DIFFICULTIES IN EXECUTING CONTRACTS WHICH MINIMIZE
PARTIAL HARVEST DAMAGE

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Abstract.—Writing a timber cutting agreement for partial
harvests which minimizes tree damage and fairly compen-
sates the landowner when damage occurs is difficult.
Examples of contract protection clauses and an economic
evaluation of bole damage from a loblolly pine (Pinus
Taeda L.) thinning are presented.

INTRODUCTION

There are many good reasons for conducting partial harvests on forestland. A few examples
would be reduction of stocking for larger dia-
ter production, management of tolerant species,
esthetics, and natural regeneration. Unevenaged
management requires partial cuts and managers of
evenaged systems may use it as a management tool
of choice. Problems arise when the harvest
operations of the buyer and the expectations of
the seller do not coincide. The buyer views
partial harvests as constraints on job produc-
tivity both from a reduced volume per acre and
in the care that must be exercised to protect
the residual stand from damage. The seller, on
the other hand, may not appreciate the produc-
tion necessary to cover fixed costs on a logging
operation and the maneuverability requirements
of the equipment on mechanized jobs.

The resulting impression of the landowner
is that the logger has no concern for job quali-
y and has total disregard for the forest
resource. The logger admits that harvest areas
are not pretty, but gets the impression that the
seller is unrealistic in his expectations. This
paper sets forth some of the difficulties that
have been encountered by the authors in market-
ing and harvesting timber under partial cutting
contracts.

CONTRACT LANGUAGE

Once a partial harvest is anticipated,
marketing strategy must be considered. Removals
must be of commercial quantity and accommodation
must be made for skidding and loading sets.
Contract constraints will affect the harvest
returns and should be taken into account before
valuation is finalized. Marketing does not
conclude with bid acceptance and contract
signatures, but must anticipate satisfactory
completion of timber sales. Contract agreements
should take into account the harvest operation
including performance and penalties as well as
removals. Marketing must not only strive to get
the greatest revenue, but also cover operation
eventualities. Careful contract specification
is always easier than interpretation of a vague
contract after the fact.

Contracts should specify the obvious—the
identity of the tract, the trees to be cut, and
the time period for completing the job. Expec-
tions of residual damage will not be constant,
but will relate to residual stand density and
tree size. Felling and skidding large trees
takes more space than processing small trees.
Contractors should be expected to take deliber-
ate care in felling and skidding. Wet weather
works against both the buyer and seller by
decreasing productivity and increasing site
disturbance. Avoiding the impacts of skid
trails on soil compaction and rutting are often
not a priority unless spelled out and impressed
upon the buyer. Specifying equipment con-
straints is usually not done, but may be
appropriate. Operating constraints work against
the seller both by eliminating bidders and
limiting the buyer in his choice of producers.

Evaluating damage consequences seems to
have been neglected in southern pine research.

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2/Associate and Assistant Professors, respec-
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71272.
Damage may relate to visual assessment or it may not. Growth may or may not be impacted, but product degrade except for pulpwood can be anticipated. Placing a fair and unemotional value on damage in the absence of empirical studies is guesswork. A litigious society may prefer to capitalize on penalties rather than receive fair treatment.

Because landowners are willing to let the buyers assume the legal cost of writing a contract, most timber is sold on a contract which protects the buyer. Landowner protection may be negotiated as amendments, but interpretation may also have to be negotiated if apparent contractual violations occur. Empirical formulas are less questionable, but are suprisingly vulnerable.

Example: In May, 1986 Louisiana Tech made a timber sale on a 30 acre tract near Simsboro, LA. The thinning was routine, mostly a low thinning to stimulate diameter growth on trees coming into sawtimber classes. Bids were accepted and a contract was drawn with the successful bidder. The following clauses pertinent to damage were written into the document.

PURCHASER is given and granted the right to utilize equipment of every nature, type and character on said land which may be useful and necessary for the purpose of cutting, harvesting and removing the timber therefrom. PURCHASER agrees to use reasonable care to minimize damage to any timber not covered by this contract. (Buyer's contract)

To cut, fell, and remove this timber in accordance with good forestry practices at all times, leaving the woods in a condition satisfactory to the forester employed by the seller. (added by Seller)

To pay Three Hundred Dollars ($300.00) per thousand board feet Doyle Log Rule for any tree cut over twelve inches (stump diameter) that was designated to be left standing. To pay Forty Dollars ($40.00) per standard cord for any tree cut twelve inches and under (stump diameter) that was designated to be left standing. (added by Seller)

The contract was signed without complaint with the seller apparently retaining good control of the operation. The final condition of this tract was unacceptable with almost half of the residual trees having at least one logging scar on the bole. The problem was not the result of a high residual stocking (61 BA per acre) but rather in the buyer's choice of a contractor to cut the tract. This was a first thinning and removed the smaller diameters to favor sawtimber production. The sale was considered a pulpwood removal (since the stand following harvest averaged only 10.3" DBH) but a contractor was chosen who was in the area and was a good merchandizer. A large shear and grapple skidders were used which could not maneuver without bumping trees either in backing or turning. A tabulation of the bole scarring on a 7.7 acre portion of the stand is given in table 1.

An attempt was made to collect contractual damages based on the buyer's clause of "reasonable care" and the seller's clause of forester satisfaction. The reaction of the buyer was that they paid a premium price to win the bid and had exercised the contractual flexibility of not having harvest equipment restrictions. This did little to relieve the seller who was left with a severely damaged stand. An administrative decision not to pursue litigation left only a research area on which to evaluate bole damage recovery in loblolly pine.

The next sale bid invitation (on a private tract) spelled out monetary charges for severely damaged trees with severe damage being described carefully.

To pay the seller for all trees to be reserved which are greater than 11" in diameter at breast height which are cut, felled, or otherwise seriously damaged, at the rate of $6.00 per inch in diameter across the stump if cut, or at 4 1/2 feet from the ground if uncut. Damaged trees for which the Buyer is so penalized will not be cut. The Buyer agrees to conduct logging operations so as to minimize any skidding damage to the residual trees. Serious damage will have occurred when a tree has lost 1/4 or more of the bark around its trunk.

The high bidder submitted a bid with the following condition:

Penalty for cutting those pine trees painted with a blue band shall be $250.00 per MBF, Doyle Scale, for pine trees having a stump diameter 12" and larger measured 6" from the ground and $30.00 per cord for the trees having a stump diameter less than 12" measured 6" from the ground.

This stipulation covered only trees cut (not damaged) moved the diameter from DBH to the stump and reduced the penalty to approximately 1 1/2 times stumpage value. The dollar adjustment was no problem, but the timber buyer was told of the need to add a damage provision to the final contract. The Buyer wrote the timber sale contract, but without any reference to damage. The damage language using the 1/4 circumference criterion was added but
<table>
<thead>
<tr>
<th>Residual Stand</th>
<th>Harvest Damage (1)</th>
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<tbody>
<tr>
<td>DBH</td>
<td>Stems</td>
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<tr>
<td></td>
<td>in.</td>
</tr>
<tr>
<td>----</td>
<td>------</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>72</td>
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<td>175</td>
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<td>270</td>
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<td>67</td>
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<td>16</td>
<td>21</td>
</tr>
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<td>----</td>
<td>------</td>
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<tr>
<td>815</td>
<td>468.804</td>
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(1) scar width as a percentage of circumference at breast height.

61 BA/acre
10.3" average DBH
106 trees per acre

defect of tree scarring, soil compaction, rutting, etc. If this knowledge was available, damage parameters and their associated values could be derived. In an attempt to measure some of these effects, a study was installed on the 7.7 acre stand at Louisiana Tech which had initial harvest damage recorded. A 100% sample was taken to follow mortality, DBH growth, and scar healing. A 20% sample (159 trees) which included both damaged and undamaged trees was taken to follow height growth and live crown ratio in addition to the DBH and scar changes. Sample trees were tagged and numbered.

After three growing seasons the average DBH had increased from 10.3" to 11.1". Comparisons of DBH growth by damage classes indicated no statistical difference between classes. Mortality overall was 6.3 percent with forty percent of that encountered the first year. The distribution of mortality by damage classes is found in table 2. Although mortality for trees withbole scars greater than 50% of the bole circumference is high, the sample number is low suggesting caution in drawing conclusions. Mortality in the undamaged class suggested that damage from sources other than bole scarring had an influence. Visual inspection revealed a log product degrade but harvest and internal inspection have yet to be done. In some cases, the scars are sites of wood rot in addition to the almost universal presence of checking.

In an effort to place a market value on the harvest damage, the data were used to construct a likely situation. The mean tree DBH in 1986 was 10.3". There was no statistical difference in the 3-year DBH growth between damaged and undamaged trees with the stand mean being 0.8" or 0.27" per year. Assuming that this rate continues for a seven year cutting cycle at which time the damaged trees can be harvested for

ECONOMIC LOSSES FROM HARVEST DAMAGE

A central problem inherent in partial harvests is a lack of knowledge concerning the

the buyer balked at signing. Permission was obtained from the client to accept the second bid (at a $1200 reduction) to get the protection desired. The following compromise was negotiated with the highest bidder which protected the seller and kept the buyer's pride intact:

Vendee shall pay Vendors for serious damage to or for the cutting of any pine trees marked with a blue painted band on the following basis:

... If the Vendee and Vendor cannot agree on the volume of marked pine trees, hardwood trees cut or as to whether or not serious damages have occurred to the said trees, then Vendee and Vendor agree to submit the matter to arbitration. Each party shall appoint a graduate forester to determine the liability, if any. If the two (2) foresters so appointed cannot agree they shall select a third forester to decide or determine the matter. The parties agree to be bound by the decision of the arbitration panel or board.

This clause was more than the buyer wanted to commit to and less than the seller desired, so it was probably reasonable for both parties. In this case, only 3 seed trees on 60 acres were found to be severely damaged. A third contract using the 1/4 circumference approach did result in several damaged trees and an invoice for $750, but was paid after a follow-up phone call.
Table 2.—Stand and Mortality Distribution by Damage Classes (20% sample)

<table>
<thead>
<tr>
<th>Damage Class</th>
<th>Num. Trees</th>
<th>Mortality</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<tbody>
<tr>
<td>No damage</td>
<td>78</td>
<td>4 (5%)</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>&lt; 25% circum.</td>
<td>34</td>
<td>1 (3%)</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>25-50% circum.</td>
<td>35</td>
<td>2 (6%)</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 50% circum.</td>
<td>12</td>
<td>3 (25%)</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

savtimber, the mean stand DBH would approximate 12.2". A 16-foot butt log with a scaling diameter of 12" would have 66 board feet Doyle.

The actual loss to the landowner may be significantly different from that of the sawmill. It is conceivable that the scar and associated checked wood would be removed as sawmill slabs and edging in the normal course of milling and result in minimal reduction in lumber grade and yield. But the landowner will receive payment on either a lump sum bid reflecting adjustment for perceived loss, or on a log scale from which deductions can be made.

The primary scars on each damaged tree averaged 2.5' above a 1' stump. A common timber cruising practice is to "jump-butt" the first log to deduct for the damaged portion. The minimum effect of this will be to reduce the volume proportionally which will amount to 10 board feet. If moving the first log up the bole results in a scaling diameter reduction from 12" to 11", the net loss is 15 board feet. The value of 15 board feet at $180/Mbf is $2.70 per damaged tree. Discounting that figure for the seven year cutting cycle at 6 percent yields a present value of $1.80 per tree. That amount seems very small in comparison to the perceived damage from the prominent scar, but from a different perspective, for 55 trees per acre, the figure is $99 per acre. When stand attributes were projected with a loblolly pine thinning model (Baldwin and Feduccia 1987), the value for a subsequent age-32 thinning, and an age-40 final harvest cut was $772 per acre (6 percent discount rate). At those values, the damage realized is 12.8 percent of the present value of the forest stand. Although the monetary loss on the damage to this stand is apparently not substantial, it is a significant loss to the profitability of an already marginal enterprise. The value lost on this evenaged pine stand is probably less than would be expected on an unevenaged system where smaller trees are held for a longer time period, and certainly in the case of hardwoods, where bole scarring introduces wood pathogens.

LITERATURE CITED


CONCLUSIONS

Contracts written to protect a timber seller against damage are difficult to specify,