

Module 7 – MANAGEMENT

1. Introduction

- a. Look at “California Forest Lands”

2. Silviculture

- a. Read “Intro to Silviculture”
- b. Look at “Silvicultural Systems” graphic
- c. Read “Even and Uneven-Aged Forest Management”
- d. Watch “Forest Harvest Methods: Variable Retention Harvest” (3:27)
<https://www.youtube.com/watch?v=IO5slTOeg4w>
- e. Watch “Forest Harvest Methods: Clearcutting” (3:28)
<https://www.youtube.com/watch?v=1kfa4jYkq9k>
- f. Watch “Forest Harvest Methods: Restoration Thinning” (3:01)
<https://www.youtube.com/watch?v=GG0553JEME8>
- h. Read “How to Make a Fire-Resistant Property”

3. Management Practices

- a. Watch “Forest Stand Improvement” (1:48)
<https://www.youtube.com/watch?v=QZhOPQHdJM8>

4. Sustainability

- a. Look at “What is a Sustainably Managed Forest?”
- b. Watch “Sustainable Forestry: How does it work?” (3:21)
<https://www.youtube.com/watch?v=GbVK02P9xCo>
- c. Look at “Sustainable Forestry Carbon Cycle”
- d. Look at “Growth, Mortality, and Harvest” graphic

5. Complete Forest Management Worksheet

California Forest Lands

Federal

NEPA
(National Environmental Policy Act)

OWNED BY
Public

MANAGED BY
National Park Service
US Forest Service
Bureau of Land Management
US Fish and Wildlife Service

NPS
...for the benefit and enjoyment of the people.

USFS
...to protect the land, preserve water flow and provide timber.

USFW
...to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people.

BLM
...to sustain the health, productivity and diversity of public lands for the enjoyment of the public.

State

CEQA
(CA Environmental Quality Act)

OWNED BY
Public

MANAGED BY
State Parks
Cal Fire

State Parks
...for the health, inspiration and education of the people...to preserve ...biological diversity, protecting ...natural and cultural resources, and creating opportunities for high-quality outdoor recreation.

Cal Fire
...emphasizes the management and protection of [CA] natural resources... through ongoing assessment and study of...natural resources and an extensive Resource Management Program.

Private

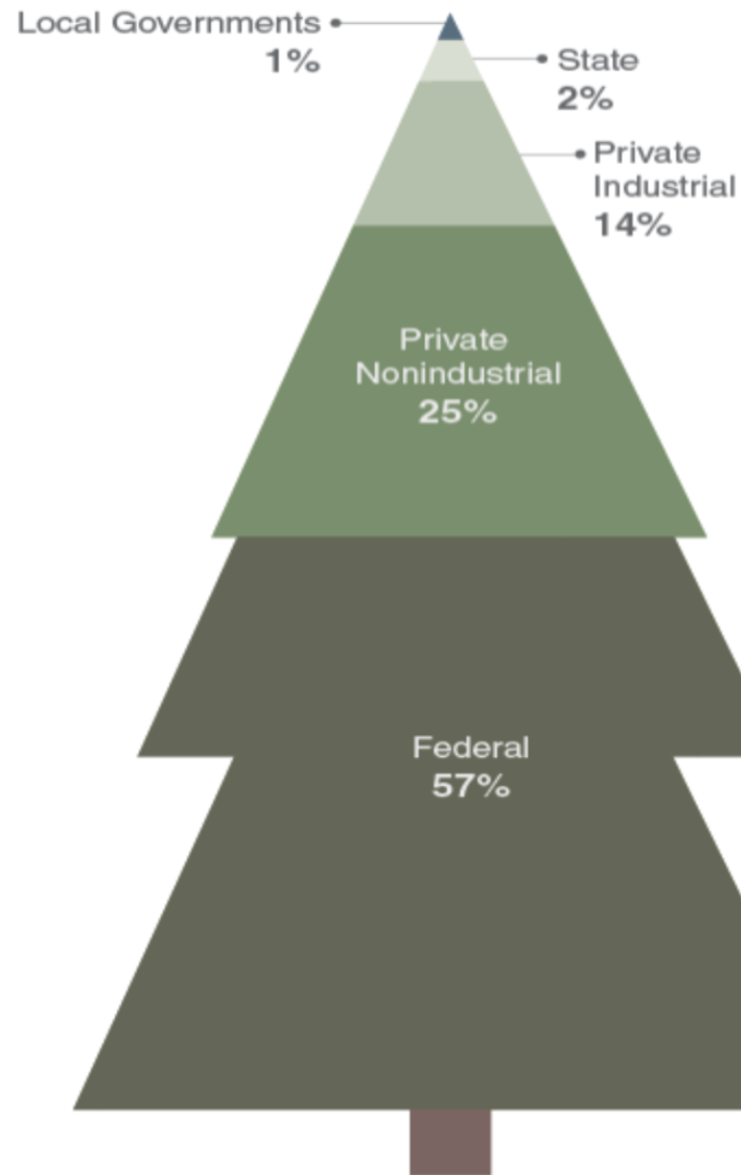
CEQA
(CA Environmental Quality Act)

OWNED BY
Private entities

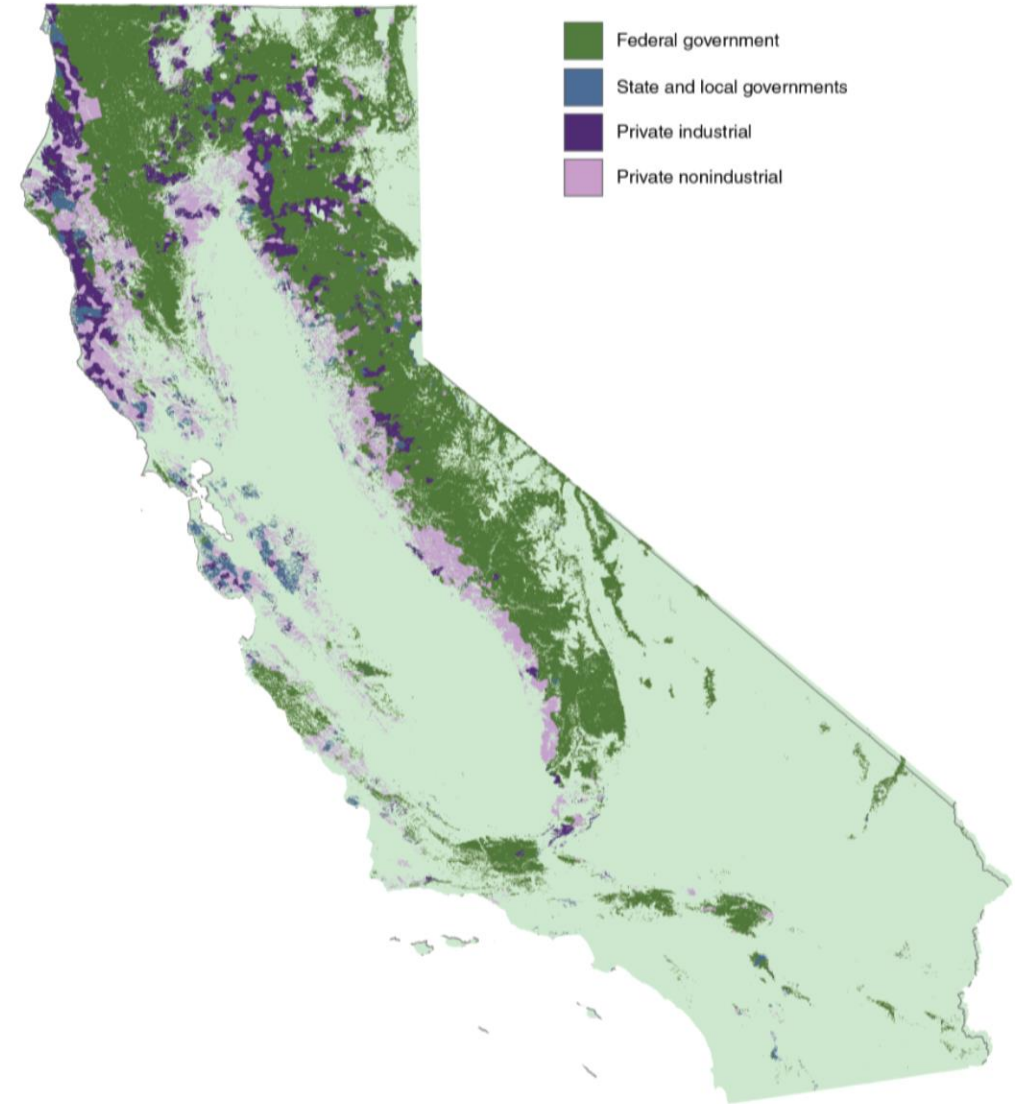
Industrial
(examples)
- SPI
- Green Diamond

Non-Industrial
(examples)
- Private Camps
- Family Land

Majority of Forestlands in California Owned by Federal Government



Patchwork of Owners Across California Forestlands



Hewes, Jaketon H.; Butler, Brett J.; Liknes, Greg C. 2017. Forest ownership in the conterminous United States circa 2014: distribution of seven ownership types - geospatial dataset. Fort Collins, CO: Forest Service Research Data Archive. <https://doi.org/10.2737/RDS-2017-0007>

Introduction to Silviculture

“Silviculture” is the science and practice of perpetuating forests by growing trees on a large scale (that is, not a single tree, but rather growing whole “stands” of trees). Different methods of growing timber stands can be divided into “selection” and “even aged” methods. In selection harvesting, individual trees or small groups (up to 2 ½ acres) of trees are cut. New trees are established by natural seeding into the openings created by this cutting, maintaining a forest that is a mix of trees of different age and size classes. In even aged harvesting, trees are removed in larger areas (typically 15 to 20 acres) so that a new stand of trees that are all about the same age is created. Foresters often plant trees to create these new stands, although seeding by trees left for that purpose is possible.

Other cutting methods, such as commercial thinning of trees to improve spacing and maintain growth, and “sanitation-salvage” harvesting of dead, dying, and diseased trees, are considered “intermediate” or maintenance harvests, not designed to establish a new timber stand.

The following table provides a brief description of the attributes of different silvicultural methods:

Attribute	Single Tree Selection	Group Selection	Seed Tree	Shelterwood	Clearcut
Ease of establishment of new trees	Difficult	Difficult	Varied w/ natural regen; good if planted	Varied w/ natural regen; good if planted	Good
Site Prep Needed?	None	None	Usually	Usually	Usually
\$\$ invested	Little	Little	Moderate	Moderate	High
Short term disturbance	Low	Moderate	Mod to high	Mod to high	High
Long-term disturbance	Moderate	Moderate	Low	Low	Low
Roads needed	High	High	Moderate	Moderate	Moderate
Utilized in CA?	Often	Occasional	Seldom	Seldom	Often
Control of growth factors (spacing)	None	Little	Good if planted	Good if planted	Good

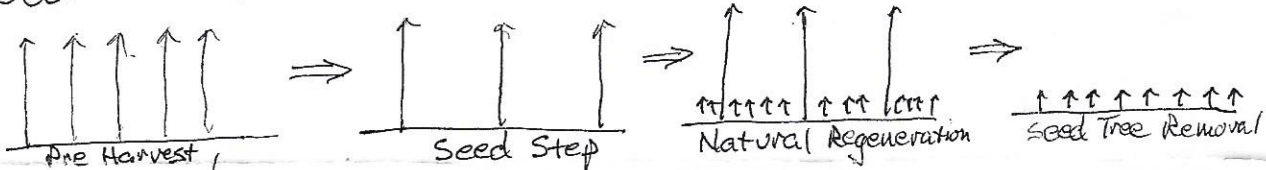
SILVICULTURAL SYSTEMS

EVEN-AGED MANAGEMENT (1-2 age/size classes)

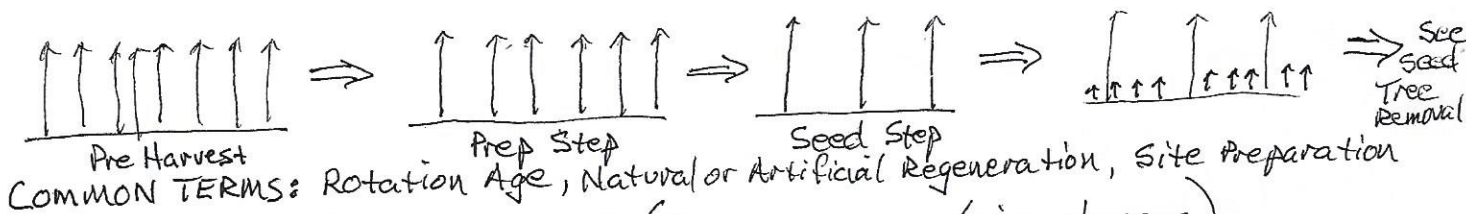
Clearcut:



Seed Tree:



Shelterwood:



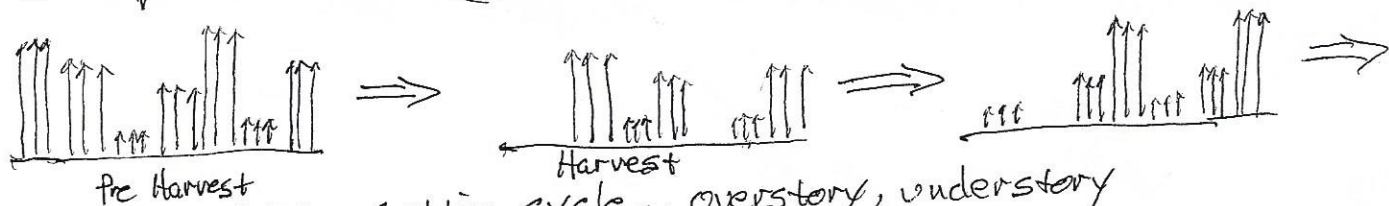
COMMON TERMS: Rotation Age, Natural or Artificial Regeneration, Site Preparation

UNEVEN-AGED MANAGEMENT (3 or more age/size classes)

Selection:



Group Selection: (group sizes range 0.25 - 2.5 acres)



COMMON TERMS: cutting cycle, overstory, understory

INTERMEDIATE TREATMENTS & OTHER

- Commercial Thinning
- Pre-commercial Thinning
- Sanitation/Salvage
- Rehabilitation of Understocked Areas
- Fuel break/Defensible Space



Even and Uneven-Aged Forest Management

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Oklahoma Cooperative Extension Fact Sheets
are also available on our website at:
<http://osufacts.okstate.edu>

Eastern Oklahoma contains about 4.7 million acres of commercial forest land. These forests have been relied upon in the past for many resources. Timber has been one of these important resources.

Many different methods exist for the management of Oklahoma's forests. Recently, the most productive of these forests have been intensively managed by clearcutting and other even-aged methods. While these methods have sound biological foundations, alternatives have been sought to improve the aesthetic result of timber harvest. This factsheet will present an overview of the management options available primarily for natural regeneration of Oklahoma's forests.

An understanding of the concepts of forest ecology and forest management will help provide a better understanding of regeneration methods. A good companion to this fact sheet which defines terminology is OSU Extension Fact Sheet NREM-5022, "Frequently Used Forestry and Natural Resource Terms for Landowners of Oklahoma," which is available at your local OSU Extension Center.

The Age of Trees in a Forest

One way to view the forest is by the age of trees. In forestry terminology, this is referred to as the age-class distribution of a forest.

Even-aged Forests

The simplest type of forest age class distribution is an even-aged forest. A plantation, established by planting one-year-old seedlings would be an example of a perfectly even-aged forest. This is illustrated in Figure 1.

Naturally regenerated even-aged stands often contain trees of different ages. When assessing a forest's age-class distribution, however, it is important to remember that a typical even-aged Oklahoma pine forest is often harvested for sawtimber between 50 to 80 years of age. In forestry terminology, this time period is referred to as the "rotation age." Professional foresters will characterize a forest as even-aged if the total range of ages present is less than 20 percent of the rotation age.

In an even-aged forest, trees are usually about the same height. This results in a single canopy and is illustrated in Figure 2. While total tree height is relatively uniform, the diameter of trees in an even-aged forest may vary widely. In a young forest where all trees are free to grow, their diameters may be

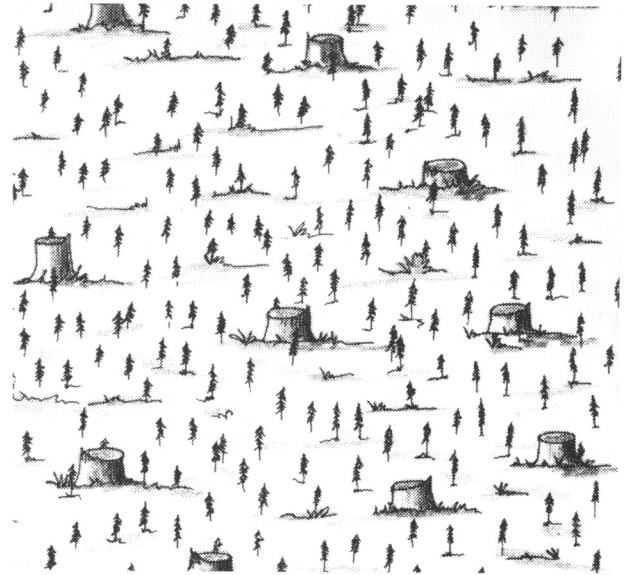


Figure 1. Planting an area with seedlings will normally result in an even-aged forest.

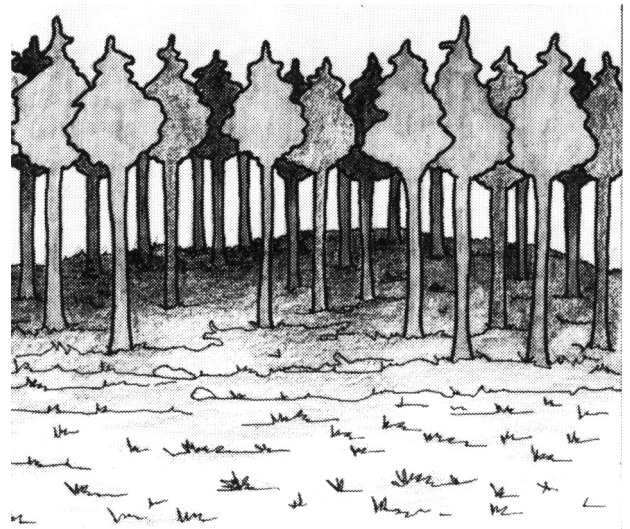


Figure 2. Even-aged pine forests consist of trees which are of equal age and roughly equal height. This results in a single canopy.

similar. In an older stand, however, crowding and competition begin to influence tree growth. Some trees will show dominance because of more favorable growing conditions or genetic factors. Other trees will grow more slowly and they will be suppressed. Thus, an even-aged forest may contain trees with a wide range of diameters. This is shown in Figure 3. Note that even-aged forests are sometimes composed of only one species of tree (shortleaf pine for example), but many times contain several species.

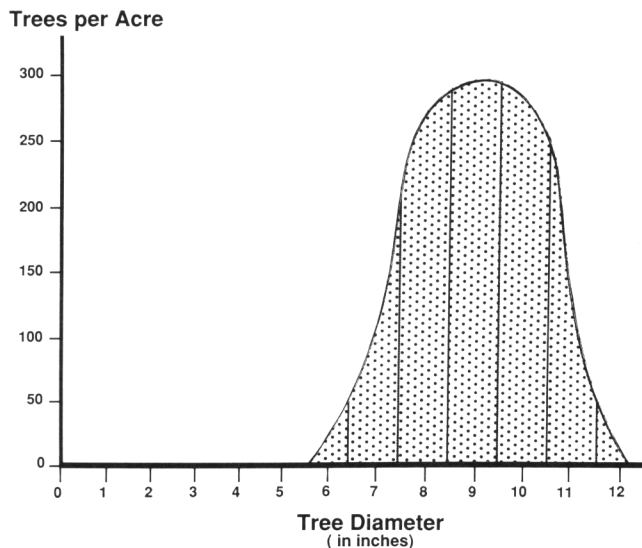


Figure 3. An even-aged forest will be made up of trees with different diameters. These diameters will be distributed in a “bell shaped” fashion about the average diameter. This type of diameter-distribution is indicative of even-aged forests.

Timber management in an even-aged forest is considered to be economically efficient since major operations require only one entry into a stand. Final harvests involve removing nearly all trees depending upon the regeneration method chosen. In an even-aged forest, foresters also have the opportunity to replant genetically improved seedlings which are more disease resistant, grow faster, and possess better timber and visual characteristics.

Two-aged Forests

A second type of age class distribution is the two-aged forest. A two-aged forest is made up of trees with two very distinct ages in the same stand. Two-aged forests will have two distinct canopy layers as shown in Figure 4.

The two-aged forest will often be composed of two tree species, one in each age-class. The older group, will be made up of types of trees that are able to regenerate barren, exposed areas following disturbances such as land clearing, fire, or clearcut timber harvesting. These tree types will normally only grow when full sunlight is available. Pines, cottonwoods, and sweetgum are examples of typical tree types in this group.

The second, younger group of trees is a more recent addition to the forest. These trees evidently were able to regenerate under the canopy of the first group. Only trees capable of growing under less than full sunlight will be found

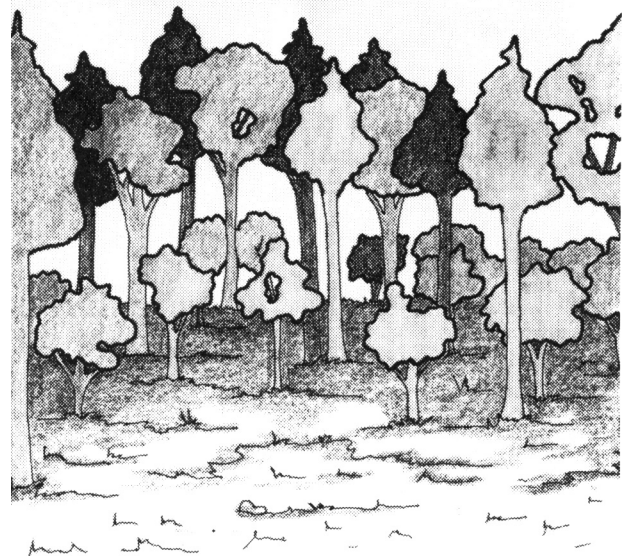


Figure 4. In a two-aged forest, there will be two distinct canopy layers. The overstory will be made up of shade intolerant trees such as pines. The understory layer will be made up of shade tolerant trees such as maples, dogwoods, and elms.

in this group. These types of trees are said to be “shade-tolerant” and include the maples, dogwoods, and elms. Other species may also occur which are somewhat shade tolerant such as oak, hickory, or ash.

Uneven-aged Forests

Consider a forest made up of three or more age-classes. Further, assume that each different age-class occupies roughly the same area. Larger trees need more room to grow and smaller trees need less. Since each age-class and corresponding diameter-class occupy the same area, there will be fewer big trees and many small trees. This situation describes an uneven-aged forest.

Looking at an three-aged forest from a diameter-class perspective, the difference between even and uneven-aged systems becomes clear. Uneven-aged forests typically have many small trees and very few big trees. Figure 5 presents the distinction.

In this type of forest, young trees will be growing in the shade of older, overtopping trees. An uneven-aged forest without human manipulation or natural disturbance will eventually be made up of mostly shade-tolerant tree types such as maple and elm which are capable of surviving and growing under these conditions. Assuming some natural disturbance occurs, intolerant and somewhat intolerant species may be part of an uneven-aged stand.

All-aged Forest

A special type of uneven-aged forest exists if a forest contains trees in each age class in one year increments from age one to the oldest. This is referred to by foresters as an “all-aged” forest. For this type of forest to come into existence, regeneration of new trees would need to occur every year. This rare forest situation is represented in Figure 6.

Timber management in an uneven-aged forest is more

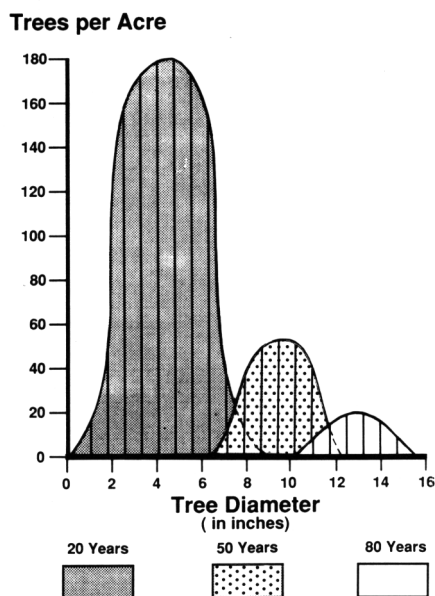


Figure 5. Diameter distribution of a three-aged forest. When a forest has three or more age classes it is considered to be uneven-aged.

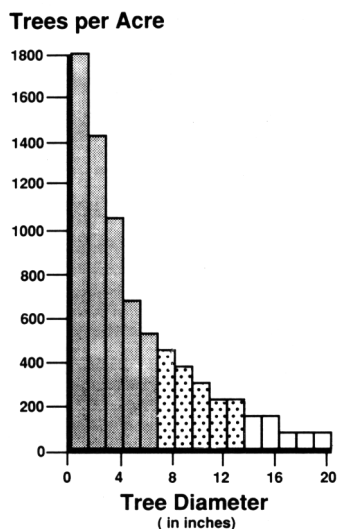


Figure 6. Diameter distribution of an "all-aged" forest. Please note that in an all-aged forest, there are many small trees and only a few big trees. Foresters call this curve the "inverted J" curve which is indicative of uneven-aged forests. For maintenance of this forest situation, trees would need to regenerate every year.

complex, and may be less economically efficient than managing even-aged forests. Care must be taken to remove trees without damaging trees that remain. Additional access and more frequent access is normally required in uneven-aged management. It is, however, sometimes perceived to be more aesthetically pleasing than clearcutting.

The previous discussion focused on unique characteristics of even and uneven-aged forests. In choosing a regeneration method, the landowner also determines what the age-class distribution of the future forest will be.

Natural Regeneration Techniques

Natural forest regeneration has been studied by foresters for centuries. From the Black Forest of Germany to our shortleaf pine forests of Eastern Oklahoma, natural regeneration techniques are well understood. Techniques will vary depending upon whether an even or uneven-aged forest is desired.

Even-aged regeneration

Foresters and other nature lovers of Eastern Oklahoma often observe young, even-aged, pine seedlings becoming established on disturbed or cleared sites. These cleared sites may be the result of construction, roadside maintenance, wildfires, agriculture, or planned timber harvest. These sites are characterized by exposed mineral soil, little or no hardwood competition and the presence of older, cone-bearing pine trees within 200-300 ft. of the site. Young pine will not become established, however, in the shaded conditions under a mature forest. Natural even-aged forests can be regenerated by three techniques including (1) clearcutting, (2) seedtree, and (3) shelterwood.

Clearcutting Method

If our goal is to regenerate a new stand of pine, or other type of intolerant tree, conditions must include exposed mineral soil with little competing vegetation. A source of seed is also needed.

A clearcut is an even-aged regeneration method. It involves harvesting all trees in a forest and establishing a new forest by planting or by natural regeneration. Openings in the forest to obtain natural regeneration will be limited in size by the ability of surrounding trees to provide seed to the site. Seeds of pines and other light-seeded trees may be dispersed up to 200 to 300 feet by the wind. Therefore, width of clearcuts must be limited if natural regeneration of pine is the desired objective. Figure 7 illustrates a naturally regenerated clearcut.

Foresters will normally prescribe some form of clearcutting if landowner objectives include intensive management of pine trees or other trees that cannot tolerate shade. Proper care taken in prescribing clearcuts ensures minimal soil erosion, maintains water quality, and improves habitat for many types of wildlife.

Seedtree Method

The seedtree method is another even-aged regeneration technique which utilizes seed trees directly on the site. It is similar, in many respects, to clearcutting. The major difference is that rather than remove all of the trees as with clearcutting, a few selected, seed-producing trees are left on the site. This provides a more uniform and reliable source of seed. Figure

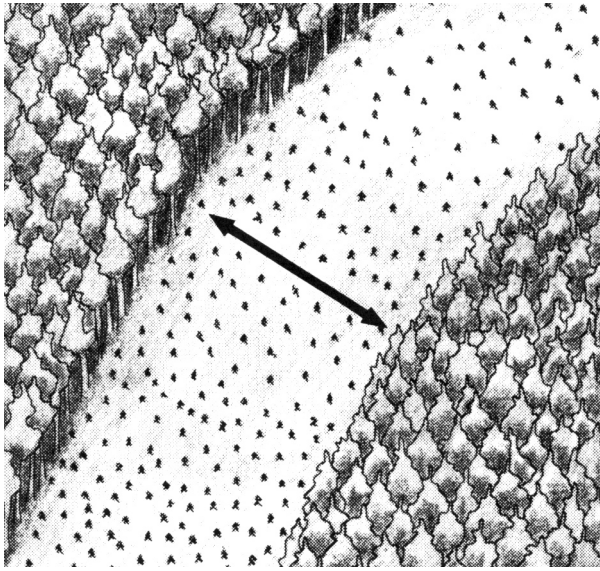


Figure 7. Clearcuts will naturally regenerate with shortleaf pine in Oklahoma if they are limited in width. Pine seed will normally disperse a distance of up to 5 times the height of seed trees. (Note arrow)



Figure 8. The seed tree method reserves a small number of trees on the site to provide seed.

8 illustrates the seedtree method.

Depending on tree species, size and expected seed production, the number of seed trees required will range from 5 to 20 per acre. The new stand will be even-aged. When a new stand has been established, the seed trees may be carefully harvested to minimize damage to the new seedlings.

Shelterwood Method

Another common method to naturally regenerate a forest is the shelterwood method. The unique aspect of this method is a stepwise harvest of the forest. This usually occurs using two or three harvests. Not all of the trees will be harvested before new regeneration has established under the "shelter" of shade from some of the remaining trees. Figure 9 illustrates

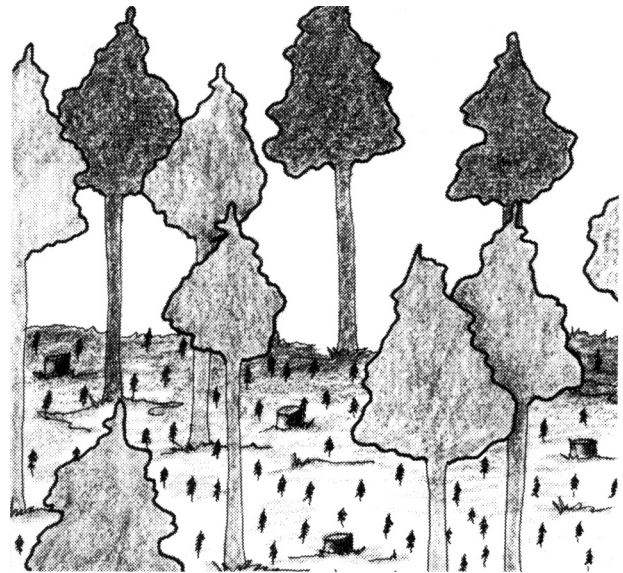


Figure 9. The shelter-wood method of even-aged natural regeneration occurs with two or three partial harvests. This allows the regeneration to be somewhat sheltered by the remaining trees.

this regeneration method.

The timing of the harvest is such that regeneration is established over a short enough time period that the stand is even-aged. Remember that the definition of even-aged is a forest with an age range of less than 20 percent of rotation age.

With the shelterwood method, the timing and quantity of trees removed in a given step can be varied to create a wide range of conditions. For example, if the preferred type of tree to be regenerated requires nearly full sunlight, the first step may remove 60 percent or more of the overhead canopy. If the preferred type of tree will grow well under partial shade, the first cutting may remove only 25 to 50 percent of the overhead shade. As regeneration becomes established, the old stand is removed to allow more room for the new seedlings to grow. The shelterwood method can be used to regenerate most types of trees, with the exception of those

that can not tolerate any overhead shade.

Uneven-aged Regeneration

Selection Method

The selection method is the only method used to regenerate uneven-aged forests. The basic requirement of regeneration methods resulting in uneven-aged forests is the periodic harvest or natural death of a portion of the mature forest at regular intervals. To create the balanced uneven-aged distribution, harvest or natural death must be followed by successful regeneration.

There are two variations of the selection method, (1) single tree and (2) group selection.

1. Single-tree Selection

With this method, single mature trees are harvested from the forest. Annual application of the single tree selection method should regenerate a forest with an all-aged stand structure as illustrated in Figure 6.

Harvesting mature trees in a forest will create vacancies within the upper tree crown level. These vacancies will cause the surrounding trees to grow faster and these trees will eventually fill the crown void. New seedlings established in the opening will be exposed to shade. Only trees which survive in the shade will grow and develop under these conditions. Therefore, the single-tree selection method is not an efficient method to regenerate types of trees which need full sunlight, such as shortleaf pine. The ability to control tree species within the single-tree selection method is accomplished by mechanical or chemical treatment of unwanted trees.

To harvest a given volume of timber using single tree selection will require access to a greater area each year than under even-aged regeneration methods. This is because even-aged methods concentrate on intensive management

and harvesting of smaller tracts at any one time.

The selection method is perceived to result in less site disturbance. Consideration, however, should be given to the frequency of forest entry with this method. Timber harvesting and competition control occurs on a more frequent basis as compared to even-aged regeneration methods.

2. Group Selection

In the group selection method, trees are harvested in small groups. The larger openings will have conditions, at least near the center of the opening, that are most suitable for regeneration of trees needing full sunlight. The dividing line between the group selection method and the clearcut method is not clearly defined. An opening of 1/10 to 2 acres is generally considered to be group selection. An opening greater than two acres is sometimes considered to be a "patch" clearcut. David Smith (1986) in *The Practice of Silviculture*, suggests that "the critical opening is probably about twice as wide as the height of the mature trees." This exemplifies the concept that there exists a continuum of regeneration techniques from which the landowner or forester must choose.

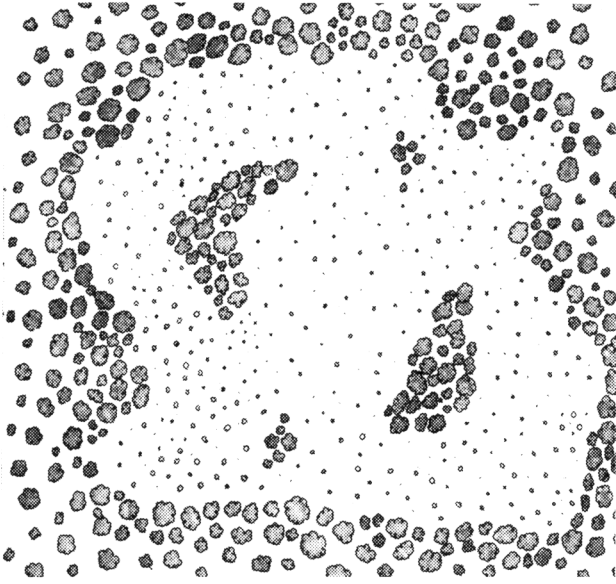
Figure 10 attempts to simplify the spectrum of regeneration methods.

Summary

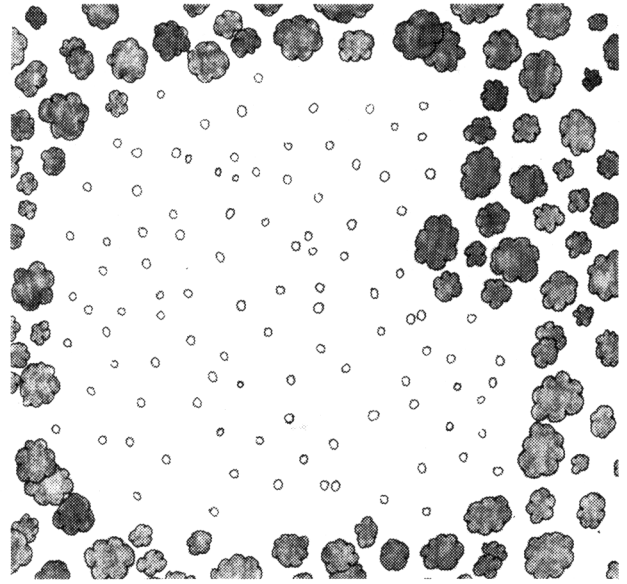
Age class structure is an important characteristic of forests. The two broad age classes that characterize forests are even and uneven-aged. The three methods used to naturally regenerate even-aged forests are (1) clearcutting, (2) seedtree, and (3) shelterwood. Uneven-aged forests are regenerated by the selection method, which has two variations including (1) single tree selection and (2) group selection.

For specific information on management of your forest land, contact your local Oklahoma Department of Agriculture, Food, and Forestry - Forestry Division professional or your local OSU Extension Center.

Even-aged regeneration methods

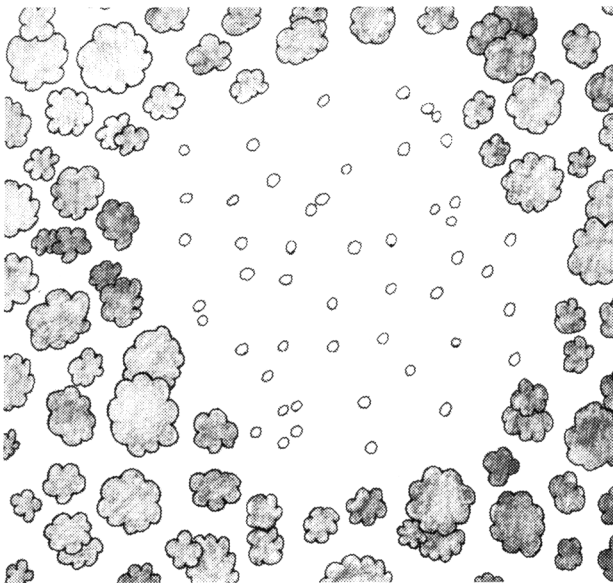


Clearcut opening with hardwood islands for wildlife -- 5 acres and larger in size.

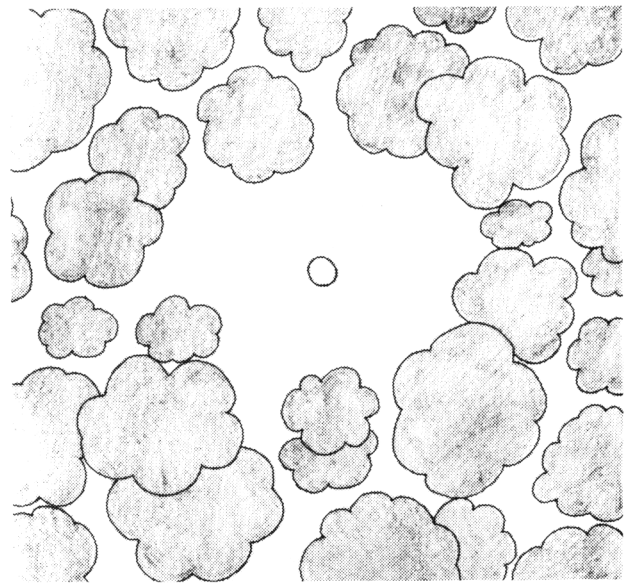


Small patch clearcut opening -- 2-5 acres.

Uneven-aged regeneration methods



Group selection opening -- 1/10-2 acres.



Single-tree selection opening -- the area occupied by a single tree.

Figure 10. The spectrum of opening sizes to obtain forest regeneration varies widely.



WOMEN OWNING WOODLANDS

Making Your Property Fire Resistant and Wildlife Friendly

by Nicole Strong

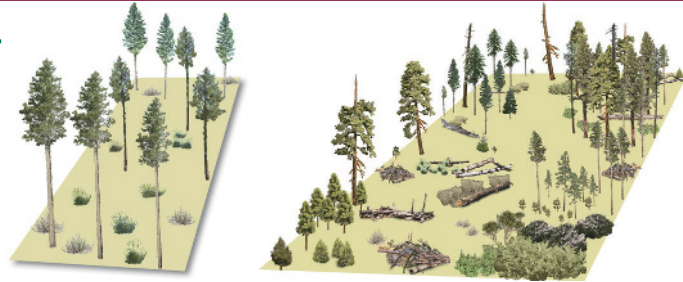
Many landowners throughout the Intermountain West, Southwest, and Southeast United States are working on making their forest more resistant to fire. This might include thinning, mowing, or even conducting prescribed burning on your property. Sometimes we get so good at “cleaning up” the forest that we remove valuable wildlife habitat. The good news is you don’t have to sacrifice the safety of your property to keep wildlife value. This article will give you a few ideas on how you may plan your fuels reduction project in a way that creates resilience to fire, improves forest health, looks more natural, and keeps or enhances high quality wildlife habitat.

Remember, you don’t have to eradicate all the fuels on your property to make sure your property is fire resilient; you just need to **break up the continuity of fuels**, which will reduce the chance of a fire spreading into the crowns of your trees, and throughout your property. You can create a landscape that is resilient to fire, looks more natural, mimics historic fire patterns, and creates high quality wildlife habitat.

You are going to manage very differently close to home if you live on your property (<100 feet) vs further out (100 ft +) in the woodlands. This article is focused on managing that ground which is further than 100 ft from a building or residence.

Snags and Down Logs

Some of the most important habitat features in any forest are made of dead wood; specifically standing dead trees (snags) and down logs. Live trees with dead portions of their stems and branches can also fill this role. Insects reside in the dead wood, often feeding on fungi, and birds such as woodpeckers, nuthatches and chickadees feed on these insects. Cavities created by woodpeckers during regular nesting and courtship behavior can provide homes for secondary



Evenly thinning a stand, pruning every tree, and removing understory will reduce fuel load, but will not help with increased water capture in the ground, nor wildlife habitat.

By conducting an uneven, or variable density thinning, including clumps and openings, as well as retaining our other desired structures (snags, down logs, piles and shrubs), you can still reduce fuels, but take steps towards a more natural, wildlife-friendly forest. Illustrations by Gretchen Bracher.

cavity species such as bluebirds or flying squirrels. Many of these species are voracious feeders on insects, including some forest pests, and thus can help keep the forest healthy if habitat is provided and they can occupy territories. If they do not present a hazard over a road, or near a house, we recommend leaving as many large (10” + diameter) snags and down logs on the landscape as possible. The bigger the snag or downed log, the better!

Shrubs

Many shrub species provide excellent fruit, insects and forage for wildlife species. Clumps of shrubs also provide nesting and hiding cover for birds and small mammals. The shrub species you have will vary greatly with your locale. Sometimes too hot of a prescribed burn can reduce the vigor of shrubs or grasses you care about. Heavy mowing can also result in undesired transition of understory species. Bitterbrush is a very important understory plant in many of our dry forests in the West, as are our native bunch grasses. Almost anything with “berry” in the name is a good choice for keeping or encouraging! The key here is location location, location! Of course you don’t want tall shrubs where you have trees with low hanging branches. This creates ladder fuels, where a fire can climb from the ground up into the crowns of trees. You might consider leaving some clumps of shrubs out in the open.

Openings (Gaps)

Openings can be areas where all, or nearly all, of the overstory trees are removed. These openings allow for the development of shrubs and grasses for wildlife, as well as regeneration of shade intolerant tree species. These can be embedded in stands of trees to allow big game animals to feel secure and to provide habitat for other wildlife associated with edge habitats. Openings usually happened in long sinuous shapes (no more than 50-110' across) rather than big circles or squares. This allows wildlife to feel safe going out into the open but quickly being able to get back in cover. Emerging research also shows that openings are important for retaining snowpack for those of us who are water-limited in the summer. So openings have many benefits to tree growth, reducing fire risk, and helping wildlife!

Patches (Clumps)

Dense pockets of young conifers and shrubs provide quality habitat for many species, such as feeding or nesting songbirds, and browse and cover for big game. Patch retention in thinning units can provide this habitat, but requires forethought. Mark areas from 30-50 feet in depth at least, and at least the same in length, or preferably longer. These areas should be left unthinned, (or thinned lightly), in order to maintain sight distance cover for large mammals such as deer, elk and bear. Patches should be configured across units to break long sight distances, and staggered at distances of 200-300 feet apart. You don't want more than 350-500' between skipped areas.

How Many Clumps/Openings?

If you have less than 10 acres of forest, creating any significant openings might not be reasonable. This is one of those situations when it is beneficial to see what is around you on the landscape and think about what you might offer that is different from your neighbors. If you have 10 acres or more of land, the recommendation is for about 10-20% of your land left as clumps or patches, and 5-15% for openings. This might look like one or two openings of .2-1 acres in size for every 10 acres.

Slash Piles

Piles can be left as distinct habitat elements and act as surrogates for down wood. They will provide cover for many species of wildlife. Best piles for wildlife involve placing at least 3-5 layers of larger logs crisscrossed, or laid lengthwise in triangular shapes. Critters will create

nests and dens in the spaces you created. Cover the top with a few layers (about 2-3 feet deep) of fine branches. Habitat piles provide lots of value, and can be used as a slash treatment option. If they did catch fire, they will burn hot only in that spot, and if placed away from overhanging trees will not act as ladder fuels to the crown. Piles should be provided at a similar rate of 2-3 per acre, preferably in clusters away from roads. These are not sources of firewood and should be marked for retention after the work is done and before the other "brush" or "slash" piles are burned.

Timing

If you have the flexibility to conduct your operations in Fall and Winter, then you will reduce the chance of disturbing or destroying bird nests or small mammal dens.

Pruning

Pruning trees helps reduce the ability of a fire to climb up from the ground to the crowns of your trees. Some people really like the way it makes the forest look, neat and tidy, with great visibility. Unfortunately, all that visibility means reduces sight cover. In addition, fledging birds that still haven't quite caught on to flight and small mammals rely on low hanging branches to move up off the ground, or to hide in the dense foliage. In some situations, if you have a very old tree with large branches, your strategy might be to remove all the vegetation around that tree, or make a small "clump". You might also prioritize and only prune trees in areas where you have a ladder fuel hazard.

Ultimately, you need to create a management plan for your property that meets your goals, your resources, and the scale of your property. We feel confident that these recommendations can help anyone who is starting to plan a fuels reduction or forest health on their property but is also interested in retaining wildlife and aesthetic qualities.

Nicole Strong, Extension Forester, Deschutes/Crook/Jefferson/Confederated Tribes of Warm Springs

Illustration by Gretchen Bracher

RESOURCES:

Oregon's Know your Forest Wildlife Learning Library:

<https://tinyurl.com/yaa6fohp>

Oregon State University Extension Reducing Fire Risk on Your Forest Property:

<https://tinyurl.com/yaz9gz6u>

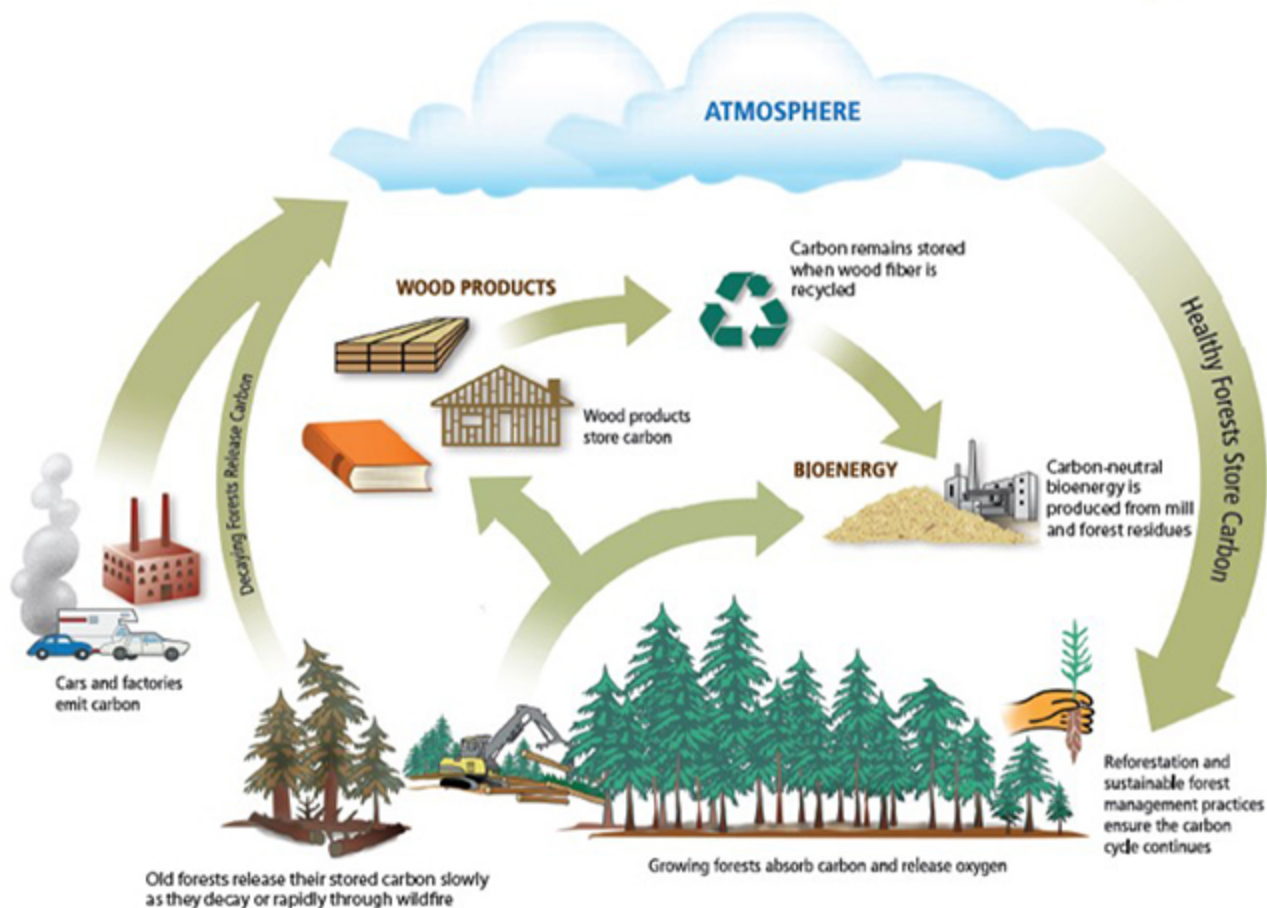
The Woman Owning Woodlands site is a joint effort of National Woodland Owners Association and the USDA Forest Service. The website is maintained by regional editors who volunteer their time to contribute to the site along with staff from the US Forest Service with financial support from the Forestry Cooperative Extension Service. National Editor: Laurie Schoonhoven, USDA Forest Service

WHAT IS A SUSTAINABLY MANAGED FOREST?

A FOREST MANAGED TO MEET ALL EXISTING REGULATIONS SUCH THAT ENVIRONMENTAL, SOCIAL AND ECONOMIC FACTORS ARE BALANCED TO MEET THE NEEDS OF THE PRESENT WITHOUT COMPROMISING THE ABILITY OF FUTURE GENERATIONS TO MEET THEIR NEEDS.

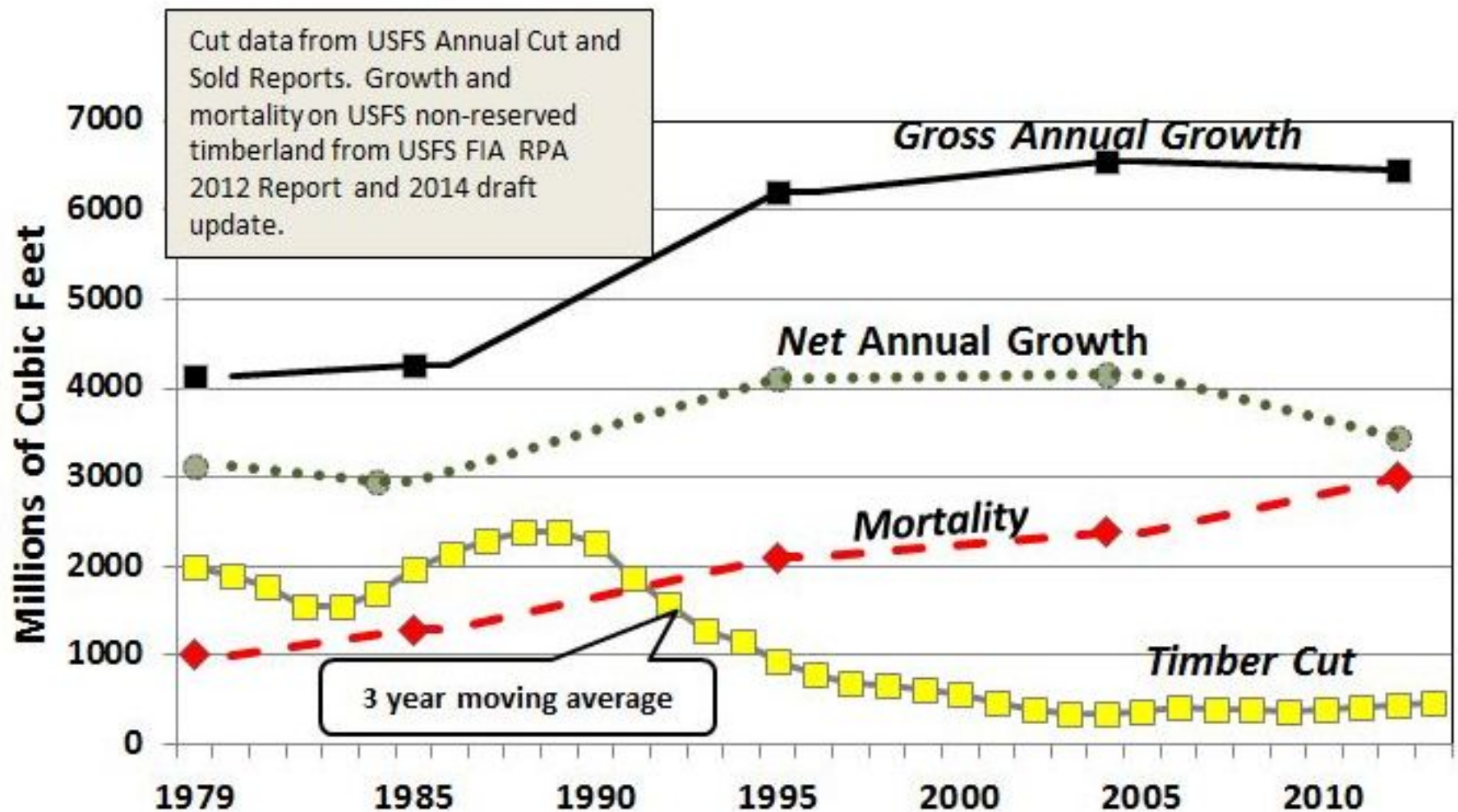


Sustainable Forestry Carbon Cycle



RESULTS OF MANAGEMENT

National Forest System Timberlands



McC Mar. 2016

During the past 30 years the timber harvest from national forests' unreserved timberlands has decreased by 83%. As unmanaged, over-dense, and aging timber stands became vulnerable to drought, fire, insects and disease, the mortality has tripled. The forests are now harvesting 7% of the annual growth while 46% of the growth dies. This while mills close, workers are idled, families are disrupted, communities die, and schools and local governments struggle to survive.

WORKSHEET - FOREST MANAGEMENT

NAME: _____

1. A person educated and trained as a forest professional is called a _____.
2. The application of business methods and technical forestry principles to the operation of a forest property is _____.
3. Managing the forest to obtain a high level of productivity is known as _____.
4. Long term planning to insure that the growth of timber on a particular piece of land will keep up with harvest is the _____ management philosophy.
5. A federally owned piece of land managed by the federal government for the purpose of preserving scenery, flora, and fauna for public enjoyment for eternity is a _____. Conversely, federally owned land managed by the government for the purpose of multiple use and sustained yield of timber is a _____.
6. Privately owned land managed by company employees or the land owner for the purpose of bearing merchantable timber that is either currently or prospectively accessible is called _____ land, or a _____.
7. After trees are cut from a piece of land, it is in the best interest of the landowner to return the land to forest (and legally required). When existing trees are allowed to disperse their seeds, or when small trees sprout from the stumps of cut trees, it is called _____. When the landowner plants seeds or small trees in the land, it is called _____.

8. An area set aside for the raising of young trees to be planted in a forest is a _____. Those young trees are called _____.
9. A _____ is a seedling that has lived in more than one place before it is planted out in the forest. Seedlings that have the soil removed before planting and are planted directly into the forest soil are _____ plantings.
10. Seedlings grown in a small tube and transported to the forest for planting intact are called _____ seedlings.
11. When the trees are finally planted in the forest, they are often set in between existing trees or brush, a process called _____.
12. A natural forest uninfluenced by human activity is a _____ forest.
13. Managing a forest properly requires the forester to have objective information about the species and ages of trees in an area. If the trees are of varying ages, it is an _____ stand, whereas an _____ stand has trees that are generally no more than 10 to 20 years different in age. The predominant species within a stand is the _____, the one around which management activities are based.
14. A forester can determine the amount of lumber contained in a tree by measuring the dbh and height and using a _____.
15. A forest full of stunted trees and/or shrubs that are not merchantable is called _____; a small but well growing tree that is one size away from being merchantable is an _____ tree.

16. _____ refers to cutting trees that are not yet merchantable size in order to allow the remaining trees (often better formed trees) room to grow faster.
17. Once a forester gets precise information on how fast the trees in a forest are growing, and how healthy they are, the location can be categorized into a _____, which are denoted by the roman numerals I, II, III, and IV. It is often helpful to the forester to put this information onto a map to get an overview of the entire property. This map is called a _____.
18. By knowing site classes of land, and using a volume table as well as other tools, the _____ or price that a stand of timber could be sold for as it stands, can be determined.

VOCABULARY LIST FOR WORKSHEET - FOREST MANAGEMENT

adolescent
artificial regeneration
bare rooted
commercial forest
container grown
even aged
forester
forest management
industrial forest
intensive forestry
interplanting
market value
national forest
national park

natural regeneration
nursery
planting stock
pre commercial thinning
principal species
scrub
site class
site map
sustained yield
transplant
tree farm
uneven aged
virgin
volume table