



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

## **CASE STUDY: RUSS HORNING 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 Russ Horning Woodlot Story**

by Keith Roulston, Publisher, The Rural voice

Russ Horning started learning about woodlot management pulling one end of a cross-cut saw when he was 12. He was big for his age and his father thought he could do a man's job on the other end of the saw.

His father used the bush as many other farmers did back then. A few trees would be selectively harvested to earn cash to pay taxes and other cash needs with the tops cut up to heat the house on the family farm near Arkwright in Bruce County.

"My father only cut trees if there was something wrong with them," he recalls, and he learned the lesson. The bush has never been cut to the diameter limit allowed by the county tree bylaw.

Because trees have only been cut selectively, there's a good undergrowth in the bush and the trees stretch up to the light, providing long, straight, branchless trunks that will make high-value timber.

Besides tree tops, his father would select ironwood trees or cull trees for use as firewood. He estimates 15-20 face cords a year were used for firewood in those days. Until 1955 they also made maple syrup using their own firewood to boil the sap.

Back in the early days it was the responsibility of the farmer to get the logs to the sawmill before he'd be paid. It meant only a few logs would be taken out in any one year. It also meant there was a steady supply of logs going to market, not the modern situation

where there's a major harvest one year, then nothing for another 10-15 years.

One year Horning remembers six loads of logs going to market. Back then stake trucks were used for hauling cattle in summer and logs in the winter and could only hold about 1,000 board feet worth of logs at a time. Another year he recalls 60-70 logs going to the mill. He thinks he's being conservative in saying 3,000 board feet per year went to market, a total of 60,000 board feet over the years.

The first major harvest of the Horning woodlot came in 1975 when 28,989 board feet of maple and 21,267 board feet of beech were taken out. Five years later a windstorm did some damage and another 1,400 board feet were salvaged from affected trees.

In 1990 he took advantage of the marking and marketing service offered by the Ministry of Natural Resources. The cut sent 48,900 board feet to market. When Horning looked at the bush after the cut, it struck him that too many of the larger trees had been removed. He feels it probably hurt the next cut in 2002 when 13,143 board feet were removed in a clean-up cut, estimating there could have been 25,000 board feet if more larger trees had been left 12 years earlier. With only 13,000 board feet, there wasn't as much competition from buyers as if there had been a larger cut, Horning says. In retrospect, he feels he trusted the expertise of the markers too much. He asked them to mark for the good of the bush and auction off the timber for him and didn't pay much attention until the cut was finished.

"I learned by the experience that when you're marking for the current cut, you're also marking for the cut you're going to make 10 or 15 years down the road," he says. "Don't thin your bush too much and you'll get better bids (from timber buyers). If you have a minimum 1,000 board feet per acre you'll get more competitive bids."

That 2002 cut was marked by a consultant and he and his son Jeff were along, asking questions about why each tree was chosen to be marked. "We only looked for trees with defects," Horning says. We looked for damaged tops or trees that were past their best. We still have our good quality trees left."

"If you keep taking out the poorer trees you're improving your growing stock and over time will gener-

ate better trees," he says, comparing tree selection to breed improvement in livestock

Adding it all up, the harvests over the years come to a total of 173,697 board feet of lumber, which averages 3047 board feet of lumber per year from the 16 acres of bush or 190 board feet per acre, per year. At \$900 per thousand board feet, it means an average return of \$171 per acre per year at today's (2004) values

And that doesn't include income from firewood. Sale of firewood added \$400 in 1975, \$35 in 1980, \$200 in 1981, \$2,800 from tops in 1991 and \$1,400 from tops in 1992 for a total of \$4835.

With his average per acre return of \$171, Horning argues that the woodlot gives a better return than most projects on the farm.

Horning's woodlot has a high percentage of hard maple while some woodlots have only soft maple, but even there, at \$250 per thousand board feet you'd still get \$47.50 per acre per year. "It will make you a good dollar for a minimum of input," he says.

Unlike the rest of the farm there are no expensive tools and machinery to buy, he says. "The biggest thing you need is knowledge. You have to know what you're looking at (when you look at your trees)."

The best way to gain that knowledge is to join your local woodlot association, Horning says. At association meetings you get to meet other woodlot owners and compare notes and you hear speakers who can bring you up to date on the latest information.

"To me that's the only way to go," he says of his decision to join the Grey-Bruce Woodlot Association. "It's been a real good thing for me. I've learned a lot. I wish they'd had it going 20 years ago."

Everybody who owns a woodlot should have a plan for it, he urges, even if it's only a one-line plan. Take a day and walk through your woodlot and see what you have there, he says. "You want to look 40-50 years ahead," he says in setting the goal you will manage toward. If you don't have any idea about how to manage your woodlot, join a good organization.

"Our bush is geared to produce top quality hardwood timber," he says of his own plan. The average woodlot, he says, has about five per cent of its logs that can

be sold for veneer production. Veneer logs can bring a woodlot owner about three times as much as a log sold for lumber. It's quite possible through good management to increase the number of logs that qualify for veneer prices, he says. He expects his woodlot will have 15 or even 20 per cent of its logs in future going at veneer prices. "There a huge difference in dollar return because veneer is where the big dollars are."

Another simple thing woodlot owners can do to increase their return is to get competitive bids. "It certainly pays to get bids in timber," he says, pointing out there was \$6,000 difference between the high and low bids on his recent sale. "The more bids you have the better. If you manage your woodlot well you'll have higher quality and bigger volume making it more attractive to get bids."

He also warns farmers against allowing companies to come in and take all trees above the minimum diameter specified in their county's tree bylaw. "In my opinion, anyone who would cut healthy trees at minimum diameter is wasting money and wasting trees," he says. "To cut a 19-inch tree is foolish. It's putting on dollars in growth (every year), especially from 19-24 inches (in diameter). It's going to make you seven to 10 per cent per year standing there and all you have to do is watch."

He also advises woodlot owners not to let anyone harvest their bush in the spring until at least the end of June or the damage may be devastating to the bush. There's a lot of damage to the floor of the bush when the ground is soft leaving deep ruts that will damage tree roots, he says. "I won't let anyone in my bush after March," he says. "I guess I'm fussy but that's the way it is." The winter is the best time to harvest, especially if there are a couple of feet of snow on the ground. The snow cushions the logging activities in the bush and the bark is tight on the trees during the winter, preventing excessive injuries to neighbouring trees from felling and skidding activities.

"I would encourage anybody, no matter how long they stay on the farm, to record anything you take out of your woodlot so it can be passed on, even if you only take out 50 cords of wood," he says. "Over time a long-term record can be gained as to what is hap-

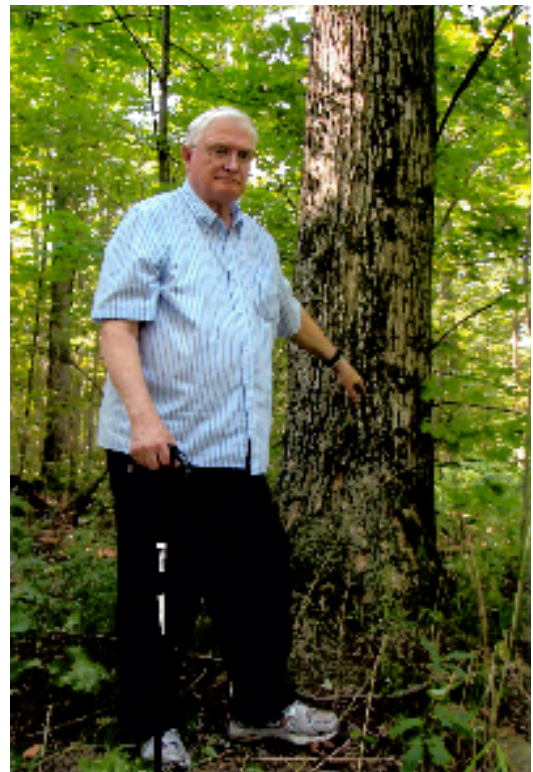
pening. Even if it's a lump-sum sale of \$20,000, write it down so somebody has some idea of what woodlots are worth." After all, he reasons, people record bushels of corn from acres but wood has a greater value and a value that continues to increase.

The woodlot has been in the Horning family since 1885 and with Jeff living on Russ's old farm nearby and taking an interest in the bush, Russ is hopeful the family tradition will be continued. Jeff has been attending woodlot association meetings and learning more about managing trees.

"He's taking an interest in it which I'm really pleased to see," Russ says. "He's realizing the value of this stuff." Russ wants to know that the bush will be productive for Jeff and possibly for his grandchildren to come. "I don't know if I'll be around to see another cut," he says of his bush, "but if I'm not, I'm leaving a good stand of trees for the next generation."

## UPDATE 2012

Russ has moved to a retirement home in Owen Sound. He visits the woodlot with his children whenever can. With his son Jeff he is planning a harvest within a year.



Russ and tree a little older in 2012

## 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 Horning woodlot is compared to the recommended distribution there are some minor differences (i.e. a deficit of trees from 10 to 25cm and a surplus from 30 to 50 cm), but on the whole the Horning structure compares quite favourably with that recommended, allowing us to conclude that the forest is in a reasonably good state of management.

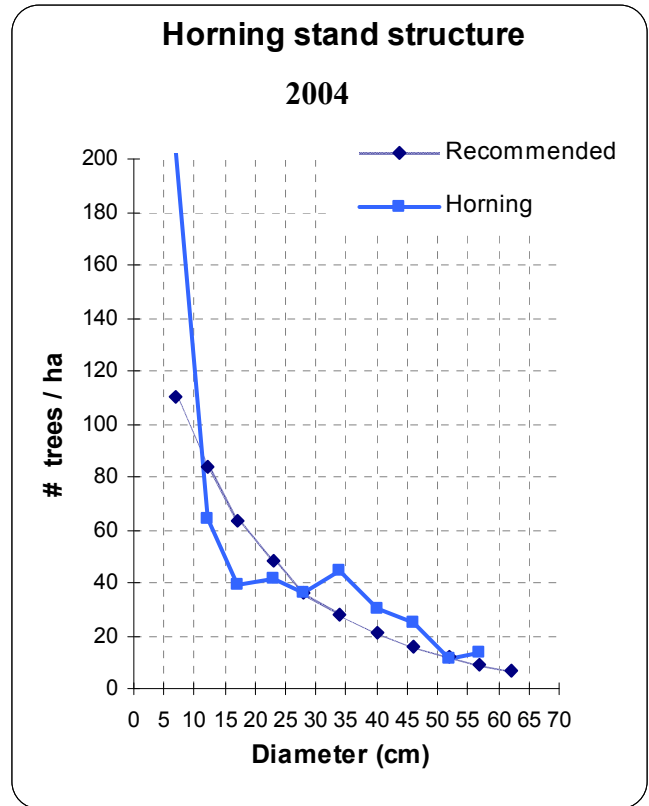


Figure 1.

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

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

Background information on the farm and forest is found in Table 1. There are 16 acres of upland hardwood woodlot on a 100 acre farm in Bruce County. The balance of the farm was previously farmed by Mr. Horning, and is currently rented for grain and hay production (less areas occupied by the farm buildings, gravel pit, and a small forested wetland. There have been three harvests in the 16 acre woodlot between 1975 and 2004 and a small cleanup after a 1980 windstorm.

## Comparison of Returns

The total earnings of all sources of income from the Horning woodlot were determined on a per acre basis over the last 36 years (1975-2010). Table 2 illustrates that Horning has generated \$5,953 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 gener-

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

The woodlot analysis indicates Horning has generated a total (in present value) of \$81,345 in revenue from timber sales, while costs were about \$905, resulting in a profit of \$80,440 at the 5% discount rate. Horning has 16 acres of woodland that were used in these calculations, so their NPV was \$5,027 per acre in timber sales. Horning also generated \$926 per acre in fuel wood sales since 1975. See Tables 4 and 5.

## Summary

**The results of this analysis indicate that Horning was able to generate substantially more net revenue per acre from 1975 to 2010 with woodlot management than a typical crop rotation of corn, soybeans and wheat in western Ontario. The crop rotation NPV per acre is 84% of the timber and fuelwood.**

**Table 1. The Horning Farm Land Use and Forest Description Land use Description Hectares (acres)**

Land use	Description	Hectares (acres)
Forest	Sugar maple 90%, Black cherry 5%, minor components of white ash, red oak, beech and white pine; rolling terrain with large central drumlin – sandy loam to loam soils	6.5 (16)
Reforestation area	Pine, spruce , cedar	5.5 (14)
Gravel pit		4 (10)
Agriculture	Including farmstead, and small wetland	24 (60)

**Table 2. Net Present Value Summary of All Sources of Income (1975 - 2010) from the Horning Woodlot at the 5% discount rate.**

Source of Income	NPV (\$/acre)	NPV (\$/acre/year)
Timber Sales	5,027	139
Fuelwood Sales	926	26
<b>Woodlot Total</b>	<b>5,953</b>	<b>165</b>
Average Crop Rotation	4,979	138
<b>Difference</b>	<b>974</b>	<b>27</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	1,093	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>

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. Revenue, Cost, Present Value (PV) and Net Present Value (NPV) in dollars of Timber Sales at 5% discount rate. (16 acre - woodlot)**

Year of Harvest	Volume Harvested (fbm) (i)	Actual Revenue	Actual Costs (ii)	PV of Revenue	PV of Costs	NPV	NPV/Acre
1975	50,254	5,837	0	32,197	0	32,197	2,012
1980	1,400	310	70	1,340	303	1,037	65
1990	48,900	11,200	0	29,717	0	29,717	1,857
2004	13,143	13,500	449	18,091	602	17,489	1,093
<b>Total (1975 -2010)</b>	113,697	30,847	519	<b>81,345</b>	<b>905</b>	<b>80,440</b>	<b>5,027</b>

(i) foot board measure

(ii) All harvests were completed by a logger, therefore M r. Horning did not incur harvesting costs. In addition, no costs were incurred for marking and planning the 1990 harvest, as it was done at no cost through Ministry of Natural Resources programs.

**Table 5. Revenue, Cost, Present Value (PV) and Net Present Value (NPV) in dollars of Fuel Wood Sales at 5% discount rate. (16 acre woodlot)**

Year of Harvest	Volume Harvested (full cords)	Actual Revenue	Actual Costs (i)	PV of Revenue	PV of Costs	NPV	NPV/Acre
1975		400	0	2,206	0	2,206	138
1980		35	0	151	0	151	9
1989		200	0	557	0	557	35
1991	70	2,800	0	7,075	0	7,075	442
1992	36	1,400	0	3,369	0	3,369	211
2004	29	1,000	0	1,340	0	1,340	84
2006	2.7	96	0	117	0	608	38
2007	2.7	96	0	111	0	111	7
2008	2.7	96	0	106	0	106	7
2009	2.7	96	0	101	0	101	6
2010	2.7	96	0	96	0	96	6
<b>Total</b>		6,471	0	<b>14,816</b>	-	<b>14,816</b>	<b>926</b>

(i) For the fuelwood harvest, Russ marked the trees All harvest and processing was contracted out to a fuelwood harvester. Russ is paid per cord.

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