Indiana Department of Natural Resources
Division of Forestry
DRAFT

RESOURCE MANAGEMENT GUIDE

State Forest: Harrison-Crawford
Forester: John Segari

Compartment: 03 Tract: 04
Date: September 20, 2011

INVENTORY SUMMARY

Number of stands: 3
Permanent Openings: 0.0 ac
Tract Acreage: 77.2
Average Basal Area: 104 sq. ft/ac

Est. Annual Growth: 141 bd. ft/ac/yr*
Est. Cutting Cycle: 13-18 yrs**
Site Index: 70-80 (for upland oaks)

*Growth calculated as follows:

1998 inventory	6559 bd. ft/ac	Harvest removals 1999	1506 bd. ft/ac
2011 inventory	6608 bd. ft/ac	Growing seasons	11

Estimated growth = [2011 volume - (1998 volume - harvest volume)]/ Growing seasons
Volumes exclude Eastern red cedar due to different scales being used, current scales assign more volume and inclusion would result in an inflated growth estimate.
** Cutting cycle calculated as the length of time required to reach a merchantable sale volume. Merchantable volume is assumed to be 1500 – 2000 bd. ft/ac. CC = 1500 / (.8)*(annual growth)

Table 1. Tract 0304 Inventory Summary

Species	Harvest		Leave		Total	
	Per acre	Total	Per acre	Total	Per acre	Total
American beech	494	38,136.8	108	8,337.6	601	46,397.2
Northern red oak	463	35,743.6	22	1,698.4	485	37,442.0
-Quality	128	9,881.6	186	14,359.2	314	24,240.8
Yellow poplar	347	26,788.4	886	68,399.2	1,255	96,886.0
Black oak	250	19,300.0	493	38,059.6	743	57,359.6
White ash	187	14,436.4	22	1,698.4	209	16,134.8
White oak	173	13,355.6	1,016	78,435.2	1,188	91,713.6
-Quality	94	7,256.8	271	20,921.2	366	28,255.2
-Prime	0	0	178	13,741.6	178	13,741.6
Pignut hickory	96	7,411.2	560	43,232	656	50,643.2
Eastern red cedar*	90	6948	0	0	90	6,948.0
Sugar maple	83	6,407.6	224	17,292.8	307	23,700.4
-Quality	0	0	49	3,782.8	49	3,782.8
Blackgum	69	5,326.8	0	0	69	5,326.8
Mockernut hickory	22	1,698.4	38	2,933.6	60	4,632.0
Red elm	18	1,389.6	0	0	18	1,389.6
Black walnut	16	1,235.2	0	0	16	1,235.2
Black cherry	0	0	28	2,161.6	28	2,161.6

Shagbark hickory	0	0	50	3,860.0	50	3,860.0
Total	**2,530**	**195,316.0**	**4,131**	**318,913.0**	**6,692**	**515,850.0**

** 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.*

LOCATION

This tract is located in Crawford County approximately 3 ½ miles northwest of Leavenworth in the western ½ of Section 27, Township 3S and Range 1E. It is west of Mansfield Rd.

GENERAL DESCRIPTION

This tract is noted in older plans as having 98 acres. However, this was assuming and erroneous eastern boundary. The tract is currently 77 acres composed of a northern and southern parcel that share a common corner located at the NE corner of the SW 1/4. The southern parcel is approximately 37 acres and the northern is 40 acres. This acreage is composed of 3 covertypes or stands; 45 acres of Oak-Hickory, 26 acres of Mixed Mesic Hardwoods, and a 6 acre stand of old field eastern red cedar. These stands will be described briefly below and in more detail in the Management section. See **Appendix 1** for a map of stand locations.

Stand 1
Oak-Hickory
This covertype is found in both the northern and southern parcels of tract 4 and comprise the majority (58%) of the acreage of the tract. It is found on the uplands and shoulder slopes of the northern parcel and is found on both north and south slopes as well as on uplands in the southern parcel.
It is dominated by white oak (2321 bd. ft/ ac.), black oak (1036 bd. ft/ac), pignut hickory (934 bd. ft/ac), northern red oak (904 bd. ft/ ac), and yellow poplar (647 bd. ft/ac). The remaining 9% is composed of white ash, mockernut hickory beech and other hardwoods. The timber is described in inventory notes as medium to large sawtimber. The black oak is mostly large trees that are over-mature.

Stand 2
Mixed Mesic Hardwoods
This covertype is found on the west facing mid and toe slopes in the northern parcel and comprises approximately 34% of the tract's area. Topography in this covertype is generally steep. Almost half (46%) of the total volume of the covertype (7644 bd. ft/ac) is found in American beech (1720 bd. ft/ac) and yellow poplar (1765 bd. ft/ac). White oak (1136 bd. ft/ac), sugar maple (1013 bd. ft/ac), and northern red oak (818 bd. ft/ac) comprise an additional 38%. The remaining 16% is composed of pignut hickory, black oak, blackgum, and other hardwoods.

Stand 3
Old Field Cedar

This covertype is found in an area that had been cleared for farming in the past that succeeded back to mostly red cedar and is starting to have more hardwoods coming in underneath. It is located on a fairly level hilltop in the western half of the southern parcel. This stand is composed of two main species eastern red cedar (1076 bd. ft/ac) and yellow poplar (3474 bd. ft/ac). There is also a small amount of red elm and a lot of sub-merchantable sassafras. It should be noted that the volume of cedar is figured using a cedar log scale that results in a higher than Doyle volume, and includes trees down to 6" DBH as sawtimber volume.

HISTORY

This tract was acquired from Mr. and Mrs. Elliot in 1946 for approximately $7/ acre (Deed 131.133). The upland portion of the southern parcel was part of a cleared field at one point. The tract saw an improvement harvest in 1999. The sale removed approximately 60,000 Doyle bd. ft. of mostly over-mature black and red oak (Sale 2001). The southern parcel was included in a sale with tracts 5 and 6 (Sale 9901), also in 1999. It is not noted how much harvest volume was removed from tract 4 in the sale, however; 419 MBF Doyle were removed from 210 acres in total. 28 of the acres were in Tract 4.

LANDSCAPE CONTEXT

The dominant land use within a 5 mile radius is a mixture of agriculture and residential with public and private woodlands. The Hoosier National Forest is located less than a mile to the west. The trend in this area has been towards more parcelization of larger farm holdings over the last several decades.

GEOLOGY, SOILS, AND HYDROLOGY

The northern parcel is dominated by a west facing slope that varies from moderate to steep. The southern parcel varies from a level upland area in the northern half to a steep drainage in the south, see

Appendix 1 for topo map.

Soils

Tipsaw-Adyeville Complex, 53 acres, 25-75% slopes, TblG,

Tipsaw: Site index for black oak and northern red oak is 70 and annual growth is approximately 684 bd.ft./acre*.

Adyeville: Site index for northern red oak is 64 and annual growth is approximately 516 bd. Ft/ acre*.

Apalona Silt Loam, 18 acres, AgrA (0-2% slopes), Agra B (2-6% slopes), AgrC3 (6-12% slopes),

Site index for black oak and white oak is 60 and annual growth is approximately 516 bd.ft./acre*.

Wellston Silt Loam, 6 acres, WhfC3 (6-12% slopes), WhfD2 (12-18% slopes),

Site indices for yellow poplar and northern red oak are 90 and 81, respectively, with annual growth of approximately 1032 and 684 bd.ft./acre*, respectively.

*-Annual growth is based on the NRCS soil series yields, Table 3. These values represent even-aged stands at culmination of Mean Annual Increment and should be viewed as the upper range of possible yields. Actual yields based on consecutive inventories have shown a much lower yield (See page 1).

These soils, as a complex, vary from moderately well-drained to excessively-drained. They are derived from loess and loamy residuum over sandstone and shale deposits. They do not offer rooting layer restrictions with restrictive layers being 40-70+ inches in depth, See Appendix 2 for soils map.

Soil concerns

The soils in this stand are steep and easily eroded. Harvest entries should be spaced out in time as much as possible to minimize the cumulative effects of soil disturbance through mechanized harvesting. This will help maintain these deep soils and prevent excess erosion.

Hydrology

This northern parcel and northern half of the southern parcel is drained to the west by a small drainage that enters Turkey Fork Creek less than a mile to the south. The southern half of the southern parcel is drained by another small drainage that also enters Turkey Fork Creek less than a mile downstream. Turkey Fork Creek in turn drains to the Little Blue River farther south.

ACCESS

External access to the track is a limiting factor in management of this tract. The northern boundary of the tract is a small road that connects with Mansfield Road. This is the only sure access however it is only about 300 ft across and is very steep. Access across private property in the southwest corner of the northern parcel is likely the best place to access the tract. Access for both harvests involving this tract in 1999 were across private holdings to the east. Internal access is also limiting. The common corner between the northern and southern parcel would require adjacent landowner consent to cross with machinery. Work to be done to secure access will include contacting adjacent neighbors to attempt to secure access for operations and monitoring.

BOUNDARIES

The tract is surrounded by private ownerships with a large individual landholder to the west and the Parkhill subdivision to the east of the northern parcel. The southern parcel is bounded by state property on the south with private property to the north, east, and west. The northern boundary of the northern parcel is a road and the western boundary is the center line of a drainage. The eastern boundary is marked by remnants of an old fence. Survey pins were noted in the 1998 management plan; however these pins were not located for this plan. The southern boundary of the northern parcel is marked with old fencing and an old roadbed. There is a corner stone marking the common corner, this stone was not located.

The southern parcel is bounded on the north by the same old roadbed with a fence on the south side of the road. It is not clear if the road or the fence mark the boundary but an old IDNR sign was found in a tree on the south side of the road. The western boundary is marked by fence fragments. The eastern boundary is also marked by fence fragments and the

1998 plan notes survey pins on this boundary; however these pins were not located for this plan. The southern boundary is an internal tract boundary with tract 0305. This boundary is located at the bottom of a drainage. Survey pins should be relocated and flagged prior to any sales taking place.

WILDLIFE: This tract represents typical upland forest habitat, in addition to a component of old field successional habitat, 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 old field cedar stand. This stand 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. The categories of optimal and maintenance guideline numbers were broken down by size class subcategory, but are inclusive of size classes above that. In other words, the maintenance guideline for number of snags in the 6" class and larger was 4 per acre, but of that number, 0.5 per acre should be 20"+ and 3 should be 10'-18" or greater. This was done because larger trees are more valuable and less common, and were given the greater importance when calculating total guideline numbers.

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

# of live trees per acre	Guidelines Maintenance	Tract 0304 actual present	–	harvest = residual
12"-18" DBH class	6	30	4.8	25.2
20" DBH and greater	3	12.1	2.6	9.5
Total	9	42.1	7.4	34.7

# snags per acre	Guidelines Maintenance	Guidelines optimal	Tract 0304 actual
6" - 8" DBH class	1	1	3.2
10"-18" DBH class	2.5	5	3.7
20" DBH and greater	0.5	1	1.1
Total	4	7	8.0

These numbers show that both live tree densities as well as snag densities meet optimal guidelines on this tract except in the 10-18" DBH class. However, all classes meet maintenance guidelines and it is likely that additional snags in the medium size class will be created by post harvest TSI activities. 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. Some snags may be removed during harvest operations if they present an unmanageable physical hazard to field personnel.
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. There may be some conversion of cedar or the old field area to temporarily open areas that will be allowed to succeed into native hardwoods, and this would change the character of the tract over time, but will not change it into a permanently non-forested cover type. Creation of regeneration openings and/or conversion of portions of the old field area into 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.

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 activities might disrupt any forest interior species by creating edge habitat for generalist species to "invade" the area. This would possibly occur if regeneration openings were put in place that offered a habitat preferred by such generalist species which might move in and start using such habitat. In the context of the surrounding landscape, this tract represents a medium- sized chunk of forest in a matrix of surrounding forest land.

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, was found on the eastern border of the northern parcel. The infestation wasn't large but should be taken care of before becoming a problem. Trees were painted in pink to facilitate TSI operations and removals. There are also some areas of multiflora rose in places – especially in the old field stand – and this would be difficult to eradicate by spraying.

RECREATION

This tract does not currently have any established recreational facilities or amenities. There are some trails going in from adjoining property and the area is likely used for hunting by local residents, however no deer stands were found. Due to the limited size and steep slopes this area has very limited potential for developed recreation.

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

History and General Tract Prescriptions

Desired Future Condition:
This tract provides an outholding of state forest away from the main body of the forest. As this provides ecological and economic benefits to the residents in the area, this condition is desired into the future. Specifically, the tract as a whole should be managed for a sustainable yield of economic benefits, i.e. quality hardwood timber and hunting opportunities, while continuing to yield a range of ecological benefits. The most realistic ecological benefits to manage for on this tract include water quality and wildlife habitat diversity.

History:
This area has seen limited management in the past due to accessibility limitations. An inventory in 1998 showed that the tract had approximately 6561.7 bd. ft/ac Doyle. This was more than 60% oaks; including scarlet, black, white, red, and chinquapin, with the remainder being composed of hickory and other hardwoods. Both parcels of the tract received an improvement harvest in the period of 1999-2000. These harvests primarily removed over mature black and red oak as well as an improvement harvest in the remainder of the stand. 60,017 Doyle bd. ft were removed from 32 acres of the northern parcel. This excluded a buffer around the sandstone feature. The southern parcel was included in a sale that comprised tracts 5 and 6. This sale removed 419,678 Doyle bd. ft. from 210 acres. This excluded the old field covertype of the southern parcel as there was likely no merchantable material in this area yet. Given the sale area found in tract 4 was approximately 13% of the land area of the sale; I estimate that 55,957 bd. ft were removed. This amounts to approximately 1506 Doyle bd. ft/ac being removed or a 20% reduction in volume. There were a few BMP violations noted in the post harvest review, but these were fixed. No regeneration openings were implemented during these harvests. No record of any follow up TSI is recorded in the tract or compartment file.

Current Condition:
The 2011 inventory shows approximately 6698 bd. ft/ac, including eastern red cedar. If red cedar is excluded from both inventories then the annual growth rate is approximately 141 Doyle bd. ft/ac/yr. This is not a very good growth rate. This is largely due to the fact that a large number of large black oaks have died and are providing the large snag/acre count. This volume is treated as lost volume and depresses the growth rate because it has largely come back as understory brush. It is believed 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 low grade cedar occupying the old field areas to a better crop of hardwood trees.

The number of trees per acre and basal area indicate that the tract as a whole is fully stocked, approximately 100%, and approaching the zone of imminent mortality, i.e. it is close to the "A" line, see Appendix 4. Removal of trees that are inventoried as harvest trees would result in the tract being considered 60% stocked.

Silvicultural Prescription:
Due to the amount of volume being carried on the majority of the tract (6698 bd. ft/ac), the general condition of the overstory trees, and the lack of early successional habitat, the initial

impression was that a medium level improvement harvest could be undertaken in this tract at anytime. This would reduce resource competition among the overstory and concentrate growth on more productive crop trees. Opening canopy space for crop trees will also have the added benefit of increasing available hard mast within the tract by promoting seed production in both the oak-hickory covertype as well as the beech in the mixed hardwood covertype. An improvement harvest would also provide for continuous cover helping to prevent erosion and sedimentation of Turkey Fork Creek. Some small group openings would provide early successional habitat and help encourage the regeneration of hard mast species such as oaks and hickories to ensure their presence in the tract into the future.

This would produce a sale volume of approximately 200,000 board feet or about 2540 board feet per acre and leave about 325,930 board feet or 4130 board feet per acre. Stocking would be reduced to the B line at 60%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 and control of ailanthus. 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. Extensive understory treatment of shade tolerant species will be necessary to encourage oak regeneration where present. Most of the TSI will probably be targeted at the old field areas where the composition and stocking could be improved from what currently occupies most of this area. Ailanthus needs to be monitored and eliminated when found to be present or establishing itself. All ailanthus should be killed pre-harvest. While ailanthus was only found in a few places, it is important to kill trees prior to harvesting to prevent a flush of new regeneration from competing with the regeneration and release of native species after the harvest.

Given the limiting nature of access on this tract, and Compartment 3 in general, it would be beneficial to coordinate harvests between tracts 4, 5, and 6. This would have the benefit of possibly increasing sale volume, limiting the crossing of neighbor land, and limiting the number of yards that are needed.

Individual Covertype Prescriptions

Stand 1: Oak-Hickory

Current condition:
This covertype is found on the upland and upper slopes of the tract and comprises 53% of the area and 55% of the volume of the tract. This covertype is dominated by medium to large sawtimber white, black, and red oak with pignut hickory. The inventory is summarized in Table 2 with species composition detailed in Table 3. Currently the covertype is just below the 100% stocked condition, see 18.

Table 2. Oak-Hickory Inventory Summary

STAND: Oak-Hickory		**ACREAGE: 45**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	2,070	4,263	6,371
Volume total	92,730	190,990	285,430
Basal area/acre	39.5	63	103.9
Trees/acre	102	216	327

Table 3. Oak-Hickory Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (Bd ft/ac)
American beech	0	48	48
Black oak	313	723	1,036
Black walnut	27	0	27
Mockernut hickory	38	65	103
Northern red oak	728	174	902
Pignut hickory	104	830	934
Shagbark hickory	0	38	38
Sugar maple	0	31	31
White ash	245	38	283
White oak	296	2,025	2,321
Yellow poplar	318	291	609
TOTAL	2,069	4,263	6,332

Desired future condition:
The objective of this stand is to provide for multiple economic and ecological services specifically a quality hardwood timber stand, dominated by oak and hickory, while providing hard mast and early to mid-seral habitat for wildlife and providing a natural filter for the Turkey Fork 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 covertype. According to the inventory data, approximately 2069 bd ft/ac should be removed from this covertype. 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 stand should be slightly heavier to white oak, with a lesser component of other oak and hickory species, as well as a minor component of mesophytic species. This provides a stand of longer-lived higher-quality white oak that allows for more management options into the future. Openings created by group selection areas will be used to ensure the supply of oak into the future as well as maintain the presence of early seral habitat. 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 covertype would be reduced from 100% to approximately 60%, still a fully stocked stand.

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 that has been found.

Stand 2: Mixed Mesic Hardwoods

Current Condition:
This covertype is found on the toe-slopes of the northern parcel and comprises 34% of the area and 39% of the volume. This covertype is dominated by medium to large sawtimber Yellow poplar and American beech. The inventory is summarized in Table 4 with species composition detailed in Table 5. Currently the covertype is just above the 100% stocked condition, see 18. This site is certainly a more productive covertype than the oak-hickory. There are few if any openings in this covertype but this type contributes to late successional habitat within the tract.

Table 4. Mixed Mesic Hardwoods Inventory Summary

STAND: Mixed Mesic-Hardwoods		**ACREAGE: 26**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	3,565	4,079	7,644
Volume total	93,770	107,280	201,050
Basal area/acre	57.2	53.2	110.4
Trees/acre	92	246	338

Table 5. Mixed Mesic Hardwoods Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (bd ft/ac)
American beech	1,481	239	1,720
Black cherry	0	84	84
Black gum	206	0	206
Black oak	201	98	299
Northern red oak	499	319	818
Pignut hickory	106	226	332
Red elm	55	0	55
Shagbark hickory	0	84	84
Sugar maple	249	764	1,013
White ash	132	0	132
White oak	283	853	1,136
Yellow poplar	353	1,412	1,765
TOTAL	3,565	4,079	7,644

Desired Future Condition:
The objective of this stand is to provide for multiple economic and ecological services specifically a quality hardwood timber stand, dominated by mid- and late-seral species, while providing hard mast and mid to late-seral habitat for wildlife and providing a natural filter for the Turkey Fork Creek watershed.

Silvicultural Prescription:
In order to meet the desired future condition, a harvest is recommended. No action would result in an increase in the amount of beech and poorly formed maple in the stand. As this site is more productive than the oak-hickory type discussed above, attempting to manage for oak might be futile without significant artificial measures. More appropriate would be to manage for a mixture of mesic species such as poplar, sugar maple, and beech while maintaining the more tolerant white oak since these are the best quality timber group that is appropriate to this site. According to the inventory data, approximately 3565 bd ft/ac should be removed from this covertype. This would leave more than 4000 bd ft/ac on the residual stand. The heavier harvesting in this stand as compared with the oak hickory type is due to the high productivity of the site. The majority of the harvest volume is in the form of beech because most is of poor form or cull. Its removal will allow more growing space and resources for other species such as poplar and sugar maple. No openings are needed in this covertype because mid- and late-seral species such as sugar maple and beech can regenerate under their own shade.

Most of this would be removed under a single tree selection routine with larger group openings targeting groups of low-grade trees or multiple large trees growing together. However, multiple tree selection should be used to encourage higher stem quality in saplings by releasing better formed individuals of desirable species. When possible, selection should also favor releasing future crop trees. The residual stand should be slightly heavier to yellow poplar, with a lesser component of sugar maple and white oak, as well as a minor component of other oak species. This provides a stand of longer-lived higher-quality poplar sugar maple, and white oak that allows for more management options into the future. Stocking in this covertype would be reduced from 100% to approximately 60%, still a fully stocked stand. This covertype serves as the last filter strip for the intermittent stream that enters Turkey Fork Creek. The maintenance of a fully stocked stand will help to ensure the continued mitigation of erosion by slowing rainfall and water movement and will limit sedimentation.

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. This will help provide additional habitat for tree dwelling species such as owls, raccoons, squirrels, and woodpeckers. As these snags fall over time they will increase the downed woody material present and provide invertebrate and small vertebrate habitat.

Stand 3: Old Field Cedar

Current Condition:
This covertype is found on the upland flat of the southern parcel and comprises 13% of the area and 6% of the volume. This covertype is dominated by small sawtimber tulip polar with

small eastern red cedar and sassafras. The inventory is summarized in Table 6 with species composition detailed in Table 7. Currently the covertype is just above the 70% stocked condition, see 18. This is misleading because the stocking is based on an upland mixed hardwoods stand and this is a cedar and sassafras stand that is succeeding to a poplar/mixed hardwoods stand. The majority of the cedar and sassafras are either dead or dying.

Table 6. Old Field Cedar Inventory Summary

STAND: Old field-Eastern red cedar		**ACREAGE: 6**	
	CUT(bd ft)	**LEAVE**(bd ft)	**TOTAL**(bd ft)
Volume/acre	1600	3412	5013
Volume total	9760	20810	30580
Basal area/acre	31.2	50	81.2
Trees/acre	118	44	162

Table 7. Old Field Cedar Volume by Species

Species	CUT	LEAVE	TOTAL
BLO	0	462	462
ERC	1076	0	1076
YEP	524	2950	3474
TOTAL	1600	3412	5012

Desired Future Condition:
This stand would be best managed for quality hardwoods and early- to mid-seral habitat.

Silvicultural Prescription:
The main tool for achieving the management goals for this stand will be a harvest. Removing the sassafras and eastern red cedar will open up more space for and accelerate the succession of this covertype to hardwoods. Transitioning to a hardwood stand dominated by poplar will result in the removal of winter thermal cover for wildlife. This process is already occurring through the natural mortality of the cedar. The fast growth of tulip polar lends itself to frequent thinning and regeneration openings. The sooner larger poplar are created the sooner they can be harvested to create more early successional habitat as well as providing opportunities for oak and hickory establishment.

Tract summary

Summary of silviculture throughout the tract:
Due to the current condition of the stand, a medium level improvement harvest could be undertaken in this tract at anytime. Overall stocking should be reduced from the current 100% to approximately 60%. This is accomplished by a combination of crop tree release, cull removal, and converting the old field area into a hardwood stand by removing the cedar and sassafras. This would produce a sale volume of approximately 200,000 board feet or about 2540 board feet per acre and leave about 325,930 board feet or 4130 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 and control of ailanthus.

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. The main affect on wildlife will be the loss of the coniferous component of the stand. This currently provides a limited amount of thermal cover in the winter for deer and small mammals. This type of cover will be permanently lost from the stand. However, the cedar is in decline and would likely have died out and this cover lost in the next two decades without management action. No action in this tract would result in the reduction of a hard mast source for small mammals and birds. 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.

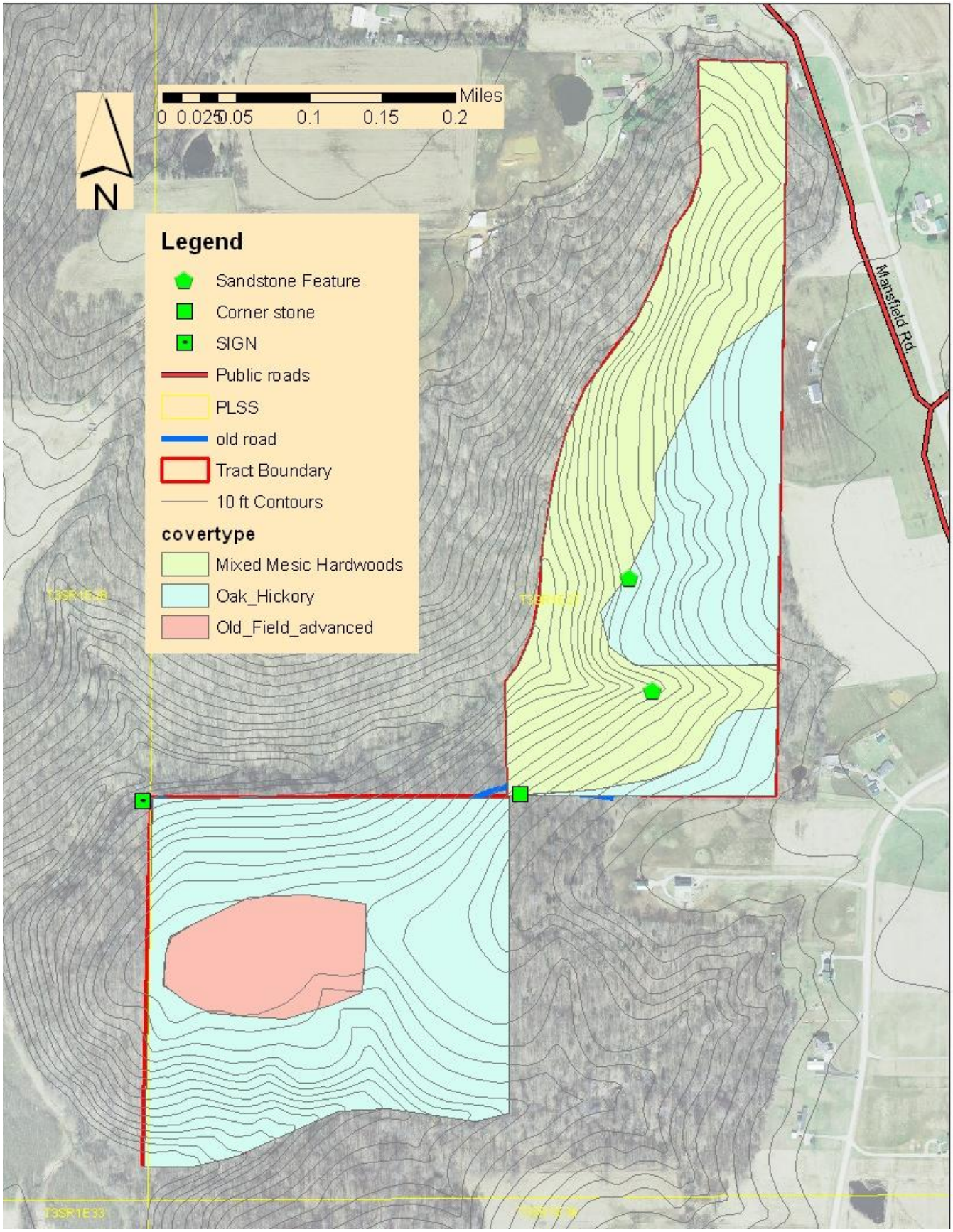
Recreation: Given the limited amount and type of recreation that is carried out on this tract, this resource will be temporarily affected. Hunting opportunities should be improved be the maintenance of early successional habitat and the recruitment of hard mast producers such as oak and hickory to provide deer and small mammal browse.

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

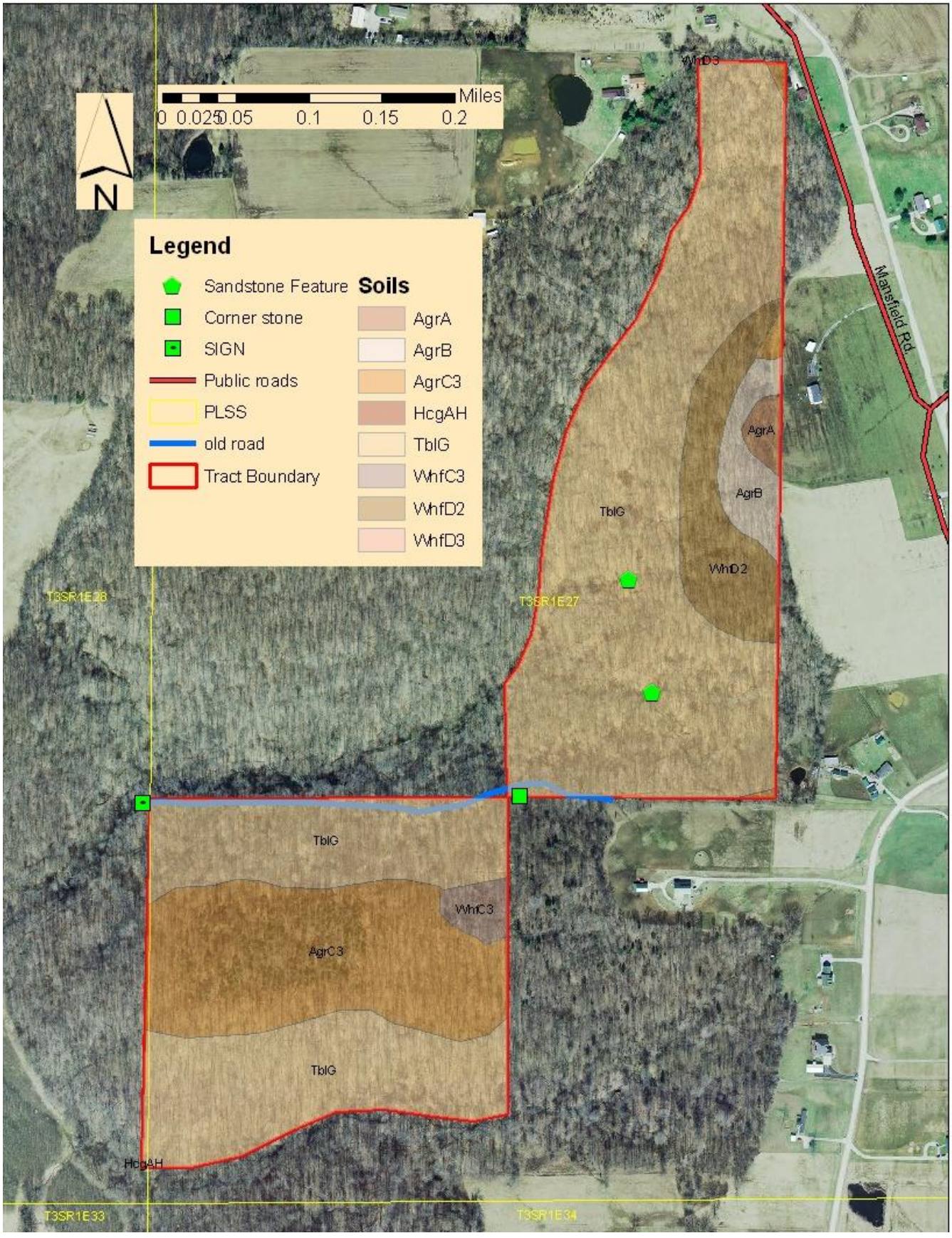
Proposed Activities Listing:

Proposed Management Activity	**Proposed date:** 2012
Treat ailanthus	2012
Contact landowners for access	2012
Mark sale	2012
Sell timber	2013/2014
Post harvest tsi	2020
Monitor regeneration openings	2031
Re-inventory	2031
Write new management plan	

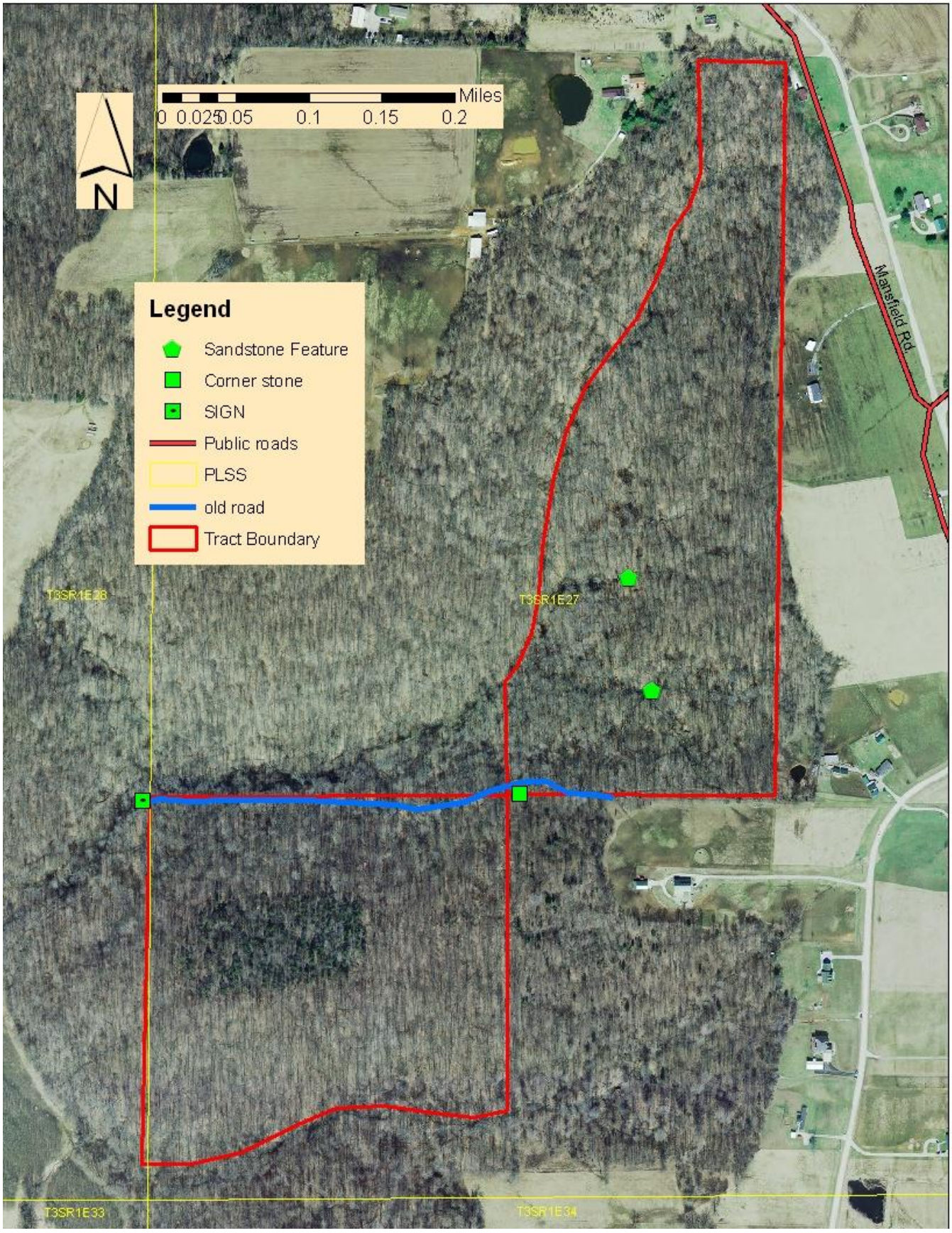
Appendix 1
Tract 304 Topographic Map with Covertypes



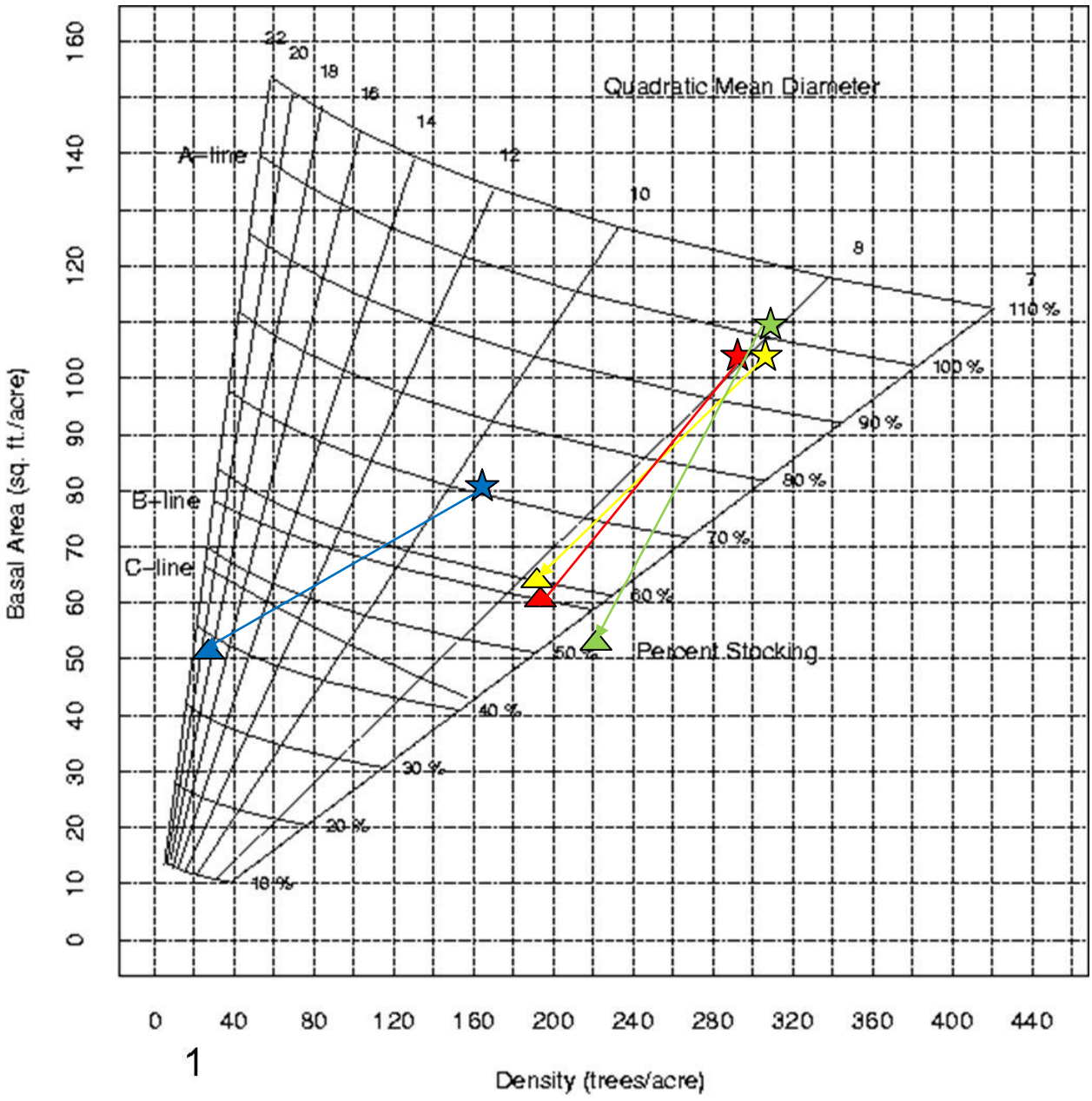
Appendix 2
Tract 304 Soils Map



Appendix 3
Tract 304 Aerial Photo (2005)



Appendix 4
Tract 304 Stocking Chart



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

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You must indicate the State Forest Name, Compartment Number and Tract Number in the “Subject or file reference” line to ensure that your comment receives appropriate consideration. Comments received within 30 days of posting will be considered.

Note: Some graphics may distort due to compression.