

TRAIL CREEK

S36 T12N R74W

TR CK

Sales Layout 37 hrs

Timber Cruise 29 hrs } 69

Plan Write up 40 hrs
106

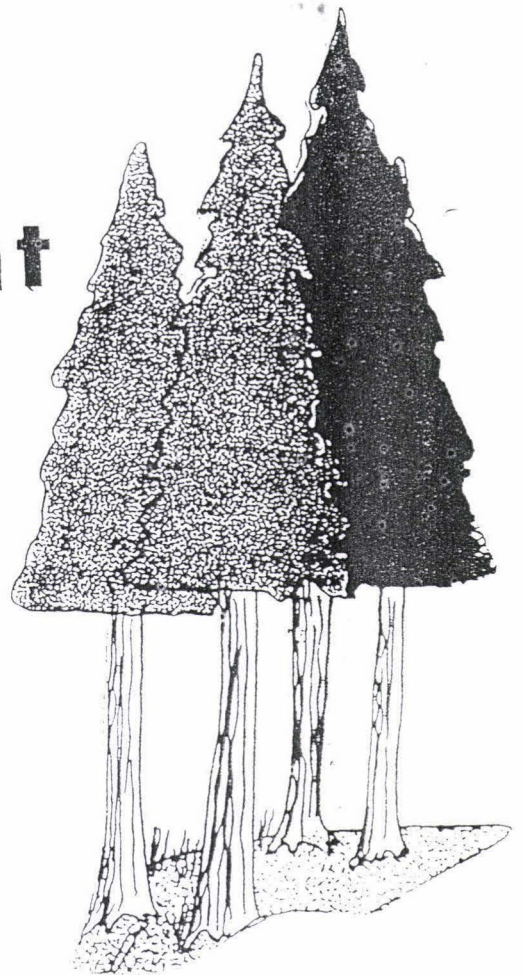
$$\begin{aligned} \$500 \div 69 &= \$7.25/\text{hour} \\ \text{changed } \$8/\text{hour} &= \$52 \\ + \text{Ray's time } \$20/100 & \\ \hline & \$652 \end{aligned}$$

These Are My hours put
in on trail Creek. A portion
of the Sales layout & Cruise
are Travel times

Ken Reed

TRAIL CREEK

Forest Management Plan



FOREST MANAGEMENT PLAN

TRAIL CREEK SECTION

T.12N., R.74W. - SECTION 36

Larimer County

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Kenneth Reed**

**Colorado State Forest Service
Fort Collins District**

October, 1991

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PURPOSE OF THE PLAN

The primary goal of this forest management plan is to develop a scheme for managing the Trail Creek section owned by the State Land Board. The main objective is to provide direction for generating income from forest wood products. This must be accomplished in a way to effectively maintain the productivity of the land and protect other important forest resources (water, grazing and wildlife).

PROPERTY DESCRIPTION

Location

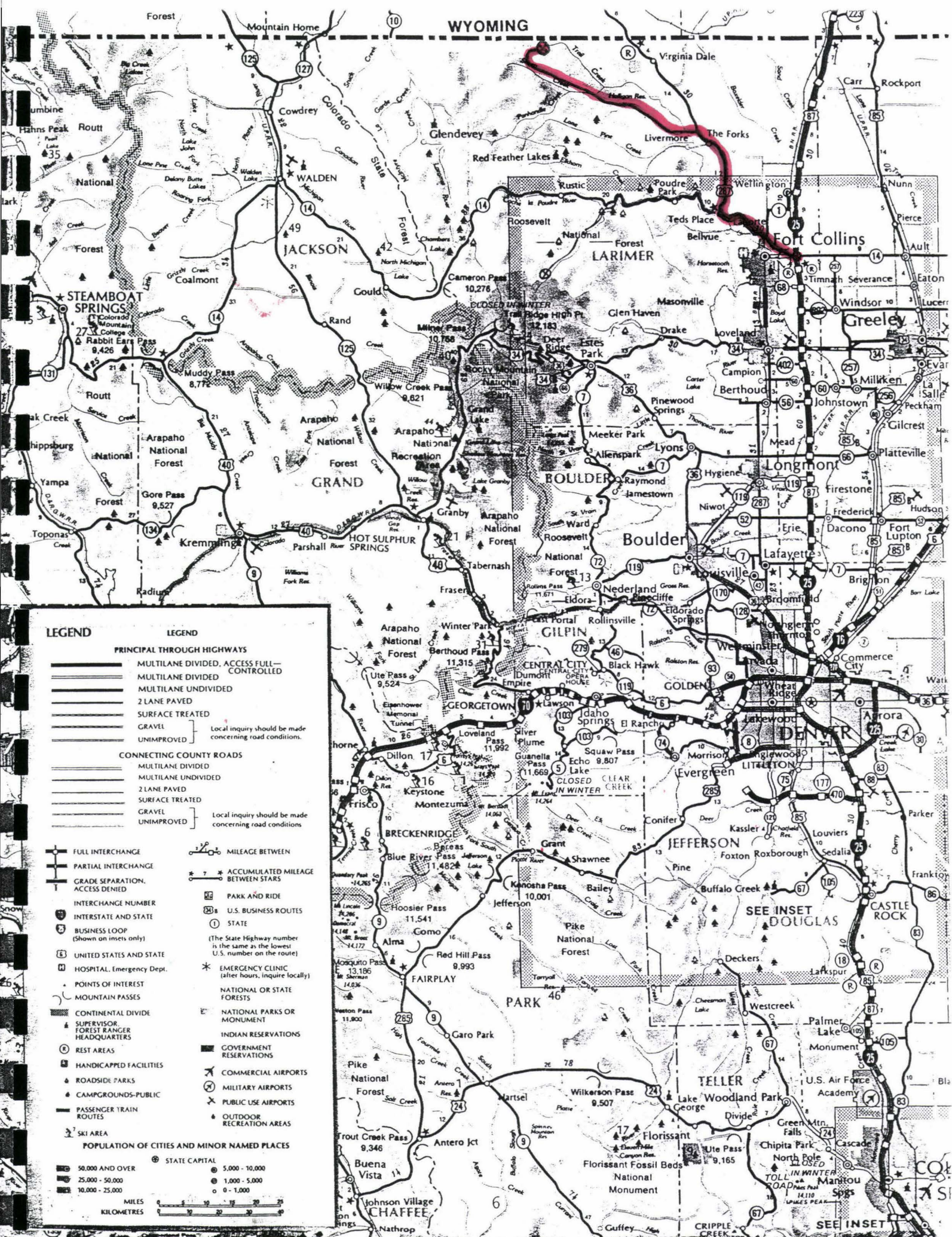
Section 36 (T.12N., R74W.) is located in the northeast corner of the Roosevelt National forest (see the regional and local maps on the following pages). The section situated 2 miles south of the Wyoming border, approximately 40 miles northwest of Fort Collins, Colorado. This area is checker boarded with federal, state and private lands. The section is border on all sides by private land.

National Forest Boundary actually excludes this section.

History

Fur Trappers and Prospectors were the first European's to work through the area in search of pelts and minerals. The first logging to take place in the area was done by tie hacks. Loggers who supplied railroad ties for the U.P. Railroad, during the middle to late 1800's. There is evidence that timber was harvested from the Trail Creek section during this period of time. During the 1890's huge wildfires occurred over most of the region. There are indicators (fire scars and charred stumps) that reveal that this section was involved in these fires. More recently possible 30 to 40 years ago post and pole size timber was thinned from a portion of the Trail Creek section.

The section has come under control of the state, which established the State Land Board for the purpose of raising revenue for the state schools. The State Land Board has asked the Colorado State Forest Service for assistance with timber related activities.



LEGEND

LEGEND

PRINCIPAL THROUGH HIGHWAYS

- MULTILANE DIVIDED, ACCESS FULL-CONTROLLED
- MULTILANE DIVIDED
- MULTILANE UNDIVIDED
- 2 LANE PAVED
- SURFACE TREATED
- GRAVEL
- UNIMPROVED

CONNECTING COUNTY ROADS

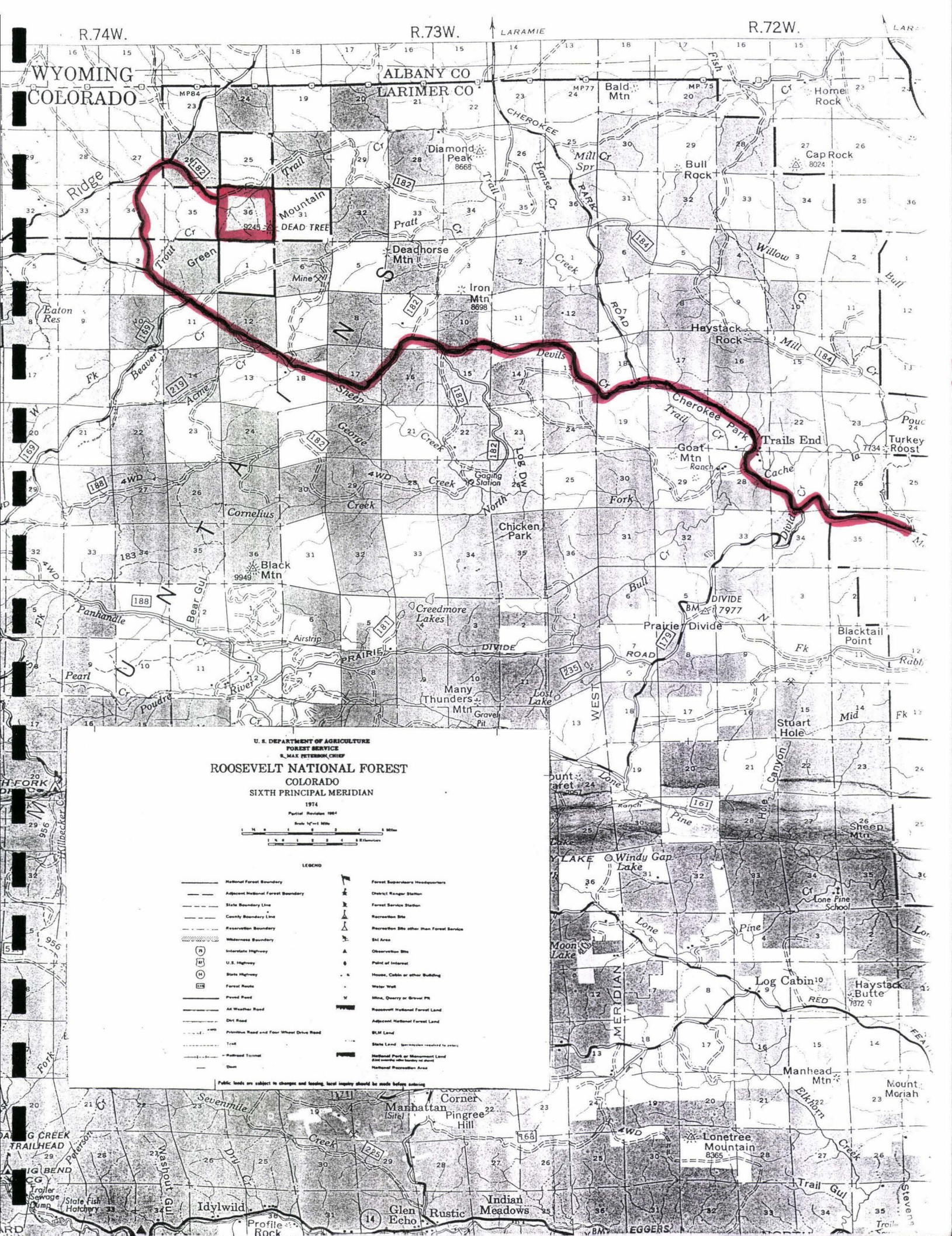
- MULTILANE DIVIDED
- MULTILANE UNDIVIDED
- 2 LANE PAVED
- SURFACE TREATED
- GRAVEL
- UNIMPROVED

- FULL INTERCHANGE
- PARTIAL INTERCHANGE
- GRADE SEPARATION, ACCESS DENIED
- INTERCHANGE NUMBER (Shown on insets only)
- INTERSTATE AND STATE
- BUSINESS LOOP (Shown on insets only)
- UNITED STATES AND STATE
- HOSPITAL (Emergency Dept.)
- POINTS OF INTEREST
- MOUNTAIN PASSES
- CONTINENTAL DIVIDE
- SUPERVISOR, FOREST RANGER HEADQUARTERS
- REST AREAS
- HANDICAPPED FACILITIES
- ROADSIDE PARKS
- CAMPGROUNDS-PUBLIC
- PASSENGER TRAIN ROUTES
- SKI AREA
- MILEAGE BETWEEN
- ACCUMULATED MILEAGE BETWEEN STARS
- PARK AND RIDE
- U.S. BUSINESS ROUTES
- STATE
- (The State Highway number is the same as the lowest U.S. number on the route)
- EMERGENCY CLINIC (after hours, inquire locally)
- NATIONAL OR STATE FORESTS
- NATIONAL PARKS OR MONUMENT
- INDIAN RESERVATIONS
- GOVERNMENT RESERVATIONS
- COMMERCIAL AIRPORTS
- MILITARY AIRPORTS
- PUBLIC USE AIRPORTS
- OUTDOOR RECREATION AREAS

- POPULATION OF CITIES AND MINOR NAMED PLACES
- 50,000 AND OVER
- 25,000 - 50,000
- 10,000 - 25,000
- STATE CAPITAL
- 5,000 - 10,000
- 1,000 - 5,000
- 0 - 1,000
- MILES
- KILOMETRES



12.4 miles
0.2
1)

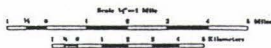


U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
R. MAX PETERSON, CHIEF
ROOSEVELT NATIONAL FOREST
COLORADO
SIXTH PRINCIPAL MERIDIAN

1974

Partial Revision 1984

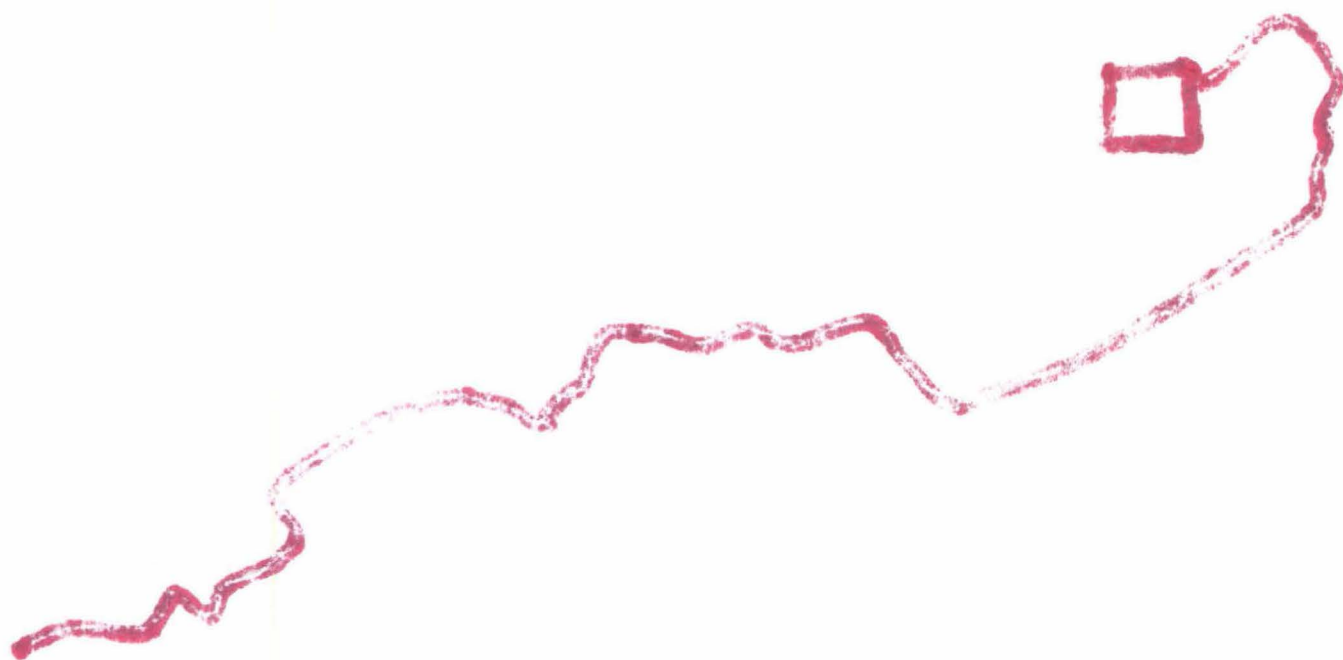
Scale 1"=1 Mile



LEGEND

- | | |
|--|---|
| — National Forest Boundary | ▲ Forest Supervisors Headquarters |
| - - - Adjacent National Forest Boundary | ▲ District Ranger Station |
| - - - State Boundary Line | ▲ Forest Service Station |
| - - - County Boundary Line | ▲ Recreation Site |
| - - - Reservation Boundary | ▲ Recreation Site other than Forest Service |
| - - - Wilderness Boundary | ▲ Ski Area |
| (H) Interstate Highway | ▲ Observation Site |
| (H) U.S. Highway | ▲ Point of Interest |
| (H) State Highway | ▲ House, Cabin or other Building |
| — Forest Road | ▲ Water Well |
| — Paved Road | ▲ Mine, Quarry or Gravel Pit |
| — All Weather Road | — Roosevelt National Forest Land |
| — Dirt Road | — Adjacent National Forest Land |
| — Primitive Road and Four Wheel Drive Road | — BLM Land |
| — Trail | — State Land (permission required to enter) |
| — Railroad Tunnel | — National Park or Monument Land |
| — Dam | — State Land (permission required to enter) |

Public lands are subject to change and leasing; local inquiry should be made before entering



Topography

There are 2 major topographic features located on the section, Dead tree Mountain and Trail Creek. The elevation ranges from 9245 feet at the top of Dead Tree mountain to 8400 feet along the riparian bottom of Trail Creek. Dead Tree Mountain forms a ridgeline that cuts across the southern portion of the section. The access of this ridgeline is limited to foot because of the steep slopes. The second topographic feature is Trail Creek which begins on the steep slopes of Dead Tree Mountain and flows into the North Fork of the Cache La Poudre River (See the topographic map on the following page). Slopes range from nearly flat to 45%.

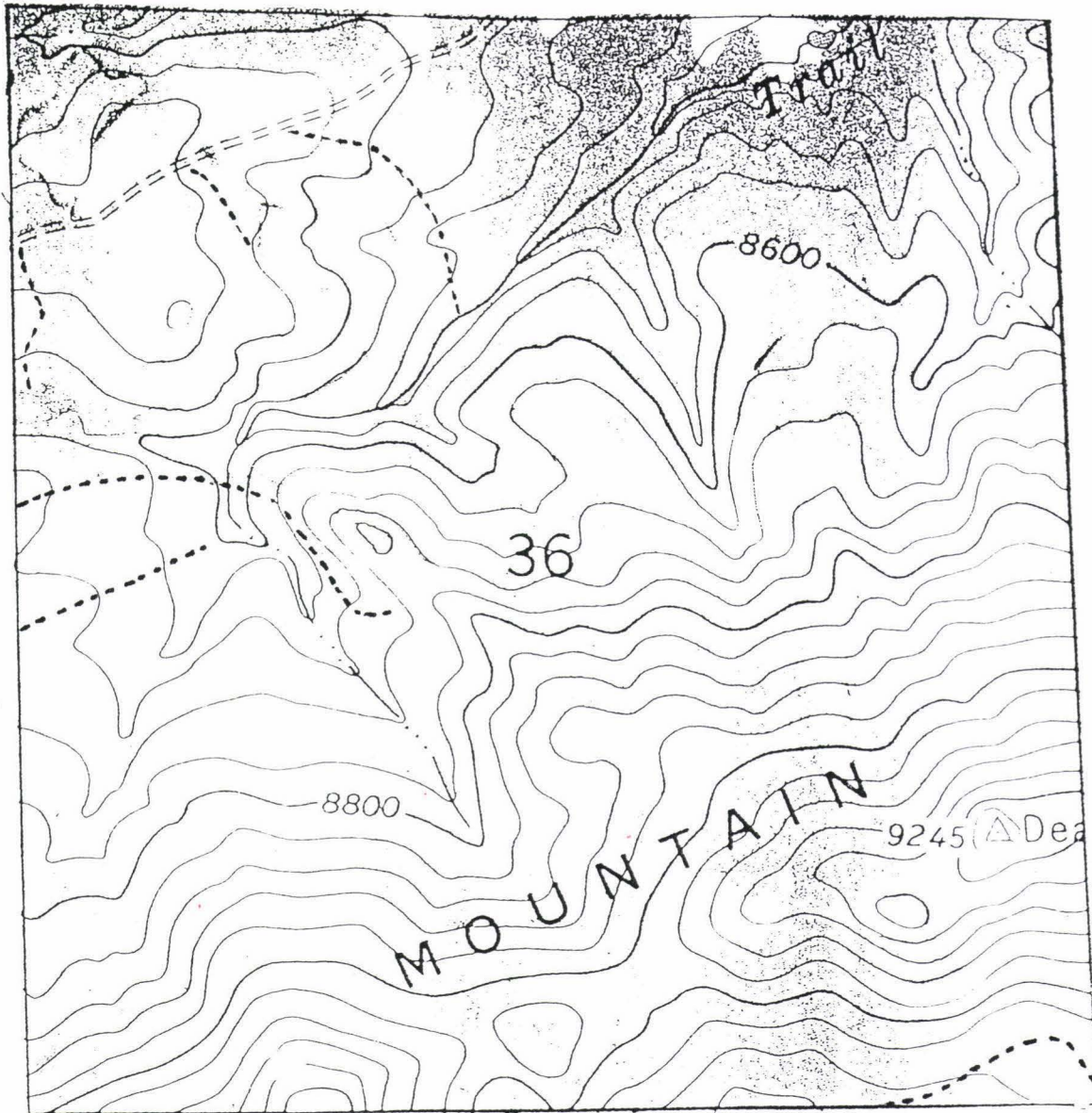
Soils

There are five soil types on the Trail Creek section, these correspond with topography and vegetation. The predominant soil type is Redfeather sandy loam, most of the timber grows on this soil type. The second most common soil type is Boyle-Ratake gravelly sandy loam which corresponds with the openings and grazing areas within the section. The Naz sandy loam is the dominant soil type found along the riparian bottom. A detailed description of these along with a soils type map can be found in Appendix A.

Access

There is a improved road on the north portion of the Trail Creek section. This road connects Boulder Ridge road and Cherokee Park road. It connects with USFS 182 on the Roosevelt National Forest map. They have applied for right-of-way permission

S 36 T 12N R 74W



SCALE: 6" = 1 mile

..... = unimproved road

through the state section (Appendix B). If permission is granted then the USFS will be responsible for maintenance of the road. They should also be required to improve the present state of the road.

There are numerous old logging roads throughout the northwestern portion of the section due to road 182 and gentle slopes (See topographic map). Access on the eastern portion of the section is limited foot because of the riparian area. There is an old logging road that goes by the southeast corner survey marker providing access to the southern portion of the section.

Wildlife

No formal inventory of wildlife was taken for the section, but informal observations were made. The section provides the basic needs of many species, food, cover and water. The most common animal in the area is the pine squirrel, feasting on the abundant pine cones. Elk and deer sign (tracks, rubs and scat) were found throughout the section, with the highest usage around the riparian areas and thick pockets of timber. Black bear, Bobcat and coyote are less common but use the area for foraging and hunting. A goshawk has nested near the headwaters of trail creek, feeding on the abundant squirrels and other small rodents. At this time no endanger species are known to inhabit the section.

Nearly all of these species will benefit from small opening created by small patch cuts. These small patch cuts must be irregular in shape, mimicking openings created by natural fires. Creating more "edge", a term used for the area between forest and

opening, creates more habitat and increases diversity. Leaving a few standing large dead trees within a harvest area will provide habitat for cavity nesters (see Appendix C).

Fire

The majority of the section has been determined to be fuel model 8, utilizing the 13 fuel models establish by the National Wildfire Coordinating Group. Fuel model 8 is represented by the closed canopy and a compact litter layer. Generally a fire in this fuel type is a slow burning ground fire with occasional pockets of heavy fuels that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds does this fuel type pose severe fire hazards.

The second dominant fuel type is fuel model 1 (Grass 1 ft. Tall) which is found in the open areas. Burning these open areas periodically would promote nutrient recycling and increase forage production.

The dominant forest type, lodgepole pine, has evolved with fire overtime and is subject to crown fires every 100 to 300 years. Trail creek should be noted as a reliable water source for suppression and prescribed fire activities. Prescribed fire can be used to eliminate slash and prepare the seedbed of a harvested area. The slash burning guidelines for Larimer county are found in Appendix D.

Scenic and Cultural Resources

No archeological sites have been found on the section. Though the remnants of an old cabin sits just over the property line near the southeast corner of the section. A fence line runs off the west side of Dead Tree Mountain which may have historical value and should be protected. The view from the top of Dead Tree Mountain is spectacular providing a unique panorama of the Redfeather area and north into Wyoming.

Insects and Diseases

The most serious insect pest of the section is the mountain pine beetle (Dendroctonus ponderosa). This beetle often kills large numbers of Lodgepole pine and Ponderosa pine during outbreaks along the front range. There is a small pocket of infested trees on the south side of stand 6, mainly damaging the old ponderosa pine. There are similar small pockets of beetle kill in surrounding sections.

Healthy well spaced trees are less susceptible to damage and have better defenses that allow them to pitch out pine beetles. Older, weaker and stressed trees are more susceptible to attack and damage (See Appendix E).

The most serious disease of the area is dwarf mistletoe (Arceuthobium vaginatum). This parasitic plant causes great damage in many parts of Colorado. The hosts include most of the pine family and infection means an early death to the tree.

Dwarf mistletoe gets its nutrients for growth from the tree, weakening the tree, making it more susceptible to other insect and

disease problems. The plant can disperse seeds up to 40 feet and 6 years later these seeds will spread again. Managing a single tree requires pruning out the infected portion. Managing large tracts of land requires clearcutting a 40 foot zone around the infected trees and thinning to increase the vigor of the trees. Once again a healthy tree is able to support the plant for a longer period of time.

A less severe disease found on the section is western gall rust (Peridermium larknessii). The hosts of the disease are Ponderosa and Lodgepole pines. It causes galls (swelling) on the truck of an effected tree and leads to an premature death. A detail description of these insect and disease problems are found in Appendix E.

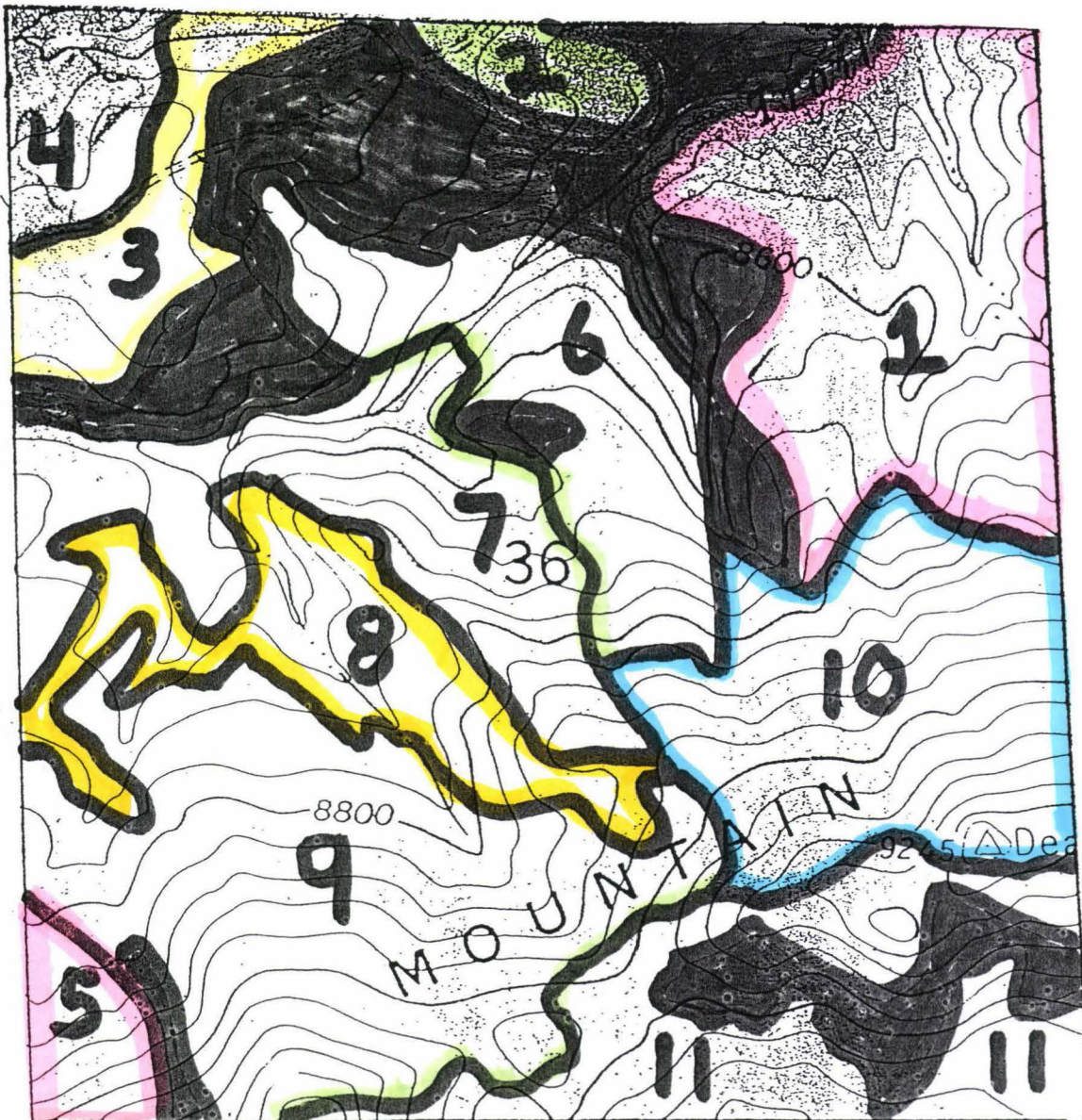
Timber

A timber inventory was conducted throughout the section during the month of September, 1991. The inventory was done on a stand basis, which requires separating similar tree species and tree densities into management units (See the stand map on the following page). Each stand was then cruised with small random plots in order to determine characteristics and the estimated volume of each management unit.

The dominant species found in these management units is Lodgepole pine (Pinus contorta). Several of the stands are a mixture of lodgepole and Douglas fir (Pseudotsuga menziesii), while others consist of lodgepole and ponderosa pine (Pinus

ponderosa). The description and ecology of these species are found in Appendix F.

The ridgetops throughout the section are areas of low productivity. Lack of soil moisture, shallow soils and exposure to high winds have slowed tree growth. The moist, protected drainage bottoms are highly productive. Trees grow much more quickly because of the deeper soils and moisture availability.



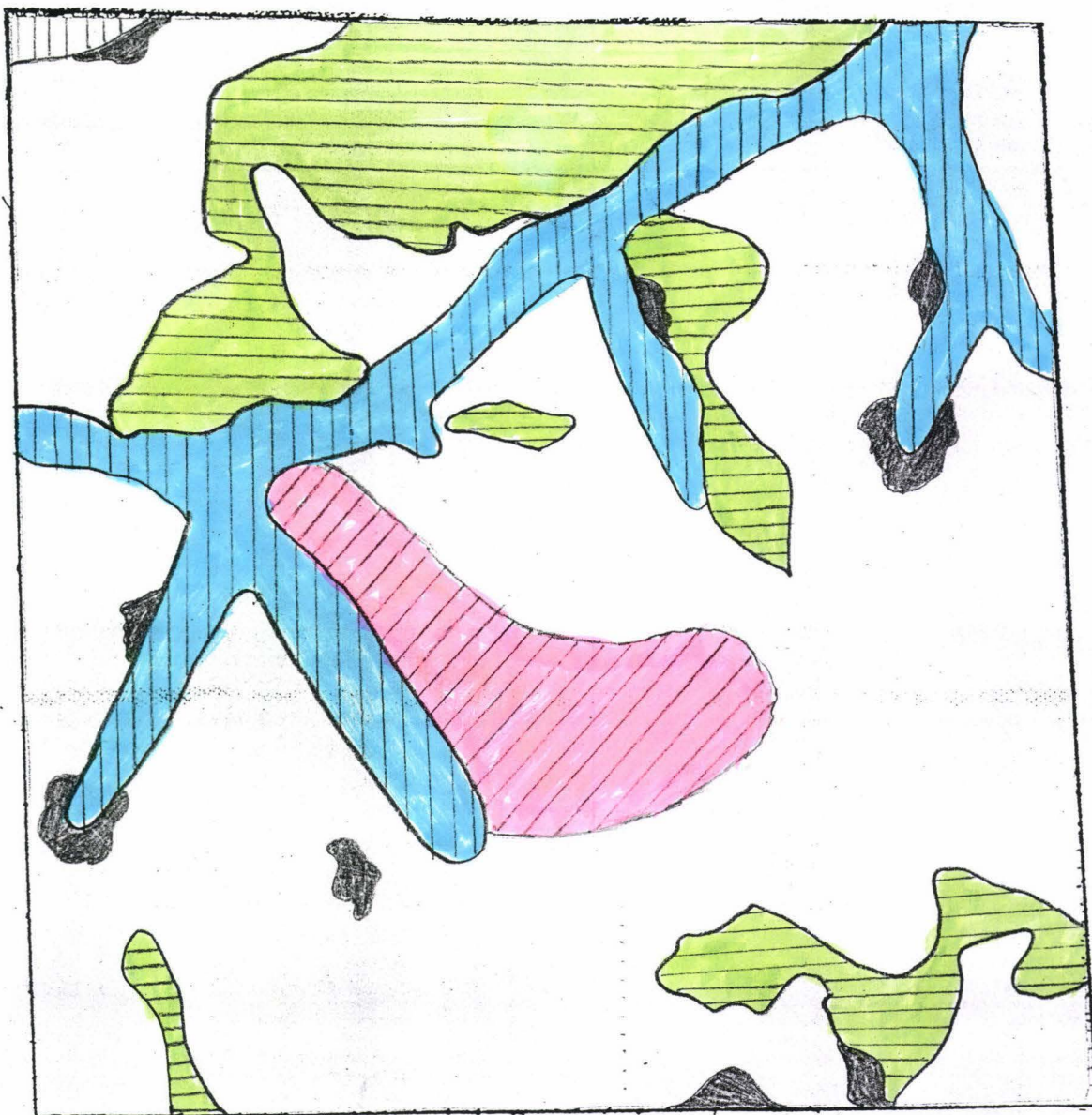
1 = STAND 1

— = MEADOW

SCALE : 6" = 1 mile

S 36 T 12N R 74W

Vegetative Type Map



SCALE: 6" = 1 mile

-  = Lodgepole pine
-  = Meadow
-  = Lodgepole & Ponderosa pine
-  = Aspen
-  = Riparian Mixed Conifer

Stand Descriptions

On the following pages each management unit is described in detail. The top line of each stand description describes the stand number, acreage, and trees per acre.

A) species, size codes, and Regeneration per acre.

B) Stand stocking level.

C) Forest products.

D) Insect or disease problems.

E) Miscellaneous information.

This will be followed by one or more recommendation numbers. These recommendations will be described in the following section.

COLORADO STATE FOREST SERVICE REMOTE SENSING UNIT

ECOSYSTEMS

AL - ALPINE	SIZE CLASSES
AQ - AQUATIC	1 - UNDER 5'' DBH
AS - ASPEN	2 - 5'' - 9'' DBH
BG - BOG	3 - OVER 9'' DBH
BR - BOG-RIPARIAN	
DF - DOUGLAS-FIR	
GR - GREASWOOD	CROWN DENSITY
LB - LIMBER/BRISTLECONE	A - 10 - 35%
M - MEADOW	B - 35 - 55%
MC - MIXED CONIFER	C - 55 - 100%
MG - MOUNTAIN GRASSLAND	
MS - MOUNTAIN SHRUB	
N - NON-VEGETATED	
O - DISTURBED	
PJ - PINON/JUNIPER	
PP - PONDEROSA PINE	
R - RIPARIAN	
SB - SAGEBRUSH	
SF - SPRUCE/FIR	
LP --Lodgepole pine	

Individual Stand Descriptions

Stand 1 92 acres, TPA - 514.

- A) LP/DF/AS --- 2-3 --- 440/acre.
 - B) Overstocked lodgepole pine (BA 132).
 - C) Post and pole with some good sawtimber, Christmas trees.
 - D) Mistletoe and rust present.
 - E) Intermittent stream through stand, wildlife sign, slopes from 5 to 30 percent, presently limited access.
- Recommendations - 1,2,7,8, and 9 Possible.

Stand 2 11 acres, TPA - 700.

- A) LP --- 2 --- 25/acre.
 - B) Wellstocked lodgepole pine (BA 115).
 - C) Post and pole timber.
 - D) Rust present.
 - E) Improved road through the stand, slope average 10 percent.
- Recommendations - 1,2,7, and 9 Probable.

Stand 3 32 acres, TPA - 356.

- A) LP --- 2-3 --- 60/acre.
 - B) Wellstocked lodgepole pine (BA 91).
 - C) Post and pole timber with some sawlogs.
 - D) Slight mistletoe present.
 - E) Improved road through the stand, slopes from 5 to 40 percent, wildlife usage.
- Recommendations - 7,8, and 9 Probable.

Stand 4 21 acres, TPA - 355.

- A) LP --- 2 --- 500/acre.
 - B) Wellstocked lodgepole pine (BA 102).
 - C) Post and pole timber with some sawlogs.
 - D) Slight mistletoe present.
 - E) Improved road through stand, averaging 10% slopes.
- Recommendations - 1,4,7,8, and 9 Probable.

Stand 5 19 acres, TPA - 679.

- A) LP --- 1 --- 0/acre.
 - B) Overstocked small lodgepole pine (BA 67), 4100 trees/acre < 4".
 - C) Little commercial value.
 - D) Heavy mistletoe present.
 - E) Rocky steep terrain, access from U.P. section, averaging 40 % slopes.
- Recommendations - 3,5, and 7 Unlikely.

Stand 6 51 acres, TPA - 844.

- A) LP --- 2 --- 400/acre.
 - B) Overstocked lodgepole pine (BA 180).
 - C) Post and pole timber with some sawlogs, Christmas trees.
 - D) Mountain pine beetle southern portion of stand.
 - E) Limited access, Riparian area through the center of stand, Slopes average 25%.
- Recommendations - 1,2,7,8, and 9 Possible.

Stand 7 55 acres, TPA - 681.

- A) LP/DF --- 2-3 --- 720/acre.
 - B) Overstocked lodgepole pine and Douglas fir (BA 148).
 - C) Post and pole timber with some sawlogs, Christmas trees.
 - D) Mistletoe and rust present.
 - E) Access possible from stand 8, Riparian area through north portion of stand, slopes from 10 to 45 %.
- Recommendations - 1,2,5,7,8, and 9 Probable.

Stand 8 39 acres, TPA - 310.

- A) LP/PP --- 2-3 --- 180/acre.
 - B) Wellstocked lodgepole pine (BA 93).
 - C) Post and pole timber with some sawlogs, Christmas trees.
 - D)
 - E) Old logging road access, riparian area on north side of stand, wildlife usage, average slope is 25%, several open areas.
- Recommendations - 4,7,8, and 9 Probable.

Stand 9 102 acres, TPA - 844.

- A) LP --- 2 --- 25/acre.
 - B) Overstocked lodgepole pine (BA 170).
 - C) Post and pole timber.
 - D) Slight mistletoe near stand 5.
 - E) Access from stand 8, heavy wildlife usage, average slope 25%.
- Recommendations - 1,2,3,7, and 9 Possible.

Stand 10 76 acres, TPA - 1034.

- A) LP --- 2 --- 400/acre.
 - B) Overstocked lodgepole pine (BA 150).
 - C) Post and pole timber.
 - D)
 - E) Limited access, average slope 25%.
- Recommendations - 1,2,7, and 9 Possible.

Stand 11 67 acres, TPA - 546.

- A) LP --- 2-3 --- 140/acre.
 - B) Overstocked lodgepole pine (BA 164).
 - C) Post and pole timber with some sawlogs.
 - D)
 - E) Good access, several open areas, average slope 18%.
- Recommendations - 1,2,7,8, and 9 Probable.

Below stocking areas 75 acres

- A) Mixture of grasses and shrubs.
 - B) Good range condition.
 - C)
 - D)
 - E) Meadows and openings used for grazing, good access.
- Recommendation - Prescribed fire periodically.

Recommendations

After each stand description there is 1 or more recommendation number. These numbers correspond to the forest management practices listed on the following pages. A more detailed description of these activities can be found in Appendix F. Each recommendation number is also followed by the word probable, possible and unlikely. This represents if the activity is feasible at this time. This is based on slope, access, and economics. A stand may need management such as thinning but the probability of the activity being carried out may be slim due to economic factors. The possible recommendations are based on the idea that things may change in the future. The price of timber may go up, roads may be extended or improved, or an insect or disease problem may make a recommendation feasible. No action is also a possible management decision, preserving the area for wildlife or aesthetics are valid alternatives.

This plan lays the foundation of management. In order to implement any of the recommendations a professional forester must come up with each individual activity plan. At the end of this section is a review of the stand recommendations.

Thin to Growing Stock Level (GSL) 80

Thinning the stand to a growing stock level of 80 means that the basal area (Appendix 4) is at 80.0 square feet per acre when the average stand diameter is 10.0 inches after thinning. Practically speaking, this yields an ideal spacing distance between the trees after thinning dependent on their average diameter. This enables the person thinning the stand to remove trees to optimize spacing at whatever size. By looking at the chart in Appendix 4 and determining what the average diameter of the stand is, an ideal distance between trees can be determined. For instance, an average diameter of 10.0 inches in a space between trees of 17.2 feet. During thinning, remove poorly shaped, damaged or diseased, and competing smaller trees. "Character trees", or trees with specific uses, such as wildlife snags, should be retained. Western gall rust infected trees should be discriminated against and removed during thinning as well (Appendix 3).

(2)

Thinning to Growing Stock Level (GSL) 100

This is similar to the previous thinning prescription, but to a slightly higher basal area. Distances between trees will be slightly less. Different sites may support, especially north facing slopes, and different species may require, Douglas-fir for example, a different spacing. Again, by looking at the chart in Appendix 4 and determining what the average diameter of the stand is, an ideal distance between trees can be determined. During thinning, remove poorly shaped, damaged or diseased, and competing smaller trees. "Character trees", or trees with specific uses, such as wildlife snags, should be retained. Western gall rust infected trees should be discriminated against and removed during thinning as well (Appendix 3).

27

(3)

Patch Cut to Sanitize Dwarf Mistletoe

Where patches of dwarf mistletoe occur, cut all infected trees within the infestation, to sanitize the stand (Appendix 3). These patch clearcuts should not exceed 5 acres in size for wildlife considerations. Patch cuts should be started on the outside of the infested areas, and proceed into the center of the infested areas. This prevents the further spread of this parasitic disease to uninfected trees outside the patch cut.

(4)

Thin to Growing Stock Level (GSL) 80 where necessary

In stands with considerable variability in the stocking level, some patches of higher density may need to be thinned, while other areas of the stand may not need to be thinned. In fact, understocked areas within the stand adjacent to these higher density patches may need to be planted or regenerated. Thus, this recommendation indicates that thinning to GSL 80, as previously described, should be done when necessary.

Improvement Cut

The purpose of an improvement cut is to remove badly diseased, damaged, standing dead, and poorly shaped trees to reduce fire hazard, and improve the residual stand. Generally, these conditions will occur in stands that were heavily infested by mountain pine beetle or cutover during previous years. Frequently, the improvement cut may also serve as a salvage cut, and the stand may need to be replaced with seedlings or natural regeneration.

Replant or Reseed

This practice involves the establishment of new trees through planting of seedlings or natural regeneration. Generally, regeneration should be of the same trees present within the stand prior to management activities. However, in the case of patch cuts for dwarf mistletoe, or in stands where this disease is present and not under control, susceptible seedlings should not be established. In these cases, dwarf mistletoe-infested ponderosa pine can be underplanted with non-susceptible species like Douglas-fir or Rocky Mountain juniper prior to the complete removal and control of the infested trees. In other situations, natural regeneration from existing trees may be desired. In this case, suitable seedbeds must be present for seedling establishment (Appendix 2, 4).

Patch Cut

This is a variation of a clearcut regeneration system, where all the trees within an area are removed to establish a new, even-aged stand. In this case, the clearcuts should be designed as patches of not more than 10 acres (Appendix 4).

Shelterwood

The shelterwood regeneration system utilizes the existing stand to provide a seed source for the new stand. As the stand matures, it is thinned to improve seedling establishment in the protection of the old stand. After the new regeneration is present, the older stand is removed (Appendix 4).

Group Selection

The group selection system replaces the older stand by creating small openings within the existing stand, and using seeding in from adjacent trees to establish regeneration. This system differs from the patch clearcut system by having much smaller openings, which are partially shaded by the surrounding stand (Appendix 4).

Review of Stand Recommendations

Stand 1 - 1,2,7,8,9 Possible
Stand 2 - 1,2,7,9 Probable
Stand 3 - 7,8,9 Probable
Stand 4 - 1,4,7,8,9 Probable
Stand 5 - 3,5,7 Unlikely
Stand 6 - 1,2,7,8,9 Possible
Stand 7 - 1,2,5,7,8,9 Probable
Stand 8 - 4,7,8,9 Probable
Stand 9 - 1,2,3,7,9 Possible
Stand 10 - 1,2,7,9 Possible
Stand 11 - 1,2,7,8,9 Probable

Product Market Description

There are numerous advantages to selling timber products from the Trail Creek section. The most important benefit is raising revenue for the state school system. Too effectively manage forests and increase the productivity requires harvesting a portion of the older timber. Sound forest management requires never cutting more than grows, ensuring a perpetual supply of timber for the future.

There is a wide variety of possible timber products to be harvested from the section. The most common products found on this particular section are posts and poles, fuelwood, and christmas trees, and sawlogs.

FUELWOOD

Fuelwood is the most common product on the section because there are few requirements on the quality of the trees. The demand for fuelwood is down along the Front Range because of the environmental impacts and weather conditions. There are several local contractors who buy and sell firewood along the Front Range. The Colorado State Forest Service usually charges between \$5 and \$15, depending on several variables such as harvest requirements or hauling distance. A second option is a public firewood sale where individuals can cut their own firewood. The price can range from \$5 to \$50 per cord, depending on the present market value or hauling distance. Either of these types of sales provide an opportunity to raise revenue and are a good way to clean up the cull material left from a timber sale.

POSTS and POLES

This is the second most dominant product found on the section. This is because overstocking, the competition is great in most of the stands and the trees are struggling against each other for limited nutrients, light and water. The tree size is limiting the possible products to posts and poles. The CSFS sells this size timber for \$5 to \$15 per cord. This depends on logging requirements and hauling distance. Some logging contractors produce the product on the site, others haul the whole tree to the mill. Mills accept a 2.5" to 3" top diameter and usually pay \$.06 to \$.15 per linear foot.

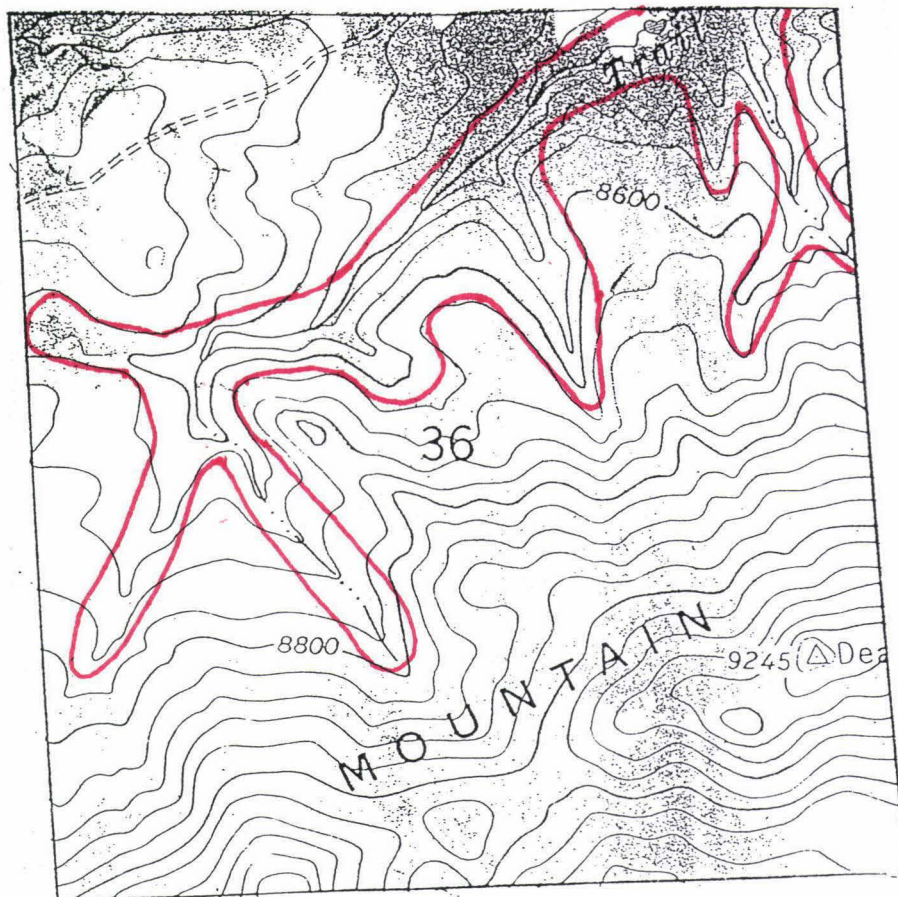
SAWTIMBER

The sawtimber found on the section is mainly mixed in with the post and pole size timber. There are numerous local logging contractors and haulers interested in this product. The USFS is currently asking up to \$110 per thousand board feet (MBF). This estimate fluctuates with logging requirements and hauling distance. Most mills require tree-length logs, cut to a 6" top diameter. Log defects (excessive knots, rot, crook, etc.) will lower the value when scaled at the mill. The local mills are paying up to \$150 per MBF. This estimate price also fluctuates constantly.

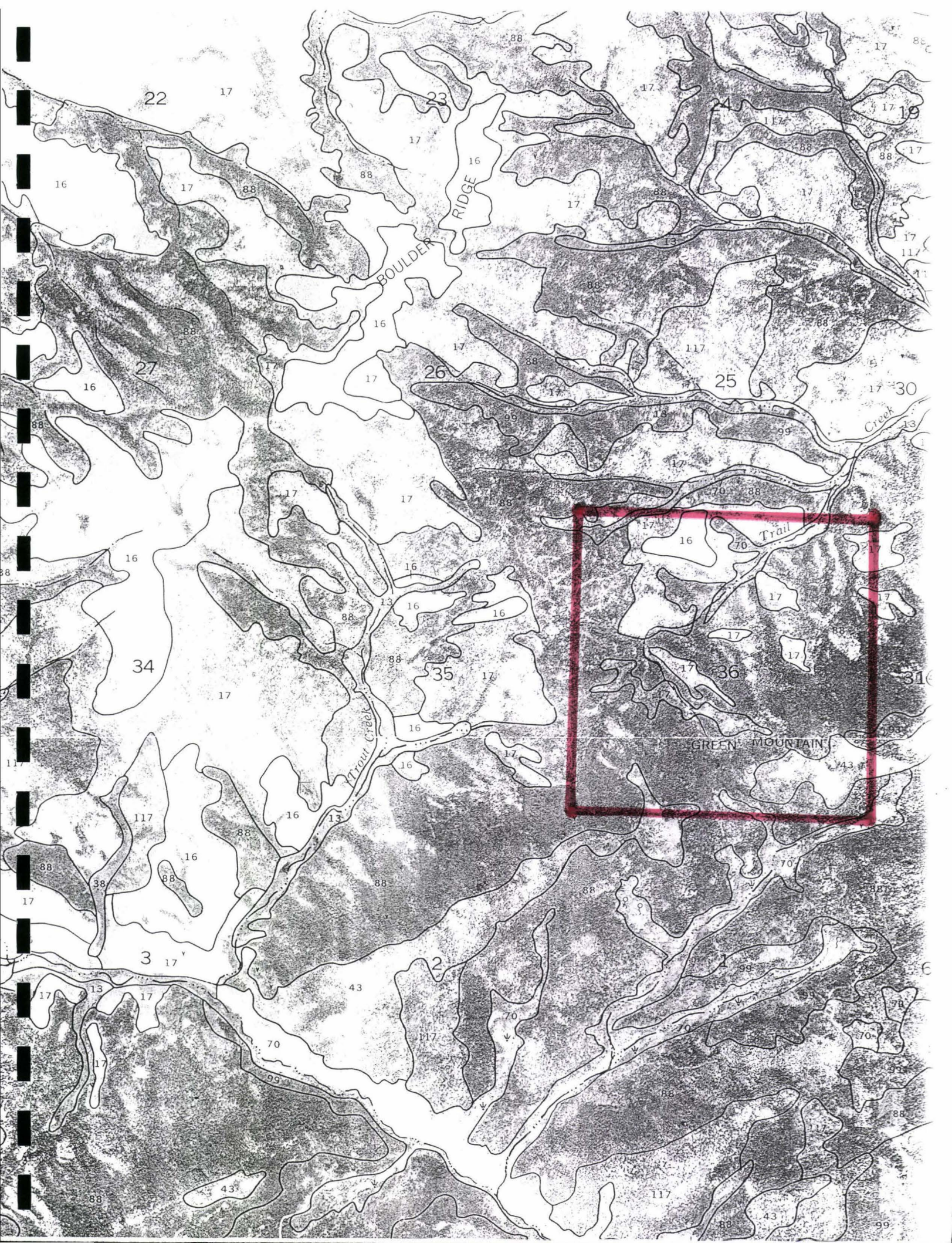
CHRISTMAS TREES and TRANSPLANTS

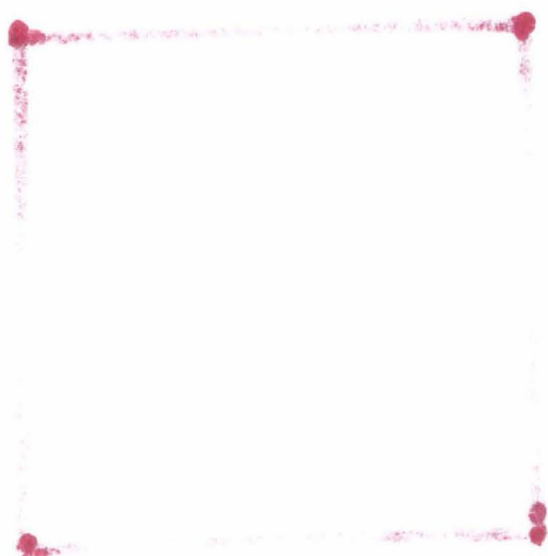
The sale of christmas trees and transplants has proven to be an excellent way of raising revenue. The CSFS presently has a contract with a local company to harvest christmas trees at a price of \$4 per tree. See the areas recommended for christmas tree harvesting below.

The section provides numerous conifer seedling (spruce, lodgepole Douglas-fir and subalpine fir) available for transplanting. These sell for approximately \$1 to \$3 each. Presently there is no aspen regeneration of the transplant size, but harvesting one of the pockets aspen would create plenty of aspen seedling available for transplants.



APPENDIX A
Soils Information





Redfeather Series

The Redfeather series consists of shallow, well drained soils that formed in material weathered from granite. These soils are on ridges and mountainsides and are underlain by granite bedrock at a depth of 10 to 20 inches. Elevation ranges from 8,500 to 9,500 feet. Slopes are 5 to 50 percent. The native vegetation is mainly forest of lodgepole pine, spruce, and some aspen and a thin understory of grass. Mean annual precipitation ranges from 15 to 20 inches, mean annual air temperature ranges from 40° to 44° F, and the frost-free season ranges from 60 to 85 days.

In a representative profile a 2-inch-thick layer of organic material is on the surface. The surface layer is dark grayish brown and light brownish gray sandy loam about 8 inches thick. The subsoil is brown gravelly sandy loam about 4 inches thick and reddish brown gravelly sandy clay loam about 5 inches thick. Below this is hard granite bedrock.

Permeability is moderately rapid, and the available water capacity is low. Reaction is medium acid above a depth of about 1 inch, strongly acid to a depth of about 12 inches, and medium acid below a depth of 12 inches.

These soils are used mainly for forest and recreation.

Representative profile of Redfeather sandy loam, 5 to 50 percent slopes, in forest, approximately 1,300 feet south and 1,000 feet west of the northeast corner of sec. 21, T. 11 N., R. 74 W.:

O1—2 inches to 1 inch; undecomposed organic material, mainly needles, bark, and twigs and remains of understory plants.

O2—1 inch to 0; partly decomposed organic material like that in the O1 horizon.

A1—0 to 1 inch; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; noncalcareous; more than 10 percent gravel and stones; medium acid; clear smooth boundary.

A2—1 inch to 8 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish

brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; about 15 percent gravel and stones; strongly acid; abrupt smooth boundary.

A&B—8 to 12 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable; few patchy clay films on peds; about 30 percent gravel and stones; strongly acid; clear wavy boundary.

B2t—12 to 17 inches; reddish brown (5YR 5/4) gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, firm; thin patchy clay films on peds; about 35 percent gravel and 10 percent cobbles; medium acid; gradual wavy boundary.

R—17 to 24 inches; hard granite bedrock.

The A1 horizon is sandy loam or gravelly sandy loam 1 inch to 3 inches thick. The A2 horizon is sandy loam or gravelly sandy loam 5 to 10 inches thick. The B2t horizon is gravelly or very gravelly sandy clay loam. Content of rock fragments, mainly fine granitic gravel and cobbles, in the solum ranges from 35 to 80 percent. Reaction ranges from strongly acid to slightly acid.

88—Redfeather sandy loam, 5 to 50 percent slopes. This strongly sloping to steep soil is on mountainsides and ridges.

Included with this soil in mapping are some small areas of shallow soils that have a darker colored surface layer. Also included are a few small areas of Schofield and Naz soils and areas of Rock outcrop.

Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

This soil is suited to woodland and forestry purposes and to recreation. Some areas are used as sites for summer homes. Capability unit VIIs-1, dryland; woodland suitability group 6d2; not assigned to a range site or windbreak suitability group.

Naz Series

The Naz series consists of deep, well drained soils that formed in material weathered mainly from granite. These soils are on terraces and valleysides. Elevation ranges from 7,500 to 9,000 feet. Slopes are 1 to 25 percent. The native vegetation is mainly scattered pine and an understory of junegrass, Idaho fescue, sagebrush, and other shrubs and forbs. Mean annual precipitation ranges from 15 to 20 inches, mean annual air temperature ranges from 42° to 44° F, and the frost-free season ranges from 60 to 85 days.

In a representative profile the surface layer is very dark grayish brown and dark grayish brown sandy loam about 22 inches thick. The underlying material is brown sandy loam about 38 inches thick.

Permeability is moderately rapid, and the available water capacity is medium. Reaction is slightly acid above a depth of 22 inches and neutral below that depth.

These soils are used mainly for native grasses.

Representative profile of Naz sandy loam, 3 to 25 percent slopes, in native grass, about one mile west of the upper Cherokee Park Road in the southwest quarter of sec. 9, T. 11 N., R. 73 W.:

A11—0 to 5 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark grayish brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; slightly acid; gradual smooth boundary.

A12—5 to 22 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky structure; soft, very friable; slightly acid; gradual smooth boundary.

C—22 to 60 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; very weak and weak coarse subangular blocky structure; soft, very friable; 15 percent gravel; neutral.

The A horizon is sandy loam or light loam 9 to 30 inches thick. The C horizon is sandy loam or coarse sandy loam. Bedrock is at a depth of 40 to 60 inches in some places. Content of rock fragments, mainly granitic gravel, ranges to as much as 15 percent.

69—Naz sandy loam, 1 to 3 percent slopes. This nearly level soil is on terraces. This soil has a profile similar to the one described as representative of the series, but the surface layer is about 25 inches thick.

Included with this soil in mapping are some small areas of soils that are more sloping and some small areas of soils that have a gravelly layer at a depth of 40 to 60 inches. Also included are a few small areas of soils in which bedrock is at a depth of 40 to 60 inches.

Runoff is slow, and the hazard of erosion is slight.

This soil is suited to pasture and native grasses. Some small areas are used for irrigated hay. Capability units VIc-1, irrigated, and VIe-6, dryland; Mountain Loam range site; not assigned to a windbreak suitability group.

70—Naz sandy loam, 3 to 25 percent slopes. This gently sloping to strongly sloping soil is on terraces and valleysides. This soil has the profile described as representative of the series.

Included with this soil in mapping are a few small areas of soils in which granite bedrock is at a depth of 30 to 60 inches. Also included are a few small areas of soils in which gravel is at a depth of 40 to 60 inches and a few small areas of granite outcrop.

Runoff is medium to rapid, and the hazard of erosion is severe.

This soil is suited to pasture and native grasses. Capability unit VIe-6, dryland; Mountain Loam range site; not assigned to a windbreak suitability group.

Haploborolls-Rock Outcrop Complex, Steep

43—Haploborolls-Rock outcrop complex, steep. This complex consists of steep and very steep, cool soils and Rock outcrop on mountainsides and fans (fig. 8). The soils are extremely variable; about 50 to 70 percent of the unit, however, is stony and cobbly, dark colored soils that range from shallow to deep. These soils mainly have a surface layer and subsurface layer of sandy loam or loam that contain 10 to 25 percent cobbles and 20 to 35 percent stones. Stones that are on the surface are mainly boulders of granite, gneiss, and schist. About 30 to 50 percent of the mapped area is Rock outcrop. It is mainly on the steeper parts of the area, but it is scattered throughout.

Runoff is rapid, and the hazard of water erosion is severe.

These soils are used for a limited amount of grazing and are also used for wildlife habitat and watershed. Capability unit VIIe-1, dryland; Haploborolls in Stony Loam range site and Rock outcrop not assigned to a range site; not assigned to a windbreak suitability group.

Boyle Series

The Boyle series consists of shallow, well drained or excessively drained soils that formed in material weathered from granite. These soils are on uplands and mountainsides and are underlain by weathered granite at a depth of 10 to 20 inches. Elevation ranges from 7,000 to 8,200 feet. Slopes are 1 to 30 percent. The native vegetation is mainly blue grama, bluebunch wheatgrass, fescues, fringed sage, and other forbs and shrubs. Mean annual precipitation ranges from 14 to 18 inches, mean annual air temperature ranges from 44° to 46° F, and the frost-free season ranges from 75 to 100 days.

In a representative profile the surface layer is brown gravelly sandy loam about 5 inches thick. The subsoil is brown and reddish brown gravelly or very gravelly sandy clay loam about 8 inches thick. Below this is weathered granite.

Permeability is moderate, and the available water capacity is low. Reaction is slightly acid to neutral.

These soils are used for native grasses.

Representative profile of Boyle gravelly loam in an area of Boyle-Ratake gravelly sandy loams, 1 to 9 percent slopes, in native grass, 1,100 feet south of state line and just west of Tie Siding Road in sec. 22, T. 12 N., R. 73 W.:

A1—0 to 5 inches; brown (7.5YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable; 15 percent gravel; neutral; clear smooth boundary.

B21t—5 to 10 inches; brown (7.5YR 5/3) gravelly sandy clay loam, dark brown (7.5YR 3/3) moist; weak to moderate medium subangular blocky structure; very hard, firm; thin patchy clay films on peds; 25 percent gravel; neutral; clear smooth boundary.

B22t—10 to 13 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; very hard, friable; thin patchy clay films on peds; 70 percent gravel; neutral; gradual wavy boundary.

Cr—13 to 20 inches; weathered granite.

The A horizon is gravelly or very gravelly sandy loam 3 to 6 inches thick. The B horizon is gravelly or very gravelly sandy clay loam about 6 to 11 inches thick. The A and B horizons range from slightly acid to neutral. Content of rock fragments ranges from 15 to 80 percent but averages more than 35 percent.

16—Boyle-Ratake gravelly sandy loams, 1 to 9 percent slopes. This complex consists of nearly level to strongly sloping soils on uplands. It is about 50 percent Boyle gravelly sandy loam and about 30 percent Ratake gravelly sandy loam. The soils are intricately intermingled throughout the mapped areas, but Boyle gravelly sandy loam commonly is more nearly level and Ratake gravelly sandy loam is steeper. The Boyle soil has the profile described as representative of the Boyle series. The Ratake soil has a profile similar to the one described as representative of the Ratake series, but the surface layer and subsoil are gravelly sandy loam, the underlying material is weathered granite, and the soil contains less mica.

Included with these soils in mapping is about 20 percent soils that are similar to Boyle and Ratake soils but in which granite is at a depth of 20 to 24 inches; granite knobs and outcrops occur with these included soils.

Runoff is slow, and the hazard of water erosion is slight.

These soils are suited to native grasses. Capability unit VIIIs-1, dryland; Rocky Loam range site; not assigned to a windbreak suitability group.

17—Boyle-Ratake gravelly sandy loams, 9 to 25 percent slopes. This complex consists of strongly sloping soils on uplands. It is about 40 percent Boyle gravelly sandy loam and about 35 percent Ratake gravelly sandy loam. The soils are intricately intermingled throughout the mapped areas, but Boyle gravelly sandy loam commonly is less sloping and Ratake gravelly sandy loam is higher and steeper. The Boyle soil has a profile similar to the one described as representative of the Boyle series, but the combined thickness of the surface layer and subsoil is about 10 inches. The Ratake soil has a profile similar to the one described as representative of the Ratake series, but the surface layer and subsoil are gravelly sandy loam; they contain less mica; their combined thickness is about 10 inches; and the underlying material is granite.

Included with these soils in mapping is about 25 percent soils that are similar to Boyle and Ratake soils but in which granite is at a depth of 20 to 24 inches; granite knobs and outcrops occur with these included soils.

Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. Deep gullies are in some areas.

These soils are suited to native grasses. Capability unit VIIe-1, dryland; Rocky Loam range site; not assigned to a windbreak suitability group.

APPENDIX B

USFS Right-of Way Document



United States
Department of
Agriculture

Forest
Service

Arapaho and Roosevelt
National Forests
Pawnee National
Grassland

240 West Prospect Road
Fort Collins, CO
80526-2098

Handwritten signature: J. F. Collins

Handwritten: F-11

Reply to: 5460

Date: JUL 17 1991

Colorado State Forest Service
Colorado State University
Fort Collins, CO 80523

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Dear Lessee:

This letter is to inform you that the U.S. Forest Service is applying for a right-of-way to cross State lands. The tract is described as follows:

T.12N., R.74W., section 36

Trail Creek

Enclosed is a map indicating the road alignment.

The Colorado State Board of Land Commissioners has informed us you are the surface lessee for Lease No. OTS-37911 on this land. This notification is in accordance with their regulations. If the right-of-way is granted to the Forest Service, we will be responsible for maintenance of the road commensurate with our use. *USFS*

Your comments on the grant are requested in writing or by telephone by August 16, 1991. If you have any questions or need additional information, please contact Rochelle Ames or Susan Witt at (303) 498-1064.

Sincerely,

Handwritten signature: John P. Underwood, Jr.
M. M. UNDERWOOD, JR.
Forest Supervisor

Enclosure

cc:
Colorado State Board of Land Commissioners
District Ranger, Redfeather RD



APPENDIX C
Wildlife Information

--SNAGS FOR WILDLIFE : MANAGEMENT GUIDELINES--

Numerous species of birds and mammals are dependant upon snags and den trees during part of their life cycle. In addition, snag and den trees are used by large numbers of insects, fungi, plants, and animals. These trees are important components of the ecosystem and must be accommodated in forest management. The increased demand for fuelwood and other wood products in recent times underscores the concern for maintaining these trees as part of the wildlife habitat. Land managers and owners should be aware of the importance of providing snag and den trees for wildlife.

Snags are standing dead or partially dead trees, at least 6 inches diameter at breast height (dbh) and 10 feet in height. Since large diameter snags meet the needs of many more wildlife species than smaller snags, value ratings of snags for wildlife are described below:

<u>Rating</u>	<u>Diameter</u>	<u>Height</u>
Excellent	20 inches plus	40-50 + feet
Good	15-19 inches	40-50 + feet
Fair	10-14 inches	15-40 feet
Poor	6 - 9 inches	10-20 feet

Den trees are trees possessing a cavity large enough to serve as a shelter for birds and mammals, or as a den site to give birth and raise young. Den trees generally must be 15 inches dbh or larger and have a cavity opening of 4 inches in diameter or more. Snag Replacements are trees, such as a cull tree (of no commercial value), which is selected to be retained on the site to produce a future snag tree.

Providing a continuing supply of good to excellent quality snag and den trees, distributed over time of management and over the whole area of management, should be a management goal on forestland. This distribution of snags and den trees is essential to maintain self-sustaining populations of all snag and cavity dependent wildlife species. In areas where good to excellent quality snag and den trees are lacking, poorer quality snags will have to be retained until larger diameter or taller trees develop. Some objectives for woodland managers and landowners to strive for in snag and den trees follow:

Den Trees

1. Managers should leave a minimum of one 15-inch or larger den tree per in all types of cuts.
2. Within 300 feet of bodies of water, at least two useful cavity trees per acre should be retained.
3. In addition, one tree per acre showing potential for development into a den tree should be retained.

Snag Trees

1. Retain a minimum of 4 excellent to good quality snags per acre. Den trees outlined above will serve as snag replacements.
2. Within 300 feet of openings and water, manage to provide 6 excellent to good quality snag trees per acre.

These recommendations are intended to help reach the goal of maintaining wildlife species dependant on snag and den trees. It may not be possible to have these den and snag trees evenly distributed over every acre. However, an even distribution over the entire management area is most desirable.

Adapted from: "Snags for Wildlife:Management Guidelines", by Doug Blodgett, in The American Tree Farmer Magazine, January-February 1986.

APPENDIX D

Slash Disposal and Fire

SLASH DISPOSAL

Slash is a term used to describe the limbs, tops, and branches left from thinning and timber harvesting activities. Slash can add significant volumes of fuel to the forest. These materials can accumulate and can serve as ladder fuels, or can become hot spots, increasing the difficulty of suppressing wildfires. Slash decomposes very slowly in Colorado and proper disposal is essential.

Three treatment methods commonly used are: (1) lopping and scattering; (2) piling and burning; (3) chipping. Proper treatment reduces fire hazard, improves access for humans, wildlife, and livestock, encourages establishment of grasses and other vegetation (including seedling trees in some cases), and improves aesthetics. Size, amount, and location of slash dictates the method of disposal used.

Lopping and scattering is the easiest and cheapest method of disposal, but must be done properly to be effective. Large branches are cut into small sections and scattered over the area. All pieces are cut small enough so all slash is within 12 inches of the ground. (Contact with the ground increases decomposition rates). This method leaves a "messy" appearance to the site for several years, especially if slash is not cut into small enough pieces. Advantages to this method are greater nutrient recovery to the site as slash decomposes, reduced surface erosion, and improved seedling establishment by some species (especially lodgepole pine).

Piling and burning is a quick way to eliminate a large amount of slash at a moderate cost. Burning is done when sufficient snow cover exists to prevent fire spread. Piles are located far enough away from remaining trees to prevent scorching, and should be compact enough to burn easily. The county sheriff and local fire departments must be notified before any burning is done. In some counties, the Public Health Department requires a burning permit be completed before the burning season. A few scattered piles may be left for wildlife use without compromising wildfire danger.

Pile dimensions will depend upon site specific conditions and manpower, but should be at least 6 feet across by 5 feet high in size (when compacted) to facilitate burning during winter conditions. Piles should be burned during the first winter following cutting for best results. This method requires reentry to the stand, frequently during inaccessible periods, to complete treatment. Cost is slightly higher than lopping and scattering. Adverse weather conditions may delay burning for several years, reducing the effectiveness of this treatment. Advantages to this method are a "clean" site after treatment, improved accessibility within the area, and suitable seedbed for seedling establishment.

LARIMER COUNTY SHERIFF'S DEPARTMENT

P.O. BOX 1190
Fort Collins, CO 80522

James W. Black, Sheriff
Marvin Schlageter, Undersheriff

GUIDELINES FOR BURNING

The guidelines attached will provide information and requirements that must be followed for burning in Larimer County. These guidelines were prepared by the Larimer County Sheriff's Department Emergency Services Section and the Colorado State Forest Service to assist you in completing a safe and well managed burn. To summarize the information attached, the following requirements must be followed:

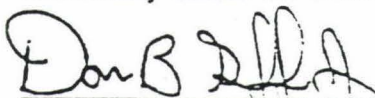
1. Piles or debris to be burned must be in open areas away from standing timber and structures.
2. There must be at least 3 inches of snow cover around the piles being burned.
3. Winds should be light yet not strong enough to blow sparks into other areas or make control of the fire difficult. (7 mph wind maximum)
4. Someone must remain with the fire at all times. If you leave the fire, it must be extinguished.
5. All burning must be completed and out by nightfall.
6. Before starting your burn, you must advise Larimer County Communications Center at 498-5141 or 498-5142.

In the Berthoud, Loveland, and Fort Collins area, you must also notify the appropriate fire department.

Failure to notify the appropriate agency will result in fire departments responding to your location due to smoke reports that our Communications Center may receive.

7. You must have a copy of your burning permit with you when burning.

If these guidelines are not followed, it may result in your permit being revoked and any fires you have going being extinguished. Please remember that the control and safety of the burn is your responsibility and if at any time your fire damages another person's property, you can be held criminally liable for damages.


Don Griffith, Specialist
Emergency Services Section


Rick Perkins, Captain
Emergency Services Section

DG/jp

FOREST SLASH BURNING GUIDELINES FOR LARIMER COUNTY

This handout is designed to be used by forest landowners, land managers, and fire department personnel in Larimer County in planning and conducting safe and effective forest slash burning in woodland situations. It cannot guarantee safety from accidents, unforeseen circumstances, changing burning conditions, or negligent actions of the individual(s) burning slash. By following the intent of these guidelines and common sense, the landowner or forest manager can reduce forest slash accumulations, improve the appearance of their forestland, and reduce wildfire risk on their properties.

Definitions

Slash: The accumulation of limbs, tops, and miscellaneous residue left by forest management activities, such as thinning, pruning, and timber harvesting.

Piling and burning: The treatment of slash by piling the limbs and tops into manageable piles. Piles are burned during safe burning conditions, generally during the winter following cutting.

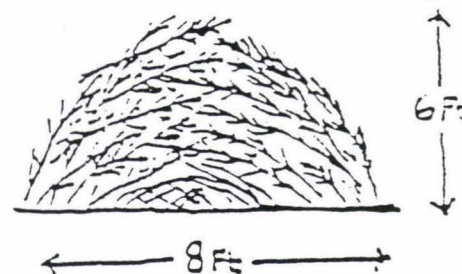
Broadcast burning: The treatment of slash by burning the limbs and tops as they lie on the ground after cutting. The slash must be distributed continuously throughout the burn area to be burned effectively. Burning is generally done during very wet periods or with light snow cover in late fall or early spring.

Mop-up: The final check of the burned slash to identify and extinguish still burning coals or materials. Extinguishment is usually accomplished by covering and mixing snow, water, or soil with the burning fuels.

CONSTRUCTION OF PILES

Pile slash immediately after cutting (while still green), and before winter snowfall. Remove all wood products such as firewood prior to piling. Pile branches and tops with the butt ends towards the outside of the pile, and overlapping so as to form a series of dense layers piled upon each other. Use a mixture of sizes and fuels throughout the pile. This prevents snow from filtering into the pile and extinguishing the fire while it is starting. Piles should be approximately 8 feet across in diameter and 6 feet in height, again to prevent drifting snow from entering the pile. Piles should be kept compact, with no long extensions, to reduce snow filtration and improve ignition. Do not place large stumps and sections of logs in the piles, as they will burn for extended periods and will frequently need to be mopped-up.

Do not include garbage or debris in the pile. Locate piles in meadows, rock outcrops, or openings in forest stands. Do not pile slash over stumps where possible, as these areas will also need to be mopped-up. Piles may be situated within forest stands, if they are at least 5 feet away from adjacent tree trunks and tree crowns do not hang over the piles.



PLANNING YOUR BURNING EFFORT

Landowners must complete the following steps before burning slash:

1. Obtain and have approved a burning permit from the Larimer County Health Department, 363 Jefferson Street, Fort Collins, CO 80524, (303) 498-6700.
2. Signed authorization and approval from the legally constituted Fire Protection District for your area of Larimer County, or from the Larimer County Sheriff's Department, Emergency Services Section located in the basement of the Larimer County Courthouse.

Burning permits consist of 3 parts, and require the completion of information about the proposed burning. Upon completion of the permit and approval of the Health Department, approval from the responsible fire authorities is required. Upon their approval, the white copy of the permit is retained by the landowner, the yellow copy is given to the responsible fire protection agency, and the pink copy is returned to the Health Department.

The landowner must notify the responsible fire protection agency the day burning is planned (see attached list). Notification of the Larimer County Sheriff's Department, at 498-5141 or 498-5142 is also mandatory and should include the dates, times, and an exact legal description of the burn location. Neighbors should be informed prior to burning as well.

Burning must be done during suitable weather conditions. Periods of snow or light rain, with light winds (for smoke dispersal) and a minimum of 3 inches of snow cover are ideal. Do not burn during periods of high winds, low humidity or drying conditions, temperature inversions, and lack of snow cover or when these conditions are expected to develop after starting. Control of burning slash must be maintained at all times to reduce wildfire hazard and damage to residual trees. If snow cover becomes sparse during the burning period, additional water sources must be provided for wildfire control and mopping-up efforts. Persons conducting the burning should have at a minimum: leather gloves; shovels and mattocks; leather work boots; work clothing; masks or bandanas for covering the mouth and nose; and proper eye protection.

BURNING SLASH PILES

Piles may be ignited by several means. If the needles and fine fuels within the pile have dried out throughout the summer, then ignition can be easily started with a large ball of newspaper placed within the bottom of the pile. If fuels are still partially green, or the pile is wet from rain or melting snow, then a hotter and longer burning source may be necessary. Sawdust, saturated with diesel fuel and placed within the bottom of the pile, can be used. Flares used for highway emergencies can also be utilized to ignite the piles. Do not use gasoline for this purpose!

One pile should be burned first as a test pile to see how it burns and at what rate prior to igniting other piles. If suitable burning conditions exist, then additional piles may be started. Ignite only those piles that can be watched with the available manpower until the piles have burned down. Depending on weather conditions, pile size, and moisture content of the fuels, piles should burn down in 20 to 35 minutes. As a general rule, 3 to 6 piles per person is a manageable rate if piles are closely situated.

After the piles have burned down, repile any unburned slash and large wood chunks (called "chunking-in") into the beds of coals before starting any new groups of piles. Do not start any new piles after 2:00 p.m. Piles started after this time may continue to burn into the evening.

If landowners have questions about possible problems with burning slash, they should contact the Larimer County Sheriff's Department, Emergency Services Section at 498-5301 or the Colorado State Forest Service, Fort Collins District Office at 491-8660. Information about wildfire hazard reduction for forestland is available from the Fort Collins District, CSFS at 491-8660.

Prepared by the Larimer County Sheriff's Department, Emergency Services Section and the Colorado State Forest Service, Fort Collins District, 2/1/90.

APPENDIX E

Insect and Disease

Service-In-Action
 Mountain Pine Beetle 5.528 (Revised)
 By David A. Leatherman
 Colorado State Forest Service
 (491-6303)

QUICK FACTS

- ... Mountain pine beetle (MPB) is the most important insect pest of Colorado's pine forests, often killing large numbers of trees annually during outbreaks.
 - ... MPB is the subject of Teletips #1705, a recorded phone message.
 - ... Trees under stress from various causes such as old age, crowding, poor growing site, and mechanical damage are most likely to be attacked.
 - ... Short-term controls include spraying, burning, and peeling, while long-term remedies include various forest management practices like thinning.
 - ... Preventive sprays are available to protect green unattacked trees.
-

Mountain pine beetle, *Dendroctonus ponderosae* Hopkins, is native to western pine forests and is periodically epidemic in Colorado. Millions of trees have been killed during recent outbreaks. MPB infestations develop irrespective of property lines, being equally evident in wilderness areas, mountain subdivisions, and urban back yards. Even windbreak pines many miles from the mountains can succumb to beetles imported in materials like firewood.

Common Names

Mountain pine beetle, MPB, Black Hills beetle, Rocky Mountain pine beetle.

Colorado Host Trees

Commonly attacked and killed: ponderosa pine, lodgepole pine, Scots (Scotch) pine, and limber pine.

Occasionally attacked and killed: bristlecone pine and pinon pine.

Rarely attacked and killed: Austrian pine and other pines not mentioned above.

Life cycle: This bark beetle has a one-year life cycle in Colorado. In late summer adults leave the dead, brown-needled trees in which they developed and attack living, green trees. After tunneling just beneath the bark and mating, female beetles each lay about 75 eggs in vertical tunnels called egg galleries. Soon these eggs hatch into larvae which feed outward from the vertically-oriented egg gallery. Larvae overwinter in infested trees. Most larval feeding occurs in spring, with transformation (pupation stage) into the adult stage occurring in early summer. Emergence of new adults can begin in early July and may continue through September. However, the great majority of beetles exit trees during late July (lodgepole pine) and mid-August (ponderosa pine). All control efforts should, of course, be completed prior to beetle emergence. Upon emerging, beetles attack living trees, often in mass, and the cycle begins anew.

A key part of this cycle is the beetle's role in transmitting bluestain fungi. Spores of these fungi contaminate the bodies of all MPB (and many other bark beetle species) and are introduced into trees during attack. Beetle attacks are successful only when both larval and fungal development progress. Thus, the network of beetle

galleries plus growing bluestain act together to disrupt the tree's water transport system. Rapid tree death results.

Signs and symptoms of attack:

1. Popcorn-shaped masses of resin called pitch tubes on trunk (may be brown to white in color).
2. Boring dust in bark crevices and around tree's base.
3. Bluestained sapwood (check at more than one point around tree's circumference).
4. Characteristic MPB galleries beneath bark.
5. Evidence of woodpecker feeding on trunk (patches of bark removed, bark flakes laying on ground or snow below tree).
6. Fading or browning of entire tree crown (usually 8 - 10 months after successful MPB attack).
7. Live MPB eggs, larvae, pupae and/or adults in galleries under the bark.

Finding live stages of MPB actively feeding as in the last symptom (7), is by far the most certain indicator a tree is infested and needs attention. Thus, a hatchet for removing bark is needed to check trees correctly.

CONTROL

- ... Natural: Woodpeckers, certain insects and other natural agents, and extreme weather all exert at least partial control on MPB populations. However, if forest or tree conditions are favorable for beetle outbreaks these checks are not capable of keeping populations at low levels.
- ... Physical and mechanical: Burning (log decks or as firewood), peeling, some types of milling, exposing to solar radiation, and burying can all be effective treatments. Some of these obviously waste the wood resource.
- ... Chemical: Remember to READ AND FOLLOW ALL LABEL INSTRUCTIONS WHEN USING ANY PESTICIDE. The current status of chemicals for direct use in killing MPB within infested trees or logs is confusing. Formerly approved materials, like ethylene dibromide (EDB), cacodylic acid (Silvisar 510), and lindane are now completely banned, unavailable, or restricted to use by certain individuals in certain situations. Consult a local CSFS or Cooperative Extension Service office for current information on chemical control options.

PREVENTION

- ... Cultural: Forest management practices, such as thinning, which increase the vigor of potential host trees, are the best long-term approach to minimizing MPB losses. Consult a professional forester for assistance in deciding which prescription is best for your land.
- ... Chemical: Certain formulations of carbaryl are registered for early summer spraying of live, green pines to prevent MPB attack. These products go by several trade names. Read the label for application instructions. This

Service-In-Action
Mountain Pine Beetle 5.528 (Revised) -- 3

preventive is quite effective through one MPB flight period per application. In lodgepole pine areas, recent evidence indicates one spraying may provide satisfactory protection through two flights (two years).

MISCELLANEOUS INFORMATION

- ... Once MPB has successfully infested a tree, nothing practical can be done to save that particular tree.
- ... Under epidemic or outbreak conditions, enough beetles can emerge from an infested tree to kill about two same size trees the following year.
- ... Ips and related beetles which emerge early in summer are often mistaken for MPB, leading to early reports of "MPB is flying." Be sure to properly identify the beetle you find before sounding the alarm.
- ... Trees from which MPB have already emerged (look for numerous, round, pitch-free exit holes in bark) do not need to be treated.
- ... The direction and spread rate of a beetle infestation is virtually impossible to predict. However, attacked trees/groups are usually adjacent or near previously killed trees/groups.
- ... Special lures, called pheromones, are now being used in some areas to attract and concentrate beetles into trees where some method of managing them is more feasible.

David A. Leatherman
Entomologist
Colorado State Forest Service

DISEASES

DWARF MISTLETOE

Dwarf Mistletoe is a parasitic plant that severely weakens and sometimes kills its host trees, ponderosa pine and lodgepole pine. Normally, different species of mistletoe affect ponderosa pine and lodgepole pine. The parasite (Arceuthobium americanum), usually infecting ponderosa pine but occasionally attacking lodgepole pine, greatly reduces the growth of an infested tree. It also limits cone production and thus, reproduction. Dwarf mistletoe infestation also increases susceptibility to other forest pests, especially the Mountain pine beetle.

Life Cycle

Dwarf mistletoe has a six-year life cycle. It flowers in the spring. Seeds mature in August and September, a year later. Upon maturing, the seeds are released explosively. Water pressure can expel them at velocities up to 50 feet per second and distances up to 66 feet. The average distance is closer to 20 feet. The seeds are covered with a sticky material and adhere to whatever they touch. If one lands on a pine needle, it will be washed to the base of the needles by rain, where it will sprout and send a shoot into a branch. Three to six years later, shoots appear on the branch of the tree. These shoots usually produce flowers two years after emergence.

Symptoms of Mistletoe Infection

The most conspicuous symptom of mistletoe infection is the presence of mistletoe shoots in the branches or trunk. Swellings on the branches can be caused by mistletoe shoots that are about to emerge. "Witches brooms", or bunches, contorted growths of branches are often caused by dwarf mistletoe.

Control

Severely infested trees should be cut down and disposed of. Such trees will probably die anyway, and are hazardous because of the possibility of dead branches or tops falling down. By leaving them standing, they will only continue to infest other trees. Patch cuts are recommended in an entire stand that is infested.

Trees not severely infested can be pruned, and will regain some of their health and continue to live. If the shoots occur mostly in the lower parts of the tree, the branches that are infested can be pruned off. All pruned branches should be cut off flush with the trunk. All live branches should be cut off up to and including the highest infected branch. If sufficient live branches remain ($1/4$ to $1/3$ tree height), prune the tree to two feet above the highest infected

branches and brush off shoots arising from the trunk. If replanting is done, a mixed forest should be the goal. Where the pines are intermixed with Douglas-fir, for example, the rate of mistletoe spread will be greatly reduced.

FIGURE 2 Dwarf Mistletoe Rating (DMR) System

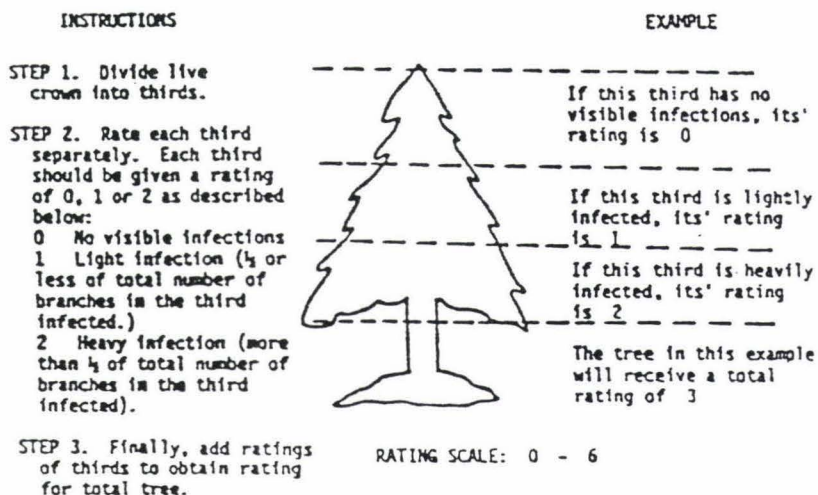


TABLE 3
SOME GENERAL CHARACTERISTICS OF THE MAJOR SPECIES OF DWARF MISTLETOE
IN THE ROCKY MOUNTAIN REGION BY HOST TREE

HOST SPECIES (<i>Arceuthobium</i>)	CHARACTERISTICS OF DWARF MISTLETOE PLANT				
	SIZE AT MATURITY	COLOR	FLOWERING	SEED MATURITY AND DISPERSAL	GEOGRAPHIC DISTRIBUTION
Ponderosa pine <i>A. vaginatum</i> subsp. <i>cryptopodum</i>	Stout, normally 4 to 10 inches long; 1/10 to 2/10 inch in diameter	Predominately orange	May to June	Late July to August following year	Common throughout Colorado Front Range & SW Colorado. Not present in the Black Hills or Wyoming
Lodgepole pine <i>A. americanum</i>	Very slender and stringy. Mostly 2 to 3 inches long; 1/10 inch in diameter	Usually olive green	April and May	August and September following year	Common throughout lodgepole pine stands in Region 2.
Douglas-fir <i>A. douglasii</i>	Mostly 3/4 to 1 1/2 inches long; less than 1/10 inch in diameter	Usually olive green	Late April to early May	Late September to early October	Southern two-thirds of Colorado
Limber pine <i>A. cyanoocarpum</i>	Stout normally 1 to 2 inches long; 1/10 inch in diameter	Yellow-green	Late August	Late August to early September	Occasional along Front Range in Colorado; throughout Wyoming
Pinon <i>A. divaricatum</i>	3 to 5 inches long; 1/10 inch in diameter	Olive green to brown	Early August to September	Early September to early November	Western Colorado

RUSTS

Rusts are fungi that invade pines and cause gall and canker formation. Western gall rust (Peridermium larknesii) and commandra blister rust (Cronartium commandrae) are two common diseases of western pines. The gall rusts cause the tree cambium to divide rapidly, much like a cancer, and form galls. These galls kill the parts of the tree which bear them. Both types of rusts may eventually kill the host tree. Cankers on the main trunk of the tree mechanically weaken the tree at that point. Heavy winds will break off the tree at the canker.

Rusts have complex life histories, going through several stages of development. Commandra rust requires a second host, the commandra plant, to complete its life cycle. In both cases, microscopic spores produced by the different lifestages are spread by wind, rain, and animals to the susceptible tissues of the host pines and alternative host plants.

WESTERN GALL RUST:

Hosts: Ponderosa pine and lodgepole pine.

Symptoms: Galls (globose - shaped swellings) produced on branches and twigs cause death of individual branches. Galls on main stems enlarge causing "hip" cankers. Yellow-orange blisters develop on galls during the summer.

Importance: Trunk cankers affect the form, lumber content, and growth rate of their hosts and may kill individual trees, but is not known to wipe out entire stands. The rust infects pines of all ages.

Control Strategy: Removal of infected trees during thinning operations and during intermediate cuts is the only practical way to reduce damage.

COMMANDRA BLISTER RUST:

Hosts: Lodgepole pine and ponderosa pine (Commandra or bastard toadflax, Commandra umbellata are the alternative hosts).

Symptoms: Spindle-shaped cankers on branches and main stem; flagging (fading) of infected branches; top-kill and death of infected trees.

Importance: Commandra rust affects much of the lodgepole pine stands in the Rocky Mountain Region. It causes spiketops and whole-tree mortality, as well as reducing tree growth and lumber content.

Control Strategy: Control is generally aimed at reducing the disease incidence rather than preventing infections. Salvage harvests of heavily infected stands should be done while the trees are still usable. Trees with commandra rust and dwarf mistletoe should be removed first. Trees with multiple stem cankers, spike tops, and girdling stem cankers in the lower crown of the tree should be discriminated against during any timber stand improvement work.

APPENDIX F
Species Descriptions

LODGEPOLE PINE
(Pinus contorta)

Lodgepole pine is one of the most aggressive and hardy of Western forest species. It reproduces quickly under many conditions, being more adaptable than many other tree species. Lodgepole pine is shade intolerant, meaning it cannot grow well or at all where other species are present and growing above it. However, when forested areas are burned or the area otherwise cleared, lodgepole pine will often regenerate and recover the area within a relatively few years provided a seed source is available and the young trees are not shaded out. Lodgepole pine is prevalent at elevations ranging from 8,000 to 11,500 feet. It is commonly associated with ponderosa pine, Douglas-fir, and other western pines. Growth averages 70 to 100 feet high and 12 to 18 inches in diameter. In the Rocky Mountain region, growth may be somewhat less due to competition and poor conditions.

Leaves - 1 to 3 inches long, in groups of two; green to yellow-green.

Cones - 3/4 to 2 inches long, occasionally open at maturity but often closed for many years.

Bark - 1/2 inch thick, orange-brown to gray, covered by thin loose scales.

DOUGLAS-FIR
(Pseudotsuga Menziesii)

Douglas-fir is the most important tree in the United States. It produces more lumber than any other species. The Rocky Mountain form is somewhat smaller than the Pacific Coast form, but can still be a very large tree. In Colorado, it may reach heights of 130 feet and diameters of three feet. It grows in pure and mixed stands and, in Colorado most frequently associates with ponderosa pine and lodgepole pine. Douglas-fir can grow in shaded conditions and so, in many stands, is replacing the pine overstory. It grows from about 6,000 to 10,000 feet in Colorado. Douglas-fir is a shallow-rooted species and so, subject to windthrow unless cuts are carefully planned.

Leaves - needles $3/4$ to one inch long; yellow-green or blue-green, light-colored under sides.

Cones - $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, having a 3 tined bract (protrusion) coming out from under each scale.

Bark - smooth and white to gray on young trees, reddish brown to dark brown and heavily ridged on older trees.

PONDEROSA PINE

(*Pinus ponderosa*)

Ponderosa pine is the most important pine in Western North America. It makes hard, strong, and fine-grained wood. High-grade ponderosa is used for doors, sashes, frames, and paneling; the low-grade wood for boxes, rafters, pallets, fencing, joists, and railroad ties. It also makes a handsome ornamental tree and hardy windbreak component. Ponderosa pine forests have also produced abundant forage and have long been grazed by domestic livestock. These forest areas produce much of the region's deer, elk, and other wildlife. Seventy species of birds were identified in the ponderosa ecosystem at Estes Park during the 1976 annual Audubon spring bird count. Recreational use has been expanding at a rapid rate.

Ponderosa pine in the Colorado Front Range occurs in the Montane Life Zone. This zone is the first timbered belt above the Plains on the east side of the Colorado Rockies. Ponderosa pine is a climax species within its normal altitudinal zone of 5,500 to 8,800 feet in Larimer County. Annual precipitation is very low for tree growth, averaging from 15 to 20 inches. Approximately two-thirds of the annual precipitation falls during spring and summer when it is most useful for regeneration and growth. Soils are largely granitic in origin.

The first harvest cutting in ponderosa pine forests occurred in the Front Range of Colorado about 1860. During the gold rush years, tens of thousands of acres were virtually clearcut for fuel, mine timbers, and lumber. The tree has been cultivated in the U.S. since 1827 for ornamental purposes.

Individual Tree Characteristics

Needles - Growing in 2's and 3's up to 7" long. They remain through 3 growing seasons.

Cones - Up to 4" long. Deciduous. Made up of scales with small prickles. Male and female flowers on same tree.

Seeds - $\frac{1}{4}$ " long with 1" wing. Two on each scale. 12,000 seeds per pound.

Form - Symmetrical single bole or trunk. Young trees conical while older trees are flat-topped.

Age - Reach maturity at 140-180 years.

Height - Tallest on record is 232 feet (California). Will reach 175 feet in best sites. Usually mature at less than 100 feet in Colorado.

Diameter - Up to 6 feet at $4\frac{1}{2}$ feet above ground in western forests. May reach 4 feet in Colorado. Normally less than 30 inches.

Root system - Tap root

Bark - Dark brown to black in young trees (furrowed) yellow-brown to cinnamon-red in old growth (smooth and platey).

Stand Characteristics

Dry site species but gets best development on relatively moist, well-drained soils.

Light demanding species which does not reproduce naturally under low light intensity.

Root competition can not be tolerated.

Generally grows in pure stands. Douglas-firs occur as scattered trees in pine stands as well as in pure patches and stands on north-facing slopes and along streams.

Includes minor species of Douglas-fir, pinyon pine, juniper, and limber pine.

Windfall is not a serious problem.

Fire tolerance is low. Although old, mature, thick barked trees are highly resistant to light ground fires, old trees are killed or severely damaged by severe crown fires. Seedlings and small saplings are killed by light ground fires. Fire is not needed for seedbed preparation, but may be beneficial to reduce a heavy litter layer which would hamper seed germination.

Regeneration - Small quantities of seed are produced annually but large crops are released only at intervals of 3-5 years. Germination is as high as 50% in nature. Seedlings can exist under canopy of parent trees but grow quite slowly (only 3-4 feet during first 15-20 years). Reproduction is best in clearings made by fire or logging. There must be abundant seed supply and plenty of moisture for 2 or 3 years in a row to get reproduction. These conditions occur only once in every 20 years and then only in restricted localities.

Growth is slow but does respond well to thinning operations (release).

Destructive agents - Lightning, high winds, dwarf mistletoe, and mountain pine beetle have been the main causes of mortality. The oldest and least vigorous trees are the most susceptible. Other problem causing agents include ips beetles, pine needle miner, pine tip moth, pine budworm, western red rot, porcupines, deer, and small rodents. High rodent populations were found to be a major obstacle to establishment of natural regeneration.

Management - The principal forest values derived from the Montane Zone relate to beauty of the landscape and to various forms of outdoor recreation. Mountain communities located here rely on these values for existence. Tree management normally is not a tool to obtain maximum production of wood products. Instead, it is a means of

reducing the damage from mountain pine beetles, dwarf-mistletoe, and other agents that can lower the attractiveness and usefulness of the zone. It can be utilized to increase and perpetuate the values of landscape, wildlife, livestock forage production, recreation, and employment.

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ASPEN
(Populus tremuloides)

Quaking aspen is the most widely distributed tree of North America. It is fast growing, relatively short-lived, and attains heights of fifty to sixty feet, and diameters of one to two feet. Aspen is a prolific seeder and often grows in pure stands that serve as cover for more tolerant conifers. Aspen is shade intolerant. After thirty or more years, competition from various understory species becomes excessive and much of the aspen dies. The maximum age for aspen is approximately 150 years, the average being somewhat less. It is very susceptible to rot causing fungi.

Leaves - one and a half to three inches in diameter, oval in shape, teeth like edges to leaves.

Bark - smooth, greenish white to cream colored, bark furrowed lengthwise, often roughed by wart-like lumps.

APPENDIX G
Management Alternatives

CLEARCUT

Clearcut: Removal of all trees within a stand, providing an open area for natural or artificial regeneration of stand.

A. Age of trees -- Even-aged.

B. Rotation -- Definite period, mature stand is cut at some given age.

C. Cutting --

- 1) Size of cutting depends on economics, species characteristics, site characteristics (slope, exposure, wind, etc.), and aesthetic and wild-life considerations. Cuts in size of 1-10 acres are generally called "patch" cuts. Larger sizes are possible, and are called clearcuts.
- 2) Select area of stand, or entire stand, to be cut. All trees, including non-commercial (unusable) trees, are cut. Commercial wood is removed, uncommercial wood is either removed or left on site. All trees are cut to eliminate competition to regeneration.
- 3) Tops, limbs, and unusable wood, also called "slash", are treated. Treatment can occur as lopping and scattering slash throughout the stand, or by piling and burning slash. Burning can be done in smaller piles scattered throughout the area, or in larger piles or windrows. Burning is generally done with snow cover present.

Lopping and scattering is done to increase decomposition rates, and to allow cones in the slash to distribute seed throughout the area for natural regeneration. Decomposing slash returns nutrients to the site very gradually, and helps protect the site. Piling and burning removes slash from the site immediately, but does not return as many nutrients to the site.

4) Natural or artificial regeneration are used to replace the harvested stand. Natural regeneration can occur from seed distributed by slash, or from adjacent stands. Artificial regeneration is accomplished by seeding or planting seedlings.

D. Results -- Creates openings in forest cover. Size and area of cutting is determined by management objectives. The stand will be even-aged.

Advantages

- A. No competition from other trees to reproduction.
- B. Operations easiest to design and administer.
- C. No damage to residual stand or reproduction.
- D. Cost of logging lowest of any method.
- E. Profit is maximized with this system.
- F. Some species will not regenerate without this type of system, such as aspen.
- G. May produce large amounts of regeneration in some species, i.e., lodgepole pine.
- H. Can be used to develop wildlife habitat, by increasing browse and forage material in cut areas.

Disadvantages

- A. Large amount of slash disposal.
- B. Aesthetically displeasing, i.e., "messy-looking."
- C. Not suitable for shade tolerant species.
- D. Regeneration may be limited by harsher site conditions, or by slash in cut area.

SHELTERWOOD

Shelterwood: The gradual removal of an entire stand in a series of partial cuttings which extends over a period of time.

- A. Age of trees -- Even-aged, i.e., trees are nearly all the same age.
- B. Rotation -- Definite period, mature timber is cut at some given age.
- C. Cutting --

- 1) Cut about one-third of stand, preferably largest trees, to open up entire stand and admit more light, then wait for seed year.
- 2) After seeding, take out another one-third of stand to make room and light for seedlings; leave the last one-third of stand as an even shelter to protect seedlings against sun, wind, and frost and also to hinder rapid development of weeds and brush.
- 3) When reproduction is well established and no longer in need of shelter, but is in need of light, last one-third of the mature timber is removed.

In practice the method varies; it may use one or several seed years and may remove the stand in two cuts or in six cuts.

- D. Results -- Cuttings usually resemble heavy thinnings. Natural reproduction starts under the protection of the older stand. Within the framework of the shelterwood method, it is possible to achieve wide variation. With long regeneration periods, individual trees of the new stand will have a wide range of age. The stand remains more nearly even-aged than otherwise and is managed as such.

Advantages

- A. Reproduction is generally more certain and complete than with clear-cutting and seed-tree methods.
- B. Best trees are retained until after regeneration is established.
- C. Protects site and aesthetic conditions.
- D. Produces better and more timber than selection cutting.
- E. Length or rotation shortened; one crop is started before the preceeding one is harvested.
- F. Growing space more fully utilized than other methods of regenerating even-aged stands.
- G. Operations are more systematic and simpler to administer than those under the selection system.
- H. Less slash disposal problems.
- I. Shading stimulates decomposition and reduces danger of fire. Partial shading is advantageous in lodgepole stands to reduce danger of overstocking.

Disadvantages

- A. Larger number of residual trees and reproduction is apt to be damaged in logging; these also will impede harvesting operations.
- B. Cost of logging is greater than seed-tree or clearcutting.
- C. Intolerant species have greater reproduction loss because of increased shading.
- D. Cutting poor trees first is financially unattractive.

GROUP SELECTION

Group selection: Removal of a group of mature trees with intent to obtain natural regeneration from seeds produced adjacent to the cut-over area.

- A. Age of trees - uneven aged - containing a mixture of even-aged groups rather than a mixture of age classes by single trees.
 - B. Rotation - Determined by size, i.e., diameter limit.
 - C. Cutting - One-half to 1 acre in size; stand is cut every 10 years to a growing stock level of 80. Cut removes large "ripe" timber, including all defective, mountain pine beetle, mistletoe infested, or other diseased trees.
 - D. Reproduction - Clearly defined even-aged aggregations.
 - E. Results - A stand is created that is more readily adapted to a wider variety of conditions than any other because the ecological requirements of most species can be met within its framework.
- Stand of all-aged, even-aged groups. If total area occupied by different age, classes can be determined with a fair degree of accuracy, the cut under the group selection method can be regulated by the area as well as by volume.

Advantages.

- A. Harvesting cheaper.
- B. Less damage to reproduction and residual stand.
- C. Reproduction develops in even-aged aggregations, thus reproduction has better form.
- D. Less root competition - more reproduction.

- E. Wildlife profits from combination of environmental conditions
Existing along boundaries between young and older trees.

Disadvantages.

- A. Root competition from older trees along perimeters.
- B. Competition for soil moisture and nutrients.

DESIRABLE BASAL AREA OF RESIDUAL STANDS

Growing Stock Level 100

Average d.b.h. after Cutting (inches)	Average Spacing Between Trees (feet)	Stems per Acre	Actual Basal Area (sq ft)
2	8x8	686	15.1
3	9x9	604	29.6
4	9x9	507	44.1
5	10x10	430	58.5
6	11x11	361	79.3
7	12x12	306	81.7
8	13x13	260	90.1
9	14x14	219	96.9
10	15x15	183	100.0
11	16x16	152	100.0
12	18x18	127	100.0
13	20x20	108	100.0
14	22x22	94	100.0
15	24x24	81	100.0
16	25x25	72	100.0
17	26x26	63	100.0
18	28x28	57	100.0

Growing Stock Level 80

Average d.b.h. after Cutting (inches)	Average Spacing Between Trees (feet)	Stems per Acre	Actual Basal Area (sq ft)
2	9x9	550	12.1
3	10x10	483	23.7
4	10x10	404	35.2
5	11x11	344	46.8
6	12x12	289	56.6
7	13x13	245	65.4
8	14x14	208	72.5
9	16x16	175	77.5
10	17x17	147	80.0
11	19x19	121	80.0
12	21x21	102	80.0
13	22x22	87	80.0
14	24x24	75	80.0
15	26x26	65	80.0
16	28x28	57	80.0
17	29x29	51	80.0
18	31x31	45	80.0

Table 2: Growing stock levels for lodgepole pine. Average distance between residual trees in the stand in relation to average stand diameter after thinning to the growing stock levels.

DBH	GSL 50	GSL 60	GSL 70	GSL 80	GSL 90	GSL 100	GSL 110	GSL 120
(Distance between trees, in feet)								
2.0	11.1	10.2	9.4	8.8	8.3	7.8	7.5	7.2
3.0	12.0	11.0	10.2	9.5	9.0	8.5	8.1	7.8
4.0	13.2	12.0	11.1	10.4	9.8	9.3	8.9	8.5
5.0	14.4	13.0	12.0	11.3	10.6	10.1	9.6	9.2
6.0	15.6	14.4	13.2	12.3	11.6	11.0	10.5	10.0
7.0	16.8	15.4	14.3	13.3	12.6	11.9	11.4	10.9
8.0	18.0	16.7	15.5	14.5	13.6	13.0	12.3	11.8
9.0	20.1	18.2	16.8	15.8	14.9	14.1	13.4	12.9
10.0	21.8	20.1	18.4	17.2	16.2	15.4	14.7	14.1

APPENDIX H
Local Markets

LOCAL MARKETS

COMPANY/INDIVIDUAL NAME	ADDRESS	PHONE	CONTACT
Louisiana Pacific Walden	:PO Box 778 :Walden, CO :80480	: :723-8231 :	: :Eric Sorenson :
Louisiana Pacific Saratoga	:PO Box 809 :Saratoga, WY :82331	: (307) :326-5241 :	: :Dave Slater :
Big Horn Lumber Co.	:1100 South Pine :Laramie, WY :82070	: (307) :742-3237 :	: :Dean :Alexander
Forks Lumber Co.	:1920 Westview Rd :Fort Collins, CO :80524	: :493-0625 :	: :Dale Moon :
Mountain View Lumber Company	:3806 S. College :Fort Collins, CO :80526	: :226-5424 :	: :Fred Bockman :
United Wood Products	:7860 Diagonal Hwy :Longmont, CO :80501	: :652-2286 :	: :Raul :Bustamonte
Colorado Wood Products	:1313 W. CR 60E :Fort Collins, CO :80524	: :484-3758 :	: :V.O. :Augustine
Westridge Forest Products	:2000 N. CR 23 :Bellvue, CO :80512	: :482-3227 :	: :Ron Sondrup :
Elkhorn Lumber Company	:RR. # 1, CR 68C :Livermore, CO :80536	: :881-2284 :	: :Russel :Robinson
Needmore Forest Products	:PO Box 326 :LaPorte, CO :80535	: :484-3696 :	: :Mark Horvat :
Majestic Log Homes	:PO Box 772 :Fort Collins, CO :80522	: :224-4857 :	: :Brad Burgat :
Anson Perina	:3900 Bingham Hill :Fort Collins, CO :80535	: :493-5826 : (home)	: :Anson Perina :
George & Howard Hersh	:237 N Overland Tr :Fort Collins, CO :80521	: :482-8530 : (home)	: :George Hersh :

Unless otherwise noted, the area code is (303).

MARKET INFORMATION

COMPANY NAME: Louisiana Pacific, Walden
PRODUCT: Sawlogs
SPECIES USED: LP, ES
PRICE PAID*: \$130-150/mbf
MERCHANTABILITY STANDARDS: Lengths:16'-6", 33'-0", 49'-6"
Minimum 6" top diameter

COMPANY NAME: Louisiana Pacific, Saratoga
PRODUCT: Sawlogs
SPECIES USED: LP, ES, SF, PP
PRICE PAID*: \$110/mbf
MERCHANTABILITY STANDARDS: Tree length, minimum 5" top diameter

COMPANY NAME: Big Horn Lumber Company
PRODUCT: Sawlogs
SPECIES USED: LP, ES, SF, PP
PRICE PAID*: \$76/mbf
MERCHANTABILITY STANDARDS: Tree length, minimum 6" top diameter

COMPANY NAME: Forks Lumber Company
PRODUCT: Sawlogs
SPECIES USED: LP, ES, DF, PP
PRICE PAID*: \$140/mbf
MERCHANTABILITY STANDARDS: Tree length, 12"-15" butt diameter

COMPANY NAME: Mountain View Lumber Company
PRODUCT: Sawlogs, Posts & Poles
SPECIES USED: LP, ES, DF, PP
PRICE PAID*: \$150/mbf
MERCHANTABILITY STANDARDS: Tree length

COMPANY NAME: United Wood Products
PRODUCT: Sawlogs, Posts & Poles
SPECIES USED: LP, ES, PP
PRICE PAID*: \$750/load (80,000-85,000 lbs per load)
MERCHANTABILITY STANDARDS: Tree length, minimum 3" top diameter

COMPANY NAME: Colorado Wood Products
PRODUCT: Sawlogs, Posts & Poles
SPECIES USED: LP, ES
PRICE PAID*: varies
MERCHANTABILITY STANDARDS: Tree Length

* These prices are variable and subject to change.

MARKET INFORMATION, CON'T

COMPANY NAME: Westridge Forest Products

PRODUCT: Posts & Poles

SPECIES USED: LP

PRICE PAID*: \$0.15/linear foot

MERCHANTABILITY STANDARDS: Tree length, minimum 3.5" top diameter

COMPANY NAME: Elkhorn Lumber Company

PRODUCT: Sawlogs, Houselogs

SPECIES USED: LP, ES, PP, DF, SF

PRICE PAID*: \$120/mbf

MERCHANTABILITY STANDARDS: Lengths: 16'-6", 33'-0", 49'-6"
Minimum 6" top diameter

COMPANY NAME: Needmore Forest Products

PRODUCT: Shakes

SPECIES USED: LP

PRICE PAID*: \$150/mbf

MERCHANTABILITY STANDARDS: Tree length, or 8' minimum length
Minimum 6" top diameter

COMPANY NAME: Anson Perina

PRODUCT: Posts & Poles

SPECIES USED: LP

PRICE PAID*: \$0.75 each for 6'-6" log with 3.5"-4.5" top diameter
1.00 each for 8'-0" log with 3.5"-4.5" top diameter
1.10 each for 8'-0" log with 4.5"-7.5" top diameter
1.50 each for 10'-0" log with 4.5"-7.5" top dia.

MERCHANTABILITY STANDARDS: See above.

COMPANY NAME: George and Howard Hersh

PRODUCT: Christmas Trees, Transplants

SPECIES USED: LP, AS, ES

PRICE PAID*: \$1.00 each for small aspen whips
3.00 each for large aspen transplants (6'+)
1.00 each for small lodgepole transplants
3.00 each for 4'-5' lodgepole transplants
3.00 to 5.00 each for Christmas Trees (LP, ES)

MERCHANTABILITY STANDARDS: See above.

* These prices are variable and subject to change.

APPENDIX I

Cruise Data

PROGRAM RMCRUZ

10:51:41 10-18-1991

STAND: STAND #1

PER ACRE STAND SUMMARY
ALL SPECIES

	DBH	20	30	40	50	60	70	80	90	100	110	120	TOTAL
		HEIGHT CLASS											
STEMS	4	0	153	0	0	0	0	0	0	0	0	0	153
CUVOL	4	0	138	0	0	0	0	0	0	0	0	0	138
SCRIB	4	0	232	0	0	0	0	0	0	0	0	0	232
STEMS	6	17	187	34	0	0	0	0	0	0	0	0	238
CUVOL	6	14	367	89	0	0	0	0	0	0	0	0	470
SCRIB	6	-123	1302	69	0	0	0	0	0	0	0	0	1248
STEMS	8	0	29	57	0	0	0	0	0	0	0	0	86
CUVOL	8	0	117	340	0	0	0	0	0	0	0	0	457
SCRIB	8	0	383	1306	0	0	0	0	0	0	0	0	1688
STEMS	10	6	0	12	0	0	0	0	0	0	0	0	18
CUVOL	10	23	0	113	0	0	0	0	0	0	0	0	137
SCRIB	10	42	0	433	0	0	0	0	0	0	0	0	474
STEMS	12	0	0	4	0	0	0	0	0	0	0	0	4
CUVOL	12	0	0	64	0	0	0	0	0	0	0	0	64
SCRIB	12	0	0	268	0	0	0	0	0	0	0	0	268
STEMS	14	0	0	6	0	0	0	0	0	0	0	0	6
CUVOL	14	0	0	118	0	0	0	0	0	0	0	0	118
SCRIB	14	0	0	496	0	0	0	0	0	0	0	0	496
STEMS	16	0	0	5	2	0	0	0	0	0	0	0	7
CUVOL	16	0	0	117	76	0	0	0	0	0	0	0	192
SCRIB	16	0	0	512	353	0	0	0	0	0	0	0	864
STEMS	22	0	0	0	1	0	0	0	0	0	0	0	1
CUVOL	22	0	0	0	70	0	0	0	0	0	0	0	70
SCRIB	22	0	0	0	332	0	0	0	0	0	0	0	332

TOTAL													
STEMS	0	23	368	119	4	0	0	0	0	0	0	0	514
CUVOL	0	38	622	840	146	0	0	0	0	0	0	0	1646
SCRIB	0	-81	1917	3083	685	0	0	0	0	0	0	0	5603

STAND: STAND #1

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
514	123	6.6	35	85

CRUISE SUMMARY

BAF USED = 20 PTS SMPLD = 6

AVG. # TREES/PT. = 6.2

PROGRAM RMCRUZ

11:45:17 10-18-1991

STAND: STAND 2

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	0	286	0	0	0	0	0	0	0	0	0	286
CUVOL	4	0	250	0	0	0	0	0	0	0	0	0	250
SCRIB	4	0	888	0	0	0	0	0	0	0	0	0	888
STEMS	6	0	357	0	0	0	0	0	0	0	0	0	357
CUVOL	6	0	701	0	0	0	0	0	0	0	0	0	701
SCRIB	6	0	2486	0	0	0	0	0	0	0	0	0	2486
STEMS	8	0	57	0	0	0	0	0	0	0	0	0	57
CUVOL	8	0	247	0	0	0	0	0	0	0	0	0	247
SCRIB	8	0	978	0	0	0	0	0	0	0	0	0	978
TOTAL													
STEMS	0	0	700	0	0	0	0	0	0	0	0	0	700
CUVOL	0	0	1198	0	0	0	0	0	0	0	0	0	1198
SCRIB	0	0	4351	0	0	0	0	0	0	0	0	0	4351

STAND: STAND 2

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
700	115	5.5	30	80

CRUISE SUMMARY

BAF USED = 20 PTS SMPLD = 4 AVG. # TREES/PT. = 5.8

PROGRAM RMCRUZ

12:01:25 10-18-1991

STAND: STAND 3

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	0	65	0	0	0	0	0	0	0	0	0	65
CUVOL	4	0	57	0	0	0	0	0	0	0	0	0	57
SCRIB	4	0	203	0	0	0	0	0	0	0	0	0	203
STEMS	6	73	87	0	0	0	0	0	0	0	0	0	160
CUVOL	6	63	172	0	0	0	0	0	0	0	0	0	235
SCRIB	6	-383	609	0	0	0	0	0	0	0	0	0	225
STEMS	8	25	33	41	0	0	0	0	0	0	0	0	98
CUVOL	8	59	141	249	0	0	0	0	0	0	0	0	449
SCRIB	8	144	559	1013	0	0	0	0	0	0	0	0	1717
STEMS	10	0	5	16	0	0	0	0	0	0	0	0	21
CUVOL	10	0	38	159	0	0	0	0	0	0	0	0	197
SCRIB	10	0	157	661	0	0	0	0	0	0	0	0	819
STEMS	12	0	4	7	0	0	0	0	0	0	0	0	11
CUVOL	12	0	33	109	0	0	0	0	0	0	0	0	143
SCRIB	12	0	117	460	0	0	0	0	0	0	0	0	577

TOTAL													
STEMS	0	97	194	64	0	0	0	0	0	0	0	0	356
CUVOL	0	122	442	518	0	0	0	0	0	0	0	0	1081
SCRIB	0	-239	1645	2135	0	0	0	0	0	0	0	0	3541

STAND: STAND 3

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
356	91	6.9	31	90

CRUISE SUMMARY

BAF USED = 20 PTS SMPLD = 7 AVG. # TREES/PT. = 4.6

STAND: STAND 4

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											
	DBH	20	30	40	50	60	70	80	90	100	110	120	TOTAL
STEMS	4	0	0	23	0	0	0	0	0	0	0	0	23
CUVOL	4	0	0	30	0	0	0	0	0	0	0	0	30
SCRIB	4	0	0	115	0	0	0	0	0	0	0	0	115
STEMS	6	10	31	132	0	0	0	0	0	0	0	0	173
CUVOL	6	10	57	393	0	0	0	0	0	0	0	0	460
SCRIB	6	27	108	1496	0	0	0	0	0	0	0	0	1632
STEMS	8	0	17	103	0	0	0	0	0	0	0	0	120
CUVOL	8	0	70	628	0	0	0	0	0	0	0	0	699
SCRIB	8	0	230	2554	0	0	0	0	0	0	0	0	2783
STEMS	10	0	0	26	0	0	0	0	0	0	0	0	26
CUVOL	10	0	0	260	0	0	0	0	0	0	0	0	260
SCRIB	10	0	0	1080	0	0	0	0	0	0	0	0	1080
STEMS	12	0	0	13	0	0	0	0	0	0	0	0	13
CUVOL	12	0	0	191	0	0	0	0	0	0	0	0	191
SCRIB	12	0	0	805	0	0	0	0	0	0	0	0	805

TOTAL													
STEMS	0	10	48	297	0	0	0	0	0	0	0	0	355
CUVOL	0	10	127	1503	0	0	0	0	0	0	0	0	1640
SCRIB	0	27	338	6050	0	0	0	0	0	0	0	0	6415

STAND: STAND 4

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
355	102	7.3	38	95

CRUISE SUMMARY

BAF USED = 10 PTS SMPLD = 5 AVG. # TREES/PT. = 10.2

STAND: STAND 5

PER ACRE STAND SUMMARY
ALL SPECIES

	DBH	20	30	40	50	60	70	80	90	100	110	120	TOTAL
STEMS	4	611	0	0	0	0	0	0	0	0	0	0	611
UVOL	4	65	0	0	0	0	0	0	0	0	0	0	65
CRIB	4	180	0	0	0	0	0	0	0	0	0	0	180
STEMS	6	68	0	0	0	0	0	0	0	0	0	0	68
UVOL	6	65	0	0	0	0	0	0	0	0	0	0	65
SCRIB	6	180	0	0	0	0	0	0	0	0	0	0	180
TOTAL													
STEMS	0	679	0	0	0	0	0	0	0	0	0	0	679
CUVOL	0	131	0	0	0	0	0	0	0	0	0	0	131
CRIB	0	359	0	0	0	0	0	0	0	0	0	0	359

STAND: STAND 5

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
679	67	4.2	20	80

CRUISE SUMMARY

BAF USED = 20 PTS SMPLD = 3 AVG. # TREES/PT. = 3.3

STAND: STAND 6

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	172	172	0	0	0	0	0	0	0	0	0	344
UVOL	4	256	187	0	0	0	0	0	0	0	0	0	443
SCRIB	4	1028	710	0	0	0	0	0	0	0	0	0	1738
STEMS	6	0	127	127	0	0	0	0	0	0	0	0	255
UVOL	6	0	243	378	0	0	0	0	0	0	0	0	621
SCRIB	6	0	626	1439	0	0	0	0	0	0	0	0	2065
STEMS	8	0	0	172	0	0	0	0	0	0	0	0	172
UVOL	8	0	0	1019	0	0	0	0	0	0	0	0	1019
SCRIB	8	0	0	3847	0	0	0	0	0	0	0	0	3847
STEMS	10	0	0	73	0	0	0	0	0	0	0	0	73
UVOL	10	0	0	724	0	0	0	0	0	0	0	0	724
SCRIB	10	0	0	2896	0	0	0	0	0	0	0	0	2896
TOTAL													
STEMS	0	172	299	373	0	0	0	0	0	0	0	0	844
UVOL	0	256	430	2121	0	0	0	0	0	0	0	0	2807
SCRIB	0	1028	1336	8182	0	0	0	0	0	0	0	0	10546

STAND: STAND 6

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
844	180	6.3	36	90

CRUISE SUMMARY

PAF USED = 20 PTS SMPLD = 4 AVG. # TREES/PT. = 9.0

STAND: STAND 7

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	229	46	0	0	0	0	0	0	0	0	0	275
CUVOL	4	199	40	0	0	0	0	0	0	0	0	0	239
SCRIB	4	705	142	0	0	0	0	0	0	0	0	0	848
STEMS	6	61	163	41	0	0	0	0	0	0	0	0	265
CUVOL	6	56	315	121	0	0	0	0	0	0	0	0	492
SCRIB	6	-40	927	460	0	0	0	0	0	0	0	0	1348
STEMS	8	11	46	34	0	0	0	0	0	0	0	0	92
CUVOL	8	25	182	209	0	0	0	0	0	0	0	0	416
SCRIB	8	-13	527	851	0	0	0	0	0	0	0	0	1365
STEMS	10	0	0	15	7	0	0	0	0	0	0	0	22
CUVOL	10	0	0	136	79	0	0	0	0	0	0	0	215
SCRIB	10	0	0	519	291	0	0	0	0	0	0	0	810
STEMS	12	5	5	0	5	0	0	0	0	0	0	0	15
CUVOL	12	30	47	0	81	0	0	0	0	0	0	0	157
SCRIB	12	84	164	0	325	0	0	0	0	0	0	0	573
STEMS	14	0	0	4	0	0	0	0	0	0	0	0	4
CUVOL	14	0	0	65	0	0	0	0	0	0	0	0	65
SCRIB	14	0	0	265	0	0	0	0	0	0	0	0	265
STEMS	16	0	0	6	0	0	0	0	0	0	0	0	6
CUVOL	16	0	0	131	0	0	0	0	0	0	0	0	131
SCRIB	16	0	0	557	0	0	0	0	0	0	0	0	557
STEMS	18	0	0	2	0	0	0	0	0	0	0	0	2
CUVOL	18	0	0	66	0	0	0	0	0	0	0	0	66
SCRIB	18	0	0	289	0	0	0	0	0	0	0	0	289
TOTAL													
STEMS	0	307	260	102	12	0	0	0	0	0	0	0	681
CUVOL	0	310	583	729	160	0	0	0	0	0	0	0	1782
SCRIB	0	737	1760	2942	616	0	0	0	0	0	0	0	6056

STAND: STAND 7

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
681	148	6.3	31	90

CRUISE SUMMARY

BAF USED = 20 PTS SMPLD = 5

AVG. # TREES/PT. = 7.4

STAND: STAND 8

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
	DBH	20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	86	0	0	0	0	0	0	0	0	0	0	86
UVOL	4	75	0	0	0	0	0	0	0	0	0	0	75
SCRIB	4	266	0	0	0	0	0	0	0	0	0	0	266
STEMS	6	38	76	0	0	0	0	0	0	0	0	0	115
UVOL	6	26	150	0	0	0	0	0	0	0	0	0	176
SCRIB	6	494	533	0	0	0	0	0	0	0	0	0	1026
STEMS	8	7	43	0	0	0	0	0	0	0	0	0	50
UVOL	8	18	185	0	0	0	0	0	0	0	0	0	203
SCRIB	8	67	733	0	0	0	0	0	0	0	0	0	801
STEMS	10	0	14	14	0	0	0	0	0	0	0	0	28
UVOL	10	0	95	139	0	0	0	0	0	0	0	0	234
SCRIB	10	0	321	579	0	0	0	0	0	0	0	0	900
STEMS	12	3	3	13	0	0	0	0	0	0	0	0	19
UVOL	12	18	35	175	0	0	0	0	0	0	0	0	229
SCRIB	12	27	146	708	0	0	0	0	0	0	0	0	882
STEMS	14	2	0	7	0	0	0	0	0	0	0	0	9
UVOL	14	19	0	135	0	0	0	0	0	0	0	0	153
SCRIB	14	48	0	566	0	0	0	0	0	0	0	0	614
STEMS	16	0	2	2	0	0	0	0	0	0	0	0	4
UVOL	16	0	29	39	0	0	0	0	0	0	0	0	68
SCRIB	16	0	114	167	0	0	0	0	0	0	0	0	281
TOTAL													
STEMS	0	137	138	35	0	0	0	0	0	0	0	0	310
UVOL	0	156	494	488	0	0	0	0	0	0	0	0	1138
SCRIB	0	902	1847	2020	0	0	0	0	0	0	0	0	4769

STAND: STAND 8

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
310	93	7.4	31	100

CRUISE SUMMARY

MAP USED = 20 PTS SMPLD = 8 AVG. # TREES/PT. = 4.6

STAND: STAND 9

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	115	115	0	0	0	0	0	0	0	0	0	229
UVOL	4	112	123	0	0	0	0	0	0	0	0	0	235
CRIB	4	422	489	0	0	0	0	0	0	0	0	0	911
STEMS	6	51	407	0	0	0	0	0	0	0	0	0	458
UVOL	6	49	801	0	0	0	0	0	0	0	0	0	850
SCRIB	6	135	2841	0	0	0	0	0	0	0	0	0	2975
STEMS	8	0	100	29	0	0	0	0	0	0	0	0	129
UVOL	8	0	432	175	0	0	0	0	0	0	0	0	607
SCRIB	8	0	1711	709	0	0	0	0	0	0	0	0	2421
STEMS	10	0	9	18	0	0	0	0	0	0	0	0	28
UVOL	10	0	67	185	0	0	0	0	0	0	0	0	252
SCRIB	10	0	275	771	0	0	0	0	0	0	0	0	1047
TOTAL													
STEMS	0	166	631	47	0	0	0	0	0	0	0	0	844
UVOL	0	161	1424	360	0	0	0	0	0	0	0	0	1945
CRIB	0	557	5317	1481	0	0	0	0	0	0	0	0	7354

STAND: STAND 9

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
844	170	6.1	30	85

CRUISE SUMMARY

PAF USED = 20 PTS SMPLD = 4

AVG. # TREES/PT. = 8.5

STAND: STAND 10

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	258	372	0	0	0	0	0	0	0	0	0	630
UVOL	4	225	325	0	0	0	0	0	0	0	0	0	551
SCRIB	4	799	1154	0	0	0	0	0	0	0	0	0	1953
STEMS	6	0	318	0	0	0	0	0	0	0	0	0	318
UVOL	6	0	626	0	0	0	0	0	0	0	0	0	626
SCRIB	6	0	2219	0	0	0	0	0	0	0	0	0	2219
STEMS	8	0	50	21	0	0	0	0	0	0	0	0	72
UVOL	8	0	216	131	0	0	0	0	0	0	0	0	347
SCRIB	8	0	856	532	0	0	0	0	0	0	0	0	1388
STEMS	10	0	5	9	0	0	0	0	0	0	0	0	14
UVOL	10	0	34	93	0	0	0	0	0	0	0	0	126
SCRIB	10	0	138	386	0	0	0	0	0	0	0	0	523

TOTAL													
STEMS	0	258	745	31	0	0	0	0	0	0	0	0	1034
UVOL	0	225	1201	224	0	0	0	0	0	0	0	0	1650
SCRIB	0	799	4367	918	0	0	0	0	0	0	0	0	6083

STAND: STAND 10

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
1034	150	5.2	29	90

CRUISE SUMMARY

PAF USED = 20 PTS SMPLD = 8 AVG. # TREES/PT. = 7.5

STAND: STAND 11

PER ACRE STAND SUMMARY
ALL SPECIES

		HEIGHT CLASS											TOTAL
DBH		20	30	40	50	60	70	80	90	100	110	120	
STEMS	4	46	46	0	0	0	0	0	0	0	0	0	92
UVOL	4	0	61	0	0	0	0	0	0	0	0	0	61
SCRIB	4	0	230	0	0	0	0	0	0	0	0	0	230
STEMS	6	0	81	81	0	0	0	0	0	0	0	0	163
UVOL	6	0	160	242	0	0	0	0	0	0	0	0	402
SCRIB	6	0	568	921	0	0	0	0	0	0	0	0	1489
STEMS	8	0	46	160	0	0	0	0	0	0	0	0	206
UVOL	8	0	198	978	0	0	0	0	0	0	0	0	1175
SCRIB	8	0	782	3972	0	0	0	0	0	0	0	0	4755
STEMS	10	0	0	66	0	0	0	0	0	0	0	0	66
UVOL	10	0	0	667	0	0	0	0	0	0	0	0	667
SCRIB	10	0	0	2777	0	0	0	0	0	0	0	0	2777
STEMS	12	0	0	15	0	0	0	0	0	0	0	0	15
UVOL	12	0	0	229	0	0	0	0	0	0	0	0	229
SCRIB	12	0	0	966	0	0	0	0	0	0	0	0	966
STEMS	14	0	0	4	0	0	0	0	0	0	0	0	4
UVOL	14	0	0	77	0	0	0	0	0	0	0	0	77
SCRIB	14	0	0	330	0	0	0	0	0	0	0	0	330
TOTAL													
STEMS	0	46	173	327	0	0	0	0	0	0	0	0	546
UVOL	0	0	418	2193	0	0	0	0	0	0	0	0	2612
SCRIB	0	0	1581	8966	0	0	0	0	0	0	0	0	10547

STAND: STAND 11

PER ACRE SUMMARY

STEMS	BA	DBH	HT	AGE
546	164	7.4	37	85

CROUSE SUMMARY

PLOT USED = 20 PTS SMPLD = 5

AVG. # TREES/PT. = 8.2

26 CCF/ac





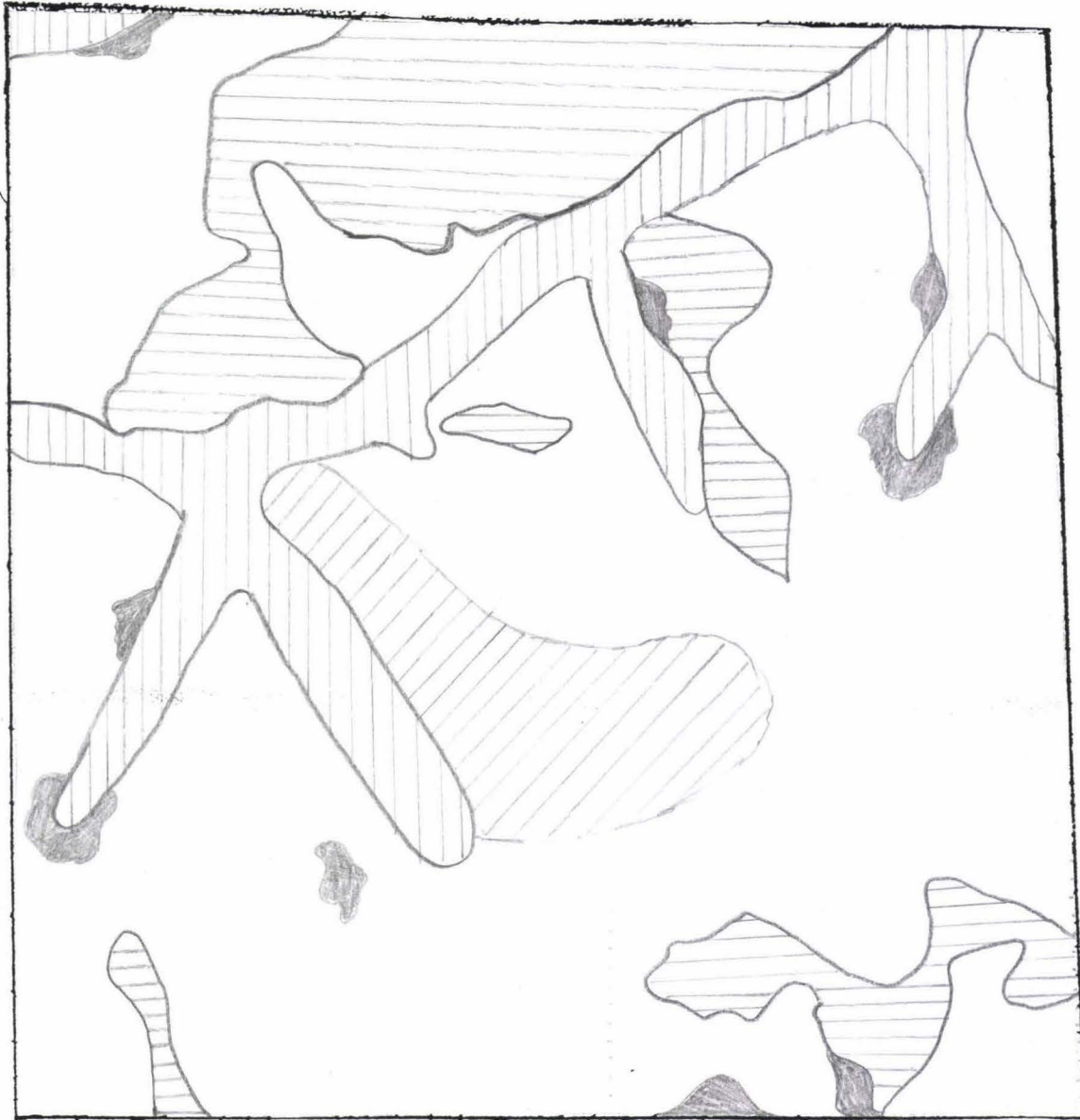






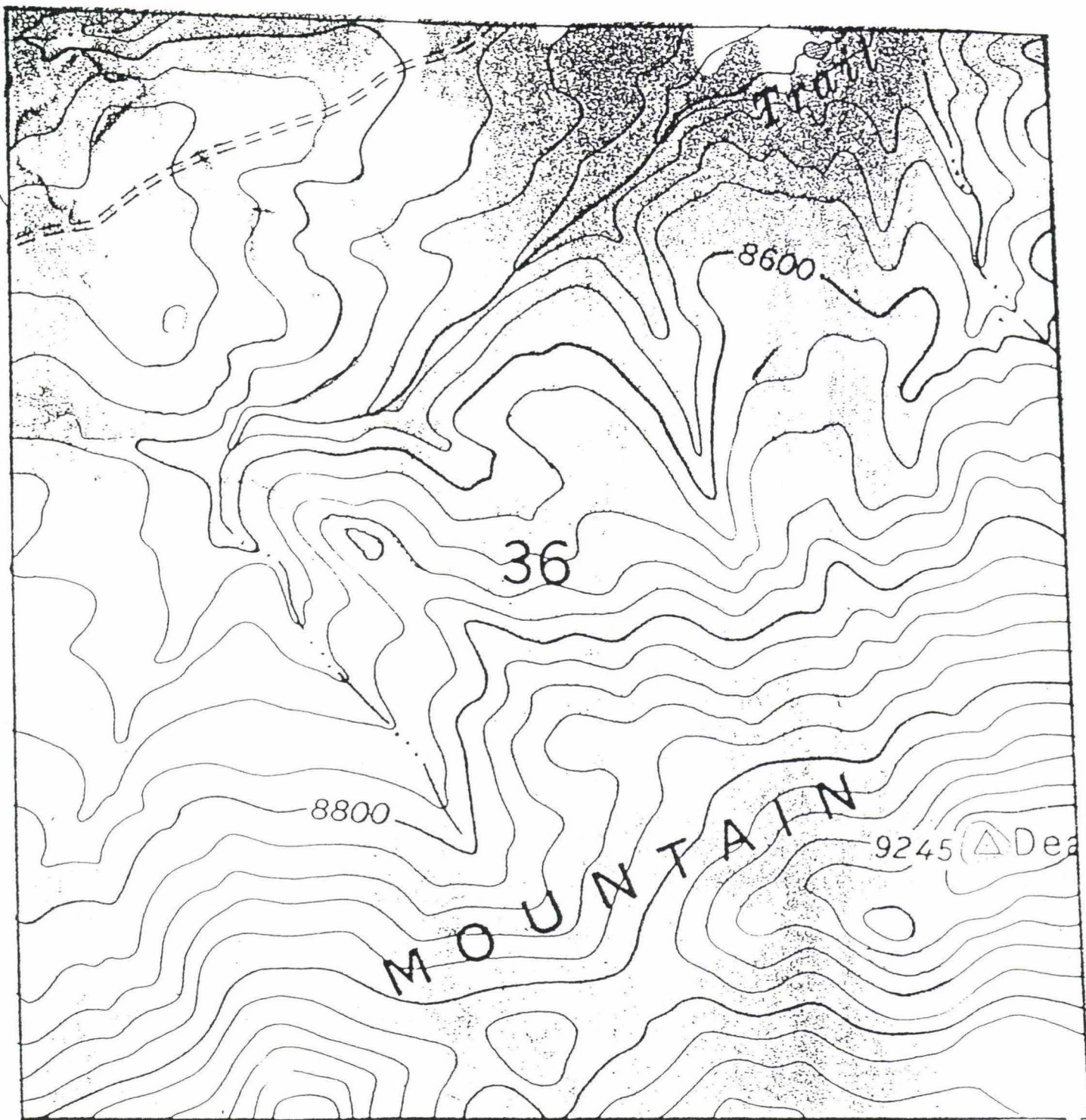
S 36 T 12N R 74W

Vegetative Type Map



SCALE : 6" = 1 mile

-  = Lodgepole pine
-  = Meadow
-  = Lodgepole & Ponderosa pine
-  = Aspen
-  = Riparian Mixed Conifer



SCALE : 6" = 1 mile