Indiana Department of Natural Resources – Division of Forestry

DRAFT

RESOURCE MANAGEMENT GUIDE

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

Compartment: 5 Tract: 3
Date: __ 1/17/2013_

INVENTORY SUMMARY

Number of strata: 3
Permanent Openings: 0.0 ac
Site Index: 69 (for upland oaks)
*Growth calculations are detailed in appendix 1

Est. Annual Growth: 81 bd. ft/ac/yr*
Tract Acreage: 57
Average Basal Area: 111 sq. ft/ac

Table 1. Tract 503 Inventory Summary

Species	Harvest		Leave		Total	
	Total	Per acre	Total	Per acre	Total	Per acre
White oak	56,150	985	165,480	2,903	221,630	3,888
Black oak	22,720	399	23,970	421	46,690	819
Shortleaf pine	14,070	247	0	0	14,070	247
Yellow poplar	13,660	240	2,960	52	16,620	292
Northern red oak	7,850	138	15,490	272	23,340	409
White ash	3,750	66	1,560	27	5,310	93
Chinkapin oak	3,570	63	1,510	26	5,080	89
Eastern redcedar*	1,840	32	0	0	1,840	32
Pignut hickory	1,160	20	2,530	44	3,690	65
Post oak	950	17	0	0	950	17
American elm	0	0	1,340	24	1,340	24
American syca-more	0	0	2,630	46	2,630	46
Bitternut hickory	0	0	1,560	27	1,560	27
Black walnut	0	0	1,790	31	1,790	31
Honeylocust	0	0	1,160	20	1,160	20
Mockernut hick-ory	0	0	1,850	32	1,850	32
Shagbark hickory	0	0	1,350	24	1,350	24
Total	**125,720**	**2,206**	**225,180**	**3,951**	**350,900**	**6,156**

** 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 Crawford County, Whiskey Run Township, Sections 20 and 29, T2S R2E. It is north of Slick Run Creek Rd. and west of S Whiskey Run Ranch Rd.

General Description

This tract covers 57 acres dominated by a north-south oriented hill with the associated east facing slope and drainage. There are three covertypes found in this tract; Shortleaf pine covers 3 acres at the hilltop next to Whiskey Run Ranch Road, Bottomland hardwoods and scattered openings cover the area adjacent to Slick Run Creek and the drainage in the southeast part of the tract, and Oak-Hickory dominates the remainder of the area. The old field area noted in the 2 previous plans has been successfully converted to young oak-hickory. The tract as a whole is overstocked at almost 110% according to the upland oaks stocking chart.
These strata will be described briefly below and in more detail in the Management section. See Appendix 2 for a map of stratum locations.

Stratum 1
Oak-Hickory
The oak hickory covertype occupies 87% of the tract area, 48 acres, and 98% of the sawtimber volume. It is dominated by White oak (67% of the volume and 52% of the basal area) followed by black oak and northern red oak. The timber is medium quality. There are scattered small sinkholes and rock outcrops on the southern edge overlooking Slick Run Creek.

Stratum 2
Shortleaf pine
This covertype is located on the hill top near Whiskey Run Ranch Rd. and occupies 5% of the area of the tract. The pine is stagnated with 10-20% live crown ratios. It is mostly large pole to small sawtimber size. There are small numbers of hardwood trees on the edge but not many.

Stratum 3
Bottomland hardwoods
This covertype accounts for 10% of the area of the tract. It is a mixture of open areas near Slick Run Creek and poor quality hardwoods in the drainage in the southeast part of the tract. It has little merchantable value.

History

This tract was acquired in 1950 from the Mills family (Deed 131.157). The 1942 aerial photos show the tract as mostly forested with fields in the area now covered with pine and some scattered pasture in the oak-hickory area.
Since the state started managing this tract there have been two previous inventories and a sale in the oak-hickory area in 1992. An inventory in 1984 showed approximately 250 MBF and recommended no harvesting at the time. The inventory in 1992 showed approximately 326 MBF and recommended a light improvement harvest. The subsequent harvest removed approximately 61 MBF mainly in the oak-hickory covertype. There are no records in the tract file documenting the pine planting.

Landscape Context

The dominant land use within a 5 mile radius is a mixture of farm fields, pasture, and closed canopy forest. Both the east and the south boundaries are more state forest land with the surrounding neighbors all having various amounts of contiguous forestland. The neighbors have had harvests in the past resulting in a variety of age classes being present in the area.

Geology, Soils, and Hydrology

The tract is dominated by a north-south oriented ridge on the western boundary and a similarly oriented drainage in the southeast of the tract. The southern boundary is Slick Run Creek which is a gravel-bottomed large intermittent stream. The area is capped with sandstone and shale over limestone.
See Appendix 2 for topo map.

Soils

The following soils describe 97% of the tract acres.
Adyeville Very Fine Sandy Loam, 35 acres, 61%
Wellston silt loam, 11 acres, 19%
Apolonia silt loam, 7 acres, 12%
These are all sandstone derived soils with moderate to excessive drainage. There are no rooting limitations near the surface. Some of the soils are heavily eroded. Soils near Slick Run Creek are limestone derived and weak. The NRCS rates the majority of the site as moderately appropriate for both landings and forest harvesting equipment. See Appendix 3 for soils locations.

Soil concerns

Some of the soils are already eroded due to abuses prior to state ownership. The culvert diverting drainage from north and west of Whiskey Run Ranch rd is contributing to active erosion in the tract.
These concerns will be addressed by the use of appropriate BMP's and locating log landings on the best rated areas of the tract.

Hydrology

The tract drains down to Slick Run Creek in the south. There are some karst features in the ledge overlooking the stream and near the stream bottom including small sinkholes and limestone outcrops.

Access

External access is good. The previous yard was located immediately adjacent to Whiskey Run Ranch rd. This access is still the best area to access the tract for management purposes. Internally there are several existing viable skid trails remaining from the previous harvest in 1992. The far eastern edge of the tract is not very accessible. This area would best be accessed from the east, tract 502. Slick Run Creek is too large to allow access across from the south.

Boundaries

This tract has moderately well established boundaries. The southern boundary is Slick Run Creek Rd. The western line is monumented in the south by a pipe in the hill by Slick Run Creek with fence fragments running north from there. There is also a fence intersection and a pipe evidencing the NW corner of section 29. The line continues north to a large Black oak

stump with a State Forest sign resting on it. This stump and corner have been monumented with two orange state forest carsonite posts. There are fence fragments forming the north line. The Northeast corner is not monumented. The east line has a series of fence fragments as well as a stone marking the section line. The fencing continues sporadically south to a fence intersection and large black oak in the south on the north side of field.

Wildlife

This tract represents typical upland forest habitat, in addition to a component of pine and old field successional habitat, with some 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 stratum, but another habitat component would come from the pine stratum.

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 0503 actual present
12"+ DBH class	509	2079
20" DBH and greater	170	530

# snags	Guidelines Maintenance	Guidelines optimal	Tract 0503 actual
5" + DBH class	226	396	679
9"+ DBH class	170	340	314
19" DBH and greater	28	57	62

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.

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

Multiflora rose and bush honeysuckle were found in this tract during the inventory. These were both found in the open area on the south side of the tract near Slick Run Creek. These

species will be naturally shaded out as this area continues to convert to a closed canopy forest.

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.

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 is found on the upland and upper slopes of the tract and comprises 84% of the area and 98% of the volume of the tract. This covertype is dominated by medium to large sawtimber white, black, and red oaks with other oaks and hardwoods such as yellow poplar and hickories. Notable large tree mortality is occurring in the white and black oaks. There is more than 1 snag over 19 inches in diameter per acre. The inventory is summarized in Table 2 with species composition detailed in Table 3. Currently the covertype is just below the 110% stocked condition. Most of the regeneration in the tract is sugar maple and beech.

Table 2. Oak-Hickory Inventory Summary

STRATUM: Oak-Hickory		**ACREAGE: 48**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	2,417	4,802	7,219
Volume total	115,040	228,570	343,610
Basal area/acre	46.2	70.4	116.5
Trees/acre	46	286	332

Table 3. Oak-Hickory Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (Bd ft/ac)
American elm	0	29	29
Bitternut hickory	0	34	34
Black oak	497	483	980
Black walnut	0	39	39
Chinkapin oak	78	33	111
Eastern redcedar	40	0	40
Mockernut hickory	0	40	40
Northern red oak	172	339	511
Pignut hickory	25	55	80
Post oak	21	0	21
Shagbark hickory	0	30	30
White ash	57	34	91
White oak	1,228	3,620	4,848
Yellow poplar	299	65	364
Total	**2,417**	**4,801**	**7,218**

Desired future condition:
The objective of this area 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. Provide a stratum that can regenerate oak and hickory species for future release.

Silvicultural Prescription:
In order to meet the desired future condition, the area should be thinned and partially regenerated. 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 2417 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. At this time, there is little oak regeneration in the tract. Getting this regeneration established is best done by using areas that will likely not survive another management cycle and thinning these areas heavier than the rest of the tract. This will allow enough light for oak seedlings to establish but maintain 40-60% canopy cover to discourage yellow poplar regeneration. Providing for the establishment of oak regeneration now will allow for its release and continued presence in the covertype into the future. To maintain adequate stocking in the covertype, some areas will be skipped for harvest altogether. When possible, selection should also favor releasing future crop trees. The residual stratum 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 stratum of longer-lived higher-quality white oak that allows for more management options into the future. 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 70%, still a fully stocked stratum.

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. These shade tolerant species will not be eliminated from the tract. They will readily regenerate in areas that are released. Controlling these species now allows intolerant and midtolerant species to be a part of the tract into the future. This ensures a resilient and diverse mix of tree species into the future. 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.

Stratum 2: Shortleaf Pine

Current Condition:
This covertype is found on the hilltop near Whiskey Run Ranch Rd. and comprises 2% of the area and 3% of the volume. This covertype is dominated by large pole to small sawtimber Shortleaf pine. 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 16. There is little hardwood regeneration here. There is also little to no understory. There is notable soil erosion occurring as a direct result of the culvert at the road that drains the northwest side of the road.

Table 4. Shortleaf Pine Inventory Summary

STRATUM: Shortleaf Pine		**ACREAGE: 3**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	3,498	431	3,929

Volume total	10,490	1,290	11,790
Basal area/acre	130	20	150
Trees/acre	173	45	218

Table 5. Shortleaf Pine Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (bd ft/ac)
Black oak	0	431	431
Shortleaf pine	3231	0	3231
White ash	267	0	267
Total	**3498**	**431**	**3929**

Desired Future Condition:
The objective of this stratum is to provide for coniferous habitats and winter cover in the short term while converting the area back to native hardwoods over time. Alleviating the soil erosion problem should also be a priority.

Silvicultural Prescription:
In order to meet the desired future condition, this area should have the pines removed in a two step process. No action would result in an increase in the amount of beech and poorly formed maple in the area as it begins to fall apart. Since there is no good hardwood regeneration to release in this operation, it should focus on thinning the area and establishing hardwood regeneration. This would best be done by thinning the areas as a whole and then including 1-1.5 acres of openings. The area should also receive follow-up TSI to control any shrubby species that might be a barrier to regeneration. Any hardwoods in this area should be maintained to provide structural diversity and seed sources.

Ideally this area could have been kept in pine for longer period of time to allow an additional covertype to be carried into the future. If it had been thinned it may have been possible to keep this stratum. The lack of prior thinning has resulted in live crown ratios below 20% on these trees are they therefore would not respond well to thinning. The thinning recommended into this plan is not to increase the growth or longevity of the pine, but simply to use the pines as a nurse tree for midtolerant regeneration.

Mitigating the affect of the culvert should be done post harvest. The drainage should be rechanneled during closeout. Adding a load of riprap near the culvert and then placing debris in the path of the water will slow the flow and the pace of erosion. This should allow vegeatation to reestablish and hold the soil for a longer period of time.

Stratum 3: Bottomland Hardwoods

Current condition:
This covertype is found on the toe slopes of the tract and near Slick Run Creek and comprises 11% of the area and <10% of the volume of the tract. This covertype is dominated by open shrubby areas mixed with small poorly formed hardwoods. In addition to the sawtimber species listed below, white ash, sugar maple, elm, locust, walnut, and cedar were observed in sub-merchantable size classes. The inventory is summarized in Table 2e 6 with species com-

position detailed in Table 7. Currently the covertype is just below the 30% stocked condition using bottomland hardwoods stocking charts. There is some tree regeneration occurring.

Table 6. Bottomland Hardwoods Inventory Summary

STRATUM: Bottomland Hardwoods		**ACREAGE: 6**	
	CUT (bd ft)	**LEAVE** (bd ft)	**TOTAL** (bd ft)
Volume/acre	0	580	580
Volume total	0	3,480	3,480
Basal area/acre	0	41.7	41.7
Trees/acre	0	144	144

Table 7. Bottomland Hardwoods Volume by Species

Species	CUT (bd ft/ac)	LEAVE (bd ft/ac)	TOTAL (Bd ft/ac)
American sycamore	0	403	403
Honeylocust	0	178	178
Total	0	580	580

Desired future condition:
The objective of this stratum is to provide for ecological services; specifically water filtration and sediment control for Slick Run Creek, quality bottomland forest habitat, and a quality hardwood timber stratum.

Silvicultural Prescription:
The location in the drainage and the mucky nature of the soils dictate that the best way to meet the goals of filtration and sediment control is to limit harvesting operations in this covertype. The soil is usually too wet to support machinery. Single tree selection should be used to remove individual stems whose removal will release better quality stems or species that provide more mast for wildlife such as any hickories or oaks. Long term maintenance of a quality hardwood forest will require the establishment of better tree regeneration. This area should be treated post harvest to control the rose and honeysuckle that is limiting regeneration in the open areas.

Tract summary

Summary of silviculture throughout the tract:
Due to the current condition of the area, 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 should be accomplished by a combination of crop tree release, single tree selection, regeneration openings, and cull removal. This would produce a sale volume of approximately 120 MBF or about 2100 board feet per acre and leave about 230 MBF or 4000 board feet per acre (total volumes deviate from table totals because of the prescription to reserve half of the pine). 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 increase of snag counts. Soil erosion measures need to take place postharvest.

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 area and should continue to provide habitat for the Indiana bat. 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. The main affect on habitat will be a reduction of the coniferous component of the stratum. 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 stratum. However, the pine is stagnated and would likely have died out and this cover lost in the next two decades without management action. 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	Guidelines Maintenance	Tract 503 present	Planned Harvest	Residual above maintenance
12"+ DBH class	509	2079	981	589
20" + DBH and greater	170	530	102	258

As noted above, snag counts for all size classes are above the maintenance levels with only the middle size class not meeting optimal guidelines. 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. 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.

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 Activity	**Proposed date:**
Mark sale	2013
Sell timber	2014
Mitigate soil erosion at culvert	2015
Post harvest tsi	2016
Monitor any regeneration openings	2019
Re-inventory	2032
Write new management plan	2032

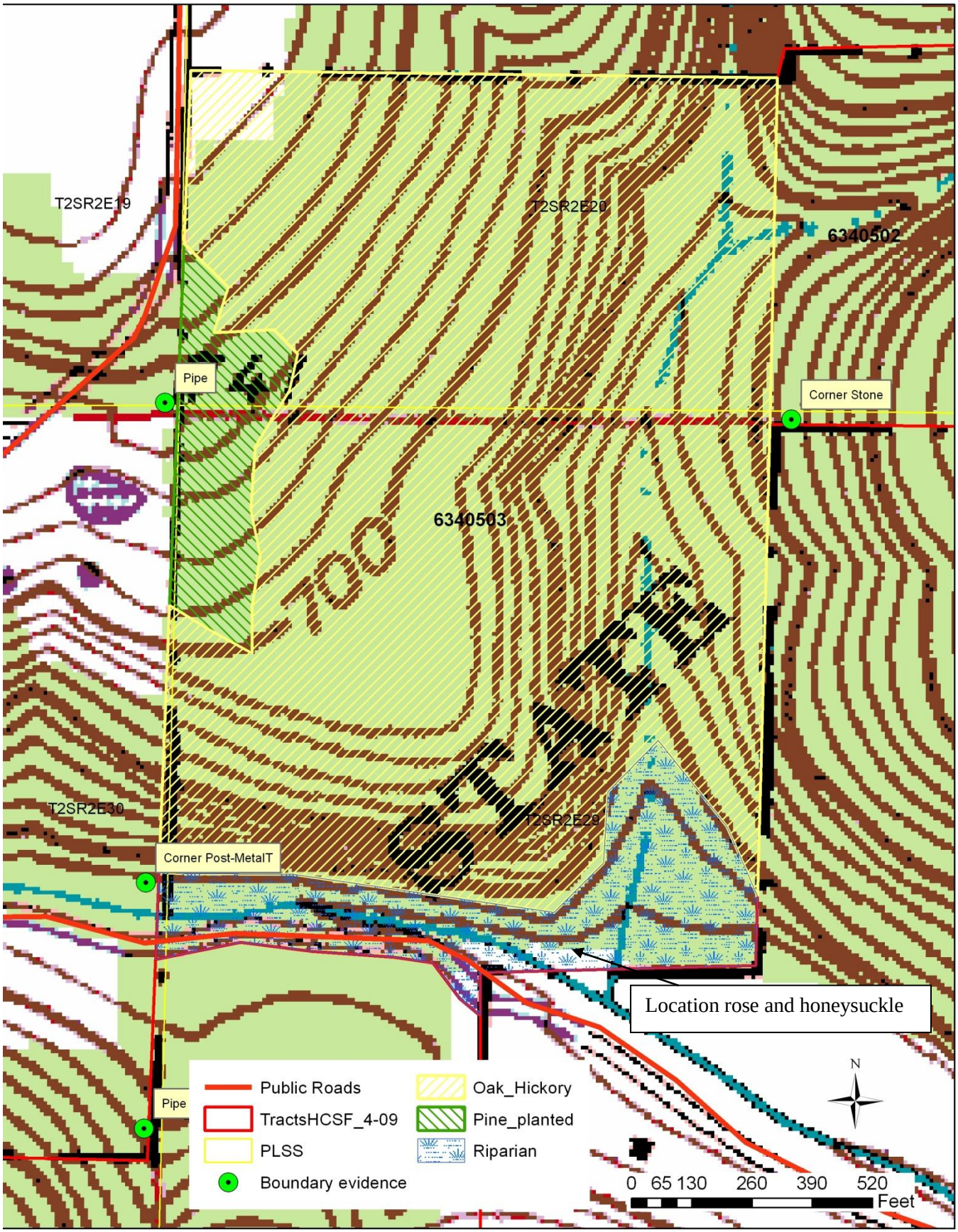
Appendix 1
Growth Calculations

Growth is calculated as the amount of merchantable saw log volume that the tract generates between two reference dates. This tract was inventories in 1984 and again in 1992, had a reduction volume through a harvest in 1993, and was again inventoried in 2012.

1984 inventory	250323 bdft
1992 inventory	326101 bdft
1993 harvest	61548 bdft
2012 inventory	350900 bdft

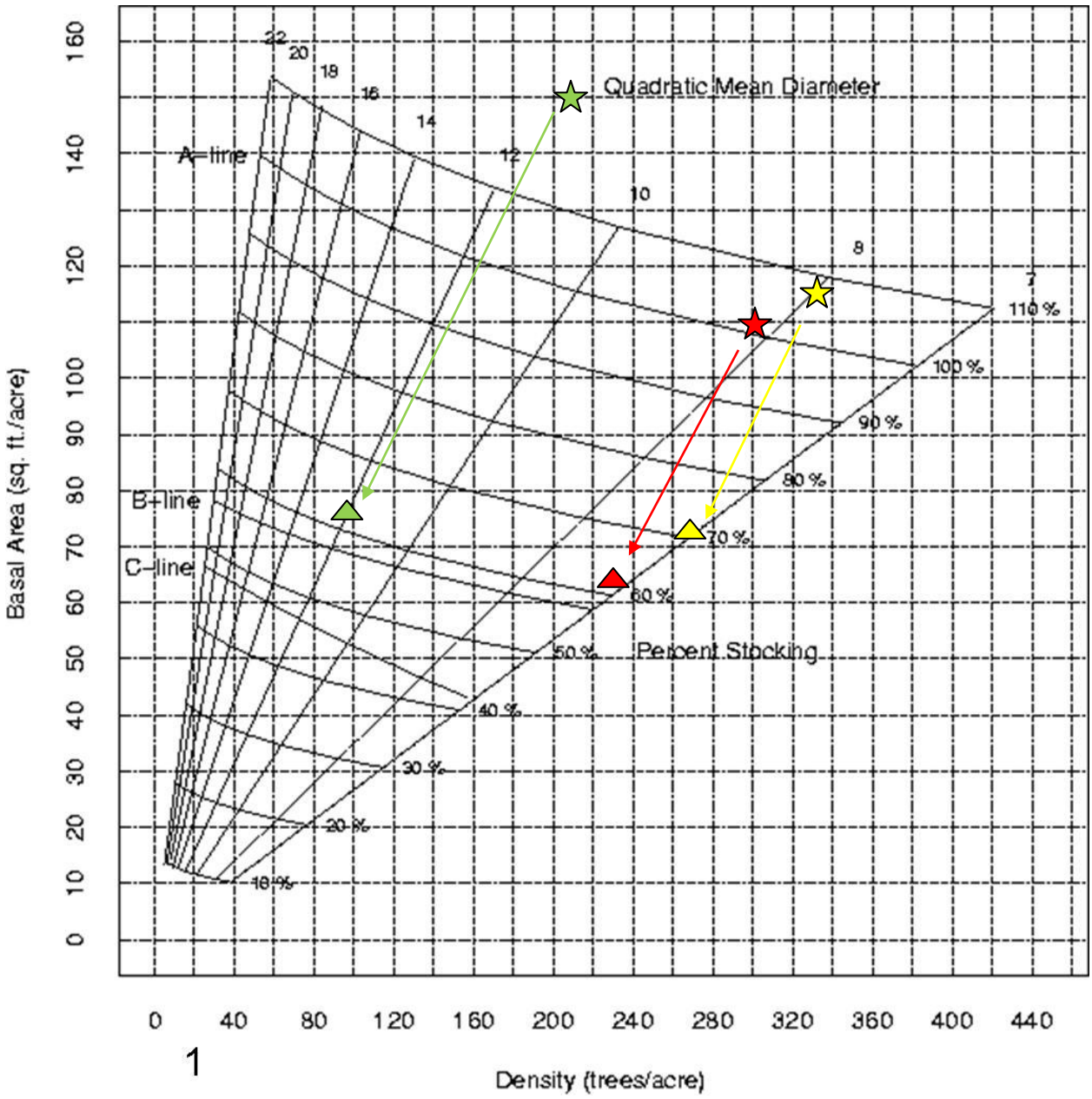
Annual growth is (2012 volume – 1992 volume + 1993 harvest volume) / (2012-1993)/ 56 acres
Growth = 81 bd ft/acre/year

Appendix 2
Tract 503 topographical with covertypes and boundary features



Appendix 3
Tract 503 Aerial Photo (2011) with soils

Appendix 4
Tract 304 Stocking Chart



☆ **Indicates the current stocking condition**

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

Indicates the Tract Total

Indicates the Pine covertype

Indicates the Oak-Hickory covertype

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