



## ***BUILDING A CASE FOR SUSTAINABLE MANAGEMENT OF PRIVATE WOODLANDS***

### **CASE STUDY: DAVE FOOTE WOODLOT**

What factors motivate private woodland owners to manage their woodlots sustainably? For some it is personal interest or stewardship ethic, while others may be more influenced by potential for economic returns.

This is one of several case studies profiling woodland owners who have not only demonstrated long-term stewardship of their forests, but have also documented financial returns over the years. The case studies have been undertaken, in part, to investigate if economic returns from woodlots can compare favourably with those from agriculture. Returns from these managed forests (mostly from timber sales but possibly including other activities such as production of maple syrup) have been compared to the income from agricultural crops on comparable land over the same period.

It is hoped these case studies will provide incentive for woodlot owners to manage their woodlots responsibly, either by demonstrating the potential for enhanced long-term financial returns or through the example of responsible stewardship provided by the woodland owners profiled in the case studies.

We appreciate the assistance of the woodland owners who have so generously shared their stories with us.

#### **Part One: The Foote Woodlot Story**

by Dave Pridham (former Stewardship Coordinator with the Victoria Stewardship Council)

In 1979, shortly after Dave Foote bought his 100 acre farm, a logger approached him about harvest rights for the farm woodlot. After some consideration, Dave contacted the Ministry of Natural Resources office in Lindsay for advice. Twenty acres of his 25-acre woodlot was subsequently marked by MNR staff, according to a prescription prepared by Bob Penwell, the Management Forester for the area.

At that time, species composition was predominantly hard maple and American beech. Over 62,000 board feet was harvested in the winter of 1980-81, with much of the volume being beech. Approximately \$160 / thousand board feet was received for this harvest. Each year since then, a few maple trees with poor form are tapped for personal use maple syrup. Four cords of fuel-wood are harvested annually, primarily from dead falls or damaged timber, to heat the family

residence on Gray Road to the south. Unfortunately, since the first harvest, much of the residual beech has suffered mortality due to the Beech Bark Disease.

This is beautiful country. The Foote family farm is located on a plateau in the rolling hills of the southern part of the City of Kawartha Lakes, former County of Victoria, just to the north of the Oak Ridges Moraine, within the headwaters region of the Pigeon River. Productive farm land is interspersed with high value hardwood woodlots and white cedar valleys, many with cold water trout streams and their tributaries flowing north from the Moraine to the Kawartha Lakes.

Unlike municipalities to the north, south and west, the City of Kawartha Lakes has no Forest Conservation By-Law to encourage sustainable management. As a result, many woodlots in this part of the country have been high-graded in the last 10-15 years, being logged according to logger's choice. Too often, the remaining trees in these woodlots are mostly of poor quality, with frequent open areas where all high quality trees were harvested. There is little or no potential for a meaningful sawlog harvest in some of these woodlots for 50 or more years. The difference between these woodlots and the Foote woodlot is like night and day. In the Foote woodlot, the high quality timber growing for the next cut, and the harvest after that, is present for all to see. Much of the 'unacceptable growing stock' has been harvested over the last two harvest cuts, with almost all trees now having the potential for high quality lumber or veneer logs. Each subsequent harvest will keep getting better and better, and yielding high quality timber.

In 1999, Dave decided it was time for another harvest. He is active with the Victoria Federation of Agriculture, chairing the Farm Safety Committee at that time. Dave approached the Victoria Land and Water Stewardship Council, and wondered if a demonstration project could be developed from this opportunity. Bob Penwell (the same Forester who marked this woodlot the 18 years ago) and Dave Pridham, the Stewardship Council Coordinator, marked the

north 10 acres for a selection harvest, as well as the separate 5-acre woodlot. Two half-day events were organized, each featuring a tour of the marked woodlot prior to harvest. A poor quality tree was felled to demonstrate safe tree felling procedures, with a log from this tree milled by a portable band sawmill, on site, to illustrate the potential for lumber recovery from poor quality logs. These 10 acres were harvested in the winter of 2000, with an average value of approximately \$555 per thousand board feet.

Dave and his family take quiet pride in their woodlot and how it contributes to the overall sustainability of their farm operation. Contrary to common belief these days, the Foote family is making a comfortable living on a 100 acre mixed farming operation, with Dave's wife Marylou driving a school bus to supplement their farm income. Their daughter, Jessica, takes great interest in the woodlot activities, and became active with the horse logging of the north 10 acres in 1999. She also worked with the same logging contractor for some time after, in other woodlots, to help finance her post-secondary education.

In the summer of 2003, the south 10 acres of the woodlot were marked for a selection harvest by Dave Foote and Victoria Land and Water Stewardship Council staff, with the same type of woodlot demonstration event implemented that fall.

This portion of the woodlot was harvested in the early winter of 2004, again by the same horse logger, with an average sale value of \$635 per thousand board feet. Dave's objective is to set up his 20 acre woodlot for a 10 acre harvest every 6-8 years.

Other than the abundance of high graded woodlots, Dave is very concerned with other trends he is seeing in the local woodlands and natural areas these days. The beech is disappearing – he encourages landowners to retain trees for future seed collection if they are illustrating genetic resistance to this disease. Another concern is the seemingly relentless spread of buckthorn into

this woodlot and other neighbouring woodlots.

Dave is a solid proponent of having woodlots marked by forestry professionals. Although he was able to organize his tree marking at no cost, by providing his woodlot for local workshops and tours, Dave feels that paying for this service should be a no-brainer. With the amount of science that farmers apply to all other crops grown on a farm, landowners should understand the value and need for science based decisions on the woodlot portion of their farm. The cost for marking by a professional would have been covered for less than what he received for the fuelwood, or would be easily recovered by developing just one veneer quality tree over the

next harvest cycle, something he is sure wouldn't happen in most logger's choice operations. His advice to other landowners is simple: "Have your woodlot marked by someone other than the people who are doing the cutting and only cut in the winter."

### **Update 2010**

David continues to cut four full cords of fuelwood annually to supply part of his winter he needs. With the lower price of maple logs he is content to wait as the trees grow. There is a high amount of quality veneer trees. As he ages David is wondering who will do the forest management for the next 30 years.



Stewardship Coordinator Dave Pridham measures a tree, while woodlot owner Dave Foote and his daughter Jessica look on.



# Is This Forest Being Managed in a Sustainable Way?

It is reasonable to ask if the forests profiled in these case studies are being managed sustainably, or if the growing stock may have been sacrificed in the interest of short term economic gain. To answer this question inventories are carried out in all of the case study sites and the data compared to the recommended stand structure diagram for tolerant hardwoods in Site region 6E (which includes much of the area where these case studies are located). The “Recommended” curve in Figure 1 represents the ideal size class distribution in an all age forest being managed under a single tree selection system. The “y” axis represents the number of trees per unit of area, while the “x” axis represents the diameter at breast height (dbh) of the trees. The resulting curve, often referred to as a “Reverse J” curve, is representative of trees found in a well managed stand, i.e. many trees in the smaller size classes and progressively fewer as size increases.

When the stand structure of the Foote woodlot is compared to the recommended distribution there are some minor differences. There are a few less trees per hectare in the 15 to 35 cm. size class a few more in the 40 to 45 cm. size class. As a result of good management, in this size class, there are many high-quality trees with veneer potential. On the whole it compares quite favourably with what is recommended, concluding that the forest is in a

reasonably good state of management. Inventory results are shown for the two 10-acre demonstration area sections.

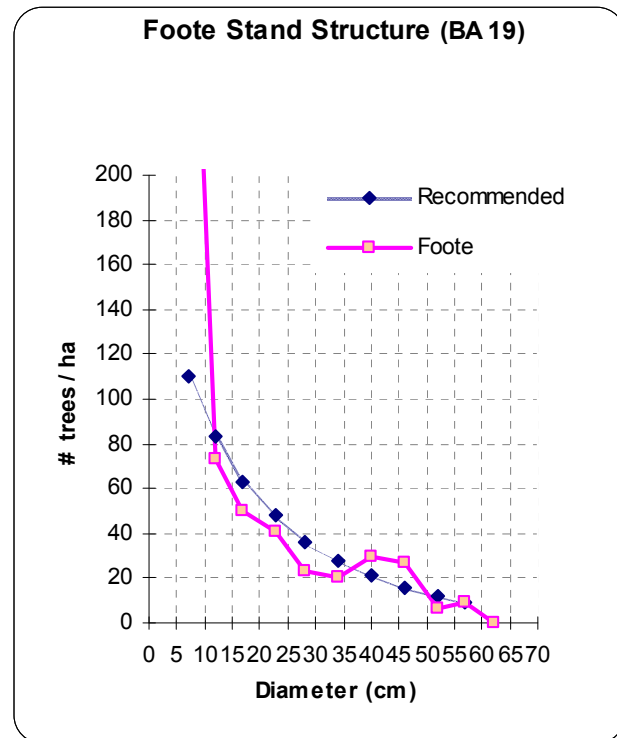


Figure 1.



Scene from David Foote's woodlot.

## Part Two: Economic Comparison of Woodlot and Crop Production for the Foote Case Study

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The objective of this economic analysis was to compare historical returns from the Foote woodlot to that from agricultural crops on comparable land over the same period. In order to make the comparison, a crop rotation was selected that would have likely been used in this area (see Crop Production Model description). Using historical returns for these crops a Net Present Value (NPV) calculation was used to estimate the returns in 2010 terms (see Net Present Value description).

Economic information for the woodlot was obtained through a personal interview with the landowner. Actual revenue and costs were collected for each forest operation for which data was available. In the Foote case, this went back to 1982. A Present Value calculation was used to estimate the equivalent 2010 value for revenue and costs from the woodlots. Then a NPV or profit was calculated.

The NPV was then calculated on a per acre basis and summed over the time period since 1980 when he started farm operations, in order to compare returns from the woodlots to that from agricultural land.

### Net Present Value

Typically sales from agricultural crops are made on an annual basis, while sales from woodlots are made only periodically. In order to assess them in a comparable way, a Net Present Value (NPV) calculation is done to estimate the value sales would have at a fixed future date (for these case studies 2010 was used). To convert past values to the present, the NPV calculation assumes that the profit (or margin) from sales is invested and compounded (i.e. the interest is added to the total investment annually) until the date that is to be used for the comparison. A 5% return was the most realistic and is reflected in most of the tables. However calculations for 2, 4, 6, 7.5 and 10% were also used.

This analysis does not attempt to place a monetary value on the many other woodlot benefits such as site protection, contributions to water quality or groundwater recharge, opportunities for recreational use, etc. It is typically more difficult to place a dollar value on these benefits, although in some locations landowners are charging for access or leasing hunting and fishing rights.

### Crop Production Model

Representative crop models were developed by region for typical crop rotations in Ontario using corn, soybeans & wheat. The representative farm model was based on crop enterprise budgets developed by the Ontario government, which reflect industry average costs and returns. Both variable and fixed costs were used in the calculations. Although fixed costs do not change with changes in acreage, overall fixed costs, including depreciation, must be covered to maintain long-term profitability. (Fixed costs do not include land rent or interest on land.)

Historic crop enterprise budgets were not readily available for all the required years. For the years that data was not available, values were estimated by averaging the total costs. To accommodate changes in reporting of crop enterprise budgets over the years, estimates using linear trends and averages based on the available historic numbers were determined. The earliest crop budgets go back to 1975.

Crop returns are cyclical in nature, based on crop rotations. To mitigate the effect that a given crop rotation cycle would have on the end results, the crop model was evaluated assuming the rotation planted 1/3 to corn, 1/3 to soybean and 1/3 to wheat annually. The present value of the rotation was used for the purpose of comparison with the woodlot per acre revenue.

### The Foote Farm

Background information on the farm and forest is found in Table 1. David Foote and family bought the farm in 1979. There are 25 acres of upland hardwood woodlot on this 100 acre farm in Victoria County (Town of Kawartha Lakes). In 2006 Foote was growing approximately 15 acres of small grains, 20 acres of pasture and 40 acres of hay in producing 98% of the feed required for a beef operation. There have been three harvests in the 25 acre woodlot (1982, 1999 and 2004) since Foote has owned the property. He cuts four full cords annually to supply a large part of his heating needs for the year. This is not included in the analysis.

### Comparison of Returns

The total earnings of all sources of income from the Foote woodlot were determined on a per acre basis over the last 30 years (1980-2010). Table 2 illustrates that Foote has generated \$3,568 per acre (NPV) for the combined profit from timber and fuel wood sales at a 5% discount rate. Annual values are added to simplify comparison to other cases.

Over the same period, the agriculture rotation generated profit of \$1,656 per acre at the 5% discount rate. The present value of revenue in the agriculture rotation was \$17,836, and of costs was \$16,180. (Table 3).

The woodlot analysis indicates the David Foote generated a total (in present value) of \$118,615 in revenue from timber sales, while costs were about \$35,039 resulting in a profit of \$83,576 at the 5% discount rate. Foote has 25 acres of woodland that were used in these calculations, so their total NPV was \$3,568 per acre in timber sales. Foote also generated \$225 per acre in three fuel wood sales as a result of the timber harvest. See Tables 4 and 5. The woodlot NPV calculated on a yearly basis is \$115 per acre, comparable to other cases in this series.

### Summary

**The results of this analysis indicate that the Foote woodlot was able to generate substantially more net revenue per acre from 1980-2010 than a typical crop rotation of corn, soybeans and wheat in central Ontario. The crop rotation NPV per acre is 46 % of the timber and fuelwood profits.**

**Table 1. The Foote Farm Land Use and Forest Description.**

Land use	Description	Hectares (acres)
Forest	Sugar maple, black cherry, white pine, 45 degree slope	2.0 (5)
Forest	Sugar maple, white ash, hemlock, beech, 10 degree slope	8.1 (20)
Agriculture	10 degree slope, all workable, hay, pasture and small grains	30.4 (75)

**Table 2. Net Present Value Summary of All Sources of Income (1980 - 2010) from the Foote Woodlot at the 5% Discount Rate.**

Source of Income	NPV (\$/acre)	NPV (\$/acre/year)
Timber Sales	3,343	108
Fuelwood Sales	225	7
<b>Woodlot Total</b>	<b>3,568</b>	<b>115</b>
Average Crop Rotation	1,656	53
<b>Difference</b>	<b>1,912</b>	<b>62</b>

**Table 3. Revenue, Cost, Present Value (PV) and Net Present Value (NPV) in dollars of Corn, Soybeans and Wheat Rotation using Central Crop Model at 5% discount rate.**

<b>Year of Harvest</b>	<b>Actual Revenue/Acre</b>	<b>Actual Cost/Acre</b>	<b>PV Revenue/Acre</b>	<b>PV Costs/Acre</b>	<b>NPV/Acre</b>
1980	267	169	1,156	732	424
1981	212	184	872	756	116
1982	194	203	759	795	-36
1983	229	201	856	751	106
1984	238	212	846	754	93
1985	209	220	708	745	-37
1986	186	213	601	688	-88
1987	247	209	758	641	116
1988	237	203	692	595	97
1989	209	230	583	640	-56
1990	204	210	542	556	-14
1991	187	205	471	517	-46
1992	193	215	464	517	-53
1993	238	225	545	516	29
1994	256	229	559	499	59
1995	357	232	741	483	258
1996	312	239	618	474	144
1997	264	246	498	464	33
1998	274	253	492	455	37
1999	263	243	450	416	33
2000	232	254	378	414	-36
2001	207	256	322	397	-76
2002	351	251	518	372	147
2003	313	270	440	380	60
2004	287	291	385	390	-5
2005	234	307	299	392	-93
2006	362	298	440	363	77
2007	357	313	413	362	51
2008	469	333	517	367	150
2009	357	380	375	399	-24
2010	539	349	539	349	190
<b>Total</b>	<b>8,484</b>	<b>7,645</b>	<b>17,836</b>	<b>16,180</b>	<b>1,656</b>

Using data from the historical crop enterprise budgets we calculated the total revenue and costs per acre for each of the harvest years of the crop rotation. The NPV revenue and costs per acre were determined for each crop rotation. The present value costs were subtracted from revenue to determine the NPV (margin) per acre. The crop rotation assumes that the corn, soybean and wheat rotation is based in central Ontario and uses values from that area. Discount rates were calculated for 2%, 4%, 5%, 6%, 7.5% and 10%. Only the 5% rate is shown here.

**Table 4. Revenue, Cost, Present Value (PV) and Net Present Value (NPV) in dollars of Timber Sales at 5% discount rate (25 acre woodlot).**

Year of Harvest	Volume Harvested (fbm) (i)	Actual Revenue	Actual Costs (ii)	PV of Revenue	PV of Costs	NPV	NPV/Acre
1982	62,000	10,000	0	39,201	0	39,201	1,568
1999	21,725	22,829	10,625	39,046	18,172	20,874	835
2004	25,138	28,534	12,586	38,238	16,867	21,371	855
2006 (iii)	unk	1,752	0	2,130	0	2,130	85
<b>Total (1982 -2010)</b>	<b>108,863</b>	<b>61,363</b>	<b>23,211</b>	<b>118,615</b>	<b>35,039</b>	<b>83,576</b>	<b>3,343</b>

- (i) (fbm) foot board measure
- (ii) Harvests in 1999 and 2004 were carried out on a share basis so revenue is total sale value of logs to the mills while costs are the logger's share of the sale value. The 1982 sale was a lump sum sale completed by a logger, therefore Mr. Foote did not incur harvesting costs. No costs were incurred for marking and planning the harvests, as it was done at no cost through Ministry of Natural Resources programs.
- (iii) The 2006 harvest followed some tornado damage. Revenue of \$1,752 is actually net of sale.

**Table 5. Revenue, Cost, Present Value (PV) and Net Present Value (NPV) in dollars of Fuel Wood Sales at 5% discount rate (25 acre woodlot).**

Year of Harvest	Volume Harvested (face cords)	Actual Revenue	Actual Costs	PV of Revenue	PV of Costs	NPV	NPV/Acre
1982	unk	1,000	0	3,920	0	3,920	157
1999	24	1,200	600	2,052	1,026	1,026	41
2004	35	1,000	500	1,340	670	670	27
<b>Total (1982 -2010)</b>	<b>59</b>	<b>3,200</b>	<b>1,100</b>	<b>7,313</b>	<b>1,696</b>	<b>5,616</b>	<b>225</b>

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