

Indiana Department of Natural Resources – Division of Forestry

**DRAFT
RESOURCE MANAGEMENT GUIDE**

State Forest: Harrison-Crawford
Forester: John Segari
Management Cycle: 20 yrs

Compartment: 23 Tract: 11
Date: __2/18/2013 __

INVENTORY SUMMARY

Number of strata: 3 **Est. Annual Growth:** 198 bd. ft/ac/yr*
Permanent Openings: 3 ac **Tract Acreage:** 107
Average Basal Area: 99 sq. ft/ac **Site Index:** 70-80 (for upland oaks)

*Growth calculations are detailed in appendix 1

Table 1. Tract 2311 Inventory Summary

Species	Harvest		Leave		Total	
	Per acre	Total	Per acre	Total	Per acre	Total
White oak	46,240	424	139,190	1,277	185,430	1,701
Black oak	41,710	383	76,970	706	118,680	1,089
Chestnut oak	41,010	376	39,220	360	80,230	736
Yellow poplar	40,380	370	75,210	690	115,590	1,060
Pignut hickory	27,390	251	26,650	244	54,040	496
Northern red oak	25,300	232	45,880	421	71,180	653
Eastern redcedar*	15,240	140	16,790	154	32,030	294
White ash	10,840	99	0	0	10,840	99
Scarlet oak	8,420	77	1,580	14	10,000	92
Shumard oak	4,690	43	4,500	41	9,190	84
Chinkapin oak	3,410	31	3,880	36	7,290	67
Sycamore	3,070	28	0	0	3,070	28
American beech	2,070	19	0	0	2,070	19
Red maple	970	9	0	0	970	9
Black cherry	0	0	2,500	23	2,500	23
Black walnut	0	0	1,240	11	1,240	11
Blue ash	0	0	2,870	26	2,870	26
Mockernut hickory	0	0	2,180	20	2,180	20
Shagbark hickory	0	0	18,640	171	18,640	171
Sugar maple	0	0	5,730	53	5,730	53
Total	270,740	2,484	463,030	4,248	733,770	6,732

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

Location

This tract is located in Harrison Township, Jennings civil township. It is found in T4S R 3E Sections 7 and 18. It is about 2 miles ESE of the HCSF office. It is south of Old Forest Rd and east of Kintner Rd.

General Description

This tract comprises 107 acres with approximately 3 acres being permanent wildlife openings and a small section of pine. The merchantable acreage is closer to 104 acres. There are five covertypes in this tract; open, pine, oak-hickory, mixed mesic hardwoods, and old-field. The openings and pine are non-merchantable types found at the top of the ridge near the fire lane and should be maintained for habitat diversity. There is a wildlife pond located in the opening area. The merchantable area divides as follows; 81 acres of oak-hickory, 19 acres of old-field, and 4 acres of mixed mesic hardwoods.

These types will be described briefly below and in more detail in the Management section. See Appendix 2 for a map of type locations.

Stratum 1

Oak-Hickory

This covertype occupies 81 acres, (78% of the land area), and provides 88% of the total volume of the tract. This covertype covers all of the slopes and some of the level areas in the tract. White, chestnut, and black oaks with lesser amounts of red oak and yellow poplar dominate the covertype. The quality varies substantially throughout the tract with some very good quality white and chestnut oak but the black and red oaks are generally of poorer quality. Little desirable regeneration is present.

Stratum 2

Mixed Mesic Hardwoods

This covertype occupies only about 4 acres and furnishes about 5% of the volume in the tract. It is found near the old-field area. It is dominated by dense medium to large poplar. It is limited in extent but occurs on good ground.

Stratum 3

Old-field

This covertype occupies 19 acres, (18% of the land area), and furnishes only 8% of the sawtimber volume in the tract. It is found on most of the level areas in the tract and is dominated by small to medium eastern red cedar with some yellow poplar and other hardwoods mixed in. The canopy trees are generally of poor quality but there are many areas of good oak poles and small sawtimber. Most of the cedar is too dense to allow regeneration to occur.

History

This tract is part of three different acquisitions. A small portion of the tract was first acquired in 1936 from a Cline family. The next year, the majority of the tract was acquired from a Mr. Kingston and the Godfreys. The flat areas of the tract were all farmed at one time. These areas have grown back to mostly cedar with some oak and the mixed hardwood area.

The tract was first inventoried in 1973. At this time, the area averaged 1400 bdf/acre. This did not include the old field areas, only the merchantable areas. The management guide

recommended a harvest between 1983 and 1988. The area was part of a harvest in 1986. The majority of this harvest was in tract 2312; however, a large opening was created in 2311 just below the rim by the wildlife opening. The tract was again part of a larger sale area in 1991 that included tract 10 to the north. This sale treated most of the tract with the exception of the old field areas. Another regeneration opening was created near the eastern property line. This sale was aimed at thinning the small diameter oak areas in tract 11 and a sanitation cut to remove dead or dying black oak.

Landscape Context

The dominant land use within a 5-mile radius is forest. To the west lies the main contiguous body of the state forest. To the east is a mixture of woodlots and farm fields. Some of the surrounding area does receive active management and some is enrolled in the Classified Forest Program. This forest is similar in composition, quality, and other attributes to much of the upland forest in the area.

Geology, Soils, and Hydrology

A southeast facing slope is the dominant aspect of this tract. There is a flat field at the top of the slope and a more gently rolling slope with a drainage at the bottom of the slope. There are a variety of grades in the tract including some rock outcrops, steep areas, and more medium grade slopes.

See Appendix 2 for topo map.

Soils

Given the topography of the tract, a variety of soils are present. Three soil series account for more than 87% of the acreage:

Hagerstown Silt Loam, 57.4 acres, 53.7% of the tract; well-drained soils formed in residuum of hard gray limestone. Slope ranges from 0 to 45 percent. Permeability is moderate.

Corydon Stony Silt Loam, 24 acres, 22.4% acreage; shallow, well drained soils that formed in as much as 20 cm (8 inches) of loess and in the underlying limestone residuum. The Corydon soils are on hills underlain with limestone. Slope ranges from 6 to 70 percent.

Crider Silt Loam, 12.2 acres, 11.4% of the acreage; very deep, well-drained, moderately permeable soils on uplands. They formed in a loess mantle and the underlying residuum from limestone. Slopes range from 0 to 30 percent.

Other soils present include those from the Gilpin and Tilsit series. See Appendix 3 for soils map.

Soil concerns

Most of the soils in this tract are limited for log yards. The log yard will be located on the ridge top to help alleviate the soil concerns. Other concerns will be adequately addressed through the implementation of Indiana's BMP's.

Hydrology

There are several sinkholes and a possible cave. Several small drainages carry water after rainfall. Indian creek is directly below the tract and provides drainage for the area. A ring of trees buffers the wildlife pond on the ridge top. Indiana's BMP's will adequately protect the water quality within and downstream of the tract.

Access

Access to this tract is good. A newly renovated firetrail coming off Kintner Road provides direct access to the field on the ridge top. Machinery movement in the interior of the tract is

limited in some areas due to rock outcrops but a trail on the ridge that forms the northern tract boundary provides a good opportunity for a herringbone pattern of skid trails into 2311 and 2310.

Boundaries

The western boundary is the Kintner Rd firetrail. The northern boundary is the ridge top and is monumented by a trail for the most part. The northeast boundary is the section line as monumented by a pipe and survey marker at the SE corner of section 7. The property line then runs southwest to another stone. The south line runs from this stone to another stone, with the line being monumented along the way with t-posts. The southwest line is a vague drainage back up to the ridge top. Internal monuments include a stone on the section line at the southern 1/4 corner of section 7. This stone has been noted in past reconnaissance but was not found during the current inventory.

There is a possible discrepancy in the location of the SE corner of section 7. This should be clarified with the Harrison county surveyor.

Wildlife

This tract represents typical upland forest habitat, in addition to a component of old field successional habitat, with dense 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. The oak-hickory type provides a hard-mast food source, but other habitat components would come from the old-field cedar type and the open field at the ridge top. This field is naturally succeeding with trees. Using the area as a log yard will remove these trees and help maintain it as an open area. The log yard will also provide a cut-off pile that will offer small mammal and reptile habitat. This old-field provides denser cover for bedding areas, especially during the winter months. The cedar, especially, might provide cover from snow or ice, as well as roosting areas for turkeys and other birds.

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. **Numbers below include the 12 species noted “as having relatively high value as potential Indiana bat maternity roost trees” by the USFWS. There are many other trees of various species present on the tract.**

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

# of live trees	Guidelines Maintenance	Tract 2311 actual present	
11”+ DBH class	963	1905	
20” DBH and greater	321	525	
# snags	Guidelines Maintenance	Guidelines optimal	Tract 2311 actual
5” + DBH class	428	749	1563
9”+ DBH class	321	642	721
19” DBH and greater	53	107	145

These numbers show that both live tree densities as well as snag densities meet optimal guidelines on this tract for all size classes. However, it is likely that additional snags in all size classes will be created by post harvest TSI activities.

Rare, Threatened, and Endangered Species

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.

Exotic Species

Ailanthus altissima, tree of heaven, and Pawlonia are establishing in old openings and near several tree falls. The infestation was not large but should be taken care of before becoming a problem. Trees were painted in pink to facilitate TSI operations and removals.

Recreation

This tract includes a short portion of the Adventure Hiking Trail. The firetrail on the ridgetop used to be part of the Turkey Ridge trail system. It is still used but is not part of the designated system. However, OWSP has expressed an interest in possibly diverting horsetrail traffic onto the new firetrail and closing the current highly eroded trail. There are some trails going in from adjoining property and local residents likely use the area for hunting, however no deer stands were found.

Cultural Resources

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.

Management Prescription

Stratum 1: Oak-Hickory

Current condition:

This covertype covers all of the slopes and some of the level areas in the tract and occupies 81 acres, 78% of the tract area, and provides 88% of the total volume of the tract. White, chestnut, and black oaks with lesser amounts of red oak and yellow poplar dominate the covertype. The quality varies substantially throughout the tract with some very good quality white and chestnut oak but the black and red oaks are generally of poorer quality. Little desirable regeneration is present. The inventory is summarized in Table 2 with species composition detailed in Table 3. Currently the covertype is just below the 90% stocked condition, see appendix 4.

Table 2. Oak-Hickory Inventory Summary

STRATUM: Oak-Hickory		ACREAGE: 81	
	CUT (bd ft)	LEAVE (bd ft)	TOTAL (bd ft)
Volume/acre	3,044	4,920	7,964
Volume total	246,564	398,520	645,084
Basal area/acre	45	58	103
Trees/acre	38	89	126

Table 3. Oak-Hickory Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (bd ft/ac)
American beech	26	0	26
American sycamore	38	0	38
Black cherry	0	31	31
Black oak	478	894	1,372
Black walnut	0	15	15
Blue ash	0	36	36
Chestnut oak	511	489	1,000
Chinkapin oak	43	48	91
Eastern redcedar	74	0	74
Northern red oak	315	488	803
Pignut hickory	289	305	594
Scarlet oak	105	0	105
Shagbark hickory	0	232	232
Shumard oak	58	56	114
Sugar maple	0	71	71

White ash	135	0	135
White oak	576	1,706	2,282
Yellow poplar	395	549	944
TOTAL	3,043	4,920	7,963

Desired future condition:

The objective of this stratum is to provide for multiple economic and

ecological services specifically a quality hardwood timber stratum, dominated by oak and hickory, while providing hard mast and early to mid-seral habitat for wildlife and providing a natural filter for the Indian Creek watershed.

Silvicultural Prescription:

In order to meet the desired future condition, a harvest is recommended. Oaks and hickories are not only the best species for supplying hard mast but are also the best quality timber group that is occurring in this covertyp. According to the inventory data, approximately 3,043 bd ft/ac should be removed from this covertyp. Most of this would be removed under a single tree 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. The residual timber should be similar to the current volume distribution. This provides longer-lived higher-quality white oak that allows for more management options into the future. Yellow poplar dominates the old openings. This underscores the need to have advanced regeneration of oak to release through openings. Openings should be large enough to achieve regeneration of desirable species and should coincide with the release of advance regeneration when possible. Stocking in this covertyp will be reduced from 90% to no less than 60%, a slightly fully stocked area.

Uneven-aged management requires that trees in all size classes be removed during harvesting to ensure regeneration. Given that many of these will be un-merchantable, post harvest TSI will be needed to ensure that poorly formed, low-quality trees are removed and treat the understory to eliminate shade tolerant species in favor of oaks and other more desirable species. The girdling of large cull trees will also help to replace any large snags that are accidentally felled during harvest operations as well as increase the downed woody material present and provide invertebrate and small vertebrate habitat. TSI will also be needed to control ailanthus and paulownia that has been found.

Stratum 2: Mixed Mesic Hardwoods

Current Condition:

This covertyp is found adjacent to the old-field area on 4 acres and furnishes about 5% of the volume in the tract. It dominated by dense medium to large poplar. It is limited in extent but occurs on good ground. The inventory is summarized in Table 4 with species composition detailed in Table 5. Currently the covertyp is just above the 100% stocked condition, see Appendix 4.

Table 4. Mixed Mesic Hardwoods Inventory Summary

STRATUM: Mixed Mesic-Hardwoods	ACREAGE: 4		
	CUT (bd ft)	LEAVE (bd ft)	TOTAL (bd ft)
Volume/acre	4,536	5,667	10,203
Volume total	18,144	22,668	40,812

Basal area/acre	70	50	120.5
Trees/acre	131	46	176

Table 5. Mixed Mesic Hardwoods Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (bd ft/ac)
Eastern redcedar	1,616	0	1,616
Northern red oak	0	1,109	1,109
Scarlet oak	0	533	533
Yellow poplar	2,920	4,025	6,945
TOTAL	4,536	5,667	10,203

Desired Future Condition:

The objective of this stratum is to maintain a mesic component in the tract. The poplar managed in the

stratum for as long as possible while allowing mid-successional species to invade the area.

Silvicultural Prescription:

Concentrated patches of poplar and other mesic species add an element of species and habitat diversity that is good for wildlife in the area. These poplars are currently experiencing stress from the drought and thinning would help to alleviate the soil moisture competition. In this area of the central hardwoods, poplar is an early successional species. It naturally dies out through drought stresses and fires allowing previously established oak to dominate these southeast-facing sites. Thinning the area will allow the continued dominance of the poplars. Without this action, they will likely die from an increase in drought stress in the future.

Stratum 3: Old-field

Current Condition:

This covertyp occupies 19 acres, 18% of the land area, and furnishes only 8% of the sawtimber volume in the tract. Most of the level areas in the tract and is dominated by small to medium eastern red cedar with some yellow poplar and other hardwoods mixed in. The canopy trees are generally of poor quality but there are many areas of good oak poles and small sawtimber. Most of the cedar is too dense to allow regeneration to be occurring. Table 6 summarizes the inventory with species composition detailed in Table 7Table 5. Currently the covertyp is just above the 85% stocked condition, see Appendix 416.

Table 6. Old Field Inventory Summary

STRATUM: Old Field		ACREAGE: 26	
	CUT (bd ft)	LEAVE (bd ft)	TOTAL (bd ft)
Volume/acre	624	2,469	3,094
Volume total	11,856	46,911	58,786
Basal area/acre	16	79	95
Trees/acre	12	203	216

Table 7. Old Field Volume by Species

Species	CUT	LEAVE	TOTAL
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	(bd ft/ac)	(bd ft/ac)	(bd ft/ac)
Black oak	160	252	412
Eastern red cedar	216	807	1,023
Mockernut hickory	0	105	105
Northern red oak	0	166	166
Pignut hickory	201	105	306
Red maple	47	0	47
White oak	0	113	113
Yellow poplar	0	922	922
Total	624	2,470	3,094

Desired Future Condition:

The objective for this stratum is to continue providing a dense coniferous habitat while allowing the quality hardwoods

that have established the growing room to continue developing. At the end of the management cycle this coverytype should have progressed to the point where the hardwood area can be classified as oak-hickory, the cedar will be starting to fall apart, and some hardwood regeneration is evident beneath.

Silvicultural Prescription:

Achieving the desired future condition is best achieved through a light improvement cutting followed by post harvest TSI. Removing overtopped poor quality trees, while maintaining bat habitat tree species, will release the younger hardwoods that have regenerated. This will allow for some productive management but not much disturbance or residual damage. The cedar should be skipped for the most part. Especially dense areas should be maintained as is to allow for cover diversity. Any areas of cedar that have significant hardwood regeneration under it should be removed if feasible to release the hardwoods. Post harvest TSI will control any remaining overtopping trees that are unnecessarily competing with the regeneration. This will provide additional raptor and turkey perch trees and structural diversity. Areas of cedar near desirable hardwood species should be thinned in TSI to assist the transition to the understory reinitiation phase.

Tract summary

Summary of silviculture throughout the tract:

Due to the current condition of the stand, a medium level improvement harvest should be undertaken in this tract at anytime. Overall stocking should be reduced from the current 85% to approximately 55%. This is accomplished by a combination of crop tree release, group selections, and cull removal. This would produce a sale volume of approximately 270 MBF or about 2,530 board feet per acre and leave about 433 MBF board feet or 4,330 board feet per acre. 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, control of ailanthus and paulownia, and additional snag creation.

Effect of Prescription on Tract properties:

Soils: The management activities prescribed in this plan should have minimal impact on soils in this tract. Some soil disturbance is likely during harvesting but this should be confined to landings and main skid trails. These areas should be properly closed out according to Indiana's BMPs to minimize the impact of management on soils.

Hydrology: Hydrology should not be permanently affected by management on this tract. Water quality and yield should not be altered if BMPs are followed during harvest.

Wildlife: Wildlife in this tract should not be adversely affected. No rare threatened or endangered species will be adversely affected during the planning period. Snags and coarse woody debris should remain at viable levels in the stand and should continue to provide habitat for the Indiana bat. Managing to recruit newly established or released oaks and hickories will help to ensure that this important food source is available into the foreseeable future.

Wildlife Discussion from Ecological Resource Review: 1.1 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 regeneration openings will create early successional 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.

Indiana Bat

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

# of live trees per acre	Guidelines Maintenance	Tract 2311 present	Planned Harvest	Planned Residual
11"+ DBH	963	1905	893	49
20"+ DBH and greater	321	525	169	36

As noted above, both snag counts and live tree densities are above both the maintenance and optimal guidelines. The table above illustrates that the management recommendations and recommended harvest levels will result in a stand that continues to exceed the recommendations. **Numbers above include the 12 species noted “as having relatively high value as potential Indiana bat maternity roost trees” by the USFWS. There are many other trees of various species present on the tract.** 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 affect that component significantly. Some snags may be felled during harvest operations if they present a physical hazard to field personnel. Additional snags will be created during postharvest TSI, so even with some felling; the densities will likely continue to exceed recommendations.

Recreation: Given the limited amount and type of recreation that is carried out on this tract, this resource will be temporarily affected. The maintenance of early successional habitat and the recruitment of hard mast producers such as oak and hickory to provide deer and small mammal browse should improve hunting opportunities in the long term. A buffer of light marking in the immediate proximity of the AHT will limit the impact to this backpacking trail.

Landscape: Landscape forest patterns will remain similar to the current situation due to this tract being kept in a forested condition.

Proposed Activities Listing:

<u>Proposed Activity</u>	<u>Proposed date:</u>
Treat ailanthus and paulownia	2013
Mark sale with 2310	2014
Sell timber	2015
Post harvest TSI	2017
Monitor regeneration openings	2021
Re-inventory	2033
Write new management plan	2033

Appendix 1 Growth Calculations

Growth is calculated as the amount of merchantable saw log volume that the tract generates between two reference dates. This tract was inventoried in 1973, had a reduction volume through a harvest in 1991, and was inventoried again in 2013.

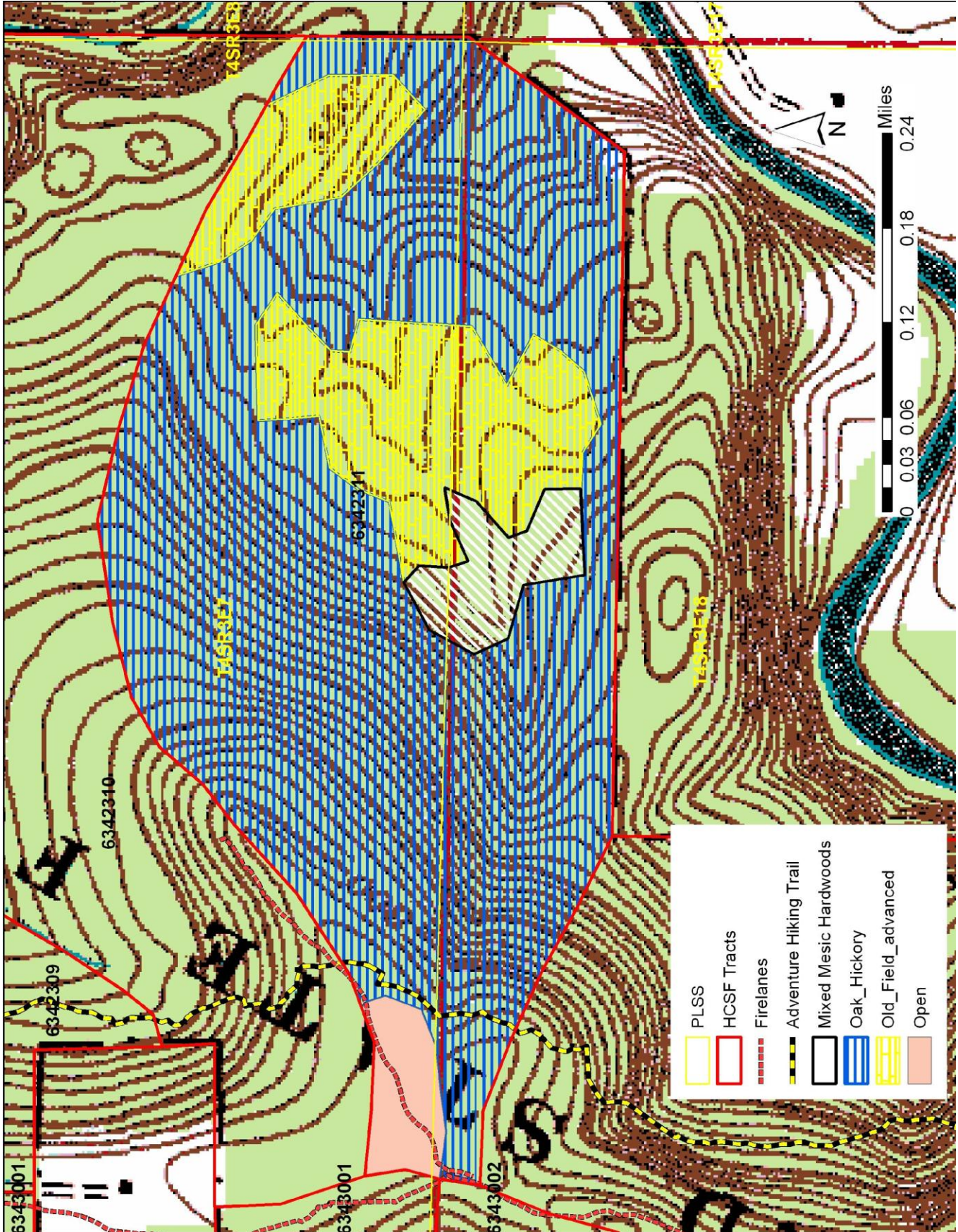
1973 inventory	1429	bdf/acre
1991 harvest	1313	bdf/acre
2013 inventory	8069	bdf/acre*

Annual growth is (2013 volume – 1973 volume + 1991 harvest volume) / (2013-1973)

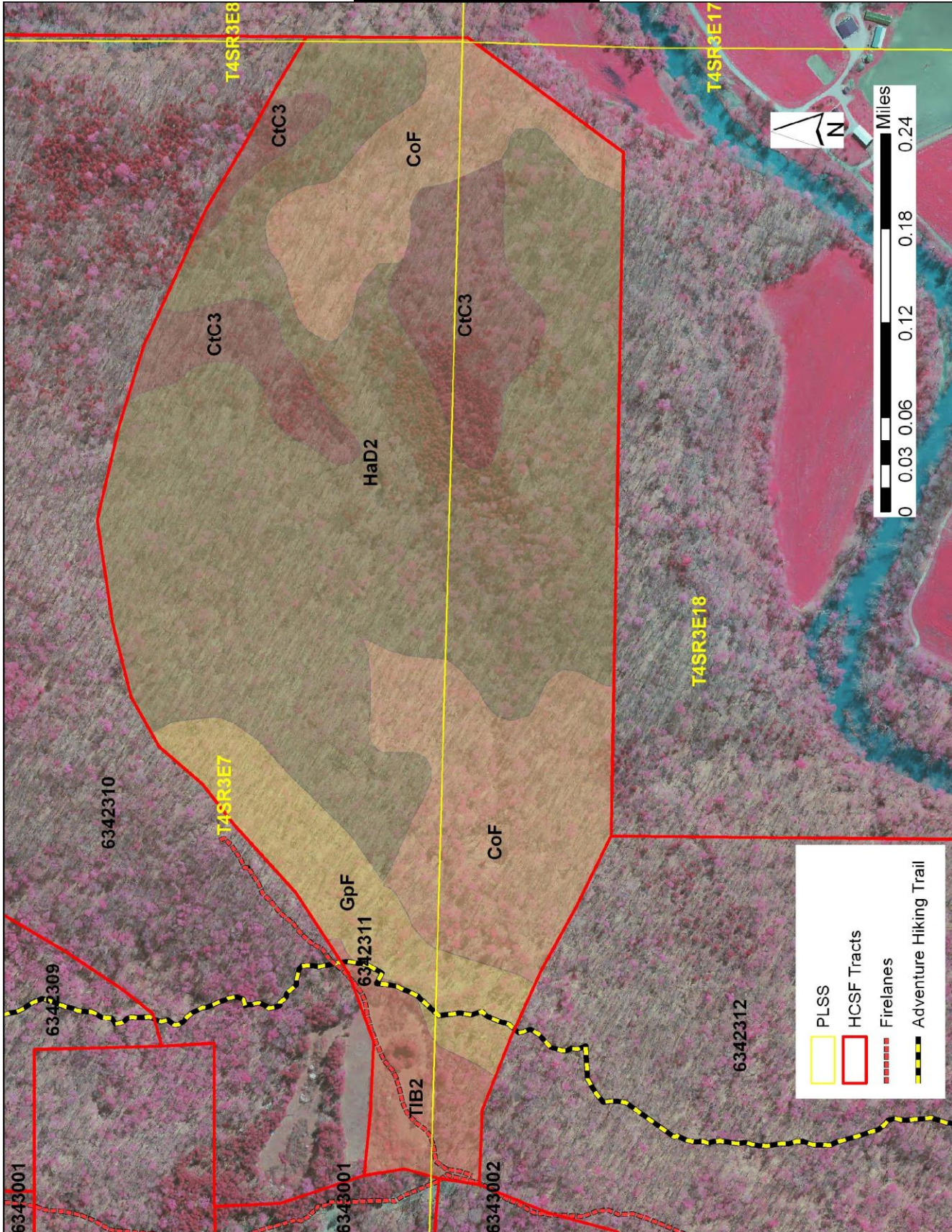
Growth = 198 bd ft/acre/year

* The 2013 volume figure uses only the per acre volume of the oak-hickory area and the mesic hardwood area. The 1973 inventory excluded the old-field area and its inclusion in the present would have skewed the growth value.

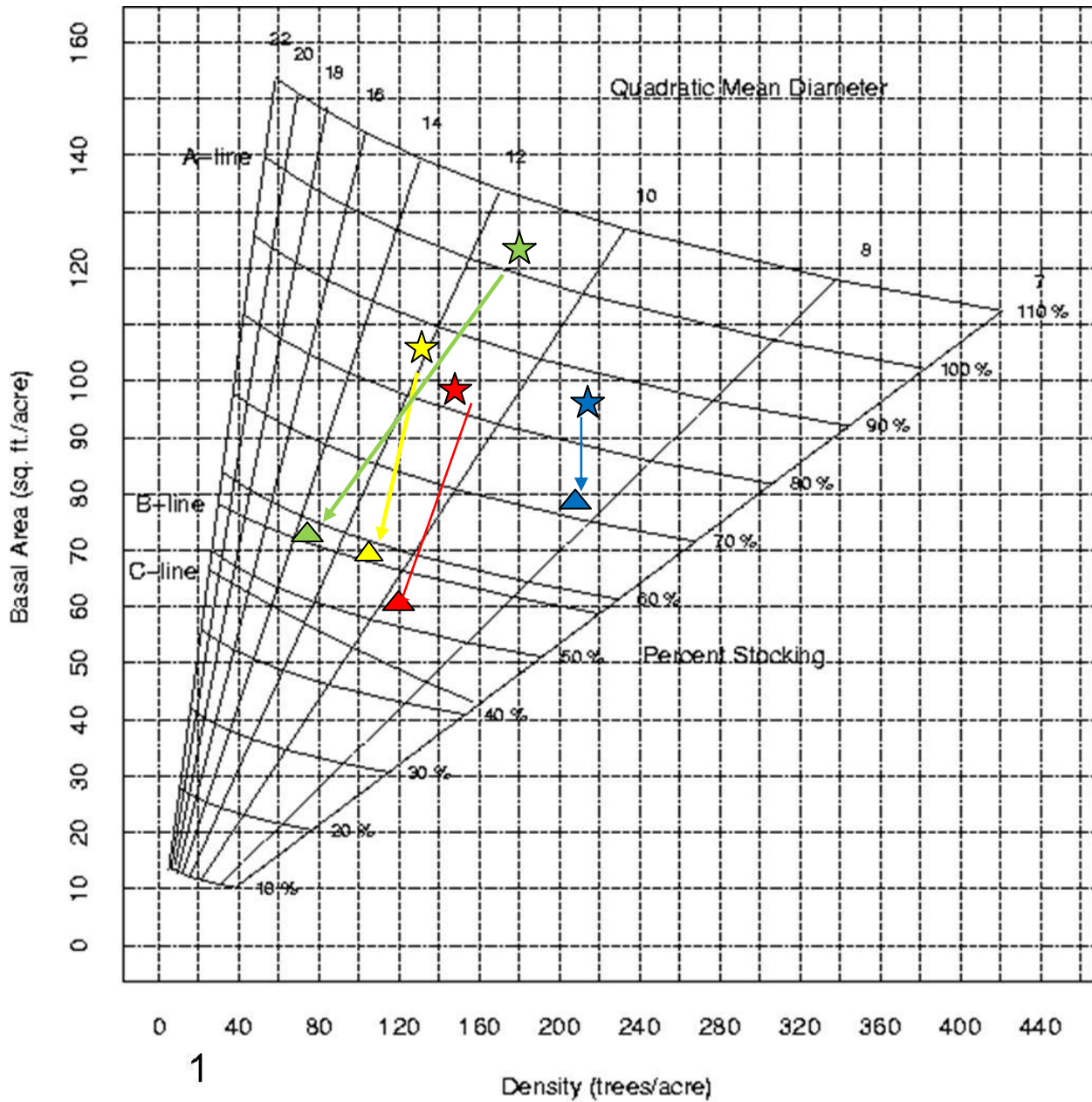
Appendix 2
Tract 2311 Topographic Map with Covertypes



Appendix 3 Tract 2311 Soils Map



Appendix 4 Tract 2311 Stocking Chart



- ☆ Indicates the current stocking condition
- △ Indicates the proposed (post harvest) condition
- Indicates the Tract Total
- Indicates the Mixed Mesic Hardwood covertime
- Indicates the Oak-Hickory covertime
- Indicates the Old Field covertime

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Note: Some graphics may distort due to compression.