

Financial Considerations in Forestry: How To Manage Your Forest to Grow Money



A Presentation for The North Carolina Forest Products
Cooperative Marketing Project

Presented by:
The North Carolina Division of Forest Resources



Important Questions to Answer

- How is the financial value of timber determined?
- How do you know when your timber is mature?
- What are important management considerations to make prior to maturity, and following maturity
- What considerations should be made when you decide to sell your timber

How is the financial value of timber determined?

Stumpage Value

- the per unit price paid to the landowner by the buyer

How this works...



www.cnr.vt.edu/dendro/epa/nroak



www.tigercat.com



www.logging-trucks.com



www.partonlumber.com

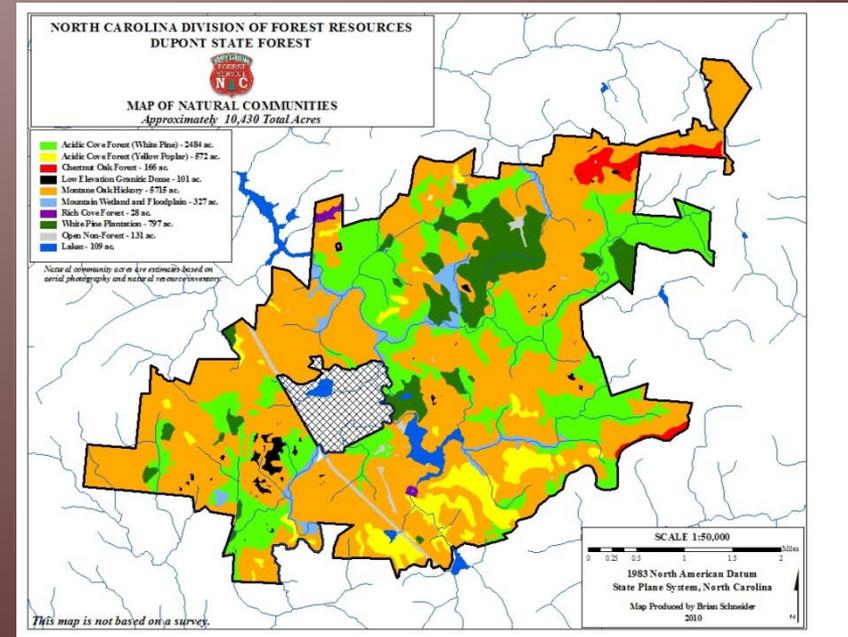
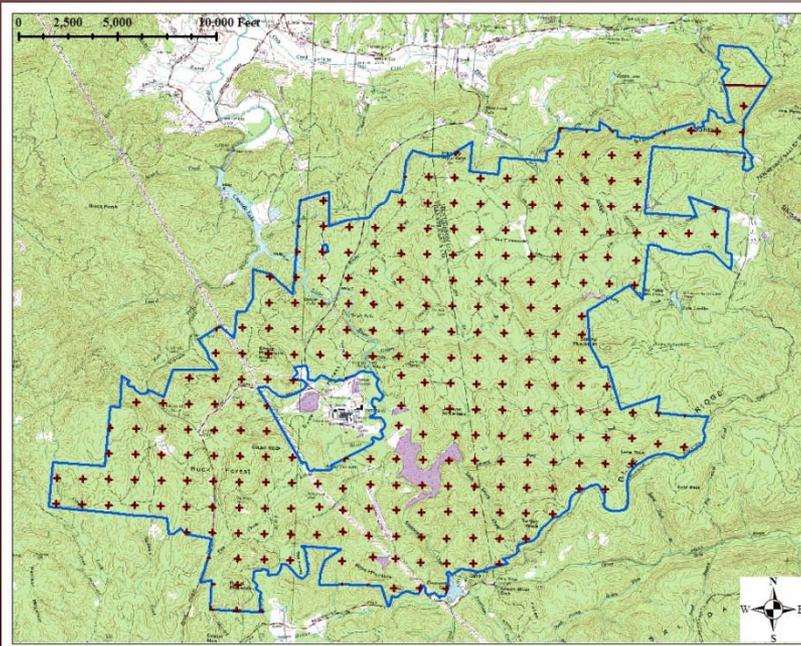
Value of product less the cost of retailing, processing, transporting, and harvesting

Valuation requires...

- a scientifically sound measure of tree volume and their product class across the property...timber cruise or forest inventory
- an assignment of stumpage value by product (i.e. veneer, sawlog, pulpwood) taking into consideration...
 - The current price being paid at the mill
 - The cost of trucking based on distance of property from mill
 - The cost of logging based on operability constraints, equipment needs, volume to harvest etc.

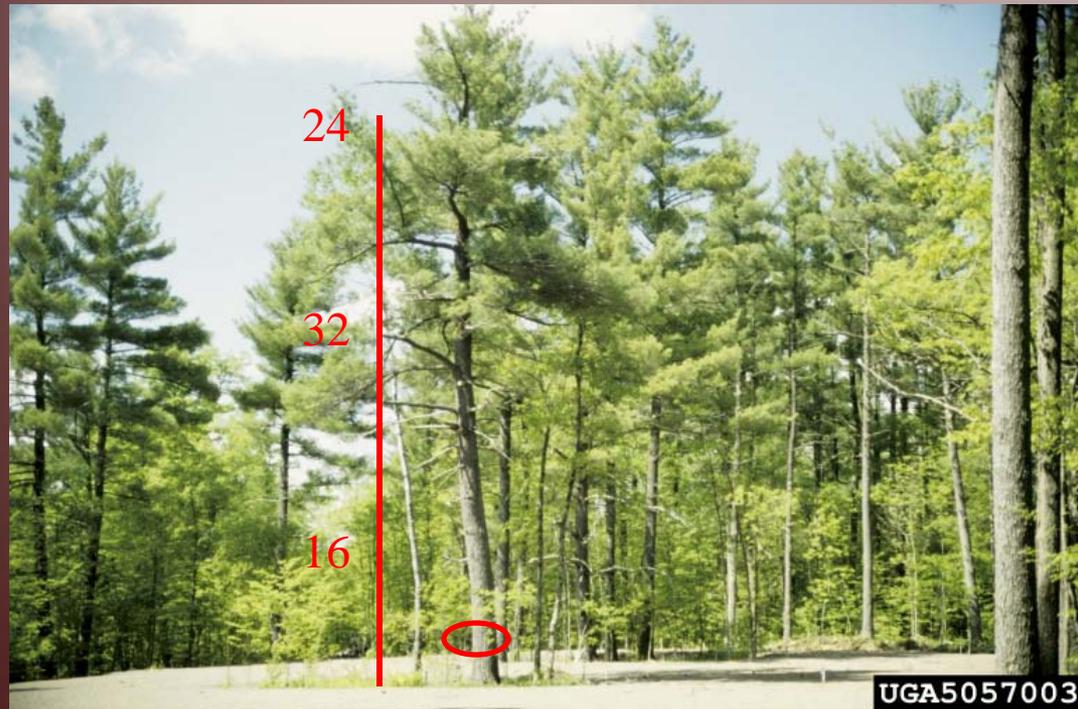
How a timber cruise is conducted

- A statistical sample is taken to approximate volume within an acceptable level of error
- Number of sample points (plots) determined by variability of stand(s)



How a timber cruise is conducted (Cont.)

- At each sample point data is taken...



Joseph O'Brien, USDA Forest Service, Bugwood.org

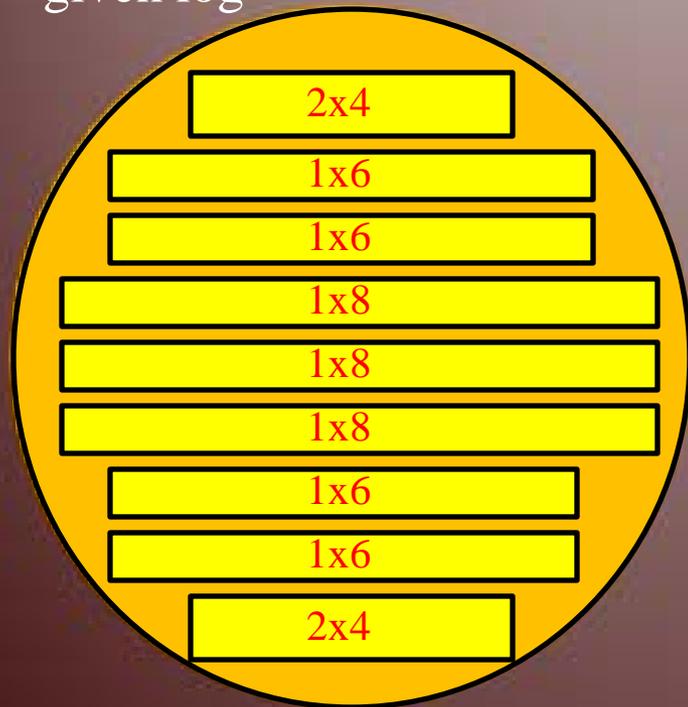
- Tree species (white pine)
- Diameter at 4.5' (16")
- Height by product class
(16' grade 1 sawlog,
32' grade 2 sawlog
24' pulpwood)

- This continues for every tree in the plot
- Volume calculated by species and product for each plot
- Volume expanded based on how much stand area plot represents

How is volume measured?

Sawtimber is most commonly measured in board feet (1 ft. x 1 ft. x 1 in.) as determined by log rule.

- *Log rules* estimate the number of board feet of lumber that will be cut from a given log



Log rules vary...know what is being used!

Common log rule estimates of a 14 in. DBH tree with 38 merchantable feet

- Doyle log rule (75 bd. ft.)
- Scribner log rule (115 bd. ft.)
- International $\frac{1}{4}$ in. log rule (130 bd. ft.)

Pulpwood is most commonly measured in tons and cords. A standard cord is a stack of wood 4 ft. high, 4 ft. wide, and 8 ft. long

We know the volume...Now what?

Apply estimated stumpage rates to the volume calculated for each product:

Sawtimber (International 1/4 in.)				
Species	Grade	Volume (BF)	Stumpage Value per MBF	Total Value
Yellow Poplar	1	3,200	300	960.00
	2	10,500	175	1,837.50
Scarlet Oak	2	8,720	125	1,090.00
White Oak	1	2,650	450	1,192.50
	2	7,200	250	1,800.00
	3	9,560	100	956.00
White Pine	2	30,250	175	5,293.75
				13,129.75

Pulpwood (Cords)			
Type	Volume	Stumpage Value per cord	Total Value
Hardwood	350	5	1,750.00
Softwood	500	3	1,500.00
			3,250.00

How does a forest grow money?

The price of stumpage has historically increased over time

- Mixed hardwood sawtimber stumpage values in western NC...
 - 1976 (30.00 dollars/MBF)
 - 1986 (61.00 dollars/MBF)
 - 1996 (109.00 dollars/MBF)
 - 2006 (205.00 dollars/MBF)
 - 2010 (162.00 dollars/MBF)

Physical growth and In-growth

- As trees grow, volume increases...but there can also be substantial per/unit value increases as trees grow from one grade and size class to another

When a 14 in. white pine log grows into a 16 in. white pine log it is more valuable because there is more volume...that's physical growth

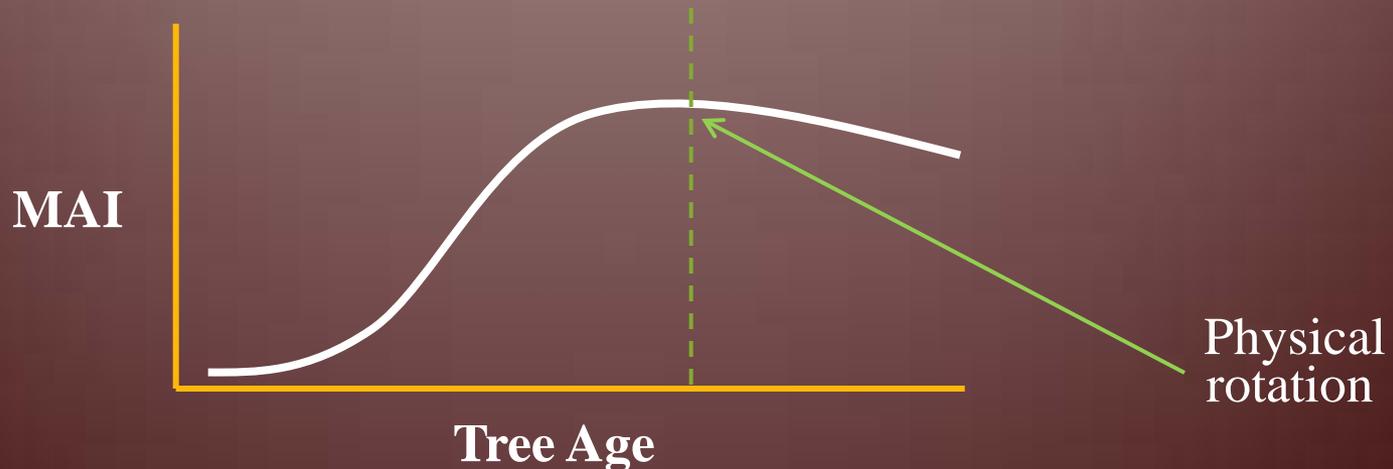
When a 16 in. white pine log grows into an 18 in. white pine log it is more valuable not only because there is more volume, but because the MBF price paid at the mill is higher for a log in that size class...that's in-growth

How do I know when my forest is mature?

The two primary “rotation” types for financial consideration...

Physical rotation age:

- Maximizes physical yield of wood
- Is reached with the culmination of mean annual increment (MAI)
- MAI refers to the average annual growth of the tree up to a given age in terms of a chosen measure of yield (bd. ft., cords, tons...)



How do I know when my forest is mature? (cont.)

Financial rotation age:

- Maximizes financial value based on an acceptable rate of return (i.e. an interest rate of 5%)
- Is reached when the stumpage value could earn more in an alternative investment based on the chosen interest rate
- Analysis requires growth rates, an estimate of stumpage value, an interest rate and time frame

Thinning Harvests vs. Regeneration Harvests

Thinning Harvests (conducted prior to maturity):

- Harvesting initiated to tend to the existing stand
- Opportunities to improve quality, health, and value of stand
- Can reduce the time it takes to get stand to final rotation age
- Can provide periodic income

Regeneration Harvests (conducted once mature):

- Harvesting initiated to establish a new stand, or new trees in a portion of a stand
- Timing is dictated by ecological factors, landowner goals (financial decisions)

It is important to have clear goals and intentions regarding what the desired condition of the stand is prior to implementation

Thinning practices to increase the value of a stand

Precommercial Thinning

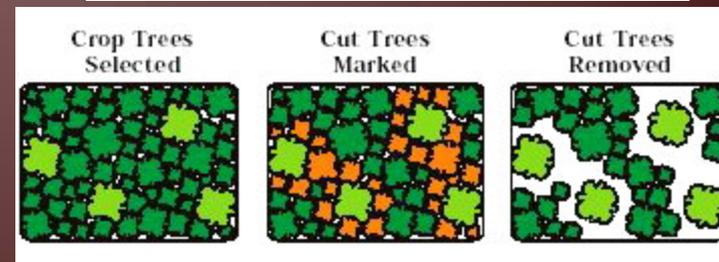
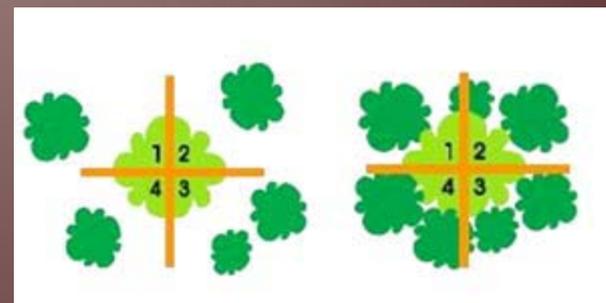
- Most commonly used in dense, newly regenerated pine stands
- By definition refers to an investment in future growth, felled trees are not merchantable or utilized
- Typically involves a per acre cost for motor-manual labor
- Desirable stems released from undesirable competition
- Reduced risk of SPB infestation
- Avoids early growth stagnation, maintains vigor
- May shorten rotation lengths for merchantable trees



Thinning practices to increase the value of a stand

Crop Tree Release

- Refers to the release of a certain number of desirable hardwood stems per acre
- Based on the fact that the majority of the value in a stand will be concentrated in relatively few trees at the end of the rotation
- For precommercial treatments, makes most sense on best sites with enough desirable species
- 10 to 15 years old, 50 to 70 trees per acre
- Focus on crop trees, not spacing
- Utilize “crown touching” thinning approach
- Improves species composition and shortens rotation lengths



Thinning practices to increase the value of a stand

Commercial Thinning Operations:

Low Thinning

-Trees removed from lower crown classes at a specified severity

-Dominant and co-dominant trees not typically removed

-Mimics the natural mortality of suppressed trees

-Captures the value of trees likely to be out-competed

-Eliminates the “losers”, may have varying effect on growth of “winners” depending on severity of cut



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Thinning practices to increase the value of a stand

Commercial Thinning Operations:

Crown Thinning

- Trees removed in the co-dominant and dominant age classes to favor the development of the best trees in those same classes
- Essentially a commercial “crop tree release”
- Also mimics natural mortality, severity of cut based on optimal or desirable density
- Reduces rotation length of most promising trees
- Provides a periodic source of income with subsequent thinnings
- A method to influence species composition to achieve future regeneration goals



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Thinning practices to increase the value of a stand

Commercial Thinning Operations:

Geometric Thinning

- Trees removed in a specified pattern (i.e. every 3rd row, every 50 ft.)
- Most applicable in highly uniform, very densely stocked stands
- The approach is similar to precommercial thinning, but product is merchantable



- Less selectivity when deciding what to retain
- Operationally efficient
- Maintains vigor in very dense stands

Thinning practices to increase the value of a stand

Commercial Thinning Operations:

Selection Thinning

- Fundamentally different than other types of thinning as the goal is to *stimulate the growth of trees in the lower crown classes*
- Also different than “selection” techniques for establishing regeneration in uneven-aged systems
- Can be used to remove scattered “cull” dominants when there are more desirable trees in the lower crown classes that are capable of responding to release
- Very few instances when this technique is the best thinning alternative...leads to “high grading” and stand degradation if improperly applied



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Cost share programs available

The Forest Development Program (FDP)

- Administered by NCDFR
- Covers a wide range of precommercial activities, site preparation, tree planting
- 40-60% reimbursement for approved practices at established prevailing rates

Southern Pine Beetle Prevention Program (SPBPP)

- Administered by NCDFR
- Covers precommercial thinning in pine stands at risk to SPB based on TPA for yellow pines and white pine, also has a BA provision for white pine
- 50% reimbursement for approved practice up to prevailing rate

Environmental Quality Incentives Program (EQIP)

- Administered by NRCS through the Farm Bill
- Goals include reduction of non-point source pollution, maintenance of water quality, at-risk habitat conservation, maintenance of declining species
- Covers precommercial thinning, priority species planting, erosion control measures, invasive plant control
- 75-90% project cost reimbursement, projects ranked by conservation value

Once the stand is mature

How does this sound...

“Well, we’re just going to thin out these bigger trees and let the small ones grow a little more.”

...probably not the best idea.

Even-Aged vs. Uneven-Aged Forests

Even-Aged stands are the result of one single disturbance, natural or human induced, resulting in one single cohort of trees.

- Many stands in the southern Appalachians fall into this category due to past land-use (i.e. clearcut harvests, abandoned agricultural land)
- The bigger trees are typically the “winners” throughout stand development
- Smaller, suppressed trees of the same age class will likely not respond vigorously if the bigger trees are removed

Uneven-Aged stands are the result of several disturbances, natural or human induced, resulting in at least three separate age classes across the stand

- Stand will contain many younger trees, fewer middle-aged trees, even fewer older trees...size may be more closely related to age in these situations
- You must have an understanding of the growth requirements of each species to ensure the establishment of desirable regeneration in un-even aged systems

Regeneration Considerations

“...a rose by any other name would smell as sweet”
(what matters is what a thing is, not what it is called)

- It's important to use functional definitions...what are we accomplishing?
- There are many different techniques, and a lot of combinations
- Some important considerations include:
 - What species are you hoping to establish/release?
 - What conditions are appropriate for their establishment?
 - What is the desired stand structure (even-aged, two-aged, uneven-aged?)
 - What type of operation is financially feasible?

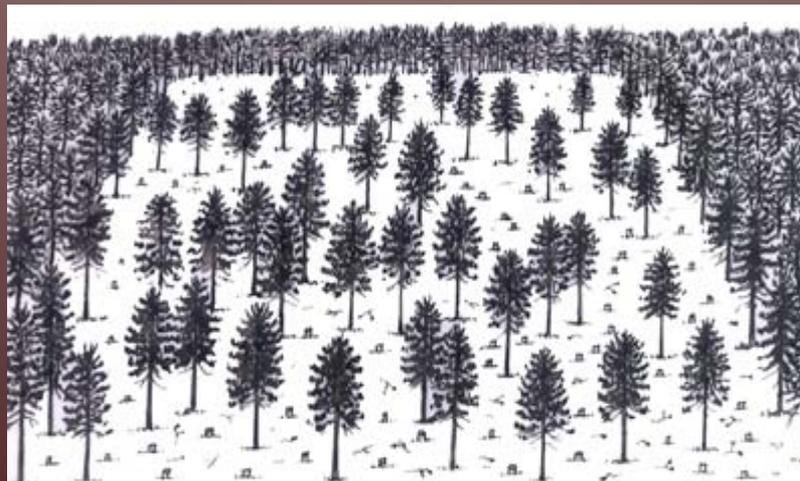
Recognize the difference between timber mining/liquidation, and a deliberate management action

Regeneration Techniques

Even-Age Techniques Include:

Shelterwood

- Designed to alter canopy density based on the light requirements of the species targeted to regenerate
- Goal is to establish advance regeneration in understory prior to removal of overstory
- Overstory may be removed all at once or partially

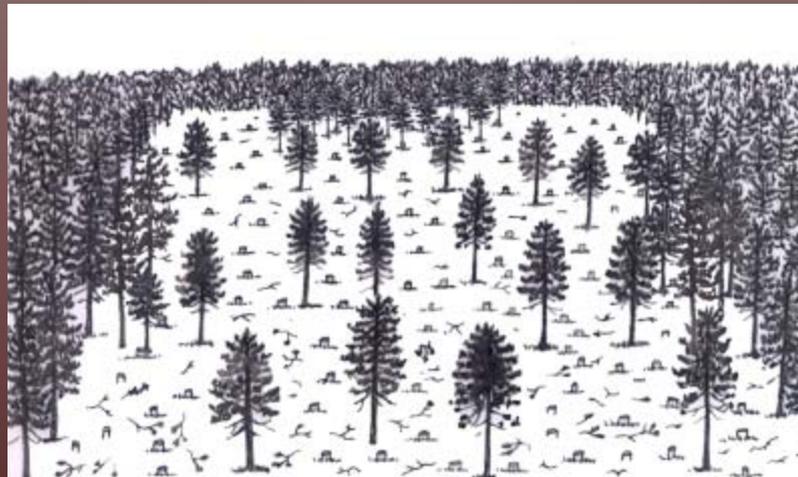


Regeneration Techniques

Even-Age Techniques Include:

Seed-tree

- Designed to reduce canopy density enough to allow shade-intolerant species to establish by seed
- Overstory is there as a seed source, negligible shade provided
- Overstory typically removed at once following seedling establishment

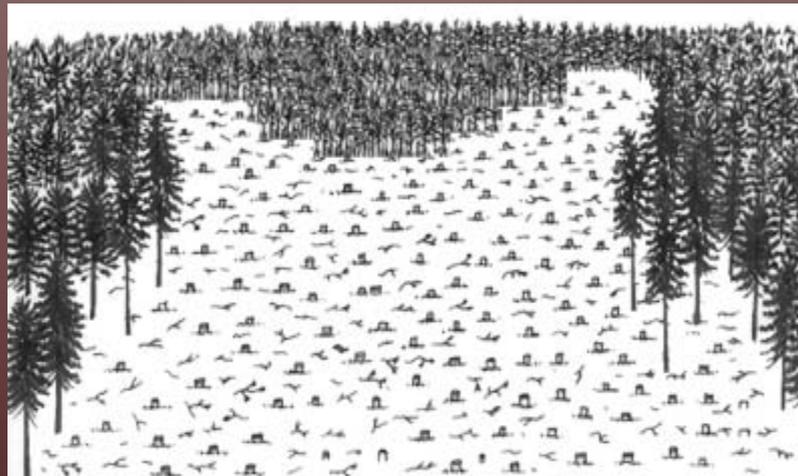


Regeneration Techniques

Even-Age Techniques Include:

Clearcut or Patch Cut

- Creates growing conditions where the influence of surrounding vegetation is minimal (this condition may occur once the gap is 2-3 times the height of surrounding vegetation)
- Promotes shade intolerant species, and species that maintain seed banks
- Overstory typically removed at once

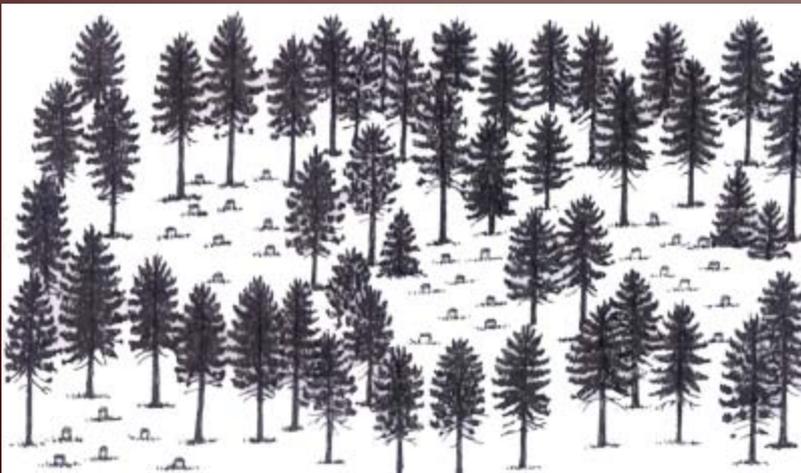


Regeneration Techniques

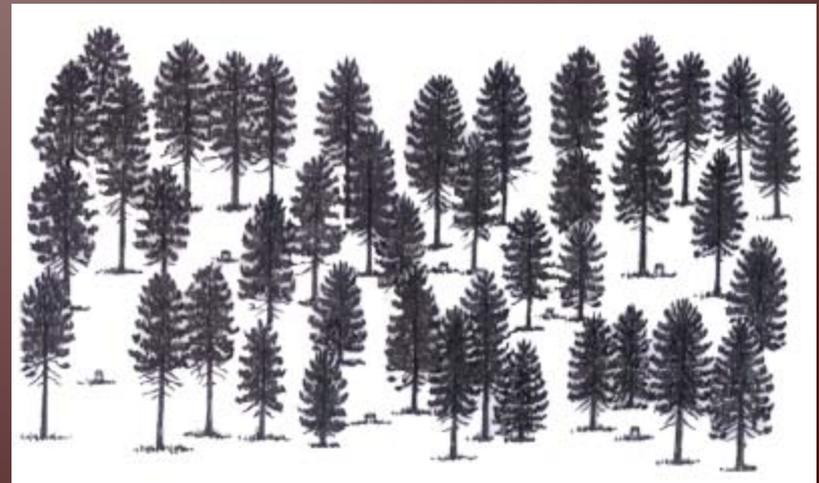
Uneven-Age Techniques Include:

Group Selection and Single Tree Selection

- Removes trees of all size classes singly or in groups, typically to establish or release shade tolerant or intermediate species
- Harvesting occurs at regular intervals throughout the stand towards the development of a desirable age/stand structure
- Group selection more applicable than single tree selection in southern Apps. given the requirements of major canopy species



<http://nrs.fs.fed.us/fmg/nfmg/fm101/silv/index.htm>



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Timber Sale Administration and Contracts

We need a whole presentation for this one topic, but here are some important things to consider...

- Timber can be sold in several different ways (lump sum, per unit, on shares) be aware of the costs and benefits of each
- Have a sound understanding of the value of the wood prior to selling
- Market the timber well, negotiate, seek out multiple bidders, and check references
- Consulting foresters can help with everything addressed in this presentation. (Be clear on who the forester represents...you, the logger, or the mill)
- **Always have a written contract.**

In Conclusion, five mistakes that will hit you in the wallet

1. Assume bigger trees are older trees, cut all those, and leave behind weaker, less vigorous, lower-value trees of the same age class.
2. Take an unsolicited bid for your timber. You must take steps to understand the value of your timber, and sell knowledgeably.
3. Fail to plan for regeneration, and assume it will just grow back. Something will grow, but maybe not what you intended.
4. Harvest trees right when they hit sawtimber size and don't take into account the value gained as trees jump into new product classes.
5. Build improper infrastructure (i.e. haul roads, skid trails, log landings), or fail to maintain what you have established. You do not want extra heavy equipment costs, or erosion issues for several reasons.