Indiana Department of Natural Resources
Division of Forestry

DRAFT

Resource Management Guide

Harrison-Crawford State Forest **Compartment: 18 Tract: 4**
Dieter Rudolph **Date: June 10, 2009**

Acres Commercial Forest: 119
Acres Noncommercial Forest: 0
Acres Permanent Opening: 0
Acres Other: 0

Acres Total: 119

Basal Area >= 14 inches DBH: 44.53sqft/ac
Basal Area < 14 inches DBH: 57.33 sqft/ac
Basal Area Culls: 4.01 sqft/ac
Total Basal Area: 117 sqft/ac

Number Trees/Acre: 366

Species	Harvest Volume (MBF)	Leave Volume (MBF)	Total Volume (MBF)
American Sycamore	60.19	69.48	129.67
Yellow Poplar	21.3	66.78	88.08
Scarlet Oak	16.08	11.6	27.68
Northern Red Oak	13.52	16.01	29.53
Black Oak	11.82	19.37	31.19
Red Pine	10.82	0	10.82
Eastern White Pine	9.53	0	9.53
Silver Maple	9.38	16.16	25.54
Sugar Maple	9.28	8.3	17.58
White Oak	7.93	30.81	38.74
Ohio Buckeye	7.18	0	7.18
Eastern Red Cedar	6.69	55.44	62.13
Shagbark Hickory	5.83	10.86	16.69
White Ash	5.77	7.05	12.82
Sassafras	5.46	0	5.46
American Beech	4.81	2.75	7.56
Chinkapin Oak	3.44	5.64	9.08
Shingle Oak	2.79	3.34	6.13
Pignut Hickory	2.18	2.41	4.59
Bitternut Hickory	0	9.03	9.03
Black Walnut	0	5.42	5.42
Eastern Cottonwood	0	2.8	2.8
Basswood	0	2.56	2.56
Black Cherry	0	1.95	1.95
Hackberry	0	0.85	0.85
Total	214	348.61	562.61
Total per acre	1.81	2.94	4.75

Location

This tract is located in Crawford County Indiana, in sections 33 and 34,T3S R2E. The nearest town is Leavenworth, which is about 3 miles to the southwest.

General Description

This tract can be broken into 5 primary stands; Old Field (60 acres), Mixed Hardwoods (31 acres), Bottomland Hardwoods (21 acres), Eastern Red Cedar (5 acres), and a Pine Plantation (2 acres). For further details see attached map. This tract contains a large array of tree species, all of which are either small or of poor form. This condition is reflective of the tract's largely agricultural past.

History

This tract was obtained in a single, 288.5 acre, purchase in 1969 and was sold by Cole.

This tract was used mostly as farmland. A homesite resides in the center of the tract, and old machinery remains have been found within the tract. A majority of the site shows evidence of once being an old field. Such evidence includes the presence of large wolfy trees, the species composition, areas almost completely inhabited by Eastern Red Cedar, and brushy undergrowth, shrubs, and multifloral rose.

A black walnut plantation was planted in the 1970s in the southwestern corner of the Bottomland Hardwoods stand. Just north of this plantation was a planting of black alder, planted around the same time. Neither of these plantations were noted during the inventory, suggesting that they have gone back to the surrounding cover type conditions. The black walnut planting should be looked for in future trips into the area.

Landscape Context

This tract is part of a contiguous body of land owned by the State of Indiana. It is almost completely surrounded by state land, the only exception being a small portion of the northwestern border. All of the surrounding land, including the private property, is forested. The Blue River marks the eastern boundary and has a large affect on the cover type and management implications.

Topography, Geology, and Hydrology

Tract 1804 contains a varying degree of topography which starts as very steep terrain on the west side which gives way to relatively flat land, previously used as a field, which then gives way to a flat riparian zone. The riparian zone moves into the flat field area in gullies and drainages. The change in elevation within the tract is about 250 feet (390-640 feet above sea level).

The slope in the northern most and southernmost areas is relatively steep, limiting the use of heavy machinery. This trait can be overcome as the slope in the central section of the tract is gradual, containing little to no limitations.

Two sinkholes were identified within the tract, one being in the northern Mixed Hardwoods stand and the other in the Old Field stand. These features suggest underground waterways. No openings were found in or around these sinkholes, making them of little concern in regard to management limitations.

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

Alford Silt Loam (AcuB2)

The Alford series consists of very deep, well drained soils formed in loess. These soils are commonly on loess hills and less commonly on outwash plains. The surface horizon consists of silt loam which is a light yellowish brown color, which is 6 inches deep. The subsoils consists of 4 horizons that accumulate more clay the further down the profile. The subsoil is 66 inches thick. These subsoil horizons are mainly a silty clay loam with the last horizon before the parent material is a silt loam. The last horizon starts at 72 inches and is a brown silt loam with weak structure. The permeability of this soil is moderate. The mean annual temperature is about 56, the mean annual precipitation is 42 inches.
Degree Slope: 2-60%
Site Index: 70
Growth Range Potential: 342
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

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

Haggatt Silt Loam (HarE2, HarD2)
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 a 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)
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.

Markland Silty Clay (McpD3)
The Markland series consists of very deep, well drained soils on lake plains. They formed in thin loess and the underlying calcareous, fine-textured lacustrine sediments. The surface horizon is a pale brown silt loam which extends for approximately 4 inches. The subsoils are comprised of two horizons of increasing clay. These horizons are yellowish silty clay. The two horizons are 24inches thick. The next three horizons are comprised of increasing clay and calcium. These soils are a yellowish brown silty clay loam. These

three horizons are 31 inches thick. The final horizon is the substratum which is a yellowish brown silty clay loam with weak structure. The permeability is moderalty slow to slow. The mean annual precipitation is 43 inches and the mean annual temperature is 54 degrees F.
Degree Slope: 12-50%
Site Index: 72
Growth Range Potential: 342
Management Concerns: runoff and erosion

Wakeland Silt (WaaAH)
The Wakeland series consists of very deep, somewhat poorly drained soils that formed in silty alluvium. These soils are on flood plains and flood-plain steps. Mean annual temperature is about 54 degrees F, and the mean annual precipitation is about 42 inches. The surface horizon is a plowed horizon with a dark grayish brown silt loam. After this horizon the rest of the profile is comprised of substratum. The substratum is mainly a grayish brown silt loam. The end of the profile is at 60 inches.
Degree Slope: 0-2%
Site Index: 80
Growth Range Potential: 342

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 clay. The stratum is 9 inches of loam. The bedrock which is at 45 inches form the surface is an acidic 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

Access

This tract has direct access from Highway 62 which defines its western border. A gate is located roughly half way along this tract's border with the highway, having served as vehicle entry point. However, currently, the service lane is in need of repair and opening to allow vehicles to travel it. Old Highway 62 enters the tract along the northwestern boundary and goes south through the tract, emerging back onto the current Highway 62 near the middle of the western boundary. From this point an old road goes into the tract providing access to much of the central area of the tract. This road was followed during the inventory up to the point where it became too difficult to interpret and followed.

Boundary

The boundary of 1804 is well defined by the highway on the west and the Blue River on the east. A small section of the southern and northern boundary is not as clearly defined, but would be easy to mark due to its short distance between highway and river.

No distinguishing markers (concrete posts, surveyor markers) were found along the tracts boundary lines. However, as the boundaries are clearly marked as described, this serves as no problem. A cornerstone exists internal to the tracts boundaries located at the southwest corner of the NW 1/4 , NW 1/4 , of section 34.

Wildlife

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 wildlife noted in this tract was typical wildlife of Crawford County, including evidence of deer, turkey, squirrels, and chipmunks as well as various songbirds, barred owls, and great blue herons.

Two wildlife ponds (probably former farm ponds) were located within the tract, one of which appeared to be seasonal. A third was located in a previous inventory but not at this time.

Indiana Bat

As management activities are currently only performed in the winter months due to voluntary adherence to season Indiana bat guidelines suggested by the USFWS, 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. Release of crop 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.

Currently, this tract has a sufficient number of living trees to support the Indiana Bat. However, the tract lacks a proper number of snags of both desirable size classifications. As a harvest is not likely to occur in the near future due to limitations and volume, the management practices should not negatively affect the bats.

Indiana bat habitat guidelines (entire tract, desired species only)

Category	Required	Inventory	Available for removal
Live trees			

11"+	1071	4438	3367
20"+	357	783	426
Snags			
9"+	714	621	-93
19"+	119	87	-32

As the tract once consisted mainly as a field, there remains many trees that were open grown, many of which are Ohio buckeye and white oak which are both species preferred by the Indiana bat due to their exfoliating bark. In the Bottomland Hardwoods area were large American sycamores, another preferred species, which contained many cavities. As these trees were of poor form or relatively hollow, they would be ideal trees to girdle, thus increasing the number of large snags for the Indiana Bat while reducing the loss of useable timber on the tract.

Recreation

There are no recreational trails within this tract, limiting the recreational use to hunting. Signs, such as shotgun shells and tree tacks, were found indicating that hunters frequently use this area.

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.

Trespass

Near the bottom of the slope in the northern section of the tract was a tire dump, containing many tires that have been deposited along and at the bottom of the hill. Other dump sites were also found throughout the tract containing a concentration of bottles and cans (the cans of which were a style used around the 1970s).

Management Limitations

The steep slope near the northern and southern sections of the tract limit the use of heavy machinery, but can be avoided by using the gradual slopes near the central area of the tract.

Summary Tract Silvicultural Description, Prescription and Proposed Activities

<u>Overall</u>

While the five stands are all significantly different, they all have minimal harvestable volume. The stands are all predominantly of a small diameter. The large trees shown on the diameter distribution are mostly cull trees that were a result of open grown individuals when the stand was a field.

<u>Bottomland Hardwoods</u>

This tract consists of 21 acres and can be found along the Blue River as well as in one of the major drainages. There were a total of 235 trees per acre and 132 square feet per acre. This stand also had the largest harvestable timber, being mostly American Sycamore. However, management practices are limited due to buffers that need to be established to meet Best Management Practices.

American Sycamore is the dominant species in this stand followed by yellow poplar, silver maple, and boxelder (at about half of the total basal area of the American sycamore each). The understory layer in this stand is open with little regeneration occurring. Stinging nettle dominates the herbaceous layer, outcompeting tree regeneration in the area.

Eastern Red Cedar

While eastern red cedar can be found throughout the tract, especially along fence lines, there are 5 acres, in two separate areas, that are almost completely eastern red cedar. One stand is found in the central section of the tract while the second is near the Bottomland Hardwoods on the eastern side.

There were roughly 322 trees per acre and 88 square feet per acre. The only species recorded in this stand were American sycamore, eastern red cedar, and yellow poplar. Eastern red cedar had the largest board feet and basal area, with yellow poplar being close behind the eastern red cedar in basal area but with almost no board feet.

As there is no harvestable timber in this stand and the area is minimal, it would be best to leave this stand alone to progress naturally. The high presence of pole sized and small sawtimber yellow poplar show that the stand is moving towards a hardwood stand that will be dominated by yellow poplar.

Mixed Hardwoods

Consisting of 31 acres, the Mixed Hardwoods stand is divided into two sections being found on the western side of the tract in both the northern and southern sections. There are 368 trees per acre and 120 square feet per acre. There are 1,830 BF/AC that is harvestable, however most of this is in smaller diameter trees. If this amount were removed, 3,330 BF/AC would remain and have a basal area of 98 square feet per acre. This is still a dense stand. If a market for this smaller size timber occurs, a commercial thinning could take place.

The understory of this stand is primarily sugar maple, though sugar maple has a low volume in this stand. At this moment yellow poplar, white oak, scarlet oak, and white ash are all roughly half the total basal areas of the sugar maple but contain a significantly higher amount of board feet. The high sugar maple basal area demonstrates how, if left to progress naturally, the stand will eventually become a homogenous sugar maple stand.

In order to prevent a homogenous sugar maple stand from occurring, this stand should have an understory thinning focusing on removing a majority of the sugar maple. While the sugar maple is being thinned, the overstory should also be thinned to increase tree growth of the trees that are present to enhance the possibility of a future harvest.

Pine Plantation

The pine plantation consisted of both red pine and white pine. These two species combined to make a high basal area of 230 square feet per acre (most of which was made up of pole sized red pine). There was also a total of 7,010 BF/AC. This data, however, is likely to be skewed as there was only one sample point placed within the pine plantation due to the stands small size of 2 acres.

Regardless, this stand should be harvested to remove the pine so that the stand can progress to a hardwood stand. To both the north and the south of this stand was a high amount of yellow poplar, if this pine were removed then yellow poplar could move into the area. As the Pine Plantation is bordered by the Old Field in which some trees are less desirable than others, such as hackberry and boxelder which were both located near the Pine Plantation, the stand should be revisited frequently to ensure that the more desirable hardwoods are establishing themselves.

Old Field

The Old Field was both the largest and most diverse stand of the five. It contained 31 different species of trees adding up to 403 trees per acre and a basal area of 107.5 square feet per acre. Despite the high density, the inventory predicts only a total of 3,330 BF/AC, of which only 960 BF/AC was deemed harvestable.

As this area was once an open field, there remain multiple open-grown trees that yield next to no board feet and take up a large section of the canopy cover.

This stand was also the site of most of the cultural sites and wildlife ponds, which would hamper any management processes using heavy equipment. Likewise, a large portion of this stand is covered with multifloral rose, an invasive species.

For this reason, the invasive species should be eradicated through removal and herbicide treatments. After the invasive species have been removed, the stand should undergo a Timber Stand Improvement (TSI) to thin out the stand and remove less desirable species and form, promoting residual growth. The large open-grown trees should be girdled and left standing to increase the number of large snags present to meet Indiana bat guidelines.

Silvicultural Prescription

Tract 1804 should first undergo an invasive treatment to prevent the further spread of multifloral rose into the rest of tract. Following this eradication should be the understory/overstory thinning prescribed in the Mixed Hardwoods stand and the TSI in the Old Field stand. The TSI should look to girdle the large wolfy trees to increase the large snags preferable to the Indiana bat. If there is a market for pine at any time following the rose removal then the pine stand should be cut, however, if this is not

economically feasible then it should be allowed to progress naturally. The main goal of this prescription is to aid in the natural progression of the forest so the overall covertype within the area will not be significantly altered.

Any actions considered in the Bottomland Hardwood stand must follow recommendations established by the BMP standards.

If at any point these prescriptions appear to be disrupting important historical areas or the plant species listed in the wildlife section are found, they should be abandoned until the area is assessed by either a naturalist or archaeologist.

TRACT ACCOMPLISHMENT RECORD
Compartment 18, Tract 4

DATE PLANNED	ACTIVITY / REMARKS	DATE COMPLETED
2013	Obtain Archeological Clearance to Improve Service Lane and to Clean Up Old Tire Dump	
2015	Conduct Prescribed TSI in the Mixed Hardwood and Old Field Stands. Control Multiflora Rose.	
2029	Re-enter Tract for Management Planning	

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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.

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