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

STATE FOREST: Harrison Crawford **COMPARTMENT**: 31 **TRACT**: 03

Date: August, 2013 – inventory **Forester: Wayne Werne**
February, 2014 - plan

INVENTORY SUMMARY

NUMBER OF STANDS: **3** **Est. growth: 140 bd. ft/ac/yr****
PERMANENT OPENINGS: **4.6 ac** **Est. cutting cycle: 13-18 yrs**
TOTAL ACREAGE: **126.3 ac**
AVERAGE SITE INDEX: **72-82** (for upland oaks)
AVERAGE BASAL AREA: **126.0 sq. ft/ac**

The tables below approximate volume based on a series of inventory plots and measurements. **Growth** was calculated by using 2013 volume and subtracting an approx. volume of 950 bd ft/ac from the 1972 inventory and dividing by 41 years of growth

TRACT 3103 TOTAL VOLUME (bd ft)

	Potential Harvest		LEAVE		TOTAL	
SPECIES	per acre	total	per acre	total	per acre	total
American beech	56	6,815		-	56	6,815
Basswood	53	6,450	36	4,381	89	10,831
Bitternut hickory		-	55	6,694	55	6,694
Black cherry	116	14,117	57	6,937	173	21,054
Blackgum		-	24	2,921	24	2,921
Black oak	200	24,340	128	15,578	328	39,918
Black walnut		-	18	2,191	18	2,191
Blue ash		-	22	2,677	22	2,677
Chinkapin oak	125	15,213	65	7,911	190	23,123
Honeylocust	24	2,921		-	24	2,921
Northern red oak	217	26,409	226	27,504	443	53,913
Persimmon		-	14	1,704	14	1,704
Pignut hickory	114	13,874	61	7,424	175	21,298
Red pine	207	25,192	195	23,732	402	48,923
Sassafras	149	18,133		-	149	18,133
Shagbark hickory		-	355	43,204	355	43,204
Shortleaf pine	89	10,831	140	17,038	229	27,869
Sugar maple	191	23,245	275	33,468	466	56,712
Sweetgum	31	3,773		-	31	3,773
Sycamore	112	13,630		-	112	13,630
Virginia pine	297	36,145		-	297	36,145
White ash	632	76,914	125	15,213	757	92,127
White oak	318	38,701	305	37,119	623	75,819
Yellow-poplar	1,236	150,421	403	49,045	1,639	199,466
TTOTAL	4,167	507,124	2,504	304,737	6,671	811,861

(using 121.7 acres of forest cover of the 126.3 tract acres)

STAND 1 – Old field - pine **ACREAGE: 67.9**

	Potential Harvest	Leave	Total
VOLUME/ACRE:	3,202	1,419	4,621
TOTAL VOLUME:	217,416	96,350	313,766
BASAL AREA/ACRE:	74.3	46.0	120.3
# TREES/ACRE:	116	106	222

STAND 2 – Mixed mesophytic **ACREAGE: 28.2**

	Potential Harvest	Leave	Total
VOLUME/ACRE:	5,431	4,123	9,554
TOTAL VOLUME:	153,154	116,269	269,423
BASAL AREA/ACRE:	61.2	57.3	118.5
# TREES/ACRE:	41	69	110

STAND 3 – Oak hickory **ACREAGE: 25.6**

	Potential Harvest	Leave	Total
VOLUME/ACRE:	5,983	4,237	10,220
TOTAL VOLUME:	153,165	108,467	261,632
BASAL AREA/ACRE:	85.4	64.1	149.5
# TREES/ACRE:	78	81	159

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

TRACT BOUNDARIES: The entire tract is surrounded by state forest property, with a drainage dividing it from tract 3101 to the north, and the west boundary formed by a ridgeline dividing it from tract 3108 – which is the Deam Cliffs Nature Preserve. This boundary is not very well defined on the ground, as the ridgeline is broad, and towards the south, the dividing line turns into the edge of the flat portion of 3103 where it drops off over the hillside of the nature preserve. The eastern and southeastern boundary is formed by the edge of the flat plateau of tract 3103, and the drop off down the hill becomes tract 3104.

ACCESS: Currently, the best access to this tract is via fire trail 308, past Greenbrier Cemetery and up the hill to the flat plateau portion. This access is not the best, with the curving fire trail, and steep hill getting up to the plateau. The fire trail continues on through the tract across the flat plateau, but is in need of improvement in this section due to narrowness, winding curves, and lack of rock, as well as a perched water table leading to wet conditions at certain times of the year.

ACQUISITION HISTORY: The land within this tract seems to have been acquired primarily in three acquisitions. The northern portion was purchased in 1939 from Joseph and Ola Pate (deed #131.50) for an unknown sum. The middle portion was purchased in 1939 from Marshall Pate (deed # 131.51) for a sum of $5 per acre. The southern portion was purchased in 1940 from John and Fern Deschamps (deed # 131.97) for an unknown sum.

TRACT DESCRIPTION: This tract was divided into three stands based on cover type and past management. These stands include: old field – pine, mixed mesophytic, and oak hickory. There was also about 4.6 acres of open to semi-open habitat that has been maintained in the past as wildlife openings. These stands will be described in detail below.

Stand 1 – Old field - pine

This 68-acre stand covers over half the tract acreage, and was found in two distinct locations – on the flat plateau at the eastern edge of the tract, and on the east facing hillside at the west side of the tract. It consists of areas that had historically been used for agricultural purposes, but have since been transformed to a variety of forest cover types. On the big plateau, a variety of pines were planted that have become the dominant type in many areas. These include Virginia pine, (probably) red pine, and some species of southern yellow pine that was called shortleaf pine in the inventory. Additionally, yellow-poplar, white ash, sassafras, black cherry, and persimmon have grown up naturally here and filled in between the stands of pine and among them where trees have blown over. On the other area of this type along the western boundary, there was no pine present, but more of the aforementioned early successional hardwoods have filled in naturally. Some of the naturally occurring poplar has grown to large size in this stand as a whole.

The semi-open to open areas were located on the big plateau amongst the rest of the stand. Some of these openings are mowed to maintain them in grassy vegetation, but others have succeeded to brush and small trees. There is a presence of exotics in this stand which is encouraged by the open component in places. Pockets of ailanthus, stilt grass along the trails, and multiflora rosebush were noted in this area in various places.

The total volume of the stand (4,621 bd. ft/ac) is composed primarily of yellow-poplar (1480 bd. ft/ac), red pine (665 bd. ft/ac), Virginia pine (491 bd. ft/ac), and shortleaf pine (380 bd. ft/ac) representing about 65% of the volume, with white ash, white oak, black cherry, and other species making up the remainder of the volume.

Stand 2 – Mixed mesophytic

This 28-acre stand covers about a quarter of the tract, and consists of typical mixed mesophytic species – primarily yellow-poplar, white ash, and sugar maple. This stand occupies the lower slopes and areas along the drainage in the northern and western portions of the tract. It contained a high stocking of large trees in places, indicating the richness of the site, and high growth potential here.

The total volume of the stand (9,554 bd. ft/ac) is composed primarily of yellow-poplar (3,139 bd. ft/ac), white ash (1,616 bd. ft/ac), and sugar maple (1,323 bd. ft/ac), which make up about two thirds of the total volume. Northern red oak, shagbark hickory, chinkapin oak, and various other species make up most of the rest of the volume.

Stand 3 – Oak hickory
This 26-acre stand covers about another quarter of the tract, and was found mostly along the mid to upper slope position of the west facing hill between the old field pine at the top and the mixed mesophytic at the bottom.

The total stand volume (10,220 bd. ft/acre) is composed primarily of white oak (2,859 bd. ft/acre), shagbark hickory (1,480 bd. ft/acre), northern red oak (1,432 bd. ft/acre), and black oak (1268 bd. ft/ac), with the remaining 30% of the volume consisting of white ash, pignut hickory, sugar maple, and chinkapin oak.

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

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.

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.

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.

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.

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

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.

ZaC2 Zanesville silt loam, 6-12% 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.

WeD2 Wellston silt loam, 12-18% 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.

WeD3 Wellston silt loam, 12-18% slopes, severely 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.

RECREATION: This tract is located in the heart of the largest contiguous block of forest comprising Harrison-Crawford State Forest, and several trails traverse the tract. There is a legitimate mapped horse trail that runs north-south through this tract across the flat ridgetop plateau, and one illegal trail that veers down the hill and seems to parallel the adventure trail in the northern portion of the tract.

The adventure trail passes through this tract, and parallels the horse trail, just over the edge of the hill, and there is an overnight shelter located on the edge of this tract that gets a high amount of use by overnight campers using the trail. The level of trash that accumulates at this site over time is a good indicator of how much use it receives.

Likely, there is a fair amount of hunting pressure here due to access off of Cold Friday Road via the fire trail system. Due to its proximity to Cold Friday Road, there may also be some general hiking going on here as well.

Jay's Pit Cave is located not too far from this tract in the nature preserve nearby, and at least one other wild cave was located during inventory in this tract – also a pit cave. So, there is likely use of the area by cavers looking to visit caves and find new ones in the area.

WILDLIFE: This tract represents a varied mixture of upland forest habitat, including mast producing oak hickory, as well as mixed mesophytic, and a sizeable area of old field that has been planted to pine, and has regenerated naturally. 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 planted pine. 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 State Forest bat and wildlife conservation strategies.

Guidelines for preferred density of live and dead trees:

# of live trees per acre	Guidelines maintenance	Tract 3103 actual present – harvest = residual
12”-18” DBH class	6	36.5 – 21.6 = 14.9
20” DBH and greater	3	12.2 - 8.4 = 3.8
Total	9	48.7 - 30.0 = 18.7

# snags per acre	Guidelines maintenance	Guidelines optimal	Tract 3103 actual
6” - 8” DBH class	1	1	39.0
10”-18” DBH class	2.5	5	19.9
20” DBH and greater	0.5	1	1.0
Total	4	7	59.9

These numbers show that both live tree densities, as well as snag densities, meet guidelines. The density of large snags is somewhat different from several other recently completed inventories because it 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. Live tree residual numbers are lower here than on other tracts due primarily to tallying of most of the pine for removal, and a significant enough amount of the acreage being taken up with pine stands.

Management activities will not intentionally remove snags, with a few exceptions of large recently dead trees or storm damage when possible, so the prescribed management activities 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 should not affect this habitat long-term from the perspective of wildlife utilizing it due to the maintenance of surrounding forested habitats. However, the tract was inventoried with the idea of creating a large complex of openings (in the short term) on the flat plateau where the pine and successional hardwood stands currently occupy the site. Creation of openings will create important 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. The elimination of much of the non-native pine, though, will remove the thermal cover that can be utilized by some species of wildlife in the winter when snow and ice may be stressing to them.

This tract does come close to - but does not border - the Ohio River. There should be no disruption of any potential travel corridors along the river by forest management activities due to a 750+ foot buffer between the two. 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 truly riparian habitat might be, or as forest in a non-forested landscape might be.

Since this tract represents a component of contiguous forest, management activities may disrupt forest interior species by temporarily creating edge habitat for generalist species. The potential impact is somewhat lessened in that there are already about 4-5 acres of maintained openings present on this tract.

WATERSHED / HYDROLOGY: The majority of the tract contains gentle to moderately steep slopes that drain into an intermittent that drains into the Ohio River less than a mile to the west. This area appears to have a potentially extensive karst system, so much of the hydrology would consist of subsurface drainage. There is at least one open sinkhole found on this tract which appeared to be a short pit cave. Jays pit cave is located to the west in the nature preserve. The area on top of the ridge is flat and probably poorly drained, with the potential for seasonally ponded water in places. There were three areas where the drainages formed small seasonal waterfalls in this tract as well.

HISTORICAL AND CULTURAL: Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted 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 several scattered pockets of ailanthus present this tract – mostly in the old field areas 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 and adventure hiking trail, and along the maintained open areas. Multiflora rose was also present in places in the old field areas.

SILVICULTURAL PRESCRIPTION:

General: Number of trees per acre and basal area per acre figures indicate that all stands are fully to overstocked at between 95% to 120%. Removal of trees tallied as "cut" either via a timber sale or TSI would significantly reduce the stocking levels in all three stands, but especially in the old field pine area. This is due to tallying most of the non-native pine and drought damaged yellow-poplar for removal to make a series of fairly large regeneration openings. Selective removals and thinning treatments between the openings would keep these thinned areas in the fully stocked range.

Utilizing records of the past history of this tract, an inventory done in 1972 indicated a total standing volume of somewhere between 371 to 1250 board feet per acre. The records in the file from this inventory are sketchy and the tracts were defined differently back then. Consequently, it becomes hard to determine what portions of which tracts' cruise data pertain to what is now defined as tract 3103. It appears that what used to be identified as tracts 3104, 3106, and 3105 now make up the current 3103.

No timber removals were performed in the intervening 40 years, and the 2013 inventory shows 6671 board feet per acre, and this figures out very roughly to a growth rate of 140 board feet per acre per year, after dividing the difference by 41 years of growth since the last inventory, and using an average of 950 bd. ft/ac as the starting inventory number.

The growth figures are reasonable considering about half of this tract is some stage of recovering old field – though the pine should have shown significant volume accumulation in the time that it has grown since the last inventory. It is hoped and assumed that this growth rate can be increased into the future with the continued management and encouragement of vigorous and healthy crop trees, and long-term conversion of the pine and low grade hardwood occupying the old field areas to a better crop of hardwood trees.

Due to current stand conditions and the amount of volume being carried on the majority of the tract (6700 bd. ft/ac), a harvest is prescribed and could be undertaken in this tract at any time. This would produce a sale volume of about 350,000-550,000 board feet The volume tallied for harvesting includes about 72,000 board feet of various pine species. If a large regeneration harvest is done in the pine stand, an additional 40,000 board feet of pine would be added to the harvest volume. Potentially this tract could be broken down into 2 sales – one involving about 300,000 board feet in the natural hardwoods stand, and one involving about 250,000 board feet in the pine stand targeting mostly a regeneration cut and early successional habitat development.

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 – especially if the pine stand is regenerated. 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 northeast slope with a fair amount of mixed mesophytic composition, as well as a flat ridgetop with poplar and ash present, this operation may not be feasible to attempt to

undertake except in the drier 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.

Stand 1: Old field - pine

This 68-acre stand covers just over half of the tract acreage, and occupies the entire flat eastern plateau, as well as the smaller ridgetop and upper slopes of the northwestern portion of the tract. Within this stand area is also contained about 4.6 acres of mostly nontimber brush and grassland that serve as wildlife openings. The stand contains a mixture of vegetation that has either grown back naturally or has been planted since these areas were abandoned from their former agricultural uses. There is a noticeable amount of planted pine of several different species here, as well as natural hardwood regeneration of yellow-poplar, white ash, black cherry, sassafras, and other assorted species. This stand contains a volume of 4621 board feet per acre of which 3202 was classified as potentially harvestable

The breakdown of harvest versus leave and the resultant reduction in stocking was a result of tallying most of the poplar, ash, and non-native pine as harvest trees to convert the stand from pine and low quality hardwoods, while leaving some residual oak and other species. Realistically, due to the drought damage to poplar, the impending EAB threat to ash, and the stagnated pine, most of this stand could be regenerated to establish a new stand and create important early successional wildlife habitat. A multi-use fire/horse trail runs through the large plateau and the Adventure Hiking Trail is not too far from it, so some buffering of this area would be in order, as well as pockets of good growing stock that could be retained. As a result, this stand might best be treated as a series of regeneration openings with fingers or pockets of uncut trees left interspersed.

Due to the presence of the red and Virginia pine, as well as low quality yellow-poplar with drought issues, and ash susceptible to EAB, the recommendation for this stand is to have a harvest that involves mostly regeneration of the existing timber to establish a new stand of trees and young forest areas on this site.

Potentially, this stand could be included in any timber sale taking place in stands 2 and 3, or it could be treated completely separately and marketed as a large regeneration cut. By itself, it could produce approximately 250,000 board feet, and a fair amount of this would be pine. The majority of the harvest volume for stand 1 would be contained in yellow-poplar, Virginia pine, and red pine. Sassafras, white oak, black cherry, white ash, and other species would make up of the remainder of the harvest volume.

Post harvest TSI should be performed to eliminate 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 throughout this tract, and most were noticed in this stand.

Stand 2: Mixed mesophytic

This 28-acre stand covers almost a quarter of the tract, and is located along the drainages and lower slopes of the tract. It contains a high volume of 9554 board feet per acre of which 5431 was classified for potential harvest. If all harvestable tallied trees were included in the harvest, stocking levels may be reduced by about 50%. However, actual removals between group selection areas would be much lighter and retain full stocking in thinned areas.

Given the current stand conditions and the very high volume of timber being carried in the stand, the recommendation would be to include it with stand 3 as a medium to high priority for conducting a managed harvest. The majority of the harvest volume for stand 2 would be contained in yellow-poplar and white ash. Sugar maple, chinkapin oak, sycamore, American beech, northern red oak, basswood, and black cherry would make up of the remainder of the harvest volume.

Most of the stand would 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. Single tree selection areas would retain fully stocked levels. 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 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 throughout this tract, but most were not noted in this particular stand.

Stand 3: Oak hickory

This 26-acre stand covers 20% of the tract, and is located mostly along the upper slopes. It contains a high volume of 10,220 board feet per acre of which 5983 was classified for potential harvest. Similar to stand 2, if all harvestable tallied trees were included in the harvest, stocking levels may be reduced by about 50%. However, actual removals between group selection areas would be much lighter and retain full stocking in thinned areas.

Given the current stand conditions and the very high volume being carried in the stand, the recommendation would be to include it with stand 2 as a medium to high priority for conducting a managed harvest. The majority of the harvest volume for stand 3 would be

contained in black oak, white ash, white oak, and northern red oak, with pignut hickory, sugar maple, and chinkapin oak making up of the remainder of the harvest volume.

Most of the stand would 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. As with many other mature oak hickory stands, this stand will continue to transition to a white oak-dominated stand as black oak is removed through silvicultural management 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 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, but most were not noted in this particular stand.

PROPOSED ACTIVITIES LISTING

Summer 2013	Field inventory
Winter 2013 – Spring 2014	Write mgmt plan
Summer 2014 - Fall 2014	Basal bark treat ailanthus
Fall 2014	Mark timber sale
Spring 2015	Sell timber sale
2015 / 2016	Post harvest TSI
2020	Recon & monitor for exotics and regeneration
2028-2029	Inventory for next mgmt cycle

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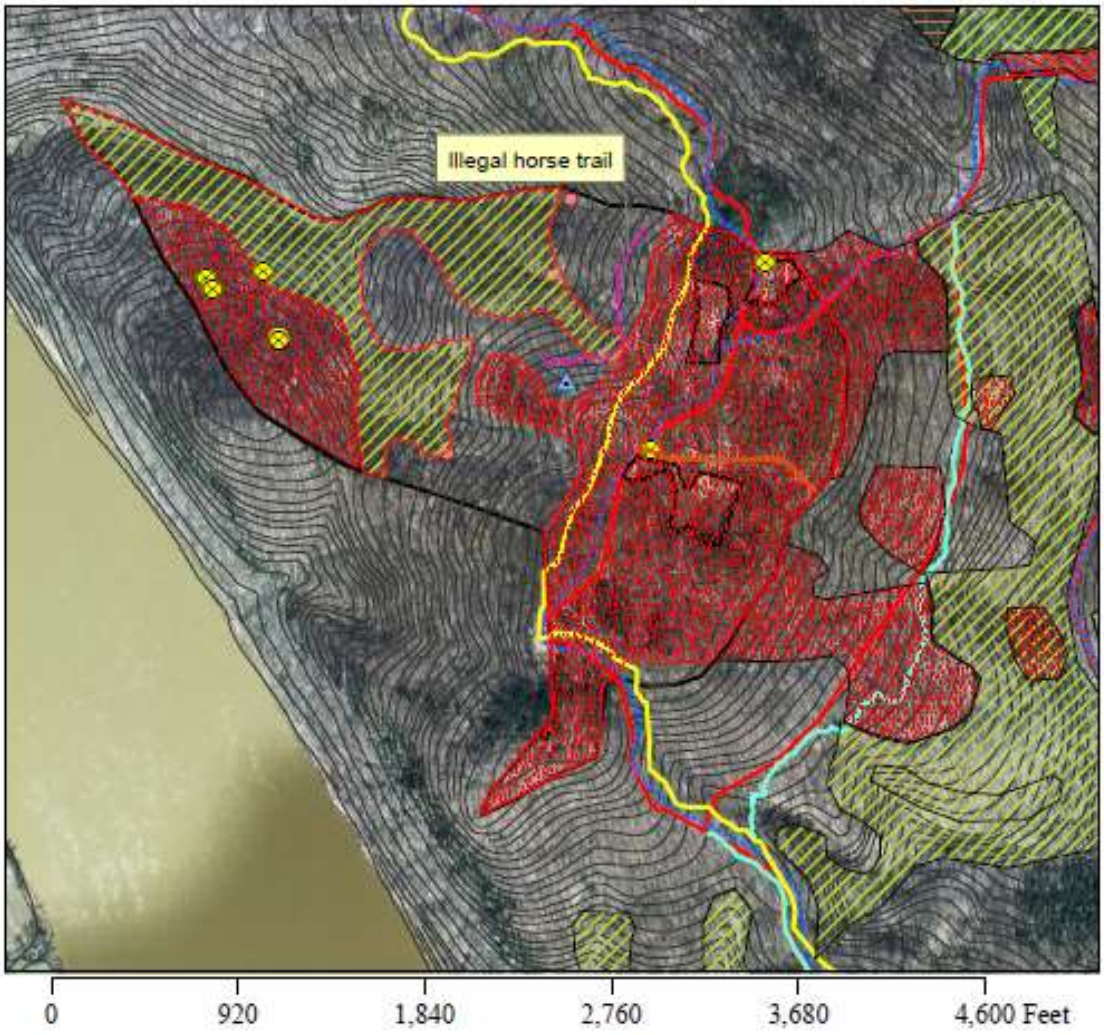
Tract 3103



Legend

- 3104 fire trail
- Adventure Hiking Trail
- Horse trails
- Firelanes
- tract 3103

Stand 1: Old field - pine - 67.9 ac

Stand 2: Mixed mesophytic - 28.2 ac

Stand 3: Oak hickory - 25.6 ac

Semi-permanent wildlife openings - 4.6 ac

Ailanthus pockets

N
W
E
S