



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

## **CASE STUDY: MURRAY SCOTT 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 Murray Scott Woodlot Story**

by Keith Roulston, Publisher, The Rural voice

As Murray Scott bounces along the trails of his woodlot on a four-wheeler he can recite the history of every corner of the bush. It's a lot of history with the 100 acres spreading over the back end of two 200-acre farms that have been in the Scott name since the land was settled in 1857.

Back then brothers Walter and David left their family in Halton County and walked up the Huron Road (now Highway 8) to Clinton, turning north on a trail until they found the 200-acre lots each took up near Belgrave in what was then East Wawanosh Township. Murray, a descendent of Walter, grew up on his family's home farm but in 1963 bought the farm next door originally settled by David.

The Scotts have always felt trees were a big part of their farm and Murray and his wife Wilma, the record keeper on the farm, have the figures to prove it. Over nearly 40 years they've taken more than 600,000 board feet of lumber out of the 100-acre bush.

Those records also show that, unlike other farm products where the price seems to stay the same despite inflation, income from each tree harvested from the woodlot has been increasing in value. Back in 1964 when the young couple made their first harvest after buying their farm the previous year, they received \$120 per 1000 board feet of maple lumber. In 2000, they received \$2,000 per

1000 board feet for veneer-quality maple and \$1,000 to \$1,500 for the rest of the hard maple.

Through 40 years of management, Murray has aimed to produce more veneer-quality maple by taking out the lower-quality trees to let the best quality grow. By that 2000 harvest, 40 per cent of the maple cut reached the top prices in the \$1,500 to \$2,000 range.

With a woodlot that big, the normal impression that you have to wait for a long time to see money from a woodlot is also proven wrong. In the past decade the Scotts have harvested every two to three years: four harvests in all totalling 270,000 board feet.

Another harvest in 2004 yielded a value of \$59,727. Given that Murray and Wilma were involved in a beef cattle operation with Murray's three cousins in a limited company called Scottslea Farms Ltd., the revenue from the woodlot proved handy given the situation in the post-BSE world. Again history comes to the fore here because it was a major infusion of cash from a harvest of the bush that helped save the farm back in the crisis years of the 1980s when high interest rates collided with low beef prices.

The woodlot, stretching across four farms, provides an interesting laboratory about woodlot management when you look at each 25-acre lot. His father liked trees, Murray says, and liked to look at them so much he probably didn't cut them as often as he should have. The result was an overly mature bush that had too many large trees and not enough variety of tree development in the 25 acres of bush on his home farm. So when the bush was marked by Ministry of Natural Resources technicians in the 1970's and became the first woodlot in the area sold by auction the result was a cut that, in hindsight, Murray feels left the bush too open. Things probably would have been all right even with that severe cut but several dry summers contributed to more damage to the remaining trees. With some trees suffering from die-back a second cut was required some years later.

Each of the 25-acre sections of the woodlot has a different character because of past management practices. A goal would be to have each of the sec-

tions have a different harvest but generally there are a few trees throughout the bush that are ready to be cut whenever a harvest is taken. Even a couple of trees per acre at 300-400 board feet each provides a good per acre income, he says.

Scott stops by one of his favourite maples that stands tall and straight, stretching up perhaps 50 feet to the first limb. He takes out a caliper that shows the tree measures 29 inches in diameter. Taking out a chart he shows that at that measure, there would be 508 board feet of lumber in the tree.

"At veneer log rates this could be a \$1,000 tree," he says. The extra girth of the tree shows the value of letting trees reach their potential past the minimum-diameter cutting limits in municipal tree by-laws, he says. A 20-inch diameter tree would yield only 370 board feet. Often a tree can put on much more wood per year after it reaches the minimum diameter limit than before.

Being a beef farmer used to measuring performance of his animals, he has always had a goal to select a number of trees and measure them regularly to track their performance. "I think you'd find that there are trees that perform and trees that don't perform," he says. He has taken a lot of advice on management over the years from Alan Craig, who operated Craig Sawmill in nearby Auburn until it closed several years ago. From Craig he learned that a healthy looking tree with tight bark had more good growth in it. A tree with loose bark was probably not going to grow much more and should be harvested.

Eight of the 12 sales they've made since 1964 had been to Craig's and Scott credits the marking skills of the company with the general health of the bush today.

The bush is mostly hard maple with some basswood, beech and cherry. The beech population has declined over the years because at one time beeches were almost considered a weed tree, he says, but the idea of diversity in a bush is much more highly regarded today.

Also a big loss was elms which were hit by the Dutch Elm Disease epidemic of the 1970s. After

those trees were removed there was a substantial regrowth as young trees sprang up, but sadly most of these have died off in the last few years as well. Before the disease hit, the bush had numerous rock elm and in a harvest in about 1952, 90-foot long logs were taken out to be trucked to Collingwood Shipyard for use.

A road system has been established throughout the bush to make cutting and skidding as efficient as possible and reduce injury to nearby trees. As well as being practical, this is also a pleasure for Scott who says he has a dream of a trail extending from Belgrave to the Wawanosh Nature Centre on the Maitland River west of his farm. Currently trails go about half that distance, he says.

Pleasure also comes from the wildlife the large, extended forest attracts with deer having a sheltered run from Belgrave Creek in the east to the Maitland River to the west. And there's the relaxation the woodlot provides.

"Sometimes when Wilma can't find me it's because I'm back here in the bush," he says.

## 2012 Update

There have been many changes in the Scott woodlot.

Murray sold the 100 acres east of the home farm to a neighbour. The home farm of 200 acres with 50 acres of woodlot was sold to his daughter in 2011. Murray continues to manage these 50 acres of woodlot and harvest fuelwood for farm use.

This lot became certified under the Forest Stewardship Council (FSC) in 2009. This means the property must have a management plan and forest operations must be carried out in a sustainable fashion. Wood products from this woodlot can use the FSC stamp. The first harvest under FSC certification was carried out in 2009. Veneer logs accounted for 13 % of the harvest.

Murray Scott measures a black cherry tree in his woodlot



## Is This Forest Being Managed in a Sustainable Way?

It has been asked 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 Scott woodlot is compared to the recommended distribution there are some minor differences (i.e. a surplus of trees from up to 30cm and a deficit above 50 cm). While it would be preferable if there were more trees 50 cm (20 inches) and over, on the whole the Scott structure compares quite favourably with that recommended, allowing us to conclude that the forest is in a reasonably good state of management.

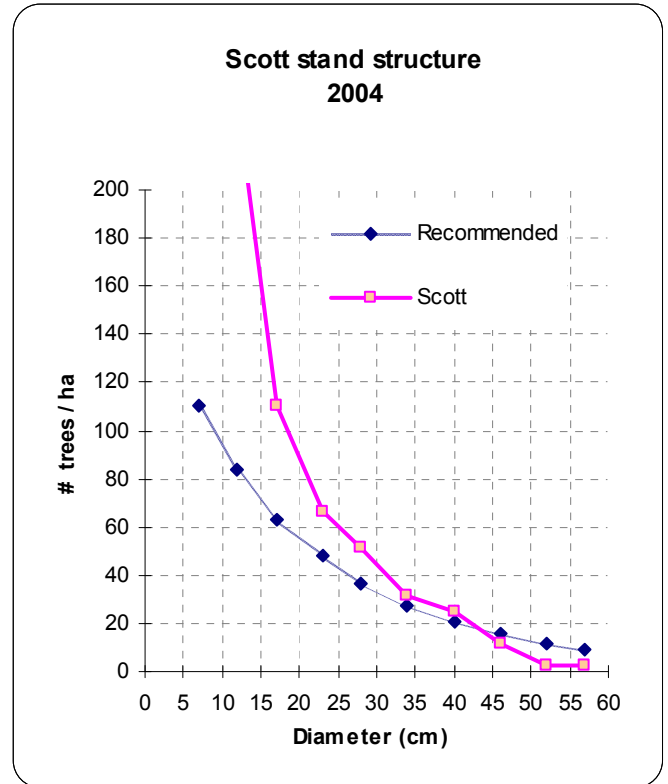
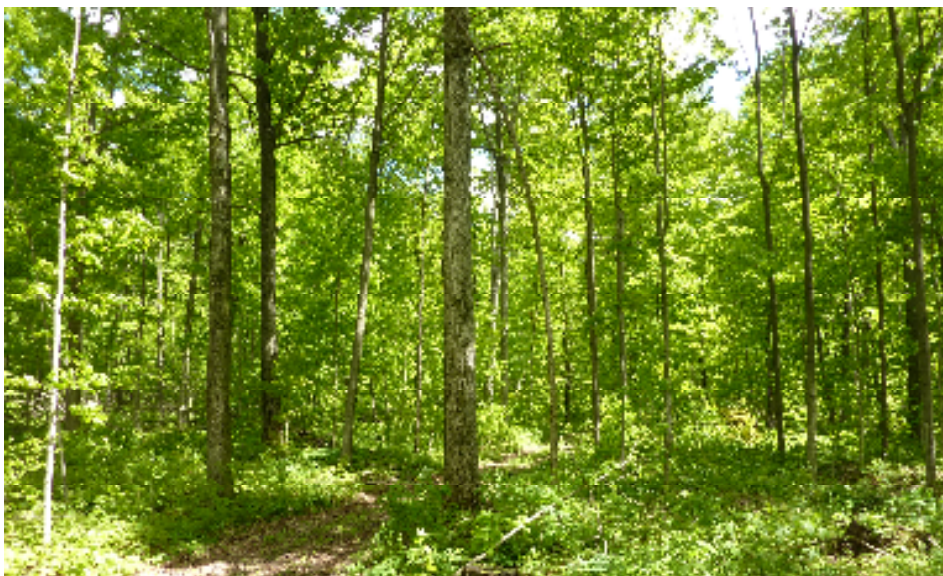


Figure 1.



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

The objective of this economic analysis was to compare historical returns from the Scott 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 Scott case, this went back to 1962. 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 1975 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 Scott Farm

Background information on the farm and forest is found in Table 1. There were 100 acres of upland hardwood woodlot on a 400 acre farm in Huron County. It has been in the Scott family since 1856. The woodlot has never been pastured. Some tapping for maple syrup occurred prior to the 1950's, but none since. The agricultural land is rotationally cropped (wheat, soybeans, corn and hay) as cash crops or feed for their beef cattle operation. There have been twelve harvests in various portions of the woodlot between 1977 and 2009.

Scott has had only a few small sales of fuelwood over the years and so the fuelwood is not included in analysis. However 65 face cords are processed annually for two homes and shop heating. He has estimated the present day cost of this harvest and processing at \$10 per face cord. Family labour is not counted in cost. The fuelwood value still outweighs the costs of heating three buildings.

## Comparison of Returns

The total earnings of timber sales from the Scott woodlot was determined on a per acre basis over the last 36 years (1975-2010). Table 2 illustrates that Scott generated \$10,966 per acre in profit from tim-

ber 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 \$4,979 per acre at the 5% discount rate. The present value of revenue in the agriculture rotation was \$25,214, and of costs was \$20,235. (Table 3).

The woodlot analysis indicates that Murray Scott generated a total (in present value) of \$1,098,497 in revenue from timber sales, while costs were about \$1,856 resulting in a profit of \$1,096,643 at the 5% discount rate. Scott has 100 acres (50 in 2009) of woodland that were used in these calculations, so their NPV were \$10,966 per acre in timber sales. See Table 4. The woodlot NPV calculated on a yearly basis is \$305 per acre, substantially higher in comparison to other cases in this series.

## Summary

**The results of this analysis indicate that the Scott woodlot was able to generate substantially more net revenue from timber sales per acre from 1975-2010 than a typical crop rotation of corn, soybeans and wheat in western Ontario. The crop rotation NPV per acre is 45 percent of the timber profits.**

**Table 1: The Scott Farm Land Use and Forest Description**

Land use	Description	Hectares (acres)
Forest	Predominately sugar maple, but includes beech, ash, black cherry, etc. Rolling terrain - loam soils.	40 (100)
Agriculture	Including farmstead, workable land plus other riparian and natural areas	120 (300)

**Table 2. Summary of All Sources of Income (1975 - 2010) from the Scott Woodlot.**

Source of Income	NPV (\$/acre)	NPV (\$/acre/year)
Timber Sales	10,966	305
<b>Woodlot Total</b>	<b>10,966</b>	<b>305</b>
Average Crop Rotation	4,979	138
<b>Difference</b>	<b>5,987</b>	<b>167</b>

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

Year of Harvest	Actual Revenue/Acre	Actual Cost/Acre	PV Revenue/Acre	PV Costs/Acre	NPV/Acre
1975	170	151	935	834	102
1976	148	155	777	814	-37
1977	175	161	876	803	73
1978	188	166	895	793	102
1979	229	175	1,038	794	244
1980	281	169	1,215	732	484
1981	243	184	1,000	756	244
1982	219	203	858	795	63
1983	293	201	1093	751	342
1984	269	212	957	754	203
1985	250	220	846	745	101
1986	200	213	646	688	-42
1987	285	209	875	641	234
1988	258	203	756	595	161
1989	233	230	649	640	9
1990	241	210	639	556	82
1991	253	205	640	517	123
1992	210	215	505	517	-12
1993	279	225	640	516	124
1994	298	229	651	499	152
1995	442	232	919	483	436
1996	337	239	667	474	193
1997	335	246	632	464	168
1998	282	253	506	455	51
1999	310	243	531	416	115
2000	268	254	436	414	22
2001	267	256	414	397	17
2002	373	251	552	372	180
2003	367	270	517	380	136
2004	314	291	421	390	31
2005	303	307	387	392	-5
2006	385	313	468	380	88
2007	480	313	555	362	193
2008	581	333	640	367	273
2009	427	380	448	399	49
2010	630	349	630	349	280
<b>Total</b>	<b>10,822</b>	<b>8,467</b>	<b>25,214</b>	<b>20,235</b>	<b>4,979</b>

Columns may not sum correctly due to rounding

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 western 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: Present Value of Timber Sales in dollars from the Scott Woodlot at 5% discount rate (100 acre woodlot).**

Year of Harvest	Volume Harvested (fbm) (i)	Actual Revenue	Actual Costs (ii)	Present Value of Revenue	Present Value of Costs	Present Value of Margin	Present Value Margin/Acre
1977	22,600	3,947	0	19,748	0	19,748	197
1978	137,934	41,500	0	197,745	0	197,745	1,977
1980	?	600	0	2,593	0	2,593	26
1981	200,000	80,500	0	331,349	0	331,349	3,313
1984	?	1,400	0	4,978	0	4,978	50
1988	71,532	35,775	0	104,651	0	104,651	1,047
1992/93	175,446	61,973	0	142,043	0	142,043	1,420
1995	13,849	9,937	0	20,658	0	20,658	207
1998	31,260	28,799	0	51,719	0	51,719	517
1999/00	48,588	53,570	0	87,260	0	87,260	873
2004	37,006	59,727	600	80,040	804	79,236	792
2009(iii)	52,508	53,060	1,000	55,713	1,050	54,663	1,093
<b>Total (1975 -2010)</b>	<b>791,723</b>	<b>430,788</b>	<b>1,600</b>	<b>1,098,497</b>	<b>1,854</b>	<b>1,096,643</b>	<b>10,966</b>

Note: columns may not sum correctly due to rounding

- (i) (fbm) foot board measure (board feet)
- (ii) Marking for harvests from 1977 through 2000 were done at no cost through Ministry of Natural Resources programs. The 2004 harvest was marked by a consultant.
- (iii) Cost of FSC certification was \$1000. Costs for marking and harvest were assumed by the logger in exchange for the fuelwood harvested. The 2009 harvest was based on the 50 acres Scott owned in 2009. All other harvest was considered on the entire 100 acres.

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