Indiana Department of Natural Resources
Division of Forestry
DRAFT
RESOURCE MANAGEMENT GUIDE

STATE FOREST: Harrison Crawford **COMPARTMENT**: 29 **TRACT**: 11

Date: April 12, 2013 **Forester: Wayne Werne**

INVENTORY SUMMARY

NUMBER OF STRATA: **3** **Est. growth: 113 bf/ac/yr ****
PERMANENT OPENINGS: **0.0 ac** **Est. cutting cycle: 17-22 yrs**
TOTAL ACREAGE: **94.3 ac** **Est. mgmt cycle: 15 years**
AVERAGE SITE INDEX: **70-80** (for upland oaks) **81-91** (for poplar)
AVERAGE BASAL AREA: **100 sq. ft/ac**

****Growth** was calculated by using 2013 volume **MINUS cedar**, subtracting the volume of 2255 bd ft/ac from the 1978 inventory and the 81,500 bd. ft. from the 1998 sale, and dividing by 35 years of growth. Cedar volume was figured using a different cedar log scale (much more volume from small trees), which was not used in 1978

TRACT 2911 TOTAL VOLUME (bd ft)

	CUT		LEAVE		TOTAL	
SPECIES	per acre	total	per acre	total	per acre	total
American beech	25	2,358	21	1,980	46	4,338
Bitternut hickory		-	19	1,792	19	1,792
Blackgum	19	1,792		-	19	1,792
Black oak	102	9,619		-	102	9,619
Blue ash		-	17	1,603	17	1,603
Chinkapin oak	73	6,884	71	6,695	144	13,579
*Eastern redcedar**	*46*	*4,338*	*162*	*15,277*	*208*	*19,614*
Hackberry		-	34	3,206	34	3,206
Northern red oak	90	8,487	259	24,424	349	32,911
Pignut hickory	297	28,007	271	25,555	568	53,562
Post oak	91	8,581	123	11,599	214	20,180
Shagbark hickory		-	143	13,485	143	13,485
Sugar maple	94	8,864	84	7,921	178	16,785
White ash	169	15,937	182	17,163	351	33,099
White oak	577	54,411	1915	180,585	2,492	234,996
Yellow-poplar	622	58,655	53	4,998	675	63,653
TTOTAL	2,205	207,932	3,354	316,282	5,559	524,214

**Cedar volume was calculated using a special cedar scale that counts volume in trees 6" DBH and larger, which results in high volumes for stands of small trees.*

STRATUM 1 – Oak hickory **ACREAGE: 71.1**

	CUT	LEAVE	TOTAL	SNAG
VOLUME/ACRE:	1,801	3,605	5,406	
TOTAL VOLUME:	128,100	256,300	384,400	
BASAL AREA/ACRE:	38.0	55.6	93.6	
# TREES/ACRE:	56	92	148	

STRATUM 2 – Mixed mesophytic **ACREAGE: 9.2**

	CUT	LEAVE	TOTAL	SNAG
VOLUME/ACRE:	5,748	2,833	8,581	
TOTAL VOLUME:	52,900	26,100	79,000	
BASAL AREA/ACRE:	62.3	60.6	122.9	
# TREES/ACRE:	61	98	151	

STRATUM 3 – Rocky south slope **ACREAGE: 14.0**

	CUT	LEAVE	TOTAL	SNAG
VOLUME/ACRE:	450	2,773	3,223	
TOTAL VOLUME:	6,300	38,800	45,100	
BASAL AREA/ACRE:	42.0	75.3	117.3	
# TREES/ACRE:	60	105	165	

TRACT BOUNDARIES: This tract is in the main chunk of the state forest, and is surrounded by other state forest tracts. The eastern boundary is a ridgeline that borders tract 2914, and the western boundary is a drainage that forms the border with tract 2912, while the southern boundary is a drainage that forms the border with tract 2913. Cold Friday Road forms the northeastern boundary of the tract. There is a 5 acre inholding of private property in the northern portion of the tract that is completely surrounded by this tract. There was only one T post in the northwest corner that was found that might serve as boundary evidence delineating this area of private property. Historically, this tract was delineated as a smaller tract of maybe 10 acres less because the boundary was the fire trail at that point.

ACCESS: Cold Friday Road provides direct access to the northern half of this tract, and fire trail 303 provides access across the northern portion of the tract as well.

ACQUISITION HISTORY: The land within this tract was acquired from several owners including Dovey and George Lowe in 1935 for an undisclosed sum, James Brewster in 1935 for slightly over $5 per acre, Jesse and Laura Gibson in 1939 for an

undisclosed sum, and Joseph and Carrie Pfeister in 1931 for $5 per acre, and George Doolittle in 1951 for an undisclosed sum.

TRACT DESCRIPTION: This tract was divided into three stratums based on cover type and past management. These stratums include: oak hickory, mixed mesophytic, and rocky south slope. The rocky south slope had a noticeable amount of cedar, as these areas always seem to have. These stratums will be described in detail below.

Stratum 1 - Oak hickory

This 71-acre stratum is the primary type in this tract, and it covers most of the central west and south facing slopes in the tract.

The total volume of the stratum (5406 bd. ft/ac) is composed primarily of white oak (3218 bd. ft/ac) and pignut hickory (826 bd. ft/ac). White oak makes up over half the volume – probably because the 1998 sale removed more chestnut oak and black oak, and left white oak as the primary residual species. The remaining 25% of the volume consists of post oak, northern red oak, shagbark hickory, and various other species.

Stratum 2 – Mixed mesophytic

This 9-acre stratum is found primarily on the north flat of the tract, where it is expressed as a poplar stand, and also along the lower reaches of the stream valleys where it is expressed as more beech and northern hardwoods.

The total volume of the stratum (8581 bd. ft/ac) is composed primarily of yellow-poplar (4322 bd. ft/ac), white ash (1338 bd. ft/ac), and northern red oak (816 bd. ft/ac). Yellow-poplar makes up half the volume due to its high volume in the small area at the north portion of the tract. The remaining 25% of the volume consists of sugar maple, black oak, eastern red cedar, American beech, white oak, and various other species. There is a pocket of planted cypress trees in this stratum near the road.

Stratum 3 – Rocky south slope

This 14-acre stratum is found mostly on the southwestern facing slope of the tract. This area has shallow soil and exposed rock that has always had natural low productivity, and contains the typical assemblage of cedar, ash, post oak, and chinkapin oak.

The total stratum volume (3223 bd. ft/acre) is composed primarily of white oak (1504 bd. ft/acre) and eastern red cedar (823 bd. ft/acre). The remaining 30% of the volume consists of white ash, northern red oak, blue ash, and various other species. It should be noted that the high volume of cedar is due to using a cedar log scale that results in a higher than Doyle volume, and includes trees down to 6” DBH as sawtimber volume.

SOILS: The following soils are found on the tract in approximate order of importance.

CoF Corydon stony silt loam, 20-60% slopes Upland oak SI is 65-75, Yellow-poplar SI is 80-90, est. growth is 155-220 bd. ft/ac/yr. for oaks and 260-335 bd. ft/ac/yr. for yellow-poplar.

GpF Gilpin-Berks complex, 18-30% slopes Upland oak SI is 70-80, Yellow-poplar SI is 70-80, est. growth is 185-260 bd. ft/ac/yr. for oaks and for yellow-poplar.

HgD3 Hagerstown silty clay loam, 12-18% slopes, severely eroded Upland oak SI is 85-95, Yellow-poplar SI is 90-105, est. growth is 300-375 bd. ft/ac/yr. for oaks and 335-450 bd./ ft/ac/yr. for yellow-poplar.

HaE2 Hagerstown silt loam, 18-25% slopes, eroded Upland oak SI is 85-95, Yellow-poplar SI is 95-105, est. growth is 300-375 bd. ft/ac/yr. for oaks and 375-450 bd./ ft/ac/yr. for yellow-poplar.

GlE2 Gilpin silt loam, 18-25% slopes, eroded Upland oak SI is 70-80, Yellow-poplar SI is 90-100, est. growth is 185-260 bd. ft/ac/yr. for oaks and 335-415 bd. ft/ac/yr. for yellow-poplar.

WeC2 Wellston silt loam, 6-12% slopes, eroded Upland oak SI is 70-80, Yellow-poplar SI is 90-100, est. growth is 185-260 bd. ft/ac/yr. for oaks and 335-415 bd./ ft/ac/yr. for yellow-poplar.

WbF Weikert-Berks channery silt loams, 35-60% slopes Virginia pine SI is 45-53, est. growth is 75-100 bd. ft/ac/yr.

TlB2Tilsit silt loam, 2-6% slopes, eroded Upland oak SI is 70-80, Yellow-poplar SI is 85-95, est. growth is 185-260 bd. ft/ac/yr. for oaks and 300-375 bd./ ft/ac/yr. for yellow-poplar.

Jo Johnsburg silt loam Upland oak SI is 70-80, Yellow-poplar SI is 80-90, est. growth is 185-260 bd. ft/ac/yr. for oaks and 260-335 bd./ ft/ac/yr. for yellow-poplar.

RECREATION: This tract is located in the largest contiguous block of forest comprising Harrison-Crawford State Forest. A horse trails traverses the northern and eastern portions of the tract. Cold Friday road gives direct nearby access. Consequently, there is probably a high amount of usage of this tract by trail riders and hikers, as well as hunters during the fall season. Some caves are nearby, so there is probably some use by cavers as well.

WILDLIFE: This tract represents typical upland forest habitat, in addition to a small component of rocky south slopes with cedar and smaller hardwoods. Consequently, it likely receives use from a typical assemblage of common game and nongame wildlife species such as white-tailed deer, wild turkey, squirrels, songbirds, snakes, box turtles, and others. Hard mast food sources are provided by the oak hickory stand, but another habitat component would come from the scattered cedar trees. These areas provide cover and bedding areas, especially during the winter months.

Snags were tallied in this inventory for potential uses by wildlife. The following tables summarize guidelines and actual data with regard to the new strategy for consideration of the Indiana bat. The categories of optimal and maintenance guideline numbers were broken down by size class .

Guidelines for preferred density of live and dead trees for use by Indiana bat:

# of live trees per acre	Guidelines maintenance	Tract 2911 actual present – harvest = residual
12”-18” DBH class	**6**	**39.1 – 16.6 = 22.5**
20” DBH and greater	**3**	**10.6 - 4.6 = 6.0**
Total	**9**	**49.7 - 21.2 = 28.5**

# snags per acre	Guidelines maintenance	Guidelines optimal	Tract 2911 actual
6” - 8” DBH class	**1**	**1**	**11.7**
10”-18” DBH class	**2.5**	**5**	**6.4**
20” DBH and greater	**0.5**	**1**	**0.8**
Total	**4**	**7**	**18.9**

These numbers show that both live tree densities as well as snag densities meet guidelines on this tract. The result for large snags is consistent with several other recently completed inventories on other tracts of the forest, where large snag densities are below one per acre, though the density here is definitely higher than on other tracts where densities seem to hover at about 0.3 per acre. The vast majority of snags are in the smaller size classes, which makes them less suitable for most nesting or roosting purposes, but some feeding use might be gained from them.

Management activities will not intentionally remove snags, with a few exceptions of large recently dead trees or storm damage when possible, so the timber sale will not negatively impact that component significantly. Creation of more snags in this size class could be undertaken by girdling large cull trees in a post-harvest TSI operation.

Additionally, management activities involving a timber sale should not affect this habitat long-term from the perspective of any wildlife utilizing it due to the maintenance of a forested habitat on the tract. Creation of openings will create early successional forest habitat that will be beneficial to certain groups of wildlife dependent upon this habitat. , Early successional habitat created with such management will also benefit a wider segment of wildlife species that preferentially utilize such habitat for feeding and cover more so than later successional stage habitat.

Since this tract does not border a major stream, there should be no disruption of any potential travel corridors by forest management activities. The habitat on this tract in the context of the surrounding landscape does not represent any special component that would be used more preferentially or exclusively by wildlife for traveling or dispersion, as riparian habitat might be, or as forest in a non-forested landscape might be.

In the context of the surrounding landscape, this tract represents a moderate chunk of forest in a matrix of surrounding forest land.

WATERSHED / HYDROLOGY: The majority of the tract contains gentle to moderately steep slopes that drain into an intermittent drainage that very shortly drains into the Ohio River to the south. This area lies within a karst landscape with underground drainage, and there are several sinkholes scattered within the tract. One open sink or possible cave was noted in the southern portion of the tract with rocks piled up next to it – likely a cairn to mark it placed by cavers. Another 2 small cave or open sinkholes were noted at the north end just south of the fire trail. A spring is present on the western central portion of the tract up from the big drainage, and another is located in the southwestern portion of the tract. Springs, sinkhole openings and caves will be buffered during management activity.

HISTORICAL AND CULTURAL: Cultural resources may be present, but their location(s) are protected. Adverse impacts to significant cultural resources will be avoided during management or construction activities

RARE, THREATENED, OR ENDANGERED SPECIES:
A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

EXOTICS: There are a few scattered pockets of ailanthus present this tract – mostly in the central portion along the ridgetop where the old skid trail was located, and where small openings have opened up the canopy. There are some ailanthus present in the north portion along the fire trail as well – though this area has been treated on numerous occasions throughout the recent past, and there is much less ailanthus present here than

there once was. These are small trees, but are producing seed, and so should be treated as soon as possible so as to better control the seed source and potential future problems. There is also some infestation of stilt grass along the edges of the horse trails in places.

SILVICULTURAL HISTORY AND PRESCRIPTION:

General: The records in the file for this tract show that an inventory was done in 1978, which indicated a total volume of 2255 bd. ft/ac (based on 88 acres total) and a minimal annual growth rate of 62 bd. ft/ac per year. A sale was conducted in 1998 in this tract and neighboring tract 2914 which resulted in 81,500 bd. ft being removed in 528 trees from this tract (867 bd. ft/ac) – most of which was white oak, black oak, and northern red oak.

The tract had a low growth rate in 1978 as determined from increment cores, and current growth was calculated by using 2013 volume MINUS cedar, subtracting the volume of 2255 bd ft/ac from the 1978 inventory and the 81,500 bd. ft. from the 1998 sale, and dividing by 35 years of growth. Cedar volume was figured using a different cedar log scale (much more volume from small trees), which was not used in 1978, and so was excluded.

This calculation resulted in a higher figure of 113 bd. ft/ac per year – almost double – though still on the low end. The predominant oak hickory type should be showing a better growth rate based on similar oak hickory types across the forest, and the amount of time since the harvest thinned the site also should be reflected in increased growth rates. It was noted, however, during the current inventory, that a certain level of overstory mortality was setting in. Some of this is no doubt due to drought stress, but some was due to wind damage, and several large oaks in the overstory were noted to have died recently, which is no doubt having a negative impact on overall volume accumulation in this tract.

Number of trees per acre and basal area per acre figures indicate that all srtata are fully stocked at between 80% to 100%. Removal of trees tallied as “cut” either via a timber sale or TSI would reduce the basal area across the entire tract to approximately 60% of its current level. The heavier reduction of stocking would be generally confined to limited areas of regeneration openings and small conversion areas, while overall the tract as a whole should remain generally fully stocked and maintain the majority of its canopy cover. The area of yellow-poplar likely to be regenerated is only 6% of the acreage of this tract. Some adjustment to the marking strategy can be adopted to reserve more basal area in areas of better timber to compensate for the reduction in, thereby keeping the stocking level above 60%.

Due to the amount of volume being carried on the majority of the tract (5351 bd. ft/ac – not including cedar), the mortality of the overstory trees that was noted, the length of time since the last managed sale (15 years back to 1998), and the general condition of the

overstory trees in the majority of the tract, a light to medium level harvest could be undertaken in this tract at any time. This would produce a sale volume of about 204,000 board feet or about 2170 board feet per acre (not including cedar) and leave about 317,000 board feet, or about 3350 board feet per acre plus some cedar. Likely, this tract would be combined with neighboring tract 2914 in any proposed sale.

It is recommended that Timber Stand Improvement (TSI) be undertaken in this tract after the harvest to accomplish a variety of tasks, including completion of any marked openings. TSI of pole-size trees may be required for thinning in places, and to open up the understory for potential oak regeneration to take hold or be released. Vines did not seem to be a big problem in this tract, but need to be kept at bay with TSI activities as well. Understory treatment of shade tolerant species is prescribed to encourage oak regeneration where present. Ailanthus needs to be monitored and eliminated when found to be present or establishing itself. There were a few small areas of ailanthus noted at the time of inventory – mostly scattered around the northern section.

Stratum 1: Oak hickory

This 71-acre stratum covers 75% of the tract, and contains a volume of 5406 board feet per acre of which 1801 was classified as harvestable and 3605 was classified as residual. This would remove 38 square feet of basal area, which would leave the residual stand with 56 sq. ft. – about 40% reduction in basal area. These figures DO include cedar as figured according to the cedar log scale.

Since the last harvest in this tract was 15 years ago, and because it also currently contains a moderate volume of both harvestable material and residual growing stock, the recommendation would be to rank this stratum as a medium priority for conducting a harvest. Additionally, it is obvious that there has been noticeable mortality from drought and wind damage over the last 10 years – likely leading to a substantial decrease in the standing volume over time and cancelling out much of the growth release from the last harvest. The majority (67%) of the harvest volume for stratum 1 (1801 bd. ft/ac) would be contained in white oak (779 bd. ft/ac) and pignut hickory (432 bd. ft/ac), with post oak, white ash, northern red oak, and various other species making up of the remainder of the harvest volume.

Most of the stratum would probably be harvested under a single tree selection routine with larger regeneration openings targeting groups of low-grade, declining and mature trees. When possible, selection should also favor releasing future crop trees. The residual stand should be heavier to white oak – the primary residual tree species, with a lesser component of other oak species.

Post harvest TSI should be performed to eliminate any residual cull or small pole-sized trees not cut during the harvest, as well as thin where necessary, complete any regeneration openings, and treat the understory to eliminate shade tolerant species in favor of oaks and other more desirable species. As always, any ailanthus present should

also be treated and eliminated. There are a few pockets of ailanthus scattered in the central and northern portion of this tract.

Stratum 2: Mixed mesophytic

This 9-acre stratum covers small portions of the tract, and consists basically of a densely stocked poplar stand in the north portion, with some mixed mesophytic pockets along the drainages. It contains a volume of 8581 board feet per acre of which 5748 was classified as harvestable and 2833 was classified as residual. This would remove 62 square feet of basal area, which would leave the residual stand with 61 sq. ft. Stocking would drop from 100% to about 51% with the indicated management. These figures DO include cedar as figured according to the cedar log scale. Regeneration of this area would only involve less than 6% of the land area. Additional reserve trees can be left in the oak hickory stratum to make up for the reduction of basal area in this area. The cypress trees in this stratum would be left to grow.

Since the last harvest in this tract was 15 years ago and basically excluded most of this area, and because it also currently contains a high volume of harvestable material and a moderate volume of residual growing stock, the recommendation would be to rank this stratum as a high priority for conducting a harvest. The reason for the high cut volume is due to the general decline of the overstocked poplar stand in the north, and the resulting tallying of most of those trees as harvest trees. Though this area is on a wet upland flat, this whole area has shown drought mortality over the last 10 years, and silviculturally should be regenerated with an opening to start the stand over. Dominant poplar overstory should ensure a prolific crop of new poplar seedlings in the regeneration.

Additionally, it is obvious that there has been noticeable mortality from drought and wind damage over the last 10 years – likely leading to a substantial decrease in the standing volume over time and cancelling out much of the growth release from the last harvest. The majority (70%) of the harvest volume for stand 2 (5748 bd. ft/ac) would be contained in yellow-poplar (3982 bd. ft/ac) with white ash (561 bd. ft/ac), black oak (381 bd. ft/ac), eastern redcedar (297 bd. ft/ac), and various other species making up of the remainder of the harvest volume.

The 6 acre portion of this stratum in the north that contains the declining yellow-poplar might be completely regenerated in a harvest in a group selection opening, or some trees may be left to serve as a visual buffer along the road and private property. The other portions of this stratum would likely be harvested under a single tree selection routine.

Post harvest TSI should be performed to eliminate any residual cull or small pole-sized trees not cut during the harvest, as well as thin where necessary, complete any regeneration openings, and treat the understory to eliminate shade tolerant species in favor of oaks and other more desirable species. As always, any ailanthus present should also be treated and eliminated.

Stratum 3: Rocky south slope

This 14-acre stratum is located on a southwest facing slope in the southern portion of the tract. It is characteristic of these stands across the forest and consists of thin soils and exposed rock, with generally small and scrubby slow growing trees with short boles.

It contains a volume of 3223 board feet per acre of which 450 was classified as harvestable and 2773 was classified as residual. This would remove 42 square feet of basal area, which would leave the residual stand with 75 sq. ft. Stocking would drop from 98% to about 63% with the indicated management (fully stocked above the B-line). These figures DO include cedar as figured according to the cedar log scale.

Since this stand intermingles with the more merchantable hardwood strata, there would likely be some trees included from here along with any timber sale taking place in strata 1 and 2. Since most of these areas are on rocky slopes rather than recovering old field areas with oak regeneration, most of it will likely will be left alone to maintain some habitat diversity, with the exception of some hardwood trees along the edges that might be included in any hardwood sale.

PROPOSED ACTIVITIES LISTING

Spring 2013	Field inventory
Summer 2013	Write mgmt plan
Winter 2013 - Summer 2014	Basal bark treat ailanthus
Fall 2013 – Winter 2013	Mark timber sale
Spring 2014 - Spring 2015	Sell timber sale
2015 / 2016	Post harvest TSI
2017	Recon & monitor for exotics
2026-2027	Inventory for next mgmt cycle

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