

*The following pages are excerpted from a Prudenterra Forest Management Plan.*



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Prudenterra wrote a Forest Management Plan for Larry Cleverley in 2017. Excerpts of the plan are published here with his permission.

**Plans include the current stocking level of the forest, which is critical to making effective management decisions.**

## Current Conditions - Inventory

The value of the stand today is estimated at \$65,223, based on the model Timber Inventory Growth & Economic Review (T.I.G.E.R. forestry software by Dr. Carl Mize). In 20 years the timber value of this woodland will grow to a Net Present Value (NPV) of \$88,794 if nothing is done besides excluding livestock grazing.

**Table 3.** All woodland compartments in Larry Cleverley's farm describing essential forest measurement data that shows the stand identifier (Stand), approximate stand size (Acres), the quadratic mean of the Diameter at Breast Height (DBH) measurement taken at 4.5 feet above the ground on the highest side of the stump (DBH), density of trees (Trees / Ac.), the *Basal Area* - amount of space in an average acre of land occupied by tree boles (BA / Ac.), and an indication of the number of trees in a stand as compared to the desirable number for best growth and management (stocking level). Areas outlined in red are the top priority stands to manage first based on the inventory data.

Stand	Acres	DBH q	BA / Ac.	Trees / Ac.	Stocking Level	%TPA AGS	%BA AGS
A	8.5	9.2	129.0	278.0	<i>overstocked</i>	<i>21.4</i>	62.0
B	2.0	23.2	156.0	325.3	<i>overstocked</i>	76.9	69.7
C	4.5	16.0	91.4	134.9	Fully stocked	73.3	81.3
D	8.5	10.4	85.6	219.2	Fully stocked	57.5	77.9
E	2.0	12.5	140.0	385.1	<i>overstocked</i>	<i>87.4</i>	67.9
F	13.0	n/a	n/a	n/a	<i>understocked</i>	<i>n/a</i>	<i>n/a</i>
G	15.0	13.6	71.0	122.0	Fully stocked	60.4	49.3
H	2.5	11.6	85.0	450.3	Fully stocked	<i>8.2</i>	<i>29.4</i>
<b>Total</b>	<b>56.0</b>						



The diameter of each tree is measured at breast height (4.5 feet above the ground) while gathering data to determine stocking level.

The first step to managing a forest is to divide areas of trees into “stands”, which are groups of similar species or age.

### Woodland Stand Map

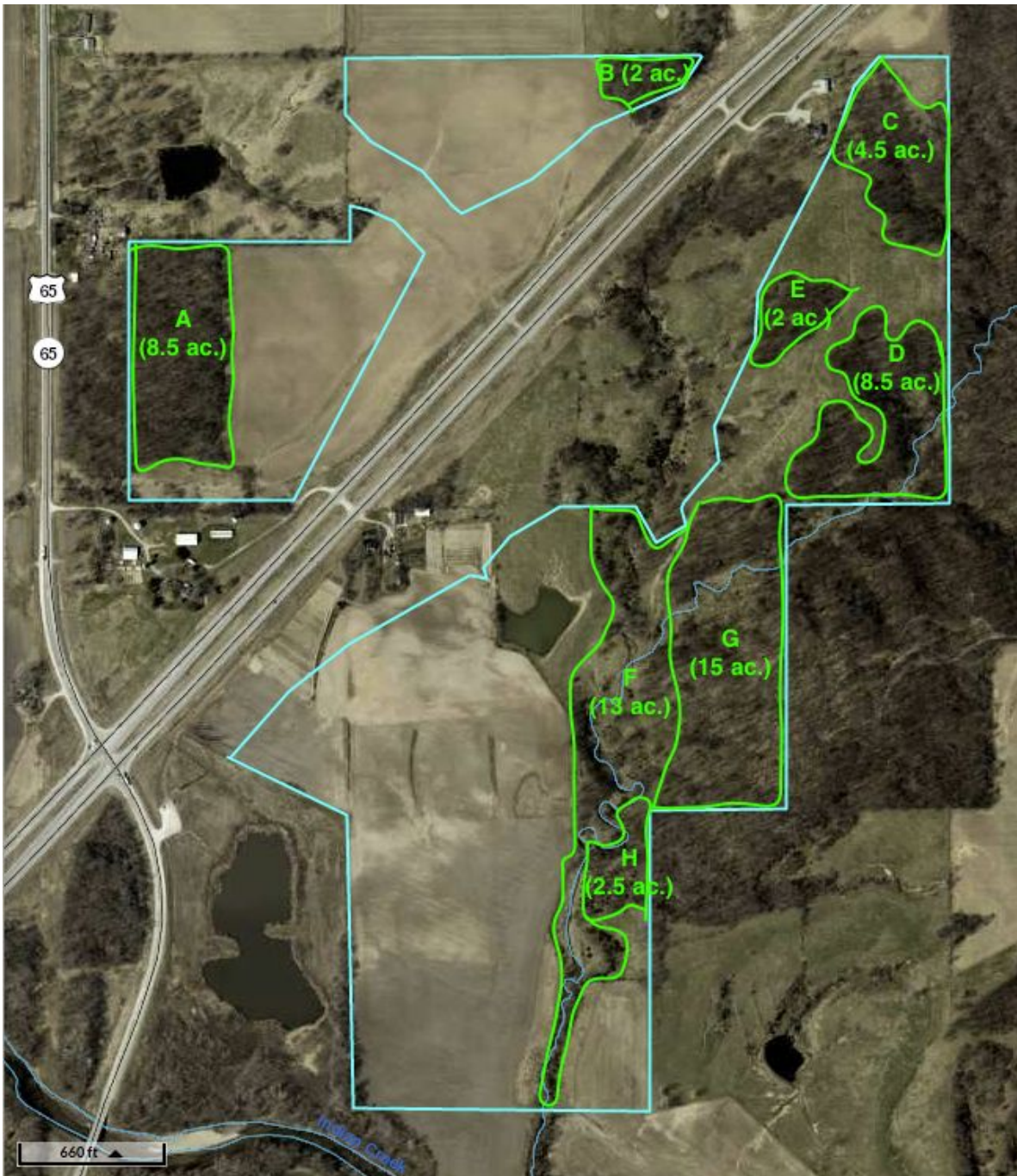


Figure 7. Woodland Stand Map for the property of Larry Cleverley

**The value of each woodland stand will increase or decrease with each management action, such as thinning. Calculations are based on species composition, stand density, size, and condition.**

## Economic Value of Standing Timber

**Table 5.** All woodland compartments in Larry Cleverley’s woodland that shows the stand identifier (Stand), approximate acres of trees (Acres), an estimate of current value of the timber growing there, what the value will grow to in the next 20 years.

Stand	Acres	2017 Value Estimated	No Management NPV Estimate 2037	Thin NPV Estimate 2037
A	8.5	\$5,700	\$3,621	\$9,003
B	2.0	\$1,037	\$1,333	\$1,883
C	4.5	\$7,117	\$9,156	(\$9,871)
D	8.5	\$10,118	\$12,875	(\$8,571)
E	2.0	\$2,417	\$2,932	\$649
F(BW only)	13.0	\$5,364	\$5,364	n/a
G	15.0	\$30,560	\$39,339	(\$21,608)
H	2.5	\$3,360	\$4,699	\$765
<b>Total</b>	<b>56.0</b>	<b>\$66,794</b>	<b>\$80,557</b>	



**Thinning** can be a profitable management action in stands that are overstocked and contain high value timber trees. It can also improve habitat by removing trees that are less valuable to wildlife.

Every woodland stand is analyzed, and given recommendations depending on the landowner's management objectives.

Figure 15 identifies the species by Diameter Breast Height (DBH) by trees/acre of Stand G. The larger diameter overstory trees are mostly highly valued species such as black walnut, white oak, and shagbark hickory. Few of these species appear in the regenerating (smaller diameter) trees. Management actions will be needed to sustain high quality wildlife habitat and timber production into the future.

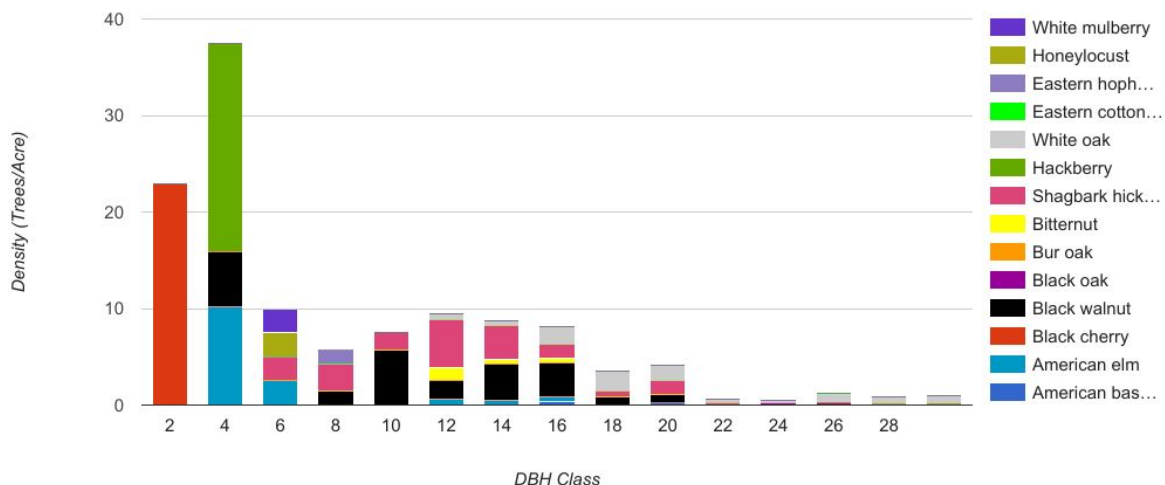


Figure 15. Diameter distribution by trees per acre of Stand G.

**Stand G (15.0 acres)**

This uneven aged stand is *fully stocked* near the “B-line” the optimal level of tree density to fully utilize the site to grow timber. Initial value of this stand is \$30,560 growing to \$39,339 with no additional management. Along the stream edge, a south facing slope on North side of the stand, this areas should be managed first due to large size of invasive species. The western half is low diversity, low quality timber species and form. Timber quality increases as you go East in the stand.

The overstory is composed of white oak, shagbark hickory, and black walnut. A few small, scattered hackberry and elm are present throughout. In sunny openings there are some honey locust trees.

The understory is full of invasive species: honeysuckle, autumn olive, multiflora rose. No regeneration of trees is possible in the dense shade of these non-native shrubs.

Small clearcuts may be the best way to manage this stand (5-10 acres in size). Low quality walnuts throughout, not any veneer quality timber here. Nearly all lumber grade.

Another option would be to manage an oak savanna on south and east of the stand with more frequent fall burning to protect the core of the timber from invasive species creeping in from the south and east.

Only one section (northeast corner) had some american basswood present. No upland bur oaks, and very few scattered black oaks were identified. No regenerating oaks/hickories/walnuts even in the sunny openings as a result of the pasture management history. Small clearcuts of 5-10 acres in size would be an ideal way to regenerate white and bur oak on the farm. I'd start with the western half of this stand as a possible clearcut in 10 years or so.

The New Vision Management Map shows landowners the location of each recommended practice.

### New Vision Management Map

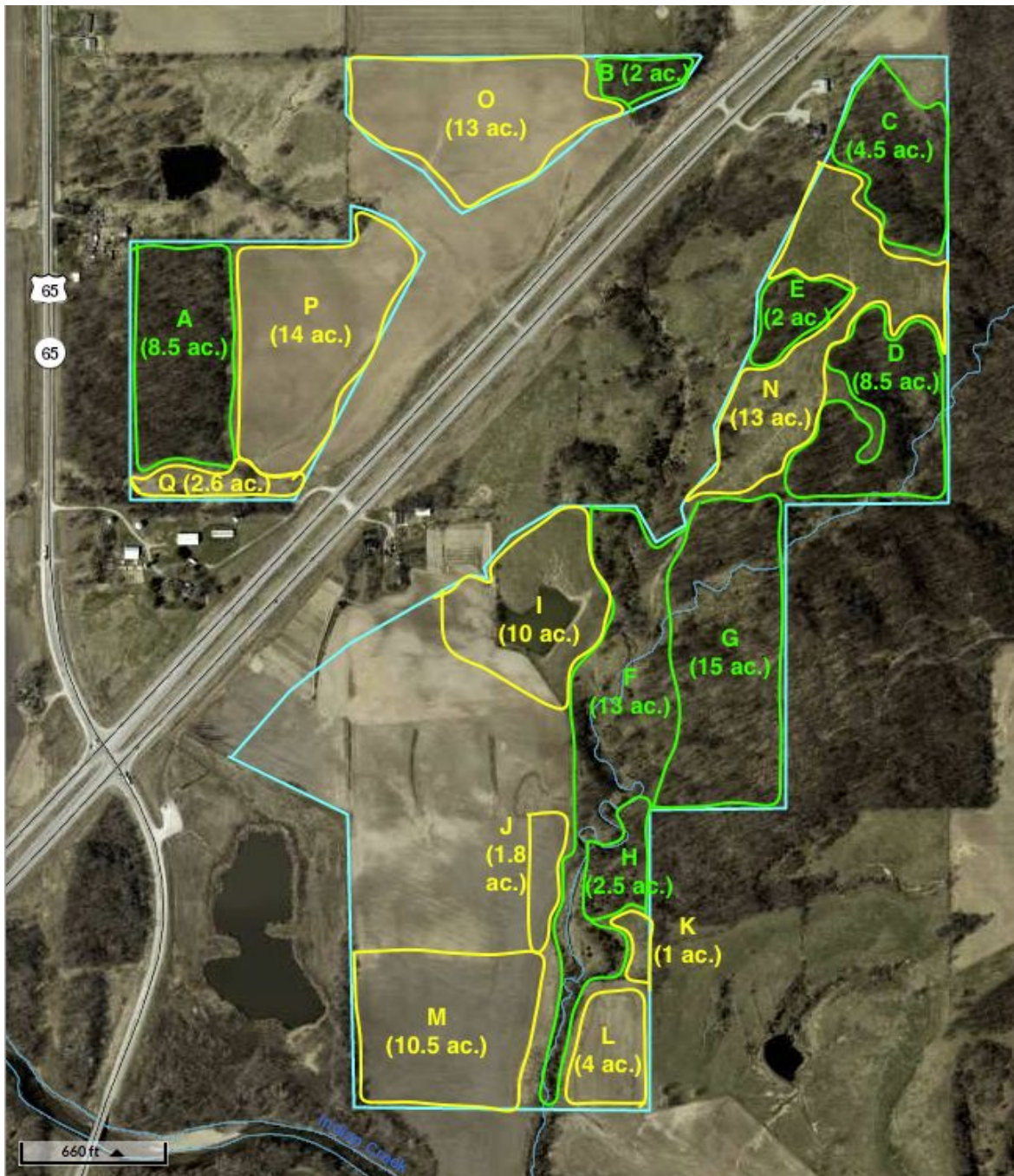


Figure 20. New Vision Management Map Larry Cleverley

***This table explains the proposed management actions in tandem with the New Vision Management Map.***

**Table 7.** New Vision Land Management Table Larry Cleverley

Stand	Acres	2016 Land Use	Action
I	10	80% pasture 20% alfalfa	Restore to prairie wildflowers
J	1.8	Cropland	Restore to prairie wildflowers OR plant diverse multispecies (prairie, trees, and shrubs) stream buffer
K	1	Pasture	Plant upland hardwood trees
L	4	Cropland	Plant upland hardwood trees
M	10.5	Cropland	Plant bottomland hardwood trees
N	13	Pasture	Plant upland hardwood trees
O	13	Cropland	Plant upland hardwood trees
P	14	Cropland	Plant upland hardwood trees
Q	2.6	Idle land (giant ragweed, elms, black willows, ash, mulberry)	Plant water loving hardwood trees
<b>Total</b>	<b>10 - 11.8</b>		<b>Reconstructed prairie wildflowers</b>
<b>Total</b>	<b>58.1 - 59.9</b>		<b>Reconstructed hardwood forest</b>



Reforestation and reconstructed prairie are both excellent ways to provide additional wildlife habitat in locations dominated by cropland and pasture. Optimal use for each parcel depends on many factors including soil and landform characteristics, and the goals of the landowner.



**A timeline of specific activities guides landowners through new management practices.**

**Table 8.** Prioritized Schedule of Management 2017-2021 - Larry Cleverley

Date	Stand	Acres	Action
June 2017	B & E	4.0	Mark Strategic Tree Selection thin
June 2017	n/a	n/a	Apply for cost-share to help fund forestry work
Aug. 2017 - Jan. 2018	G, E	9	Cut and treat stumps of invasive species with herbicide in western 1/3 of stand; Cut Strategic Tree Selection thin
Oct. 2017	K, L	5	Direct Seed oaks, walnuts, hickories
November 2017	C; A; I	5; 5; 10	Burn high quality white oak savanna; Remove invasive species; Restore prairie wildflowers
Winter 2018	H	2.5	Remove all cedars and invasive species
Spring 2018	J, F	1.8; 13	Install prairie stream/field buffer; Convert to prairie wildflowers or forest; Manage restoration seedling care (forest)
Summer 2018	F	13	Manage restoration by mowing (prairie)
Fall 2018	D; C & G	3; 20	Plant woodland openings by direct seeding; Burn oak woodlands; Manage restoration by seedling care (forest)
Winter 2019	G	5	Cut and treat stumps of invasive species with herbicide in Eastern 1/3 of stand;
Spring 2019	Q & A; N; F; P & O	11; 13; 27; 13	Underplant oaks, hickories, walnuts; Plant alfalfa in disturbed soils by DOT; Plant upland oaks, hickories; Manage restoration by seedling care (forest)
Summer 2019	F	13	Manage restoration by mowing (prairie)
Fall 2019	Q, F, P & O; M	42.5; 10	Manage restoration by seedling care (forest); Plant bottomland hardwood forest
Winter 2020	G	5	Cut and treat stumps of invasive species with herbicide in middle 1/3 of stand;
Spring 2020	Q, F, P, O & M	42.5	Manage restoration by seedling care (forest)
Summer 2020	F	13	Manage restoration by mowing (prairie)
Fall 2020	Q, F, P, O & M; A, F	42.5; 8.5	Manage restoration by seedling care (forest); Send Timber Sale bid notice to loggers for clearcut harvest Stand A; Also sell merchantable walnuts in Stand F
Winter 2021	D	8	Cut and treat stumps of invasive species with herbicide
Spring 2021	Q, F, P, O & M; N	42.5; 13	Manage restoration by seedling care (forest); Plow and replant alfalfa
Fall 2021	F	13	Manage restoration by seedling care (forest)



## Glossary of Forestry Terms

**Basal Area** - The area of a parcel that is occupied by tree trunks. Measured by the cross-sectional area of each tree trunk, taken at 4.5 feet above the ground.

**Crop Tree Management** - Natural stands of trees start out with thousands of trees per acre. Planted stands may contain 500 to 1,500 trees per acre. At maturity, due to constraints of space, nutrient availability and the increased size of individual trees, there can be only 50 to 70 trees per acre.

**Crop Tree Release** is the practice of selecting the individual trees that are to remain in the stand until maturity and then removing competing trees. Crop trees can be selected for aesthetics, wildlife benefits, or income generation. Black walnut and red and white oak are the most commonly selected trees in Iowa. Also referred to by Prudenterra as Strategic Tree Selection.

**Diameter at Breast Height (DBH)** - Standard measurement of the diameter of a standing tree, taken at 4.5 feet above the ground from the ground level on the highest side of the tree.

**Ecological Succession** - a natural process whereby one plant community replaces another, with conditions of the physical environment, growth characteristics of different plants, effects of herbivory and other biological factors, and available sources of regeneration determining the species that become established and eventually dominate a site.

**Mast Tree** - Mast = nut. A mast tree is a nut bearing tree such as oak, walnut, beech, etc. **Shade Tolerance** - the relative capacity of tree species to compete for survival under shaded conditions. It is a tree trait, a functional adaptation that varies among species. Because of its outsized influence on tree survival and stand growth, shade tolerance is a pillar of silviculture.

### Silvicultural prescriptions for timber harvests

**Shelterwood (10-20 acres in size)** - a method of regenerating a forest whereby a portion of the stand is harvested and the rest of the stand, evenly distributed over the area, is left to protect the site and provide seed to reseed the area. After the new stand is well established, the residual trees are harvested. The method is used to regenerate species not tolerant of shading.

**Clearcut (5-10 acres in size)** - a method of regenerating a forest in which all trees on a given area are cut. Clearcutting results in conditions which allow the greatest amount of sunlight to reach the forest floor, a desirable condition for regrowth of certain valuable tree species such as oaks and walnut. Confers certain benefits for many wildlife species.

**Seedtree** - a method of regenerating a forest whereby all trees on an area are cut except for several per acre which are left to provide seed to reseed the harvested area. Usually 5 or 6 tree per acre are left. After the new stand is well established, the residual trees are harvested. The method is used to regenerate species not tolerant of shading.

**Selection Harvest** - a method of harvesting whereby individual trees are selected for harvest. One characteristic is that the form and appearance of the forest is maintained and the site is not exposed to sunlight and weathering. This scheme favors tree species which tolerate shading such as maple and basswood. It also benefits certain wildlife species.

**Weed Tree Eradication** - a selective culling and weeding of less desirable species and poor-quality trees that are of low vigor or bad health. By killing and coppicing such trees, the more desirable species present in the woodland are expected to respond with enhanced growth and/or potential for regeneration in the future.