Salvage Operations
in the Douglas-Fir Region:
Their Present and Future

By
John B. Grantham

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OREGON STATE COLLEGE
Corvallis
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By
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A Research Project of the Oregon Forest Products Laboratory,
Oregon State College, Corvallis, Oregon
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Salvage Operations 
in the Douglas-Fir Region:  
Their Present and Future*

During the past two years salvage operations have been augmenting the region's timber supply by a substantial amount. These operations will be affected adversely by the present trend of the lumber market.

In view of the potential benefits obtainable through close woods utilization, an examination of the progress made in salvage activities as a basis for predicting future trends is appropriate. This analysis emphasizes the importance of salvage operations, reviews current activities in the salvage of several classes of material, estimates the volume of material being salvaged currently, and predicts the future extent of salvage operations based on present trends.

**IMPORTANCE OF CLOSE WOODS UTILIZATION**

Briefly, the recovery of material normally left on the ground after logging benefits the region, as it

1. Permits a higher regional wood production while converting the region from a liquidating to a sustained yield timber economy.
2. Prolongs the life of individual plants by supplementing the wood supply within local areas.
3. Provides an additional supply of fine-grained, clear wood which is of importance in retaining eastern markets for all grades of west coast lumber.
4. Decreases the necessity of cutting immature timber.
5. Reduces the fire hazard on cutover lands.
6. Provides a better seed-bed condition for the early establishment of the next crop.

Figures 1 and 2, taken where the recovered volume averages somewhat over 10 thousand board feet per acre, illustrate some of the benefits.

*The assistance of several Oregon State Board of Forestry inspectors, who reported on small salvage operations in their districts, is gratefully acknowledged.
Figure 1. The right background has been relogged by the Dwyer Lumber Co. in Clackamas County, Oregon.

Figure 2. The same area as in Figure 1, showing the type of material re-logged from the right background.
Concerning the value of salvage operations in maintaining production, the Joint Committee on Forest Conservation of the Pacific Northwest Loggers and West Coast Lumbermen’s Associations based the following minimum production estimate on Kirkland’s 1946 report (Tillamook burn only):

From 320 billion feet, public and private, under present calculations yield 3.2 billion
From 59.5 billion feet, private, that may be put on sustained yield 0.8 billion
From 59.5 billion feet, private, in liquidation 2.5 billion
From 51 billion feet of young second growth 0.5 billion
Closer logging and relogging 0.5 billion

Total 7.5 billion

The 1945 and 1946 log and pulpwood productions were close to this total estimate. While other measures can be taken to expand or meet the industries’ wood requirements, it is noteworthy that closer logging and relogging are included in the minimum estimate for the next 5 to 10 years.

Based on the more than 2 billion board feet of potentially usable material that is left annually after logging and the increasing salvage activities of the past two years, the 0.5 billion board feet recovery estimate may seem conservative. While Table 1 reveals that the industry may meet the estimate during the first half of 1947, the future is less certain. The many factors that will affect the extent of future salvage operations will be considered in the following sections of this analysis.

Table 1. **Anticipated Volume of Material to Be Salvaged During 1947 by Close Initial Logging or by Relogging**

<table>
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<tr>
<th>Source of salvage material</th>
<th>Board feet</th>
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<td>Close initial logging</td>
<td>350 million</td>
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<tr>
<td>Salvage from old burns</td>
<td>200 million*</td>
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<tr>
<td>Relogging</td>
<td></td>
</tr>
<tr>
<td>Pulp species</td>
<td>50 million</td>
</tr>
<tr>
<td>Douglas fir pulpwood</td>
<td>40 million</td>
</tr>
<tr>
<td>Douglas fir for lumber and plywood production</td>
<td></td>
</tr>
<tr>
<td>Principally from standing trees</td>
<td>25 million</td>
</tr>
<tr>
<td>Principally from down material</td>
<td>65 million</td>
</tr>
<tr>
<td>Total estimated salvage</td>
<td>730 million</td>
</tr>
</tbody>
</table>

*Kirkland, B. P., *Forest Resources of the Douglas Fir Region*. Joint Committee on Forest Conservation, Pacific Northwest Loggers Association & West Coast Lumbermen’s Association, Portland, Oregon, July 1946.*
TYPES OF SALVAGE OPERATIONS

Salvage operations have taken many forms under the stimulus of strong markets. These operations were expanding steadily until the spring of 1947 and included:

1. Closer initial logging
2. Increased salvage from old burns
3. Relogging

CLOSER INITIAL LOGGING

Everyone appreciates the fact that operators have been able to do a cleaner job of logging since 1940 than they were previously because of favorable markets. Detailed studies on two operations*† revealed that the wood volume left on the ground during 1943 was approximately one half that left in prewar years.‡ A few operators have been able to make an even greater improvement in woods utilization.

Figure 3. A setting clean logged by Fischer Lumber Company near Marcola, Oregon.

Figure 3 illustrates the appearance of the ground where the operator did an exceptionally clean job of logging.

The United States Forest Service found during the course of its reappraisal studies that the wood left on lands logged in 1944 averaged 10 thousand board feet per acre. This fact combined with the previous statement that the present volume of wood left after logging averages only one-half of the prewar volume makes it appear that the prewar volume of residual wood averaged 20 thousand board feet per acre and that operators are removing an additional 10 thousand board feet per acre. Such an assumption would lead to the conclusion that lands which yielded 40 thousand board feet per acre 8 or 10 years ago are now yielding 50 thousand board feet—a 25 per cent increase.

However, it is not possible to generalize in this regard, for such factors as transportation distance and available markets will affect the degree of utilization on individual operations. Furthermore, the size and general high quality of some timber stands permitted close utilization in prewar years. Thus the wartime demand for lumber has increased the utilization of some timber stands by less than the indicated percentage.

Previous estimates place the regional improvement in utilization at 10 to 15 per cent greater recovery per acre. The more conservative figure of 10 per cent has been used in compiling the data for Table 1. Therefore, the predicted log production for 1947 of 7.5 billion board feet could be assumed to include approximately 6.8 billion feet of logs that were merchantable in prewar years plus 10 per cent or approximately 700 million board feet of material that was formerly left on the ground. This assumption appeared justifiable for the first four months of 1947 thus accounting for 210 million board feet. However, the lack of a market for No. 4 Common and the slow movement of No. 3 Common lumber have caused a sharp decline in the degree of woods utilization on many operations. The anticipated salvage of wood through close initial logging during the last 8 months of 1947 may drop to one-third of the rate estimated for the first 4 months. This would give a recovery of 140 million board feet for the last 8 months and a total of 350 million board feet salvaged during 1947 through close initial logging.

INCREASED SALVAGE FROM OLD BURNS

Large volumes of logs are being obtained from salvage operations in old burns. Time has not permitted an accurate determination of this quantity. However, the greatest volume has been salvaged from the Tillamook burn, and it is of interest to know that
approximately 200 million board feet of logs were recovered from that burn during 1945.

As a new sawmill is just beginning operation in the Trask River drainage, it seems likely that the 1947 salvage from the Tillamook burn may equal that for 1945.

RELOGGING

Relogging opportunities vary widely over the region, depending upon the type of material left on the ground and the adjacent markets for salvaged material. The type of material left is in turn dependent upon a multitude of factors such as the size, density, and quality of the original timber stand. The time and method of initial logging are also factors.

In comparing close initial logging with relogging, it should be recognized that as a rule close initial logging cannot achieve as complete woods utilization as relogging. While there are notable exceptions, many of the current relogging operations are following the so-called clean logging of the past seven years. In such cases relogging may recover 8 to 12 thousand board feet per acre as compared with recoveries of 20 to 30 thousand board feet from prewar cuttings. Whenever market conditions tend to induce a return to prewar standards of woods utilization (as they are now doing) the need for salvage operations, and particularly relogging, will be increased.

No attempt is made to discuss the salvage of cedar from cut-over lands since relogging for cedar has been an established regional practice for many years. In fact the bulk of the present cedar production comes from salvage cuttings rather than from initial logging operations.

In general, relogging operations may be based primarily on standing trees—considered unmerchantable at the time of original logging—or on down material.

Relogging Standing Timber

Where the operation is based on the salvage of standing material, the relogging is likely to resemble a standard logging operation. Heavy equipment is needed to handle the large logs. As a rule, no specialized yarding or loading equipment is needed to facilitate handling small material unless the operation is primarily a salvage of understory trees which are in danger of blowing down. Relogging costs on this type of operation follow ordinary logging costs closely. Falling and bucking, yarding, and loading costs may be somewhat higher because of the smaller volumes recovered from each acre. Stumpage costs may be only slightly less than normal on a per thousand-foot basis but are generally considerably below average where the presale
cruise gives the relogger the benefit of the doubt in the matter of estimated volume recovery. A further saving is made in road construction costs.

Experience varies in this type of operation. Many attempts to relog culled trees have been abandoned after a few acres of the timber were felled and bucked. The disappearance of the wood log market will further handicap such operations.

On the other hand many relogging operations of this type have been highly successful. One operator found that one out of three trees left was of high quality; one contained at least one sawlog; and one tree was a cull. Some operators have found an even higher percentage of good trees.

Such findings reflect past logging practices. Since the bull buck's efficiency was measured by the operator's falling and bucking costs, he tended to pass up any tree which was of doubtful quality. Normally insufficient consideration was given to the fact that larger volumes per acre have a favorable effect on other logging costs and offset higher falling and bucking costs.

The writer has learned of 15 small operators relogging standing cull timber in the Willamette Valley. All of these are tractor operations with crews varying from 2 to 11 men. Production varies from 20 thousand to approximately 150 thousand board feet per week but averages about 40 thousand per week. For 1947 these operators have accounted for a production of approximately one-half million board feet each. It is anticipated that some of these reloggers will be forced out of production by the virtual absence of a wood log market. The total 1947 production of these operators should be 12 to 15 million board feet. While no information could be obtained on the volume produced elsewhere in the region by this type of operation, a total regional production of 25 million board feet should be conservative.

This salvaged material is being used for the production of both lumber and veneer. A large percentage of the sawlogs is dumped in the Willamette River for use in permanent mills. The Western Veneer Company in Sweet Home is the largest single user of salvaged logs for veneer production and seven small contractors are relogging for this one plant.

Relogging Down Material

The largest volume of relogged material is coming from operations based primarily on down material, although in some cases standing trees taken along with the down material may account for as much as 30 per cent of the salvaged volume.
In order to give a better picture of current relogging activities, and anticipated recovery, these salvage operations will be discussed under the headings of: (1) salvage of pulp species, (2) salvage of Douglas-fir pulpwood, and (3) salvage of material for lumber production.

Salvage of pulp species. The salvage of pulp species takes two forms: (1) the salvage of log lengths, or (2) the salvage of 8-foot wood. Although the number of operators relogging pulp species in log lengths is probably only 12 to 15 as compared with more than 30 salvaging 8-foot wood, the estimated volume to be recovered by each class of operation during 1947 is approximately the same, namely, 25 million board feet or about 50,000 cords.

In general, pulp mills state that pulp species must be recovered within 2½ years of the date of original logging. Although hemlock which has been on the ground for longer periods has been sold, it has probably done more harm than good since such material is likely to establish an unwarranted prejudice against salvaged wood. If salvage operators use judgment in selecting down pulpwood, and particularly if the salvage operation follows the initial logging more closely, this type of recovery operation should expand in the future.

Many pulp mills have altered their barking and other wood room facilities to handle 8-foot wood or small pulp logs more efficiently. Thus, they are in a position to use increasing amounts of salvaged wood. One Washington pulp mill has stated that it would like to obtain 15 per cent of its annual wood requirements from salvaged material.

Figure 4. A home-made donkey used to salvage 8-foot pulpwood near Bellingham, Wash.
Figure 5. Horse logger salvaging pulpwood and small sawmill logs near Vernonia, Oregon.

Figure 6. Salvaged material decked by a small operator near Vernonia. The area on the far side of the spar tree has been relogged.
A typical supplier of 8-foot salvaged pulpwod operates the home-made donkey shown in Figure 4 with a 2-man crew. This operator covers approximately 15 acres in one setting. On cut-over land yielding 7 to 20 cords per acre of salvaged material, his production has been from 2 to 3 cords per man-day.

Most producers of 8-foot wood use horses or small tractors for yarding. Figure 5 shows a horse logger who was averaging 2 to 2½ cords per man-day with one horse and a two-man crew. On this operation the salvaged wood was principally Douglas-fir. Pieces under 15 inches in top diameter were cut into 8- to 16-foot lengths and decked for pulpwod. Larger pieces were reserved for small sawmills. Some of the decked material is shown in Figure 6.

The yarding and loading of pulpwod in log lengths involves the use of more mechanical equipment, in many cases standard logging equipment. Specialized yarding equipment such as that used by the Soundview Pulp Company and by the Crown Zellerbach Corporation has been described in Oregon Forest Products Laboratory Bulletin 1.*

It is interesting to know that the Soundview Pulp Company expects to have six of its tubular steel, wheel-mounted yarding towers in use during 1947. One of these towers and a truck-mounted Skagit yarder, usually used in conjunction with a tower, are shown in Figures 7 and 8.

Where several relogging contractors are working in one general area, a company-owned, wheel-mounted crane may be used to load out previously decked logs. The crane shown in Figure*9 can load 50 to 60 cords of salvaged logs per day. This is based on loading conventional log trucks and trailers equipped with 42-inch stakes at the rate of 6 to 8 loads per day, a typical loading rate for small salvaged logs. It illustrates the need for a better method of loading this class of material through preloading, prebundling or some other means. The Crown Zellerbach Company is now experimenting with a system of prebundling 8- to 16-foot salvaged wood. These bundles are light enough to be loaded easily by a motorized crane.

The St. Paul and Tacoma Lumber Company’s salvage of log-length pulp material from old skidder settings differs from others in that salvaged logs are loaded directly into gondola cars. Settings are relogged by a 100 horsepower donkey using the original spar trees and one raised tree between each two original trees. After yarding, a locomotive crane is used to load. The 7-man yarding

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Figure 7. Portable steel tower built for relogging on lands of the Soundview Pulp Co. Contractors may or may not use this company-owned equipment.

crew and 4-man loading crew average 3 to 4 cars (60 to 80 cords) per day.

The Oregon Pulp & Paper Company has adopted a still different method of utilizing salvaged pulp species. While some salvaged wood is brought directly to the pulp mill in log lengths, the company has initiated a program of sawing salvaged logs from its own cut-over lands into 8-foot cants in the woods. In June 1947, the company had one such mill operating near Gates, Oregon, and expected to have two additional mills in operation by July.
Douglas-fir pulpwood. The volume of Douglas-fir to be salvaged for pulp during 1947 may be 80 per cent of the amount of pulp species salvaged—approximately 40 million board feet. It is antici-
Figure 10. A relogging operation at 2,500-foot elevation in Clackamas County, Oregon.

It is anticipated that approximately 75 per cent of this recovered volume will be in the form of wood logs. This volume may be surprising in view of the present limited market for Douglas-fir pulpwod and is indicative of the beneficial effect that expanded sulphate pulp production might have in improving the utilization outlook for partially defective or small Douglas-fir. Thus far, the Crown Zellerbach Corporation's sulphate mills have made the most extensive use of salvaged Douglas-fir for pulp.

Figure 10 illustrates an area at about a 2,500-foot elevation where several species, including a large volume of Douglas-fir wood logs, were being salvaged during the spring of 1947.

The Simpson Logging Company has experimented with a plan of using its salvaged Douglas-fir for sawlogs, pulp logs, or fuel logs, depending upon the quality. Where such integrated utilization is possible, it will improve the chance for a profitable salvage operation.

It should be mentioned that the selection of Douglas-fir wood logs in salvage operations has been far from satisfactory. In order to avoid prejudicing the pulp industry against the use of all wood logs, it is highly desirable to educate choker setters to select only those wood logs that are usable. The present price that pulp companies are offering for wood logs is a reflection of the poor selection which has been exercised during the past two years.

It may be that wood logs will be salvaged only where the user is also the landowner and where the relogger is working on a contract.
basis. Some reloggers should find it advantageous, however, to have the pulp log buyer visit their operations to discuss log selection. The high rate of turnover among choker setters previously nullified attempts to educate these men regarding log selection, but this condition is improving.

**Prelogging pulp species.** Although cedar poles are often pre-logged, only one company is known to be prelogging pulp species. The Weyerhaeuser Timber Company has been testing this system of obtaining the maximum recovery from the hemlock understory on its Vail operation. After several months of operation the company is now recovering 700 to 800 cords per month of small pulp logs (from trees 16 inches or less on the stump) using two 40-foot portable spars and D 7 tractors with double drums (Figure 11) for high lead yarding up to 500 feet. As far as is known, the company has not yet decided whether the additional breakage of the Douglas-fir overstory due to the prelogging will prohibit this type of operation.

**Salvage of material for lumber production.** It is estimated conservatively that 65 million board feet of logs (principally down material) will be salvaged for lumber production during 1947. Roughly 90 per cent of this volume will be recovered from lands

![Figure 11. Double drum tractor and portable spar used for prelogging pulp species by Weyerhaeuser Timber Co.](image)
owned or cut over by the companies doing the relogging, although in a few cases the actual milling will be done on a contract basis. About 30 per cent of the salvaged logs will be sawn in mills located in the woods.

For sawing in the woods two companies will employ sled-mounted log gang mills. The Log Gang Mill Company operating near National, Washington, plans to move its mill into each setting while the Fall Creek Lumber Company operating in Lane County, Oregon, has set its mill on the main road within a mile of its logging operation. Figure 12 illustrates the type of small uniform-sized material available for the Log Gang Mill Company's operation.

Of four other mills sawing salvaged logs in the woods in May 1947, three were employing direct yarding to the mill site while one was trucking logs for short distances to the mill. The Relogging Forest Products Company in Linn County, Oregon, was yarding with tractor and arch direct to the small pond at its sled-mounted double circular mill shown in Figures 13 and 14. The Dwyer Lumber Company was high leading to cold decks along the road with its sled-mounted American Economy mill moving in to each cold deck. The logs shown in Figure 2 were being decked for this mill. Owen Dixon, operating a small mill under contract to the White River
Figure 13. A turn of salvaged logs being direct yarded to the pond of the Relogging Forest Products Company’s sawmill.

Figure 14. The same mill as in Figure 13 showing green chains, sawdust bin, and loads of lumber set on blocks.

Lumber Company of Enumclaw, Washington, was tractor yarding direct to his mill. While this particular mill was only semiportable, Dixon planned to replace it with two circular mills, each mounted on two steel frames for portability on either railroad cars or flat-bed trailers. The Long-Bell Lumber Company’s salvage mill which began operation in June 1947 is built along similar lines. These mills will be used principally along company railroads and will be moved to each relog setting.
Figure 15. Cherry picker built on a GMC 6-wheel drive Army truck for lumber loading and slab disposal.

For use in conjunction with his salvage mill, Dixon has built the cherry picker shown in Figure 15. This machine, which facilitates lumber loading and slab disposal, has proved to be not only less expensive but more flexible than a crane.

The Mt. Jefferson Lumber Company of Lyons, Oregon, has set up its sled-mounted, 8-foot salvage mill on the county road near
its woods operation. This all-electric, double circular mill cuts defective or small logs and produces lumber or cants for trucking to the main mill. Figures 16 and 17 show the pond and interior of this mill.

Opinion among salvage mill operators still varies with respect

Figure 16. Log pond of Mt. Jefferson Lumber Company's salvage mill.

Figure 17. Interior of mill shown in Figure 16.
to the most desirable method of handling salvaged wood and whether or not sawing this material in the woods is the best practice. This is not surprising when the wide variation in conditions is considered. The most important fact is that a number of companies are engaged actively in producing lumber from salvaged logs and that they expect to continue operation. While the lumber market change has seriously reduced the profit in salvage milling, operating experience indicates that additional savings can be made in salvage logging and milling costs. At least two operators are looking forward to the time when the initial logging will leave all small logs for the salvage operation and thus increase the efficiency of each operation. Where the company doing the original logging is carrying on or directing the salvage program there is an increasing appreciation of the indirect as well as direct benefits of closer woods utilization.

FACTORS FAVORING FUTURE SALVAGE OPERATIONS

Despite the loss of a wood log market there are many reasons to expect a large scale continuation of salvage operations, particularly if certain developments in equipment, planning, and usage occur. The anticipated developments are reviewed as follows:

1. An expanded production of sulphate pulp in the region would improve the opportunity to utilize many more number 3 sawlogs, selected wood logs, and small chunks of Douglas-fir. A higher percentage of Douglas-fir may be used for current sulphate production because of the growing demand for paperboard and an increasing knowledge of how the properties of Douglas-fir pulp may be improved by blending with other species.

2. The market for small pulp logs and 8-foot pulpwood should increase now that additional facilities for handling small wood efficiently are being made available at pulp mills.

3. Prior planning will improve the efficiency of relogging operations. Where relogging is anticipated prior to the initial logging, small logs of all grades can be left for the secondary operation and thus improve its profitableness.

4. When relogging operations follow the initial logging closely, the quality and usability of the salvaged material, particularly that of pulp species, will be improved.

5. The growing tendency for pulp mills and other users of salvaged material to own timberlands or to direct the initial logging will continue to improve wood utilization.
6. Continued advancements in the construction of fast, flexible yarding and loading equipment will cut salvage costs.

7. The manufacture of more cut-up stock, or of partially fabricated stock, in this region will permit the improved utilization of low-grade lumber and eventually permit closer woods utilization.

8. A high premium on clear lumber will encourage the utilization of defective logs, even though 50 per cent of the log content may not be usable at the present time.

9. A growing appreciation of the indirect benefits of close woods utilization (reduction of fire hazard and improved regeneration conditions) will stimulate operators to improve utilization on their own lands and will cause public timberland owners to insist on closer utilization.

10. Research and development related to utilization of the material will add to the present outlets.

11. Increasing experience in the logging, milling and use of salvaged material, developed over the past three years, will improve the chance for new ventures to succeed.
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<th>Location</th>
<th>Species used</th>
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<td>Cut in portable gang, company relogging</td>
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<td>Cut in portable gang, direct high lead yarding</td>
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<td>Cut in small mill adjacent to main mill, independent producers</td>
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<td>Relogging Forest Products Co.</td>
<td>Scio, Ore.</td>
<td>Douglas-fir, hemlock, cedar</td>
<td>Logs</td>
<td>Portable mill, direct tractor yarding</td>
</tr>
<tr>
<td>Simpson Logging Co.</td>
<td>Shelton, Wn.</td>
<td>Douglas-fir, hemlock, cedar</td>
<td>Logs</td>
<td>Sawn in main mill or sold, company relogging</td>
</tr>
<tr>
<td>Western Veneer Co.</td>
<td>Sweet Home, Ore.</td>
<td>Douglas-fir</td>
<td>Peeler logs</td>
<td>Company relogging, contract relogging and milling</td>
</tr>
</tbody>
</table>