

## **Module 5 – FOREST PRODUCTS AND HARVEST**

### 1. Products

- a. Read “Forest Products”
- b. Look at “Processing Streams for Wood”

### 2. Timber Harvest

- a. Look at “Timber Harvest in CA – 1978 to 2017”
- b. Read “Logging Method – Ground”
- c. Read “Logging Method – Mechanical”
- d. Read “Logging Method – Cable”
- e. Read “Logging Method – Helicopter”
- f. Watch “Tahoe Forest Restoration” (3:34) illustrating the mechanical harvest method with mastication and biomass components. Filmed and edited by Samuel Neill, son of Diane Dealey Neill, seen in cab at 0:37.

<https://www.youtube.com/watch?v=ogacigtPC9o>

# **WHAT PRODUCTS COME FROM TREES?**

There are over 5,000 forest products people use daily in their lives.  
Here are a few examples:

## **SOLID WOOD PRODUCTS**

- Structural Lumber
- Furniture
- Doors
- Musical Instruments
- Baseball Bats

## **PAPER PRODUCTS**

(from cellulose, the predominant component of wood – it makes up 40% of the total weight)

- Paper
- Kites
- Newspaper
- Product labels
- Paper towels
- Postage stamps
- Milk cartons

## **BARK OF TREES**

- Cork
- Cinnamon spice
- Shoe polish
- Cosmetics
- Pharmaceuticals

## **TORULA YEAST**

(yeast fermented from spruce wood)

- Baby foods
- Bread
- Commercial baked goods
- Imitation bacon
- Breakfast cereals

## **CELLULOSE**

(fibrous or structural unit of wood made up of polymers, cellulose, hemicellulose, lignin and cellulose acetate)

- Rayon
- Plastic packaging
- Toothpaste
- Nail polish
- Photographic film
- Artificial sponges
- Artificial vanilla flavoring
- Hair spray
- Sausage casings

## **WOOD DERIVED CHEMICALS**

(tree oils, resins, lignin and conipheryl-alcohol)

- Pine oil
- Turpentine
- Rosin-based adhesives
- Asphalt additives
- Epoxy additives
- Emulsifiers

## **OTHER PRODUCTS FROM THE FOREST**

(non-wood/non-paper products)

- Fruits
- Nuts
- Mistletoe
- Carnauba wax
- Electricity (from biomass)

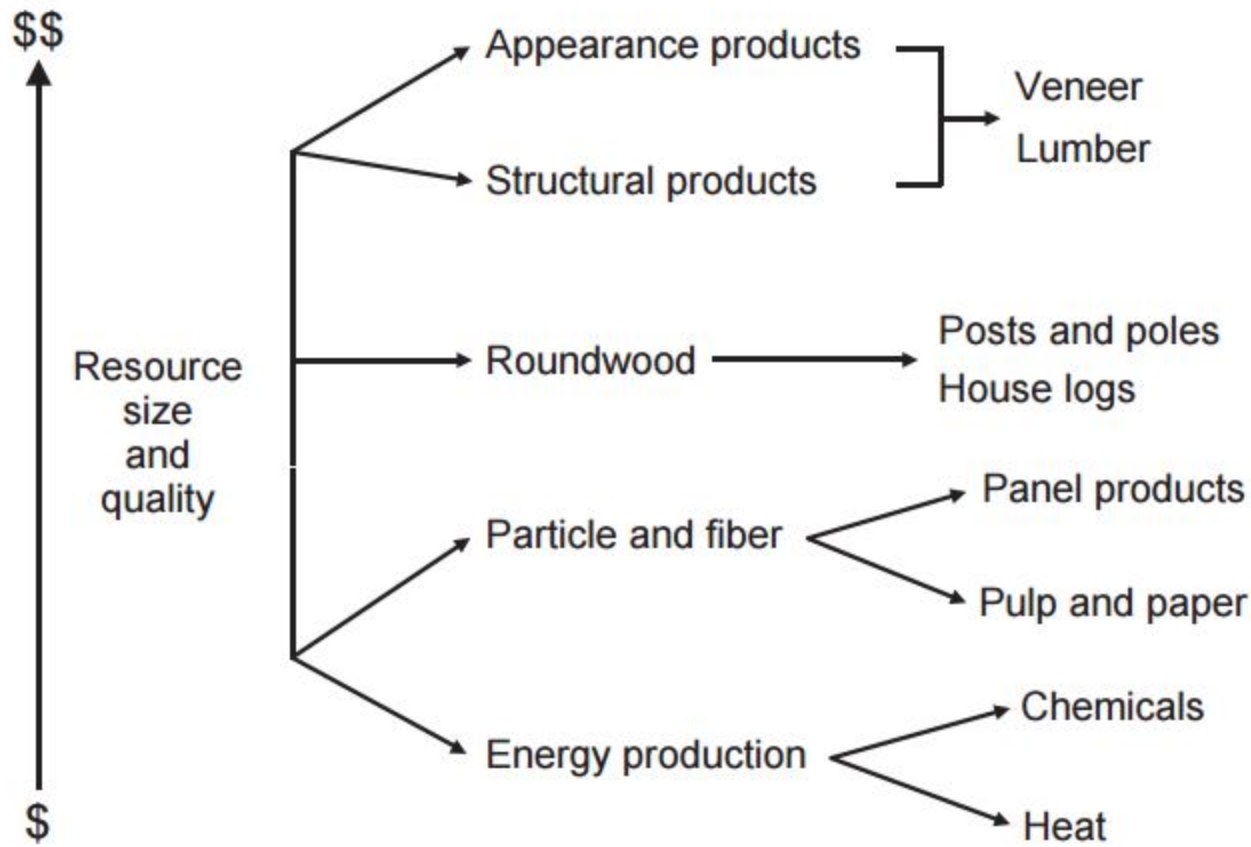
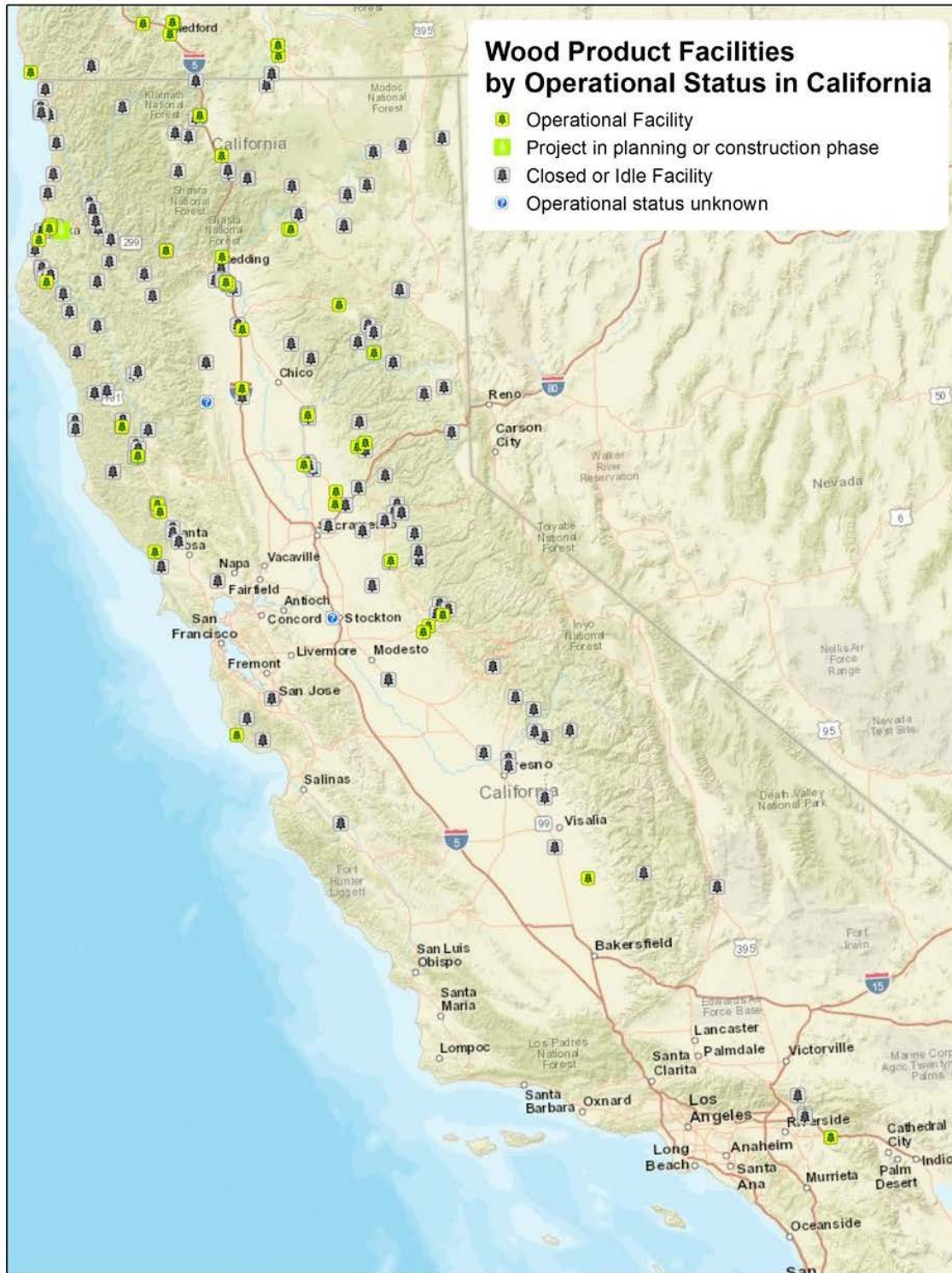


Figure 13—Typical processing streams for wood based on resource size and quality, starting with smaller, lower value at base and increasing in value toward top (vertical axis).



The map above shows the location of closed or idled wood product facilities, along with operational or planned facilities (as of June 2017). Formerly active sites offer unique opportunities for redevelopment due to their proximity to abundant forest resources and existing infrastructure (transportation, electricity, communications). The facilities labeled “closed or idled” date to 1971.

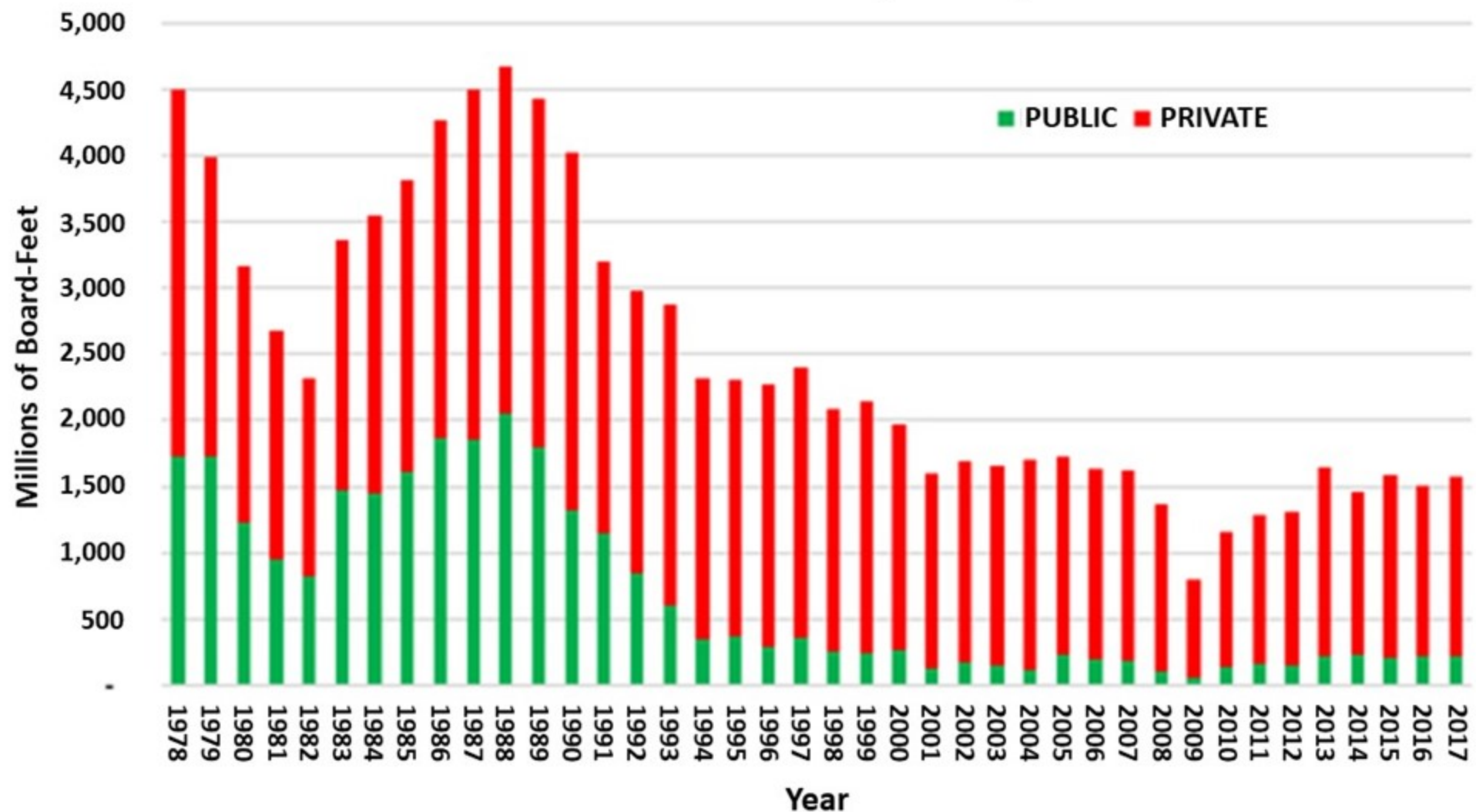
## APPENDIX C: ASSOCIATE'S DEGREE AND CERTIFICATE PROGRAMS

Associate's degree and certificate programs for forestry, forestry technician, and wood products technology at California community colleges include:

- *Bakersfield College*, Certificate of Achievement, A.S. Degree, and A.A. Degree in Forestry; Engineering and Industrial Technologies Certificate of Achievement in Woodworking & Cabinetmaking; and Engineering and Industrial Technologies A.S. Degree in Industrial Technology: Woodworking & Cabinetmaking
- *Cerritos College*, Engineering and Industrial Technologies A.A. Degree in Woodworking Manufacturing Technologies; and Engineering and Industrial Technologies Certificate in Woodworking Manufacturing Technologies
- *Citrus College*, Certificate of Achievement in Wildland Resources and Forestry
- *College of the Redwoods*, A.S. Degree in Forestry Technology; Certificate of Achievement in Forestry Technology; and Engineering and Industrial Technologies Certificate of Achievement in Fine Woodworking
- *Columbia College*, A.S. Degrees in Forestry Technology, Forestry Technology (Occupational), and Watershed Management Technology; and Certificates of Achievement in Forestry Technology and Watershed Management Technology
- *El Camino College*, Engineering and Industrial Technologies Certificate of Achievement in Construction Technology – Cabinet and Fine Woodworking; and Engineering and Industrial Technologies A.S. Degree in Construction Technology – Cabinet and Fine Woodworking
- *Fullerton College*, Engineering and Industrial Technologies Certificate of Achievement in Cabinetmaking and Millwork Technology
- *Laney College*, Engineering and Industrial Technologies Certificates of Achievement in Mill & Cabinet Maker Apprenticeship and Wood Technology
- *Long Beach City College*, Engineering and Industrial Technologies Certificate of Achievement in Wood Products Manufacturing; and Engineering and Industrial Technologies A.S. Degree in Wood Products Manufacturing
- *Palomar College*, Engineering and Industrial Technologies A.S. Degrees and Certificates of Achievement in Cabinetmaking and Millwork; Carving Technology; Case Furniture Construction/ Manufacturing; Lathe Turning Technology; Table and Chair Manufacturing; Veneering Technology; and Woodworking Skills Technology
- *Modesto Junior College*, A.S. Degree in Forestry; and Certificate of Achievement for Forestry Technician
- *Reedley College*, A.S. Degree in Forestry/ Natural Resources; and Certificates of Achievement in Forest Surveying Technology and Forestry Technician Firefighting Emphasis
- *San Joaquin Delta College*, Engineering and Industrial Technologies Certificates of Achievement in Mill Cabinet Technology and Apprenticeship: Mill Cabinet Technology
- *Santiago Canyon College*, Engineering and Industrial Technologies Certificates of Achievement and A.S. Degree in Apprenticeship: Carpentry, Millwriting
- *Shasta College*, A.S. Degree in Forest Science and Technology



## VOLUME-ALL TIMBER (MMBF)



\*PUBLIC is timber removed from local, state, and federal government lands. It does not include timber removed from tribal lands.

## **LOGGING METHOD:**

### *Ground*

1. A “faller” uses a chainsaw to cut trees down, “buck” the logs into lengths that will fit on a log truck, and removes the limbs and top.
2. Specialized tractors, called “skidders”, are used to move cut trees or sections of trees from the site where they were dropped to a landing (or collection) site.
3. Skidders can have rubber tires or tracks. Some track skidders are designed to minimize soil compaction.
4. The logs are attached to the skidder either by:
  - a. A cable hooked to the skidder that is tied around one or more logs (a “choker”); or
  - b. The skidder can be equipped with a grapple to pick up one end of the log(s).
5. Logs generally are skidded down a slope or on flat ground. Skidding is best done straight down the slope, as skidding across a hill can cause the logs to roll down the slope and damage remaining trees (the residual stand). Skidding uphill (adverse skidding) can increase soil disturbance and compaction and can put additional strain on equipment.
6. Skidders need room enough to move off the landing after logs are unhooked. This is easiest to do if the landing has an entrance at one side and an exit on the other.
7. Advantages of ground logging compared to other methods include:
  - a. Lower operating costs on favorable terrain, and lower investment costs for equipment;
  - b. Smaller crew needed for an efficient and successful operation; and



- c. Can be operated efficiently where a small number of trees are being harvested per acre.
- 8. Disadvantages of ground logging compared to other methods include:
  - a. Not a good system on wet or easily compacted soils;
  - b. Limited capacity to yard (move trees) uphill; and
  - c. Requires more landing sites than other methods.

## **Logging Method:**

### *Mechanical Harvesting*

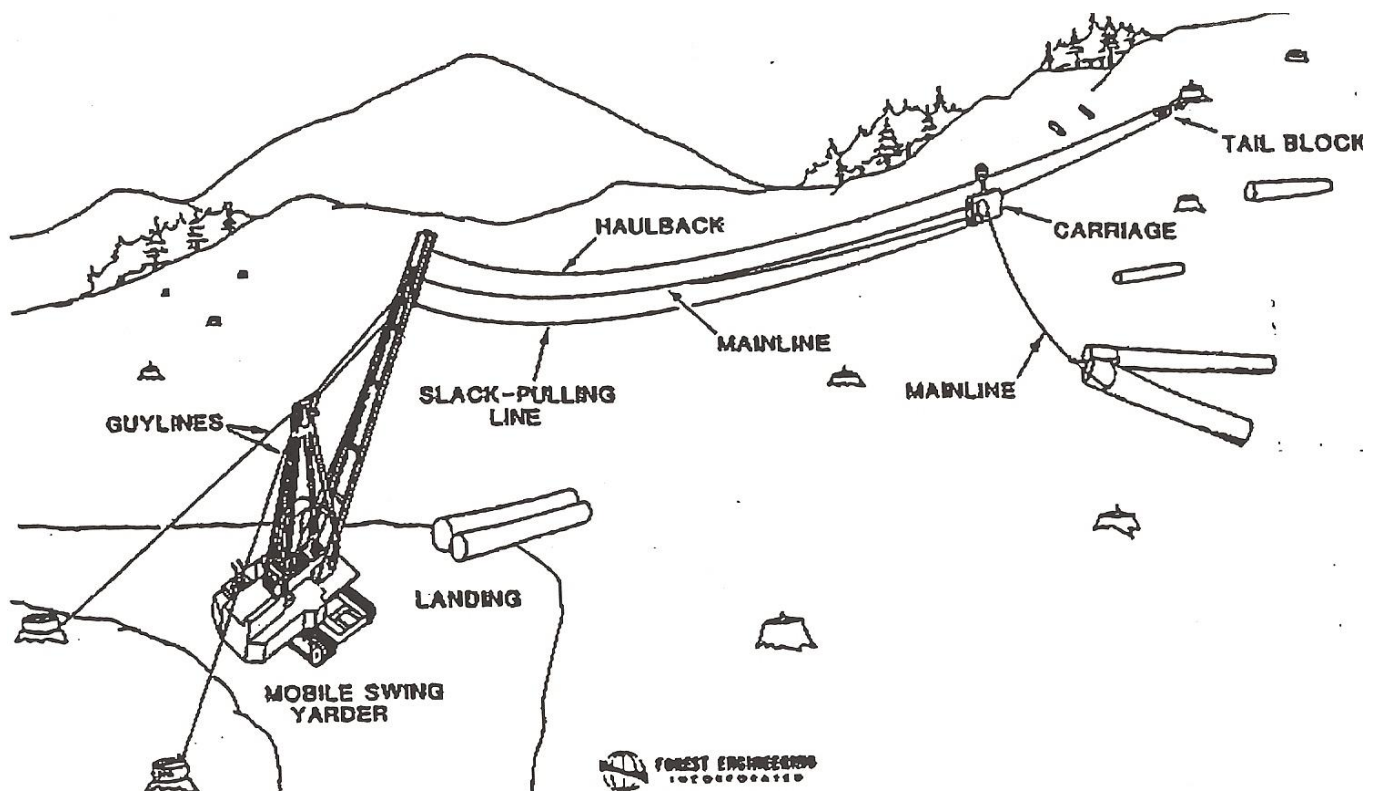
1. “Mechanical” harvesting is a term used to describe logging that utilizes a set of machines to cut the tree and manufacture logs from the cut tree. It differs from traditional tractor logging in several ways.
2. A cutting machine called a feller-buncher is used to cut the tree down, rather than falling the tree by hand with a chainsaw.
3. After the tree is severed, the feller-buncher can hold the tree in a vertical position, move around, and set the tree down, allowing several cut trees to be placed together in a “bunch”.
4. By orienting this “bunch” of trees to point to the landing or skid trail, the next step in the operation, pulling the logs to the landing, becomes much more efficient.
5. This “skidding” is similar to traditional cat logging, in that a skidder or cat is used to pull the logs to the landing. Mechanical harvesting is more efficient because the “bunch” of trees is already prepared for the skidder. In traditional logging each log has to be oriented and bunched together by the skidding machine before transport to the landing.
6. In traditional logging, the tree is manufactured into several logs where it was felled, and the unusable portion of the top left in place. In mechanical logging the tops and limbs are not severed before reaching the landing. This is termed “whole tree yarding”.
7. At the landing, a machine called a dangle head processor cuts the tree into logs after its laser and computer system calculates the optimum length of logs to cut from the tree. While doing so it strips the branches, or “delimbs” the tree. The tops and limbs are separated into a pile, apart from the logs.
8. The logs are then loaded onto a log truck in the same manner as traditional logging.
9. Some advantages of mechanical harvesting are:
  - a. Better control of the tree during cutting allows for less damage to the remaining trees.
  - b. The tops and limbs come into the landing, reducing the residual fuels in the logged area.

- c. In areas with viable chip or fuel markets, the accumulated slash and tops may be economically transported and utilized for paper pulp or generation of electricity.
  - d. Fewer people are needed to run the operation, and it is generally more productive.
10. Some disadvantages of mechanical harvesting are:
- a. It takes a very large landing, usually at least  $\frac{1}{2}$  acre, to accommodate the operation and the residual slash pile.
  - b. There are limits to the size of tree that the feller-buncher can handle.
  - c. The basic machinery is expensive compared to traditional cat logging.

## **LOGGING METHOD:**

### *Cable*

1. A series of towers and cables are used to yard logs to a landing for loading onto a log truck.
2. A variety of tower types (“head spars”) are used depending on the slope and the distance the logs need to be yarded. The cable systems used in California are the Running Skyline or Standing Skyline systems.
3. The cable is attached to the head spar at one end and the tail block at the other.
4. If the cable is stretching a great distance, a tree can be used at a point midway between the head spar and tail block to hang the cable. This tree is called a lift tree.
5. Guylines are ropes used to support head spars and tail blocks.
6. Advantages of cable logging systems compared to other methods include:
  - a. Ability to yard logs on steep terrain;
  - b. Lower operational costs than helicopter logging; and
  - c. Relatively low soil disturbance due to the fact that the logs are partly or entirely suspended while being yarded.
7. Disadvantages of cable logging systems compared to other methods include:
  - a. Complex equipment to set up and maintain;
  - b. Limited range for yarding once head spar and tail block are set up at one site; and
  - c. Difficult to use unless clearcutting, as the remaining trees can be easily damaged by the logs being yarded to the landing.
8. Cable logging is the method seen on the Discovery Channel program “Axe Men”.



## **LOGGING METHOD:**

### *Helicopter*

1. Helicopters with adequate power can be used to carry logs from the forest to the landing. A crew on the ground in the woods selects and places chokers on each load of hand-felled trees. When the logs are set down at the landing, the load is released automatically.
2. Radio communications are maintained between air and ground crews to make the operation safe and efficient.
3. It is important to strive to make each load of logs approach the helicopter's carrying capacity without exceeding it to make the use of helicopters cost effective. The ground crew is responsible for selecting the correct combination of logs for each load.
4. To maximize the log carrying capacity of the aircraft, a full fuel load is not carried. Refueling is done at pre-set intervals without shutting down the helicopter's engine(s).
5. Advantages of Helicopter logging compared to other methods include:
  - a. Access to harvest sites with steep slopes, rugged terrain, and limited roads;
  - b. Minimal soil disruption of residual vegetation and soil; and
  - c. Ability to move (or "yard") the logs a longer distance to the landing.
6. Disadvantages of helicopter logging compared to other methods include:
  - a. High cost due to the purchase, fuel, and maintenance costs for the helicopter(s);
  - b. Frequent work stoppage due to bad weather, such as poor visibility or high winds; and
  - c. Minimal soil disturbance. Soil disturbance after a fire can be beneficial to break up surface crust and mix the soil before new trees are planted.