ROOTED IN FORESTRY

Michael Denman ACF, CF
24890 Edison Road
South Bend, IN 46628
(574) 292-9217
mdenman@rootedinforestry.com

Andrew Suseland
721 Obispo Street
Culver, IN 46511
(574) 952-8030
ajsuseland@rootedinforestry.com

www.rootedinforestry.com

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Ardella Reust Estate
c/o Jon Rosen
227 E. Main St.
North Manchester, Indiana 46962

ARDELLA REUST ESTATE WOODLAND TIMBER APPRAISAL
173 ACRE TRACT

The following is an appraisal of the current merchantable value of timber in approximately 173 acres of woodlands located in Sections 7 and 18, Huntington Township, Huntington County, Indiana. The purpose of this appraisal is to provide information about this woodland to the buyer and seller of the property. This appraisal assumes the best use for this timber is for hardwood veneer or stave logs, grade lumber and pallet materials.

WOODLAND DESCRIPTION

The main species in this 173-acre woodland is cottonwood and sycamore, making up 28% and 20% respectively, of all the merchantable sized trees. Most of these cottonwood average 26 inches DBH, and sycamore average 25 inches DBH. Unfortunately, much of this timber is of low value and difficult to access due to high water and frequent flooding/ponding. In stark contrast, the third most common species is black walnut, at 12% with an average DBH of 20 inches, with 50 trees of potential veneer value and the likelihood for many more in the future with proper management. Red oak (9%), tulip-poplar(8%), sugar maple(7%) are common throughout the property as well and average much smaller diameters between 12 and 19 inches, with a few scattered mature trees. Species making up 1-3% respectively include chinkapin oak, basswood, black cherry, hackberry, hickories, American elm, bur oak, silver maple, and white oak. There are a few rare species present such as swamp white oak, butternut and blue ash.

Several large areas of the property, totaling about 50 acres, were reforested by hand, machine planting and natural regeneration over the past 38 years, and are just now reaching a minimum merchantable size (12-16 inches). These tree plantings are dominated by either black walnut or tulip poplar, with some red and white oak as well.

Areas of mature timber suitable for harvest are in floodplains and short steep slopes along Clear Creek, very steep slopes leading up to the roadway in the southwest corner, and remote areas of higher ground in the northeast end of the property. Further management and timber harvesting will require the installation and use of either permanent or temporary creek crossings. While acceptable in the past, fording of perennial streams with equipment is to be avoided as a best management practice(Indiana BMP Guide 2005). Any harvesting will need to be done with the oversight of a forester to ensure best management practices are followed and appropriate stream crossings, water bars and diversions are installed to minimize stream sedimentation and erosion.

Invasive exotic species are a serious impediment to proper forest management activities on this property. All areas that were planted in the past are densely populated with autumn-olive, bush honeysuckle, burning bush, multi-flora rose, oriental bittersweet and others. Any roadside, creekbank or other area without canopy closure is also likely to have one or more invasive plant species present. These plants make much of the property difficult to hike or manage and slow the growth of overstory trees by as much as 50%. Luckily, the areas of accessible mature timber are more sparsely populated with invasives in general. Any canopy disturbance without invasive brush control will result in explosive spread and growth of exotic invasive species and severely limit future productivity and timber value.

The woodland is well-stocked to over-stocked with a good mix of appropriate timber species, except in low, wet areas dominated by cottonwood and sycamore. The fact that hand planted walnut trees are growing well in the same areas as cottonwood and sycamore indicates that an improvement harvest is appropriate to promote better timber species. Timber form, quality and value is above average, with many trees of potential veneer quality. Grapevines are an issue in some limited areas but could be easily controlled. Access is severely limited by Clear creek, prone to flash flooding, which landlocks a large central area and must be forded twice to reach the entire property. There is an area of approximately 6 acres on the northeast edge of the property that is inaccessible due to Clear creek, and an area of about 6 acres on the west side that is an unforested wetland, with an active beaver population.

UNIQUE FEATURES

It would be an understatement to say this property has a unique role in the local ecosystem, as a long section of Clear creek winds through the property. Signs of high-water quality are abundant, including crawfish, mussel shells, and Blue Herons. A large heron rookery is present on the property on the northeast side of the area landlocked by clear creek. Steep limestone cliffs and overlooks are scattered throughout the property as are oxbow lakes, wetlands, seeps, beaver ponds and towering stands of 50"+ wide cottonwood trees. Forest diversity is high for both timber and non-timber species with a wide range of age classes. White-tailed deer are abundant, but the forest is aging and lacks food and young, native cover in the upland areas. Any management or recreation activities need to be mindful of best management practices to preserve water quality and protect unique habitats.

SOILS DESCRIPTION

The woodland soils are a mix of loam, silt loam and clay loams. Eel silt loam, Shoals silt loam and Genesee silt loam make up 63% of the property including the Clear Creek channel and associated floodplains. It may seem surprising, since they are occasionally flooded, but these are the most productive soils on the property with a site index of 100; prime black walnut and tulip-poplar areas. The higher ground is dominated by Hennepin loam (20%), Martinsville silt loam (9%) and Morley silt and clay loams (5%). Some of these areas are highly eroded with slopes up to 70% but overall the site index for these areas ranges from 80 to 90 for oak and walnut. The Clear Creek bottom is exposed bedrock and river stone in the two fords used to access the entire property. Flash flooding is frequent with heavy rainfalls, and the property drains quickly thereafter making access unpredictable. Trails are solid, but frequently flooded or washed out in spots and provide access to most of the tree planting areas.

PAST FOREST MANAGEMENT ACTIVITIES

There appears to have been hand planting of black walnut and tulip-poplar throughout the property, particularly in floodplains adjacent to clear creek. In addition to these scattered plantings, there are two main areas of mechanical tree planting, in the north central area and in the area landlocked by clear creek itself, in the central part of the property. While a map of mechanical tree planting by Wakeland Forestry is not available, we do know that 12,000 trees were planted over 28 acres in 1981. The species mix was as follows: 4800 white pine, 1100 black walnut, 2000 white ash, 1000 red oak, 2100 tulip-poplar, 500 white oak, 400 soft maple, and 100 sycamore. Survival rates in all the plantings are good, except for white ash and white pine, most of which are dead or dying. The dominant surviving species are black walnut, tulip-poplar and red oak. Stocking levels in these plantings are high and they do not appear to have been thinned in the past. Pruning work was done on 23 acres of tree plantings in 1992, also by Wakeland Forestry.

Timber stand improvement work, in the form of crop tree release work, was performed on 31 acres of the originally forested areas in 1980 and 21 acres in 1981. Some grapevine work was also performed in 1981. Based on the dominant species in the originally forested areas, timber stand improvement was a good investment and has resulted in numerous veneer quality black walnut trees throughout the property.

TREE PLANTINGS – INVESTMENT VALUE

The thousands of black walnut, tulip poplar, red oak and white oak planted throughout approximately 50 acres of this property currently appear to have little or no market value. This skews the current inventory and value totals down. The truth is that these trees are part of an investment that has matured for about 38 years, of what typically is a 65 to 70-year cycle and the net liquid value is low. The best approach for a current value is to estimate a present investment value based on the future value(in today's dollars) at economic maturity, discounted backwards. This is essentially the amount of money you would need to invest today, at a 4% annual rate of growth, to generate the future value of this stand at maturity.

This requires a few assumptions, first that non-commercial thinning is completed to reduce stocking to 100 prime crop trees per acre at 5000 trees total (maximizing growth rate & quality). In 10 to 15 years 35 trees/acre of the residual trees could be sold in some areas for value of at least $17,000, but the negative impact of logging on remaining crop trees needs to be avoided. Also, invasive control work is required, roughly doubling the residual stand growth rate when completed. Additional periodic invasive exotic control and trail maintenance will be an ongoing cost.

A period of 30 years(n) should be enough for most (but not all) trees to reach a mature harvest size at reasonable growth rates as shown. I am assuming that 2% of the trees in these 50 acres will produce black walnut veneer logs of 110 bd. Ft. or more in 30 years, based on a 1% rate of veneer trees in the surrounding mixed hardwood forests.

Once all the calculations are completed, the 50 acres of tree plantings have a current investment value of $4,885/acre or $244,254.00. In general, a mature woodland at this value per acre would be considered above average. The cash flow for the next 30 years will be negative, however cost-share programs exist within NRCS EQIP guidelines to help offset most of these continued management activities. Failure to proceed with these management recommendations will result in a tree planting with stunted growth, lower timber quality and a significant delay in harvest deadlines.

Current Investment Value Calculation Table

% of Crop Trees (65/ac)	Species/Grade	Current Avg. DBH	Growth Rate in DBH/Yr.	2049 Avg. DBH	2049 Value in Current $
38%	Black Walnut (Grade)	11	.4	23	$158, 272
2%	Black Walnut (Veneer)	11	.4	23	$6,613
30%	Tulip Poplar	14	.6	32	$56,114
20%	Red Oak	11	.5	26	$50,502
10%	White Oak	7	.25	15	$1,052

Cash Flow Outline for 50 Acre Tree Planting:

2019: Current Costs of Thinning (Target: 100 Crop Trees/Acre) : (~$7500)
2019-21: Current Costs of 3 years Invasive control : (~$30,000)
2034: Current Value of first Commercial Thinning (35 Trees/Acre) : $17,000
2026-49: Current Costs of Future Invasive Control/Trail Maintenance : (~$7,800) (Over 30 years)
2049: Current Investment Value of Final Harvest (65 Trees/Acre) : $272,554.00
Net Current Investment Value of 50 acres of tree plantings : $244,254.00
Net Current Investment Value/Acre for 50 Acre tree plantings : $4,885/ac

INVENTORY

The fieldwork for this appraisal was completed over many rainy days by Foresters Mike Denman and Andrew Suseland and completed on July 3rd, 2019. To estimate the timber volume in the 173 acres we used the horizontal point sampling method with DBH, and merchantable heights measured. We took 172 sample points, of which 50 were either within or adjacent to an area that was hand or machine planted to hardwood trees. In those plots that were associated with plantings, we also recorded average diameter of planted species around the plots. We inventoried 100% of the 50 black walnut trees and 1 white oak tree of potential veneer quality, relying on sample points for grade lumber estimates. The forested acreage was measured from aerial photos initially and adjusted down to 154 acres based on areas we deemed inaccessible. Inaccessible areas and Clear Creek itself occupied about 19 acres of the property.

The inventory results show a total of 5,621 board feet per acre, which is below average. We estimated a total of 865,655 board feet for the 154 acres. Deducting 50 acres to account for tree planting areas produces a total of 8,324 bd. Ft. per acre on 104 remaining acres which is more reasonable. The following table is a listing of my estimates of the number of trees and timber volume in the 154 acres inventoried.

Timber Inventory 154 Acres of Woodland

Species	# of trees	estimated board foot volume
Cottonwood	554	232,986
Sycamore	429	170,137
Black Walnut	649	110,138 plus 8,260 bd. Ft. veneer in 50 trees
Red Oak	422	73,534
Tulip-Poplar	382	65,773
Sugar Maple	726	59,065
Chinkapin Oak	144	24,102

Basswood	230	21,841
Black Cherry	175	20,244
Hackberry	129	17,167
Bitternut Hickory	140	16,969
American Elm	106	9,947
Bur Oak	23	9,438
Silver Maple	36	6,076
White Oak	17	5,495 plus 340 bd. Ft. veneer in 1 tree
Shagbark Hickory	30	4,921
Blue Ash	25	2,699
Boxelder	22	1,870
Beech	27	1,661
Swamp White Oak	3	1,625
Butternut	6	551
Aspen	11	365
TOTALS	4,286 trees	865,655 bd.ft.

APPRAISAL

To appraise this timber value, I used the fair market approach using six comparable sales, which were selected from sealed bid sales that I conducted for my clients in the northern Indiana marketing area within the time period of two years. Tree species, quality, tree and woodland size, location, and logging accessibility and date sold were all factors considered when selecting comparable sales and values per board foot. Stumpage value means the value paid for the trees standing and unharvested in the woodland with the buyer assuming all the cost of harvesting. Merchantable timber means trees 12" DBH and larger.

Appraisal Summary - Based on selected comparable timber sales, and my knowledge of timber markets and values, and my volume and quality estimates, I would appraise the July 2019 total stumpage value in this 173-acre woodland to be as follows.
865,655 board feet at $0.34 board foot = $294,668 or $1,703/acre*

*- More specifically: 19 acres at $0/acre, 104 acres at $2,833/acre and 50 acres with potential current investment value of $4,885/ac maturing in 30 years. This averages out to $3,115/acre for 173 acres.

MANAGEMENT RECOMMENDATIONS

The owner of this property should maintain or re-enroll in the classified forest program to protect the property from tax hikes in perpetuity and obtain the assistance of the local district forester for future forest management planning. Once this is complete, the owner should apply for EQIP funding through NRCS to obtain a CAP106 plan that calls for thinning of the tree plantings, timber stand improvement of the original forest, and invasive brush control over the entire property. I recommend hiring a TSP or consulting forester to assist in these activities, as they will be ongoing for many years and require several weeks of work initially.

The forest is overstocked and the best way of maintaining the health and vigor of the forest sustainably would be a merchantable timber harvest soon; less than 5 years. A combination of single tree selection, small group selection and large group selection would be best to release established growing stock from competition and promote dense regeneration of desirable timber species in other areas.

Some small "patch cuts" would be ideal for the regeneration of black walnut, tulip-poplar, red oak, white oak, black cherry and bur oak. There are large stands of sycamore and cottonwood growing where red oak, white oak, black walnut and tulip-poplar could be growing along the Clear Creek. These prime soil areas need to be identified and the low value species should be sold to allow for natural regeneration or hand planting of these areas to black walnut.

A harvest as described would provide more stratified and diverse habitats over a 15-year period, as the forest regenerates to fill those harvest openings. Timber markets for the species of harvestable size and age are strong at this time but could improve if global trade situations are eased. There are 50 black walnut trees that are of a size and quality consistent with veneer production, although not all have reached a peak value. **There is currently over $50,000 in timber value in mature walnut veneer and lumber trees present on the property that could be included in a sustainable improvement cut to remove another $15,000 of cottonwood and sycamore trees.** For all these reasons, a sealed bid, lump sum timber sale handled by a professional consulting forester would be best at this time. If handled correctly, this timber sale could be the first of a steady series of sustainable harvests, every 10 to 15 years. In addition, these harvests could be coordinated with previously recommended tree planting harvests to maximize income and generate interest in the timber sale. This would allow the owner to maximize timber production and provide a consistent level of diverse woodland habitat for wildlife, game and non-game, in perpetuity. Maintaining trails and pursuing a hunting lease is also advised. Overall, this is an excellent investment property for growing walnut veneer trees but requires some intense management currently.

Respectfully Submitted,

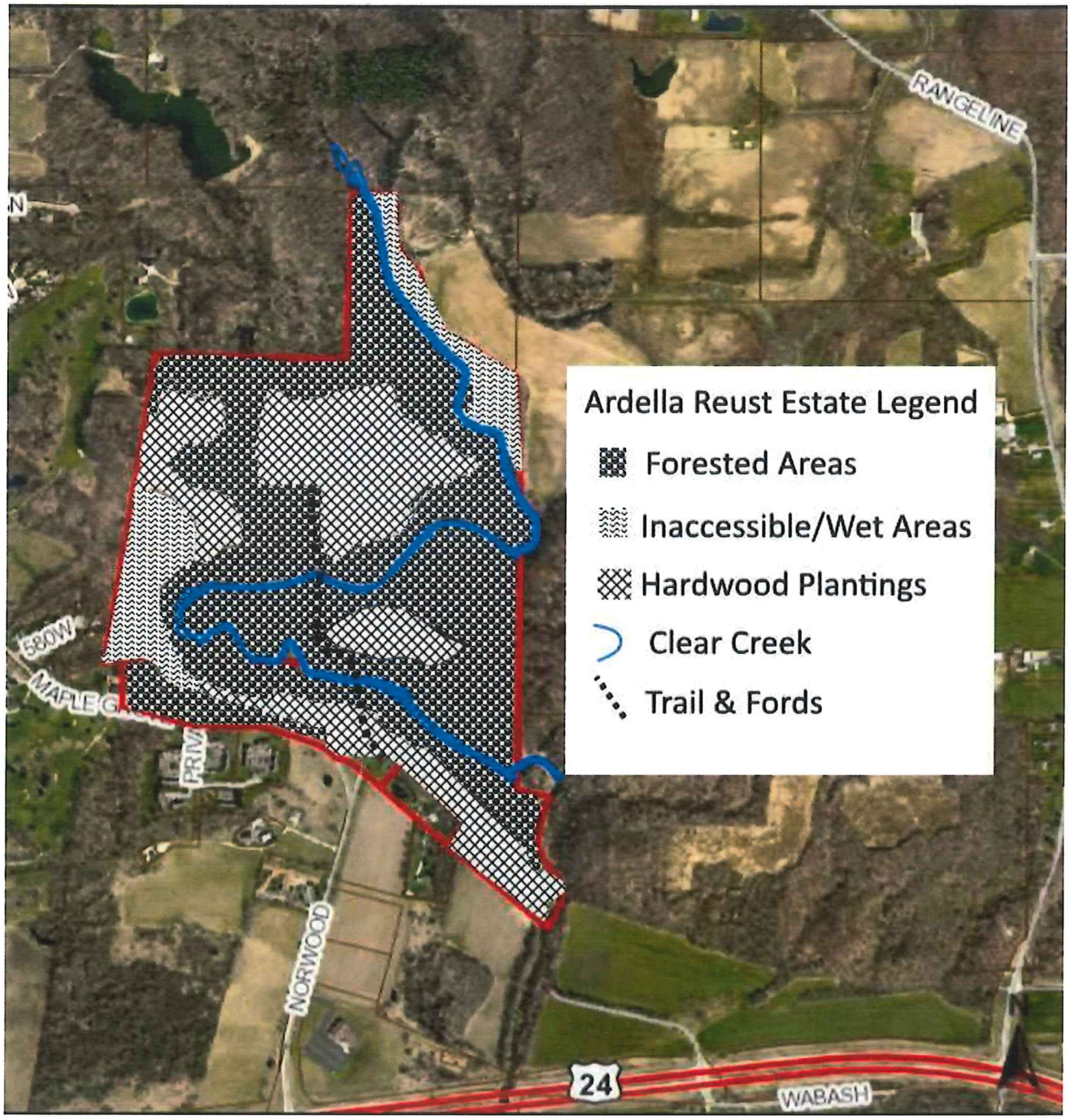
Michael Denman CF, ACF
Rooted IN Forestry LLC

Comparable Timber Sales

The following timber sales were selected from lump sum sealed bid timber sales that Rooted IN Forestry, LLC conducted for their clients. These sales have timber in some way like the Ardella Reust Estate timber and occurred in a comparable marketing area and market time period and were used to arrive at a value per board foot for this appraisal.

Owner	Date	County	Main Species	Veneer	$/Bd.Ft.
White	5/18	Fulton	COT, SWO, SYC	312	.26
Smith	1/19	Marshall	SOM, SYC, REO	459	.40
Smith	1/19	Marshall	SYC, SOM, BIH	580	.30
Tom Family Farms	5/19	Kosciusko	HAC, SYC, BIH	1776	.53
Camp Swampy	9/18	Starke	PIO, SOM, SWO		.25
Fritz	12-18	Pulaski	PIO, SOM, SWO		.29

COT=Cottonwood	BIH = bitternut hickory
SWO = swamp white oak	HAC = hackberry
SYC = American sycamore	SHH = shagbark hickory
SOM = soft maple (silver maple)	BLW = black walnut
REO = red oak	BAS = basswood
PIO = pin oak	BLO = black oak


RANGELINE
Ardella Reust Estate Legend
Forested Areas
Inaccessible/Wet Areas
Hardwood Plantings
Clear Creek
Trail & Fords
580W
NORWOOD
24
WABASH