Cut-To-Length Thinning Techniques

Basic Thinning Methods for Single Grip Harvesters

1. Use about 4 m (13 foot) wide strip roads in the forest to be thinned.

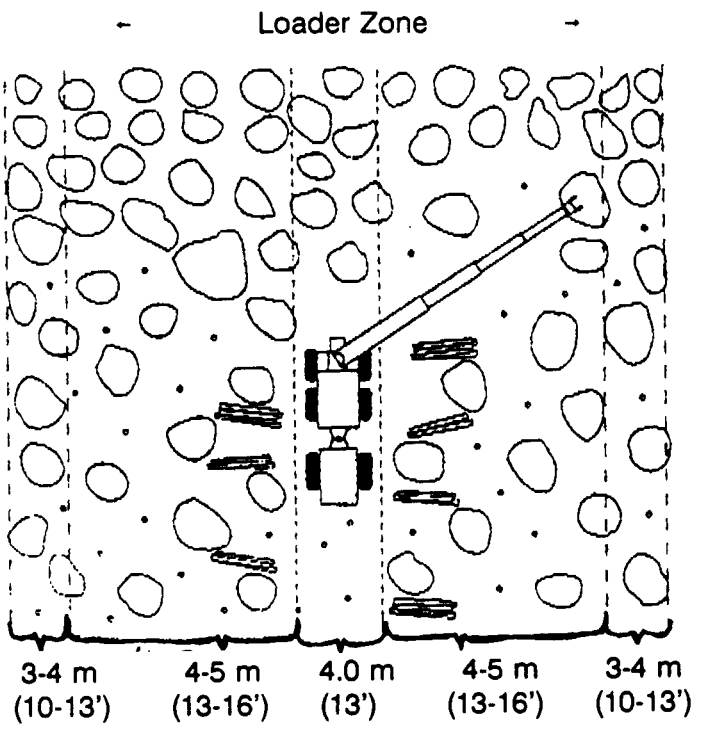
2. Mechanically harvest the loader zone, 4-5 m (13-16 foot) wide, depending on the effective reach of the loader used on the Harvester.

3. Use chain saw felling to harvest a further 3-4 m (10-13 foot) manual zone, felling the trees towards the strip road.

Standard Method For Thinning With The Timberjack 990 Harvester

1. Start by felling the strip road, using about 5 m (16 feet) of the loader reach. Delimb the trees over the strip road in order to create a brush mat to protect the strip road. Lay brushwood and tops against delicate trees and roots so that the forwarder will be able to use an improved trail.

Timberjack 990 Harvester



2. Fell in the loader zone to the right and left. It does not matter which side you start processing on. Try to direct the felling so that processing can begin without moving the tree again. Plan the piling areas for the logs. Choose the felling pattern to keep the engine idling for as short a time as possible. When trees are processed over the road, the next tree can be felled on the other side of the road to minimise driving time and wasted boom movements.

3. The felling direction of saw log trees should be chosen with regard to the sorts needed, since it is often difficult to rearrange them after felling because they are heavy.

4. If possible, start with the secondary pulp wood sort so that it lies under the main sort; this makes forwarding easier and loading faster.

   If possible harvest groups of trees of the same species together, then the next species.

   Sorting by product in thinnings is difficult for the Harvester and increases the risk of damage to residual trees. The forwarder is the less expensive machine in the thinning system so the main bulk of sorting should be left to it.

Cut-To-Length Thinning Techniques

Basic Thinning Methods For Single Grip Harvesters

Start by processing area #1 ahead of the machine to create the strip road.

- Open up a strip road width of about 4 m (13 feet), depending on bends and side slopes. Note the strip road must be wider on side slopes to allow passage of the forwarder and avoid damage to the residual trees.

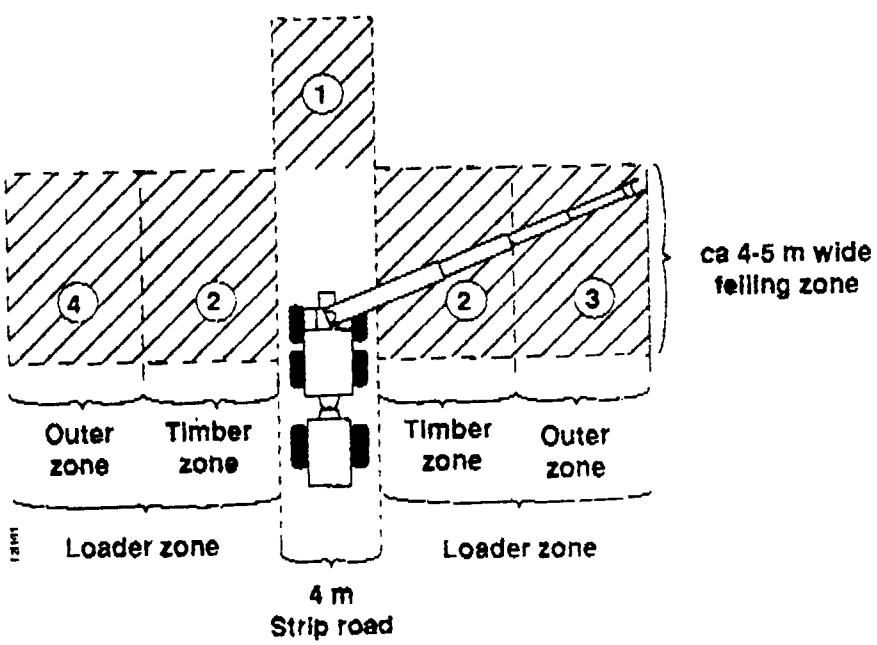
Then process timber zones #2

- Plan the collection points for the log and pulpwood piles.
- Process the trees over the road and put the logs on the opposite side from where they were felled.
- To minimize wasted time with the loader you should take trees alternately from each side of the road.

Finish by processing "outer zones" #3 and #4 (which you can now see more clearly)

- If possible start farthest out in each area.
- Process on one side of the Harvester at a time from each set-up point. Fell the trees away from the harvester.
- Pull the trees back and process them toward the strip road while laying the logs on the same side of the Harvester that the trees were felled on.

FMG 990 Single Grip Harvester



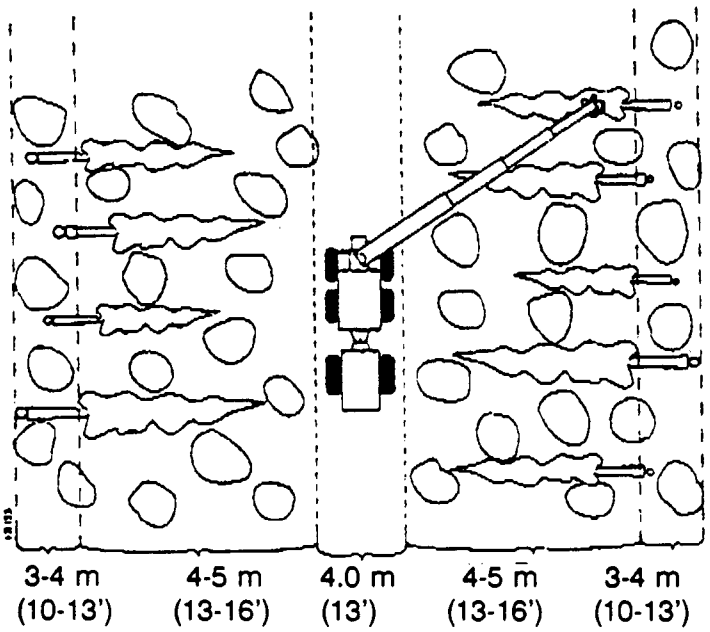
Cut-To-Length Thinning Techniques

Processing Manually Felled Trees in a Thinning

1. Always manually fell the trees at right angles towards the strip road.

2. Fell trees parallel to each other. Avoid felling in bunches. Lots of trees together in a bunch increases dragging damage, makes it difficult to pick up the trees, and increases the risk of the Harvester breaking off the tops and dropping the trees.

FMG 990
Processing Manually Felled Trees

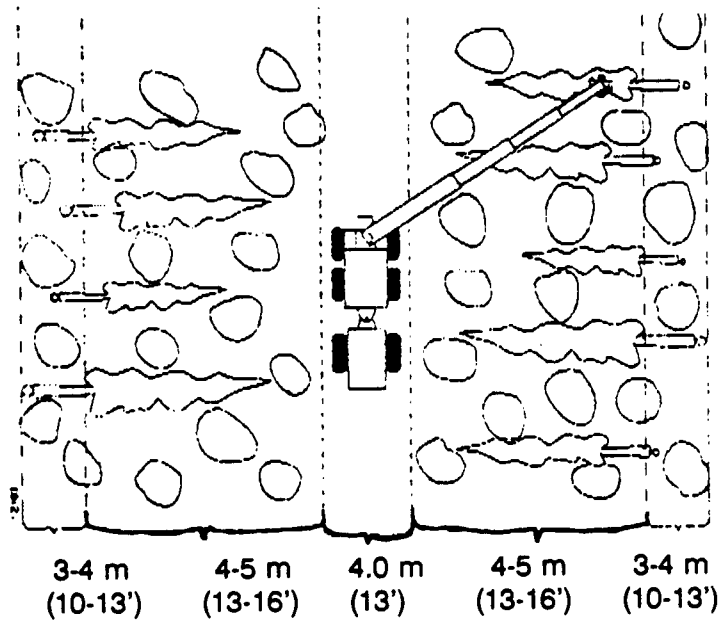


3. Random log lengths can be cut from the top.

4. Process the tops over the strip road to create a better brush mat.

5. Make the first cut from the top short. Plan cross-cutting of saw logs to get the best value from each tree.

6. Lay processed wood by the nearest processed pile. This reduces the forwarder's effort and the risk of damage to residual trees.



If the trees are tall enough, motor manual felling can be carried out toward every other strip road since the entire motor manual zone can be felled toward one strip road.

Cut-To-Length Thinning Techniques

SILVICULTURAL EFFECTS

1. **Strip Roads**

- Always mark the strip roads. At least two markers should be visible from the harvester cab at any given time. This is to make the driving direction clear. Strip roads through thinnings should be straight. Some winding to follow the landscape can be tolerated.

  In areas of high public visibility, angling the strip roads after one machine length can reduce the visual impact of uniform strip road spacing in a forest.

- Keep the width of the strip roads to about 4 m (13 feet). On side slopes and around turns and obstacles the width must be increased above 4 m (13 feet). Adjust the strip road width to suit the harvester and forwarder capabilities.

- Number the strip roads along the way and on a map of the area.

- If possible keep the maximum length of logs produced to 5 m (16 feet). This reduces the sweep area of the log and reduces the risk of striking a residual tree.

- On sensitive and prime sites, where possible, create strip roads across the forest, connecting two truck roads, so that the forwarder can drive down one strip road and unload then drive back and unload on the other truck road to avoid excessive and repeated travel.

Thinning Prescription - thinning down to the correct number of stems per area

1. Choose the main stems to leave, evenly distributed and of the right tree species.

In Order of Priority

2 a) Remove damaged, dead or forked trees

b) Remove poorly formed and slow growing trees.

c) Remove hardwood and/or the least valuable species.

d) Thin out the residual species to give an even distribution.

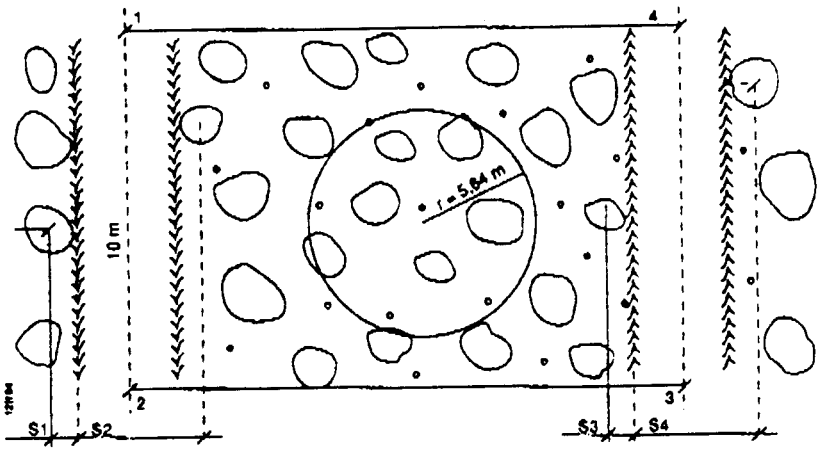
Cut-To-Length Thinning Techniques

POST THINNING CHECK

To confirm that you are achieving the thinning prescription make your own test plots.

Check For: strip road spacing
strip road width
the number of trees damaged by forwarder, harvester
the strip road track depth
the basal area or number of residual trees per area

Strip Road Spacing



A) Position the corners of your test plot in the middle of the stand between two strip roads. Measure 10 m from corner 1 to corner 2. From corner 2, measure the perpendicular distance to corner 3. Measure 10 m to corner 4. Then measure the distance from corner 4 to corner 1. The corners can be marked with ribbon or spray paint.

Distance (2 to 3 + 4 to 1)/2 = the average separation of the strip roads.

B) Measure the distance from the middle of one set of tracks to the nearest trees on the right and left within the 10 m stretch.

(S1+S2+S3+S4)/2 = the average width of the strip road

C) Count up the total number of stems and the number of damaged stems inside the plot.

(Number damaged)/(Total number) x 100 = percent damaged (maximum 5% tolerated.)

D) The number of stems/hectare can be calculated in a circular test area having a radius of 5.64 m (use a string or tape measure), which gives you an area of 100 square meters or 1/100 of a hectare.

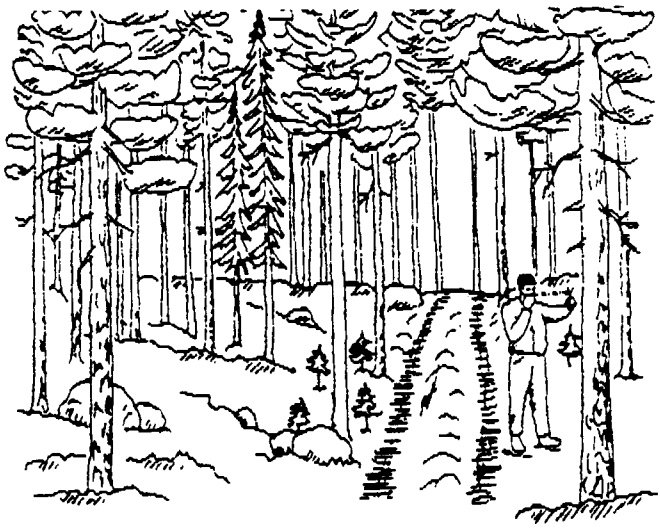
Multiply the number of trees in the circle by 100 = this gives the approximate number of trees/hectare. Example: 14 trees inside the plot means a density of 1400/hectare.

E) The number of stems per acre can be calculated as above using a test circle with a radius of 11.78 feet representing 1/100 of an acre. Example: 7 in the plot = 700/acre (or count the trees in a circle 37.24 feet in radius and multiply by 10).

F) If the ground is soft the strip roads should be carefully covered with brush and the track depth after completing the thinning should not exceed 10 cm (4 inches).

Cut-To-Length Thinning Techniques

GROUND INVENTORY USING A RELASCOPE



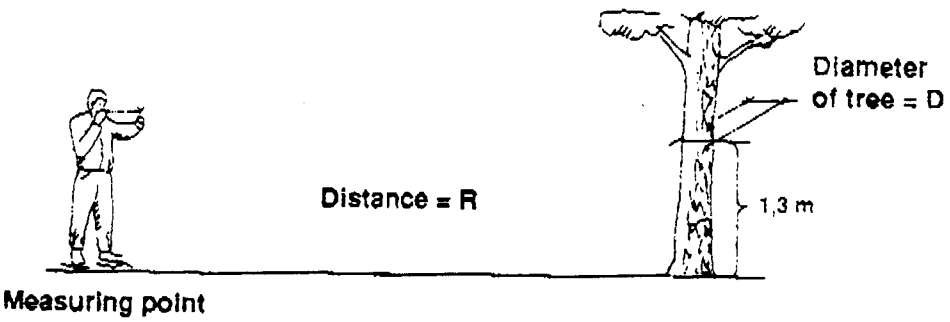
Relascope measurement can be carried out from the edge of a strip road inside the test area. First count all of the trees in a half circle from the edge of the road into the test area, then cross the road and measure another half circle on the other side of the road. Point the relascope at the trees at breast height (DBH) (1.3 metre) and count each tree that appears within the sights.

Some trees may be on the borderline. In theory you should count every second such tree. If you are unsure about borderline cases then they can be checked using a measuring tape and callipers.

Every tree which has a diameter (D) at breast height that is equal to or larger than the distance (R) between the measuring point and the tree divided by 50 should be counted. D = > (R / 50) means a tree to count.

Example:

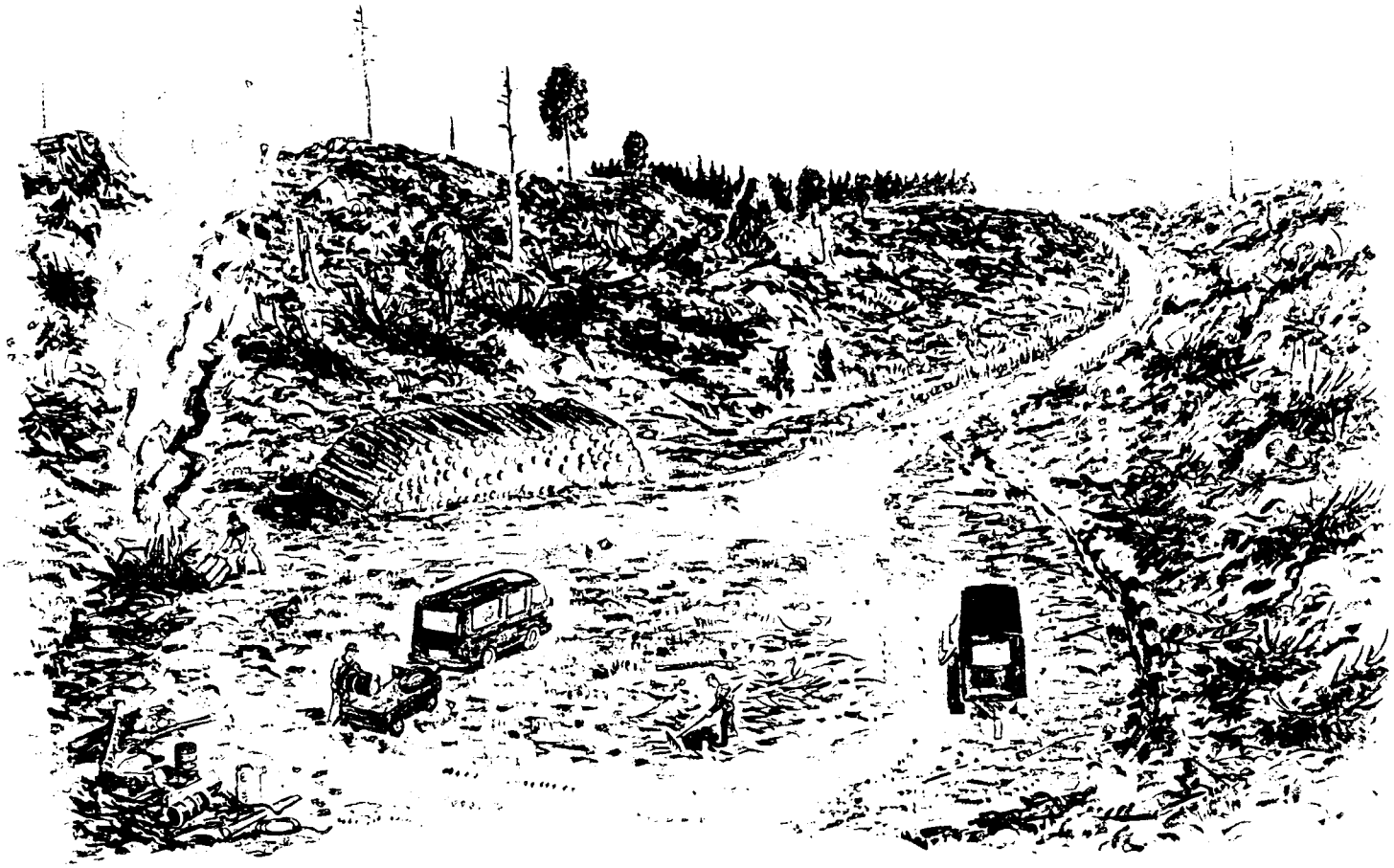
At a distance (R) of 17 m, any tree that has a diameter (D) at breast height of 34 cm or greater should be counted. (17 m/50 = 0.34)



The number of trees within the two half circles that fill the sights of the relascope = an estimate of the basal area/hectare.

Cut-To-Length Thinning Techniques

DON'T LITTER



CLEAN

Clean up and remove all your garbage -empty oil cans, rags, paper, grease tubes, etc.

FUEL AND OILS

Don't leave fuels and oils on or in the woods. Be conscious of fuel pollution.

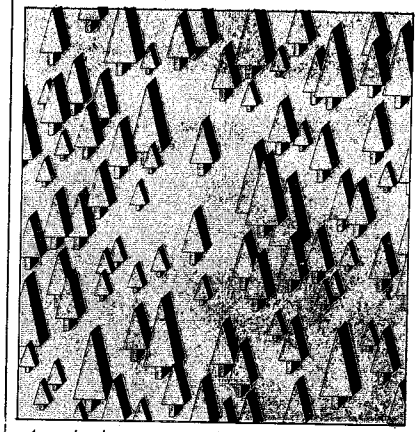
THINK ABOUT THE ENVIRONMENT

FMG Timberjack Inc.

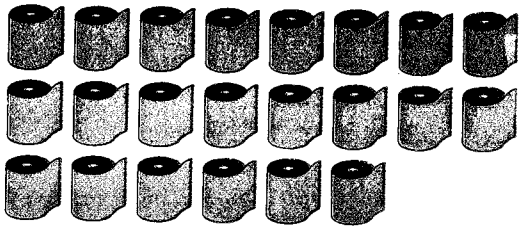
A COMPARISON OF THE YIELDS ON 40 ACRES OF RED PINE AT POTLATCH

CLEARCUT AFTER 70 YEARS VERSUS 3 THINNINGS AND A FINAL HARVEST

Unmanaged



A typical unmanaged, natural 40-acre red pine site is normally harvested after 70 years. No thinning is done prior to final harvest.



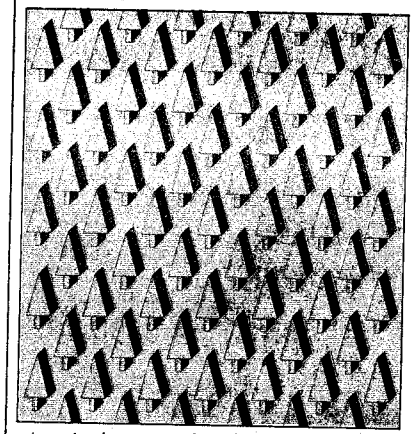
Yield: 330 tons of paper (or 392 cunits of pulpwood).

Yield: Enough framing lumber to make 35 houses—based on a 2,000 square-foot, single-family home with attached two-car garage. (Or 288,000 board feet of 2x4 studs. No other lumber is produced.)

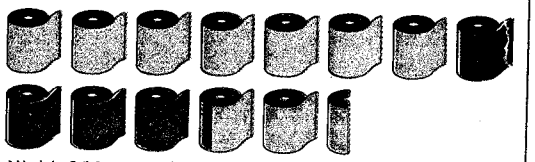
Unmanaged Forest - Production harvested from 40 acres after 70 year rotation.
Yield - 392 cunits of pulpwood
- 288,000 FBM, (enough 2"x 4" lumber to frame 35 houses) or 480 cunits of logs

Total - 872 cunits or 21.8 cunits/acre

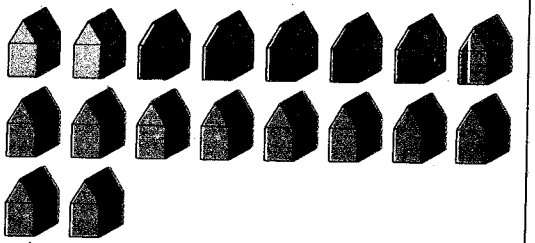
Managed



A typical managed Potlatch 40-acre red pine plantation has about 300 trees per acre and would be thinned at 40, 50 and 60 years, with final harvest at 70 years.



Yield: 203 tons of paper (or 240 cunits of pulpwood).



Yield: Enough framing lumber to make 162 houses (or more than 1.3 million board feet of lumber).

Represents 15 tons of paper.

Represents 9 houses.

Yield at 40 years.
Yield at 50 years.
Yield at 60 years.
Yield at 70 years.

Managed Forest - Production from 40 acres with thinnings at 40, 50, 60 years, final felling at 70th year
Yield - 240 cunits of pulpwood
- 1,300,000 FBM of lumber (enough framing for 162 houses) or 2167 cunits of logs

Total - 2407 cunits or 60 cunits/acre

The total yield after three thinnings and a final felling is 2.75 times more wood produced than a single clearcut after 70 years of growth. Dramatic evidence that thinning is a sensible and productive forest management treatment.

If a mill relied only on clearcut harvesting they would have to cut 110 acres of land to yield the same wood volume produced by thinning on 40 acres.

Tim J. White

TW/st/REDPINE