

FOREST AGRICULTURE and STEWARDSHIP INCENTIVES PLAN

For:

Button Rock Tree Farm

JOHN GORDON  
12712 North Saint Vrain Drive  
Lyons, CO 80540  
(303) 823-6302

40.0 acres

E1/2 W1/2 NW1/4, Sec 4, T3N, R71W, S.P.M.

Prepared By:

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February 1, 1999

This management plan has been prepared at my request to guide my forest management activities which I voluntarily apply on my property. Activities recommended in this plan are appropriate to my objectives and will benefit the natural resources on my property.

\_\_\_\_\_  
John Gordon

\_\_\_\_\_  
Date

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## OBJECTIVES

The forestry objectives for this property are:

1. Consistent with the Forest Agriculture and Stewardship Incentives Programs, to improve health and vigor of the forest and enhance its productivity.
2. Practice silviculture and multiple use management, giving particular attention to protection of wildlife habitat and recreational qualities of the area.
3. Preserve the aesthetic qualities of the property.
4. Protect soil and water resources.

## GENERAL DESCRIPTION

## Property Location

The property is adjoins the Boulder-Larimer county line, about seven miles northwest of Lyons. It is located one-half mile west of US-36.

## Area

The property contains 40.0 acres, as determined from a dependent resurvey done by the Surveyor General's Office in 1913.

A breakdown is shown below:

Forested:	25.0 Acres	Ponderosa poles, medium stocking.
	7.2 Acres	Ponderosa small sawlogs, medium stocking.
	<u>6.3</u> Acres	Ponderosa/Douglas-fir small sawlogs
	40.0 Acres	FOREST AGRICULTURE and STEWARDSHIP

## Boundary Monuments

All corners were marked by iron rebars capped with aluminum pines in preparation for subdividing the property. No attempt was made to locate corners in the field.



## Access

There is an existing driveway entering the property from US-36 from the east. The northern part of the property is accessible from it. Steep terrain limits access along the south sides and along the creek.

## TOPOGRAPHY

### Slope and Aspect

Aspect is primarily south, becoming north on the south side of the creek. On most sites, slope is around 30%, with slopes up to 60% in the southern parts of the property.

### Elevation

The lowest point is where the creek leaves the property at an elevation of about 6560 feet above sea level. The highest point is along the west line with an elevation of about 6880 feet above sea level.

### Geology

Precambrian rocks now about 1.8 billion years old were intruded about 1.4 billion years ago by the Silver Plume Quartz Monzonite Formation. This is the bedrock throughout the property.

A north-northwest trending fault of Precambrian Age passes east of, but does not cross, the property. It has occasionally been reactivated.

Lower Paleozoic rocks (Cambrian through Mississippian) are missing in this area. It is thought that these rocks once existed, but were eroded away during Early Pennsylvanian times when the area was uplifted on the northeast flank of the Ancestral Front Range uplift, one of several northwest-trending mountain ranges that comprised the late Paleozoic Ancestral Rocky Mountains. These mountains (Ouachita Orogeny) resulted from the reactivation of Precambrian structures when Africa collided with South America and the southern edge of North America. Gravel and sediments washing off the Ancestral Front Range were deposited as the Fountain Formation, which was later uplifted to form the Flatirons. By the late Paleozoic, the Ancestral Front Range was eroded to a set of low hills.



In the Early Cretaceous, the area began to subside and was eventually buried under almost 10,000 feet of marine sediment (Pierre Shale).

In the Late Cretaceous-Early Tertiary (about 67.5 million years ago), the Laramide Orogeny uplifted a mountain range with much the same configuration as the present day Front Range. Erosion about balanced uplift so that the relief was never great, much less than at present. By the Late Eocene the uplift ceased, leaving a low-profile range of hills. Most of the faulting and eastward tilting that raised the Flatirons into position occurred during the Laramide Orogeny.

Intrusive volcanic activity occurred to the east during the Paleocene, creating Valmont Dike and the basalt formation now being mined by Andesite Rock Company. No Paleocene igneous activity involved this property.

During the Oligocene this region was reduced to a plain, similar to eastern Colorado today with an elevation of about 3000 feet. In the Miocene, thermal uplift and east-west expansion formed the Rio Grande Rift and began the rise of the modern Front Range, which continues to rise today.

The property has never been glaciated (The nearest glacier reached the highway bridge at Peaceful Valley.); although Wisconsin-age and later climate fluctuations have had major impacts on plant life and continue to have an effect, even now.

## Soils

South of the creek soil is primarily in the Fern Cliff series. North of the creek, it is primarily in the Juget series.

### Fern Cliff Soil Series<sup>1</sup>

The Fern Cliff series is made up of deep, well-drained soils. These soils formed in loamy mixed alluvium on short fans and valley side slopes in the mountain area. Slopes are 15 to 60 percent. Elevations are 6,300 to 8,200 feet. The native vegetation is mainly a forest of ponderosa pine and Douglas-fir with a sparse understory of grass. Annual precipitation is 18 to 24 inches. Mean annual air temperature is 43° to 47° F., and the frost-free season is about 80 to 120 days.

In a representative profile the surface layer is dark grayish-

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<sup>1</sup>Moreland, Donald E. and Moreland, Ronald C., Soil Survey of Boulder County Area, Colorado, USDA - Soil Conservation Service, Denver, 1975.



brown stony sandy loam about 3 inches thick. The subsurface layer, about 17 inches thick, is light-gray stony sandy loam. The upper part of the subsoil, about 9 inches thick, is light-gray and yellowish-brown stony sandy loam and sandy clay loam. The sandy clay loam is in thin layers and bands in the sandy loam. The lower part of the subsoil is light brownish-gray and yellowish-brown stony sandy clay loam and sandy loam about 31 inches thick. Below this is light yellowish-brown sandy loam that contains many stones.

Fern Cliff soils have moderate to moderately rapid permeability. Available water capacity for the profile is moderate. Roots can penetrate to a depth of 60 inches or more. Moderate amounts of stone are on the surface and throughout the profile.

Reaction in the upper part of the surface layer is slightly acid, and in the subsurface layer it is medium acid. In the subsoil and substratum it is slightly acid.

These soils are used for pasture, for recreation and forestry, and for homesites.

Typical profile for Fern Cliff stony sandy loam in Fern Cliff-Allens Park-Rock outcrop complex, 15 to 60 percent slopes, located 1,400 feet south and 2,400 feet west of the northeast corner of sec.5, T. 1 N., R. 71 W.:

- O1 - 4 inches to 2, undecomposed organic material, chiefly needles, bark and twigs.
- O2 - 2 inches to 0, partially decomposed organic matter like that of the horizon above.
- A1 - 0 to 3 inches, dark grayish-brown (10YR 4/2) stony sandy loam, very dark brown (10YR 2/2) when moist; strong, fine, crumb structure; soft, very friable; 15 to 20 percent stone; slightly acid; clear, smooth boundary.
- A2 - 3 to 20 inches, light-gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) when moist; weak, fine, platy structure that parts to moderate fine granular; soft, very friable; 15 to 20 percent stone; medium acid; gradual, wavy boundary.
- A&B - 20 to 29 inches, light-gray (10YR 7/2) stony heavy sandy loam, grayish brown (10YR 5/2) when moist; weak, fine, subangular blocky structure; horizon contains thin, discontinuous, yellowish-brown (10YR 5/4) sandy clay loam lamellae and seams that are dark yellowish brown (10YR 4/4) when moist; in some places a soft matrix and very hard lamellae, and in other places a very friable matrix and friable lamellae; thin, nearly continuous clay films on ped faces in lamellae; 20 percent of soil horizon is stone; horizon is slightly acid; diffuse, wavy boundary.



- B&A - 29 to 60 inches, yellowish-brown (10YR 5/4) stony clay loam in ½- to 2-inch thick discontinuous lamellae; these lamellae are dark yellowish brown (10YR 4/4) when moist, and interspersed between them is light brownish-gray (10YR 4/2) heavy sandy loam material like that of the horizon above; dark grayish brown (10YR 4/2) when moist; lamellae have moderate, medium, subangular blocky structure, and interspersed material is massive; lamellae are very hard and friable and interspersed material is slightly hard and very friable; lamellae have thin, continuous clay films on ped faces; this horizon is 20 percent stone; slightly acid; gradual, wavy boundary.
- C - 60 to 80 inches, light yellowish-brown (2.5Y 6/3) very stony sandy loam, light olive brown (2.5Y 5/3) when moist; massive; slightly hard, very friable; 60 percent stone; slightly acid.

The A1 horizon ranges from 0 to 4 inches in thickness, and in some places it is absent. The A2 horizon ranges from loamy sand to sandy loam in texture. Content of coarse fragments ranges from 5 to 35 percent throughout the solum, but reaches as high as 60 or 70 percent in the C horizon. Depth to bedrock is 60 inches or more.

Fern Cliff-Allens Park-Rock outcrop complex, 15 to 60 percent slopes (FcF). - This complex is made up of about 30 percent Fern Cliff stony sandy loam, about 30 percent Allens Park gravelly sandy loam, and about 20 percent Rock outcrop. ....

Fern Cliff soils are on mountain slopes and short fans. Allens Park soils are on ridges and side slopes, and on saddles between the ridges. Rock outcrop is throughout the property, but mainly on ridges.

Included with this complex in mapping are minor areas of Fern Cliff stony loamy sand, Juget soils, Peyton soils, and narrow bands of alluvial soils along drainageways. These included soils make up about 20 percent of the property north of the creek.

Runoff is medium to rapid on areas of this complex. The erosion hazard is high.

All of the acreage of this complex is woodland. Timber cutting is somewhat limited by the steep slope and the slow growth of trees. Some areas are used for grazing. Many areas are now used as sites for cabins and homes, and for recreational uses and wildlife habitat. (Capability unit VIIe-1, nonirrigated; tree suitability group 1)



Juget Soil Series<sup>2</sup>

The Juget series is made up of shallow, somewhat excessively drained soils. These soils formed on mountain slopes and ridges in sandy residuum weathered from granite. Slopes are 9 to 55 percent. Elevations are 6,300 to 8,200 feet. At lower elevations the native vegetation is mainly ponderosa pine, and at higher elevations it is Engelmann spruce and Douglas-fir with an understory of grass. Annual precipitation is 18 to 24 inches. Mean annual air temperature is 43° to 46° F., and the frost-free season is about 80 to 120 days.

In a representative profile the surface layer, about 6 inches thick, is dark-gray very gravelly sandy loam. The underlying material, about 5 inches thick, is brown very gravelly loamy sand. Underlying this layer is granite. Soil reaction is slightly acid.

Juget soils have rapid permeability. Available water capacity for the profile is low. Roots can penetrate to a depth of less than 20 inches.

These soils are used mainly for grazing, although some areas with scattered trees are used for recreation, forestry and homesites. The grass cover must be maintained to help prevent erosion.

Representative profile of Juget very gravelly sandy loam, in Jug-et-Rock outcrop complex, 9 to 55 percent slopes, located 2,540 feet north and 650 feet east of the southwest corner of sec. 11, T. 1 N., R. 71 W.:

- A1 - 0 to 6 inches, dark-gray (10YR 4/1) very gravelly sandy loam, black (10YR 2/1) when moist; weak, very fine, granular structure; soft, very friable; 60 percent gravel and stone; slightly acid; clear, smooth boundary.
- C - 6 to 11 inches, brown (10YR 5/3) very gravelly loamy sand, dark grayish brown (10YR 4/2) when moist; massive; hard, friable; about 80 percent fine gravel; slightly acid; clear, wavy boundary.
- R - 11 inches, hard granite bedrock.

The A1 horizon ranges from 4 to 8 inches in thickness and very gravelly sandy loam to very gravelly loamy sand in texture. Depth to bedrock ranges from 10 to 20 inches. The average rock fragment content of the soil ranges from 50 to 70 percent and is dominantly fine gravel.

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<sup>2</sup>Moreland, Donald E. and Moreland, Ronald C., Soil Survey of Boulder County Area, Colorado, USDA - Soil Conservation Service, Denver, 1975.



Juget-Rock Outcrop Complex, 9 to 55 percent slopes (JrF). - This complex is made up of about 50 percent Juget very gravelly sandy loam and about 30 percent rock outcrop. .... The profile of the Juget soil in this complex is the one described as representative of the Juget series.

Included with this complex in mapping are small areas of Peyton soils near drainageways and a few small areas of Allens Park soils. These included soils make up about 20 percent of each mapped area.

Runoff is rapid on this complex. The erosion hazard is high. Juget soils take in water rapidly, but they retain only limited amounts for plant use because of their shallow depth to bedrock.

None of this complex is suitable for cultivation. It is in grass and scattered trees and shrubs. In the past, it was used for grazing livestock and for forestry, but now many areas are used for homesites, recreational purposes, and wildlife habitat. (Capability unit VIIIs-1, nonirrigated; tree suitability group 2)

#### LOCAL MARKETS

Sawtimber markets in Boulder and vicinity are severely limited and do not apply on this property, anyway. Firewood markets are very weak at the moment, but still able to handle expected cutting on the property.

#### LAND USE

##### Current

The property is being used as a homesite. Mr. Gordon makes recreational use of the property, is interested in enhancing its appearance and in reducing taxes. Product values are being considered because they are required by both Forest Agriculture and Stewardship Incentives.

##### Historical

The current forest typology originated following a major climatic shift at the end of the Pleistocene, about 11,000 years ago. Species that now occur at 9500 to 10,500 feet of elevation, such as Engelmann spruce and subalpine fir grew here.

During the Altithermal, about 7000 to 9000 years ago, the climate became even warmer and dryer than it is now. Most of this prop-



erty was probably pure stands of ponderosa pine during the Altithermal.

The current forest originated about 1760 following a major fire. This is surmised from the existence of a class of Douglas-firs, all dating from about the same decade. The only known agent capable of large-scale land clearing over thousands of acres, is fire.

About 1853 a large fire burned the area west of Boulder, including most of western Boulder County. According to local legend, this fire was set by Arapahos, angry at being cheated by whites. One suspects the legend sprang up later so that whites would not have to take the blame for settlers' carelessness.

The property was horse-logged in the 1870s. It has been grazed since, but because of steep, rocky terrain, cattle have had little impact. Grazing ended when the property was bought by Mr. Gordon's father.

The township was originally surveyed in the 1870s or 1880s (I don't have a copy of the original survey for this township.). A dependent resurvey was done in 1913 by Wallace Shapcott. The Surveyor General's map dated January 29, 1916 shows a trail crossing the property on the high ground north of the creek. This trail appears to have provided access to summer range for cattle. The same map shows Button Rock. It also shows the Little Thompson River arising in Section 5 where, in fact, your creek originates. US-36 is shown as "Stage Road."

Mountain pine beetles avoided this stand during the epidemic of the 1970s. Spruce budworm has attacked the stand south of the creek, but damage was minor.

#### DESIRED CONDITIONS

Healthy, vigorous, fully-stocked stands of trees are required by both the Forest Agriculture and Stewardship Incentives Programs. This condition need not be achieved immediately, but progress should be made in this direction.

It would be desirable to increase the area's usefulness to wildlife, indirectly enhancing recreational values. In particular, nesting sites for cavity-nesting birds and shelter piles for small animals would be beneficial.



## IMPACT ON NEIGHBORS &amp; NEARBY COMMUNITIES

Potential cutting sites are located well off the highway where they would not be easily seen by the public. Visual impacts will be minimal.

## INVENTORY

Stand A (7.2 acres) is a ponderosa pine large pole stand. Stocking is medium with a basal area of about 70 square feet per acre. Stand age is about 100 years.

Stand B (7.2 acres) is the stand surrounding the house and barn. It has two components: a lightly stocked area around the buildings (5.0 acres) and a heavily-stocked area south (downhill) of the house (2.2 acres). This is a small sawtimber ponderosa stand that averages about 70 square feet of basal area. Stand age is about 100 years. A Defensible Space practice around the house would reduce fire hazard and provide this stand with the only treatment it really needs.

Stand C (17.8 acres) is actually the same stand as Stand A. These adjoin across land recently sold.

Stand D (6.3 acres) is a ponderosa pine/Douglas-fir small sawtimber stand. It is heavily stocked; basal area averages about 120 square feet per acre. About fifteen years ago it was attacked by spruce budworms which killed many trees. These trees are beginning to decay and fall over, creating fuel jackpots that will cause serious damage to live trees should this stand ever burn.

## Threatened and Endangered

The U. S. Fish and Wildlife Service lists the following species for Boulder County:

American peregrine falcon, Falco peregrinus, Endangered  
Bald eagle, Haliaeetus leucocephalus, Endangered  
Whooping crane, Grus americana, Endangered  
Eskimo curlew, Numenius borealis, Endangered  
White-faced ibis, Plegadis chihi, Category 2  
Mountain plover, Charadrius montanus, Category 1  
Northern goshawk, Accipiter gentilis, Category 2  
Black tern, Chlidonias niger, Category 2  
Mexican spotted owl, Strix occidentalis lucida, Threatened  
Loggerhead shrike, Lanius ludovicianus, Category 2  
Boreal toad, Bufo boreas boreas, Category 2  
Black-footed ferret, Mustela nigripes, Endangered



Preble's meadow jumping mouse, Zapus hudsonius preblei,  
Category 2  
Fringed-tailed myotis, Myotis thysanodes pahasapensis,  
Category 2  
North American wolverine, Gulo gulo luscus, Category 2  
Swift fox, Vulpes velox, Category 2  
Greenback cutthroat trout, Oncorhynchus clarki stomias,  
Threatened  
Plains topminnow, Fundulus sciadicus, Category 2  
Rocky Mountain capshell, Acroloxus coloradensis, Category 2  
Regal fritillary butterfly, Speyeria idalia, Category 2  
Lost ethmiid moth, Ethmia monachella, Category 2

The following plants are also listed:

Bell's twinpod, Physaria bellii, Category 2  
Larimer aletes, Aletes humilis, Category 2  
Ute ladies'-tresses orchid, Spiranthes diluvialis,  
Threatened  
Colorado butterflyweed, Gaura neomexicana coloradensis,  
Category 1  
Showy prairie gentian, Eustoma graniflorum, Category 2  
Pale moonwort, Botrichium pallidum, Category 2  
Purple lady's slipper orchid, Cypripedium fasciculatum,  
Category 2

The peregrine falcon and bald eagle have been observed in Boulder County numerous times since 1987. The white-faced ibis has been observed just across the county line at Continental Pond in Weld County in the fall of 1994.

The purple lady's slipper has been observed several times since 1987.

The Mexican spotted owl occurred in Boulder County historically, but has not been seen here since the Threatened and Endangered Species Act was passed in 1973. The nearest known nest is located south of Denver in Douglas County. A detailed search of Coal Creek, Boulder and Lefthand canyons and their tributaries is planned for the summer of 1995.

The northern goshawk is favored by the many age classes of trees created by rotational cutting. As long as buffer zones are left around nests (30 acres) and cutting activities avoid a fledging area (400 acres) during the fledging season, there should be no problems. Though this bird may occur in Boulder County, I am not aware of it.

To the best of my knowledge, the black-footed ferret is listed only because its prey (prairie-dogs) is found here. I do not know of any sightings. The ferret is a creature of the plains and would not pose a problem for most mountain projects.



The whooping crane was included on the list because it might come here during migration. Again, I am not aware of any sightings. The same applies to the Eskimo curlew.

The Ute ladies'-tresses only occurs below 7000 feet; there is no need to worry about it at higher elevations.

The black tern is a shorebird and is a concern around creeks and reservoirs, but not in the mountains, away from water.

The black-footed ferret, preble's meadow jumping mouse, fringed-tailed myotis, Colorado butterflyweed and showy prairie gentian occur only in the plains. The mountain plover, northern goshawk, Mexican spotted owl and purple lady's slipper occur only in the mountains (except for a single spotted owl sighting in Adams County).

Other listed species could occur in either mountains or plains, especially areas where forest and prairie intermix.

#### PRESCRIPTION BY MANAGEMENT UNIT

##### All Stands

Thin to 100 square feet of basal area per acre. This should be done slowly, at a rate of about 3.2 acres per year, with the entire operation spread over 12.5 years. This is done to increase growth rates of residual trees. Mature trees will be "stored on the stump" until there are enough to make harvesting silviculturally desirable (probably about 2010-2020). Selected dead trees will be preserved as wildlife trees and a few additional trees killed to create snags. Following thinning, unoccupied holes in the stand will be planted (mostly with ponderosa pines).

Thinning will yield about two cords to the acre, an average production of a little over 25 cords per year of ponderosa pine and Douglas-fir firewood.

In areas where access is difficult, slash is to be piled for animal shelter ("bunny huts").

Roads and skid trails will be gradually extended into the stands as needed.

Colorado State Forest Service foresters will set work standards for residual stocking. If a contractor is used to do part of the work, standard CSFS cutting regulations will apply. Landowner may set his own rules for slash and cleanup requirements for work that he does.



Accessibility will determine the order in which work is implemented - accessible areas first.

Stand B: A Defensible Space strip near the house will give fire-fighters a chance to stop a fire before it can reach the house. This treatment can be extended beyond the usual 1.2 acres, if desired. The Defensible Space practice is optional, not required and is cost-sharable. The following standards apply:

1. Thin so residual crowns do not touch.
2. Remove "fire ladders (branches, bushes and small trees)" to a height of ten feet so that fire cannot climb from the ground into the tree tops.
3. Chip and/or remove resulting slash and burnable debris.
4. Be sure the Defensible area extends at least 100 feet downhill from the house and at least fifty feet in all other directions. See CSFS publications for more detail.

#### IMPLEMENTATION SCHEDULE

1999:

Thin 3.6 acres in Stand A. Thinning includes the cutting phase of dwarf-mistletoe reduction, if applicable to the site. Make use of Stewardship cost-sharing, if available. In practice, these sales usually take more than one year. We will be lucky if this project can be completed by the end of 2001. Adjustments to the plan are usually needed after the first two or three years.

2000:

1. Thin the rest of Stand A (3.6 acres), as above.
2. Complete Defensible Space practice around house and barn. Use SIP cost-sharing, if available (This practice is not required by either program; however, it is recommended.).
3. Prune dwarf-mistletoe from Block 1999, if applicable. Use SIP cost-sharing (65% of cost, up to \$200 per acre for a first-time pruning), if available.

2001:

1. Thin 3.6 acres in Stand C, as above.
2. Prune dwarf-mistletoe from Blocks 1999 and 2000. Use SIP cost-sharing, if available (Second and third dwarf-



mistletoe prunings are cost-shared at 65% of cost up to \$70 per acre; cost-sharing is not available for fourth or later prunings.)

## 2002:

1. Thin 3.6 acres in Stand C.
2. Prune dwarf-mistletoe from Blocks 1999, 2000 and 2001. Use SIP cost-sharing, if available. After the third pruning, dwarf-mistletoe, if present, should be so reduced as to have a negligible effect.

## 2003:

1. Thin 3.6 acres in Stand C.
2. Prune dwarf-mistletoe from Blocks 2000, 2001 and 2002.
3. Plant Block 1999. The exact number of seedlings needed will depend upon the residual stocking. A seedling cruise in 2002 will be needed to determine this. The objective is to achieve 100 growing stock level. SIP cost-sharing may reimburse \$410 per acre for planting and 65% of cost up to \$775 per acre for weed barrier; the total not to exceed \$1000 per acre). In addition, planting costs are eligible for the 10% investment tax credit (Expenses that are not cost-shared can be amortized over 84 months (straight-line amortization, half-year convention) and deducted from income. Consult your tax preparer for details.
4. Review this plan. Update and revise, if needed.

## 2004:

1. Thin 3.6 acres of Stand C.
2. Prune dwarf-mistletoe from Blocks 2001, 2002 and 2003.
3. Plant Block 2000.
4. Interplant failed seedlings in Block 1999 (Losses are usually around 12% during the first winter, around 8% during the second winter and around 4% in the third winter. After that, they are negligible.)

## 2005:

1. Thin 3.4 acres of Stand C.
2. Prune dwarf-mistletoe from Blocks 2002, 2003 and 2004.
3. Plant Block 2001.
4. Interplant failed seedlings in Block 2000.



2006:

1. Thin 3.2 acres of Stand D. Include Douglas-fir salvage.
2. Prune dwarf-mistletoe from Blocks 2003, 2004 and 2005.
3. Plant Block 2002.
4. Interplant failed seedlings in Block 2001.

2007:

1. Thin Remainder of Block D (3.1 acres).
2. Prune dwarf-mistletoe from Blocks 2004, 2005 and 2006.
3. Plant Block 2003.
4. Interplant failed seedlings in Block 2002.

2008:

1. Prune dwarf-mistletoe from Blocks 2005, 2006 and 2007.
2. Plant Block 2004.
3. Interplant failed seedlings in Block 2003.
4. Prepare new plan for the next decade. There is a requirement of the Forest Agriculture Program.

#### Subsequent Years:

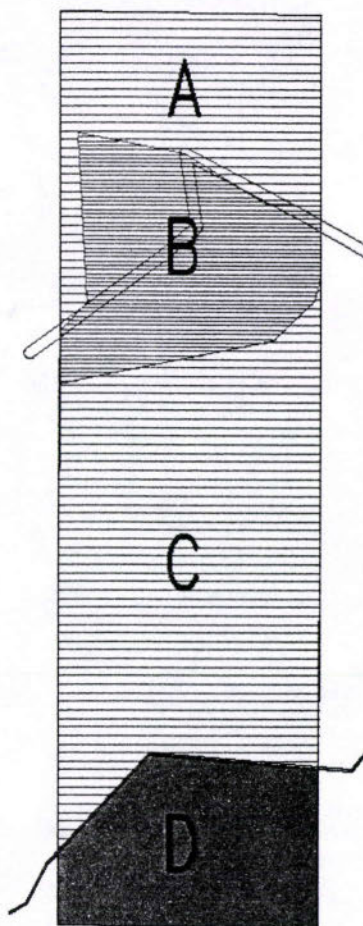
By this time, the entire property should be finished. The only real change in the new plan anticipated at this time is some adjustment of dates and acreages. It is unlikely that the practices recommended will actually be completed exactly on schedule.

Once the entire property has been thinned and brought to optimum stocking (in 2007), only light thinning and dwarf-mistletoe control is anticipated for the second cycle (ending in 2019).



Colorado State Forest Service

Scale: 1/6717; 1 Inch = 560 Feet



John Gordon

NW1/4, Sec 4, T3N, R71W, S.P.M.

—— Property Line  
—— Road  
—— Permanent Stream

PP2=  
PP3=  
PP/DF3~

Drawn By: Douglas J. Stevenson

February 1, 1999



DOUGLAS-FIR (Pseudotsuga menziesii (Mirb.) Franco<sup>3</sup>)

#### BOTANICAL FEATURES

**Leaves**  $\frac{3}{4}$ " to  $1\frac{1}{4}$ " long, yellow-green or blue-green, more or less flattened, standing out from all sides of the twig or with a tendency to be somewhat 2-ranked; apex rounded-obtuse or rarely acute, stomatiferous below, persistent for 8 or more years. **Cones** 3" to 4" long, pendent, ovoid-cylindric, with exserted, 3-lobed, forklike, appressed or strongly reflexed bracts; seeds triangular, terminally winged; about 42,000 seeds to the pound, dewinged.

**Buds** fusiform, sharp-pointed, lustrous brown.

**Bark** on young stems smooth except for resin blisters; at length becoming 6" to 24" thick on old trees, and then divided into thick reddish-brown ridges separated by deep irregular fissures. In a few instances the bark is "tight" (fine-textured) on old trees and corky on others, particularly those of the mountain form.

#### GENERAL DESCRIPTION

Douglas-fir, monarch of Pacific Northwest forests, was first observed by Menzies on Vancouver Island when he accompanied the British naval captain Vancouver on an expedition to the Pacific Coast in the early 1790s. For more than a quarter of a century this tree was variously classified as a spruce, hemlock, true fir, and even as a pine; in fact logs exported by the Hudson's Bay outpost near the mouth of the Columbia River were listed in European ports as "Oregon pine," a name which has persisted in the trade to this day, especially in Australia. It remained for David Douglas, a Scottish botanist sent out by the Royal Horticultural Society in 1825, to study this tree, to show that it was sufficiently different to be considered as separate from other previously described conifers; later Carrière coined the new generic name Pseudotsuga. This name was a rather unfortunate choice, since it literally means "false hemlock." The common name, Douglas-fir (The names red fir and yellow fir have been used by loggers and lumbermen to differentiate locally certain specimens on the basis of ring width, color and softness.), commemorates Douglas, and in addition serves to distinguish this species from the true fir (Abies).

Douglas-fir is a dimorphic species with two more or less distinct forms (Several European workers have claimed that there are three species of Douglas-fir; this is based largely upon needle structure. Studies by W. E. Kilgore at the New York State College of

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<sup>3</sup>Harlow, William M. and Harrar, Ellwood S. Textbook of Dendrology, Fifth Edition, McGraw-Hill, 1968.



Forestry have failed to substantiate this viewpoint.). One of these is restricted to the forests of the Pacific slope, and the other to those of the Rocky Mountain region.

The Rocky Mountain form of Douglas-fir is considered distinct from the coast form by some taxonomists, who accordingly classify it as Pseudotsuga glauca Mayr. or Pseudotsuga menziesii var. glauca (Beissn.) Franco. However, in certain sections, the two types intergrade. Usually the foliage of the Rocky Mountain tree is blue-green, but sometimes trees with blue-green foliage and others with yellow-green leaves are found standing together. Similarly, although yellow-green crowns are typical of the coast form, some trees show a blue-green coloration. The principal botanical difference between these two forms lies in the structure of their cones. Rocky Mountain trees have small cones rarely 3 inches in length, with much-exserted and strongly reflexed bracts. By contrast, the cones of the coast form are often 4 in. long and have straight, more or less appressed bracts.

Douglas-fir comprises about 50 percent of the standing timber of our western forests. It produces more timber than any other American species and at the present time furnishes about one-fifth of the total annual cut.

#### ROCKY MOUNTAIN FORM

The Rocky Mountain form of Douglas-fir rarely exceeds a height of more than 130 ft or a diameter of 3 ft. It occurs in both pure and mixed stands with ponderosa pine, western larch, and grand fir. Other associates include western hemlock, western white and lodgepole pines, Engelmann spruce, white fir and aspen. Douglas-fir is more tolerant than these except the hemlock and spruce.

Although most abundant on moist sites, Rocky Mountain Douglas-fir is quite drought resistant and is often found on arid areas with ponderosa pine. It is frost-resistant and hardy in the East and is a common ornamental of that region. The trees are grown for timber in Europe and have been planted successfully in many parts of the world.

#### RANGE

Western United States and British Columbia. Altitudinal distribution: sea level to 5,000 ft along the coast; 4,000 to 6,000 ft inland; 10,000 ft in the southern Rocky Mountains.



LIMBER PINE (Pinus flexilis James)<sup>4</sup>

## DISTINGUISHING CHARACTERISTICS

Needles in 5's about 2½" long, clustered near the branch ends, dark green, stout, rigid, stomatiferous on all surfaces; resin canals dorsal. Cones 3 to 10 in. long, cylindrical, the scales thickened, and slightly reflexed at the apex; seeds large, with rudimentary wings or wingless. Bark on young stems smooth, silvery white to light gray or greenish gray; that on old trunks dark brown to nearly black, separated by deep fissures into rectangular to nearly square, superficially scaly plates or blocks.

## GENERAL DESCRIPTION

Limber pine was first observed near Pike's Peak by Dr. Edwin James, an army surgeon attached to Long's Mountain Expedition of 1820. Like other relatively inaccessible trees of high altitudes, limber pine is primarily of importance in protection of valuable watersheds. Ordinarily the tree attains but small proportions, varying from 30 to 50 ft in height and from 15 to 24 in. d.b.h. (max. 85 by 7 ft). The bole is stout, noticeably tapered, and supports a number of large plumelike often drooping branches. The result is an extensive crown which not infrequently reaches to within a few feet of the ground. Young trees develop a long, sparsely branched taproot which is later supplemented by several laterals.

## RANGE

East slopes of the Rocky Mountains in southern British Columbia and southern Alberta, south along the mountains to Arizona and New Mexico; west to the mountains of southern California, and north along the Sierra Nevada to northern California; east through Nevada and Idaho (one outpost is found in the Black Hills of South Dakota). Altitudinal distribution: 4,000- to 10,000-ft elevation in Montana, Wyoming, and Idaho; 4,500 to 11,500 ft in Colorado; 8,000 to 11,800 ft in southern California.

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<sup>4</sup>Harlow, William M. and Harrar, Ellwood S., Textbook of Dendrology, Fifth Edition, McGraw-Hill, New York, 1968.



PONDEROSA PINE (Pinus ponderosa Laws.)<sup>5</sup>

## BOTANICAL FEATURES

Needles in 3's, or 2's on the same tree, 5" to 11" long, dark gray-green to yellow-green, flexible, persistent until the 3rd season. Crushed needles have a turpentine odor similar to that of most other pines.

Cones 3" to 6" long, ovoid to ellipsoidal, sessile, solitary or clustered; usually leaving a few basal scales attached to the twig, when shed; apophysis dark reddish brown to dull brownish yellow, transversely ridges and more or less diamond-shaped; umbo dorsal, with a slender, often deciduous prickle; seeds ¼" long, ovoid, slightly compressed toward the apex, brownish purple; wings moderately wide, about 1" long; about 12,000 (6,900-23,000) seeds to the pound.

Twigs stout, exhaling a turpentine odor when bruised; buds usually covered with droplets of resin.

Bark brown to black and deeply furrowed on vigorous or young trees (bull pines); yellowish brown to cinnamon-red and broken into large flat, superficially scaly plates separated by deep irregular fissures on slow-growing and old trunks.

## GENERAL DESCRIPTION

This is the most important pine in western North America, and in the United States is found in commercial quantities in every state west of the Great Plains. At present it furnishes more timber than any other American pine and in terms of total annual production of lumber by species is second only to Douglas-fir.

Ponderosa pine is a large tree 150 to 180 feet high and 3 to 4 ft in diameter (On the best sites, 300-year-old dominant trees average about 175 ft high and 48 in. d.b.h.) (max. 262 by 8.6 ft). Even though this species commonly forms open parklike forests, the boles are ordinarily symmetrical and clear for one-half or more of their length; short conical or flat-topped crowns are characteristic of old trees. Four-year-old trees may have tap-roots four to five feet long. Moderately deep wide-spreading laterals develop as the trees get older. Ponderosa pine is not exacting in its soil requirements, but trees on thin, dry soils are usually dwarfed. Its occurrence on dry sites with the nut pines and certain of the junipers is indicative of its great resistance to drought. This species attains its greatest development, however, on the relatively moist but well-drained western

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<sup>5</sup>Harlow, William M. and Harrar, Ellwood S., Textbook of Dendrology, Fifth Edition, McGraw-Hill, 1968.



slopes of the Siskiyou and Sierra Nevada Mountains of southern Oregon and California, respectively.

Ponderosa pine occurs in pure and mixed coniferous stands. Excellent pure forests are found in the Black Hills of South Dakota, the Blue Mountains of Oregon, the Columbian Plateau northeast of the Sierra Nevada, and in northern Arizona and New Mexico. It is also commonly the most abundant tree in mixed coniferous stands; east of the summit of the Cascade Range in Washington and Oregon it occurs with western larch, Douglas-fir, and occasionally lodgepole pine; in the central Rocky Mountains with Douglas-fir; and in California with Jeffrey and sugar pines, incense-cedar, Douglas-fir, and white fir. On the Fort Lewis plains in western Washington, near Puget Sound, ponderosa pine is occasionally found in association with Douglas-fir and Oregon white oak.

Small quantities of seed are produced annually, but large crops are released only at intervals of three to five years. Under forest conditions germination as high as 50 percent may be anticipated, but in the nursery this figure can be increased to 80 percent. Seedlings can exist under the canopy of the parent trees, even though they grow quite slowly, and in such conditions often attain a height of only 3 to 4 ft during the first 15 to 20 years. Reproduction is best in clearings made by fire or logging. The seedlings will grow on sterile sites and have been planted extensively in the Nebraska sand hills and elsewhere. Ponderosa pine is classed as intolerant.

The rapidity of growth has a marked effect on the general appearance of the trees of this species. Young, vigorous specimens commonly develop dense crowns of dark foliage, and bark which is dark brown to nearly black, more or less corky, and deeply furrowed. In contrast, the foliage of old-growth or slow-growing trees is yellow-green, and the bark yellow-brown to cinnamon-red and plated. Those of the first type are generally called "bull" or "blackjack pines," and to some woodsmen ponderosa pine and bull pine are different trees. Fast-growth bull pines 150 years of age found near Cle Elum, Washington, measured 30 to 40 in. in diameter, while more typical ponderosa pines occurring in the same vicinity were only 10 to 14 inches in diameter at the same age. The growth of this species varies considerably with locality. In California, trees 120 years of age averaged 23 in. d.b.h., while in Arizona trees of the same age were only 16 in., and in the black hills 10½ in. Trees over 500 years of age are seldom encountered (Keen considers that this pine may reach an age of 800 years, while Mills reported a tree in southwestern Colorado with 1047 rings.). Severe damage is caused by bark beetles, and ponderosa pine is also attacked by more than 100 other kinds of insects. Fires kill seedlings and cause considerable damage even to large trees. Severe fires in the past have completely destroyed hundreds of thousands of acres of ponderosa



pine forest. Other destructive agents include mistletoe and fungi.

The common name ponderosa pine is identical with the species name. Previously called western yellow pine, logs of this tree were also sold under such names as Arizona white pine, California white pine, and western soft pine, since the wood resembles that of the white pines rather than that of the hard, moderately heavy wood of the southern yellow pines. Finally, the name ponderosa pine was adopted by the U. S. Forest Service, and it is now accepted by the industry.

#### RANGE

Western North America. Altitudinal distribution: 5,000 to 8,000 ft in Arizona, 3,300 to 6,000 ft in Montana and South Dakota, 2,000 to 7,000 ft in northern Idaho, sea level to 6,200 ft in British Columbia and Washington, sea level (Columbia River Valley) to 7,000 ft in Oregon, 300 to 7,000 ft in northern California, 4,000 to 9,000 ft in southern California; for the most part a tree of relatively low elevations.

ALDER (Alnus B. Ehrh.)<sup>6</sup>

#### BOTANICAL FEATURES OF THE GENUS

Leaves mostly ovate, oval, or obovate; usually irregularly serrate or dentate.

Flowers staminate aments preformed, in racemose clusters of 3 to 5, the individual flowers consisting of 1 to 4 stamens attached to a 4-parted calyx and subtended by 3 to 5 bractlets, with 3 to 6 flowers for each scale; pistillate aments often preformed, in clusters of 2 or 3, the individual flowers composed of a naked ovary surmounted by two stigmas and subtended by 2 to 4 bractlets, in clusters of 2 to 4 at the base of bracts.

Fruit a small nutlet borne in a persistent semiwoody strobile or cone; nutlets compressed, laterally winged, chestnut-brown.

Twigs slender to moderately stout, reddish or tinged with red; buds stalked, covered by 2 or 3 valvate or imbricate scales; leaf scars raised, more or less triangular to semicircular, generally with 3 bundle scars; pith homogeneous, triangular in cross section.

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<sup>6</sup>Harlow, William M. and Harrar, Ellwood S. Textbook of Dendrology, Fifth Edition, McGraw-Hill, New York, 1968.



THIN-LEAF ALDER (Alnus tenuifolia)<sup>7</sup>

Thin-leaf alder is more of a bush than a tree. It rarely gets more than 4" d.b.h. or more than 30 ft high. It grows in multi-stemmed clumps along flowing streams and localized wet areas in the lower mountains and foothills. It is not a commercial species and does not qualify as "forest" for purposes of the Forest Agriculture Program; although, there are usually plenty of commercial trees nearby, so the distinction is usually moot. It is in demand for silk tree cores because its bark can be stained to a deep purple color.

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<sup>7</sup>Stevenson, Douglas J. Mountain Alder, Colorado State Forest Service, Boulder, 1994.



DWARF-MISTLETOE<sup>8</sup>**Quick Facts**

Dwarf mistletoe causes a serious forest problem in many parts of Colorado.

Hosts for mistletoe include most members of the pine family. The seeds of mistletoe are dispersed in August and early September.

The ultimate effect of dwarf mistletoe is premature death of the affected tree.

Dwarf mistletoes (Arceuthobium spp.) are a major problem in Colorado forests on ponderosa and lodgepole pine. Other members of the pine family, Douglas-fir, pinyon and limber pine are damaged occasionally. Nursery and ornamental plantings seldom are attacked; however, this parasite can be introduced into an area by the planting of collected stock infected with dwarf mistletoe.

Dwarf mistletoes are small, leafless, parasitic flowering plants. The seeds, explosively discharged from the fruit, are very sticky and adhere to any surface they strike. Seeds that adhere to young branches of susceptible trees germinate and the mistletoe plant penetrates the bark. These seeds generally are dispersed in August and September.

This parasite is easily identified by the yellow to green or brownish-green segmented shoots that protrude from the infected part of the tree. These perennial shoots are 2 to 6 inches (5-15 centimeters) long and  $\frac{1}{8}$ - to  $\frac{1}{4}$ -inch (.3-.6-cm) in diameter.

The "roots" of the dwarf mistletoe are imbedded in the bark and phloem of the tree. The parasite produces secondary root-like structures called "sinkers" that become imbedded deeper in the wood as the twig adds its annual growth rings. These "roots" provide the parasite with nutrients obtained from the living tissues of its host.

**Symptoms**

The first symptom of dwarf mistletoe infection is a slight swelling of the bark at the site of infection. As the "roots" of the parasite become more extensive in the host, a distorted branching habit or witches' broom may form. The witches' broom diverts food from uninfected parts of the tree, subsequently

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<sup>8</sup>Swift, C. E. and Dickens, L. E. Dwarf-Mistletoe, Colorado State University Extension Service, Service in Action Leaflet No. 2.925.



reducing vigor and causing premature death of the tree. Infected trees that do not develop witches' brooms usually have visible mistletoe shoots protruding from the infected area; however, shoots are not formed until two to three years after infection.

### Control

Pruning is the best control measure available for reducing or eliminating dwarf mistletoe infections in ornamental trees or urban forests. Trees severely infected in the upper branches or those with only a few live branches should be cut. Trees with high, unreachable mistletoe infections will continue to rain seeds on nearby trees if not cut down.

Lightly infected trees can be freed from the parasite by pruning off all infected branches. All branches to be pruned should be cut off flush with the trunk. The entire branch should be removed. The trees should be examined every two or three years and any infected branches pruned off. The mistletoe shoots die as soon as the branch is cut, consequently burning pruned-off branches is not necessary.

If the mistletoe on a branch is close to the trunk the infection may have already entered the trunk. Shoots will form on the trunk even if the branch is removed. When pruning infected limbs, the following guidelines should be used to insure the trunk is free from infection. Trees with infections closer than indicated should be cut down to remove a future source of infection.

Branch diameter (outside bark)	Distance of infection on branch from trunk
Under 1.0 inch (2.5 centimeters)	6 inches (15.2 cm)
1.1 - 2.0 inches (2.8 - 5.1 cm)	8 inches (20.3 cm)
2.1 - 3.0 inches (5.3 - 7.6 cm)	10 inches (25.4 cm)
3.1 - 4.0 inches (7.9 - 10.2 cm)	12 inches (30.5 cm)

In some cases a highly desirable tree with a trunk infection cannot be removed for aesthetic or other reasons. In these instances, the mistletoe shoots must be knocked off periodically as they appear to prevent further spread.

In heavily infested areas, nonsusceptible trees can be planted to replace cut trees. Ponderosa pine areas can be planted to:

Douglas-fir	Pinyon pine	White fir
Limber pine (sic)	Blue spruce	Rocky Mountain juniper

In lodgepole pine areas, the following trees can be substituted:

Engelmann spruce	Subalpine fir	Douglas-fir
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Hardwoods such as ash, birch and aspen, also can be planted in



affected areas because dwarf mistletoes do not attack hardwood trees.

#### DWARF-MISTLETOE ADDENDUM<sup>9</sup>

Three species of dwarf-mistletoe occur in Boulder County. They are ponderosa pine dwarf-mistletoe (Arceuthobium vaginatum), lodgepole pine dwarf-mistletoe (Arceuthobium americanum) and limber pine dwarf-mistletoe (Arceuthobium cyanocarpum), each named for its primary host.

Besides its primary host, each dwarf-mistletoe species attacks the other two pine species as a secondary host (Limber pine is attacked by ponderosa pine dwarf-mistletoe as a secondary host and should not have been listed on the Service in Action leaflet as suitable for planting on ponderosa pine sites.). Only in rare circumstances are other species of trees affected.

Dwarf-mistletoe infects and eventually kills its primary host. Secondary hosts are much more resistant to attack. There are numerous examples of secondary host trees standing in the middle of heavy dwarf-mistletoe infections without becoming infected.

Dwarf-mistletoe control is achieved in forest situations by clear-cutting the infected patch, allowing the stand to regenerate from natural seeds from adjacent stands. If the patch is a large one, the clearcut may have to be completed in several stages so that a seed source remain nearby until the stand regenerates.

In urban settings, or with ponderosa pine dwarf-mistletoe, which is large enough to see easily, it is often feasible to prune dwarf-mistletoe out of infected trees. Due to dwarf-mistletoe's incipient stage, this process must be repeated for at least three consecutive years.

Planting with susceptible tree species before the overstory stand is free of dwarf-mistletoe will result in reinfection. Seedlings are small and not usually infected during the first few years, so if control efforts are continued until all dwarf-mistletoe is gone, an extra two or three years' growth can be obtained by planting after the first year's cleaning.

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<sup>9</sup>Stevenson, Douglas J. Dwarf-mistletoe Addendum, Colorado State Forest Service, Boulder, 1994.



1990

## A N A C T

HOUSE BILL 90-1229.

BY REPRESENTATIVES Irwin, DeHerrera, Masson, Pankey, Ulvang, and K. Williams;  
also SENATORS Schaffer, Allard, and McCormick.

CONCERNING THE CLASSIFICATION OF FOREST LANDS SUBJECT TO FOREST  
MANAGEMENT PLANS AS AGRICULTURAL LAND FOR PROPERTY TAX  
PURPOSES.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. 39-1-102 (1.6) (a), Colorado Revised Statutes, 1982 Repl. Vol., as amended, is amended, and the said 39-1-102 is further amended BY THE ADDITION OF THE FOLLOWING NEW SUBSECTIONS<sup>10</sup>, to read:

39-1-102. Definitions. (1.6) (a) "Agricultural land" means EITHER OF THE FOLLOWING:

(I) A parcel of land which was used the previous two years and presently is used as a farm or ranch, or which is in the process of being restored through conservation practices. Such land must have been classified as "agricultural land", consistent with this subsection (1.6), during the ten years preceding the year of assessment. Such land must continue to have actual agricultural use. "Agricultural land" UNDER THIS SUBPARAGRAPH (I) includes land underlying any residential improvement located on such agricultural land and also includes the land underlying other improvements if such improvements are an integral part of the farm or ranch and if such other improvements and the land area dedicated to such other improvements are typically used as an ancillary part of the operation.

(II) A PARCEL OF LAND WHICH CONSISTS OF AT LEAST FORTY ACRES; WHICH IS FOREST LAND; WHICH IS USED TO PRODUCE TANGIBLE WOOD PRODUCTS THAT ORIGINATE FROM THE PRODUCTIVITY OF SUCH LAND FOR THE

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<sup>10</sup>Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.



PRIMARY PURPOSE OF OBTAINING A MONETARY PROFIT; WHICH IS SUBJECT TO A FOREST MANAGEMENT PLAN; AND WHICH IS NOT A FARM OR RANCH, AS DEFINED IN SUBSECTION (3.5) AND (13.5) OF THIS SECTION. "AGRICULTURAL LAND" UNDER THIS SUBPARAGRAPH (II) INCLUDES LAND UNDERLYING ANY RESIDENTIAL IMPROVEMENT LOCATED ON SUCH AGRICULTURAL LAND.

(4.3) "Forest land" means land of which at least ten percent is stocked by forest trees of any size and includes land that formerly had such tree cover and that will be naturally or artificially regenerated. "Forest land" includes roadside, streamside, and shelterbelt strips of timber which have a crown width of at least one hundred twenty feet. "Forest land" includes unimproved roads and trails, streams, and clearings which are less than one hundred twenty feet wide.

(4.4) "Forest management plan" means an agreement which includes a plan to aid the owner of forest land in increasing the health, vigor, and beauty of such forest land through use of forest management practices and which has been either executed between the owner of forest land and the Colorado State Forest Service or executed between the owner of forest land and a professional forester and has been reviewed and has received a favorable recommendation from the Colorado State Forest Service. The Colorado State Forest Service shall annually inspect each parcel of land subject to a forest management plan to determine if the terms and conditions of such plan are being complied with and shall report by March 1 of each year to the assessor in each affected county, the legal descriptions of the properties and the names of their owners that are eligible for the agricultural classification. The report shall also contain the legal descriptions of those properties and the names of their owners that no longer qualify for the agricultural classification because of noncompliance with their forest management plans. No property shall be entitled to the agricultural classification unless the legal description and the name of the owner appear on the report submitted by the Colorado State Forest Service. The Colorado State Forest Service shall charge a fee for the inspection of each parcel of land in such amount for the reasonable costs incurred by the Colorado State Forest Service in conducting such inspections. Such fee shall be paid by the owner of such land prior to such inspection. Any fees collected pursuant to this subsection shall be subject to annual appropriation by the General Assembly.

(4.5) "Forest management practices" means practices accepted by professional foresters which control forest establishment, composition, density, and growth for the purpose of producing forest products and associated amenities following sound business methods and technical forestry principles.

(4.6) "Forest trees" means woody plants which have a well-developed stem or stems, which are usually more than twelve feet in height at maturity, and which have a generally well-defined crown.



(12.5) "Professional forester" means any person who has received a bachelor's or higher degree from an accredited school of forestry.

SUBSECTION 2. Applicability. This act shall apply to property tax years commencing on or after January 1, 1991.

SECTION 3. Safety clause. The General Assembly hereby finds, determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

\_\_\_\_\_  
(signed)  
Carl B. Bledsoe  
SPEAKER OF THE HOUSE  
OF REPRESENTATIVES

\_\_\_\_\_  
(signed)  
Ted L. Strickland  
PRESIDENT OF  
THE SENATE

\_\_\_\_\_  
(signed)  
Lee C. Bahrych  
CHIEF CLERK OF THE HOUSE  
OF REPRESENTATIVES

\_\_\_\_\_  
(signed)  
Joan M. Albi  
SECRETARY OF  
THE SENATE

APPROVED \_\_\_\_\_ (April 16, 1990 at 3:09 p.m.)

\_\_\_\_\_  
(signed)  
Roy Romer  
GOVERNOR OF THE STATE OF COLORADO



## VOLUME IN CORDS

(Six-inch stump height, three-inch top dob)

DBH	Height in 4-foot bolts						
	1	2	3	4	5	6	7
4	0.003	0.005	0.008	0.010	0.012	0.014	0.016
5	0.005	0.008	0.011	0.015	0.018	0.021	0.024
6	0.007	0.011	0.015	0.020	0.024	0.028	0.032
7	0.009	0.014	0.020	0.025	0.031	0.036	0.042
8	0.012	0.019	0.026	0.033	0.039	0.046	0.053
9	0.015	0.023	0.032	0.038	0.049	0.057	0.066
10	0.019	0.029	0.039	0.050	0.060	0.070	0.080
11	-----	0.035	0.047	0.060	0.072	0.084	0.096
12	-----	0.041	0.056	0.070	0.085	0.099	0.113
13	-----	0.049	0.065	0.082	0.099	0.116	0.132
14	-----	0.056	0.076	0.095	0.114	0.133	0.153
15	-----	0.064	0.086	0.108	0.130	0.152	0.174
16	-----	0.073	0.098	0.123	0.148	0.173	0.197
17	-----	0.082	0.110	0.138	0.166	0.194	0.222
18	-----	0.092	0.124	0.155	0.186	0.217	0.249
19	-----	0.103	0.138	0.172	0.207	0.242	0.277
20	-----	0.113	0.152	0.190	0.229	0.267	0.306
21	-----	-----	0.168	0.210	0.252	0.294	0.337
22	-----	-----	0.176	0.230	0.276	0.323	0.369
23	-----	-----	0.200	0.251	0.301	0.352	0.402
24	-----	-----	0.218	0.273	0.328	0.383	0.438
25	-----	-----	0.236	0.296	0.352	0.415	0.474
26	-----	-----	0.256	0.320	0.384	0.449	0.513
27	-----	-----	0.276	0.345	0.414	0.484	0.553
28	-----	-----	0.296	0.371	0.445	0.520	0.594
29	-----	-----	0.318	0.398	0.477	0.557	0.637
30	-----	-----	0.340	0.425	0.511	0.596	0.682



## VOLUME IN CORDS

(Six-inch stump height, three-inch top dob)

DBH	Height in 4-foot bolts							
	8	9	10	11	12	13	14	15
4	-----	-----	-----	-----	-----	-----	-----	-----
5	0.027	0.031	0.034	-----	-----	-----	-----	-----
6	0.037	0.041	0.045	0.049	0.054	-----	-----	-----
7	0.047	0.053	0.058	0.064	0.069	0.074	0.080	0.085
8	0.060	0.067	0.074	0.081	0.087	0.094	0.101	0.108
9	0.074	0.083	0.091	0.100	0.108	0.116	0.125	0.133
10	0.091	0.101	0.111	0.121	0.132	0.142	0.152	0.162
11	0.109	0.121	0.133	0.145	0.157	0.170	0.182	0.194
12	0.128	0.142	0.156	0.171	0.185	0.200	0.214	0.228
13	0.149	0.166	0.183	0.199	0.216	0.233	0.249	0.266
14	0.172	0.191	0.210	0.230	0.249	0.268	0.287	0.307
15	0.196	0.218	0.240	0.262	0.284	0.306	0.328	0.350
16	0.222	0.247	0.272	0.297	0.322	0.347	0.372	0.400
17	0.250	0.272	0.306	0.334	0.362	0.390	0.418	0.446
18	0.280	0.311	0.343	0.374	0.405	0.437	0.468	0.499
19	0.311	0.346	0.381	0.416	0.450	0.485	0.520	0.555
20	0.344	0.382	0.421	0.459	0.498	0.536	0.575	0.613
21	0.379	0.421	0.464	0.506	0.548	0.590	0.633	0.675
22	0.415	0.462	0.508	0.554	0.601	0.647	0.693	0.740
23	0.453	0.503	0.554	0.605	0.655	0.706	0.756	0.807
24	0.493	0.548	0.603	0.658	0.713	0.768	0.823	0.878
25	0.534	0.594	0.653	0.713	0.772	0.832	0.891	0.951
26	0.578	0.642	0.706	0.771	0.835	0.899	0.964	1.028
27	0.622	0.692	0.761	0.830	0.900	0.969	1.039	1.108
28	0.669	0.743	0.818	0.892	0.967	1.041	1.116	1.190
29	0.717	0.797	0.877	0.957	1.037	1.116	1.196	1.276
30	0.767	0.852	0.938	1.023	1.109	1.194	1.279	1.365



SILVICULTURE TERMINOLOGY<sup>11</sup>

**Advance Regeneration (Reproduction) syn**

**Advance Growth**

Seedlings or saplings that develop or are present in the understory.

**Afforestation**

Establishment of a forest or stand in an area not previously forested.

**Age Class (Cohort)**

A distinct aggregation of trees originating from a single natural disturbance or regeneration cutting.

**Artificial Regeneration (Reproduction)**

Creation of a new age class by renewal of a tree crop by direct seeding, or by planting seedlings or cuttings.

**Burning, Prescribed**

The application of fire, usually under existing stands and under specific conditions of weather and fuel moisture, in order to control vegetation to meet goals of silviculture or hazard reduction.

**Cleaning**

A release treatment made in an age class not past the sapling stage in order to free the favored trees from less desirable individuals of the same age class which overtop them or are likely to do so.

**Cohort**

See Age Class.

**Composition, Stand**

The proportion of each tree species in a stand expressed as a percentage of either the total number, basal area, or volume of all tree species in the stand.

**Crop Tree**

Any tree that is selected to become a component of a future final harvest.

**Crown**

The part of a tree or woody plant bearing live branches and foliage.

**Crown Class**

A class of tree based on crown position relative to the crowns of adjacent trees.

**Codominant**

Trees with crowns forming the general level of the main canopy in even-aged groups of trees, receiving full light from above and comparatively little from the sides.

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<sup>11</sup>Loftis, David L., "Silviculture Terminology" SAF Silviculture Working Group Newsletter, Society of American Foresters, Bethesda, Maryland, 1993, pp. 1-3.



**Dominant**

Trees with crowns extending above the general level of the main canopy of even-aged groups of trees, and receiving full light from above and partly from the sides.

**Intermediate**

Trees with crowns extending into the lower portion of the main canopy of even-aged groups of trees, but shorter in height than codominants. They receive little direct light from above and none from the sides.

**Overtopped (Suppressed)**

Trees of varying levels of vigor that have their crowns completely covered by the crowns of one or more neighboring trees.

**Crown Cover**

The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeters and commonly expressed as a percentage of total ground area (syn. Canopy Cover).

**Crown Density**

The amount, compactness, or depth of foliage of the crowns of trees and/or shrubs.

**Cutting Cycle**

The planned interval between partial harvests in an uneven-aged stand (See Thinning Interval.).

**Even-Aged Stand**

A stand of trees containing a single age class in which the range of tree ages is usually less than 20% of rotation.

**Harvesting Method**

A cutting method by which a stand is harvested. Emphasis is on meeting logging requirements rather than silvicultural objectives (See Regeneration Methods.).

**Improvement Cutting**

A cutting made in a stand past the sapling stage primarily to improve composition and quality by removing less desirable tree species.

**Ingrowth**

Trees that during a specified period have grown past an arbitrary lower limit of (usually) diameter or height. Ingrowth is usually measured as basal area or volume per unit area.

**Intermediate Treatments (Tending)**

A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment of regeneration and prior to final harvest (See Tending, Stand Improvement.).

**Liberation**

A release treatment made in a stand not past the sapling stage in order to free the favored trees from competition of older, overtopping trees.

**Natural Regeneration**

An age class created from natural seeding, sprouting, suckering, or layering.



**Nurse Tree (Nurse Crop)**

A tree, group or crop of trees, shrubs, or other plants, either naturally occurring or introduced, used to nurture or improve the form of a more important tree or crop during youth by protecting it from frost, insolation, or wind.

**Overstory Removal**

The cutting of trees comprising an upper canopy layer in order to release trees or other vegetation in an understory.

**Precommercial Thinning (PCT)**

A thinning that does not yield trees of commercial value, usually designed to improve crop spacing.

**Regeneration (Reproduction) Method**

A cutting method by which a new age class is created. The major methods are Clearcutting, Seed Tree, Shelterwood, Selection, and Coppice (See Harvesting Method.).

**Even-Aged Methods****Clearcutting**

A method of regenerating an even-aged stand in which a new age class develops in a fully-exposed microclimate after removal, in a single cutting, of all trees in the previous stand. Regeneration is from natural seeding, direct seeding, planted seedlings, and/or advance reproduction. Harvesting may be done in groups or patches (**Group or Patch Clearcutting**), or in strips (**Strip Clearcutting**). In the Clearcutting System, the management unit or stand in which regeneration, growth, and yield are regulated consists of the individual clearcut stand (See Group Selection).

**Clearcutting with Reserves**

A clearcutting method in which varying numbers of reserve trees are not harvested to attain goals other than regeneration.

**Seed Tree**

An even-aged regeneration method in which a new age class develops from seedlings that germinate in fully-exposed micro-environments after removal of all the previous stand except a small number of trees left to provide seed. Seed trees are removed after regeneration is established.

**Seed Tree with Reserves**

A seed tree method in which some or all of the seed trees are retained after regeneration has become established to attain goals other than regeneration.

**Shelterwood**

A method of regenerating an even-aged stand in which a new age class develops beneath the partially-shaded micro-environment provided by residual trees. The sequence of treatments can include three distinct types of cuttings: 1) an optional preparatory harvest to enhance conditions for seed production; 2) an establishment harvest to prepare the seed bed and create a new age class; and 3) a removal harvest to release established regeneration from competition with the overwood. Harvesting may be done uniformly throughout the stand (**Uniform**



Shelterwood), in groups or patches (Group Shelterwood), or in strips (Strip Shelterwood).

#### **Shelterwood with Reserves**

A variant of the Shelterwood Method in which some or all of the shelter trees are retained, well beyond the normal period of retention, to attain goals other than regeneration. The resulting stand may be two-aged or tend towards an uneven-aged condition as a consequence of both an extended period of regeneration establishment and the retention of reserve trees that may represent one or more age classes.

#### **Two-Aged Methods**

Methods designed to maintain and regenerate a stand with two age classes (See Shelterwood with Reserves and Coppice with Reserves.).

#### **Uneven-Aged (Selection) Methods**

Methods of regenerating a forest stand, and maintaining an uneven-aged structure, by removing some trees in all size classes either singly, in small groups, or in strips.

##### **Group Selection**

A method of regenerating uneven-aged stands in which trees are removed, and new age classes are established, in small groups. The maximum width of groups is approximately twice the height of the mature trees, with small openings providing micro-environments suitable for tolerant regeneration and the larger openings providing conditions suitable for more intolerant regeneration. In the Group Selection system, the management unit or stand in which regeneration, growth, and yield are regulated consists of a landscape containing an aggregation of groups (See Clearcutting.).

##### **Single Tree Selection**

A method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed more-or-less uniformly throughout the stand to achieve desired stand structural characteristics.

#### **Coppice Methods**

Methods of regenerating a stand in which the majority of regeneration is from stump sprouts or root suckers.

##### **Coppice**

A method of regenerating a stand in which all trees in the previous stand are harvested and the majority of regeneration is from sprouts or root suckers.

##### **Coppice with Reserves**

A coppice method in which reserve trees are retained to attain goals other than regeneration. The method normally creates a two-aged stand.

#### **Regeneration (Reproduction) Period**

The time between the initial regeneration cutting and the successful re-establishment of a new age class by natural means, planting, or direct seeding.



**Regular Uneven-Aged (Balanced) Stand**

A stand in which three or more distinct age classes occupy approximately equal areas and provide a balanced distribution of diameter classes.

**Release (Release Operation)**

A treatment designed to free young trees from undesirable, usually overtopping, competing vegetation. Treatments include cleaning, liberation, and weeding (See Stand Improvement.).

**Reserve Trees**

Trees pole-sized or larger, retained after the regeneration period under the Clearcutting, Seed Tree, Shelterwood, or Coppice Methods. syn. Standards.

**Salvage Cutting**

The removal of dead trees or trees being damaged or killed by injurious agents other than competition, to recover value that would otherwise be lost.

**Sanitation Cutting**

The removal of trees to improve stand health and to reduce actual or anticipated spread of insects and disease (See Stand Improvement.).

**Sapling**

A tree, usually young, that is larger than a seedling but smaller than a pole.

**Silviculture**

The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis.

**Silvicultural System**

A planned process whereby a stand is tended, harvested, and re-established. The system name is based on the number of age classes (See Even-Aged, Two-Aged, Uneven-Aged.), and/or the regeneration method used (See Clearcutting, Seed Tree, Shelterwood, Selection, Coppice, Coppice with Standards.).

**Site Class**

A classification of site quality, usually expressed in terms of ranges of dominant tree height at a given age or potential mean annual increment at culmination.

**Site Preparation**

A hand or mechanized manipulation of a site designed to enhance the success of regeneration. Treatments may include chopping, disking, bedding, raking, burning and scarifying. All treatments are designed to modify the soil, litter, vegetation and to create microclimate conditions conducive to the establishment and growth of desired species.

**Site Quality (Productivity)**

The productive capacity of a site, usually expressed as volume production of a given species.



**Size Classes**

Tree sizes recognized by distinct ranges, usually of diameter or height.

**Stand**

A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit (See Mixed, Pure, Even-Aged, and Uneven-Aged Stands.).

**Mixed Stand**

A stand in which there is a mixture of species.

**Pure Stand**

A stand composed of essentially a single species.

**Stratified Mixture**

A stand in which different species occupy different strata of the total crown canopy.

**Stand Density**

A quantitative, absolute measure of tree occupancy per unit area in such terms as numbers of trees, basal area, or volume.

**Stand Improvement**

A term comprising all intermediate cuttings made to improve the composition, structure, condition, health and growth of even- or uneven-aged stands.

**Stocking**

An indication of growing-space occupancy relative to a pre-established standard. Common induces of stocking are based on percent occupancy, basal area, Relative Density, and Crown Competition Factor.

**Stratum (Canopy Layer)**

A distinct layer of vegetation within a forest community.

**Tending**

See Intermediate Treatments.

**Thinning**

A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality.

**Crown Thinning (Thinning From Above, High Thinning)**

The removal of trees from the dominant and codominant crown classes in even-aged stands, or in even-aged groups within uneven-aged stands, in order to favor the best trees of those same crown classes.

**Free Thinning**

The removal of trees in even-aged or uneven-aged stands to control stand spacing and favor desired trees using a combination of thinning criteria without regard to crown position.

**Low Thinning (Thinning From Below)**

The removal of trees from the lower crown classes to favor those in the upper crown classes.

**Mechanical Thinning (Geometric Thinning)**

The thinning of trees in either even- or uneven-aged stands involving removal of trees in rows, strips, or by using fixed spacing intervals.



**Selection Thinning (Dominant Thinning)**

The removal of trees in even-aged stands, or in even-aged groups within even-aged stands, in the dominant crown class in order to favor the lower crown classes.

**Thinning Interval**

The period of time between successive thinning entries, usually used in connection with even-aged stands (See Cutting Cycle.).

**Tolerance, Shade**

The relative capacity of a plant to become established and grow in the shade.

**Two-Aged Stand**

A stand composed of two distinct age classes that are separated in age by more than 20 percent of rotation.

**Undercutting (Root Pruning)**

The root pruning of seedlings in a nursery bed.

**Uneven-Aged Stand**

A stand of trees of three or more distinct age classes, either intimately mixed or in small groups.

**Uneven-Aged System**

A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes (See Single Tree Selection, Group Selection.).

**Weeding**

A release treatment in stands not past the sapling stage that eliminates or suppresses undesirable vegetation regardless of crown position.

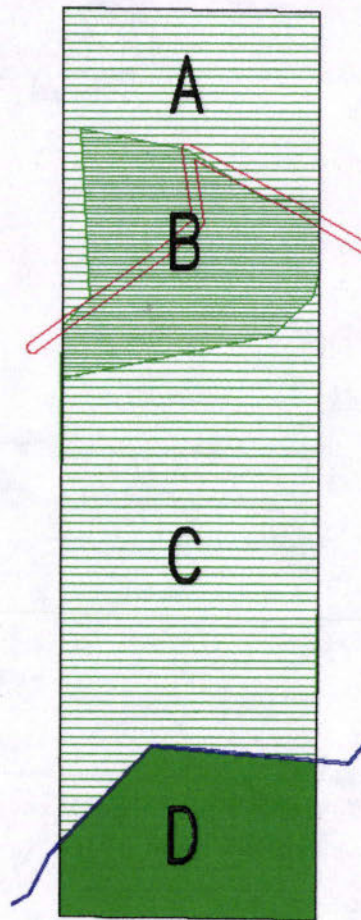
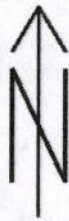
**Wrenching**

The disturbance of seedling roots in a nursery bed (e.g. with a tractor-drawn blade) with the objective of stimulating the development of a fibrous root system.



Colorado State Forest Service




Scale: 1/6717; 1 Inch = 560 Feet



John Gordon

NW1/4, Sec 4, T3N, R71W, S.P.M.

- Property Line
- Road
- Permanent Stream

-  PP2=
-  PP3=
-  PP/DF3~

Drawn By: Douglas J. Stevenson

February 1, 1999