5110.

TIMBER MANAGEMENT PLAN

MT. TRUMBULL

VERMILLION RESOURCE AREA

ARIZONA STRIP DISTRICT

JUNE 1975

MT. TRUMBULL TIMBER MANAGEMENT PLAN

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TIMBER MANAGEMENT PLAN

Mt. Trumbull

I. INTRODUCTION

A. Purpose and Objectives

The intent of this report is to develop a Timber Management (or Activity) Plan for the Mt. Trumbull area. When initiated, this plan will provide guidelines for harvesting of timber products commensurate with market demands, and coordinated with and developed around the other demands placed on the area. Other disciplines include, but are not limited to, grazing, wildlife, recreation and watershed management.

Primary concern in developing the area will be to remove the overmature, mature, diseased and hazardous trees, as outlined by the MFP. At the same time, the management prescription will allow for the fullest possible enhancement of these other resources establishing a compatible environment for all activities involved. The ultimate goal will be to generate the greatest possible habitat for wildlife species, as hunters are anticipated to be the primary user group of this area for the foreseeable decade.

B. Area

The unit lies in the western portion of the Vermillion Resource Area, about 70 miles south of St. George, Utah and 65 miles southwest of Fredonia, Arizona, as identified on Map #1. Access to the area is over dirt roads, both from Utah and Arizona. The Colorado River and the Grand Canyon to the south restrict access from this direction. During inclement weather, access roads from the north become impassible. Consequently, to harvest this material the main access roads will require considerable maintenance and probable reconstruction to permit logging operations.

A network of main roads exist within the proposed sale boundaries. However, these too will require updating to standards acceptable for logging trucks. Existing transportation arteries are located on the main access roads overlay.

C. Description of the Area

The forest consists of approximately 20,280 acres of ponderosa pine type and associated species. This area is identified on the timbered area overlay.

Following is a breakdown of the acreage figures by type classification:

TOTAL ACREAGE

PP1-	25.6
PP1-/PP2-	221.1
PP1-/PP2=	2134.5
PP1-/PP2=,B	1275.9
PP1-/PP3=	80.3
PP1=/PP2-	296.7
PP1=/PP2=	1419.4
PP1=/PP2=,B	741.0
PP2-/PJ	165.2
PP2=	902.5
PP2=/B	758.7
PP1-/PP2=,PJ	447.9
PP1-/B	279.9
PP2-/B	82.2
PP1-/PP3=	26.0
Scattered PP/PJ	1249.9
PJ/B	4619.6
Open	134.9
Brush	240.6
PJ	4193.0
Lava	528.4
Aspen	10.3
Scattered PP/B	449.2
TOTAL	20,282.8

A representative type classification PP1-/PP2= is interpreted as a ponderosa pine (PP) stand with a mature-to-overmature overstory (1) and a 0-33% crown closure (-). The understory consists of a ponderosa pine stand (PP), young sawtimber (2) with a 34-66% crown closure density.

Type Classifications

PP= Ponderosa Pine
PJ= Pinyon-Juniper
B= Brush Species
A= Aspen
Lava
Open

Age Classes

1 - Mature and Overmature Sawtimber
2 - Young Sawtimber
3 - Poles and Smaller

Densities

- 0 - 33% Crown Closure
= 34 - 66% Crown Closure
≡ 67 -100% Crown Closure

Plans are to form two balanced units containing approximately 3 MMBF in each unit. This should constitute enough volume to afford an economically harvestable unit. Unit boundaries will be identified more concisely after cruise information has progressed further. Immediately surrounding the ponderosa pine area, and as the elevations decline, is a dry, relatively unproductive pinyon-juniper site.

Elevations within the commercial area vary from 6,500' to near 8,000' on Mt. Logan. Gentle slopes prevail generally throughout, however, some slopes in excess of 35% are present. These slopes have been delineated on the logging restrictions overlay; logging operations and logging access to these areas will be restricted.

Mt. Trumbull proper located in the northern part of the unit is an escarpment with access limited to foot travel. Present MFP restrictions exclude this area from any harvest operations, at least until such time that excessive environmental damage can be avoided. Another area of steep terrain is the Hell's Hole area west of Mt. Logan. However, this area does not enter into the unit, as commercial timber is not prevalent.

Separate activity plans will be prepared for all disciplines that carry a major impact on the unit. These plans will express in detail the affect that timber harvest operations will have on their respective disciplines. It is felt that elaboration on these associated disciplines need not be done at this juncture.

D. History of Past Logging

The Mt. Trumbull area lies within the highest precipitation and deepest soil area on the Arizona Strip District.* Over the past 100 years various degrees of timber harvest operations have been conducted. From early 1868 to 1950, sawmills operating in the area were small and unable to utilize the then maturing ponderosa pine. By selectively avoiding these trees, the result has been the development of a two-storied stand, an overstory consisting of trees 250 to 300+ years old prevalent over 80% of the area. While over the entire area is a young blackjack (ponderosa pine) stand and approximately 2,000 acres of which are in need of some degree of timber stand improvement work.

* Reference Soils Survey-SCS-1974, copy on file Arizona Strip District Office

Timber sales were conducted by the U. S. Forest Service while the area was under their jurisdiction. The Forest Service sold 2,167 MBF of timber covering approximately 1,200 acres, or 20% of the area. These sales are identified on the U.S.F.S. sales overlay. Harvesting of other small products (Christmas trees, posts, etc.) occurred over this period also.

Due to the size and character of the stand, the area is too small to be regulated as an economically sustainable unit from the timber standpoint. However, by harvesting a portion of the stand, removing the potentially decadent trees and providing other means of site development, the overall unit will be enhanced for a multi-purpose objective.

II. FOREST RESOURCES

A. Non-Commercial (Fringe timber-presently not economical)

Several sites have been delineated within the ponderosa pine type and excluded from any logging operations. These sites consist of economically inoperable areas due to the fringe nature of timber resources, recreation, and wildlife development restrictions identified in the MFP, or fragile soils as identified in the soils survey. Other areas may be subsequently recognized after the activity plans for recreation and wildlife management have been prepared later in FY 1976. Acknowledged problem areas will be governed by special logging requirements and listed in the logging contract, or these areas may be excluded from harvest operations entirely. A tabulation of these potential problem areas are presently identified and depicted on the logging restriction overlay.

B. Commercial

Forested areas presently identified as unlogged commercial consist of approximately 2,841 acres of ponderosa pine. Of this acreage, the total figure will undoubtedly be adjusted downward somewhat when activity plans for wildlife and recreation are completed, and their limitations plugged into an overall plan.

Listed below is the acreage and type breakdown of the commercial forested area:

Timber Type	Acreage
PP1-/PP2=	237.4
PP1-/PP2=,B	948.1
PP1-/PP2=,PJ	100.0
PP1-/B	133.8
PP1=/PP2=	703.4
PP1=/PP2=,B	691.5
PP2-/B	27.2
Total	2,841.4

C. Problem Sites (Erosive soils, steep terrain, lava, etc.)

Problem forested lands exist within the proposed boundaries of this area where slope percent exceeds optimum levels permissable for tractor operations. These areas are small in total acreage. Requiring the contractor to provide additional equipment to log these areas would not be economically practical. Consequently, they are considered problem sites and excluded from harvest operations. These areas have been identified on the problem sites overlay.

III. MANAGEMENT PLAN OBJECTIVES

A. Sales Plan

1. Marking and Cruising

Commercially timbered areas within these proposed units should be cruised by an acceptable method and offered as a lump-sum sale. A sale of this character requires less technically trained support personnel to administer. A crew of two or three men would, however, be necessary to cruise the stand and these individuals of necessity should have forestry background to better equip them to make prudent assessments of the resource.

Trees designated for removal should be marked with paint, both on the stump and at DBH with a suitable tree marking paint. (In the case of thinning operations, opposed to sawlog sales, it may be desirable to mark the leave trees.) High risk trees, severe leaners, spike-topped and diseased trees will be harvested to reduce the incidence of snag fires. All mistletoe-infected trees should be harvested to avoid future re-infestation of the residual stand, especially where only isolated infections occur. To benefit wildlife species, selected snags below the acreage crown height and selected spike-topped trees may be reserved for wildlife habitat. Squirrels, owls, turkeys and woodpeckers would benefit by this exclusion.

Development of a more vigorous stand will require the removal of young sawtimber trees in order to obtain proper spacing. Growth of the residual stand can be enhanced by obtaining proper spacing and, in turn, the area will develop a more esthetically appealing stand. Where conflicts arise in this procedure, modification of this may be necessary where wildlife habitat or other activities are seriously affected, i.e., the nesting or roosting areas of turkeys may need special consideration.

2. Logging Operations

The timber sales contractor should be encouraged to employ a diverse variety of equipment to better perform the harvest operations with minimal environmental damage.

A number of spur roads will be required to facilitate the removal operations, these roads will be kept to a minimum, but still adequate to afford an expeditious logging operation. Because most of the timbered area in question has previously been exposed to some degree of harvesting, many spur roads, although somewhat obliterated are still present. Pioneering of new spur roads will be held to a minimum while old existing spur roads will be reactivated. As logging operations have been completed in designated areas, these spur roads will be put to bed. Suitable grass seed will be distributed over these roads after erosion control features have been installed. Main roads and other designated spur logging roads essential in the administration of the area will be left passable.

Prior to commencing any logging operations, the main roads essential for future development will be constructed to a minimum standard and designed by the District Engineer.

Presently the only existing mill site is located in Fredonia, Arizona, approximately 60 miles distance over a combination of gravel and dirt surfaced roads. Assuming that this remains valid and logs are transported to this site, considerable maintenance and reconstruction of bridges, culverts and replacement or widening of at least one cattleguard and installation of several others will be necessary.

3. Slash Treatment

Slash treatment will be a necessary operation after logging. The treatment system adapted to an area will be dependent on the character and potential for erosion of the particular soil type. Areas where soil has a tendency to move, lopping and scattering of brush may be the designated treatment. From the watershed standpoint, this would assist in trapping and holding water while allowing moisture to percolate into the soil and become available for plant use. Also, although the Mt. Trumbull area is relatively higher in elevation than the surrounding landscape, evaporation still remains a significant problem. Lopping and scattering of brush within 18 inches of the ground surface will help to reduce the overall surface temperature providing for a more favorable seedbed, not only for trees, but for grass species.

Differing means of slash treatment will be necessary along main access routes and in conjunction with critical fire problem areas. Chipping of slash, if economics permit, may be the suggested alternative adjacent to access routes. This would place the flash fuels closer to the ground surface allowing this material to afford a greater degree of soil stabilization and a deterrent to moisture loss. Esthetically this treatment would produce the least visual displeasure initially. Piling and burning of slash along this corridor may result in the scorching of individual trees if carried out in a haphazard manner.

Fire protection becomes a critical problem during the spring and summer periods. To better assist in the protection of this area, fuels that result from logging operations that are located along ridgetops or other designated critical areas should be piled and burned to remove this material entirely from the area. Also, establishment of areas void of logging slash would provide a fuelbreak necessary to assist in the suppression of wildfires. These areas will be located along ridgetops where drastic or dense fuel changes exist.

4. Soils

Two soil types, Lomaki and Wukoki, may have an impact on whether harvest operations are conducted on these identified soils. Both of these soils listed in Table No. 11 of the Mt. Trumbull Soil Survey (See Appendix 1) overlie fragmented, cindery mesic and as indicated in this table are conducive to moderate-to-severe erosion potential, with moderate wind throw possibilities. Equipment limitation is also rated as moderate or above. The soil survey indicates a site index, based on these soil classifications and using a base index of 100 years, of trees growing on this soil would be expected to attain an average height of 50 feet in 100 years of growth. This is not a very productive soil from the timber standpoint.

Where soil classifications indicate that the stability factor of a given soil type is subjected to moderate erosion and depending on the density of slash, consideration should be given to lopping and scattering of slash. Soils in this category, as indicated in Table No. 11, include:

Collbran	3, B&C	
Lomaki	5B	15-60% Slope
Sponseller	4B	
Wukoki	5B	15-60% Slope

Collbran Soils - Generally are well drained and have high available water capacity. Runoff is slow-to-rapid and permeability is slow. Depending on the slope percent, the treatment recommended for slash may vary.

Lomaki Soils - This series is usually well drained, undoubtedly because of its development over cinders on cinder cones and alluvial fans below cinder cones. Due to the well-drained characteristics, these soils have a low available water capacity. Runoff is slow-to-rapid and permeability is moderate.

Sponseller Soils - In a representative profile there is generally a 1/2 to 1 inch pine needle mulch on the soil surface. The soil consists of deep, well drained soil which formed in residuum from weathered basalt and cinders on basalt flows and cinder cones. These soils are well drained and have high available water capacity. Runoff is slow-to-medium and permeability is moderate-to-moderately-slow.

Wukoki Soils - These soils too are formed over cinders or cinder cones and alluvial fans below cinder cones. Wukoki soils consist of deep, somewhat excessively drained loamy soils with low-to-very-low available water capacity. Runoff is slow-to-high and permeability is moderately rapid.

The above identifies soils that have moderate-to-severe erosion potential, depending on their respective position with regard to slope. Therefore, both the slash disposal and method of logging must be correlated to the particular soil type to produce the least environmental damage. In the case of soils that have a slow rate of permeability, coupled with only a light vegetative cover, skidding operations must be restricted to existing skid trails and logging roads or areas of more stable soil character. Slash disposal methods on the remaining soil classes would not be as critical as those identified above.

B. Site Improvements (Timber Stand Improvement)

1. Reforestation

Early stages of logging in this area, as has been mentioned in the past history of the Mt. Trumbull Unit, saw the removal of trees within a specified diameter range as being the common practice. This cutting practice left ponderosa pine trees ranging in size from 30 to 60 inches in diameter at breast height and containing approximately three logs. Residual trees of this stature were a prolific seed source enabling a very dense stand of blackjack to develop. The

exclusion of fire also encouraged this dense stand development. Through a proper selective harvest prescription, the mature and overmature yellow pine (30 to 60' DBH), along with the removal of a portion of the blackjack sawtimber, will leave a residual stand capable of producing a sufficient quantity of viable seeds to reestablish the balanced environmental system. The re-introduction of controlled fire would help abate the stagnated conditions as they now exist and prevent this reoccurrence. Fire would also provide a degree of pruning necessary to assure better log grades.

As has already been suggested, the ultimate goal is to thin this now stagnated young sawtimber stand during logging operations where practical and profitable to permit greater board foot growth. Thinning would also open the understory and allow increased development of grass species and browse. Success of this will be dependent on the extent that livestock are permitted to utilize the area. Areas of sagebrush are now prevalent throughout the understory of this unit and to establish a successful conversion to grass and browse species for wildlife use, consideration must be given to the implementation of a grazing system.

In the Mt. Logan area stems per acre exceed an optimum level of stocking and on these sites pre-commercial thinning operations would be beneficial. Releasing the residual stand would make available nutrients, space and moisture to the remaining vegetation on the site. Areas suitable for thinning have been identified on the proposed thinning area overlay. Approximately six miles of main access roads, one to Mt. Logan and a branch off the Logan road to Petty Knoll, exist in the ponderosa pine type on the unit. Corridors several hundred feet wide should be planned, and along these main roads, trees should be thinned and pruned. The removed material should be either piled and burned or chipped and scattered. This would provide a more esthetically pleasing stand and potential fuel for combustion would be reduced along these access arteries.

Thinning and/or pruning operations should be delayed two-five years after commercial harvest operations to allow ample time for slash deterioration, thus avoiding any potential insect buildup. Presently there is a Mt. Pine Beetle (Dendroctonus monticolae) buildup on the North Kaibab Forest. Also, by delaying thinning and pruning, this would allow for the removal of non-commercial material that was damaged during logging or has died from the result of harvest operations.

Trees should be pruned for the first sixteen feet and approximately 100 yards from the main access road. Slash resulting from this TSI operation should be disposed of in a manner as previously mentioned.

The degree of thinning necessary should be based on the existing stand and what the desired results may be. For example, spacing will be one of the determining factors, but to provide for the best prescription it will be necessary to thin from both above and below to obtain the best results. When thinning from above, consideration must be given to crown classification and condition of the reserved tree. This, in combination with thinning from below, which would be based on spacing, will provide for the greatest overall result in stands 30 to 100 years. Areas such as exist near Mt. Logan, where stands of ponderosa five to 30 years old are present, it would be more practical to thin stands of this nature strictly on a spacing criteria. Standard spacing of 18 feet between ponderosa pine will be an acceptable pattern in the 30 to 100 year size classes, however, six to ten feet should be the consideration for the younger aged classes.

2. Site Improvements

Scarification of the soil is a very critical phase in developing an acceptable seedbed for ponderosa pine seedlings. Natural regeneration will be the primary means of establishing a future crop of trees in this area, consequently, disturbance of the soil under existing trees is essential. Granted that different species develop better on soil suited to their character, e. g., in the Rocky Mountains, indications are that only spruce germinates and grows best on burned seedbeds and next best on mineral soil, and subalpine fir makes its best showing on decayed wood. Notwithstanding, it is generally conceded that the ideal seedbed for establishing most forest species, including ponderosa pine, consists of well-loosened mineral soil.

Several alternative methods of site preparation are common and include: fire, chemical and mechanical. Of these mentioned, a combination of mechanical and fire would serve to provide the greatest potential seedbed for ponderosa pine in this locale with the least monetary outlay. Mechanical site preparation, after logging operations and in conjunction with slash disposal, has the benefit of disposing of logging residue, reduces plant competition, prepares mineral soil seedbeds and creates favorable micro-environments. Combine this with prescribed burning, either as broadcast burning or disposal of debris in windrows or piles,

the resultant seedbed produced is more receptive to seedling development. Machine scarification exposes sufficient mineral soil, but still leaves an adequate protective cover of small woody material and duff over much of the area. By creating depressions, this treatment usually increases the storage capacity of the land, but seldom increases the overland flow and soil erosion hazard.

Brush areas have been identified on the type map. When these are in conjunction with suitable timber-producing sites, they should be plowed and planted either to native grass species or planted to ponderosa pine. However, because of the emphasis placed on this area for wildlife development, planting of suitable grass or browse species may benefit the area more.

3. Prescribed Burning

Prescribed burning, once an understory of trees has been established, is a recognized effective management tool to reduce potentially high intensity forest fires. When fire is totally excluded from an area, debris of all character will accumulate. If allowed to continue, this situation can be most detrimental should a project fire develop.

Through evolution, ponderosa pine was assured preservation by the development of resistance to fire. Periodic lightning-set fires occurring in the past prior to total fire exclusion as we recognize it today maintained low fuel levels. Thus, when fires occurred during extreme conditions, the results were not significant as would be the situation now due to current fuel buildups. Also, by near total fire exclusion the stagnated condition that now is prevalent undoubtedly would not have developed had nature's selection method been allowed to progress. Stands would have been thinned; fire would have pruned dead branches from these trees while they were in the sapling and pole stages. Vast areas of sagebrush present throughout most of the timbered area would have been substantially reduced.

Recognizing the potential buildup of slash and after logging operations have been completed within a given area, a control burning schedule should be established. Treatment should be on a systematic basis, both from the standpoint of the area treated and the periodic recurrence of this treatment. Recurring treatments on any one designated area may be conducted at three-to-five year intervals, dependent on the buildup that has resulted. In some cases, it may be desirable to extend this interval period.

Initial emphasis on prescribed burning should be placed on the timber sale areas that have previously been harvested by the U. S. Forest Service. These sales are identified on the overlay indicating prior U.S.F.S. Timber Sales.

Natural barriers such as roads, trails, lava flows, etc., should be utilized in establishing burning units. In situations where natural barriers are lacking, construction of barriers may be necessary.

The benefits derived from a prescribed burning operation can be seen in the reduction of fuels lessening the potential for wildfires, grass species would increase due to the diminished solid needle cover created by coniferous species and wildlife would benefit from the succulent growth of rejuvenated browse species.

C. Multi-Purpose Objectives

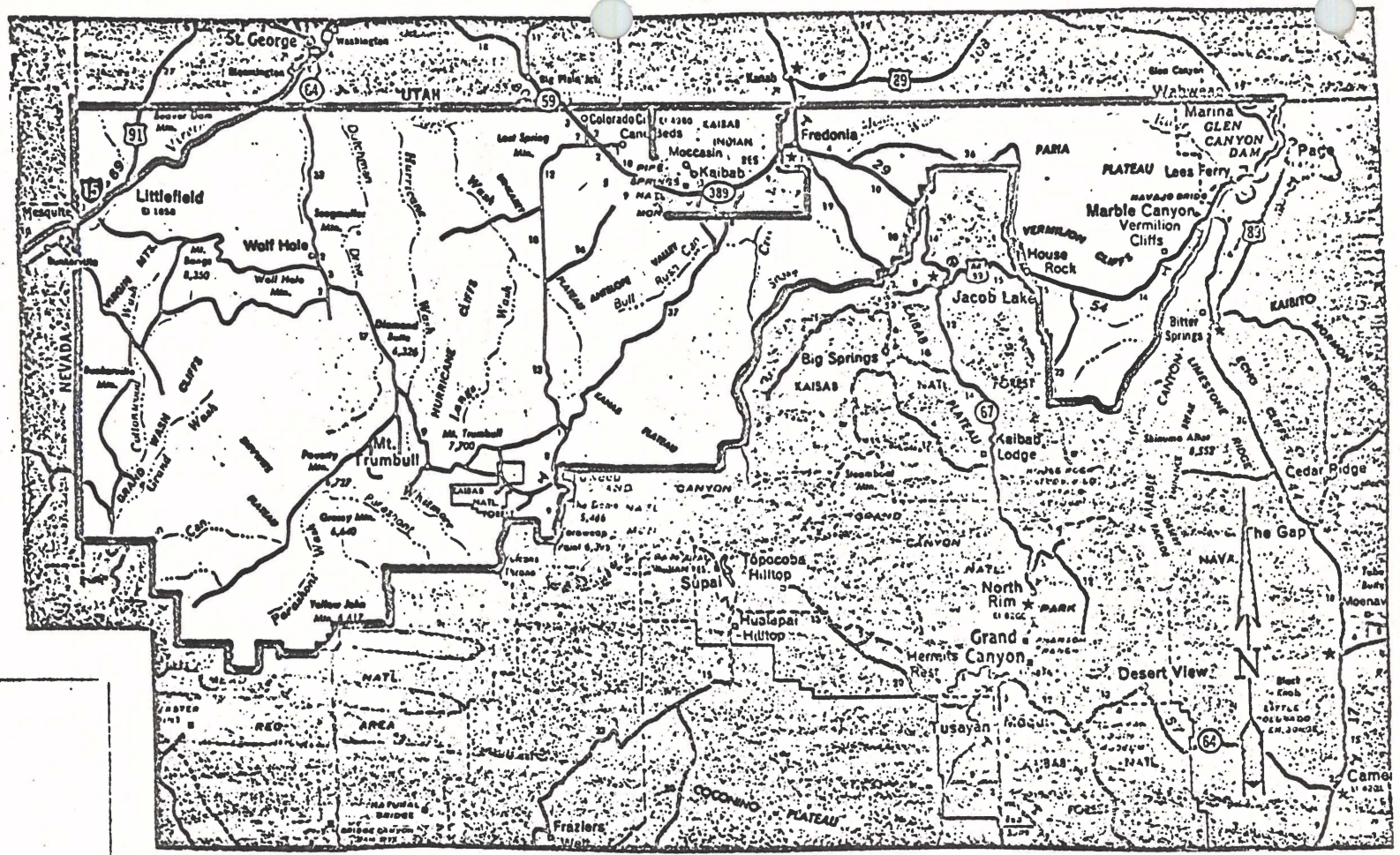
Harvesting of the coniferous species within the Mt. Trumbull Unit as expressed, will be attuned to the future enhancement of wildlife, recreation and grazing management. Reasoning mentioned previously is that the unit does not lend itself to an economically sustainable forest from the sawlog timber standpoint. Therefore, some areas have already been eluded to and undoubtedly others will surface after completion of the other activity plans that will be restricted from harvest operations. However, until these other activity plans have been completed later in FY 1976, it is not possible to foresee all exceptions placed on harvesting, thinning or other forest activities that have so far been identified.

D. Proposed Action Plan

Scheduling the proposed completion of the various steps outlined should take the following priority. Initially the multiple-use conflicts between the involved disciplines should be resolved during Fiscal Year 1976 to make further planning possible. Presently areas of conflict exist in the development of a wildlife habitat plan. Archeological restrictions will also impose considerations on the area because of Indian ruins; grazing, watershed and recreation activities too will be decisive in the overall management plan.

Once conflicts that may arise are settled and activity plans for all involved disciplines are prepared, then emphasis can be placed on a more intensive inventory and development of the area. Gathering of inventory data will be initiated through establishment of CFI (Continuous Forest Inventory) plots.

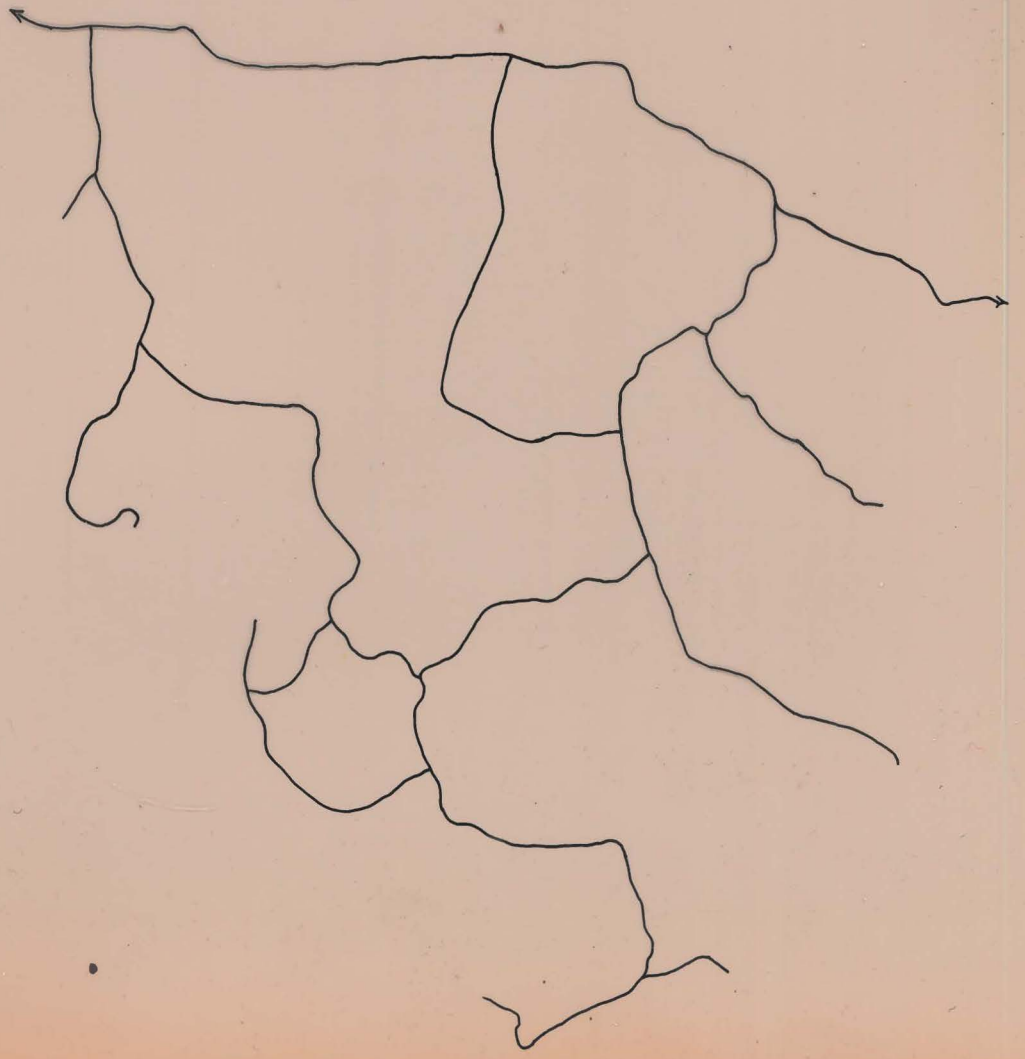
These plots should be established through guidance and assistance from the forestry staff at the Denver Service Center and should be scheduled during Fiscal Year 1977. After analysis of field data, a timber harvesting schedule can be developed in the latter part of Fiscal Year 1977. Subsequent to the timber harvest plan development in Fiscal Year 1977, cruise plans should be initiated during Fiscal Year 1978, followed by harvest operations during the succeeding calendar years.



Map # 1

ARIZONA STRIP DISTRICT

MAIN ACCESS ROADS

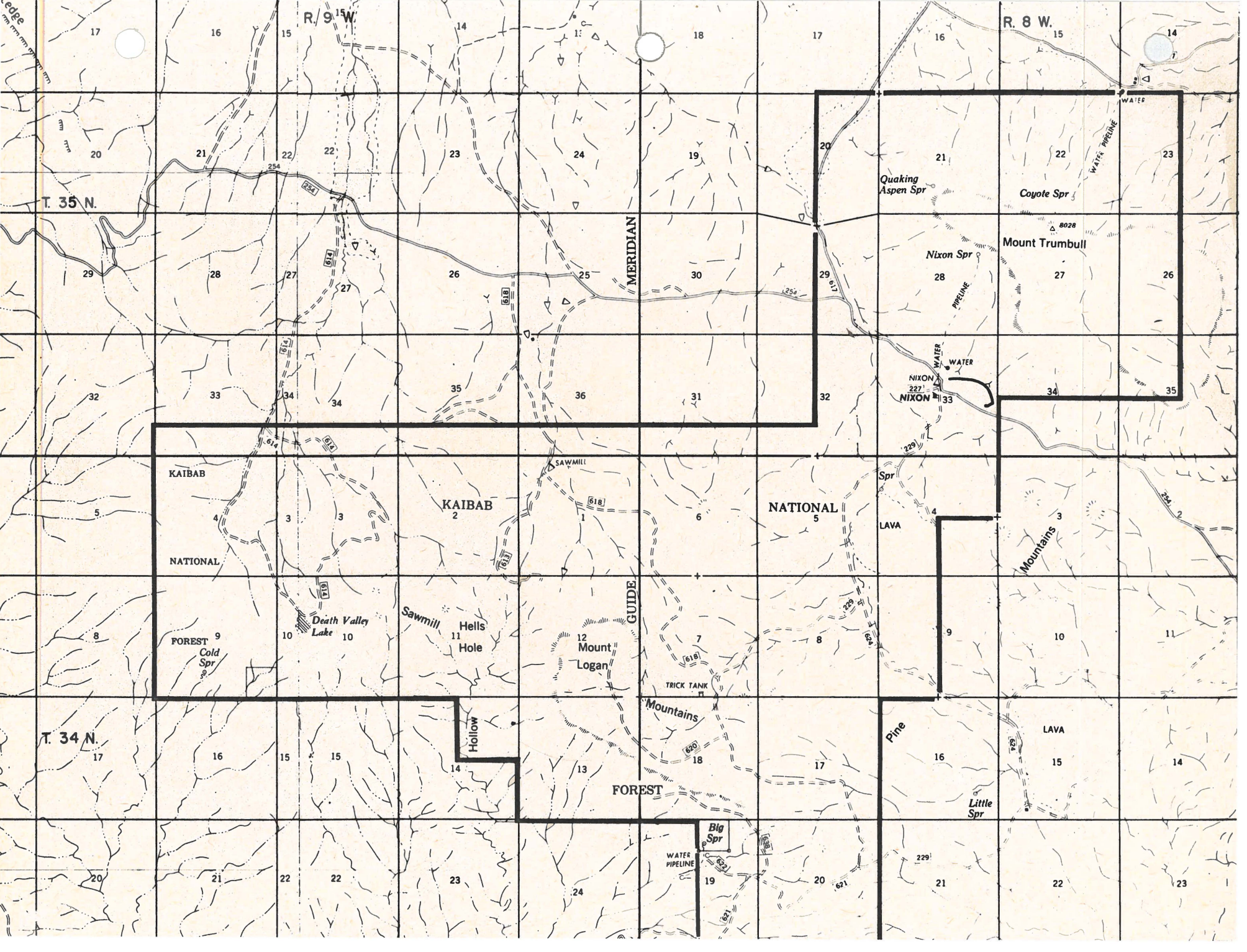




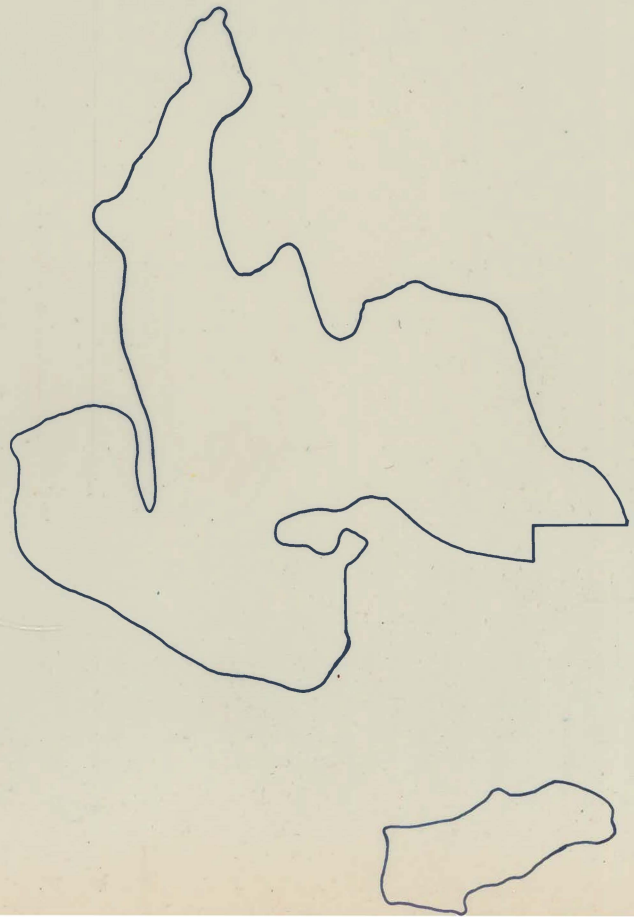
TIMBERED AREA

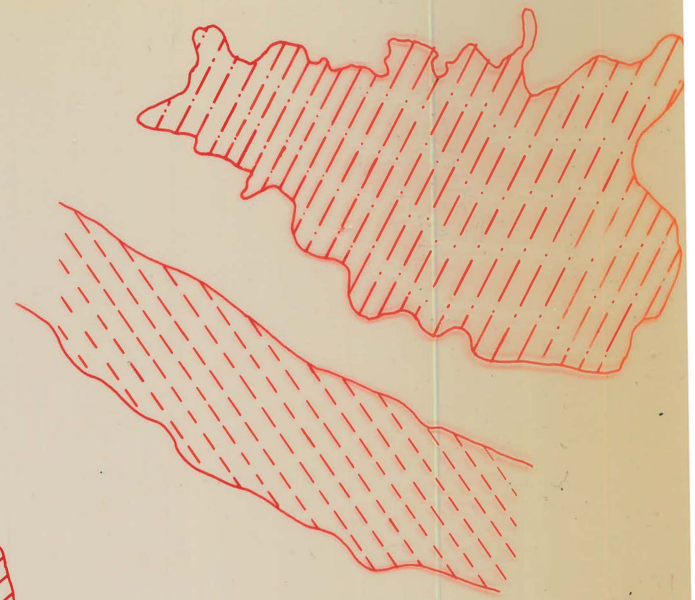


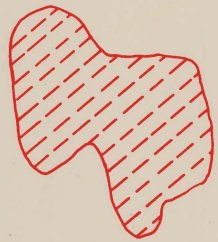
Lava


R. 9 W.
R. 8 W.
T. 35 N.
T. 34 N.
MERIDIAN
GUIDE
KAIBAB
NATIONAL
FOREST
LAVA
Mountains
Hollow
Pine
Quaking Aspen Spr
Coyote Spr
Nixon Spr
Mount Trumbull
8028
NIXON
227
WATER
WATER PIPELINE
PIPELINE
SAWMILL
Death Valley Lake
Cold Spr
Sawmill
Hells Hole
Mount Logan
TRICK TANK
Big Spr
Little Spr
254
614
618
617
621
622
624
625
629
616
620
229

PROPOSED TIMBER SALE AREA











LOGGING RESTRICTIONS

M.F.P. Restriction

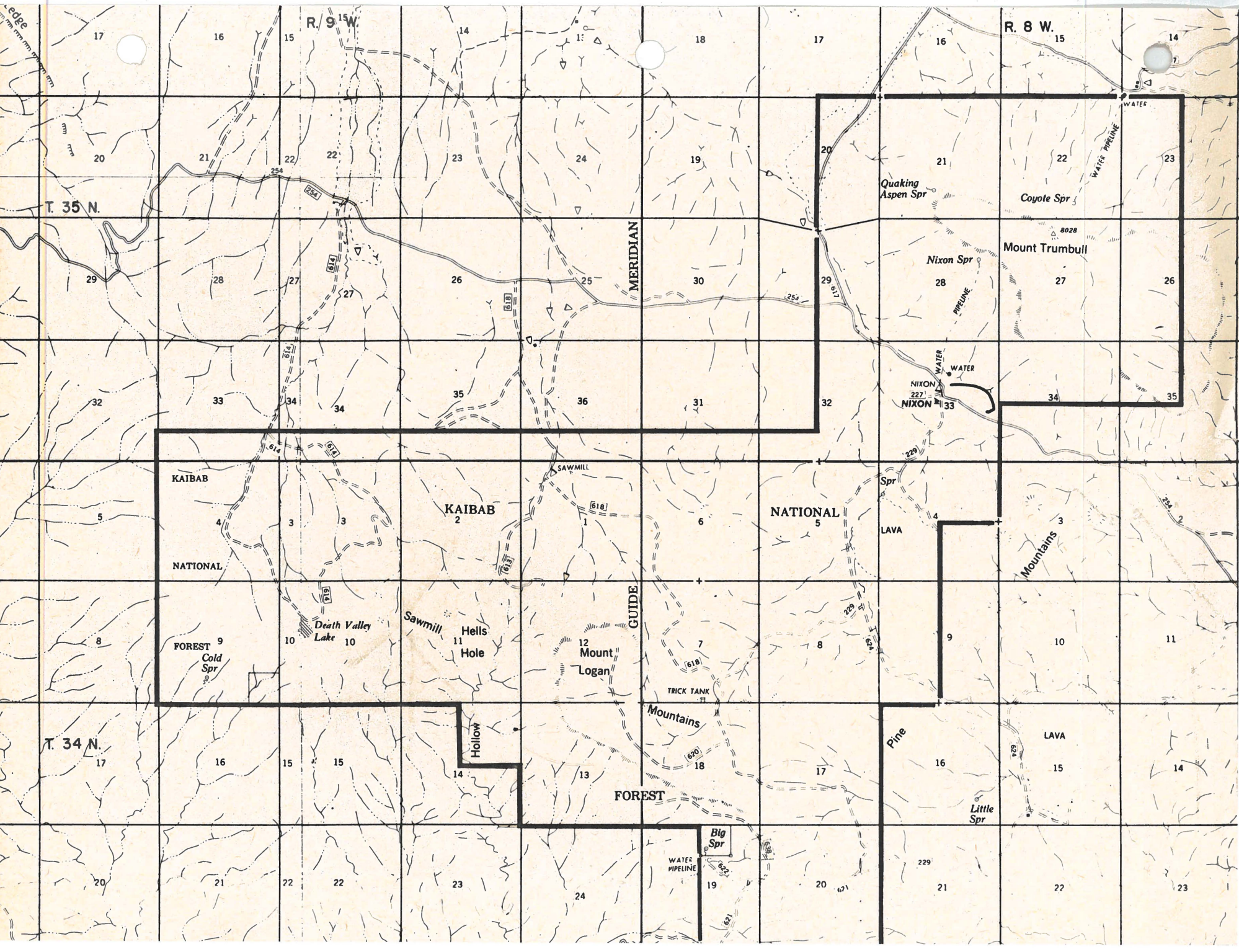


M.F.P. Exclusion

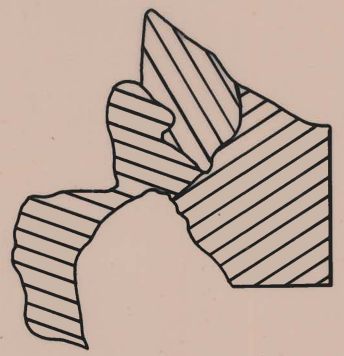


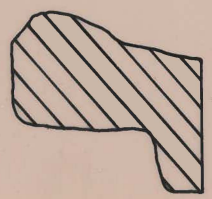
Slope % Restriction




R. 9 W.
R. 8 W.
T. 35 N.
T. 34 N.
MERIDIAN
GUIDE
KAIBAB
NATIONAL
FOREST
Death Valley Lake
Cold Spr
Sawmill
Hells Hole
Mount Logan
Hollow
Mountains
TRICK TANK
Quaking Aspen Spr
Coyote Spr
Nixon Spr
Mount Trumbull
8028
NIXON
227
WATER
PIPELINE
SAWMILL
LAVA
Pine
Little Spr
Big Spr
WATER PIPELINE
254
614
618
617
624
229
620
621
622
638

U.S.F.S. SALES

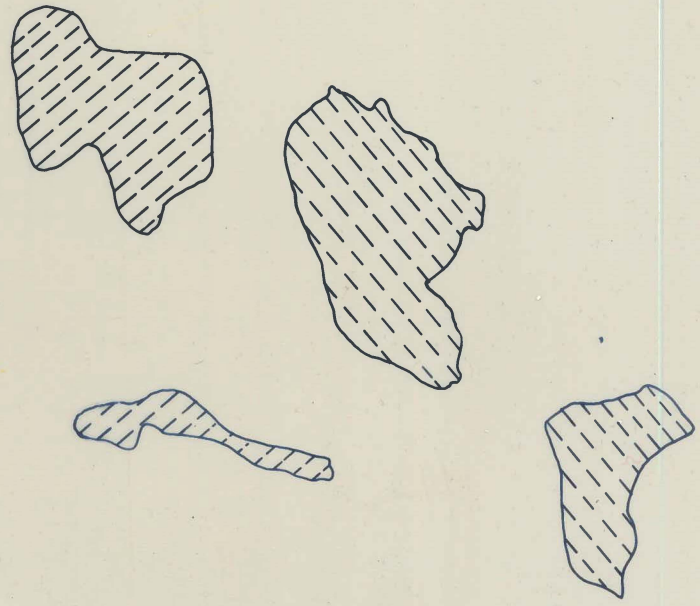


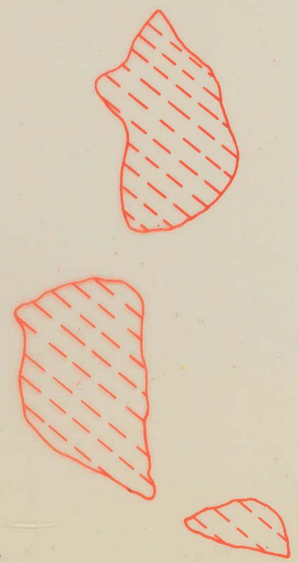


PROBLEM SITES

LAVA

SLOPE





PROPOSED THINNING AREA

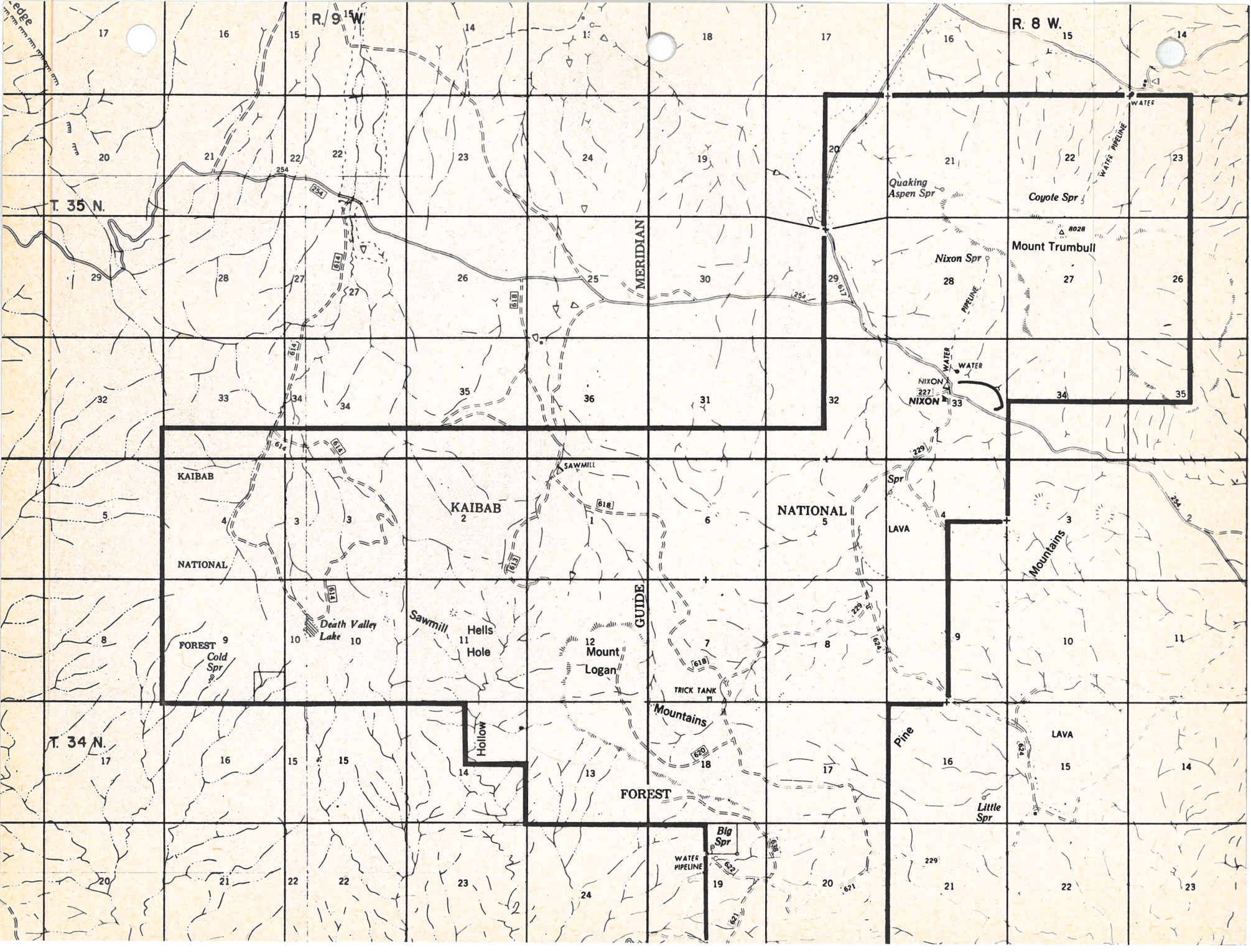

R. 9 W.
R. 8 W.
T. 35 N.
T. 34 N.
MERIDIAN
GUIDE
KAIBAB
NATIONAL
FOREST
LAVA
Mountains
Hollow
Sawmill
Hells
Hole
Mount
Logan
Death Valley
Lake
Cold
Spr
Quaking
Aspen Spr
Coyote Spr
Nixon Spr
Mount Trumbull
8028
NIXON
227
TRICK TANK
WATER
WATER PIPELINE
PIPELINE
SAWMILL
Big
Spr
Pine
Little
Spr
254
614
618
620
621
622
624
627
229

TABLE 11.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed in this table.)

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index	Trees to plant
Collbran:									
3A	4c1	Slight	Slight	Slight	Slight	Slight	Ponderosa pine	70	Ponderosa pine
3B	4c1	Moderate	Moderate	Slight	Slight	Slight	Ponderosa pine	70	Ponderosa pine
3C	4c1	Moderate	Moderate	Slight	Slight	Slight	Ponderosa pine	50	Ponderosa pine
Lomaki:									
part of 5B	7f	Moderate-Severe	Moderate-Severe	Moderate	Moderate	Moderate	Ponderosa pine	50	Ponderosa pine
Sponseller:									
4A	4Ø	Slight	Slight	Slight	Slight	Slight	Ponderosa pine	70	Ponderosa pine
4B	4Ø	Moderate-Severe	Moderate	Slight	Slight	Slight	Ponderosa pine	70	Ponderosa pine
Wukoki:									
part of 5B	7f	Moderate-Severe	Moderate	Moderate	Moderate	Moderate	Ponderosa pine	50	Ponderosa pine
part of 10	7f	Slight	Slight	Moderate	Moderate	Moderate	Ponderosa pine	50	Ponderosa pine