



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

## **CASE STUDY: MARTIN/HORST 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 Albert Martin/Norman Horst Woodlot Story**

by Keith Roulston, Publisher, The Rural Voice

The 18-acre woodlot provides a disproportionate part of the farm income mix for Norman Horst, his wife Bernadine and their three young children on their 110-acre mixed farm just outside Elmira.

Norman estimates that sales of maple syrup and timber from the bush provide about 25 per cent of the farm's income to go along with the apple orchard, hogs, cattle and poultry. Most of the maple syrup, along with the apples from the 10-acre orchard, are sold through a retail store on the farm, which attracts customers on the busy Listowel Rd. that leads to the City of Waterloo, nearby. If there is a really good maple syrup crop, say 350 gallons, then he would wholesale about 50 gallons. "But we can pretty well

retail 300 gallons at the door," says Norman. "This being a major roadway from Listowel to Waterloo really helps us out (with retail sales)."

"It was the location that helped my father when he started up," adds Albert Martin, who operated the farm prior to the Horsts buying it in 2000. "We used to have customers right from Kincardine to the odd one in Toronto and Montreal. Dad didn't start making syrup until 1944," said Albert. His father also planted the orchard. Albert grew up on the farm and started farming in 1959, later buying the farm from his father.

Norman didn't grow up with a family tradition of making maple syrup. "One winter back when I was 17, I worked for another maple syrup producer. I was up there all winter helping him cut his firewood, then with the maple syrup in the spring. But most of what I've learned was from Albert."

Albert, in turn learned management of the woodlot from his father Enos. "I just learned from my dad you have to take out some of the big trees so the young trees can grow, but after several years of farming I had the (Ministry of Natural Resources) forestry guys in to mark (trees)." He did that several times before the program was discontinued and continued to remove marked trees for several years after the last marking.

"My main objective is to remove the bigger ones so I always have different generations of trees," says Norman. "Big trees look nice but they kind of deteriorate (for sap production). I think the main thing you can do is keep the forest growing as vigorous as possible," says Norman.

As part of that strategy, Norman spends part of each winter in the bush, cutting mature trees for sale and using the tops for firewood to fuel the boiler for the maple syrup evaporator. Waterloo Region's woodlot by-law deems taking more than 30 logs per year as a commercial harvest. "My aim is to always stay below that," Norman says. "It means a couple of wagon loads of logs (2,000-3,000 board feet) a year taken to the sawmill."

Typically, woodlot owners are told that maple syrup production and timber sales don't mix. But Albert explains that the farm's bush may not be a sap bush like some. "It's more of a timber bush. You have huge, long tree stems. The trees are fairly close together and grow tall."

Because of the height of the trees in the bush, they still get a lot of timber out of trees cut. Norman explains that the lower six to eight feet of log is lost to timber production because of the staining caused by tapping the trees. "The local sawmill where I take the trees is very surprised with the quality of logs I bring." Norman sells some of the lower logs, which have been stained from the tapping, for pallet wood. He thinks there might be a specialty market, as a curiosity, for lumber cut from trees with tap holes.

The bush work is a winter-time job for Norman. "I

probably spend up to two weeks in the bush in the winter. I enjoy doing it myself. Sometimes if there's a tree hung-up in another tree I wonder but it's an enjoyment for me." The workload involves cutting 10-12 trees as well as making fuel wood. He usually has two people cutting. "We don't do a lot of cutting in the bush. We drag the branches out to the yard, cut to three-foot firewood lengths, and get a splitting crew together to split the bolts." That crew usually involves 4-5 people. "As much help as I can get", he says.

The bush work is fitted in around grading apples, usually a few bushels a day. Livestock is a small part of his workload, apples are the biggest. "A lot of the work in the livestock part of the operation is in summer. The maple syrup is usually in the spring and the apples in the fall, so there's something at all times of the year." "In some ways maple syrup and apples don't mix well in the spring time because you should be out pruning trees when you're looking after the syrup," says Albert. "But then at the retail end of it the two blend in very well."

Customer preferences have changed over the years and people buy both the apples and the maple syrup in smaller quantities, but they buy more often. "The syrup market has changed to a year-round market," says Albert. "You have to try to serve the customer well, and put out a good product at a reasonable price. If you go to a place and you enjoy the people behind the counter you like going there. We can't please everybody but we try."

For those thinking of getting into the maple syrup business, Albert suggests attending information meetings to get as much information as possible. "Don't get all your advice from one person because not everybody sees things the same." He suggests talking to a forestry expert or to the maple syrup equipment supplier. "Then you have to use some of your own thinking too." When he started using a pipeline he developed many of this own practices from experience.

Norman also seeks outside advice. "I remember hearing at an information meeting a forester advising not cutting so as to only have maple trees left in the bush," he says. "If this Asian Long-horned Beetle or some other pest gets out of control and we only have maple trees, we won't have anything left," is the comment he made.

Traditionally the bush has been mostly maple with some beech and cherry. "We cut a lot of beech for

timber when he rebuilt the barn in 1948,” says Albert. “I’m not cutting down every beech that I see when it’s only a twig. I tend to leave them a little bit longer so I can get a bit of firewood out of them. Now I’m not letting them grow to two-foot diameter, or anything like that. But I guess it made me think a little bit.”

Norman and Albert have a unique working relationship. Norman’s brother Mark was custom cutting hay at Albert’s farm in the late 1990s when he got talking to him. He learned that nobody from Albert’s family appeared ready to take over the farm. Later, when Norman started talking about wanting to buy a farm, his brother recalled the conversation and dropped in to ask Albert if he was interested in selling.

Norman was only 24 when they had the first meeting to discuss the sale of the farm in the fall of 1999. In 2000, Albert bought a house in Elmira and Norman moved into the house on the farm. “There was an understanding that they had to help as much as possible so they’d get used to the customers,” Albert says. “Then in the new year whatever apples and maple syrup were left, I made a very reasonable price for him to get started.”

Albert continues to help out on the farm.

“Now if I have a question, I’ll ask Albert. If he doesn’t have anything to do he’ll ask me if I have something to do. We just kind of help each other.”

“Sometimes I put my hours down and sometimes it’s free labour,” Albert says, who also serves as the chairman of the Maple Syrup Museum in St. Jacobs.

Their friendship has allowed the two modern Mennonite farmers to carry on a successful farming and woodlot formula that might otherwise have disappeared.

## Update 2012

Operations continue at the Horst farm.



Bernadine and Norman Horst and their three children with Albert Martin

## 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 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.

The Horst’s goal (and Martin before him) for their woodlot is to manage it in a manner that will sustain or improve maple syrup production for the next generation. Their forest management activities have included culling poor-quality and over-mature larger trees to make room for young growth in order to maintain a healthy growing forest with trees of all ages. The Martin-Horst’s have an appreciation for natural resources and an awareness of income from woodlots. In past they have utilized MNR for tree marking and management advice. The stand structure in this woodlot is typical of a forest being managed for maple syrup production, with sufficient larger trees to maintain good syrup production, but enough smaller trees for future growth. Thus the stand appears to be in a state that will achieve the landowners’ goal of sustaining maple syrup production.

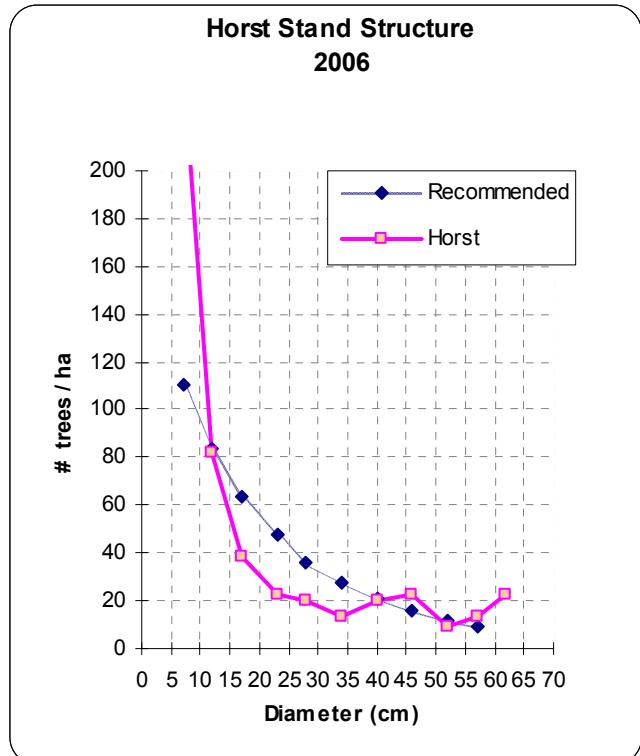


Figure 1.



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

The objective of this economic analysis was to compare historical returns from the Horst 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 both Martin and Horst. Actual revenue and costs were collected for each forest operation for which data was available. In the Horst case, this went back to 1983. 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 1983 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. Individual revenues and costs can vary significantly from crop budget estimates.

## The Horst Farm

The Horst property is located on 110 acres in Wellesley, Region of Waterloo. There are 18 acres of maple woodlot. See Table 1.

The woodlot and farm was originally owned by Albert Martin and his father before him. In 2000, Norman Horst bought the farm. Current farm practices on the Horst farm are a mix of hog, cattle, poultry, orchards and maple syrup. They also have acreage devoted to silage corn, grain corn, mixed grain and alfalfa.

Maple syrup is the dominant practice from the woodlot, followed by timber production. The Horst woodlot also has non-timber values in the form of recreational hunting. The Horst's have not received revenue for the hunting on the property.

### Comparison of Returns

The total earnings of all sources of income from the Horst woodlot were determined on a per acre basis over the last 28 years (1983-2010). Table 2 illustrates that Horst has generated \$14,077 per acre (NPV) for the combined profit from maple and timber sales at a 5% discount rate. Annual values are added to simplify comparison to other cases.

Over the same period, the agriculture rotation generated \$3,704 per acre. The present value of revenue in the agriculture rotation was \$23,915 and of costs was \$20,235 for a net profit of \$3,704 at the 5% discount rate. (Table 3).

The woodlot analysis indicates Horst has generated a total (in present value) of \$613,175 in revenue from maple syrup sales, while costs were about \$ 422,594, resulting in a profit of \$190,581 at the 5% discount rate. Timber sales which are subsidiary to maple syrup produced a profit of \$62,801. Total NPV per acre was \$10,588 for maple syrup and \$3,489 in timber sales. See Tables 4 and 5.

### Summary

**The results of this analysis indicate that Horst and Martin before him were able to generate substantially more net revenue per acre from 1983 to 2010 with maple syrup and woodlot management than a typical crop rotation of corn, soybeans and wheat in western Ontario. The crop rotation NPV per acre is 26% of the maple syrup and timber.**

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

Land use	Description	Hectares (acres)
Bush	Mostly hard maple, beech, cherry.	7.3 (18)
Agriculture	Corn silage, grain corn.	22.7 (56)
Agriculture	Mixed grain	4.8 (12)
Agriculture	Alfalfa	4.8 (12)
Orchard		4.0 (10)

**Table 2. Summary of All Sources of Income (1983 - 2010) from the Horst Woodlot.**

Source of Income	NPV (\$/acre)	NPV (\$/acre/year)
Timber Sales	3,489	125
Maple Syrup Sales	10,588	378
<b>Woodlot Total</b>	<b>14,077</b>	<b>503</b>
Average Crop Rotation	3,704	132
<b>Difference</b>	<b>10,373</b>	<b>371</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
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>9,169</b>	<b>7,104</b>	<b>23,915</b>	<b>20,235</b>	<b>3,704</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. (18 acre woodlot).**

Year of Harvest	Volume Harvested (fbm) (i)	Trees harvested	Actual Revenue	Actual Costs (ii)	PV of Revenue	PV of Costs	NPV	NPV/Acre
1983		10	322		1202		1202	67
1984		10	129		459		459	25
1985		10	72		244		244	14
1986		10	250		806		806	45
1988		10	327		957		957	53
1989		10	119		332		332	18
1990		10	120		318		318	18
1991		10	375		948		948	53
1992		10	326	400	785	963	-272	-10
1993		10	353		809		809	45
1994		10	349		762		762	42
1995		10	537		1,116		1,116	62
1996		10	150		297		297	16
1997		10	240		453		453	25
1998		10	423		760		760	42
1999			10,000		17,103		17,103	950
2001	272	8	281		736		736	24
2002	1,857	12	5,310		7,845		7,845	436
2003	1,944	10	1,724		2,425		2,425	135
2004	3,264	10	4,412		5,913		5,913	328
2005	3,541	10	3,755		4,793		4,793	266
2006	5,625	20	5,157		6,268		6,268	348
2007	4,800	20	2,850		3,299		3,299	183
2008	3,273	14	1,400		1,544		1,544	86
2009	2,759	13	2,014		2,115		2,115	117
2010	2,544	18	1,776		1,776		1,776	99
<b>Total 1983-2010</b>			<b>42,771</b>	<b>400</b>	<b>63,763</b>	<b>963</b>	<b>62,801</b>	<b>3,489</b>

All woodlot management costs were included in the maple operation.

Maple and timber harvest have been ongoing since the 1940's.

The MNR marked the woodlot for Albert Martin in 1983 and 1992 and he harvested trees over time for small sawlog sales and fuelwood production. A final marking and commercial harvest was conducted in 1999.

All fuelwood was used to fire the evaporator.

Reference: Chapeskie, Dave. 2000. Report on the Economics of Maple Syrup Production. Published by the Canadian Farm Business Management Council and Ontario Ministry of Agriculture, Food and Rural Affairs.

**Table 5. Revenue, Cost, Present Value (PV) and Net Present Value (NPV) in dollars of Maple Syrup Sales at 5% discount rate (18 acre woodlot).**

Year of Harvest	Volume produced (litres)	Actual Revenue	Actual Costs	PV of Revenue	PV of Costs	NPV	NPV/Acre
1983	1,270	6,350	5,461	23,707	20,,388	3,320	184
1984	1,270	7,360	5,189	26,170	18,449	7,721	429
1985	1,270	6,950	5,235	23,535	17,727	5,808	323
1986	1,270	8,013	5,628	25,843	18,150	7,693	427
1987	1,270	5,526	5,626	16,973	17,282	-309	-17
1988	1,270	8,861	5,579	25,921	16,319	9,601	533
1989	1,270	9,669	5,766	26,937	16,065	10,872	604
1990	1,270	6,927	6,102	18,379	16,191	2,188	22
1991	1,270	8,827	6,743	22,305	17,040	5,265	293
1992	1,270	7,994	12,181	19,239	29,315	-10,076	-560
1993	1,270	10,187	6,408	23,349	14,687	8,662	481
1994	1,270	8,728	6,416	19,052	14,005	5,047	280
1995	1,270	10,500	6,532	21,829	13,579	8,250	458
1996	1,270	12,661	6,417	25,068	12,706	12,362	687
1997	1,270	12,024	5,945	22,673	11,209	11,464	637
1998	1,270	13,329	8,557	23,937	15,367	8,570	476
1999	1,270	9,941	6,215	17,002	10,630	6,372	354
2000	1,270	14,176	6,521	23,091	10,622	12,470	693
2001	1,246	16,486	17,568	25,575	27,254	-1,679	-93
2002	1,583	15,058	8,199	22,248	12,114	10,134	563
2003	1,332	11,690	8,217	16,449	11,562	4,887	272
2004	1,004	15,545	8,869	20,832	11,885	8,947	497
2005	1,303	12,281	8,432	15,674	10,762	4,912	273
2006	1,065	15,035	9,146	18,275	11,117	7,158	398
2007	1,050	16,277	9,128	18,843	10,567	8,276	460
2008	1,413	20,800	12,028	22,932	13,261	9,671	537
2009	1,565	22,300	9,844	23,415	10,336	13,079	727
2010	1,200	23,922	14,006	23,922	14,006	9,916	551
<b>Total - 1983-2010</b>		<b>337,417</b>	<b>221,958</b>	<b>613,175</b>	<b>422,594</b>	<b>190,581</b>	<b>10,588</b>

Mean production was 1.26 litres per tap ranging from 0.8 to 1.4 litres per tap.

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