Indiana Department of Natural Resources
Division of Forestry

DRAFT

RESOURCE MANAGEMENT GUIDE

State Forest: Harrison-Crawford
Forester: John Segari

Compartment: 02 Tract: 01
Date: __6/29/2012 _

INVENTORY SUMMARY

Number of stands: 7
Permanent Openings: 1.5 ac
Tract Acreage: 54.2 (46 merchantable**)**
Average Basal Area: 89.7 sq. ft/ac

Est. Annual Growth: 259 bd. ft/ac/yr*
Est. Cutting Cycle: 15 yrs**
Site Index: 66 (for upland oaks)

*Growth calculated as a weighted percentage of NRCS soil yields:
** 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 0201 Inventory Summary

Species	Harvest		Leave		Total	
	Total	per acre+	total	per acre+	total	per acre+
Yellow poplar	30420	661	12030	262	42450	923
White ash	24980	543	3720	81	28700	624
Eastern redcedar	19610	426	0	0	19610	426
White oak	14010	305	44190	961	58200	1265
-Quality	0	0	3600	78	3600	233
Sugar maple	10720	233	0	0	10720	238
American beech	10120	220	830	18	10950	394
Black oak	6330	138	11780	256	18110	438
American sycamore	6240	136	13920	303	20160	815
Northern red oak	5700	124	31780	691	37480	162
-Quality	0	0	1740	38	1740	75
Chinkapin oak	3430	75	4040	88	7470	46
Black walnut	2180	47	1290	28	3470	115
Black cherry	2120	46	0	0	2120	157
Pignut hickory	1800	39	3510	76	5310	115
Shagbark hickory	0	0	7220	157	7220	91
Shumard oak	0	0	5290	115	5290	78
Bitternut hickory	0	0	4170	91	4170	38
Silver maple	0	0	1450	32	1450	32
Boxelder	0	0	740	16	740	16

Total	**137,660**	**2,992.6**	**151,300**	**3,289.1**	**288960**	**6,281.7**

** 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.*
+per acre values are calculated with merchantable acres (46 not 54).

Location

This tract is located in Crawford County. The PLSS description is part of T4S R1E Section 1. The tract is less than a mile west of Leavenworth, IN. It is south of highway 62 across from the Leavenworth Memorial Gardens. It is north of Indiana Hollow Rd. and is on the eastern end of Compartment 2.

General Description

The acreage of this tract is 54.2 acres with 46 of those being merchantable. There are 7 distinct covertypes: Oak-Hickory (20 acres, 37%), Mixed Mesic Hardwoods (14 acres, 26%), Old Field (9 acres, 17%), Rocky south slope (5acres, 9%), Bottomland hardwoods (3 acres, 5.5%), open road (1.5 acres, 3%), riparian (2 acres, 3.5%). The tract has never had a managed harvest. The southern ridge is mostly low productivity old field. The northern ridge is low productivity oak hickory with more productive mesic hardwood. This area includes exposed rock faces.
The stands will be described briefly below and in more detail in the Management section. See Appendix 1for a map of stand locations.

Merchantable covertypes

Stand 1

Oak-Hickory- 20 acres
This covertype comprises 37% of the area and 47% of the merchantable volume in the tract.
This covertype is found in the northern and southern ridges. On the higher slopes it is poor-quality, widely-spaced trees. Tree quality increases on the lower slopes. It is dominated by White oak (36%) with all oaks totaling 70% of the sawtimber volume. The remaining 30% is composed of a typical assemblage of upland hardwoods including hickories, maples, poplar, and beech. However, sugar maple makes up 25% of the basal area.

Stand 2

Mixed Mesic Hardwoods
This covertype comprises 26% of the area and 35% of the merchantable volume in the tract.
This covertype is found along the toe slopes and drainages of the tract. It is medium quality and dominated by small to medium sawtimber northern red oak (17%) and yellow poplar (30%). The remaining 53% is composed of a wide variety of hardwood species.

Stand 3

Old Field
This covertype comprises 17% of the area and 10% of the merchantable volume in the tract.
This covertype is found on the upper slopes of the southern ridge from the homesite north.
This covertype is low quality small to medium sawtimber. It is dominated by White ash (49%), Eastern red cedar (39%), and Sugar maple (13%).

Stand 4

Bottomland Hardwoods
This covertype comprises 6% of the area and 7% of the merchantable volume in the tract.

This covertype is found in the low lying area on the western end of the tract and the center of compartment 2. It was previously farmed and has regenerated back to scattered large bottomland hardwood species such as silver maple, sycamore, boxelder, and hackberry.

Non-merchantable Covertypes

Rocky South Slope
This covertype is located on the southern exposure above Indian Hollow Rd. It covers approximately 5 acres or 9% of the tract. It has exposed rock and talus with scattered large trees such as beech, blue ash, and cedar. It is too steep to be efficiently managed.

Open
This area comprises the road and road shoulders. It is approximately 1.5 acres or 3% of the tract. It is dominated by grasses and forbs.

Riparian
This covertype is located between Indiana Hollow Rd. and the Ohio River. It is mostly cottonwood, sycamore, ash, and boxelder. It is steep and managed by the Army Corps of Engineers for ease of navigation.

History

This area was acquired in 1944 (deed 131.127) from a Mr. Elbert Ewing. It has not been inventoried or harvested since the state took ownership. There was a possible timber trespass documented in 2001. This trespass was not pursued due to the small number and size of trees involved.

Landscape Context

The dominant land use within a 5 mile radius is forests and crop fields. The town of Leavenworth is located with a mile of the tract. Development and management trends in this location include housing development. The nearby private forestland has recently been subdivided and is up for sale.

Geology, Soils, and Hydrology

The tract is dominated by two east-west ridges divided by a drainage that runs to the Ohio River. The area is steep with few level areas.
See Appendix 1for topographical map.

Soils

Corydon Stony Silt (CqyG)
(Soil covers 87% of the area of the tract and 90% of the merchantable area)

The Corydon series consists of shallow, well drained soils that formed in as much as 8 inches of loess and in the underlying limestone residuum. The Corydon soils are on hills underlain with limestone. The surface horizon is 8 inches of a silt loam. The subsoil is 9 inches of clay. The bottom of the profile is un-weathered bedrock.
Degree Slope: 20-60%
Management Concerns: runoff and erosion

Hydrology

This area has limited Karst hydrology. The subsurface is limestone and there are a few small sinkholes. The area drains almost directly to the Ohio River. Sink holes will be avoided as specified in Indiana's BMP's.

Access

Management access for this tract is not good. External access is limited because the lowland area will be impassable for logging equipment and the south exposure is too steep. The old road bed going past the homesite provides the only accessible grade. The internal access is also limited. The deep drainage that bisects the tract is not passable in most places. However, there are one or two places where it is possible.

If management activities are taken, the best route may be to access through the private land between the road and the north ridge. This option should be explored further.

Boundaries

The boundaries for this tract are fairly well monumented. The southern boundary is the Ohio River. The western boundary is a major drainage. The eastern boundary has been surveyed by Timberlake in 2007. It begins at a dead scarlet oak tree in the northeast corner. This tree has a Primavera survey pin about 3 ft to the west and a 2 inch pipe 3 ft to the north. The line is monumented with metal T-posts and varying distances. The southern ridge has a state concrete ROW marker on the line. The east and north boundaries are private boundaries while the west is internal.

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 some 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.

<u>Guidelines for preferred density of live and dead trees for use by Indiana bat</u>:

# of live trees per acre	Guidelines Maintenance	Tract 0201 present
12"-18" DBH class	6	20.9

20" DBH and greater	3	5.8
Total	9	26.8

# snags per acre	Guidelines Maintenance	Guidelines optimal	Tract 0201 actual
6" - 8" DBH class	1	1	4.4
10"-18" DBH class	2.5	5	5.7
20" DBH and greater	0.5	1	1.5
Total	4	7	11.9

These numbers show that the numbers of live trees per acre are above the minimums recommended by the Voluntary Interim Indiana Bat Management Guide. The numbers of snags in all size classes are above both the recommended maintenance and optimal levels.

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 western boundary near Indian Hollow Rd. This tree should be controlled as soon as possible.

Honeysuckle and Multiflora rose are present. These should be controlled whenever possible to limit spreading.

Japanese Chaff Flower, *Achyranthes japonica,* is found in the bottomland in large quantities. The species is abundant but mixed with native nettles and other lowland species.

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. Residents of Leavenworth have mentioned the idea of developing a trail system throughout Compartment 2.

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

Stand 1: Oak-Hickory

Current condition:
This covertype is found on the upland and upper slopes of the tract and comprises 37% of the area and 47% of the volume of the tract. This covertype is dominated by medium sawtimber white, black, and red oak with all oaks accounting for 70% of the volume of the stand. The inventory is summarized in Table 2 with species composition detailed in Table 3. This inventory doesn't reflect the transition to maple that is occurring. 16% of the BA of the stand is pole size sugar maple with maples altogether comprising >25% of the basal area. Currently the covertype is just below the 100% stocked condition, see Appendix 4.

Table 2. Oak-Hickory Inventory Summary

STAND: Oak-Hickory		**ACREAGE: 20**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	2,596	4,154	6,750
Volume total	52,439	83,911	136,350
Basal area/acre	60	42	103
Trees/acre	226	81	307

Table 3. Oak-Hickory Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (Bd ft/ac)
American beech	135	63	198
Bitternut hickory	0	102	102
Black cherry	104	0	104
Black oak	255	503	758
Chinkapin oak	168	198	366
Eastern red cedar	59	0	59
Northern red oak	0	1004	1,004
Pignut hickory	88	85	173
Shagbark hickory	0	173	173
Shumard oak	0	182	182
Sugar maple	286	0	286
White ash	368	75	443
White oak	658	1657	2,315
White oak (quality)	0	112	112
Yellow poplar	475	0	475
Total	**2,596**	**4,154**	**6,750**

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.

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 highest quality timber group that is occurring in this covertype. According to the inventory data, approximately 2,569 bd ft/ac could 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 over-mature trees growing together. When possible, selection should also favor releasing future crop trees. The residual stand should be slightly heavier to white and red 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 is somewhat misleading. The inventory data would reduce stocking to around 40%. This is, however, largely because a high proportion of the BA of the stand (25%) is in maple that should be targeted for removal. The division's policy of capturing impending ash mortality results in another 13% of the BA. The removal of ash and maple alone will account for a 38% reduction in stocking. The harvest should be adjusted from these figures to keep more oak and hickory stems to allow for fuller stocking. Keeping some of the better maple would help but the fact that 25% of the stocking is maple is an indication of a pending transition to a more tolerant species composition. Keeping a slightly understocked stand will allow a more intolerant species composition in the future regeneration. When more intolerant species have recruited into the canopy, stocking should be maintained at the more conventional 60-100%.

Stand 2: Mixed Mesic Hardwoods

Current Condition:

This covertype comprises 26% of the area and 35% of the volume. This covertype is dominated by medium to large sawtimber yellow poplar and northern red oak. The inventory is summarized in Table 4 with species composition detailed in Table 5. Currently the covertype is just below the 100% stocked condition, see Appendix 3. 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. The poplar is experiencing heavy drought damage.

Table 4. Mixed Mesic Hardwoods Inventory Summary

STAND: Mixed Mesic-Hardwoods		**ACREAGE: 14**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	3,762	3,763	7,526
Volume total	51,163	51,177	102,354
Basal area/acre	70	38	108
Trees/acre	187	85	272

Table 5. Mixed Mesic Hardwoods Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (bd ft/ac)
American beech	541	61	602
American sycamore	337	208	545
Black oak	83	111	194
Black walnut	0	95	95
Eastern red cedar	506	0	506
Northern red oak	419	876	1,296
Northern red oak (Quality)	0	128	128
Pignut hickory	0	131	131
Shagbark hickory	0	271	271
Shumard oak	0	115	115
Sugar maple	87	0	87
White ash	223	161	384
White oak	43	764	807
White oak (Quality)	0	96	96
Yellow poplar	1,523	746	2,269
Total	**3,762**	**3,763**	**7,526**

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- to late-seral species, while providing hard mast and mid to late-seral habitat for wildlife.

Silvicultural Prescription:
A harvest in this covertype could help maintain mid-tolerant and mid-seral species. The covertype has an abundance of midtolerant oak, northern red and white, comprising almost 23% of the basal area of the stand. The removal of the drought damaged poplar would release the established canopy oaks as well as providing regeneration openings to allow a new cohort of trees to be established. While the inventory indicates approximately half the volume could be removed, during marking, more sugar maple and beech would likely be kept to increase the late seral component and maintain a fully stocked stand; except in areas that are being regenerated.

Stand 3: Old Field

Current condition:
This covertype comprises 17% of the area and 10% of the merchantable volume in the tract. This covertype is found on the upper slopes of the southern ridge from the homesite north. This covertype is low quality small to medium sawtimber. It is dominated by White ash (49%), Eastern red cedar (39%), and Sugar maple (13%). The inventory is summarized in Table 6 with species composition detailed in Table 7. Currently, the covertype is just below the 100% stocked condition, see Appendix 3.

Table 6. Old Field Inventory Summary

STAND: Old Field		**ACREAGE: 9**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	3,297	0	3,297
Volume total	29,673	0	29,673

Basal area/acre	88	6	95
Trees/acre	518	231	749

Table 7. Old Field Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (Bd ft/ac)
Eastern red cedar	1280	0	1280
Sugar maple	412	0	412
White ash	1605	0	1605
Total	**3297**	**0**	**3297**

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.

Silvicultural Prescription:
This stand should be harvested over two cutting cycles to convert the area to a productive hardwood stand. The stand is currently low in density and quality. Regenerating this covertype will increase density and quality. There is oak and hickory in the stand that didn't show up on the inventory. Marking should create openings in areas of oak regeneration and concentrate thinning around established oaks. Removals should not include oaks and hickories. This will maintain favorable seed trees and allow oaks and hickories to be established for release during the next cutting cycle.

Stand 4: Bottomland Hardwoods

Current condition:
This covertype is found on the toe slopes of the tract and comprises 5.5% of the area and 7% of the volume of the tract. This covertype is dominated by medium to large sawtimber silver maple, sycamore, and boxelder. The inventory is summarized in Table 2e 8 with species composition detailed in Table 9. Currently the covertype is just below the 80% stocked condition using bottomland hardwoods stocking charts, see Appendix 4. There is no tree regeneration occurring. The floor of the area is carpeted with false nettle, stinging nettle, and Japanese Chaff flower. There is also a large amount of rutting and compaction from local ATV use.

Table 8. Bottomland Hardwoods Inventory Summary

STAND: Bottomland Hardwoods		**ACREAGE: 20**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	1,128	5,075	6,203
Volume total	3,835	17,255	21,090
Basal area/acre	45	85	130
Trees/acre	85	184	269

Table 9. Bottomland Hardwoods Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (Bd ft/ac)
American sycamore	487	3261	3748
Bitternut hickory	0	614	614
Black walnut	641	0	641
Boxelder	0	218	218
Silver maple	0	426	426
Yellow poplar	0	555	555
Total	1128	5074	6202

Desired future condition:
The objective of this stand is to provide for ecological services specifically, water filtration and sediment control for the Ohio River, quality bottomland forest habitat, and a quality hardwood timber stand.

Silvicultural Prescription:
The location in the Ohio River flood plain and the mucky nature of the soils dictate that the best way to meet the goals of filtration and sediment control is to not have harvesting operations in this covertype. The soil is too wet to support machinery. The Japanese chaff flower should be treated according to the most current methods of dealing with the problem. ATV access should be limited by possibly felling trees across trails but the location is so extensive that it will not be easy.

NON MERCHANTABLE COVERTYPES
These areas are operationally limiting to harvesting and should be avoided and allowed to naturally develop.

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 current stand in two cuts. This would produce a sale volume of approximately 100,000 board feet or about 2217 board feet per acre and leave about 188,000 board feet or 4000 board feet per acre. (These numbers are based on managing the merchantable 46 acres)

While a harvest is recommended, access limitations may result in a lack of marketability. Efforts will be made to contact the adjacent landowner for access to the north ridge. If access cannot be obtained, then access through the homesite can be developed.

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 felled during harvest operations as well as increase the downed woody material present and provide invertebrate and small vertebrate habitat.

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.

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. 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.

1.2 While this tract borders the Ohio River, there are no real riparian areas that will be adversely affected by the recommendations of this plan. This tract, and compartment as a whole, represents the largest contingent of contiguous forest within a mile. As such it is likely utilized more by wildlife than the surrounding area. The development pressures on the adjacent woodland will only increase the importance of maintaining a forested setting here in the future. The habitat on this tract in the context of the surrounding landscape does represent a 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. This travel may be disrupted in the short-term but long-term, the area will remain forested and provide dispersal and travel corridors into the future.

1.3 This tract represents a somewhat disjointed 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 and agricultural land.

Indiana Bat

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

# of live trees per acre	Guidelines Maintenance	Tract 0201 present	Planned Harvest	Planned Residual
12"-18" DBH class	325.2	1132	653	479
20" DBH and greater	162.6	316	86	230
Total	487.8	1448	786	709

As noted above, snag counts for all size classes are above the optimal levels. 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 felled during harvest operations if they present a physical hazard to field personnel. The table above shows that live tree densities will also not be below the recommended levels.

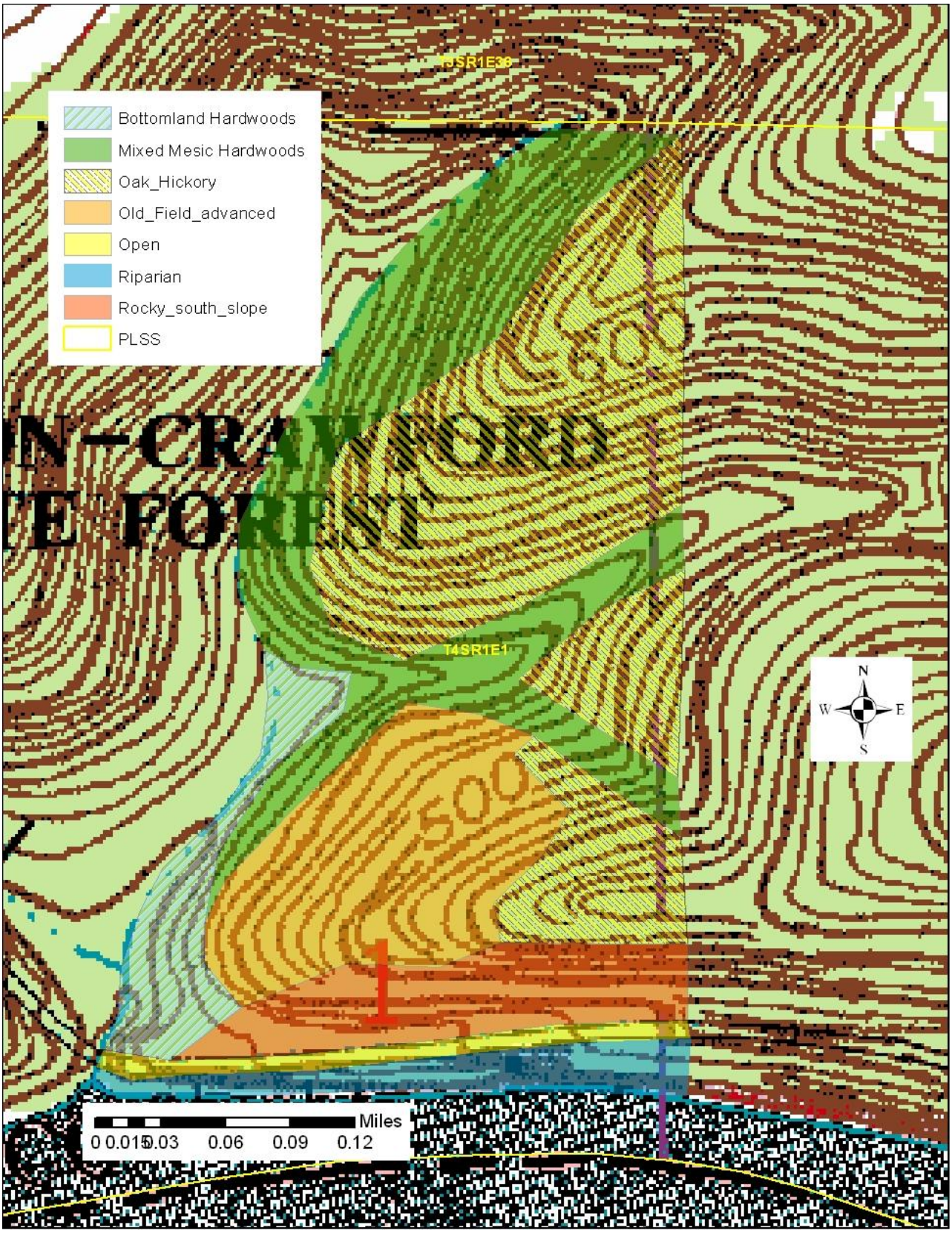
Recreation: Given the limited amount and type of recreation that is carried out on this tract, this resource will be temporarily affected. Hunting opportunities should be improved be the maintenance of early successional habitat and the recruitment of hard mast producers such as oak and hickory to provide deer and small mammal browse. ATV trails should be closed off in the bottomland area. Hiking trail access could be increased if the town of Leavenworth produces a proposal that is acceptable.

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

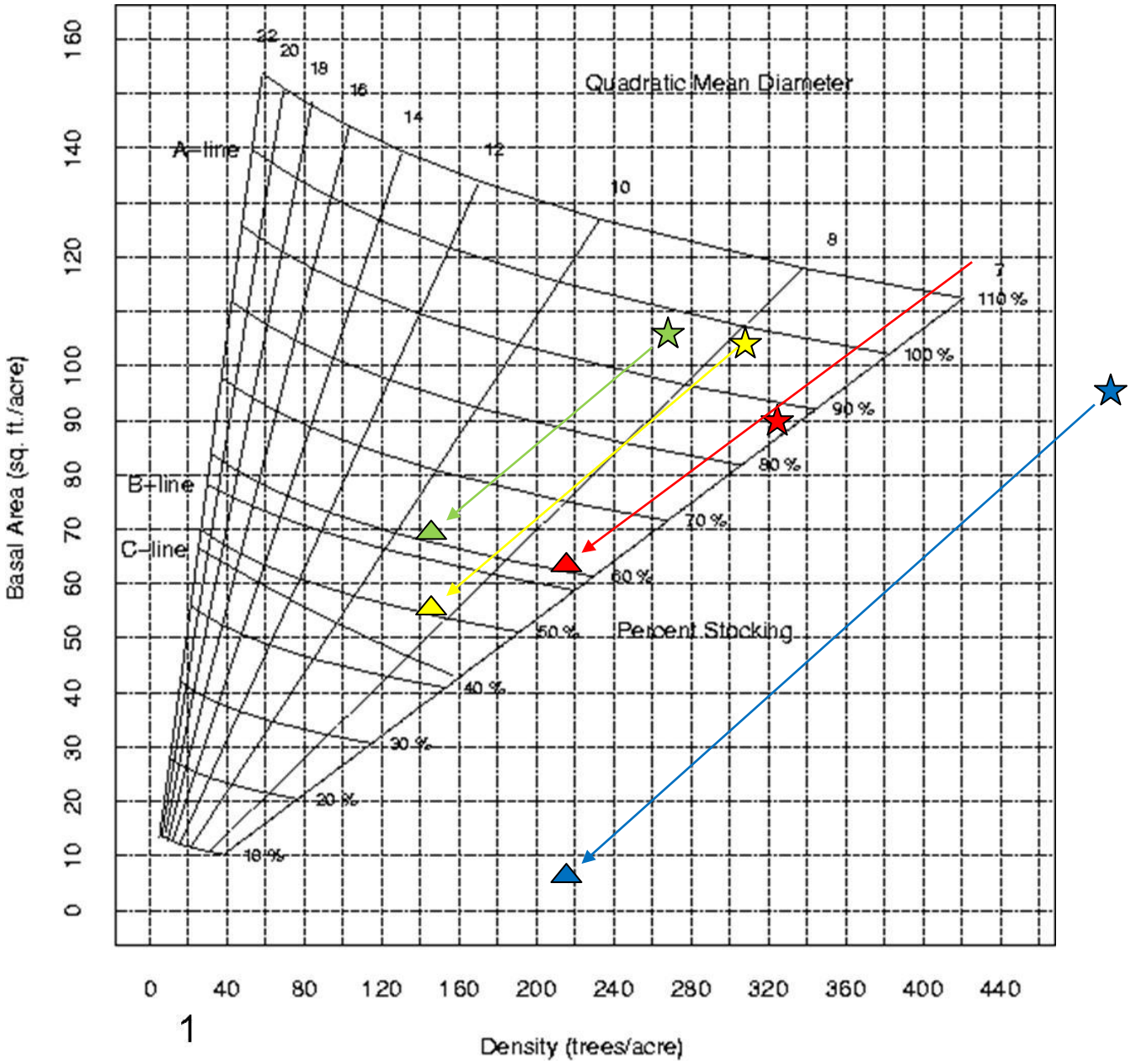
Proposed Activities Listing:

Proposed Management Activity	**Proposed date:**
Contact landowners for access	2012-13
Mark sale	2013-14
Treat invasives	2013-14
Sell timber	2013-14
Post harvest tsi	2015-16
Monitor regeneration openings	2020
Re-inventory	2031
Write new management plan	2031

Appendix 1
Tract 201 Topographic Map with Covertypes

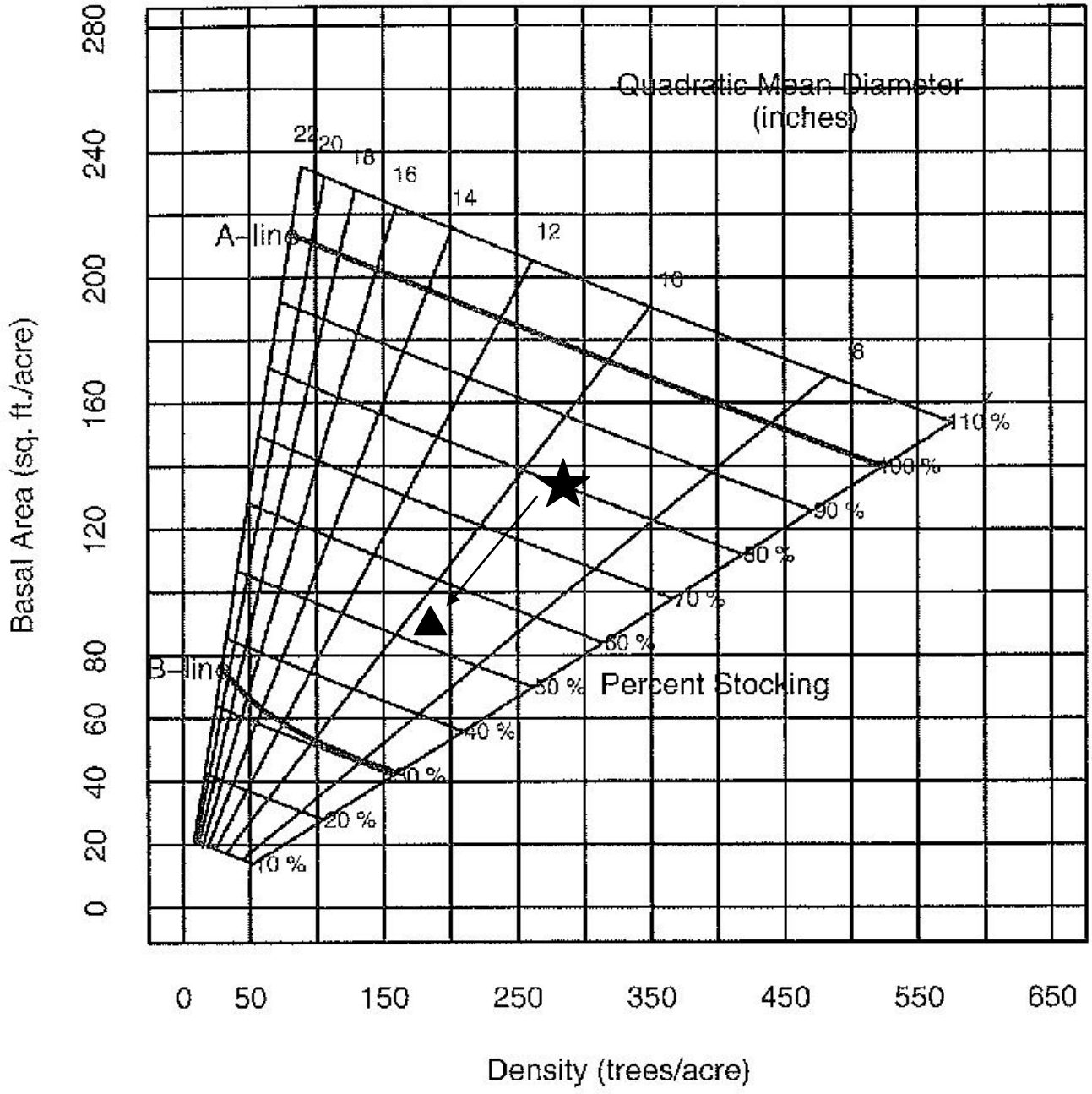


Appendix 3
Tract 201 Upland Hardwoods Stocking Chart



☆ **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
Indicates the Bottomland Hardwood covertype

Appendix 4
Tract 201 Bottomland Hardwood Stocking Guide



■ **Indicates the Bottomland Hardwood covertype**

☆ **Indicates the current stocking condition**

△ **Indicates the proposed (post harvest) condition**

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Note: Some graphics may distort due to compression.