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

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. The 20 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 fuelwood 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.

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 couldn't 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. 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."

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. In an effort to answer this question an inventory was carried out in several 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 stand structure diagram (see "Recommended" curve in Figure 1) represents the ideal size class distribution in an all age forest being managed under a single tree selection system, as is recommended for upland tolerant hardwood forests such as the one represented in this case study. 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; however, on the whole it compares quite favourably with what is recommended, allowing us to conclude that the forest is in a reasonably good state of management.

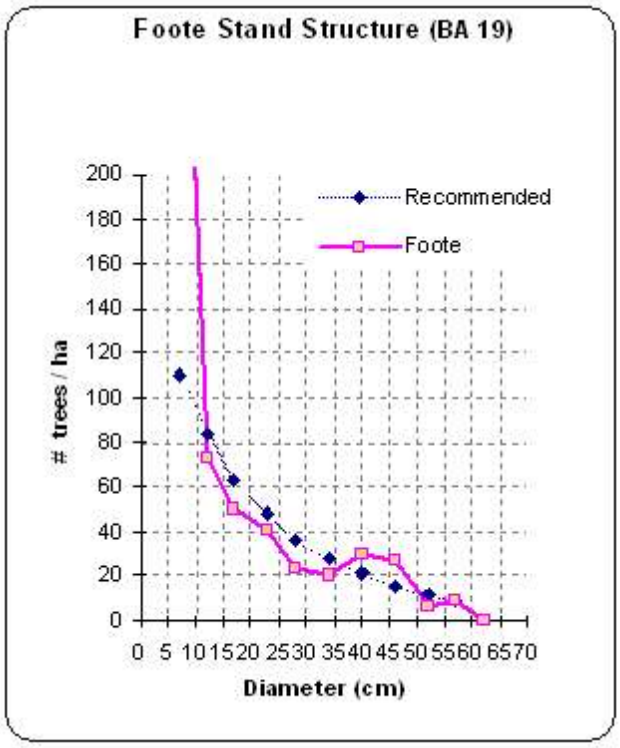

Figure 1

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

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 2004 dollars (see Net Present Value description). The NPV of returns from the woodlot and the crop production model are listed in Table 1.

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 stretched back to 1982). Profits (or margin) were determined (revenue minus costs), then a Net Present Value calculation was used to estimate a 2004 value for returns from the woodlot.

The NPV of returns were then calculated on a per acre basis and summed over the time period since 1982 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 compare them in a way that is economically valid, a Net Present Value (NPV) calculation is done to estimate the value sales would have at a future date (for this case study 2004 was used). 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 felt to be most realistic and is reflected in most of the tables, however calculations for 7.5% and 10% were also used and are mentioned periodically as well.

The Foote Farm
Background information on the farm and forest is found in Table 2. There are 25 acres of upland hardwood woodlot on a 100 acre farm in Victoria County. The balance of the farm is farmed by Mr. Foote, 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 Mr. Foote has owned the property.

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.

Crop yields and prices are cyclical in nature, so the order of the crop rotation would have an impact 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.

Comparison of Returns

The economic analysis indicates the Foote woodlot has generated a total (in present value terms) of $86,923 in revenue from timber sales, while costs were $26,146, resulting in a margin of $60,777. The Foote woodlot is 25 acres in size, so the total earnings from timber sales were $2,431/acre. The woodlot also generated $168 profit per acre in fuel wood sales since 1982 (values in 2004 dollars calculated at a 5% compound rate).

Following analysis of all sources of income from the Foote woodlot, the total earnings were determined on a per acre basis over the last 23 years (1982-2004). Table 1 illustrates that the Foote woodlot has generated between $2,599 and $5,064 revenue per acre from combined fuelwood and timber sales, depending on the compound rate applied. The agriculture rotation generated between $571 and $921 per acre.

Summary

The results of this analysis indicate that the Foote woodlot was able to generate substantially more revenue per acre from 1982-2004 than a typical crop rotation of corn, soybeans and wheat in eastern Ontario. At the various compound rates the difference between woodlot management timber sales (including fuelwood sales) and crop rotation ranged from $2, 028 (355%higher for woodlot) to $4,143 (450% higher for woodlot) more in profit per acre. See the tables below for a summary of the data.

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.

Table 1: Summary All Sources of Income (1982 - 2004) From the Foote Woodlot (Present Value, $/acre)

Source of Income	5%	7.5%	10%
Timber Sales	$ 2,431	$ 3,302	$ 4,680
Fuelwood Sales	$ 168	$ 251	$ 384
Woodlot Total	**$ 2,599**	**$ 3,553**	**$ 5,064**
Average Crop Rotation	$ 571	$ 720	$ 921
Difference	**$ 2,028**	**$ 2,833**	**$ 4,143**

Note: columns may not sum correctly due to rounding

Table 2: 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 3: Present Value of Corn, Soybeans and Wheat Rotation (at 5% rate) *(i)*

Year of Harvest	Actual Revenue/Acre	Actual Cost/Acre	Present Value Revenue/Acre	Present Value Costs/Acre	Margin/Acre
1982	193.50	202.77	566.04	593.16	-27.12
1983	229.40	201.11	639.10	560.27	78.83
1984	238.01	211.98	631.52	562.45	69.07
1985	209.09	220.01	528.35	555.97	-27.61
1986	186.25	213.42	448.22	513.62	-65.40
1987	246.63	208.84	565.27	478.66	86.61
1988	236.70	203.48	516.68	444.17	72.51
1989	209.39	229.67	435.31	477.46	-42.15
1990	204.21	209.62	404.32	415.04	-10.72
1991	186.51	204.77	351.69	386.13	-34.44
1992	192.76	214.90	346.16	385.93	-39.76
1993	237.84	225.03	406.79	384.87	21.92
1994	255.91	228.72	416.85	372.55	44.30
1995	356.50	232.41	553.05	360.54	192.51
1996	312.04	239.27	461.03	353.51	107.52
1997	263.87	246.14	371.29	346.34	24.95
1998	273.87	253.17	367.01	339.27	27.74
1999	262.82	243.24	335.43	310.44	25.00
2000	231.90	254.03	281.87	308.77	-26.90
2001	207.31	256.12	239.99	296.49	-56.51
2002	350.63	251.46	386.57	277.23	109.34
2003	312.65	270.33	328.28	283.85	44.43
2004	287.45	291.00	287.45	291.00	-3.55
Total					**$ 570.58**

Note: columns may not sum correctly due to rounding

(i) Using data from the historical crop enterprise budgets it was possible to calculate the total revenue and costs per acre for each of the harvest years of the crop rotation. The crop rotation assumes that the corn, soybean and wheat rotation is based in western Ontario and uses values from that area. Using the 5%, 7.5% and 10% compound rate, 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. As identified in the table above, the total margin for the crop rotation over the 23 year time period from 1982 to 2004 (expressed in 2004 dollars, using a compound interest rate of 5%) was $571 per acre. For 7.5% and 10% compound rates, net present values were $720 and $921 per acre respectively.

Table 4: Present Value of Timber Sales (at 5% rate) (25 acre - woodlot)

Year of Harvest	Volume Harvested (fbm) *(ii)*	Actual Revenue	Actual Costs *(iii)*	Present Value of Revenue	Present Value of Costs	Present Value of Margin	Present Value Margin/Acre
1982	62,000	10,000	0	29,253	0	29,253	1,170
1999	21,725	22,829	10,625	29,136	13,560	15,576	623
2004	25,138	28,534	12,586	28,534	12,586	15,948	638
Total (1982 -2004)	108,863			**$ 86,923**	**$ 26,146**	**$ 60,777**	**$ 2,431**

Note: columns may not sum correctly due to rounding

(ii) (fbm) foot board measure (board feet)

(iii) 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.

Table 5: Present Value of Fuel Wood Sales (at 5% rate) (25 acre - woodlot)

Year of Harvest	Volume Harvested (face cords)	Actual Revenue	Actual Costs	Present Value of Revenue	Present Value of Costs	Present Value of Margin	Present Value Margin/Acre
1982	?	1,000	0	2,925	0	2,925	117
1999	24	1,200	600	1,532	766	766	31
2004	35	1,000	500	1,000	500	500	20
Total				**$ 5,457**	**$ 1,266**	**$ 4,191**	**$ 168**

Note: columns may not sum correctly due to rounding

Acknowledgments:
Part One written by Dave Pridham. Economic analysis carried out by Cher Brethour of the George Morris Centre. Financial and /or in-kind support provided by Huron Stewardship Council, George Morris Centre, Huron Perth Chapter of the Ontario Woodlot Association, Maitland Watershed Partnership Initiative, Ontario Ministry of Natural Resources and Ontario Stewardship Opportunity Fund.

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