

Indiana Department of Natural Resources
Division of Forestry

DRAFT
Resource Management Guide

Harrison-Crawford State Forest
Dieter Rudolph

Compartment: 18 Tract: 6
Date: October 15, 2009

Acres Commercial Forest: 117
Acres Noncommercial Forest: 0
Acres Permanent Opening: 0
Acres Other: 0

Basal Area >= 14 inches DBH: 35.58sqft/ac
Basal Area < 14 inches DBH: 77.32 sqft/ac
Basal Area Culls: 4.21 sqft/ac
Total Basal Area: 112.90 sqft/ac

Acres Total: 122

Number Trees/Acre: 385

Species	Harvest Volume(MBF)	Leave Volume(MBF)	Total Volume(MBF)
Eastern Red Cedar	91.11	101.82	192.93
Black Oak	30.41	21.22	51.63
White Oak	20.89	95.05	115.94
Scarlet Oak	18.49	18.38	36.87
Shortleaf Pine	11.03	20.86	31.89
Yellow Poplar	9.16	36.22	45.38
Pignut Hickory	6.57	43.11	49.68
American Beech	6.33	0	6.33
Sugar Maple	5.66	6.74	12.4
Northern Red Oak	4.96	3.61	8.57
Black Cherry	3.32	1.64	4.96
Post Oak	2.97	0	2.97
Virginia Pine	2.07	0	2.07
Hackberry	1.78	0	1.78
Eastern White Pine	1.47	3.33	4.8
White Ash	0	7.62	7.62
Cinkapin Oak	0	3.87	3.87
Black Walnut	0	2.56	2.56
Total	216.22	366.03	582.25
Total per Volume	1.86	3.13	4.99

Location

This 117 acre tract is located in Crawford County, Indiana. It is in section 33, T3S, R2E and section 4, T4S, R2E.

General Description

This tract is a narrow stretch of land running in a southwest to northeast direction, taking in a secondary ridge. It is relatively thin from east to west and has a drainage running along the northern and southern borders as well as the southwestern border. The northeastern section of the tract is the high point with a finger of this slope running

through the middle of the tract moving into a lowland area in the southwestern section. The slope is not severe throughout the tract making most sections easily accessible from the ridge.

There are a total of seven stand types within the tract; Oak Hickory (44 acres), Old Field (25 acres), E. Red Cedar (20 acres), Pine (14 acres), Open Field (8 acres), White Pine (4 acres), and Mixed Hardwoods (2 acres). The Old Field and Cedar covertypes are both found in three separate stands, mainly in the southern two thirds of the tract surrounding the two pine stands and the Field stand. The Oak Hickory stand is mostly within the northern third of the tract along the highest point of the tract.

History

The land in this tract was purchased in 2 segments. The area in section 4 as well as E ½ of the SW ¼ was part of a 271 acre parcel purchased from Hockman in 1968. The rest of the area in this tract was a part of 208.5 acre purchase from Engleman in 1972. In 1975, 1,000 yellow poplar were planted in the tract by C.E.T.A employees, presumably at the south end of the tract, near the confluence of the boundary stream channels. This planting covered 3 acres. The tract document also labels this effort as a “Batesville Casket” plantation. Although no records have been located, around 10.5 acres of southern and white pine were planted on an old field site at about the same time as the yellow poplar just described. In 1986, a managed timber harvest in tract 6 and the adjacent tract 5 took place. This harvest covered 45 acres of the easternmost portion of the tract. This area took in, basically, that part of tract 6 that had not previously been open to farming. At that time, 67,578 bd.ft. were removed from this tract. One regeneration opening of about .7 acre and another, shared with tract 5 of 1.0 acre were created at that time. In 1988, follow up TSI took place in the tract.

Landscape Context

1806 is part of a contiguous body of land owned by the State of Indiana and is surrounded mainly by state land. There is a corner of privately owned land sharing a border with this tract in the southwestern section of the tract. All of the land immediately surrounding this tract is forested, mostly hardwoods with some patches of pine and e. red cedar. A majority of the tract's boundaries are defined by drainages that drain into Dry Run stream (about 1.1 mile), which in turns empties into Blue River, another .7 mile further downstream. Blue River runs as close as less than ¼ mile south of the tract. A large amount of private property lies less than ½ mile to the west and to the southwest of tract 6. The land to the west is mostly forested, with very little developed for residential or agricultural use. The land to the southwest contains both single family residences and open field areas, mostly grassland pasture. The town of Leavenworth is just over 1 mile southwest of this tract.

Topography, Geology, and Hydrology

The majority of the tract is a ridge coming off of the top of the slope in the northeast. This ridge runs through the middle of the tract from the northwest ending at a drainage in the southwestern boundary. The highest elevation of the tract is at 760 feet above sea level, at the northeastern end and the lowest at around 440 feet at the opposite end

making a total change in elevation of around 320 feet. The sloping of the land in this tract is relatively gentle.

The drainages present lead towards the Blue River, which is in close proximity to the tract and acts as the major watershed feature for the area.

There is also evidence of a high amount of karst activity in the tract and surrounding area. Multiple sinkholes were found throughout the tract as well as some that had openings in the bottom. Though no passable caves were located, there are several well known caves in the neighboring tracts. Due to the presence of sinkholes and caves, protection of underground waterways is to be planned for when management activities occur.

Soils

Adyeville Very Fine Sandy Laom (AbqE2, AciE)

The Adyeville series consists of moderately deep, somewhat excessively drained soils. Surface Horizon is 9 inches thick. The subsurface horizon then grades into 8 inches of silt loam then with the remaining 60 inches turns into a loam texture type soil. The bedrock consists of moderately cemented sandstone with some siltstone, and shale. The permeability is moderately rapid. The mean annual precipitation is about 43 inches and the mean annual temperature is about 54 degrees F.

Degree Slope: 8-60%

Woodland suitability group: 3o10

Site Index: 70

Growth Range potential: 200

Management Concerns: Runoff and erosion

Apalonia Silt Loam (AgrA, AgrB, AgrC2, AgrC3)

The Apalonia series consists of very deep, moderately well drained soils forms in loess and the underlying residuum from shale with limestone and siltstone. They are moderately deep or shallow to a fragipan. The surface horizon is a silt loam 8 inches thick. The first 8 inches of the subsoil is a silty clay loam. The next 33 inches is a silt loam. The next 11 inches is clay then it turns into a clay loam for 9 inches. The last 21 inches of the subsoil is a loam. The bedrock is weakly cemented shale with moderately and strongly cemented sandstone. The mean annual precipitation is about 43 inches and the mean annual temperature is about 54 degrees F.

Degree Slope: 0-12%

Woodland suitability group: 3d9

Site Index: 60

Growth Range potential: 258

Management Concerns: runoff and erosion

Corydon Stony Silt (CqyG)

The Corydon series consists of shallow, well drained soils that formed in as much as 8 inches of loess and in the underlying limestone residuum. The Corydon soils are on hills underlain with limestone. The surface horizon is 8 inches of a silt loam. The subsoil is 9 inches of clay. The bottom of the profile is unweathered bedrock. Mean annual precipitation is about 44 inches, and mean annual air temperature is about 54 degrees F.

Degree Slope: 20-60%

Woodland suitability group: 1o8

Site Index: 64

Growth Range potential: 258

Management Concerns: runoff and erosion

Gatchel Loam (GacAW)

The Gatchel series consists of very deep, somewhat excessively drained soils on flood plains. They formed in loamy alluvium containing a high percentage of rock fragments in the lower part. The surface horizon is a loam that is 4 inches thick. The first 5 inches of the subsoil is loam, the next 9 inches is a fine sandy loam. The substratum is a coarse sandy loam turning into a sandy loam. Mean annual precipitation is about 43 inches and mean annual temperature is about 54 degrees F.

Degree Slope: 0-2%

Woodland Suitability: 1o8

Site Index: 60

Growth Range potential: 155

Management Concerns: runoff and erosion

Haggatt Silt Loam (HarE2, HarD2) Silty Clay (HafC3, HafD3)

The Haggatt series consists of deep, well-drained soils formed in clayey residuum that can be capped with up to 20 inches of loess. They are on hills and in sinkholes underlain with limestone. The Surface Horizon is a silt loam that is 5 inches thick. The first 11 inches of the subsoil is a silty clay loam. The next 28 inches of the subsoil is clay. The bedrock is fractured, indurated limestone bedrock. Mean annual precipitation is about 43 inches, and mean annual temperature is about 54 degrees F.

Degree Slope: 2-25%

Woodland suitability group: 1o1

Site Index: 68

Growth Range potential: 300

Management Concerns: runoff and erosion

Haymond Silt Loam (HcgAH, Hm)

The Haymond series consists of very deep, well drained, soils that formed in silty alluvium. These soils are on flood plains and flood-plain steps. Slope ranges from 0 to 3

percent. Mean annual air temperature is about 55 degrees F, and mean annual precipitation is about 42 inches. The surface horizon is a brown silt loam plow layer that extends approximately 10 inches. The first subsurface horizon is a dark yellowish brown silt loam that extends to 25 inches. The second subsurface horizon is a yellowish brown silt loam that extends until 44 inches. The stratum is a massive yellowish brown fine sandy loam.

Tipsaw Very Fine Sandy Loam (TbIG)

The Tipsaw series consists of moderately deep, somewhat excessively drained soils. They formed in loamy residuum from sandstone with shale and siltstone. The surface is a dark grey very fine sandy loam about 2 inches thick. The subsurface horizon is also a very fine sandy loam about 3 inches thick. The subsoil is 15 inches is a fine sand loam and the last 20 inches is a loam. The bedrock consist of a weakly cemented and moderately cemented sandstone with shale, siltstone. The mean annual precipitation is about 43 inches, and mean annual temperature is about 54 degrees F. Permeability is moderate or moderately rapid

Degree Slope: 20-70%

Woodland Suitability: 3r12

Site Index: 70

Growth Range potential: 342

Management Concerns: runoff and erosion

Wellston Silt Loam (WhfC2, WhfD2, WhfD3)

The Wellston series consists of deep, or very deep, well drained soils formed in silty material from loess and from fine-grained sandstone or siltstone and with bedrock at depths of 40 to 72 inches. These soils have moderate permeability. The surface horizon is a silt loam which is 2 inches thick. The subsurface horizon is a silt loam about 8 inches thick. The first portion of the subsoil consists of 11 inches of a silt loam, the next portion consist of 4 inches of a silty clay loam. The last portion of the subsoil is one inch of a clay. The stratum is 9 inches of loam. The bedrock which is at 45 inches form the surface is an acid fine-grained sandstone. Mean annual precipitation is about 40 inches, and mean annual temperature is about 53 degrees F. Well drained. Runoff is medium to rapid.

Degree Slope: 0-50%

Woodland suitability group: 3o10

Site Index: 80

Growth Range potential: 342

Management Concerns: runoff and erosion

Access

This tract is accessible through the horse trail that runs throughout the tract on the ridge top and meets up with a firelane in the northeastern corner of the tract. State Road 62 is a short distance from the tract with a small parking area being found in the neighboring tract, 1805 providing for foot access to the southwestern section. The firelane can be accessed off of State Road 62 in 1805 and traveling north into 1806.

Boundary

The northern boundary is defined by a drainage that then crosses private property and returns to the tract by making up the southwestern boundary. The drainage entering private property causes there to be no definite boundary markers between state and private land. If any active management occurs in the area, the land should be surveyed to find the exact property line or the suspected line should be buffered to ensure trespass does not occur.

The southern boundary is likewise defined by a drainage. This drainage joins the northern drainage at the southernmost point of this tract. The northernmost point is defined by where the two drainages begin, though is difficult to determine without a topographical map. A corner stone ½ mile to the north has been located that could provide useful evidence when establishing this line.

Wildlife and Plants

A Natural Heritage Database review was obtained for this tract. 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 presence of cavity trees in the tract is below the maintenance level for all size classes. The tract also does not meet the minimum requirement for snags except for the size classes of 5"+. Furthermore, there are an insufficient number of large legacy trees within this tract. It should be noted that the estimation of cavity trees is likely lower than the actual number due to the inventory being conducted in the summer where the foliage makes it difficult to spot many cavities. Nonetheless, at this point in time the tract does not offer a wide range of habitat for many wildlife species.

Wildlife species that were noted on this stand were those typical of the area. Evidence of deer, squirrels, chipmunks, raccoons, and turkey were seen in the area. The presence of oak and hickory species creates a source for hard mast which is beneficial to multiple wildlife species.

Wildlife Habitat Feature (Tract Wide)

Category	Maintenance level	Optimal Level	Inventory	Available Above maintenance	Available Above Optimal
Legacy Trees *					
11"+	1053		1512	459	
20"+	351		258	-93	
Snags (all species)					
5"+	468	819	1957	1489	1138
9"+	351	702	592	241	-110
19"+	58.5	117	75	16	-42
Cavity Trees (all species)					
7"+	468	702	402	-66	-300
11"+	351	468	232	-119	-236
19"+	58.5	117	12	-47	-105

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

Indiana Bat

As management activities are currently only performed in the late fall to early spring months due to the voluntary interim Indiana bat guidelines, it is unlikely that direct harm will come to the Indiana bat as they are hibernating in nearby caves at this time. Any skid trails/haul roads created in this tract could improve the habitat for the Indiana bat by improving the canopy foraging conditions due to the reduction of understory clutter. Furthermore, the areas around likely roost trees can be opened up to benefit the bat. Released residual trees and the edge of log yards can increase the solar exposure of roost trees which improves the microclimate and thermal conditions of the roosting areas.

Trees that are ideal for roosting bats such as large snags and large trees that have loose/exfoliating bark can be retained to provide for the Indiana bat. Furthermore, the growth of ideal tree species for the Indiana bat can be managed to promote growth to increase the recruitment of trees into the categories suitable for the Indiana bat. At the moment this stand contains a surplus of live trees in the diameter classes between 11 and 20 inches in diameter and a deficit in those greater than 20 inches in diameter. Likewise, there is an adequate amount of snags in the 5"+ size class. There are not enough snags in the 9"+ and 19"+ size class to meet the Indiana bat requirements.

Due to not being able to meet the maintenance level in most of the categories listed above, this tract does not offer a quality habitat to the Indiana bat. Snags cannot be created from the live trees in this tract due to the low amount of large legacy trees present. At this time there is no way to increase habitat quality for the Indiana bat other than encouraging growth in the stands. This can be done through management such as release of potential legacy trees through harvesting and subsequent timber stand improvement.

Recreation

This tract contains a horse trail that runs the entire north/south length of the tract as well as into the neighboring tracts. This horse trail showed evidence of frequent use. Popular caves in the surrounding area make this compartment one of use to the local cavers. The presence of deer and turkey along with the easy access makes this a popular area for hunting.

Cultural

Cultural resources may be present on this tract but their location is protected. Adverse impacts to significant cultural resources will be avoided during any management or construction activities.

Invasive

Ailanthus was marked as being a potential problem in this tract. The Pine stand had some smaller Ailanthus in the understory that, if allowed to grow, would easily ascend into the overstory and out-compete the native vegetation. Also, the Oak Hickory stand of the neighboring tract (1805) had a handful of points where Ailanthus had already

established itself in the overstory. It is possible that, if the Ailanthus in 1805 is not treated, it will spread and become a problem in the Oak Hickory stand of 1806.

Management Limitations

Most soil types in this tract have a management concern of runoff and erosion. In order to limit these problems, any management activities need to be sure to leave downed dead wood and trees to hold the soil in place.

Summary Tract Silvicultural Description, Prescription, and Proposed Activities

Overall, this tract roughly follows a reverse J-shaped curve which is the typical diameter distribution for uneven-aged stands. The type of distribution allows for multiple diameter classes while allowing the young trees the opportunity to succeed into dominance. This theme should be maintained with the focus on promoting the growth of the residual. To obtain this the smaller sawtimber trees should be thinned while leaving most of the larger individuals. This type of thinning will increase growth through the reduction of competition allowing for improvement in timber production and wildlife habitat.

This tract was last inventoried in March of 1988 at which time there was 132,566 bf present. The species with the highest volume was white oak followed by black oak. The last inventory did not show any cedar or pines which both were found in their own stands in this tract. Overall, the change in volume between the two inventories was 183 bf/ac/year. The species with the highest growth excluding eastern red cedar was white oak (25 bf/ac/year), yellow poplar, and scarlet oak (both 15 bf/ac/year).

The management activities that follow should be performed in concurrence with those described in the management guide for tract 1805 due to their proximity and similarity in stands.

Cedar (20 acres)

This stand is broken up into three parts, each bordering a section of the Old Field stands, often times without any clear boundary between the two. The total basal area for this stand is 138.1 sqft/ac with 54.2 sqft/ac being deemed harvestable, leaving 83.9 sqft/ac. The total volume for the stand is 7,920 bf/ac, of which 3,960 bf/ac is harvestable with 3,960 bf/ac being residual. Over half of the basal area and almost all of the board feet was made up of eastern red cedar, though hardwood species were found growing in the understory. The hardwood component was almost entirely submerchantable to pole sized individuals.

The goal for this stand would be to increase the rate of succession to reach a covertime predominantly made up of hardwoods. The proposed activity would be to remove roughly half of the eastern red cedar present. By doing so the stand would have enough residual trees to prevent erosion and runoff while still presenting an opportunity for the other species in the understory to move into the overstory, creating a mixed hardwood stand. If there is a market for cedar at the time of this thinning then it can be performed as a commercial harvest, though if there are no buyers, the stand should undergo a timber stand improvement to reach this goal.

Open Field (8 acres)

The Field stand is located near the center of the tract on the top and southern side of the ridge. Within the field is a frequently used horse trail. The main part of the field was covered in grasses and small eastern red cedars that had a large amount of space between individuals. The fringe of the stand is where most of the basal area came from, being similar to an old field stand in structure. There was a total basal area of 69.1 sqft/ac and 1,540 bf/ac.

Due to the small size of the stand and the aesthetic properties it brings to the horse trail, nothing should be done to this stand. By leaving it as it is it increases the suitability for wildlife fringe species while also enhancing the experience of the equestrians.

Old Field (25 acres)

For purposes of this inventory, the Mixed Hardwoods stand will be included in the Old Field stand due to its small size (2 acres) and proximity to this stand. As is typical with old field coverts, this stand is the most diverse in species composition and is mainly composed of smaller sized trees. The stand is dense with 103.8 sqft/ac with 3,150 bf/ac. It is suggested that 27.8 sqft/ac should be removed, leaving 76 sqft/ac (1,160 bf/ac removed leaving 1,990 bf/ac).

The goal for this stand would be to increase the growth rate of the hardwood species present with an emphasis on better quality trees. Due to the fact that the volume present is made up mainly of a large number of smaller trees, this stand does not show current potential for a commercial harvest. For this reason, a non-commercial timber stand improvement should occur in order to remove the lower quality trees and reduce competition for residual.

Pine (14 acres) and White Pine (4 acres)

Due to the proximity of these two stands and their similarity, both will be managed together. The Pine stand contains mostly shortleaf pine, eastern red cedar, and Virginia pine with the occasional white pine. Likewise, there were a handful of hardwoods in the understory. The stand had 160.2 sqft/ac and 3,600 bf/ac. Close to half should be removed (68 sqft/ac and 1,380 bf/ac) to promote growth in the residual (92.2 sqft/ac and 2,220 bf/ac).

The White Pine stand was composed mostly of eastern white pine with some shortleaf pine occurring near the border of these two stands. There were 140 sqft/ac of pine reaching 1,560 bf/ac, of which 60 sqft/ac and 480 bf/ac would be removed leaving 80 sqft/ac and 1,080 bf/ac.

Both of these stands have a high basal area and appear to be relatively young due to their lower volume. In order to reach the full potential of these plantations, they should be thinned using the aforementioned guidelines. This thinning would likely be a non-commercial thinning due to the low volumes involved. After this thinning, the stands

should be allowed to grow and revisited in ten to twenty years to access the timing for a second thinning or possibly the final harvest for the stands.

Oak Hickory (44 acres)

As the largest stand, the Oak Hickory stand takes up roughly a third of the tract. The stand contained 98.8 sqft/ac and 6,400 bf/ac. Of this, 23.4 sqft/ac and 2,700 bf/ac are harvestable leaving a residual of 75.4 sqft/ac and 4,330 bf/ac. The most prominent species within this stand was white oak. Other prominent species within this stand were pignut hickory, black oak, yellow poplar, and scarlet oak, the rest of the stand being a combination of other hardwood species.

This stand would benefit from a thinning with the focus on increasing quality growth and regeneration. The main species of focus would be white oak, but other hardwoods should be left in order to avoid a monoculture from occurring. Based on the guidelines described, a large portion of the volume is left in order to provide the stand to have large quality trees in the future. Some species that will be targeted for removal would be eastern red cedar in order to create more opportunity for hardwood regeneration, scarlet oak as many individuals of this species had poor form and multiple defects in the stem, and sugar maple in order to prevent this highly shade tolerant species to become dominant in the overstory.

TRACT ACCOMPLISHMENT RECORD
Compartment 18, Tract 6

DATE PLANNED	ACTIVITY / REMARKS	DATE COMPLETED
2012	Submit Archeological Clearance Request(s) to Access for Management	
2013	Precommercial or Commercial Thinning of Pine	
2014	Harvest in Oak Hickory Stand	
2016	TSI in Post Harvest Area and in Old Field Stand	
2023	Exam Pine Plantings for Further Thinning Need	
2030	Re-enter for Management	

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