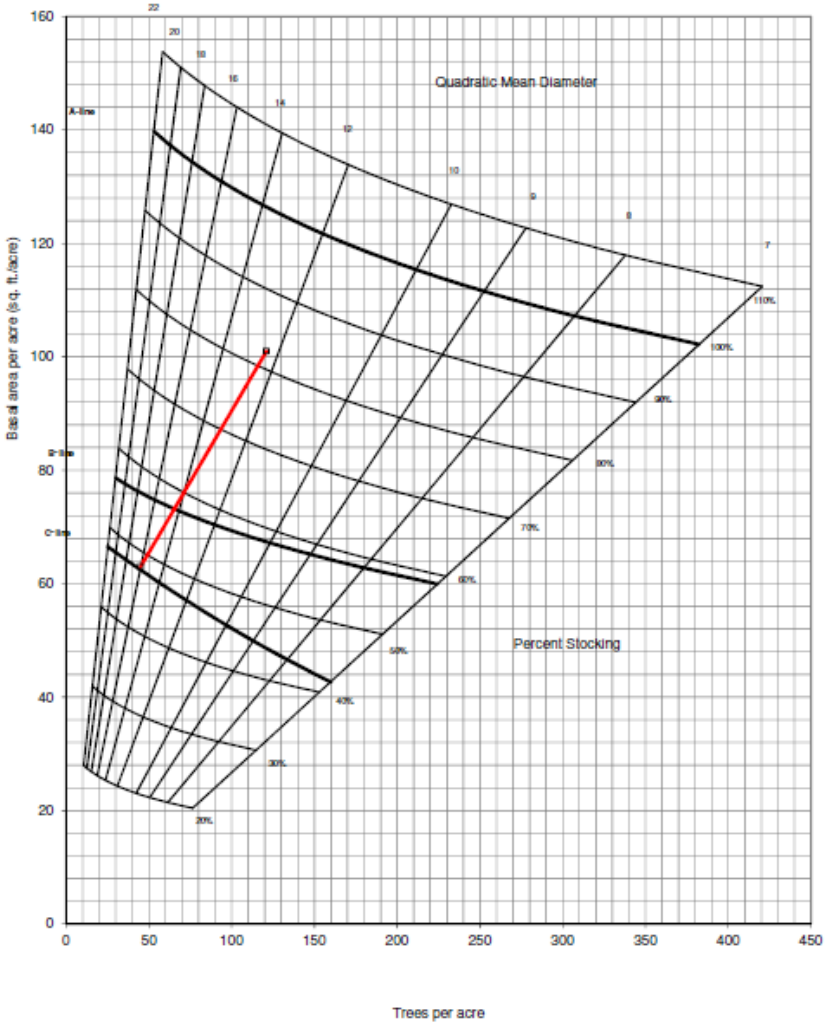
Shelterwood harvest: 29 acres

Areas of the tract that are dominated by a mature oak overstory are recommended to be managed under a shelterwood silivicultural system. The goal is to promote the regeneration of oak seedlings to make up the future cohort. This will be accomplished by first removing the prominent, shade tolerant midstory. 1-4 years after non-oak species are removed from the midstory, the oak overstory will be reduced to a stocking of approximately 40 percent. This phase may remove approximately 5,000 bd. ft. per acre. The best dominant and codominant oaks should be left as equally spaced as possible. In areas that the heavy regeneration of yellow-poplar is expected, a higher stocking should be maintained. The seedling regeneration shall be monitored, and additional understory control should be implemented to prevent the hindrance of oak regeneration. When the oak regeneration is adequate to replace the stand, the remainder of the overstory should be removed in one harvest. Reserves may be left for the purpose of: wildlife habitat, mast production, aesthetics, recreation, or immature good growing stock. The location of this tract offers significant potential for forest management demonstration and interpretive trail development. The implementation of the prescription should bear this in mind.



Single tree select harvest: 46 acres

A select harvest is prescribed in the oak-hickory stand that was not selected for a shelterwood. The goal of the select harvest is to release crop trees, salvage suppressed trees, and reduce the density of shade tolerant species. Approximately 3,700 bd. ft. per acre will be removed during this harvest.



Regeneration openings:

Areas that are inhabited with poor growing stock, such as the plantation, may be subject to group selections that will create a component of even-aged mixed hardwood regeneration. Regeneration openings are recommended within the oak-hickory stand where the overstory is over mature. The goal of these openings is to capture mortality and promote the regeneration of desirable hardwood species. Openings of this type are expected to cover less than 5% of the tract.

TSI:

Timber stand improvement (TSI) is prescribed for this tract. Work should include the following:
-Midstory removal of shade tolerant species prior to the shelterwood harvest.
-Treatment of Ailanthus, Amur cork and Amur honeysuckle if found.
-Cutting and treating grapevines in harvest areas as needed.

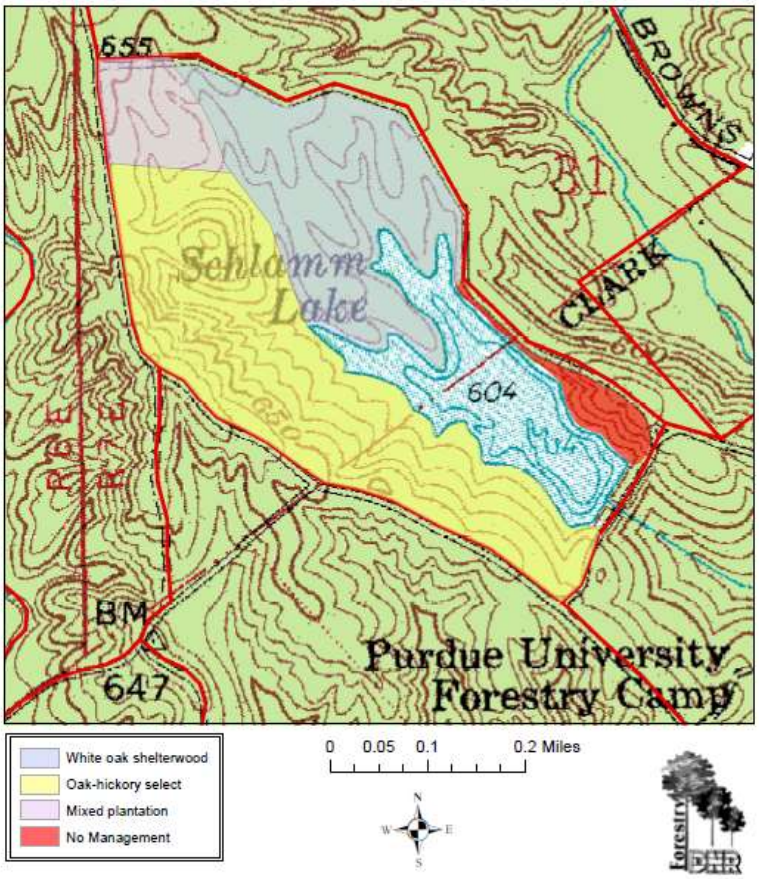
-Post-harvest exotic control as needed.
-Post-harvest midstory control as needed.

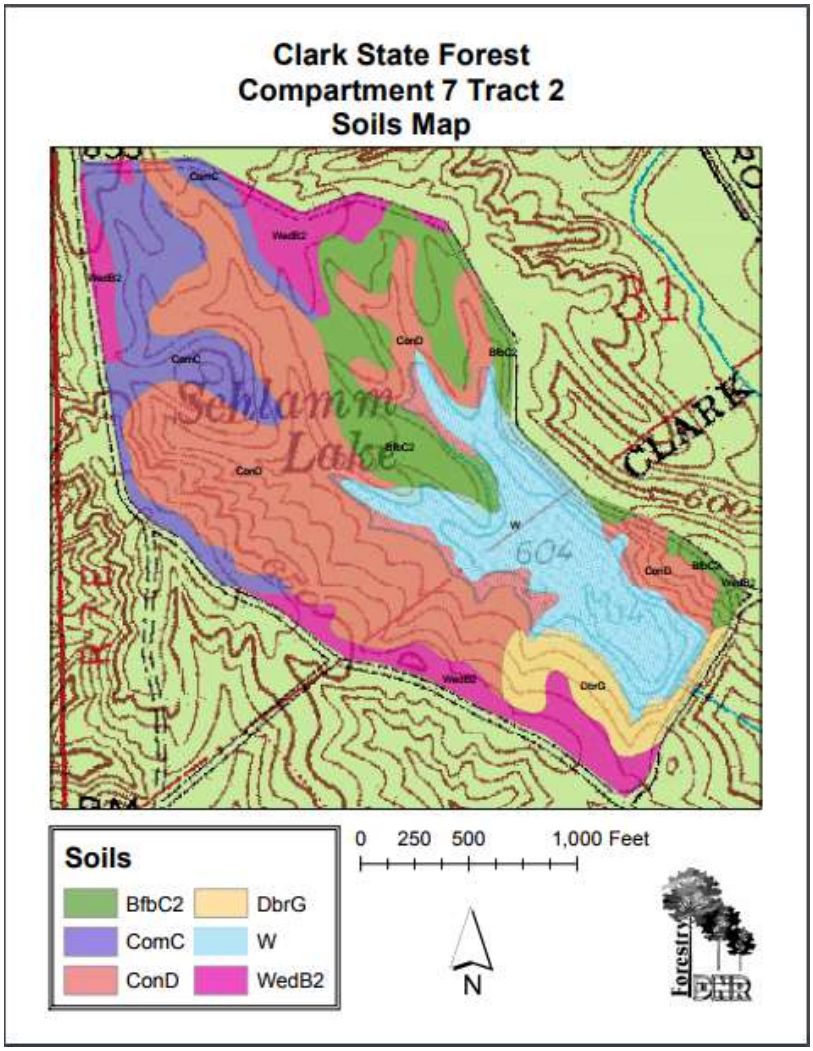
Best Management Practices: During and after completion of the proposed management activity BMP's will be implemented in order to minimize soil erosion.
Guide revision: This tract should receive another inventory and management guide 20 years following the completion of the timber harvest.

Schedule:

Proposed Activities Listing	*Proposed Date*
Midstory removal TSI	2019-2020
Timber marking/sale	2019-2023
Regeneration evaluation/treatments	2020-2022
Invasive species management	2020-
Shelterwood phase 3	2025-2030
Interpretive trail development	2012-2025
Inventory/Management Guide	2038

Clark State Forest
Compartment 7 Tract 2
Stand Map




Clark State Forest
Compartment 7 Tract 2
Soils Map
Schlamm Lake
CLARK
Soils
BfbC2
ComC
ConD
DbrG
W
WedB2
0 250 500 1,000 Feet
N

Clark State Forest
Tract: 6300704 (Compartment 7 Tract 4)
Tract Acreage: 84
Forested Acreage: 84
Forester: Bartlett
Date of Inventory: June 2018
Management Cycle End Year: 2038
Management Cycle Length: 20 years

Location
Compartment 7 tract 4 is located in Clark County, Indiana, more specifically Military Grant 283, Township 2 North, Range 7 East. This tract is approximately 2 miles northwest of Henryville, IN.

General Description
The three delineated stands within this tract are: oak-hickory, mixed hardwoods with a softwood component, and a mixed mesophytic stand. The oak-hickory stand is composed of mainly medium sized white and northern red oak. The eastern part of this stand has solid oak regeneration and an overstory basal stocking of approximately 130 square feet per acre. The remaining portion of the oak-hickory stand is occupied with a shade tolerant mix of regenerating species. The mixed mesophytic site is primarily Eastern white pine, Virginia pine, and yellow poplar. The area does contain some very large, open grown white oaks that have little timber value, but provide wildlife, aesthetic and other ecological values. Regenerating species in this stand are yellow poplar, sweetgum, red maple, and sugar maple. The mixed hardwoods with a softwood component stand occurs on the north facing slope and the far southeastern part of the tract. The majority of its volume comes from American sycamore, Eastern white pine, and yellow poplar.

History
1926 – Acquisition
1989 – Property lines surveyed and set with fence posts.
1990 – Timber sale (1,330 bd. ft. per acre)
2018 – Inventory and management guide

The last harvest date in the mixed mesophytic stand is not noted in the tract file. This area in between the perennial stream and Brownstown road was converted from a field to forest in 1970 when white ash was planted.

Access
There is access to this tract off of Brownstown road. There is an ungated, gravel fire lane that provides good access to the entire tract. No improvements needed at this time.

Boundaries
The west side is bordered by Interstate 65, and there is a fence that runs along this boundary. The east is bordered by private residential land. The northern border is defined by Brownstown road. The southern tract boundary is designated by a stream, and the adjacent land is owned by the Division of Forestry.

Exotic and Invasive Species
There is an approximate 1/5 acre infestation of Amur cork and Amur honeysuckle. These invasive plants are currently at a stage that can easily be controlled with a minimal amount of chemical used. Most are below waist height, but a few cork trees will require to be treated with either a cut stump method or girdled. Japanese stiltgrass is present on the fire lane that divides the tract. Adjacent to Brownstown road there are scattered invasives such as multiflora rose and Amur honeysuckle. These species are

prevalent throughout the county and while eradication is not feasible, control measures can reduce them to manageable levels on the tract.

Soils

BcrAW – Beanblossom silt loam, 1 to 3 percent slopes, 15.2 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.

BfbC2 – Blocher, soft bedrock substratum-Weddel silt loams, 6 to 12 percent slopes, eroded, 15.7 acres
This moderately sloping, deep, moderately well-drained soil is found on side slopes in the till plains. It is well suited to trees. Erosion hazards are a management concern that should be considered during implementation of Best Management Practices for Water Quality. Blocher has a site index of 76 for northern red oak and 90 for yellow poplar and Weddel has a site index of 70 for northern red oak and 75 for yellow poplar.

ConD – Coolville-Rarden complex, 12 to 18 percent slopes, 31.2 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, 8.5 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.

StdAQ – Stendal silt loam, 0 to 2 percent slopes, 6.1 acres
This nearly level, deep, somewhat poorly drained soil is on bottom land along small streams. It is well suited to trees. Seasonal wetness limits equipment and should be considered when planning management activities. This soil has a site index of 90 for pin oak and yellow poplar.

WedB2 –Weddel silt loam, 2 to 6 percent slopes, eroded, 7.0 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.

Recreation
Compartment 7 tract 4 is located within Clark State Forest's safety zone, so no hunting is allowed within the tract. There are no designated trails within the tract's boundary. Wildlife viewing and foraging, are potential recreation activities in the tract.

Wildlife
This tract contains diverse vegetation and wildlife resources (age, type, structure) conducive to providing habitat for a variety of wildlife species. Habitat types include: oak-hickory canopy, mixed hardwood canopy, and riparian areas.

A Natural Heritage Database Review was completed for this tract. If Rare, Threatened or Endangered species (RTE's) were identified for this tract, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The Division of Forestry has developed compartment level guidelines for two important wildlife structural habitat features: snags and legacy trees.

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.

Legacy trees are specific tree species that are preferred by the Indiana bat for roost trees.

	Maintenance level	Inventory	Available above maintenance
*Legacy trees 11"+ DBH	801	3279	2478
*Legacy trees 20"+ DBH	267	685	418
Snag 5"+ DBH	356	721	365
Snag 9"+ DBH	267	633	366
Snag 19"+ DBH	45	42	-3
*Selected tree species: AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO			

Inventory data for Compartment 7 Tract 4 shows that both legacy tree classes, 5"+ DBH snags, and 9"+ DBH snags exceed maintenance levels. In this tract, snags larger than 19" DBH is slightly under the recommended maintenance level at 93% of target 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.

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 Description and Silvicultural Prescription:
The current forest resource inventory was conducted on 7/16/2018 by Bartlett/Steffek. A summary of the estimated tract inventory results are located in the table below.

Tract Summary Data*

Total acres= 84	Overall % stocking= 73% (fully stocked)
Total trees per acre= 104	Present volume per acre= 5,868 bd. ft.
Basal are per acre= 92 Sqft	Harvest volume per acre= 1,000-1,300 bd. ft.

*trees greater than 11 inches dbh.

For the purpose of this guide, this tract is divided into three management stratum based on the overstory composition. Below is a general tract description and silvicultural prescription.

Oak-hickory

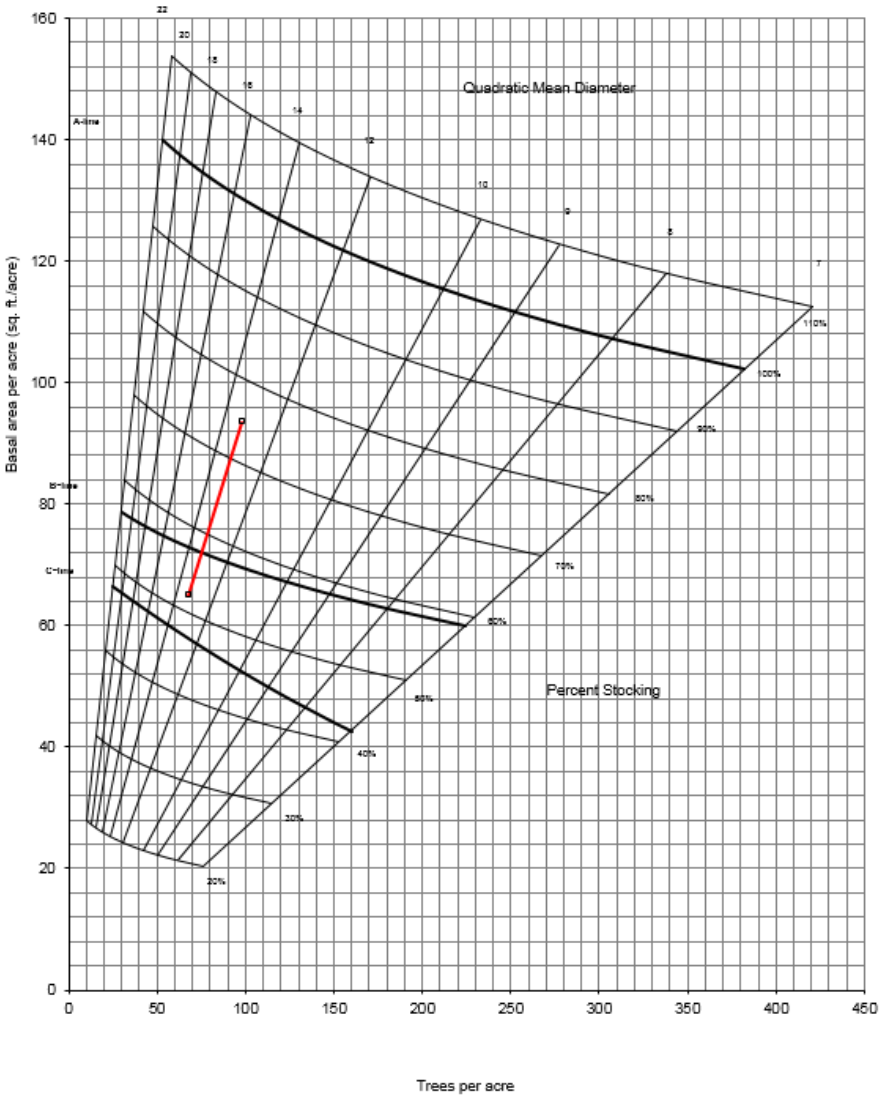
The oak-hickory portion of this tract is 94% composed of white and northern red oak by volume. The component of hickory was mainly contained within smaller diameter trees. The east side of the tract has abundant white oak regeneration, but the remainder has a heavy establishment of shade tolerant species in the understory. Stocking currently is within the fully stocked B level category with overstory trees ranging predominately in the 12”-24” DBH range.

Basal area per acre (square feet)	86
Trees per acre (>11” DBH)	98
Approximate stocking	70%

Species	Bd. ft. per acre	Bd. ft.
White oak	5,643	220,077
Northern red oak	163	6,357
Virginia pine	132	5,148
Sugar maple	106	4,134
American beech	69	2,691
Pignut hickory	27	1,053
Total	6,140	239,460

Both a single tree selection and group selection method is recommended in the oak-hickory portion of this tract. Single tree selection should be used to release crop trees, with emphasis on Oak species. Crop trees should be selected based on vigor, health, quality, and form. It should be attempted to release crops trees on at least 2 sides.

Group selections should target areas that are dominated by poor growing stock. The goal of the group selection is to promote the regeneration of shade intolerant species. There are areas in the oak-hickory stand that already have abundant oak regeneration. These areas should be considered for group openings if the overstory is in decline. The boundary of an opening shall be trees of high quality. Regeneration opening evaluations shall be completed within three years of the openings’ creation to ensure satisfactory regeneration has occurred. Approximately 1,000-1,400 bd. ft. per acre will be removed from this stand. Under the prescribed managed harvest stocking between regeneration openings is expected to remain in the fully stocked range. Regeneration opening are expected to occur on less than 5% of the tract.



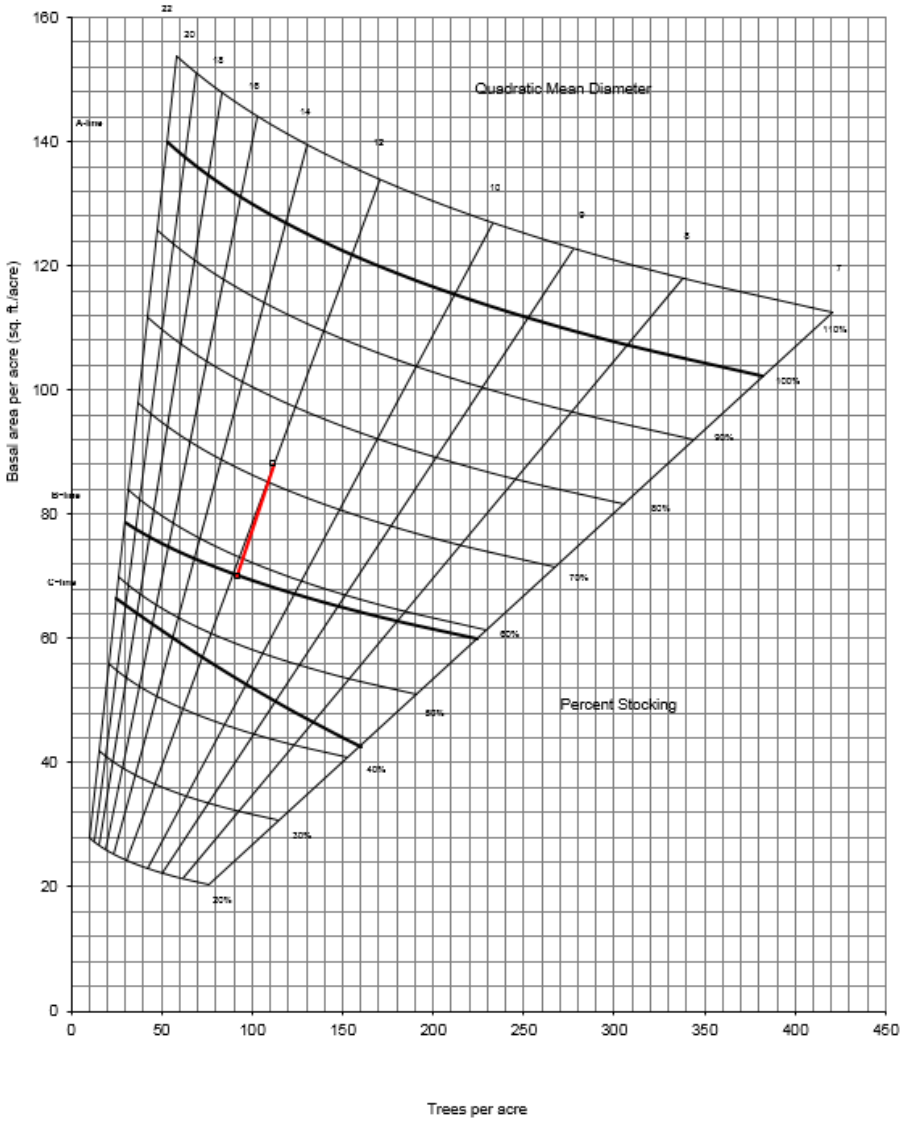
Mixed hardwoods with a softwood component

The mixed portion of the tract has a very diverse overstory. The volume of eastern white pine and Virginia pine comes from the bottom of the north-facing slope. These species are large in volume but not in number of stems. The regeneration of this stand possesses a diverse species mix, but is favoring shade tolerant species. Stocking currently is within the fully stocked B level category with overstory trees ranging predominately in the 12”-22” DBH range.

Basal area per acre (square feet)	88
Trees per acre (>11” dbh)	112
Approximate stocking	76%

Species	Bd. ft. per acre	Bd. ft.
White oak	2,038	61,140
Virginia pine	527	15,810
Yellow poplar	360	10,800
Eastern white pine	358	10,740
Pignut hickory	260	7,800
Black oak	257	7,710
Sugar maple	252	7,560
Red maple	227	6,810
Northern red oak	220	6,600
Shagbark hickory	175	5,250
Shingle oak	146	4,380
American sycamore	116	3,480
Pin oak	116	3,480
Scarlet oak	72	2,160
Total	5,124	153,720

A single tree selection harvest method is recommended for this stand. Single tree selection should be used to release crop trees. Crop trees should be selected based on vigor, health, quality, and form. It should be attempted to release crops trees on at least 2 sides. Approximately 600-1,000 bd. ft. per acre will be removed from this stand. Under the prescribed managed harvest stocking between regeneration openings is expected to remain in the fully stocked range.



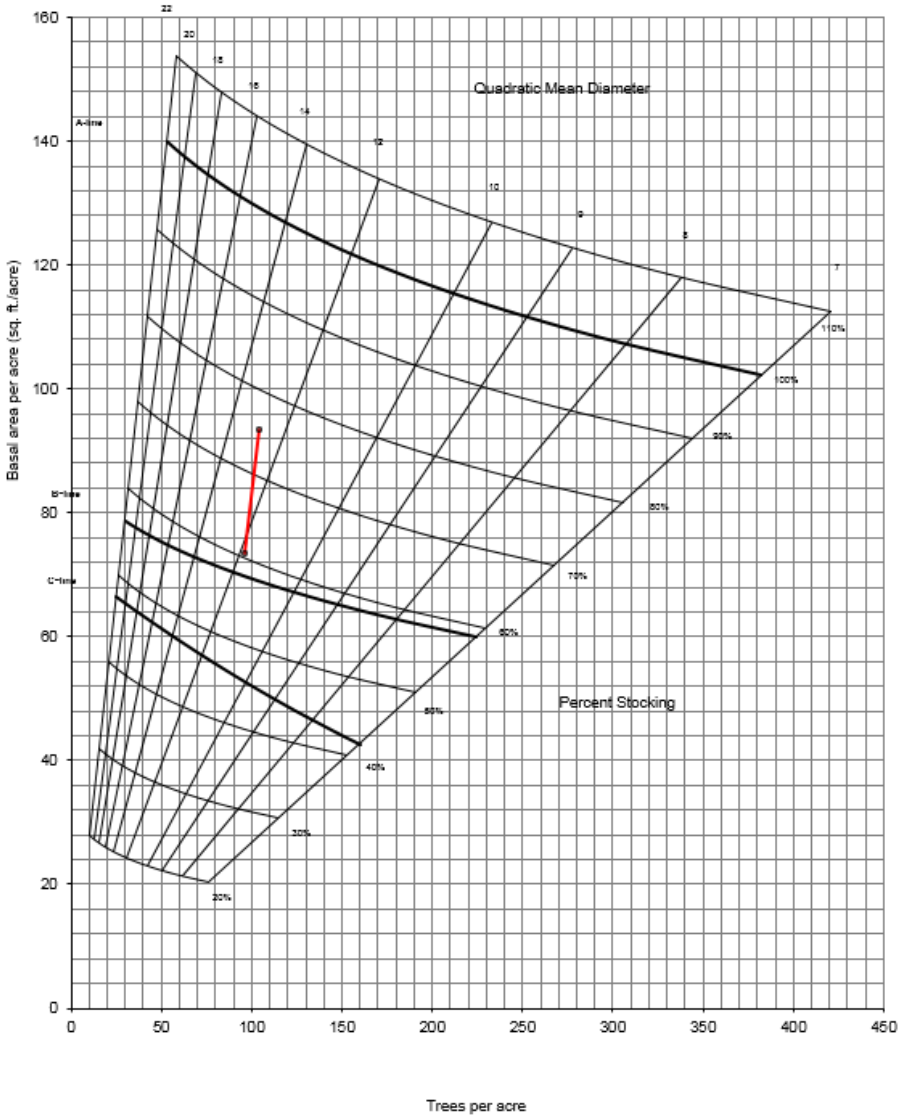
Mixed Mesophytic

The mixed mesophytic site in this tract has the most volume per acre of the three delineated sites. The American sycamore, eastern white pine, and yellow poplar are in larger diameter classes, while the rest of the species are contained within smaller classes. The removal of trees from this tract will be a challenge due to the positioning of the deeply embanked stream, and some areas may be excluded from the prescribed harvest. There were scattered invasive species in this stand due to its shared border with Brownstown road. None of the planted white ash were found to be alive. Stocking currently is within the fully stocked B level category with overstory trees ranging predominately in the 14”-26” DBH range.

Basal area per acre (square feet)	93.4
Trees per acre (>11” dbh)	104
Approximate stocking	73%

Species	Bd. ft. per acre	Bd. ft.
American sycamore	1,983	29,745
Eastern white pine	1,583	23,745
Yellow poplar	553	8,295
Black oak	413	6,195
Shagbark hickory	376	5,640
Sweetgum	338	5,070
Pignut hickory	276	4,140
Sugar maple	240	3,600
Black cherry	228	3,420
White oak	218	3,270
Northern red oak	194	2,910
American beech	135	2,025
Red maple	59	885
Total	6,596	98,940

A single tree selection harvest method is recommended for this stand. Single tree selection should be used to release crop trees. Crop trees should be selected based on vigor, health, quality, and form. It should be attempted to release crops trees on at least 2 sides. Approximately 1,500-1,800 bd. ft. per acre will be removed from this stand. Small regeneration openings <2 acres in size may occur in areas of heavy pine aggregations. Under the prescribed managed harvest stocking between regeneration openings is expected to remain in the fully stocked range.



Other Considerations:

Invasive species management: The area containing Amur cork and Amur honeysuckle should be treated before other forest management takes place. Invasive control is necessary before canopy disturbance to prevent the spread and establishment of these species. Foliar spray is sufficient for the majority of the plants present. Those that are too tall for foliar spray shall be treated with either a basal application or treated with a cut stump method. The problem pockets of multiflora rose within the mixed mesophytic site should treated before timber harvest activity takes place. Caution to the tract's nearby stream shall be taken. Japanese stiltgrass occupies the main road through the tract. This treatment will require a foliar spray treatment with reapplications to be most effective.

Timber stand improvement: Within two years after the timber harvest, TSI is prescribed to complete the regeneration openings, removing understory and overstory trees that are

inhibiting oak, hickory and other desired native species regeneration. TSI operations should also release crop trees that were not adequately released during the harvest. Additionally, TSI should be utilized to address problem occurrences of invasive species in the stand, and to create snags from low timber value trees for wildlife, such as the Indiana bat.

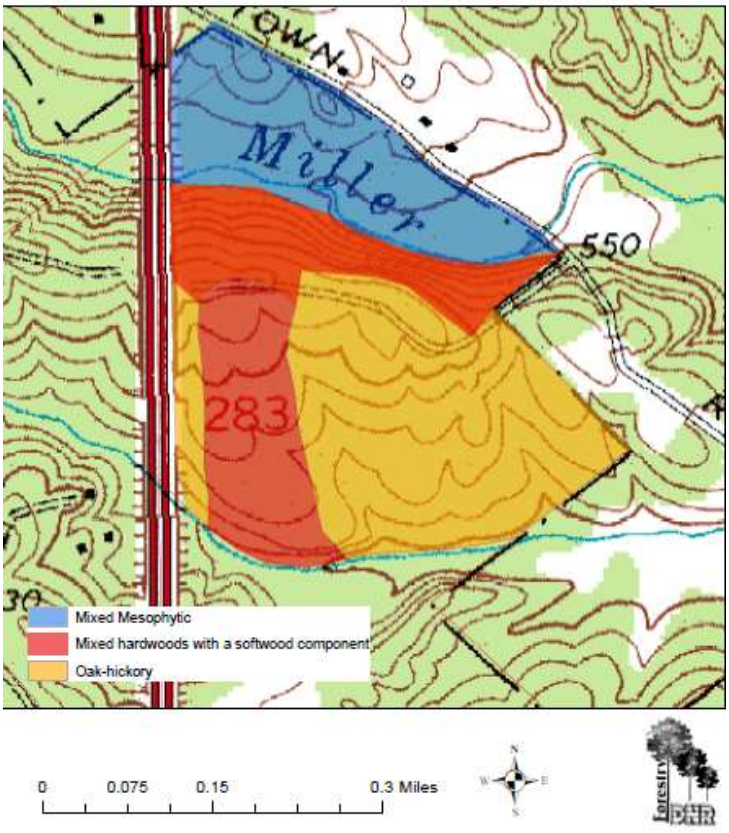
Best Management Practices: During and after completion of the proposed management activity BMP's will be implemented in order to minimize soil erosion.

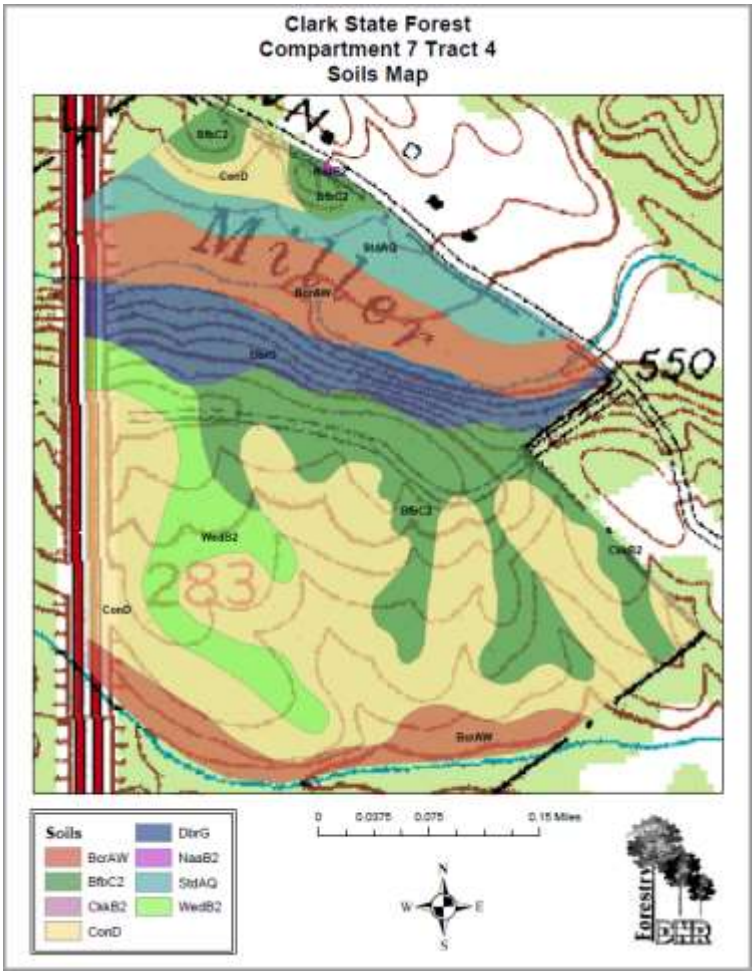
Guide revision: This tract should receive another inventory and management guide 20 years following the completion of the timber harvest.

Schedule:

Proposed Activities Listing	*Proposed Date*
Invasive species management	2019
Timber marking and sale	2019-20
Post-harvest timber stand improvement	2021
Regeneration opening evaluation	2023-2025
Inventory and management guide	2038

Clark State Forest
Compartment 7 Tract 4
Stand Map

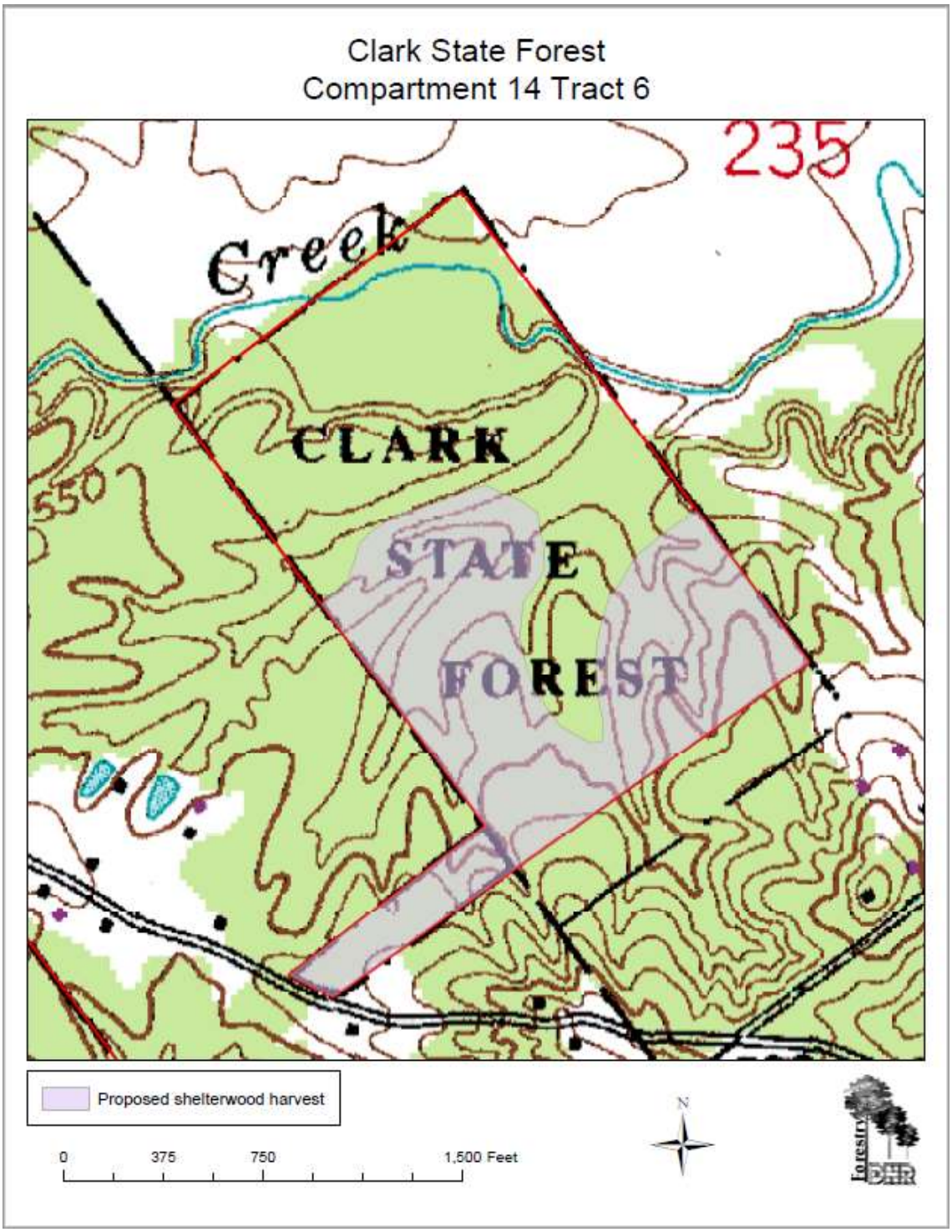



Clark State Forest
Compartment 7 Tract 4
Soils Map
Miller
550
283
BfbC2
ConD
StdAQ
BorAW
DbrG
WedB2
Soils
BorAW
BfbC2
ClaB2
ConD
DbrG
NaaB2
StdAQ
WedB2
0
0.0375
0.075
0.15 Miles
N
W
E
S
Forestry
DNR

Clark State Forest
Compartment 14 Tract 6
Management Guide Amendment
August 16, 2018

This amendment is written to adjust the silvicultural prescription for the oak-hickory component of compartment 14 tract 6. The original prescription and this amendment share the same goal – ensure that the future cohort maintains its composure of primarily oak and hickory.

The original guide prescribed the use of: a low thinning, improvement cut, timber stand improvement, and a prescribed fire to reduce the stocking to approximately 70 percent and remove the shade tolerant understory. This amendment prescribes that a shelterwood silivicultural system be implemented over portions of the tract that are dominated by a mature oak overstory. The goal is to promote the regeneration of oak seedlings to make up the future cohort. This will be accomplished by first removing the prominent, shade tolerant midstory through a TSI operation. Prominent species include beech, sugar maple and ironwood. 1-4 years after non-oak species are removed from the midstory, the oak overstory will be reduced to a stocking of approximately 40-60 percent. The best dominant and codominant oaks should be left as equally spaced as possible. It is recommended in this harvest that the overstory stocking is reduced to an average of 40 percent across the oak-hickory stand. This release provides adequate room and sunlight for the regeneration of desired species. In areas that the heavy regeneration of yellow-poplar is expected, a higher stocking should be maintained. The seedling regeneration shall be monitored, and additional understory control should be implemented to prevent the hindrance of oak regeneration. This could include the use of prescribed fire. When the oak regeneration is adequate to replace the stand, the remainder of the overstory will be removed. Reserves may be left for the purpose of: wildlife habitat, seed and mast production, or immature good growing stock.



1: Loftis, Davis; McGee, Charles E. eds. 1993. Oak Regeneration: Serious problems, practical recommendations. Symposium Proceedings; 1992 September 8-10; Knoxville, Tennessee. Presented by the Center for Oak Studies. Gen. Tech. Rep. SE-84. Asheville, North Carolina: U.S. Department of Agriculture, Forest Service, Southeast Forest Experiment Station. 319pp.