Small Woodlot Harvesting

A Guide for:
Landowners, Land Managers and Forest Products Operators

Studying Biologic, Social and Economic Aspects


In Maryland 85% of all forest landowners own fewer than 10 acres. In the nation 61% of forest landowners own fewer than 10 acres.
Using small scale equipment with little disturbance may be the answer.

Working Woodlot Initiative

Studying the biologic, social and economic aspects of small scale harvesting on small woodlots

Paving the Way for the Future of Forest Products From Small Woodlots

Study Partners

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Division of Forestry and Natural Resources
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Dr. A. E. Luloff, Professor of Rural Sociology

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Sustainable Resource Management Inc.
Brian Knox, Consulting Forester

Frank & John Stark, Consulting Foresters

Forest Products Operators:

Matthew and Gus Diehl, Loggers

State Partners:

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Department of Natural Resources, Forest Service

The Commonwealth of Pennsylvania,
Department of Conservation and Natural Resources, Bureau of Forestry

Funding Provider:

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Forest Service

State of Maryland

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Welcome To

Small Woodlot Harvesting

The Working Woodlot Initiative Guide for landowners, land managers and forest products operators derived from the study of biologic, social and economic aspects of small scale harvesting.

Paving the Way for the Future of Forest Products From Small Woodlots

Design and Layout by Daniel B. Hedderick, Forester, Maryland Department of Natural Resources Forest Service.

All but one photo in this guide were taken by the MD DNR Forest Service during the study from the five sites, associated mills as well as other landowner's properties with related projects. We thank Lex Siehler for the donation of the photo on page 17.

The study was paid for with funds from the United States Department of Agriculture, Forest Service, through the Forestry Innovation Grant.

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Introduction

Landowners, Land Managers, & Forest Products Operators

In Maryland 85% of all forest landowners own fewer than 10 acres. In the nation 61% of forest landowners own fewer than 10 acres. We must find ways to provide these owners with assistance, including ecosystem service markets, and strive to find the answers to their land management challenges. Will landowners harvest more forest products given a system which provides very little disturbance, protects remaining trees, and minimizes soil erosion?

Landowners, land managers and forest products operators are faced with the challenge of managing these parcels of land and need insight into the complex nature of the biologic, social and economic aspects of small scale harvesting. Understanding only one aspect will not provide the complete picture or understanding of the land management challenges faced when managing these small land parcels.

This guide is written so that it can be reviewed in three ways. First, for a quick review of the facts, see the text boxes titled *"Quick Facts at a Glance"* associated with each section. Second, for those who want to understand the complexity of the challenge, read the bulk of the guide. Third, for an in-depth look at the most critical data and reports used and disseminated in this study, see the appendix for individual reports from each partner. Also, under each section title is listed which audience the topic is written for, including *Landowners, Land Mangers, & Forest Products Operators.* Choose the topics that are appropriate for you.

We hope that this guide will start to provide insight and a path that you can follow to successfully manage these small woodlots and harvest products that are traditionally overlooked and needed to meet the demands of society. The more we understand the complexity of the biologic, social and economic aspects of small scale harvesting, the better we can work with the owners of small woodlots to mange for their desires. This study will also provide a new tool for the emerging markets of ecosystem services while using local products to meet local demand for our sustainable future!

Brian Knox, Dan Hedderick and Matt Diehl visit Ebys Mill to see firewood being processed from site #3

Sit back and enjoy as we take this unprecedented journey into Small Woodlot Harvesting, looking at the biologic, social and economic aspects while paving the way for the future of forest products from small woodlots.

Harvesting on small woodlots can be labor intensive.

How the Study was Accomplished

Land Managers, & Forest Products Operators

Quick Facts at a Glance

- Innovation Grant from USDA Forest Service to MD DNR Forest Service
- Involved three universities, WVU, FSU, & PSU.
- Involved two consultants doing pre & post harvest evaluations and silvicultural prescription.
- Involved five private properties with woodlots ranging from 8.7 to 3.4 acres.

The Maryland Department of Natural Resources Forest Service received an Innovation Grant from the United States Department of Agriculture, Forest Service. The study took the bulk of three years to complete. The MD DNR Forest Service hired two consulting foresters, three universities and one forest products operator to accomplish all the tasks associated with the study.

Landowners that participated were selected by various partners; one was selected by the MD DNR Forest Service, one by a consultant and three were chosen by the forest products operator. The acres in each stand or woodlot were less than 10, ranging from 8.7 to 3.4 acres in size. The stands had a diversity of species and size classes, providing a good range of parameters for a study of this nature. Different tree size classes were selected to find a breakeven point and what stands worked and which did not work. These stands were all located in Allegany County, Maryland.

Consultant Brian Knox with Sustainable Resource Management did the pre-harvest evaluation. He looked at soils and did a 100% inventory of all trees greater than 10 inches in diameter, by species, and by acceptable and unacceptable growing stock. He then looked at the regeneration and volumes, canopy density, competing vegetation and basal area to have a complete understanding of each site.

Consultants John and Frank Stark then looked over the site, without the influence of Brian Knox, and determined the silvicultural prescription. They then marked the stand for a sale and determined the volumes to be removed.

At this point, the forest products operators Matt and Gus Diehl discussed and signed a standard harvesting agreement with the owner and obtained all necessary permits and required road use bonds, if necessary. After that, they moved in to harvest the trees, but, more importantly, to collect data on every aspect of their day. The data was placed into log books, including daily log, employee log, equipment log, expense log and production logs including mill sheets of products sold. These log books were developed by the MD DNR Forest Service under the direction of Stuart Moss with West Virginia University.

Stuart Moss, Research Assistant Professor with West Virginia University, Davis College of Agriculture, Division of Forestry and Natural Resources was the recipient of

the data collected for a paper titled *Economic Evaluation of Small-Scale Timber Harvesting*. This report provided an in-depth look at the details associated with small scale harvesting and has provided income statements, and a time utilization chart. Other analyses included productivity, cost, and break-even points, expected monthly income, equivalent wage rate, prediction of gross stumpage prices, distance to site vs. net stumpage price and sensitivity analysis.

Once the forest products operators had finished the logging and data collection, the sale was closed out by consultants John and Frank Stark. After that, consultant Brian Knox returned to the site to do the post harvest evaluation, including all aspects listed in the pre-harvest evaluation and checking on soil compaction along the haul roads, landings and skid trails. The above process repeated five times until all sites were completed.

The harvesting was completed with no benefits promised to the landowners other than the agreement they made with the forest products operator. Sales and purchasing of the products removed were handled solely by the forest products operator with mills and buyers he felt had the best markets. Transportation of products was contracted and paid for by the forest products operator with two different haulers. Products sold included veneer, saw logs, firewood (in various forms) and locust posts.

Two other universities also played a major but independent and separate role. Dr. Fritz Kessler from Frostburg State University, Department of Geography, assisted by two students, Clair Ruffing and Zach Rawe, put together a study that produced a paper titled *Availability of Land and Products.* They used MD DNR Forest Service stewardship database and associated information as a means to look at how many woodlots and/or stands 10 acres in size and smaller are available in Allegany County. This was followed by the development of a map and a GIS data base.

Ph.D. student candidate Cara Raboanarielina, overseen by Dr. Jim Finley, Professor of Forest Resources, and Dr. A. E. Luloff, Professor of Rural Sociology from Pennsylvania State University did the social acceptance study. She produced a paper titled *Landowner Perspectives on Timber Harvesting*. This report was designed to find out what people thought about small scale harvesting.

To assist each partnering entity, some of the data was shared between these parties for each partner to have a clear picture of what their individual reports and/or data represent in the overall study.

All this information has been evaluated and combined into this guide. More details on each of the university's reports and their methodology are explained in each individual's paper found in the appendix of this guide.

Operators tallying logs after a day of work.

Small Scale Equipment

Landowners, Land Managers, & Forest Products Operators

Quick Facts at a Glance

- ATV with receiving-style hitch cost $8,699
- Skidding arch cost $1,630
- Chainsaw cost $570
- Log truck contracted for $125 to $150 per load and hauling cost needs to be shared with owner.
- Hard to find small equipment in the US.

The forest products operator working on the study had the option to choose any equipment he wanted without being influenced by the MD Department of Natural Resources as long as it was considered small scale equipment. The operator chose five simple pieces of equipment. The heart of the operation was a Polaris MV 7 Sportsman 700 ATV 4x4 built for the Gulf War, valued at $8,699, and an ATV forwarding/skidding arch designed by Future Forestry and sold by Log Rite, valued at $1,630. Also included was a standard, high production 361 Pro Series Stihl chainsaw valued at $570 and a MTD Yard Machine 26 ton wood splitter valued at $1,199. Last but not least were two different pickup trucks, a 1981 Dodge ¾ ton 2-wheel drive truck and a 1994 Dodge ¾ ton 2500 diesel 4-wheel drive truck. Nothing else was purchased other than consumables used on every site. One thing for sure, the equipment could not get any smaller and be considered capable of handling production!

Before choosing the equipment, the operator researched a number of different pieces of small equipment. The information showed that what was locally available was very limited. More equipment is available in Canada and other areas outside the United States. Small scale equipment in the United States is becoming more abundant and more popular. That said, many pieces of equipment, specifically for timber harvesting, will not be showing up anytime soon at local equipment dealers, but are available online and can be found at forest products equipment shows. Discussing all the different types of equipment and their capability is outside the scope of this study.

Other equipment used to move harvested products off the site were several contracted tri-axel log trucks and drivers. Their involvement was solely handled by the forest products operator. This equipment was requested as needed during harvesting of each site. The

Operator at work with ATV & skidding arch - notice minimal disturbance.

truck was contracted for $125 to $150 for every load, regardless of the material hauled. The expenses were handled by the forest products operator. The forest products operator's experience with hauling costs has taught him that the expenses may need to be shared with the landowner to make small scale logging feasible for all parties. Included are photos of the equipment used for the study and a photo of one of the contracted haulers at work.

Equipment Used in Study


ATV


Arch

Saw


Splitter


Truck


Haul Truck

Advantages and Disadvantages of Equipment Selected

ATV: The Polaris ATV has the advantages of dual gas tanks, front and rear winches and a run-flat tire design. The independent rear suspension and small size of the equipment makes it extremely maneuverable in stands, greatly reducing any residual stand damage.

Quick Facts at a Glance

Advantages:
- ATV is very maneuverable
- Arch increased production

Disadvantages:
- No push blade on ATV
- No safety cage on ATV

The disadvantages are that the equipment has no hydraulic blade on the front to assist in pushing debris or piling up logs on the landing. Once the landing was full, additional areas had to be used for landing logs or a haul truck was needed before more logs could be brought to the landing. See photo below.

Another disadvantage was the difficulty in pulling down trees that were hung up in other trees during felling. Some trees were able to be pulled out with the winch system while others took a lot of additional physical labor, creating unsafe conditions. The last limitation was noticed by a visiting logger, who discussed the lack of a safety cage around the operator for protection from falling debris.

Logs spread out in open area on site #3 waiting for pick up by a log truck. Hydraulic blade would have been able to pile logs.

Arch: The forwarding arch was a real benefit and the forest products operator said he would not go back to skidding with just the chains since the arch had greatly increased his production. Logs from small firewood size up to 24 inches in diameter were moved to the log landings for processing and hauling. This equipment was also light and maneuverable and increased production by reducing the number of trips compared to using just chains for skidding.

The disadvantages are that the wheel axles bend easily when bumped into trees and the link on the hoist system easily wears and breaks but it is simple enough to fix. The real problems were the weak tires which were always going flat. It is suggested that better tires and a run-flat design similar to the ATV should be used on the arch.

Other Considerations and Equipment Desires: The other pieces of equipment were basic for almost any logging job or hobby farm project. The biggest desires for other equipment was a dump truck to increase hauling capacity and eliminate unloading labor and physical stress to the individual. Also, a loading system for logs and firewood would have made the jobs faster and less labor intensive. The physical stress to the individual was a limiting factor in this small scale system. Mechanizing these activities is a must!


Without large equipment, hung up trees take a great deal of labor to remove and safety becomes an issue!

Biologic Aspects

Landowners, & Land Managers

Quick Facts at a Glance

- Economically important timber species increased in percentage after harvest.
- Acceptable growing stock increased after harvest.
- Soil compaction was not significant enough to be measured and erosion did not occur.
- Most landowners prefer brush piles to be created out of the tree tops.
- Invasive species should be dealt with prior to harvest but it may not be financially feasible.
- Remaining trees were not damaged.

There are many biological aspects to consider with small scale harvesting and this guide will share those aspects that are most important and different from other traditional harvesting.

The five sites had a variety of conditions and tree sizes associated with them. They ranged from small pole-sized to large sawtimber, from flat to steep and from relatively smooth to rocky. These areas also included a variety of skid lengths from very long to short. There were as few as one to as many as four log landings per site. The conditions and variations made for a good study so that we could find out what sites would work best with this small scale harvesting system. One similarity is that sites had the same thinning prescription, called area wide release. This type of release is simply explained as selecting the better quality trees and thinning out around them to provide them with the best growing conditions possible. Biologically speaking, the stand was improved by the harvest. Unfortunately, not all sites were economically feasible to harvest, which will be discussed in the economic aspect of this guide.

Stands & Species

In most woodlots and stands economically important timber species increased in percentage after harvest and the less valuable timber species decreased. That said, a diversity of trees are still present. The table on the following page will show you the most abundant species both before (pre) and after (post) the harvest. Only the top three species and their representative percentages are shown. The black cherry, red oak and sugar maple are traditionally considered more economically important. The ash and poplar are middle of the road and hickory, locust and red maple make up the least valuable species. Specifically, black locust have decreased on all sites or dropped out of the top three.

John Stark marking site #3.

Figure #1: **Proportion of Species Both Before and After Harvest**

	Site #1		Site #2		Site #3		Site #4		Site #5	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
Black Cherry	**59%**	56%			**38%**	34%	43%	**44%**		
Red Oak	12%	**19%**								
Black Locust	9%		**18%**	12%			**26%**	22%	**15%**	7%
Sugar Maple		**9%**			7%	**8%**	**19%**			
Ash			26%	**28%**						
Red Maple			**14%**	13%				20%	23%	**28%**
Poplar					45%	**49%**				
Hickory									17%	**22%**

Site #1 shows that black cherry and red oak remained about the same but sugar maple became more dominant after harvest and black locust dropped out the top three dominant species present on the site.

Site #2 shows that ash and red maple both increased and black locust decreased.

Site #3 shows a 4% decrease in black cherry with an increase in both sugar maple and poplar.

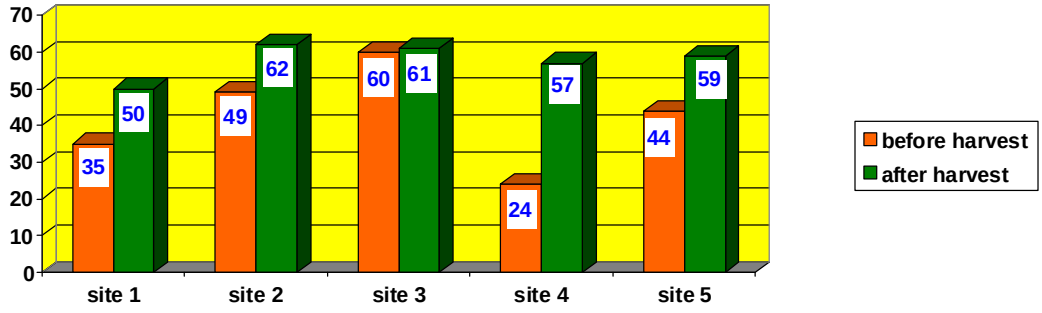
Site #4 shows black cherry about the same with a decrease in black locust and sugar maple dropping out of the top three. Red maple is not a desired species, but has improved in value over the years. It is not as high in quality as sugar maple. Overall, site four was different for many reasons.

Site #5 Again this site showed a decrease in black locust but an increase in both red maple and hickory.

Trees marked in orange and blue to be removed, releasing the better quality tree in the center of the photo on site #1. The value of the removed trees was low, but economic benefits to the stand are high.

Total acceptable growing stock improved on all sites, as can be seen in the table below. The table is in terms of percentage of acceptable growing stock before and after the harvest.

Figure #2: Increase in Percentage of Acceptable Growing Stock After Harvest



Soil Compaction On Haul Roads and Landings

Soil compaction was measured with a penetrometer. In general, plant roots penetrate well in soils with readings of 200 psi or less, moderately at 200 to 300 psi, and poorly above 300 psi. There was difficulty in measuring with the penetrometer since measuring during dry soil conditions can give you a higher reading than wet conditions. After comparing soil compaction before and after the harvests, most haul roads and landings were the same or showed very little differences.

All landings were smooth, with no compaction. Three sites had some minor rutting on the haul roads; two sites had no rutting. The amazing part of these results is that no dozers or heavy equipment were used to create, level or smooth off landings and roads either before or after the harvest. Overall, the equipment selected did very little disturbance.

Skid path on site #1; notice minimal disturbance and small width of path.

Slash Challenge

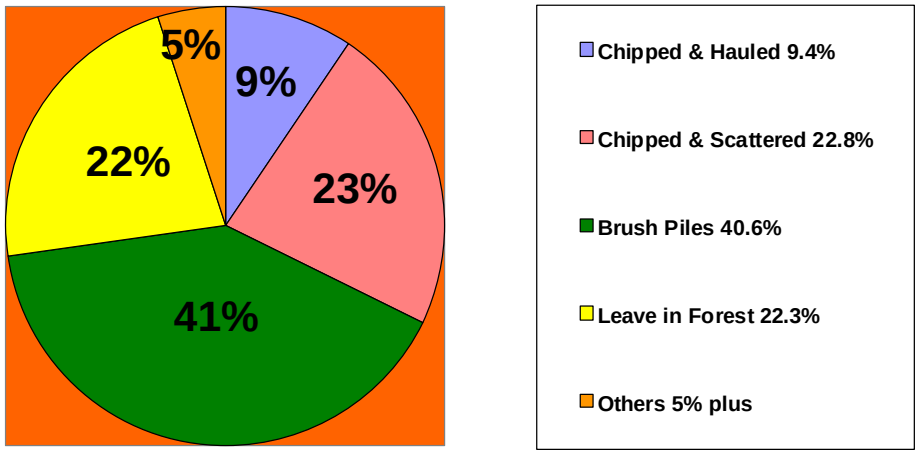
Slash or woody debris left after harvest is a major concern for landowners. In places near the residences brush piles for wildlife were built to alleviate the unsightliness of the slash. In other woodlots the debris was left and the operator explained to the landowners its benefits for the woodlot and soil. In residential settings, landowners most likely will not accept the logging debris, especially when they only have the small acreages. At this point, other than letting the slash lay or creating brush piles, no other

economically beneficial solutions are known. Maybe landowners are willing to pay to have it chipped or piled. This may be especially true since aesthetics are one of the most important aspects. One thing that we do not recommend is hauling slash away. The soil needs the nutrients from the decaying debris.

Brush Piles built from tree tops near residence to improve aesthetics and wildlife habitat.

The survey done by Penn State about landowners' perspectives on forest management asked what landowners would want to have done with the tops after harvesting. Most landowners, some 41%, would like tops (slash) piled into brush piles for the benefit of wildlife.

Figure #3: Landowners' Desires for Tree Tops After Harvest



Wildlife Advantages

The increased growing room, sunlight, water and nutrients in the stand will be used by the remaining trees. Bigger crowns mean increased mast (acorns and nuts) production. The vegetation in the understory will also increase, providing both food and cover for an abundance of wildlife species. Brush piles created out of the tops will create yet another habitat component. On all harvesting sites, a number of den trees were also left; this is a recommended practice on any harvest. This project did not include research on benefits to wildlife, and the comments above were from established forest management principles.

Invasive & Competing Vegetation

Competing vegetation is considered to be a problem when it exceeds 30%. In pre-harvest evaluations only two sites were considered to have a high percentage of competing vegetation prior to the harvest. That said, all sites are expecting an increase in competing vegetation due to the increase of sunlight to the forest floor. Non-native, invasive species that were considered competing vegetation included multiflora rose, bush honeysuckle, ailanthus, garlic mustard, and stilt grass. No pre-harvest treatments were made, but it is something that is recommended prior to a harvest. Have no doubt, treating non-natives can cut into the bottom line for the landowner and may not be financially feasible in the short run. However, longer term demise of native species that have a higher economic value will ultimately occur, hurting the economic value of the stand in the future.

Various cost share options are available to help offset the cost of treating invasive species. Some cost share options provide up to $1,100 per acre to treat invasive species. With this type of cost share a landowner could include the treatment of invasives with a harvest and insure a successful bottom line not hampered by invasive species treatment. This may also give the contractor or forest products operator another service to provide.

Residual Stand Damage

Although residual stand damage was looked for, the amount was not even measurable and has not affected the future of these woodlots. The small size of the equipment and its inability to pull whole trees resulted in no damage at all. All materials needed to be cut in the forest and removed a piece at a time. Traditional harvesting many times pulls whole trees to the landing for trimming, damaging the remaining trees.


Before Harvest

During a survey of landowners it was interesting to find 45.9%, said that reducing damage to residual stand was extremely important when looking at issues related to their willingness to use small scale harvesting techniques (Roboanarielina 2007).


After Harvest

Basal Area Changes

Basal areas were measured on all sites and checked periodically. We discovered that all sites could have been cut harder to reach optimum growing potential for the remaining stands. That said, the light reduction in basal area may appeal to small woodlot owners, especially when these sites are used for so many other objectives, including aesthetics and recreation. Above are photos of the same stand before and after the harvest.

Although residual stand damage was looked for, the amount was not even measurable, an advantage of small equipment.

Social Aspects

Land Managers & Forest Products Operators

Quick Facts at a Glance

- Understanding your clients is the key to success.
- PSU put together a 50 question survey with return of over 51% from landowners.
- 48% of landowners harvested timber over the past 10 years.
- 75% of landowners indicated that they use firewood.

Social aspects are very important to managers and forest products operators setting up a new businesses to assist landowners with land management services. Understanding clients is the key to success. This section is designed to help land mangers and forest products operators understand their clients and how to assist them.

Survey Results

Penn State University (PSU) did the research on this important aspect of the study. This section is not meant to explain the entire study, but to highlight certain findings. These finding were from a 50 question survey sent out to landowners in Allegany County, Maryland with a response rate of over 51%. The complete report from PSU can be found in the appendix and is suggested reading for anyone that is planning on servicing landowners with small woodlots.

- Typical respondents to the survey had an income of $100,000 or more.
- The highest percentage of landowners have 24 acres or less.
- About 48% percent of the respondents harvested timber from their land in the last 10 years.
- 55% of landowners who harvested timber were very happy with the outcome of the harvesting.
- Of those that did harvest, 23% used small-scale harvesting techniques.
- The most important factor that led landowners to practice small-scale harvesting techniques was:
  - to achieve objectives in their plan 27.3%
  - to improve growing conditions of remaining trees 18.2%
  - the need for wood for their own use 11.4%
- About 16% of landowners managed the harvest themselves, whereas a little over 12% received advice from MD DNR Forest Service and only 3.5% received advice from a consultant.
- 53.5% of landowners want skid trails left open for walking.

- While very few, 15.5%, of landowners were opposed to small-scale harvesting, landowners were asked why they have not used small-scale harvesting techniques and their responses were:
  - not interested in harvesting timber 30.2%
  - concerned about damage to property 16.8%
  - aesthetics issues 20.8%
  - hunting would be impacted 12.9%.
  - property is too small 11.4%

- As far as forest products needed, 75% of landowners indicated they used firewood and 55.3% indicated they would use mulch. When asked if they would be willing to accept forest products as an alternative to cash income, 84.5% said they would NOT accept forest products solely.

- Of those landowners willing to accept forest products in place of income, 20.8% would accept firewood.

The above bullets are just a few of the important points that came out of PSU's report. The one thing that comes to mind is the way in which landowners define small scale logging. This indicates that the techniques we used with the overall study are in line with what landowners really want out of small-scale harvesting. For example, the study has shown that soil erosion is not occurring, and residual tree damage did not occur and properties are not too small! This leads us to believe that once small-scale harvesting is demonstrated to the landowners, more requests will develop and landowners' desires to undertake small-scale harvesting will increase!

A Shift in Society

Many individuals want to move out of the city and have a piece of the country all their own. This results in numerous woodlots with acres traditionally too small for standard harvesting practices. Many landowners are not interested in having a large traditional harvest, but are interested in harvesting firewood and improving their woodlots. As markets improve for carbon credits and other emerging ecosystem services, landowners may become more willing to investigate the possibility of low impact logging.

In Europe many of the forests were lost in the past and today woodlots are intensely managed for their multiple benefits to society. If our society realized all the important aspects of our forests and began to think sustainably, then forest products could be realized and valued from these small woodlots that are traditional traditionally overlooked.

Professional View

"Our nation's size still somewhat buffers the growing populations moving into the traditional working woodlands. Despite occasional mill yard shortages and declining prices, they are not really thinking forward enough to a point where their raw product will be scarce. I guess they just close the mill when it becomes not profitable enough, and we can get our products from elsewhere. Sustainability of the industry, not just a preset profit level, will be the corporate mindset needed to overcome this, and this can only happen when economies of scale are changed and industry practices are thus changed to follow."

George Eberling, MD DNR Forest Service

Landowners Perspectives on Timber Harvesting Summary By Raboanarielina

This study reflects input from 202 private forest landowner residents of Allegany County, Maryland who participated in a mail survey conducted in 2006 with landowner perspectives on forest management. The survey instrument was designed to obtain information on landowner characteristics, their attitudes toward forest management, and harvesting behavior. The central question of this study was, "what factors are related to landowner perspectives on forest management, timber harvesting, and small-scale timber harvesting?" (Raboanarielina 2007)

"The responses from landowner respondents in Allegany County provided insight into landowner characteristics, their values and attitudes about the forest, and their harvesting behavior. Almost half of private forest landowners had harvested timber on their land before. More importantly, of those landowners with harvesting experience, a majority owned forest parcels of 24 acres or less. Those landowners who had used small-scale harvesting techniques in the past were male, generally younger, had higher incomes, with some college education, lived in rural areas, and worked full time. Overall, almost twenty-four percent of landowners had used small-scale harvesting techniques in the past." (Raboanarielina 2007)

"In examining the biophysical and social factors associated with landowners' harvesting intentions we cannot conclude whether landowners in Allegany County are timber-oriented. For the most part, landowners valued the forest more for its intrinsic worth and expressed a genuine reverence toward them. At the same time they valued the forest as a renewable natural resource capable of meeting human needs." (Raboanarielina 2007)

If you compare Raboanarielina's survey results to the National Landowner Survey by Brett Butler you will find some differences which should be taken into account when dealing with the local landowner community in your area. The National Landowner Survey can be viewed at: www.fs.fed.us/woodlandowners/publications/nwos_draft_table_july_2005.pdf..

Raboanarielina's report was specifically designed for the Working Woodlot Initiative and can be found in the appendix of this document. I encourage those that are looking closely at providing services to this landowner group to review these surveys in detail and learn as much as possible about these landowners and their desires. It will help you provide better services to your community!

Landowners learn about processing firewood from MD DNR Forest Service at a Goods From the Woods Conference.

The most important factors that led landowners to practice small-scale harvesting techniques were:

- ***to achieve objectives in Stewardship Plan.***
- ***to improve growing conditions of remaining trees.***
- ***the need for wood for their own use.***

Economic Aspects

Landowners, Land Managers,& Forest Products Operators

Quick Facts at a Glance

- Mills will accept high valued species with small diameters but return is expected to be low.
- An operator needs to work about 6 hours a day producing 400 to 500 bd.ft. to make a living with today's standards.
- 40% of raw material cut needs to be high quality hardwoods.
- Average tree size needs to be greater than 10 inches in dia.

All readers may be interested to know that economically there is something for everyone. WVU looked closely at the economics behind running a business with an ATV on small woodlots and came up with some interesting findings. The table below shows the site number, acres and number of loads (not including all firewood sales). It also shows the number of saw logs and corresponding board footage purchased by the mill and its value. It also shows average diameter and length of logs sold. The diameter became an issue with the mill as the forest products operator pushed the small

Figure #4: Volumes, Values and Agreements

Sites & Acres	Loads	# of Logs	Bdft. Sold	Total Value	Ave. Dia.	Ave. Len.	Cords Cut	Cords Total Value	Landowner Agreement & Take	Loggers Total Take
1 3.4 ac	1 pickup	14	200	$51.00	8.1	7.3	17	$1,425.00	$10/cord **Declined**	$1,476 Loss
2 7.4 ac	1	53	818	$227.50	9.2	8.0	26	$260.00	$10/cord 40% log **$372**	$1,490 Loss
3 8.7 ac	1	71	2,622	$751.92	9.9	9.9	24	$1,337.75	$4/ton 50% log **$1,333.29**	$2,468 Even
	2	25	877	$236.80	9.3	11.0	-	-		
	3	71	3,455	$1,249.85	10.5	11.2	-	-		
4 3.6 ac	1	58	2,751	$1,759.73	12.1	8.4	18	$1,835.00	$10/cord 50% ven. 40% saw **$2,618.10**	$6,861 Gain
	2	34	2,439	$2,104.18	13.6	9.0	-	-		
	3	62	2,870	$2,116.10	11.0	9.1	-	-		
5 7.16 ac	1	60	4,045	$1,136.10	12.3	10.9	30	$1,963.50	$6/cord 1/3 saw **$579.77**	$2,921 Gain
	2	77	3,135	$699.20	10.3	10.3	-	-		

diameter limits of what they would accept. Most of the time only high valued species such as black cherry, black walnut and sugar maple will be taken at very small diameters, but returns are very low. Some of these logs only sold for pallet and/or tie lumber values, which came out to 0.15 to 0.30 cents per board foot or $6 to $8 dollars per log; hardly worth the effort. On site #1 the forest products operator spent half a day taking a pickup truck load of small sawlogs, 6' to 8' long, to the mill and sold it for $51 dollars, then came back to the landing and cut and split a load of firewood out of the same material and sold it for $90 with no real travel distance to speak of. This is a lesson the forest products operator won't forget anytime soon.

Log values varied from as low as $1.80 and as high as $560 depending on grade. One of the $1.80 logs was a black cherry 8 feet long and 8 inches in diameter purchased as pallet lumber. The $560 log was in the same load and was also black cherry at a length of 15 ft and diameter of 20 inches with a total bdft. of 240. The bdft.was reduced at time of purchase to 224 bdft. due to a defect crotch, a lost of 16 board feet, and was purchased as a veneer log. All saw logs were purchased using International log rule and veneer was purchased using Doyle log rule.

Next on the chart are the cords cut per site and their corresponding value. Firewood sold for and average of $65/cord. The wood was sold in three

Reality Check & Traditional Harvest

During the study a 17 acre property, which was recommended for a non-commercial timber stand improvement, was sold to a local logger. The landowner requested the property to be marked to remove the undesirable trees. When we asked how many acres he wanted marked we were told all and to our surprise we found out that a logger had agreed to harvest the stand.

During meeting with both parties it was explained to them that we mark 50% of the basal area releasing the better quality trees regardless of size. This was primarily a firewood and/or pulpwood thinning with 313 tons of pulp and/or firewood and about 8,371 bd. ft. of sawtimber. The operator divided the material out for three markets: firewood, pulp and sawlogs. The pulp was some of the smallest pulpwood we ever saw but it was purchased. The landowner's agreement was $3/ton on pulp and firewood and 40% on all sawlogs. In the end the landowner received $2,011.96 total.

As far as the remaining stand the goal was to remove 50% of the stand leaving 65sqft.of basal area and we successfully removed 34% missing our mark by 16%. leaving 74 sq. ft. of basal area. That said 12 sq. ft. of basal area was damaged representing 16%. So the landowner will be able to harvest that 16% as firewood over the years. Where the problem comes in is that only 50 sq. ft. of basal area that remains is good growing stock leaving 24 sq. ft. of poor or damaged growing stock. The reality of traditional logging is sometimes hard to take. Overall, everything should work out fine, because as the stand matures more trees will need to come out. Future investment in the better quality trees that were damaged will not be realized, however. This is similar to investing money and borrowing from it before it matures, paying penalty on the future investment.

different ways: at $33/cord for green sticks to a mill to be processed, $85/cord for green chunks and $150/cord cut, split, dry & delivered. One needs to decide if the time it takes to cut, split, dry and deliver the wood is worth the time it takes to raise the value of a cord from $33 to $150 per cord. In looking at the entire system the value of firewood may not matter that much since only a few sites made a profit.

Firewood being offloaded for processing, a labor intensive operation.

On the five sites that were harvested, sites #1 and #2 did not make any money. On the last three sites, which were sites #3, #4 and #5 you can safely assume a profit of $200 per month or higher if you only harvest the best sites which were the volumes and values coming off of sites #4 and #5.

The second to last column on the chart shows the landowner's agreement in terms of tons or cords for firewood and percentage of sawlogs and veneer logs. The last numbers in bold print are the total value that the landowner received from the sale. One landowner declined payment for the improvement that was made to the forest.

The last column is the total income the forest products operator received not subtracting expenses. Fixed costs were only $243/month. Fixed costs included insurance and equipment depreciation, which was placed on a 5 year schedule, the life of the equipment. Variable costs included fuel, parts, etc. and were valued at $1.50/hour. The column also shows whether the forest products operator made money on the harvest or not.

Targets for a Successful ATV Harvesting Business

After looking at some of the details of the stands that were harvested, it is important to consider targets that an operator should be shooting for to be able to make a decent living and profit! These targets were obtained from Stewart Moss's work, (see *An Economic Evaluation of a Small Scale Timber …* in the appendix for more details).

Productivity Target

- Productivity of at least 0.65 tons per field hour.

Practical Example: At 6 hours a day that would be almost 4 tons or 1.5 to 2 cords of wood per day or 400 to 500 bdft. per day. This is based on 2.9 tons per cord or 9.0 tons per 1000 bdft.

Net Stumpage Price Target

- Net stumpage price of $25 per ton or $225/1000 bdft. or 0.22 cents/bdft.

(see WVU report) for sites less than 5 miles from the operator's place of business. A black cherry log 16' long and 8" in diameter graded as pallet lumber is valued at 20 cents per bdft. Net stumpage price should increase $2-3 per ton with each 5-mile increase in one-way distance.

Practical Example: at least 40% of the material cut needs to be saw logs and at least 40% of the sawlogs need to be high quality to reach this target or better.

Average Tree Size Target

- Average tree size of at least 0.60 tons per tree.

Practical Example: This is equivalent to trees that are over 10 inches in diameter.

Field Hours Worked Target

- Yearly average of 90 field hours worked per month.

Practical Example: at 20 working days per month one will only need to work 4.5 hours per day.

Time Utilization Target

- Time utilization of at least 80%.

Practical Example: If one works 4.5 hours a day then 80% of that day or 3.6 hours need to be spent in the field harvesting higher valued trees.

Distance to the Site Target

- Limit distance to the site to 5 miles one-way, unless expected net stumpage price is above $25 per ton. Increase net stumpage price by $2-3 per ton for each 5 miles increase in one-way distances.

Practical Example: The farther you go from your base of operations the larger the trees must be or the less the landowner will receive in the contracted agreement.

One of four landings used at site #5 with pole-sized trees waiting to be picked up along the road. Logs were sold to mill in log length to be processed into firewood for only $25 per ton.

The charts developed by WVU can be used to determine if one is within the target area and to make a determination for profit before harvesting a site. These charts can be seen in the appendix portion of this guide and should be looked at closely by any forest products operator or land managers who will be doing this type of activity.

Expected Monthly and Hourly Income for a Forest Products Operator (Moss 2007):

If all of the minimum targets are met:

- Expected monthly pre-income tax will be at least $951 per month.
- The equivalent wage rate should be at least $8.45 per hour.

If all of the minimum targets are met and tree size is larger like it was on sites 4 & 5 of the study, with a productivity of 0.75 tons per field hour, then:

- Expected monthly pre-income tax will be at least $2,316 per month. The equivalent wage rate should be at least $16.85 per hour.

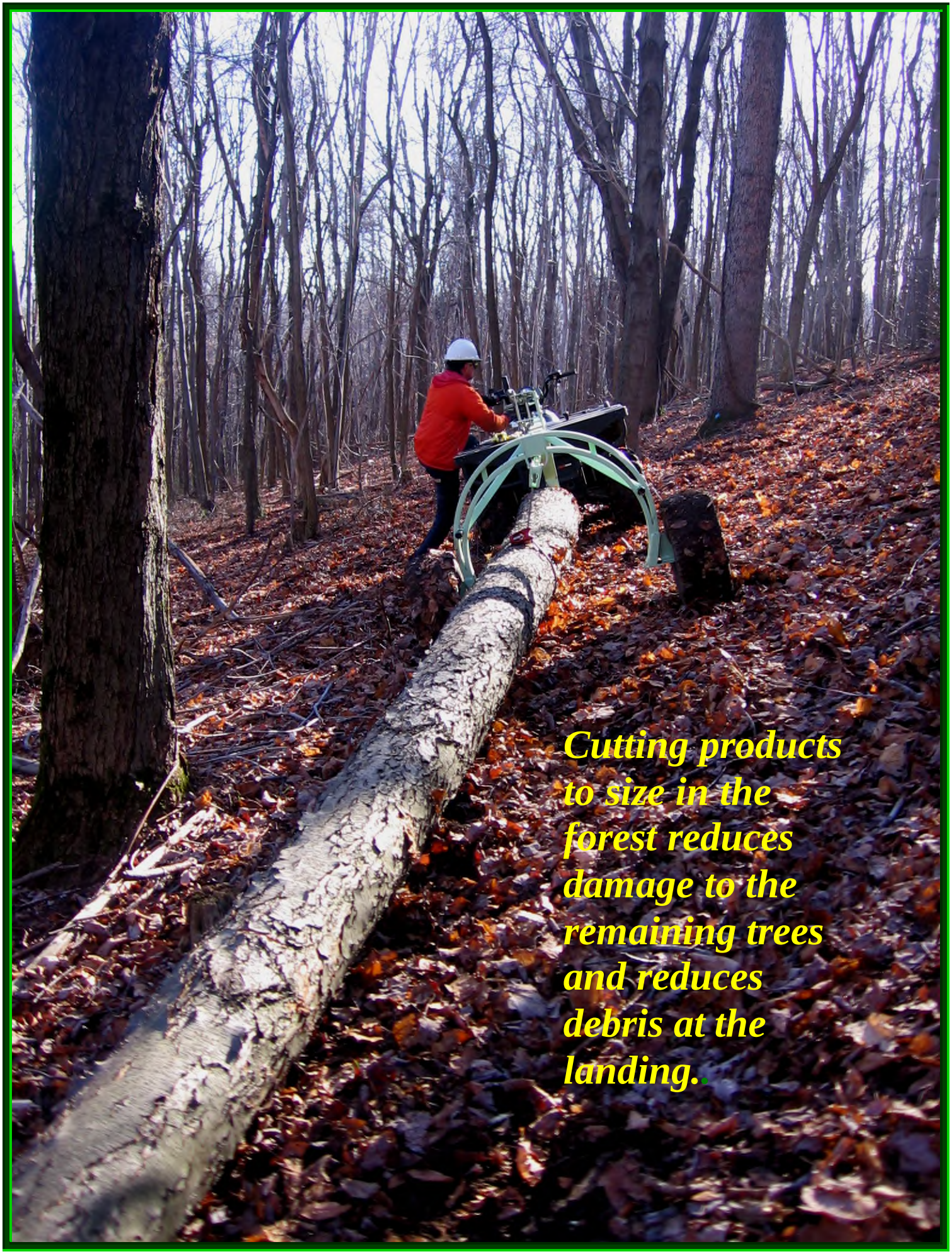
Failure to meet any of the targets will greatly reduce expected income, especially if the volume of timber is only pole-sized material as on sites 1 & 2 in this study:

- Expected monthly pre-income tax will be as low as $178 per month.
- The equivalent wage rate would be as low as $2.04 per hour.

Economic Evaluation Summary By Stuart Moss

"As can be seen from this analysis, satisfactory profit and wages can be earned from a small-scale harvesting operation. However, close attention must be paid to the important determinants of profitability," (outlined in Moss's paper found in its entirety in the appendix of this guide.) *"As the operator settles into a routine performance level, variable field cost and time utilization are likely to stabilize at fairly consistent levels. Furthermore, productivity will primarily become a function of average tree size. Therefore, the variables that are most likely to influence profitability on a site are average tree size, the proportion of sawlogs to total harvest volume, and distance to the site. Idle time between sites will also affect income. Since the operator's fixed costs are low, the maximum loss due to idle time is $243 per month. However, the true impact of idle time is the income lost by not engaging in productive work. As with virtually any business, satisfactory income will depend on the ability of the operator to maintain a steady flow of work." (Moss 2007)*

Operators dropping another log at the landing on site #5. The landing was created by clearing brush and trees by hand.


Cutting products to size in the forest reduces damage to the remaining trees and reduces debris at the landing..

Opportunity for a New Forest Products Operator

Forest Products Operators

Quick Facts at a Glance

- 85% of all MD landowners have 10 acres of land or less.
- 61% of all landowners across the nation have 10 acres of land or less.
- Harvesting may be a tool used to manage for other landowner desires and ecosystem services.
- An operator needs to be open minded and creative to make a business of this type work successfully.

Real World Success and the Perfect Harvest Site

The forest products operator that worked on the study has put into practice what we have learned and is currently working on a 6.2 acre stand reducing the current basal area of 130 sqft. to optimum growing potential of 70 sqft. The silvicultural prescription for the stand is to remove the unacceptable growing stock and any mature trees.

Overall, this is a win win situation, since the operator is within 5 miles of his base of operations and a significant number of high quality black cherry trees are being cut that are greater than 20 inches in diameter.

The landowner is receiving $10/cord for firewood removed, 40% of the regular sawlogs and 50% of the veneer logs. The volume to be cut is 35 cords of firewood and 7,035 bdft. of sawlogs, with high quality cherry making up 49% of the volume.

The forest products operator's skid is short and downhill in open forest with few rocks on the surface. Two landings will be used to remove various products. All this will be done without building roads or clearing landings with heavy equipment. What is really of interest, though, is that the forest products operator has worked on the property in the past with other equipment but has chosen to do this harvest with the same equipment he used in the study, the ATV and arch. This harvest is successful, making this an example that works in the real world. Best of all, the landowner could not be happier!

With 85% of all forest landowners owning fewer than 10 acres in Maryland and 61% of forest landowners owning fewer than 10 acres across the nation an opportunity is present for a new forest products operator. If assistance is going to be provided to these landowners with ecosystem service markets in mind, then we must find ways to provide these owners with assistance. Will landowners harvest more forest products given a system which provides very little disturbance, no soil erosion, no damage to the remaining trees and no real change in aesthetics? This answer will depend on land managers, landscape contractors and forest products operators realizing that a market exists to assist these small woodlot owners. Harvesting may not be the primary interest of many of these owners, but it may be an important part to meeting their other desires, which are aesthetics, recreation, firewood, and the new emerging ecosystem services markets. A healthy and well managed forest can store more carbon than a forest that is not well

managed. Overall, there is a market to assist these owners but at the same time it will take lots of demonstrations for landowners to overcome the stigmatisms of what they see with traditional harvesting. A forest products operator and/or land manager needs to be open minded and creative for this business to work well. Many landowners say that they will be willing to accept some forest products as a tradeoff for work to be done, but also want some cash out of the deal. By showing these landowners where they are saving money or increasing the financial values of the remaining trees will be well worth the extra time it takes to make a deal work.

Facts for a Business Model or Plan

Land Managers & Forest Products Operators

Quick Facts at a Glance

- 85 % of all Allegany County, MD landowners have a stand in their forest that is 10 acres or less in size.
- Production with ATV logging is not likely to exceed 0.75 tons per hour.

For land mangers and forest products operators to develop a business model or plan, knowledge of the availability of land and products is needed. The economic feasibility study showed that an operator needs to produce 400 to 500 bdft. every 6 hours for the business to be able to make money.

The Frostburg State University (FSU) study revealed that at least 83% of the properties, in their study, had at least one forested stand that was 10 acres or less in size. In these stands some 2,300 bdft. per forested stand is available to harvest. For more information and a plethora of facts about the availability of small stands and woodlots in Allegany County, Maryland see the "*Spatial Analysis of Stewardship Data*" section in the FSU report titled "*Availability of Land and Products*".

In Maryland 85% of all forest landowners own fewer than 10 acres. In the nation 61% of forest landowners own fewer than 10 acres. Although these numbers may sound impressive they only make up a small percentage of the total forest land in the state and nation. That means that a lot of people own just a few of the forested acres. But small landowners have different interests than larger landowners. The larger landowners have many opportunities for them to take advantage of. Small landowners have been pushed aside but hold a great resource that should be managed.

- Depreciation for equipment used in the study is 5 years.
- Fixed costs including insurance and equipment depreciation are $243 per month.
- Cost of equipment was $8,600 for ATV; $750 for chainsaw; and $1,831 for the arch.
- Equivalent wage rate analysis is $10.71 per hour, which is the expected wage rate for these types of activities.
- Time utilization for operation was 6% prep & reclamation, 6% maintenance, 70% field time and 18% other (bookkeeping, mills and landowner visits, etc)
- Labor productivity as tons per hour ranges from 0.50 ton/hr. to 0.75 tons/hr. Working part time should produce 2 to 4 tons per day. If wood weighs 2 to 2.9 tons per cord then 1 to 2 cords a day is all that is needed. If a cord sells for $150 and the landowner receives $10 the operator will have $140 left.
- The number of productive field hours required to break even is 19.8 hours per month. Thus, the operator could expect to begin

making a profit after only 3 full working days each month.

- To break even, looking at distance to each site you would need to produce 16.2 tons per month to break even at only 5 miles from base of operation.
- The further the distance from base of operations the more volume you need to produce per hour.
- The average gross stumpage price on the better sites was $39.00 per ton.
- Production is not likely to exceed 0.75 tons/hour.
- Throughout the project, the operator was able to produce in excess of 30 tons each month. As long as net stumpage price is $25/ton or greater and round trips distances are less than 50 miles, the operator should be assured of earning at least some profit, regardless of productivity.
- With low stumpage prices, distance to the site must be kept low to provide any chance of profitability.
- You can predict monthly income assuming a net stumpage price of $25 per ton (close to the average for the project) and 90 field hours per month (the average for sites 3 – 5). The operator should expect a monthly income of $1,176 if the distance to sites is 5 miles (10 miles round-trip). If the distance to the site increases to 25 miles (50 miles round-trip), expected income falls to $642 per month, or just over half the income if the site was 5 miles distance.
- Assuming productivity of 0.75 tons per hour (a high level of productivity), a round-trip distance of 10 miles, and a net stumpage price of $25 per ton (both typical for the project), the operator would need to spend at least 80% of his or her working time in the field in order to earn a wage rate of at least $10.00 per hour.
- Assuming productivity of 0.75 tons per hour, 90 field hours worked per month, a net stumpage price of $20 per month, and a round-trip distance of 10 miles, monthly income is projected to be $839.
- Field variable costs are $1.50/hour.

Harvesting veneer logs in winter provides for a higher value for both the seller and operator..

Landowners Do-It-Yourself

Landowners

Quick Facts at a Glance

- Improving the land can not always be measured economically.
- Working with a knowledgeable forester will help you market your trees or logs.
- Creating brush piles can improve aesthetics and create wildlife habitat.
- Using cost share may be possible for stands that do not have salable timber.

Many landowners will have equipment that is similar to what was used in this project and may find they want to try this on their land. Working the land can be quite enjoyable and satisfying. As many of us know, improvements to the land provide benefits that can not always be measured by economics. Many of these small stands with small products may not pay for themselves directly, but over time the benefits to the stand will pay off both financially and in the knowledge of an accomplishment. You as landowners will need to decide if the investment in your time and physical abilities are worth it. While a forest products operator managing these pole sized stands only breaks even, a landowner needs to factor in the improvements to the stand, the value they save in firewood, and the enjoyment of working the land. In many ways the benefits outweigh the economic cost.

Work with a Forester and Local Markets

Landowners wanting to try this themselves should work with their local, state, industrial or consulting foresters. They can assist you in which trees to remove and, more importantly, which trees to maintain. These individuals can also assist you with markets for your products and who will buy the material and how much is needed to interest a buyer. A log here and there will not do the trick unless you have ways in which to take the products to market yourself. Having 50 to 70 logs ready to go is the time to call and contract out a truck assuming you already have an interested hauler prior to harvesting Current hauling costs have run around $125 to $150 per load but with fuel prices unstable and on the rise we have seen charges after the study go to $175 to $250 per load. The cost to haul the load will depend on the hauler's distance to the mill and fuel prices, something you will want to work on with your forester. Having a rapport with a local logger or mill to haul your logs is very important and your local forester should be able to help you with that. Once you have a load ready you can call to have your load picked up. Make sure your access is practical for a log truck to enter and have your local forester check that as well. Remember, selling logs in the winter will give you better price on the high quality logs, including veneer. If your logs are going to sit for some time you will want them in the shade or will need to seal the ends. Check with your local mill to see what type of sealer they recommend.

In Maryland, being active in a forestry program usually means a tax break will be realized on the land. The additional savings can be a real incentive for landowners to manage their woodlots.

Landowners may want to consider using a cost share program to cover the cost of thinning in pole-size stands that are not economically feasible for timber harvest. If an operator is doing the thinning for you, you may want to consider trading out services for firewood produced from the stand. Remember, during a harvest, firewood and pulpwood only has a value of $10 per cord to the owner selling the wood to a forest products operator in raw form. So, if firewood cut, split and dried sells for $150 per cord, the landowner may have to pay the operator $140 or trade out the value.

Most Asked Questions and Their Answers

Q - Is the forest products operator limited by the type of harvest he or she can perform?

A - No limitation on the type of prescription but having 40% of the material as high value sawlogs is recommended.

Q - What can be done with the tree tops?

A - Most landowners prefer to have them piled into brush piles for wildlife; not only will it look better but it will provide wildlife habitat.

Q - Will this do more or less damage to my woodlot and remaining trees?

A - Damage was so light on the study sites we did that it could not even be measured and I challenged others to find damaged trees. That said, an occasional top or branches would be broken in the remaining trees, but nothing that would threaten the life and value of those trees in the future.

Q - Will soils be damaged?

A - Soils were not damaged other than a little rutting on the haul roads from the operator's pickup truck. These problems of rutting can be dealt with by carefully managing the site and choosing the right weather conditions to work in. All these things can be included in the contract with the operator.

Brush Piles
A Personal Experience

Having brush piles on the farm became a necessity with large amounts of debris from everyday maintenance and both small and larger scale management practices. One day we watched up close as a coyote chased a small animal into one of our brush piles on the edge of our field. The coyote was unsuccessful in getting to the smaller animal and ran circles around that brush pile with real intensity. After we had our fill of enjoyment, the coyote realized that we were watching, took one long look at us, and darted for the mountain. It was a real joy to watch and listen to that coyote yip and carry on until he had to give up for fear of a larger predator watching him. Our brush piles were a necessity, but also become an important attraction for wildlife.

Dan Heddderick, Landowner

Q - Will aesthetics be changed or damaged?

A - Aesthetics will not change in the long run. That said, any harvest needs at least one growing season and leaf drop before it looks normal again. Many landings and skid trails from the harvesting sites were well on their way to naturalizing themselves as if nothing had ever taken place. The aesthetics were just as good or better than when we started. In some cases the stands looked tidier once the poor quality trees were removed. Landowners could also see a greater distance into their woodlots!

Q - Will water quality or springs be damaged?

A - In most cases the Soil Conservation District did not even require a permit for this type of logging since the soil disturbance was less than 5000 sq.ft. In most all cases soil disturbance did not even come close to the breaking point for a permit since no large earth moving equipment was brought in to alter roads or landings. The operator simply used what was on the site or the side of the road. Overall, water quality will not be damaged.

Notice minimal disturbance during active harvesting in summer.

Q - Where do I go for help?

A - We are seeing more and more forestry consultants and cooperative extension outlets taking on the challenge of small woodlot management and it should not be difficult to find a local state or city forester to help you. If they have not heard about this type of activity, encourage them to look into this guide. The local foresters already have the standard knowledge of these natural systems and all they need to do is apply that to small woodlots. If you run out of luck, give Dan Hedderick, MD DNR Forest Service a call at 301-777-5835.

Fence posts and firewood being harvested from site #2, good for the stand but a financial loss for the operator.

Q - Will thinning my small stand be economically beneficial for the remaining trees?

A – Any tree will increase in growth if given additional growing room, nutrients and sunlight. An increase in growth will mean an increase in value.

Q- Why should I harvest trees in my small woodlot if I am not interested in harvesting trees?

A- Harvesting may be a way for you to meet other goals and objectives on your land. For example; if you are interested in providing an abundance of food for wildlife, a thinning releasing the better trees will increase the crowns of those trees. The larger the crown, the more acorns and nuts a tree will produce.

Q- Why should harvesting be important to me?

A-If you are interested in global climate change, then managing for a healthy forest can increase the amount of carbon stored. Not only do trees store carbon, but products that are made of wood, like furniture, also store carbon. If trees are allowed to decay in the forest and are not harvested that carbon is once again released into the environment.

Q - Will cost share be available to assist me with my activities in my woodlot or small stand?

A- There are a number of cost share programs and it will depend on which program is funded at that time. If a program is available the shared cost will normally be 50% to 65%. This is assuming that the harvest is non-commercial. Material that is 10 inches or smaller in diameter will be non-commercial and may qualify for cost share.

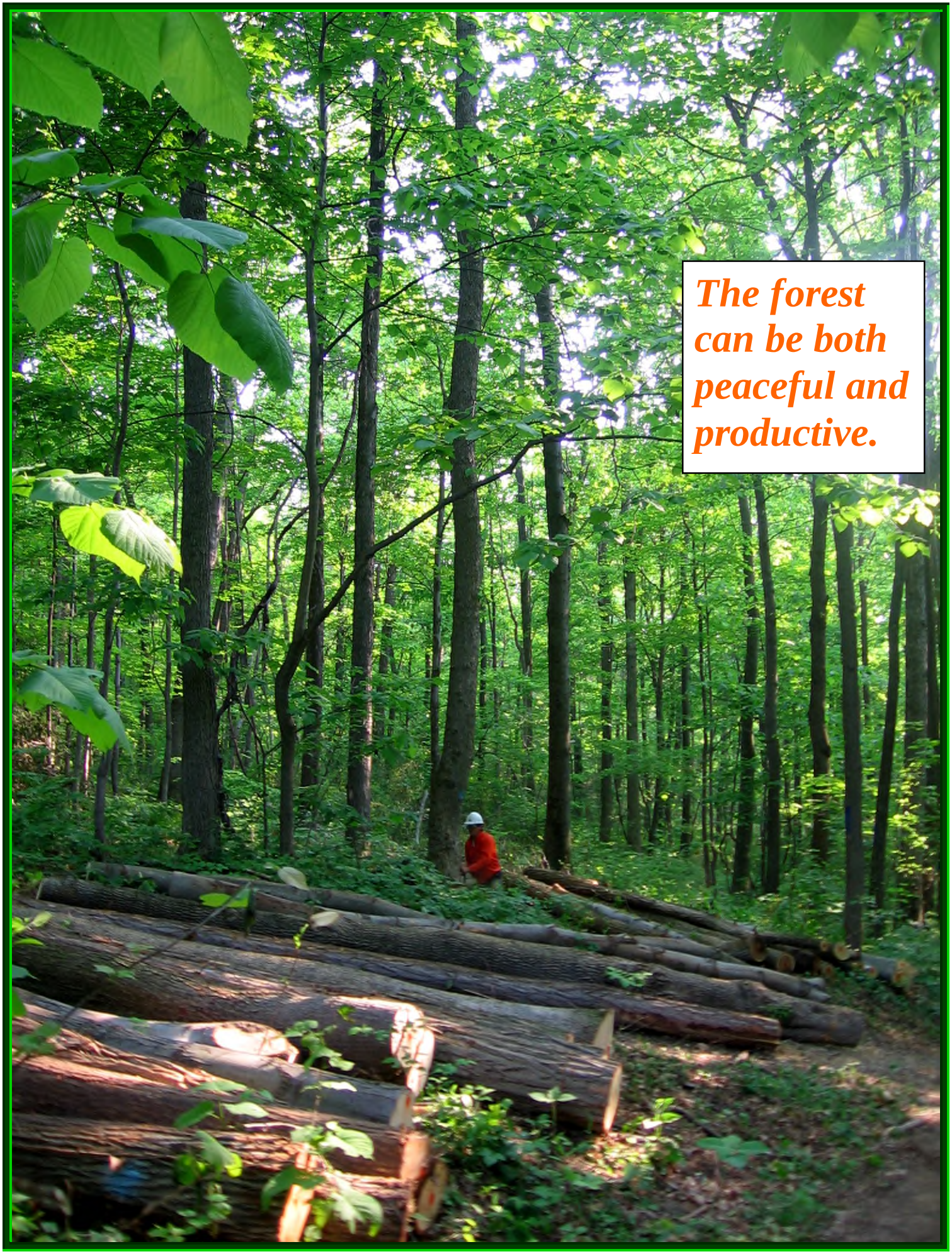
Removing undesirable trees for firewood is a great way to improve the growth of the remaining trees.

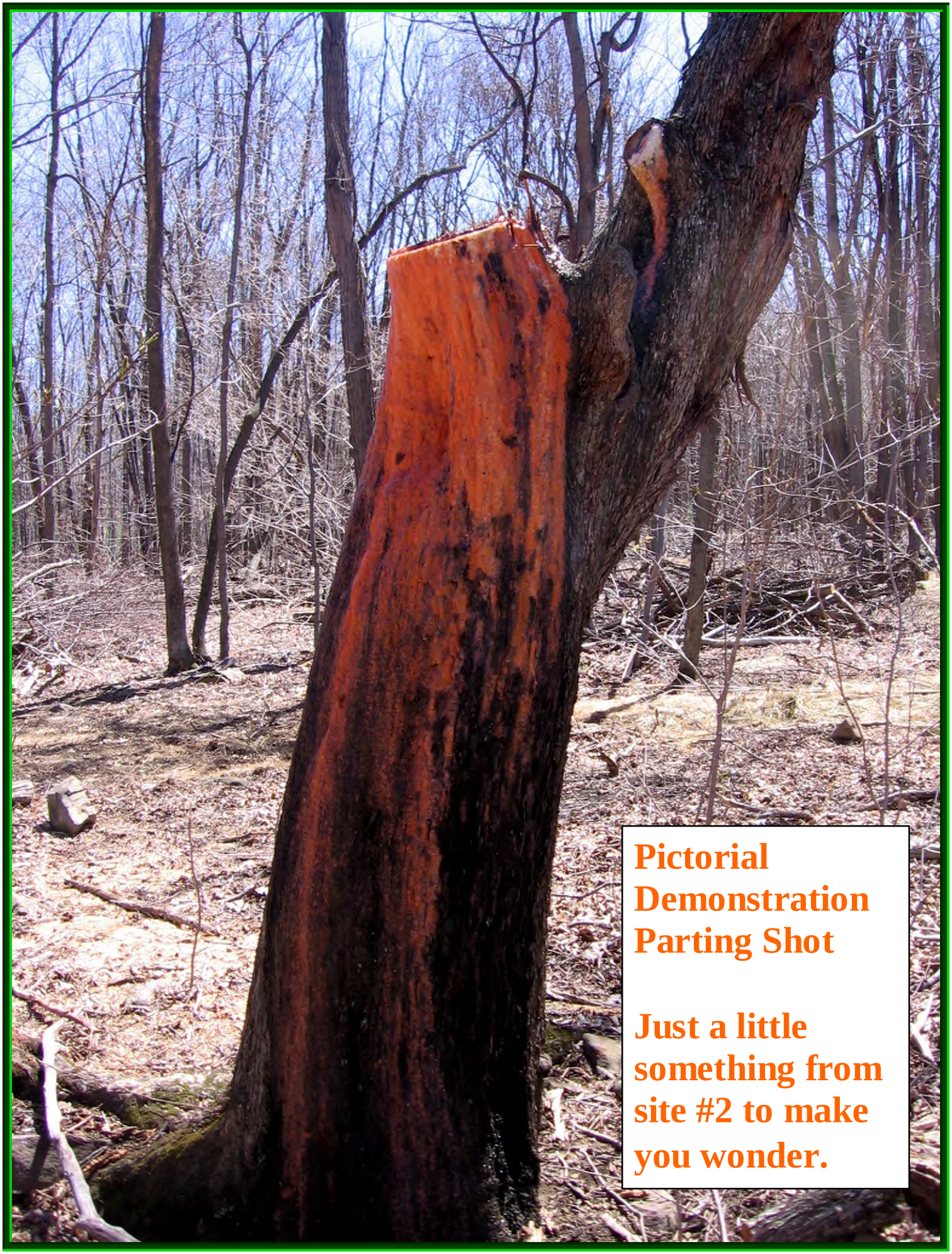
Pictorial Demonstration

Landowners, Land Managers, & Forest Products Operators

A Picture is Worth a Thousand Words


Satisfactory income will depend on the ability of the forest products operator to maintain a steady flow of work!


The forest can be both peaceful and productive.


Pictorial
Demonstration
Parting Shot
Just a little
something from
site #2 to make
you wonder.

Forest Products Operator's Experience

Landowners, Land Managers, & Forest Products Operators

Quick Facts at a Glance

- The operator's needs to have the operation mechanized to reduce stress to individual workers.
- Local products can meet local demands, making these operations environmentally & economically sustainable.
- 3 or more people per harvesting team make the harvests more efficient.

The forest products operator found that it is possible to harvest with this small system. The operator's biggest concern was the stress and physical muscle it took to accomplish these harvests. Mechanizing the activity would make it less physically stressful. Below are the operators accounts of those things he thought were most important to learn from the three aspects of this study.

Experience with Biologic Aspects

All stands were thinned with little to no noticeable damage to the residual stand as compared to damage seen on traditional logging jobs. Some trees were even girdled and left standing since they provided wildlife habitat and/or were too difficult to harvest and had no real value once cut. Other trees that were cut down were left as mushroom trees for the benefit of the forest.

Soil disturbance was very light and erosion was non-existent. All landings and skid trails were stabilized with either brush or hay. All log landings have completely healed and you would never know that a landing was present. The stand most recently harvested even has stump sprouts and seedlings emerging on the landing and in a few years will be covered by thick vegetation. In one stand the light soil disturbance created a perfect situation for the germination of hundreds of black cherry seedlings along the skid trails.

Overall, biologically speaking, activity and disturbance were very light. No roads were built, and no cut and fill areas. Soil disturbance was so minor that a permit from the Soil Conservation District was not even warranted. Even after asking I was told that I did not need one.

Experience with Social Aspects

All landowners were very accepting of the harvest. Four out of the five landowners received income from the commercial thinning. The one that did not receive compensation turned down the offer of $10/cord for firewood and was happy with just the improvement to the pole-sized stand. Only one required a performance bond to be placed on the logging activity, as occurs on a traditional logging job. Once activities were started, neighbors were impressed with the light disturbance that was present. Many of the neighbors purchased both the firewood and locust posts from the sites. On sites that had road frontage many visitors would stop by the sites and thought that logging with an ATV was a great activity! The uniqueness of the activity on those sites brought a lot of positive attention. On some days their interest even slowed me down.

Overall, the thinnings were a good way to use local products to meet local demand. If more landowners did these harvests there would be better forests and more locally produced products. Produced locally and used locally goes over very well with the citizens of the area and is quite sustainable.

Experience with Economical Aspects

Business Organization

Having a three person family-owned business would be valuable and financially beneficial. To cover an employee that is not a family member takes an amount equal to what they are being paid. With a small, family-owned business we would try to do everything ourselves and produce value-added products and get away from selling everything to a mill. A three person crew would mean one feller, one ATV operator and one person on the landing dealing with the product. The bottom line is that the business would be more lucrative. In any event, the business would need to have more overhead in terms of equipment to mechanize the operation to reduce stress and danger to all employees. The business could also offer additional services like non-commercial timber stand improvement at $200 to $500/acre, firewood harvesting at $140+/cord, etc. In the past, when I owned a small mill, I charged $20/hour for milling the logs for individuals who would bring logs to me.

Operator hooking cable to pull log under arch before skidding.

Products & Markets

Three of the five sites, numbers 1, 2 and 3, should have been a non-commercial timber stand improvement cuts. The other two sites 4 and 5 had enough products to make things work out. The only change might have been to cut only that material that was of value, leaving the other material for a follow up post-harvest timber stand improvement either with or without a cost share program at $200 to 500/acre.

Ebys Mill loading a pile of low quality black locust valued at $300/1000 bdft. Better logs are needed for load to be worth harvesting.

High grade valuable logs are the only products that should be leaving the site to a mill without adding value to the material. That said, all sold logs should be scaled by the seller to verify the load is evaluated correctly. Know what you are selling! All other low-grade material should be milled on site with a portable band mill or cut for firewood. A good portion of the material harvested on these sites was of small diameter and perfect for a band mill to handle, but not worth selling to a mill. Species that I came across that would not be worth putting on a mill were basswood, elm and red maple.

Firewood is a product that only has value for species like black locust, hickory, and white oak and has the best value during the burning season selling at $150/cord. All other woods are not worth selling. I was getting only about $65/cord for unseasoned wood, of mixed species, out of season. Trying to stockpile wood with the extra labor in hopes of making additional profit would have not have been feasible. The additional profit would have been taken up by the additional labor. The best sites would be ones that I could control and keep seasoned wood on location, selling it at the right time. This is not a practical scenario for all woodlots.

In many cases firewood has more value than selling the same volume as a sawlog for small diameter wood. You can double your income from the wood by cutting it into firewood. Large enough logs that were not sold to a mill could have been placed on a portable sawmill. If a portable sawmill had been purchased during the time of the sale, I would have used it on sites 2, 3 & 5. Black locust and yellow poplar would have been those species not sold in log form, but kept for the band mill to produce value added products. The locust is only purchased at tie or pallet lumber prices as low as $2 dollars a log or less. Selling locust as firewood or milling it would have been much more profitable, and I will no longer sell locust in any other fashion!

Also, experience has shown me that I would be better off selling logs to a buyer on the landing than having a mill scale them after they are taken. For the volume that is sold, markets are not as high as the landowners think they are.

Equipment

The equipment used was great, but overall I would need to mechanize the operation more by adding in a portable sawmill, dump truck and loader or small tractor. The labor and time required without the equipment is too great. I would still hire out a log truck with the hope of sharing the hauling expense with the landowner either outright, in the agreement, or as a hidden cost that would be dealt with in the offer I made to the owner.

Operators pulling cable to skid a log. Teamwork is the key to speed!

On site #2, which was steep, I would have not skidded as much. I would have used a cable system to get out only those logs I wanted. Steepness, rockiness and density of the stand are all limiting factors with ATV skidding.

Also, I would no longer haul logs with a pickup truck since it is not cost effective or safe when loading.

Forest Products Operator's Final Words

If more landowners did these types of harvests, the forest would be improved. There would also be more available wood to meet local demand for products. Overall, the forest is still intact and in good shape for the multiple benefits it provides. The more valued added products you can make, the better for the feasibility of a project like this.

As the importance of small woodlots is realized, the better appreciated these types of activities will become. This type of harvesting does work as long as you have the right site and the right volume with some additional equipment. Selling value added products, combined with a post timber stand improvement cut, is the ticket to making harvests work on sites that have only low value products!

Something to Consider

Landowners, Land Managers, & Forest Product Operators

Although the study did not include portable sawmills for producing value added products, there are individuals that say they have done so and were able to make a go with small portable mills. One operator told us he would mill free lumber from his place to build outdoor sheds and turn a large profit. Another operator told us he was able to build pallets with his and had contracts with local businesses where they were buying as many as he could make.

Landowners have also been telling us that they have had a portable mill come in to cut up their logs and they have been charged anywhere from 0.21 cent a board foot to 0.45 cent a board foot depending on the thickness they request. The landowners claimed they were very happy with the outcome and made use of the waste for firewood and sawdust for mulch or animal bedding. They were happy having the waste to deal with instead of it going to a mill.

Landowner demonstrates his mill.

All this said, caution should be used when considering a serious business venture!

Conclusion

Landowners, Land Managers, & Forest Products Operators

Overall, we have learned a great deal about small woodlot harvesting while taking a close look at the biologic, social and economic aspects.

Biologically speaking, small scale harvesting is a big success, with little to no soil erosion or compaction and no residual stand damage.

Socially speaking, small scale harvesting is not something that most small landowners have considered. For those that did small scale activities, the study by PSU shows that most were pleased with the outcome. This said, more work needs to be done on behalf of promoting small scale harvesting and showing the landowners what little to no disturbance is, reducing the stigmatism of traditional harvesting.

Economically speaking, harvesting works for the forest products operator, but is very limited by the distance an operator can travel. The farther the operator goes from his base of operations, the bigger the timber needs to be to make the financial aspects work for the landowner and forest products operator. Also, a good proportion of economically important timber species of sawtimber size trees needs to be available. That said, traditional timber stand improvement on pole-sized stands is still considered non-commercial since the forest products operator can not make ends meet when harvesting small pulpwood and firewood stands.

We believe that if society changes its views and realizes the importance of our forests and starts to manage woodlots for long term benefits and multiple uses, then small scale harvesting will become a popular activity, as it has in Europe. It will take creative individuals to market harvesting as a means for small woodlot landowners to meet other goals and objectives. Also, as markets for ecosystem services become a reality and are better understood, activities on small woodlots will become more popular. This will ultimately result in meeting landowners' needs, the needs of society and protecting these woodlots from urbanization.

This guide is not meant to provide all the answers but meant to pave the way for the future of forest products from small woodlots, a trend that is inevitable. We believe that harvesting needs to be mechanized with a slightly larger piece of equipment than an ATV. This piece of equipment would need to have independent rear suspension to make it stable and safe in the forest, one that would have a hydraulic blade in the front and a safety cage over the operator. The research that went into this study shows that it is possible to successfully run an ATV logging business and ATV logging will have its place in areas where no other pieces of equipment can gain access! One thing that is for sure, traditional equipment is becoming larger and woodlots are becoming smaller and if harvesting on these woodlots is going to become a reality, society and individuals need to take a close look at small scale equipment and its benefits.