

Stewardship Notes

Indiana Division of Forestry



ECONOMICS OF LONG TERM FOREST MANAGEMENT

Historically, forests in Indiana have been mismanaged, abused, or neglected because of a perception that there was no real value to the woods when compared to adjacent tillable ground. This perception is not accurate, and our Hoosier forests are actually quite valuable. In fact, forests under long-term management can be just as productive as traditional agricultural ground, even when compared on a per acre, per year basis. Managed forests typically have a species mix that favors higher valued species such as oak, walnut, maple, ash, cherry, and poplar. Under proper management, the quality of the timber improves, and the timber actually grows faster. Well-planned management activities include selective, improvement harvests and timber stand improvement (TSI).

To illustrate the value of long-term management in woodlands, consider this 70 acre forest in east-central Indiana. Management began in 1967 with a veneer sale. This harvest was followed by a lumber grade sale. Another veneer sale occurred in 1971, and was followed by a selective improvement harvest. Timber stand improvement was done after this harvest was completed to remove cull trees, thin overcrowded areas, control vines, and release potential crop trees from undesirable competition. The timber was allowed to grow, and another general improvement harvest was done in 1987. This, too, was followed with timber stand improvement. Another veneer sale was done in 1993 and was also followed by a lumber grade harvest. Most recently, the forest was selectively harvested in 1997. The original species mix in this forest included Black Walnut, Red and White Oaks, Sugar Maple, White Ash, Tuliptree, and Basswood, among others. Because the forest was managed for its long-term health and productivity, these same species are still the dominant species in the forest. The forest remains fully stocked with high quality timber, and the trees are growing at a rapid rate. See Table 1 for a list of incomes and expenses for this woodland.

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Table 1. Incomes and expenses for a 70 acre forest in east-central Indiana, 1967-1997

Year	Activity	Income (Expense)
1967	Veneer harvest	\$ 25,000
1969	Improvement harvest	\$ 3,178
1971	Veneer harvest	\$ 22,350
1974	Improvement harvest	\$3,676
1974	Timber Stand Improvement	(\$ 483)
1987	Improvement harvest	\$ 33,667
1988	Timber Stand Improvement	(\$ 784)
1993	Veneer harvest	\$ 83,188
1994	Improvement harvest	\$ 12,526
1997	Improvement harvest	\$ 18,501
Total		\$ 200,819

When calculated on a per acre, per year basis, this woodland produced an average income of about \$96 per acre each year over that thirty year period. It is important to note, however, that this forest was even more productive than what these figures show. Because data is not available on the value of the original standing timber, it is impossible to calculate how much the standing timber increased in value since 1967. If the accrued value of the standing timber were included, this forest would be producing substantially more per acre per year.

The previous woodland was obviously a high quality forest when management first began. However, even low quality forests can drastically increase in quality and value with long-term management, and they can also produce considerable incomes. For instance, an 87 acre forest in southwestern Indiana was heavily abused, and a portion was planted to Black Locust in the 1930's to limit erosion. This forest was brought under management in 1966. The forest was dominated by Black Oak, Tuliptree, White and Red Oaks, Sugar Maple, and Hickory. There were only about 30 trees per acre that measured at least 12" in diameter, and the volume at that time was 2900 board feet per acre which equaled about \$87 per acre. An improvement harvest was done in 1966 and was followed by timber stand improvement. Part of the forest was harvested in 1977. In 1988, another portion of the forest was selectively harvested. In 1990, a salvage harvest was performed to reclaim about five acres damaged in a storm. About half of the forest was selectively harvested in 1994, and another portion was cut in 1996. With the exception of the 1990 salvage sale, each harvest was followed with timber stand

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improvement. Additionally, 16000 board feet were cut for home use in 1986 and 1990. The standing timber in 1998 had a volume of 7100 board feet per acre, and there are 42 trees per acre that measure at least 12" in diameter. See Table 2 for a list of incomes and expenses for this woodland.

Table 2. Incomes and Expenses for an 87 acre woodland in Southwestern Indiana, 1966-1996

Year	Activity	# Acres	Income (Expense)
1966	Improvement harvest	80	\$ 3,000
1966	Timber stand improvement	80	(\$ 300)
1977	Improvement harvest	20	\$3,300
1977	Timber stand improvement	20	(\$ 75)
1986	Harvest for home use	?	\$ 6,400
1988	Improvement harvest	20	\$ 12,800
1988	Timber stand improvement	20	(\$ 200)
1990	Harvest for home use	?	\$ 6,400
1990	Salvage harvest	5	\$ 5,700
1994	Improvement harvest	42	\$ 24,000
1994	Timber stand improvement	42	(\$ 630)
1996	Improvement harvest	15	\$14,000
1996	Timber stand improvement	34	(\$ 495)
Totals			\$73,900

Cash income since 1966 is approximately \$28 per acre per year. However, the value of the standing timber has increased from \$87 per acre in 1966 to \$2,130 per acre in 1998. When the accrued value of the standing timber is taken into account, this forest has produced over \$96 per acre per year. It is also important to note how the growth rate has changed in this forest. In 1966, this forest only grew 150 board feet per acre each year which would correspond to about \$4.50 per acre per year. With this long-term management regime, this forest is now growing 325 board feet per acre per year or \$97.50 per acre each year. The forest is fully stocked with high quality timber and is still dominated by Tuliptree, Black, White, and Red Oaks, Hickory, and Sugar Maple.

It does not necessarily require thirty years to achieve these results, either. Consider this 10.5 acre forest in Northern Indiana. The woods had been subjected to years of livestock grazing and high-grade harvesting, resulting in a stand of mostly Hickory and low-quality Oak. There were many Black Walnut and Black Cherry trees, but they were mostly less than 12" in diameter. When proper forest management began in 1981, there were 5,320

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board feet per acre, with 35% in Hickory. This corresponded to a value of approximately \$1,010 per acre. An improvement harvest was done in 1981 which removed a large amount of the Hickory and the overmature and defective Oak. The treetops left after the harvest were sold to a local firewood cutter, and timber stand improvement was applied. The stand was harvested again in 1995 similar to the previous harvest, and was again followed by timber stand improvement. The forest was inventoried in 1997 and had 4,923 board feet per acre, of which only 6% was Hickory. The value of the standing timber in 1997 was \$2,277 acre. Refer to Table 3 for a list of incomes and expenses for this woodland.

Table 3. Incomes and Expenses for a 10.5 acre woods in Northern Indiana, 1981-1996

Year	Activity	Income (Expense)
1981	Improvement harvest	\$ 3,108
1982	Tops sold for firewood	\$ 330
1982	Timber stand improvement	(\$ 103)
1995	Improvement harvest	\$ 4,813
1996	Timber stand improvement	(\$ 147)
Totals		\$ 8,001

The total income per acre per year from 1981 to 1997 for this woodland was almost \$48. Including the accrued value of the standing volume, this figure increases to almost \$127 per acre per year. There were 3,981 board feet per acre removed from this forest, and the ending volume was 4,923 board feet per acre. Even though the standing volume in 1997 was slightly less than that in the initial inventory in 1981, consider that the standing value in 1997 was \$2,277 per acre compared to \$1010 per acre in 1981. The forest is now dominated by Black Cherry, Black Walnut, and White, Bur, and Red Oaks. Under this management regimen, this forest grew 224 board feet per acre per year, which translates to an increase of 3.5% each year. Over the 16 years this forest has been managed, it has produced a 9.25% return on the original investment, and future returns should be much higher because the woodland has been converted to much higher quality and more valuable trees.

Part of the reason all three of these woodlands have been economically productive is due to the increase in the stumpage price of timber. However, the largest part of the gain in value is because the woodlands have increased in quality and growth rates. Additionally, managing for and increasing the amount of high-value, highly desirable species has also contributed to this increase in overall value. The key to these impressive incomes is proper, long-term management. By utilizing selective, improvement harvests and following them with timber stand improvement, forests increase in quality, growth, and value. When averaged over several years, well-managed forests can perform equal to, or even better than, adjacent land in traditional agricultural uses.

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For assistance in developing a management plan for your woods, setting up a timber sale, or performing timber stand improvement, contact a consulting forester, your local district forester, or the Division of Forestry at:

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