Indiana Department of Natural Resources – Division of Forestry

Draft

Resource Management Guide

STATE FOREST: Harrison Crawford **COMPARTMENT**: 28 **TRACT**: 07

Date: July, 2013 – inventory
January, 2014 - plan

Forester: Wayne Werne

INVENTORY SUMMARY

NUMBER OF STRATA: 3 **Est. growth: 105 bd. ft/ac/yr**
PERMANENT OPENINGS: (pond) 1.4 ac **Est. cutting cycle: 14-24 yrs**
TOTAL ACREAGE: 168.5 ac
AVERAGE SITE INDEX: 75-85 (for upland oaks)
AVERAGE BASAL AREA: 113.9 sq. ft/ac

TRACT 2807 TOTAL VOLUME (bd ft)

	CUT		LEAVE		TOTAL	
SPECIES	per acre	total	per acre	total	per acre	total
Basswood	15	2,507		-	15	2,507
Bitternut hickory		-	39	6,517	39	6,517
Black cherry	25	4,178	14	2,339	39	6,517
Blackgum	14	2,339		-	14	2,339
Black oak	290	48,459	248	41,441	538	89,900
Black walnut		-	104	17,378	104	17,378
Chinkapin oak	79	13,201	269	44,950	348	58,151
*Eastern redcedar**	*1,234*	*206,201*	*15*	*2,507*	*1,249*	*208,708*
Northern red oak	69	11,530	268	44,783	337	56,313
Persimmon		-	26	4,345	26	4,345
Pignut hickory	143	23,895	67	11,196	210	35,091
Post oak	31	5,180		-	31	5,180
Red elm	15	2,507		-	15	2,507
Red maple	30	5,013		-	30	5,013
Scarlet oak	20	3,342		-	20	3,342
Shagbark hickory		-	175	29,243	175	29,243
Shumard oak	16	2,674	227	37,932	243	40,605
Sugar maple	249	41,608	315	52,637	564	94,244
Sweetgum		-	19	3,175	19	3,175
Sycamore	21	3,509	34	5,681	55	9,191
White ash	170	28,407	185	30,914	355	59,321
White oak	618	103,268	1,275	213,053	1,893	316,320
Yellow-poplar	434	72,521	211	35,258	645	107,780
TTOTAL	3,473	580,338	3,491	583,346	6,964	1,163,684

(using 167.1 acres of forest cover of the 168.5 tract acres)

**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: 87.9**

	CUT	LEAVE	TOTAL
VOLUME/ACRE:	2,993	4,166	7,159
TOTAL VOLUME:	263,085	366,191	629,276
BASAL AREA/ACRE:	52.0	61.4	113.4
# TREES/ACRE:	61	78	139

STRATUM 2 – Mixed mesophytic **ACREAGE: 62.0**

	CUT	LEAVE	TOTAL
VOLUME/ACRE:	2,474	2,981	5,455
TOTAL VOLUME:	153,388	184,822	338,210
BASAL AREA/ACRE:	48.3	63.8	112.1
# TREES/ACRE:	68	108	176

STRATUM 3 – Old field - cedar **ACREAGE: 17.2**

	CUT	LEAVE	TOTAL
VOLUME/ACRE:	7,344	1,904	9,248
TOTAL VOLUME:	126,317	32,749	159,066
BASAL AREA/ACRE:	83.6	39.7	123.3
# TREES/ACRE:	150	77	227

Note: Please reference the appendix for tables and graphs of various stand statistics

TRACT BOUNDARIES: The entire tract is surrounded by state forest property and is bordered by Cold Friday Road to the east for a portion near the south end, with the rest of the eastern boundary formed by a drainage dividing it from tract 2808 to the east. The north boundary is formed by Potato Run Creek and an O'Bannon Woods State Park horse camp beyond to the north. The west boundary is a drainage dividing it from neighboring tract 2805 to the west. The south boundary is formed by a drainage dividing it from tract 2806 to the south.

ACCESS: This tract is easily accessed directly west off of Cold Friday Road near Cold Friday Pond.

ACQUISITION HISTORY: One of the original purchases, most of the land that makes up this tract seems to have been acquired from Joseph and Carrie Pfeister in 1931 as part of the second land acquisition for the state forest. The land was purchased for a sum of $5 per acre. Most of the rest of the area was acquired from Samuel Breeden in 1944. The remainder of the area was acquired from James Brewster in 1932, M. Briles in 1932, and J.M. Conner in 1932.

TRACT DESCRIPTION: This tract was divided into three strata based on cover type and past management. These strata include: oak hickory, mixed mesophytic, and old field - cedar. Cold Friday Pond is also located in the southeastern tip of the tract, and takes up about 1.4 acres. These strata will be described in detail below.

Stratum 1 – Oak hickory
This 88-acre stratum covers just over half of the tract, and was found mostly along the mid to upper slope position of the north and northwest facing hill making up this tract. The quality of the trees was good with an overstory of mostly white oak and a typical shaded understory of sugar maple.

The total stratum volume (7,155 bd. ft/acre) is composed primarily of white oak (3,342 bd. ft/acre), black oak (667 bd. ft/acre), and northern red oak (549 bd. ft/acre), with the remaining 35% of the volume consisting of white ash, chinkapin oak, sugar maple, eastern redcedar, and various other species.

Stratum 2 – Mixed mesophytic
This 62-acre stratum covers about a third of the tract, and consists of typical mixed mesophytic species – primarily yellow-poplar and sugar maple. This stratum occupies the lower slopes and areas along the drainage within this tract, as well as the flat ridgetop at the southeastern portion. The area on the flat ridgetop is primarily poplar resulting from the regrowth of an old field area back into forest cover, while the lower slope areas are naturally mesic in their composition.

The total volume of the stratum (5,454 bd. ft/ac) is composed primarily of yellow-poplar (1,200 bd. ft/ac), sugar maple (1,104 bd. ft/ac), and shumard oak (666 bd. ft/ac), which make up about half the total volume. Eastern redcedar, chinkapin oak, white ash, black oak, and black walnut make up most of the rest of the volume, along with various other species.

Stratum 3 – Old field - cedar
This 17-acre stratum was found in about 3 distinct locations along the lower slope where old fields once were, which have since grown back to mostly cedar and poplar. It had some larger yellow-poplar, oak, and ash in the overstory with cedar, sassafras, and sugar maple in the understory. It was obviously an open agricultural field at one time, and since succeeded back to its current state.

The total volume of the stratum (9,246 bd. ft/ac) is composed primarily of eastern redcedar (6402 bd. ft/ac) and yellow-poplar (1,326 bd. ft/ac) representing about 85% of the volume, with black oak, sycamore, shumard oak, and other species making up the remainder of the volume. 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.

HaD2 Hagerstown silt loam, 12-18% slopes, 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.

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.

TlB2 Tilsit 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.

HgE3 Hagerstown silty clay loam, 18-25% slopes, severely 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.

Hm Haymond silt loam Yellow-poplar SI is 95-105, est. growth is 375-450 bd. ft/ac/yr. for yellow-poplar.

RECREATION: This tract is located in the heart of the largest contiguous block of forest comprising Harrison-Crawford State Forest, and is geographically located in a relatively high profile / high use area directly south of the horse camp and west of Cold Friday Road. There are a couple of legitimate mapped horse trail that runs north-south through this tract, and one illegal trail that runs along the northern edge of the tract next to the creek. Many of the horse trails in this tract are badly eroded and eroding, and need to be rebuilt and armored to avoid further direct runoff of sediment into the drainages.

Likely, there is a fair amount of hunting pressure here due to easy access. Due to its proximity to Cold Friday Road, there may also be some general hiking going on here as well, though there are no hiking trails within the tract.

WILDLIFE: This tract represents typical upland forest habitat, in addition to a component of 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, woodpeckers, songbirds, snakes, box turtles, and others. Hard mast food sources are provided by the majority oak hickory stand, but another habitat component would come from the areas of 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 strategy for consideration of the Indiana bat.

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

# of live trees per acre	Guidelines maintenance	Tract 2807 actual present – harvest = residual
12"-18" DBH class	6	40.1 – 15.4 = 24.7
20" DBH and greater	3	11.1 - 5.3 = 5.8
Total	9	51.2 - 20.7 = 30.5

# snags per acre	Guidelines maintenance	Guidelines optimal	Tract 2807 actual
6" - 8" DBH class	1	1	18.4
10"-18" DBH class	2.5	5	13.0
20" DBH and greater	0.5	1	0.8
Total	4	7	32.2

These numbers show that both live tree densities, as well as snag densities, meet guidelines. 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 unsuitable 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 any timber sale will not negatively impact that component significantly. Creation of more snags in the large size class could be undertaken by girdling large cull trees in a post-harvest TSI operation.

Additionally, the prescribed management activities, including planned timber removals, maintains forested habitats on the tract to the benefit of wildlife species long term. Creation of openings will create early successional forest habitat that will be beneficial to certain groups of wildlife dependent upon this habitat. Likely, 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.

Since this tract represents a component of contiguous forest, it is possible that forest management and recreation activities might disrupt forest interior species by creating temporary edge habitat for generalist species to "invade" the area in the short term. 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 directly into Potato Run Creek or ephemeral and intermittent drainages which shortly drain into that creek. Potato Run drains into the Ohio River a few miles downstream. This area appears to have a potentially extensive karst system, so much of the hydrology would consist of subsurface drainage. There are at least three open sinkholes found on this tract, which would be buffered during management activities.. There is also a small wet area on the top of the ridge, which may be a naturally ponded area with a high water table.

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

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

EXOTICS: There are several scattered pockets of ailanthus present this tract – five separate ones noted mostly in the southern portion near the ridgetop, and where small openings have opened up the canopy. 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. These were painted with pink bands when found to facilitate easy relocation for treatment. There is also some infestation of stilt grass along the horse trails, the old skid trails, and in the yard area north of Cold Friday Pond.

SILVICULTUAL PRESCRIPTION:
General: Number of trees per acre and basal area per acre figures indicate that all strata are fully to overstocked at between 93% to 108%. Removal of trees tallied as "cut" either via a timber sale or TSI would reduce the stocking levels to near 60% at the B-line in the mature stands, and below the C-line in the old field area – due to tallying all cedar for removal.

There is record in the tract file of an inventory done in 1975 that showed 1961 board feet per acre growing there at the time. Sometime in 1975 or 1976, there was a veneer sale that may have included some trees from this tract, but seems to have been primarily from

other nearby tracts – this sale only removed about 18,000 bd ft in total, so likely had little impact on the volume of tract 2807.

There was another inventory in 1998, showing the volume to have increased to 5309 board feet per acre, and there was a sale the following year that removed 178,100 board feet, or about 1057 board feet per acre – mostly white oak, black oak, red oak, and yellow-poplar. The most recent inventory shows the total volume to have grown to 5715 bd. ft. per acre plus 1249 bd. ft. per acre of cedar for a total of 6964 bd. ft. per acre. Taking all this into account, the tract grew about 146 bd. ft/ac per year from 1975 to 1999, and 105 bd. ft/ac per year from 1999 to 2013 when removing cedar from the equation. A modern cedar scale is currently used to figure cedar volume, and this was not used in the past. If cedar volume was included, the most recent growth rate would figure out to 181 bd. ft/ac per year.

Considering the mesic nature of much of the site, the figure of 105 board feet of growth per acre per year seems somewhat low, even though the tract has had 15 years to respond to the management done in 1999. There has likely been some level of mortality due to droughts over the years and other issues such as wind damage, ice damage, loopers, jumping oak gall, two lined chestnut borer, and other issues. The aging stand has undoubtedly lost volume due to a combination of these factors, and the degraded old field areas currently containing cedar are not growing to their full or former potential. However, the 105 board feet per acre per year of growth did amount to the accumulation of 265,000 board feet of net volume increase in this tract in the last 15 years.

Due to the amount of volume being carried on the majority of the tract (7000 bd. ft/ac), and the fact that the last timber sale took place 15 years ago, the initial impression was that a light to medium level harvest could be undertaken in this tract at any time. This would produce a sale volume of about 374,000 board feet (not counting cedar volume) or about 2220 board feet per acre and leave about 580,000 board feet or about 3442 board feet per acre. Additionally, there is about 208,000 board feet of cedar on this tract, which amounts to 1234 board feet per acre, and most of this was tallied for removal, though a separate cedar sale would likely be required to actually undertake this plan. The hardwood portion of the sale would cover the majority of the tract with the possible exception of stratum 3 where sale volume would be minimal – unless cedar is included.

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. Vines did not seem to be a big problem in this tract, but need to be kept at bay with TSI activities as well. Any attempt to establish or encourage understory oak regeneration would require more extensive understory treatment of shade tolerant species. Due to the fact that a segment of this tract is a north slope with a fair amount of mixed mesophytic composition, this operation may not be feasible to attempt to undertake except in the old field areas where more small oak is present. Ailanthus was found in a few areas of the tract, and needs to be monitored and eliminated when found to be present or establishing itself.

Stratum 1: Oak hickory

This 88-acre stratum covers half of the tract, and is located mostly along the upper slopes. It contains a moderately high volume of 7155 board feet per acre of which 2991 was classified as harvestable and 4164 was classified as residual. This would remove 42 square feet of basal area, which would leave the residual stand with 71 sq. ft. Stocking would drop from 93% to about 60% with the indicated management. These figures DO include cedar as figured according to the cedar log scale.

Since this stratum was last harvested 15 years ago, and currently contains a moderate volume of harvestable material and a moderate volume of residual growing stock, it would be included with stratum 2 as a medium priority for conducting a managed harvest. The majority (70%) of the harvest volume for stratum 1 (2991 bd. ft/ac) would be contained in white oak (1098 bd. ft/ac), black oak (384 bd. ft/ac), eastern redcedar (318 bd. ft/ac), and pignut hickory (254 bd. ft/ac), with white ash, sugar maple, yellow-poplar, 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 or group selection routine with larger regeneration openings targeting groups of low-grade trees or multiple large mature or declining trees growing together. When possible, selection should also favor releasing future crop trees. As with many other mature oak hickory stands, this stratum will continue to transition to a white oak-dominated stand as black oak is removed through natural mortality and silvicultural treatments to favor the longer lived and more vigorous white oak.

Post harvest TSI should be performed to eliminate residual cull or small pole-sized trees marked but 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 throughout this tract.

Stratum 2: Mixed mesophytic

This 62-acre stratum covers a little over a third of the tract, and is located along the drainages and lower slopes of the tract, as well as on the ridgetop at the southeastern corner of the tract. It contains a moderate volume of 5454 board feet per acre of which 2475 was classified as harvestable and 2979 was classified as residual. This would remove 38 square feet of basal area, which would leave the residual stand with 74 sq. ft. Stocking would drop from 95% to about 60% with the indicated management. These figures DO include cedar as figured according to the cedar log scale.

Since this stratum was last harvested 15 years ago, and currently contains a reasonable volume of harvestable material and a moderate amount of residual growing stock, it would be included with stratum 1 as a medium priority for conducting a managed harvest. 70% of the harvest volume for stratum 2 (2475 bd. ft/ac) would be contained in

yellow-poplar (831 bd. ft/ac), sugar maple (477 bd. ft/ac), and eastern redcedar (425 bd. ft/ac). Black oak, white ash, red maple, and various other species would make up of the remainder of the harvest volume.

Most of the stratum would also probably be harvested under a single tree or group selection routine with larger regeneration openings targeting groups of low-grade trees or multiple large trees growing together. When possible, selection should also favor releasing future crop trees. Drought damage to yellow-poplar and impending EAB mortality to ash trees should be factors to be considered when selecting trees to mark for sale.

Post harvest TSI should be performed to eliminate any residual cull or small pole-sized trees marked but 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 throughout this tract.

Stratum 3: Old field - cedar

This 17-acre stratum is found in pockets mostly in the northern portion of the tract, and contains a volume of 9246 board feet per acre of which 7344 was classified as harvestable and 1902 was classified as residual. This would remove 84 square feet of basal area, which would leave the residual stand with 40 sq. ft. Stocking would drop from 108% to about 40% with the indicated management. These figures DO include cedar as figured according to the cedar log scale.

Cedar contributes the vast majority of the volume to this stratum, and it was all tallied for removal, which is what led to the majority of reduction of stocking. Realistically, with the dominance of cedar in this stratum and the intention of removing most of it, these parts of the tract could be viewed in the context of regeneration openings rather than selectively marked stands.

Likely, parts of this stratum would be included in any timber sale taking place in the rest of the tract, though having a separate cedar sale might be a more feasible option considering the large amount of cedar that would be removed from this area. 96% of the harvest volume for stratum 3 (7344 bd. ft/ac) would be contained in eastern redcedar (6402 bd. ft/ac) and yellow-poplar (617 bd. ft/ac). Black oak, sycamore, and white ash would make up of the remainder of the harvest volume.

In places in this stratum, there is oak regeneration present in the understory. Timber harvest and post harvest TSI should concentrate on releasing this oak regeneration – mostly with larger openings.

PROPOSED ACTIVITIES LISTING

Summer 2013	Field inventory
Winter 2013 – Spring 2014	Write mgmt plan

Summer 2014 - Fall 2014	Basal bark treat ailanthus
Spring 2014	Mark timber sale
Summer 2014	Sell timber sale
2015 / 2016	Post harvest TSI
2019	Recon & monitor for exotics
2028-2029	Inventory for next mgmt cycle

Stratum 1: Oak hickory

Volume (bd ft/ac)

Species	CUT	LEAVE	TOTAL
BAS	27		27
BIH		42	42
BLG	25		25
BLO	384	283	667
BLW		17	17
ZCO	121	308	429
ERC	318	26	344
NRO	73	476	549
PER		17	17
PIH	254	66	320
POO	54		54
SCO	35		35
SHH		233	233
ZSO		33	33
SUM	196	210	406
WHA	224	209	433
WHO	1098	2244	3342
YEP	182		182
TOTAL	2991	4164	7155

Stratum 2: Mixed mesophytic

Volume (bd ft/ac)

Species	CUT	LEAVE	TOTAL
BIH		53	53
BLC	87		87
BLO	175	105	280
BLW		275	275
ZCO	38	303	341
ERC	425		425
NRO	96		96
PER		57	57
PIH		102	102
REE	51		51
REM	102		102
SHH		151	151
ZSO	56	610	666
SUM	477	627	1104
SWG		64	64
SYC	24	49	73
WHA	113	176	289
WHO		38	38
YEP	831	369	1200
TOTAL	2475	2979	5454

Stratum 3: Old Field - ERC

Volume (bd ft/ac)

Species	CUT	LEAVE	TOTAL
BLC		98	98
BLO	154	397	551
BLW		98	98
ZCO		48	48
ERC	6402		6402
ZSO		212	212
SUM		98	98
SYC	94	136	230
WHA	77	106	183
YEP	617	709	1326
TOTAL	7344	1902	9246

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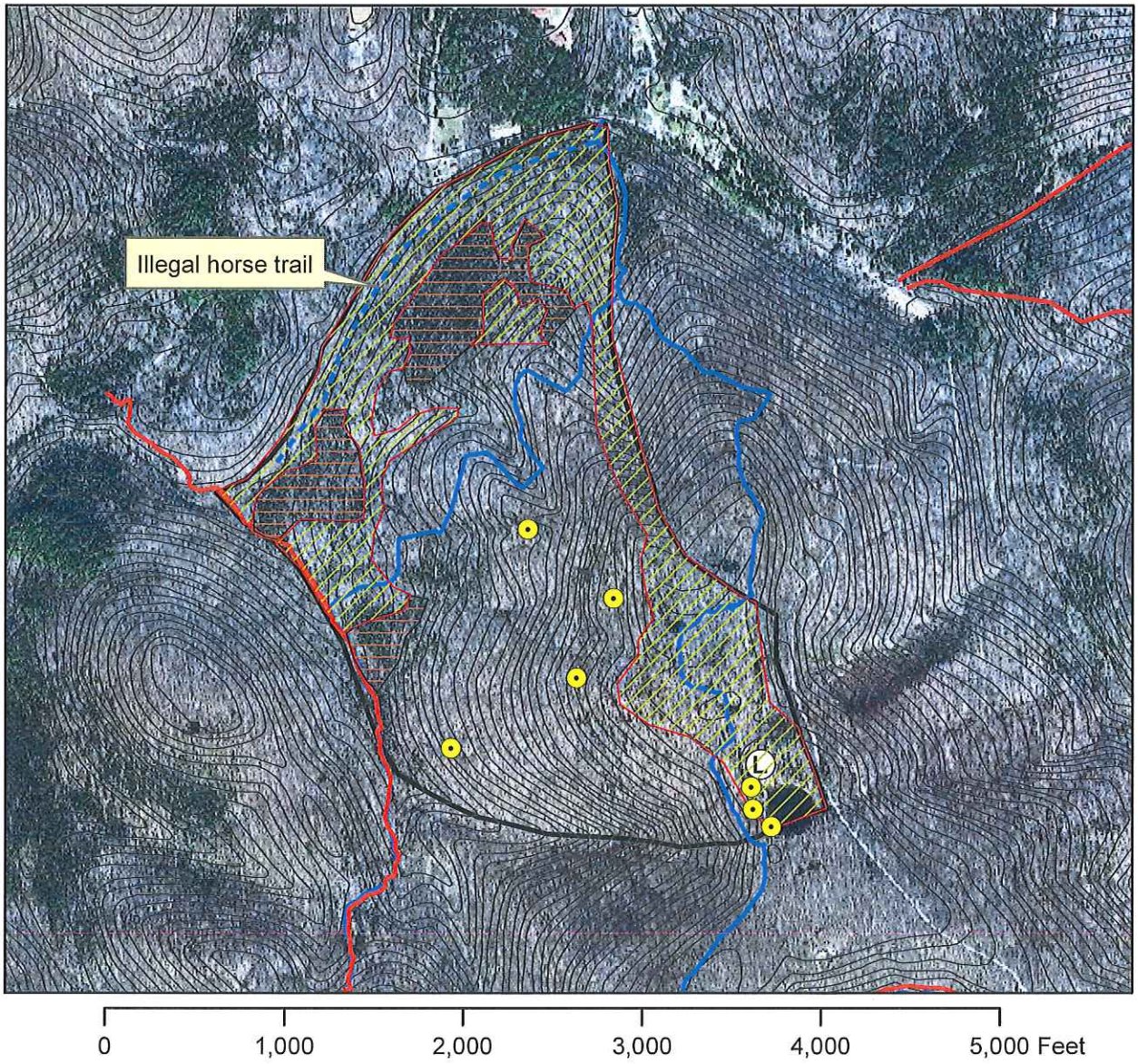
Tract 2807



Stand 1: Oak hickory

Stand 2: Mixed mesophytic

Stand 3: Old field - cedar

Ailanthus pockets

Legend

- L — 2807 log yard
- Fire Lanes
- Horse trails
- tract2807

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W E
S