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Silvicultural prescription stand 827-01-066, Tally Lake Ranger District, Flathead National Forest

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SILVICULTURAL PRESCRIPTION

STAND 827-01-066

TALLY LAKE RANGER DISTRICT

FLATHEAD NATIONAL FOREST

by

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I. Timber Stand Location

Stand 82701066 is located on the Tally Lake Ranger District, Flathead National Forest and consists of 32 forested acres within the Hand Creek drainage, with a legal location description of the NE 1/4 of Section 33, T30N, R25W, M.P.M., Flathead County, Montana (Appendix A).

Access to this stand is currently possible via Forest Road No. 538B which is located off Forest Road No. 538, off the Flathead County Pleasant Valley Road, and U.S. Highway No. 2 west of Kalispell, Montana. Road No. 538B is legally open year round although it is generally inaccessible in the winter unless snowplowing is being done by timber sale purchasers in the area.

Stand 82701066 is approximately 30-60 miles from several local mills located in Olney, Columbia Falls, and Kalispell, Montana. Historically, timber from this general area has been processed by most of these mills. The nearest pulp mill is in Missoula, Montana, approximately 165 miles away.

Stand 82701066 was delineated based on past management practices as were most of the stands in the immediate vicinity. Stand 82701066 is bordered to the north by stand 82701021, to the south by stand 82701001, to the east by stand 82702017, and to the west by stand 82701025. Stand 82701021 is predominantly a mature, even-aged *Pinus contorta* stand with other species scattered throughout. It is currently scheduled for regeneration harvest within five years. Stand 82701001 was harvested in 1972 and the subsequent regeneration is clumpy with a wide range of size and age classes and good species diversity. Stand 82702017 is a highly variable stand, both in terms of age and size class as well as species diversity, resulting from a sanitation and salvage harvest which removed most of the *Pinus contorta* component. Stand 82701025 is the riparian area along Hand Cr. and has a diverse stand structure, good species diversity, variable crown closure, and a significant dead component.

II. Land Management Objectives

In addition to the major laws regulating Forest activities, more site specific management of this stand is found in the Flathead National Forest Management Plan (USDA Forest Service, 1985a). Stand 82701066 is in the Sylvia Lake Geographic Unit of the Flathead National Forest Management Plan and designated Management Area 15. In Management Area 15 cost efficient timber production is emphasized while protecting the productive capacity of the land and timber resource. Other resources will be managed in a manner consistent with timber management goals. The long term desired future condition for MA-15 lands is designed to achieve many resource objectives. Specifically, this condition will include a diverse pattern of vegetation distributed across the management area in both time and space.

Stand size class (differing age classes) can best describe this vegetative diversity. It is anticipated that the future stand size class distribution will include approximately 25-35% seedling/sapling (0-30 yrs.), 45-55% pole or immature (30-80 yrs.), and 20-25% mature (80 years and older, which also could include old growth stands).

These conditions will be achieved using road development, and timber culture and harvest practices consisting primarily of even-aged silvicultural systems and treatments. Once these age-class distributions are reached, they would be maintained by timber harvest activities, regenerating approximately 10% of the area each decade. This distribution will provide a relatively even flow sustained yield of wood and other forest products along with highly productive diverse wildlife habitat components. These treatments will maintain diverse patterns of vegetation through time and space, achieving a healthy forest resistant to catastrophic fire, and insect and disease outbreaks.

The distribution of the vegetative patterns through time and space will be such that both wildlife habitat and security needs will be maintained for species of animals such as, but not limited to: elk, moose, and deer. The local need for security of various wildlife species will be balanced with the flow of wood products and recreational uses. Although cavity-dependent species habitat will be a major focus in adjacent riparian management areas and other management areas unsuitable for timber harvest, snags and replacement snags will also be managed within MA-15 to provide diversity of this habitat across the analysis area.

Soil productivity on MA-15 lands will be maintained to at least 85% of its current condition by limiting compaction and displacement to 15% of any harvest units. Water quality in adjacent streams will be maintained at or above State Water Quality Standards to provide for the short-term and long-term quality of the water resource.

Through the use of proper design and scheduling of activities, management activities will dominate the landscape in patterns that repeat the natural line, form, color, and textures native to the area to achieve a modification or, where appropriate, a maximum modification visual quality objective.

Various recreation opportunities will be available within the management area. For those roads not closed for wildlife security objectives, access for dispersed recreation activity will be available for berry picking, firewood gathering, hunting, hiking, snowmobiling and cross-country skiing. Scenic view points will change as the diverse pattern of openings changes. Access to trailheads for hikers and horseback use into the adjacent roadless areas will be provided by roads maintained to a standard for passenger car use. Sufficient parking and trailhead facilities, consistent with adjacent management area objectives, will be provided.

Management objectives, guidelines, and standards for Management Area 15 which relate to this stand include:

1) Permit vegetation management practices which:

a) maintain or create diverse patterns of vegetation, using primarily even-aged silvicultural systems.

b) are not chosen primarily because they will give the greatest dollar return or the greatest output of timber, although these factors shall be considered.

c) are made in such a way that the technology and knowledge exist to adequately restock the lands within 5 years after final harvest.

d) are chosen after considering potential effects on residual trees and adjacent stands.

e) are practical in terms of transportation and harvest requirements and total costs of preparation, logging, and administration.

2) Prohibit logging in areas sensitive to soil compaction or erosion without special considerations and mitigating measures. This objective is discussed more specifically on page 10.

3) Maintain long-term water quality to meet or exceed State Water Quality Standards. This objective is discussed more specifically on page 18.

4) Meet a visual quality objective of modification or maximum modification.

5) Give wildlife habitat appropriate protection and manage it to provide cover, forage, and security areas. These objectives are discussed more specifically on page 15.

6) Consider integrated pest management strategies in project analysis and design. Emphasize treatments that reduce losses due to insects and diseases in project silvicultural prescriptions. These objectives are discussed more specifically on page 14-15.

III. The Physical Site

A. Climate

The climate of this area is dominated by a strong westerly flow, which brings most of the precipitation from Pacific maritime weather systems. This flow is strongest from November to February, when most snowfall occurs, and also in May and June, when most rainfall occurs. Most of this precipitation is associated with orographic lifting. Other dominant climatic characteristics are a July to September drought period associated with Great Basin high pressure systems, and occasional severe winter conditions associated with Arctic air masses (Cunningham, 1983).

The mean annual precipitation for stand 82701066 is approximately 31 inches. About 40-60% of this precipitation falls as snow, or rain into the snowpack. The summer months receive less precipitation than the winter months, although this area exhibits a remarkably uniform seasonal distribution (Appendix C). Strong winds occasionally occur in the winter, generally associated with storm fronts from the southwest.

B. Physiography

Slopes range from 6 to 24 percent with a 15 percent average. The aspect is generally west with southwest and south slopes in the upper portion of the stand. The mean elevation is 4700 feet with a range of 4600 to 4800 feet.

C. Geology and Soils

The subject stand is located in the Salish Mountains which were formed about 60 million years ago during the Laramide Orogeny, which is the mountain building episode when the Rocky Mountains were formed. Bedrock was gently uplifted and folded into an arch with many faults crossing the mountains. One fault crosses the Hand Creek watershed in a northwest-southeast direction a little east of the center of the watershed. Several small faults cross the watershed (Appendix C).

The Hand Creek watershed is underlain by Precambrian argillite and quartzite. West of the main fault bedrock is siliceous argillite of the Burke and Prichard formations; east of the fault it is argillite of the

Spokane and Empire formations. West of the fault bedrock dips gently westward and east of the fault it dips gently eastward.

Glacially deposited material overlies bedrock in most of the watershed, except the highest parts. A ground moraine was deposited by the lobe of ice that moved south from Canada over the Kalispell area and on to the south. The ice left deposits of 5 to 20 feet on the valley floor but almost no deposits on the high ridges. Lacustrine (lake) deposits consisting of very fine-grained sand, silt, and clay veneer the ground moraine in places. These deposits were formed when the ice lobe from Canada dammed small streams, including Hand Creek (Appendix C).

This stand in on Landtypes 14-2, 26D-7, and 26D-8, as mapped on an order II Landtype Inventory for the Tally Lake Ranger District in 1986 (Martinson and Basko, 1983, 1986). The major landtype in this stand is 26D. It occurs on the upper slopes away from Road 538B. Soils in Landtype 26D are developing in loamy or very fine sandy loam glacial till. The minor landtype, 14-2, occurs on the lower part of the slope along the road. Soils in Landtype 14-2 are developing in silty lacustrine deposits. Both soils have a layer of volcanic ash on their surface, deposited about 6800 years ago by the eruption of Mt Mazama. This ash is generally 4 to 7 inches thick, but is absent in some areas because of past disturbance and redistribution from logging and site preparation.

Soils in Landtype 26D are classified Dystric Cryochrepts, loamy-skelatal, mixed. These soils are formed in glacial deposits that are about 10,000 years old. These soils contain 35 to 60 percent rounded coarse fragments. Soils in Landtype 14-2 are classified Glossic Cryoboralfs, fine-silty, mixed. These soils were deposited in very slow moving or still water, and therefore have very few or no coarse fragments.

Landtype 26D has moderate timber production potential. This results from the relativly coarse soil texture, and the high coarse fragment content. Landtype 14-2 has high timber production potential. This results from the deep soil profile and silty soil textures that hold a lot of moisture and nutrients for plant growth. (Refer to site productivity potential page 17 for a more detailed discussion.)

Landtype 14-2 occupies a very small part of this stand. It will, however, affect how the stand is treated. Some small areas of wet soils exist in this part of the stand. These soils have low bearing strength when wet and are subject to rutting and puddling.

Landtype 26D, the major landtype, is a dense, brittle till soil on which compaction can greatly reduce productivity. This soil often has natural bulk densities that are near the limiting density for plant roots (1.45 g/cc). Therefore it is important to take measures to reduce the risk of soil compaction. There is a chance that the soil in this stand is already compacted by previous management activities. If this is the case these compacted areas should be identified and avoided by future equipment passage. Continued passes of equipment could result in enough compaction to severely reduce the growth of the trees in this stand.

The following are some suggested management practices, appropriate to this landtype, to mitigate these potential impacts (Basko, 1989). These management practices generally apply to soils subject to compaction.

1) Equipment should use the existing road and skid trail system. These areas are already compacted.

2) Any equipment that operates within the stand should do so when soils are dry. This action does not eliminate soil compaction, but does reduce the degree of compaction and eliminates the risk of rutting and puddling.

3) Winter logging greatly reduces the impacts to the soil resource. If it meets the silvicultural goals, it can be a good alternative to protect soil productivity.

D. Slope Hydrology

According to the Forest Hydrologist (Snow, 1989), water movement is controlled by localized soil and slope conditions. Subsurface movement occurs throughout the stand, with a southwest flow towards Hand Creek located about a chain outside the stand. The soils in this stand have a moderate to high infiltration capacity. The slopes are not excessively steep or long between minor benches and no drainageway development has occurred to date. Considering these factors surface erosion should not be a problem within this stand. However, water infiltration capacity could be reduced by soil compaction possibly resulting in some surface runoff.

E. Habitat Type

Forest habitat types of Montana (Pfister, et al, 1977) were used to classify the stand. The primary habitat type for the stand was ABLA/VACA with some inclusions of ABLA/CLUN-VACA on lower slopes with high water tables, and ABLA/XETE-VASC on the upper slopes and benches. The ABLA/VACA habitat type is mainly found on well drained benchlands and frosty basins where cold air accumulates. Typically these areas are located primarily on the east front of the continental divide between 6000 and 7200 feet. They are, however, locally common in the Hand Cr. and Griffin Cr. drainages. This habitat type is generally associated with frequent summer frosts and warm daily maximum temperatures, a combination that damages new growth on most conifers, but not *Pinus contorta*. For this reason, *Pinus contorta* appears to be the only species well suited for management (Pfister, et al, 1977). Pinus contorta is a persistent, seral dominant in this habitat type with minor representation of other species and even at age 15 this stand exhibits this species composition. Understory vegetation is fairly typical of this habitat type and is described in detail on page 14.

F. Fuel Load and Fire Hazard

The fuels in stand 82701066 are very light. Duff depth is less than an inch. Debris potential in tons per acre (ovendry weight), as given from R1 edit stand examination data, is 6.2 tons/acre. All debris would occur as live crowns and unmerchantable tops. Slash disposal following the original entry was accomplished through dozer piling of debris in large windrows. Nearly all large fuels were consumed in this process leaving little for site amelioration and nutrient capital.

Fischer's photo guide (Fischer, 1981) did not appear appropriate and was not used in rating fuel hazard. Based on my own experience and consultation with the District Fuels Management Officer the following risk and hazard ratings were assigned. The fire risk rating would be low, with rate of spread, intensity, torching, crowning, and resistance to control all rated as low. The fire hazard rating would be rated low to moderate given the volume of traffic on road number 538B.

IV. The Forest Community

A. Timber Stand

Stand exam data, field notes, and field reconnaissance comprise the basis for this stand description. Stand 82701066 was formally examined during April, 1987, using Region One stand examination procedures in compliance with Region One Field Instructions For Stand Examination And Forest Inventory (USDA Forest Service, 1985b). This 1987 exam data generated the R-1 edit stand tables included in Appendix B and summarized in the following data table.

Table 1. Stand Attributes:

Species	T/A%	T/A	BA	Avg Age	Avg DBH	Avg HT	LCR %
PICO	90	2650	41.3	12.7	1.4	16.9	89.8
PSME	3	75	.0	2.7	.5	1.0	76.7
PIMO	1	25	.0	4.0	.5	2.0	90.0
PIEN	3	75	.0	8.7	.5	2.0	90.0
ABLA	3	100	.0	7.5	.5	2.0	85.0
All Species	100	2925	41.3	12.7	2.1	16.9	89.8

The stand data describes an even-aged stand sructure with minimal species diversity. It should be noted, however, that due to plot location species other than Pinus contorta were inadequately sampled. The stand, as a whole, can best be described as even-aged with 1800 to 3000 trees per acre consisting almost entirely of Pinus contorta with minor amounts of Abies lasiocarpa, Pseudotsuga menziesii, Larix occidentalis, Picea englemannii, Pinus ponderosa, and Pinus monticola. However, the species composition varies considerably with habitat type with a higher proportion of other species in the northeastern portion of the stand. The manageable Pinus contorta component is 13 to 17 years old and 15 to 25 feet tall with fairly even distribution except where windrows were burned and where there are small areas of thin soil. In the northeast portion of the stand, the manageable component of other species is 7 to 12 years old and 5 to 15 feet tall and integrated with the Pinus contorta component.

B. Understory Vegetation

Common cover types include Calmagrostis rubescens, Carex spp., Xerophyllum tenax, Vaccinium caespitosum, Vaccinium scoparium, Linnaea borealis, and Spiraea betulifolia. Trace ammounts of noxious weeds including Centaurea maculosa also occur in the stand. No sensitive plant species occur in the stand or in the immediate vicinity.

C. Diseases

Several areas of residual timber serve both as a regeneration seed source and a reinfection point for the major disease pathogens in the stand. Arceuthobium americanum and Endocronartium harknessii are significant disease problems in the adjacent stands and are increasing problems in the northeastern portion of this stand. A trace of Armillaria spp. was identified in this stand but to date root diseases have not been a major problem in this area. No other significant disease problems occur in the stand or the surrounding area.

D. Insects

Pissodes terminalis is a chronic pest at this time and has resulted in considerable top damage to many of the dominant and codominant *Pinus contorta*. Other insect problems include minor amounts of *Pissodes strobi* and, *Adelges cooleyi* (Appendix B).

E. Animal Damage

Rodent damage including foliage clipping and stem barking is common in the stand. The most common damage is stem barking associated with stem galls. Some browsing of seedlings by big game also occurs, primarily near the stand perimeter. Several saplings in the general area have been girdled by bears. Girdling of sapling size trees may become a problem in this stand if tree vigor is increased (Schmidt, 1987).

F. Wildlife and Fisheries

The Hand Creek drainage provides diverse habitat for big game animals, small animals, grouse, and a variety of non-game birds. Elk, moose, mule deer, and whitetail deer use the area in the spring, summer, and fall and migrate for winter range to the west. Black bear also use the area on a seasonal basis. Timber harvest in the area has increased habitat diversity but large opening sizes and roads have reduced habitat effectiveness. Hiding and thermal cover are adequate, and forage is readily available throughout most of the area. A marsh/beaver pond complex near the mouth of Hand Creek provides good habitat for moose and adds to the diversity of the area. Old growth habitat is quite limited due to the fire history and previous timber harvest activities. Habitat for cavity dependent species is also limited in the area and no snags exist in the stand (Appendix D).

No streams exist in or adjacent to this stand and surface erosion should not affect the fishery in Hand Creek.

V. Stand History and Development

Stand 82701066 (32 acres) was originally regeneration harvested as part of a larger unit (82701001/88 acres) in 1972. The slash was dozer piled in windrows in 1972 and burned in 1973. The original 88-acre unit consisted of two timber types, roughly corresponding to current stand boundaries, with the major difference in species composition being the extent of the *Pinus contorta* component. A significant amount of this component was left on the site during harvest due to the existing merchantability and utilization standards. The subsequent regeneration was unevenly distributed and varied in species composition resulting in the 1982 redelineation of the two stands referenced above. Stand 82701066 was certified stocked in 1982 and stand 82701001 was interplanted in 1984.

The pre-harvest stand probably originated from a small fire occurrence around 1860 which varied considerably in intensity in the immediate vicinity of the stand. This is indicated by the age class distribution, species composition, and the presence or absence of fire killed snags and large woody debris.

VI. Site Productivity Potential

A. Timber

The Flathead National Forest Plan includes the ABLA/VACA habitat type in productivity class 5 and habitat group 5 (Cool and Dry). Productivity for these clasifications is 50 to 84 cubic feet per acre per year under intensive timber management at CMAI. This is a general productivity rating and may vary for specific habitat types within this group (USDA Forest Service, 1985a). Pfister, et al, (1977) estimated that for this habitat type, yield capabilities could span from 45 to 65 cubic feet per acre per year based on inventory data primarily from forests east of the continental divide. Martinson and Basko (1983) assign a productivity rating of moderate, based on soils classification, with a mean annual increment of 50 to 70 cubic feet per acre per year. Based on landtype, and climatic factors, and considering the fact that this site has had considerable disturbance, the productivity of this stand is probably near mid-range of productivity for this habitat type, which is about 60 cubic feet per acre per year. The base 100 year site index for the

ABLA/VACA habitat type is 66 feet in R-1 tables or 73 feet in the PROGNOSIS model.

B. Watershed

Water quality for the upper Hand Cr. catchment as indicated by the water quality monitoring data (Page and Hill, 1987) can be generally characterized as good. Activities should be managed to minimize impacts on water quality.

The upper Hand Cr. catchment has been analyzed using the H2OY water yield model and estimated to be approximately 4% above natural yield (Appendix C). Current management direction allows up to 12% increase over natural yield.

These soils have a moderate to high infiltration capacity and the slopes are not excessively steep or long between minor benches. Considering these factors surface erosion should not be a problem. A system of temporary roads exists so no road construction is projected for this rotation further reducing the sediment production potential.

C. Grazing

This stand is not included in any current grazing allotments. Grazing occurs on the district but not in this area, at this time. This area is not scheduled for livestock grazing in the foreseeable future.

D. Wildlife and Fisheries

This stand is dominated by saplings of various species. Regeneration is sparse where slash was windrowed and burned following past harvest. These poorly-stocked strips increase within-stand diversity and help maintain forage productivity for wildlife. Vaccinium caespitosum and Vaccinium scoparium berries provide good forage for grouse and black bear.

This stand has high value in providing hiding cover, particularly in its eastern part. This portion of the stand lies along a gently sloping ridge heavily used by big game animals for travel and bedding.

Cavity-dependent species habitat will be a major focus in adjacent riparian areas and other management areas unsuitable for timber harvest. However, snags and replacement snags should also be managed within this stand, emphasising species other than Pinus contorta, to provide diversity of this habitat. Similarly, vertical diversity for avian species will be provided by other management areas.

Leaving large woody debris on the ground can improve habitat for small mammals (Appendix D).

Fisheries are not considered to be an issue with the subject stand. No live streams are present in the stand and sediment yield will be minimal from any logging activity, therefore, fisheries will not be featured in this prescription.

E. Recreation

A small developed campground at Sylvia Lake lies two miles northwest of the stand on Rd. 538B. Other recreation in the area is limited to dispersed activities such as hunting and firewood cutting. Recreation will not be featured in this prescription.

F. Visual Resource

The visual quality objective of this area is modification. According to Pat Thomas, the Forest Landscape Architect, the subject stand is in a low level of sensitivity and is in a variety class where the vegetation and terrain is common to the Forest. The visual resource will not be featured in this prescription since nearly any treatment alternative would meet the visual quality objective.

VII. Silvicultural Objectives

The main silvicultural objective is to maintain or improve the productivity of the site while obtaining the maximum volume production in the most cost efficient manner. Additional objectives include maintenance of species diversity, reduction of insect and disease problems, and improvement of the genetic resource. To meet these objectives, a target stand is defined below in terms of composition, structure, and density.

A. Composition: Silvical characteristics of *Pinus contorta* and the other similar species in the stand largely dictate the constraints of viable management options. *Pinus contorta* will be the predominant species in the target stand, with other species featured in the portion of the stand where they occur. *Pinus contorta* appears to be the only species well suited for management in the ABLA/VACA habitat type (Pfister, et al, 1977). Other species occur mainly in the northeastern portion of the stand where the most common habitat type is ABLA/XETE-VASC. This habitat type is much better suited for management of these other species. *Arceuthobium americanum* and *Endocronartium harknessii* are significant disease problems in the adjacent stands and are increasing problems in the northeastern portion of this stand. Featuring other species in this portion of the stand will significantly reduce the rate of spread, and long term volume and value losses. At maturity, the resulting variation in species composition in the two portions of the stand will also provide different management opportunities. Desired species mix, for the entire stand, should be about 85 percent *Pinus contorta* and 15 percent *Pseudotsuga menziesii*, *Larix occidentalis*, and *Pinus monticola*, with a trace of *Picea englemannii*, *Pinus ponderosa*, and *Abies lasiocarpa*. This species mix will be nearly 100 percent

Pinus _contorta_ in the majority of the stand and aproximately 70 percent _Pinus_ _contorta_ and 30 percent other species in the northeastern portion.

B. _Structure_: The stand should be even-aged in structure, both to match silvical characteristics of the of the preferred species with management activities and for cost effectiveness reasons. This structure also provides the greatest protection from damaging agents common to these species.

C. _Density_: Trees per acre and basal area should be managed to enhance stand vigor to preclude insect and disease damage and to maximize merchantable volume in a cost efficient manner. A mean stand density of 2700 trees per acre requires some form of stocking control to meet these silvicultural objectives due to the onset of restrictive competitive interaction. This stocking control will reallocate the growth potential of the site as well as provide an opportuntiy for the adjustment of species composition, the reduction of insect and disease problems, and the improvement of the genetic resource. Normal yield tables, stocking guides, and graphs provide a systematic way of evaluating stand conditions and comparing them to optimal stocking levels to meet management objectives. They help determine treatment needs, assess the benefits, and establish timing and/or intensity of treatments. Stocking guides are a valuable management tool for diagnosing treatment needs and comparing alternatives and should be used in conjuntion with a growth and yield simulator such as PROGNOSIS.

Other resource considerations that affect stand density treatments include maintainance of suitable hiding and thermal cover for big game, and snags for cavity dependent species.

VIII. Alternative Treatments

A. Existing Stand Comparison to Target Stand

In general, the stand is similar to the target stand. However, with approximately 2700 stems per acre at age 15, the existing stand is overstocked. Species composition is similar to the target stand in both portions of the stand, although more selection favoring other species will be required in the northeastern portion of the stand. Structure is even-aged throughout the stand which corresponds to the target stand.

B. Alternative Treatments

Management actions considered to modify the existing stand to match the target stand involve stocking control activities, both precommercial (cleaning) and commercial thinning. Because the stand is similar to the target stand, a no action alternative was also considered. A number of other alternatives were considered but not fully developed and evaluated. The alternative treatments fully developed and evaluated for stand 82701066 are 1) defer treatment, 2) precommercial thinning (cleaning) only, 3) one precommercial thinning (cleaning) and one commercial thinning and 4) commercial thinning only. Several variations of each treatment alternative were developed, based on different intensities in both commercial and precommercial thinning (cleaning). Final harvest is projected to take place at culmination of mean annual increment (CMAI). Alternatives considered are listed below in Table 2.

Table 2. Intensity and Timing of Alternative Treatments

Alt. No.	Precommercial Thin 1990 (Density)	Commercial Thin 2020 (BA/Ac)	Harvest CMAI (Year)
1.	2766	None	2070
2.	2766	125	2080
3.	2766	135	2090
4.	1210	None	2070
5.	1210	125	2090
6.	1210	135	2090
7.	889	None	2070
8.	889	135	2090
9.	681	None	2090
10.	681	135	2100
11.	436	None	2100
12.	302	None	2110

C. Discussion of Alternative Formulation

The twelve stocking control activities described above are thought to represent a reasonable range of alternatives to reduce the stocking density of the existing stand to the density of the target stand.

Stocking guides and PROGNOSIS growth and yield simulator outputs wereused to develop, analyze, and compare the effects of the alternatives. While these tools may not be completely accurate, they still provide a relatively reliable and consistent means to compare the treatment alternatives.

I have attempted to improve the accuracy of the PROGNOSIS model, relative to this site, by adjusting the mortality prediction functions to reflect higher site productivity. The default calibrations were based on data by Pfister and others (1977) collected primarily on forests east of the continental divide. The mortality functions are modeled by three subroutines within PROGNOSIS and controlled by the basal area maximum (BAMAX) keyword. Basal area maximum is a concept that a particular type of site can only support a limited amount of biomass. BAMAX is important in the limiting of PROGNOSIS output to prevent growth projections from exceeding that which is a normal maximum for a particular type of site. The default BAMAX value for this habitat type is 180 square feet per acre based on Pfister's data (1977). Christophersen and Applegate (1987) developed a good system to use stand exam data for a given area to adjust BAMAX. This system identified a midrange BAMAX of 215 square feet per acre for this habitat group on the Lolo N.F. It should be noted that this particular habitat type is on the high end of this group in terms of productivity. The Region One Timber Management Group identified a BAMAX of 270 square feet per acre for this habitat group in Western Montana. In the site specific establishment of a BAMAX for this prescription, I considered all of the values discussed above and made a series of PROGNOSIS runs at three different stand densities and four different BAMAX values. The results of these runs, summarized in the following data table and included in appendix F, indicate how a BAMAX value of 240 square feet per acre, as modeled by alternatives G, H, & I, bests represents the productivity estimate of this site. Refer to section VI Site Productivity Potential page 17 for detailed discussion.

Table 3. Alternative Treatments to Calibrate Basal Area Maximum Value

Alt. Id.	1990 Stand Density T/A	Productivity CUFT/AC/YR	BAMAX BA/AC
A.	2766	48.8	180
B.	1210	50.5	180
C.	681	47.7	180
D.	2766	55.0	210
E.	1210	60.4	210
F.	681	57.2	210
G.	2766	60.1	240
H.	1210	60.8	240
I.	681	60.3	240
J.	2766	63.4	270
K.	1210	63.3	270
L.	681	64.5	270

Precommercial thinning: The stand, with a density of 2700 trees per acre, is considerably above the densities delineated by the management zone graphically displayed in appendix G (USDA Forest Service Handbook

2409.13 R-1 Supp 6 M-3, 1985). This management zone is based on the principle described by Smith (1962) that there is a wide range of stocking over which production of cubic volume is nearly constant for any given age. The zone is further defined by the goal of maximum per acre board foot volume production over a 100 year index period. The upper and lower limits of the zone represent the range of stocking to attain 90% of the maximum possible production. This range of stocking represents the optimum allocation of the growth potential of the site to meet management objectives. Precommercial thinning (cleaning) was considered as a treatment to reduce stocking. Five different densities (1210 T/A, 889 T/A, 681 T/A, 436 T/A, 302 T/A) were modelled as well as a no action alternative. These alternatives are graphically compared to the R-1 management zone in appendix E. It should be noted, however, that the alternatives modelled are an imperfect representation of the actual implementation of the precommercial thinning entry. The proposed treatment is a modified free thinning rather than a mechanical thinning modeled by spacing. Additionally, species not adequately represented in the stand exam data will be featured in part of the stand. In a free thinning (cleaning) treatment the thinner should select the best tree of any desireable species at a given location. The treated stand should result in the prescribed residual stand density with stocking well distributed. The "spacing" may vary up to 50% to select the best trees and still attain the target stand density. Phenotypically superior leave trees will be selected based on juvenile growth and form characteristics such as bole straightness, branch angle, tendency to self prune lower live limbs, and insect and disease resistance. Only one timing choice was considered, with precommercial thinning (cleaning) to be done around 1990. This time was selected based on the current reduction in damage from Pissodes terminalis. This reduction probably results from natural population cycles as well as the ability of Pinus contorta to "outgrow" susceptibility to new attacks (Gibson, 1987, 1989). This timing of thinning should also correspond to a time when clear establishment of dominance and natural pruning of lower live limbs will have occurred Another factor considered was that stands of this density exhibit a significant reduction in growth after age 20 (Schmidt, 1987). Therefore waiting much past 1994 may reduce stand vigor and benefits from the thinning may be reduced.

Commercial thinning: The timing of commercial thinning is selected based on the stocking level curves in appendix G (USDA Forest Service Handbook 2409.13 Supp. 6 M-3, 1985). These curves are a function of basal area, trees per acre, and quadratic mean diameter. Stands are considered for a commercial thinning when their stocking densities meet or exceed the densities delineated by the upper level of the management zone on the stocking guide in appendix G. Commercial thinnings reduce stocking densities toward the lower level of the management zone represented on these charts. This density best allocates the growth potential of the site to meet management objectives. The summary statistics from the stand growth prognosis model (Wykoff, et al, 1982) were used to quantify and compare the growth patterns of the alternatives and to determine when thinning should occur. Only one timing choice was considered, with commercial thinning to be done around 2020. This was selected as the time when no significant reduction in growth had occurred and minimum post and pole merchantability specifications had been attained. The timing and intensity of commercial thinning relative to these stocking charts are displayed in appendix E. Alternatives which were thinned to densities of 436 T/A and 302 T/A were not considered for a commercial thin because they did not fully occupy the site.

Normally, the only type of thinning to be considered in this type of a stand would be thinning from below due to the silvical characteristics of the prefered species. With this stand, however, some thinning from above will also occur because of the selection of *Pseudotsuga menziesii* and *Pinus monticola*, which occupy an intermediate position in the canopy. This should have no negative effect on volume production by the end of the rotation.

Final harvest: For modeling and analysis purposes culmination of mean annual increment (CMAI) was used to determine when the regeneration harvest would occur. This is consistent with current management direction (USDA Forest Service Handbook 2409.13-32.1, 1985). The type of harvest system used should be selected to match stand conditions at CMAI. After intermediate treatments adjusting species composition and stand density the two portions of this stand should be quite different.

As a result of these treatments the northeast portion of the stand should be well suited for a seed tree system while the optimal system for the major portion of the stand should be a clearcut. Either of these methods can provide adequate natural regeneration.

Site preparation and reforestation: Debris management and adequate site preparation can be achieved through broadcast burning or mechanical piling, trampling and scarification. The compaction susceptibility of soils in this landtype would commonly indicate broadcast burning as the preferred treatment. At this time, however, prescribed burning is considerably more expensive than mechanical site preparation. Also the backlog of units due to air quality considerations has limited the use of prescribed burning to only those units with site conditions excluding mechanical options. Impacts to the soil resource can be minimized, however, through careful timing and administration of activities. Therefore, mechanical site preparation is assumed in all alternatives. Natural regeneration is the desired method of reforestation because of lower cost, potentially greater genetic diversity, and better stock/site match than artificial regeneration. Seed trees will be retained in the portion of the stand managed for species other than *Pinus contorta*. The seed source for the major portion of the stand will be serotinous cones left on site during harvest activities.

IX. Analysis of Alternatives

The twelve stocking control activities described in Table 2 are felt to represent a reasonable range of alternatives to reduce the stocking density of the existing stand to the density of the target stand. Stocking guides and PROGNOSIS growth and yield simulator outputs were used to analyze and compare the effects of the alternatives. The effects in terms of timing and timber volume output are summarized in the following data table and graphically displayed in appendix E.

Table 4. Growth and Yield Comparison of Treatment Alternatives

Alt. No.	1990 Stand Density T/A	2020 Stand Thin BA/AC	YEAR CMAI	CMAI QMD	CMAI BA/A	CMAI MBF/A
1.	2766	NONE	2070	9.2	201	23.5
2.	2766	125	2080	12.7	194	28.1
3.	2766	135	2090	13.1	200	30.7
4.	1210	NONE	2070	10.5	200	24.4
5.	1210	125	2090	13.7	199	31.3
6.	1210	135	2090	13.1	200	30.7
7.	889	NONE	2070	10.9	202	25.2
8.	889	135	2090	13.4	198	30.9
9.	681	NONE	2090	13.0	199	30.4
10.	681	135	2100	14.2	199	33.2
11.	436	NONE	2100	14.9	195	33.5
12.	302	NONE	2110	16.5	179	33.8

As previously discussed under Alternative Formulation, the range of stocking delineated by the management zone in appendix G represents the best allocation of the growth potential of the site to meet silvicultural objectives. Treatment alternatives that resulted in growth patterns outside this management zone for a significant portion of the rotation were therefore dropped from further consideration and analysis. More specifically, alternatives 11 and 12 are understocked during the entire rotation and clearly fall into this category. Alternative 1 is overstocked until about 2030 when the growth curve flattens out yielding small stems and low volume. Alternative 2 is also overstocked until 2020 when the basal area is reduced to 125 square feet per acre resulting in understocking. Similarly, alternative 5 is reduced to understocking from the optimal stocking range when the basal area is reduced to 125 square feet per acre. Alternatives 8 and 10 were also dropped because the volume and number of pieces available for a commercial thin would not make the alternative economically viable.

A. Productivity Enhancement

The remaining five alternatives 3, 4, 6, 7, and 9 all reach CMAI within 10% of maximum timber production and within twenty years of each other. If timber volume production was the only consideration any of these alternatives would be acceptable including alternatives 4 and 7 which are slightly deficient but still in the viable range.

B. Cost Efficiency Analysis

Cost efficiency is a primary concern, but not the only concern, in choosing the preferred treatment alternative. Present net value is used as the primary measure of cost efficiency (USDA 36 Code of Federal Regulations, 1982b, part 219.3). Present net value (PNV) for each treatment was calculated using the ECON model (Cawrse, 1984), which is available on Flathead National Forest. The PNV as well as the cost benefit ratio for each alternative are included in the following data table. Modeling assumptions and additional values for each treatment are displayed in Appendix H.

Table 5. PNV & Cost Benefit Ratio Comparison of Treatment Alternatives

Alt. No.	Present Net Value	Cost: Benefit	YEAR CMAI	CMAI QMD	CMAI BA/A	CMAI MBF/A
3.	2444	2.640	2090	13.1	200	30.7
4.	1158	1.318	2070	10.5	200	24.4
6.	273	1.078	2090	13.1	200	30.7
7.	1353	1.369	2070	10.9	202	25.2
9.	-297	.909	2090	13.0	199	30.4

When comparing the economics of the remaining five alternatives, a similar pattern to the growth and yield comparison develops. If economics was the only consideration any of these alternatives except 9 would be acceptable. Alternative 6 has a low PNV because of its longer rotation length but not enough to preclude its implementation. Alternative 3 has the highest PNV because no precommercial thinning investment had to be made and caried over the rotation. This alternative, however, is highly dependent on a market for post and pole material around 2020. This is a difficult prediction to make due to the variability of supply and demand for these products. Alternatives 4 and 7 have practically the same PNV considering the variability of the sample and the models. These two alternatives are the most reliable and economically viable.

C. Preferred Alternative and Rationale

In reviewing our silvicultural objectives our main objective is to maintain or improve the productivity of the site while obtaining the maximum volume production in the most cost efficient manner. Additional objectives include maintenance of species diversity, reduction of insect and disease problems, and improvement of the genetic resource. While any of the remaining five alternatives would meet the main objective the additional objectives would not be equally met by all alternatives.

I feel implementation of alternative 6 best meets all of the silvicultural objectives for the following reasons:

1. A 1990 stand density of 1210 trees per acre allows for full occupation of the site and provides future managers some treatment alternatives to respond to future conditions. The stand could be reduced to 135 square feet of basal area per acre as prescribed or carried "as is" through the rotation. This opportunity is enhanced by the "operability" of the ground. Either of these options result in 90% or more of the maximum volume production at CMAI and a positive PNV.

2. The two stand density adjustment treatments in alternative 6 provide a much greater opportunity for integrated pest management.

These treatments will foster greater species diversity and improvement of the genetic resource while reducing insect and disease problems.

X. The Prescribed Treatment

The selected treatment alternative consists of a precommercial thin in 1990, a commercial thin from below to 135 square feet of basal area per acre in 2020, and a final harvest at CMAI in 2090.

Precommercial Thin (1990)

The stand should have a precommercial thinning (mechanical/free cleaning) entry implemented at this time. This timing should provide for clear establishment of dominance, natural pruning of lower live limbs, and sufficient height to "outgrow" susceptibility to Pissodes terminalis (Gibson, 1987, 1989). In this entry Pinus contorta will be featured in most of the stand while other species will be featured in the portion of the stand where they occur. This will maximize species diversity and enhance the opportunity for a seed tree harvest at rotation age. Other factors considered in this timing and species selection were previously discussed in the alternative formulation section on page 25. In a free thinning (cleaning) treatment the thinner should select the best tree of any desireable species at a given location. The treated stand should result in a residual stand density of 1210 trees per acre with stocking well distributed.

The "spacing" may vary up to 50% to select the best trees and still attain this stand density. Spacing should be aproximately 6' x 6' adjusted for openings to achieve the desired density. This stocking level will allow for the intermediate harvest and mortality without dropping out of the management zone. All trees must be cut below the lowest live limb or have live limbs removed from the stump which may not exceed 8 inches in height. To reduce the fire hazard, directional fall cut trees and slash limbs and tops to a depth of 3 feet or less. A leave strip, one chain wide, will be maintained along road number 538B. This will reduce sight distance into the stand and provide hiding cover for wildlife as well as reduce the fire hazard. Phenotypically superior leave trees will be selected based on juvenile growth and form characteristics such as bole straightness, branch angle, and tendency to self prune lower live limbs. Similarly, insect and disease resistance will be selected utilizing the following preference specifications:

1. Trees that exhibit no signs of disease or insect damage.
2. Trees that exhibit only signs of insect damage.
3. Trees that exhibit disease symptoms limited to the branches.
4. Trees that exhibit disease symptoms in the bole.
5. Trees that exhibit signs of both disease and insect damage.

Commercial Thin (2020)

1. Sale Preparation (2019)

a). Unit boundaries should follow current stand boundaries.

b). Logging systems will be laid out using previous entry roads, landings, and windrows (Appendix A).

c). The stand should be leave tree marked for a thinning from below, except as necesary for species diversity, resulting in a residual stand of approximately 135 square feet of basal area per acre, evenly distributed. Selection will feature species other than Pinus contorta where they occur and is particularly important along the seed walls. Selection of all species will be based on the following growth and form characeristics;

1.) Bole straightness

2.) Branch angle

3.) Crown size and form

4.) Cone production ability

5.) Insect and disease resistance

A few extra trees should be marked along travel corridors to allow for removal of trees damaged during harvest operations.

2. Sale Administration (2020)

The relatively gentle topography and the extensive road and windrow network in the stand as well as the small material being harvested provide a variety of harvest system options. This stand could be thinned using a semi-mechanized, continuous loop/capstan cable, or a conventional manual-mechanical harvest system. Regardless of the system used, trees should be directionally felled with a lead angle of 45 degrees off the direction of yarding. Equipment operation should be limited to designated corridors (Appendix A) using some form of cable yarding or manual removal within timbered strips. Bumper trees may be used to minimize damage to leave trees during yarding and should be removed.

3. Slash Treatment

Removal of material down to a 3" top diameter or less and lopping and scattering of debris concentrations should result in minimal fire hazard and rapid decomposition.

Regeneration Harvest (2090)

1. Sale Preparation (2088)

a.) Unit boundaries should be established at this time to conform to variations in species composition. The stand should be roughly divided by one of the temporary roads from the original harvest. These two units hereafter will be refered to as Unit A and Unit B (refer to appendix A for detailed map).

b.) Logging systems will be laid out using previous entry roads, landings, and windrows (Appendix A). Harvest systems will be the same as for the commercial thin with the exception of the continuous loop/capstain cable sysem no longer being applicable due to the larger material.

c.) Unit A should be well suited for a seed tree regeneration system. The seed trees should be marked leaving 3-6 per acre featuring the best individuals from the following species preference;

1.) _Pseudotsuga menziesii_

2.) _Larix occidentalis_

3.) _Pinus monticola_

d.) To meet Flathead Forest Plan snag retention and replacement guidelines all of the seed trees will remain on the unit. They will be kept live for third rotation seed trees unless a significant snag shortage requires girdling. Typically seed trees in this area have not had many problems with windthrow but a density of 3-6 per acre will allow for some problems over time and still meet management needs.

e.) In Unit B clearcutting will be the optimal regeneration harvest system.

2. Sale Administration (2090)

As with the commercial thin, a variety of logging systems could be used. However, conventional manual-mechanical or full to semi-mechanized systems are the most common in these types of stands. Both of these systems utilize machinery over much of the site during harvest. The soils on these land types are operable for equipment only during dry conditions. These conditions typically occur for only a short time each summer. For this reason a much more workable option in this area has been winter logging. Both of these systems are well adapted for winter operation. If a summer operation is conducted equipment should be restricted to designated corridors (Appendix A) using some form of cable yarding in between. If whole tree yarding is used sufficient tops to leave at least 3.7 serotinous cones per square meter should be left on the site (Lotan 1975). This is particularly important for Unit B. In Unit A care should be taken to minimize damage to seed trees.

3. Debris Management (2091)

Activity fuels and debris loading resulting from this type of management will likely be in the 5-15 tons per acre range and vary considerably in size. This volume and size distribution should not constitute an unacceptable fire hazard and will produce a mosaic of microsites for regeneration. Additionally, this debris enhances long term site productivity through moisture retention, ectomycorrhizal activity, nitrogen fixation and erosion prevention. Debris adjacent to Rd. 538B should be piled and burned to minimize the fire hazard. This could be accomplished even during wet periods using an excavator-piler from the road surface.

4. Site Preparation (2091)

Site preparation and scarification should occur when soils are sufficiently dry to minimize compaction. Scarification should result in 30-45% bare mineral soil. A number of tools exist to accomplish this objective. Chain-drag and Leno type scarifiers are generally the most cost effective for these conditions. Concurrent with site preparation activities some rehabilitation of old windrows should also occur. Dependent on the degree of soil compaction these areas should be ripped with a decompactor where possible.

5. Reforestation (2096)

Desired stocking level after the fifth growing season should be 550 trees per acre with a minimum of 250 seedlings per acre well distributed throughout the stand (USDA Forest Service, 1985b, pg I-12). Monitor for natural regeneration by use of stocking surveys in the first, third, and fifth growing seasons. If natural regeneration is not successful or reasonably projected to meet minimum stocking levels after the fifth growing season, interplanting the stand should be programmed. If interplanting is required, plant for species diversity in Unit A and Pinus contorta in Unit B as needed. Stock should be 2-0 DF, 1-0 WL, 2-0 WP, or 2-0 LP depending on natural species composition. All stock should be spring planted with a hoedag. Spacing will vary with the natural stocking but should result in 550 trees per acre.

Monitoring and Treatment Evaluation Plan

The following monitoring and evaluation proceedures will ensure the prescription is effected in a manner consistent with management objectives.

1. Sale Preparation

Unit layout, marking guidelines and contract clauses should be agreed upon by both the silviculturist and pre-sale forester. Contact should also be made with key ID Team members to ensure NEPA compliance on mitigation measures and special treatment areas. Crews should be trained and/or inspected as needed to insure consistency with unit layout and marking guidelines.

2. Timber Harvest and Debris Management

Silviculturist and sale administrator should discuss contract clauses during sale preparation. They should also visit operations to ensure contract compliance and identify prescribed management objectives to be met through timber sale activities.

3. Stand Examinations

Stand examinations should begin with first, third, and fifth year stocking surveys and then be done at ten year intervals to monitor growth, mortality, species composition, and stand density, as well as insect and disease conditions in the stand. Estimated timing and need for intermediate treatments should be verified with stand examination data and field reconnaissance.

XI. Effects of the Treatment

A. Growth and Yield

The preferred alternative comes close to maximizing net merchantable volume production when compared with management zone projections and exceeds that of other alternatives. Stand vigor should be enhanced with each treatment as both precommercial thinning and commercial thinning from below will reallocate the growth potential of the site and increase the amount of water and nutrients available for the residual stand.

B. Genetic Consequences

In this type of treatment the potential for genetic gain varies considerably from one characteristic to another since genetic gain is a function of both selection differential and heritability. For some characteristics heritability is clearly defined, while for others little or no research has been completed. In the following section I have tried to address these characteristics in *Pinus contorta* specifically as well as other aspects of the treatment with genetic implications for other species.

The genetics of growth charateristics is complex and usually has a strong nonadditive and environmental component in addition to the additive component (Zobel & Talbert, 1984). However, relatively intense selection pressure for good juvenile growth will probably result in some genetic gain. The potential for this gain is enhanced with an intermediate entry harvest by further increasing the selection differential and selecting non-juvenile growth characteristics.

Form characteristics, such as bole straightness and branch angle, are strongly inherited (Wright, 1976). Because of the strength of this inheritance and the intensity of the selection differential the genetic gain from this treatment should be moderate. These characteristics have commercial significance due to their ability to increase wood quality, volume, and value.

The selection for species other than Pinus contorta will maintain the maximum possible species diversity. This will also provide an opportunity for the environment (frost/warm temperatures) to continue its intense selection for individuals well suited to these climatic conditions. These individuals will be evaluated at rotation age to determine their suitability for seed trees which would realize the genetic gain from this natural selection and increase the species diversity of future stands.

The concept of integrated pest management is simple, but most difficult to achieve in silviculture. This integrated approach is becoming routine with other organisms but has been too infrequently used in forestry (Waters & Cowling, 1976). One aspect of integrated pest management is the selection and breeding of disease and insect resistant stock. This has proven to be a difficult task and many species have yet to be adequately researched including the major pest species problems in this stand. In the absense of specific data, I will address the general characteristics of insect and disease resistance and discuss the potential genetic gain from mass selections such as the prescribed treatments. Most of this discussion of genetic gain will be implied from comparable host/pest relationships as well as general characteristics.

Breeding for resistance to diseases is the most difficult aspect of breeding forest trees (Heimberger, 1962). Genetically, most disease resistance in forest trees is complex, and is not determined by a simple Mendelian dominant-recessive system. Cronartium ribicola is an example in which tolerance may be inherited through a complex quantitative system (Blake, 1987). However, experience has shown that, especially for rust and canker diseases, breeding for resistance by selecting within wild populations has been generally successful (Zobel & Talbert, 1984). And although it has not been experimentally demonstrated, there are indications that strong genetic gains in mistletoe resistance can also be made through this type of selection and breeding (Roth, 1978). It can be assumed that since the stand is heavily infested with Endocronartium harknessii and the selection pressure will be fairly intense that some genetic gain will be realized. The situation with Arceuthobium americanum is somewhat different since the disease is localized in the stand and primarily effects the younger trees. The selection pressure will probably be greater during an intermediate harvest entry.

Although damage to forest trees by insects is sometimes catastrophic, much less progress has been made in developing insect-resistant strains of forest trees than has been achieved for diseases. There are many reasons for this, among which are the mobility of the insect, the lack of ability to predict where and when an attack will occur, lack of knowledge of insect genetics, and a limited understanding of what causes resistance (Connola & Belskafuer, 1976). Resistance on an individual tree basis is perhaps the most important in control of insect damage, although only limited studies have been done on this aspect of resistance to insects. Work has been published on resistance to *Pissodes strobi* (Gerhold, 1962: Garrett, 1970), but the results have been variable and inconclusive. Some usable resistance has been isolated however, and due to the similarities of both the host and pest species some resistance to *Pissodes terminalis* can be implied. Given the intensity of selection both for lack of infestation and good recovery form characteristics, some genetic gain can be expected for both susceptibility and vulnerability resistance.

Since genetic gain is a function of both the heritability of different characteristics and the selection differential of the treatments with respect to those characteristics, it is difficult to make general statements about the stand as a whole. In this treatment, however, the number of crop trees will be reduced from 2700 T/A to 1210 T/A then further reduced through an intermediate harvest and natural mortality to 213 T/A. With this selection intensity, including the intermediate entry, there is some potential for genetic gain even when it is distributed over several characteristics. In the long term this gain will be realized in future stands of genetically improved trees. Gain may also be realized by planting genetically improved stock if interplanting is required.

B. Insects and Disease

The timing and selection criteria for these intermediate treatments will reduce the incidence of most of the insect and disease problems in the stand. With soil compaction minimized through proper logging methods and nutrient cycling increased through decomposition of debris from thinnings the stand should not be predisposed to insect and disease attacks. The probability of any serious outbreaks of insects or diseases including Dendroctonus ponderosae should be precluded by proper timing of final harvest.

C. Soils

Impacts on the soil resource will be minimal provided management guidelines and mitigation measures are followed. This will be particularly true if final harvest is conducted in the winter. Additionally, long term site productivity will be enhanced by the volume of organic debris left from the treatments as well as the decompaction of old windrows and skid trails.

D. Slope Hydrology

No increase in water yield is anticipated from the intermediate treatments because the site is fully occupied following the each entry. The shrub forb community will also contribute somewhat to this stability. Minimal water yield increase is expected from the regeneration harvest which should be coordinated both in time and space with other harvest activity in the catchment. Effective hydrologic recovery is projected for this type of stand in 10 to 20 years following harvest.

E. Wildlife

The within-stand habitat diversity will be maintained quite well for a maturing stand because of the old windrows and skid trails. As the stand matures into summer thermal cover these areas will become increasingly valuable forage. The treatments will also increase the value of the ridge as a travel corridor. Managing for replacement snags will ensure adequate habitat for cavity dependent species. Screening cover will be provided by the" green strip" left along the road during the precommercial thinning.

F. Recreation

The recreation resource should not be affected by the prescribed treatments.

G. Visual Quality

The visual quality objective of modification will be met.

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XIII. Appendices

A. Maps (Vicinity, Topography, Logging Systems, Aerial Photo)

B. Stand Exam Data

C. Geology and Hydrology Report

D. Wildlife Report

E. PROGNOSIS Model Outputs

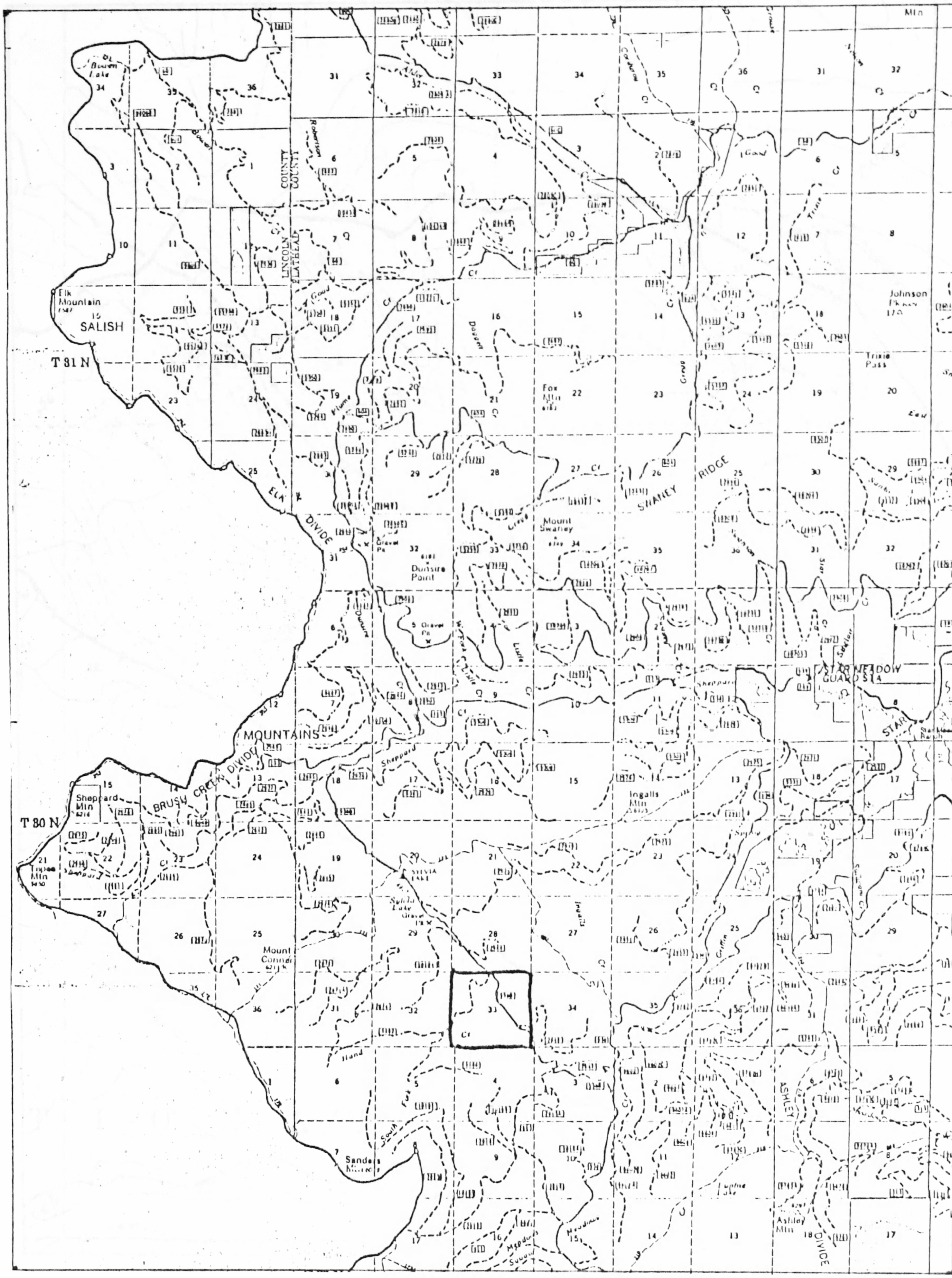
F. PROGNOSIS Model Calibration

G. R-1 Stocking Guides

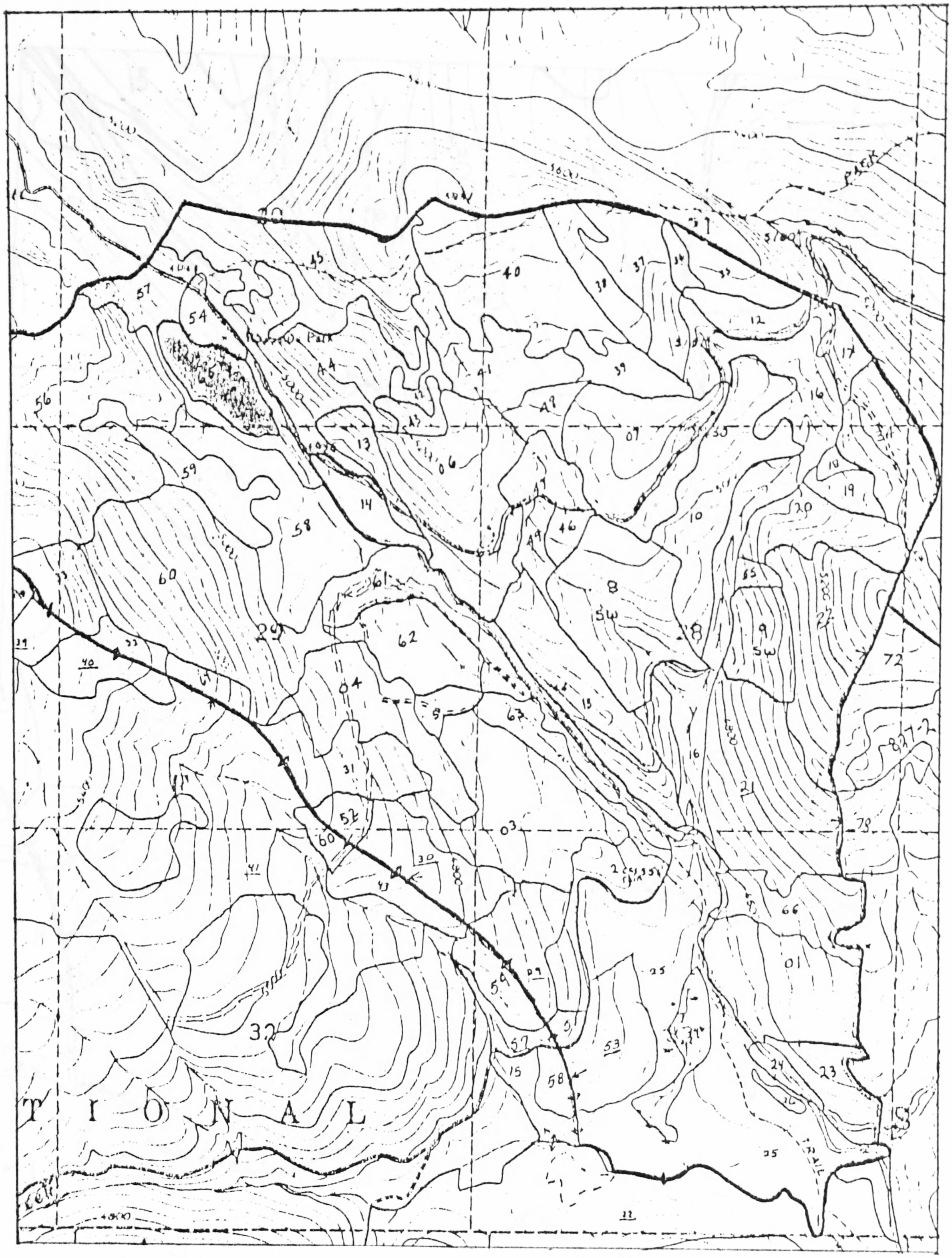
H. Economic Analysis

APPENDIX A

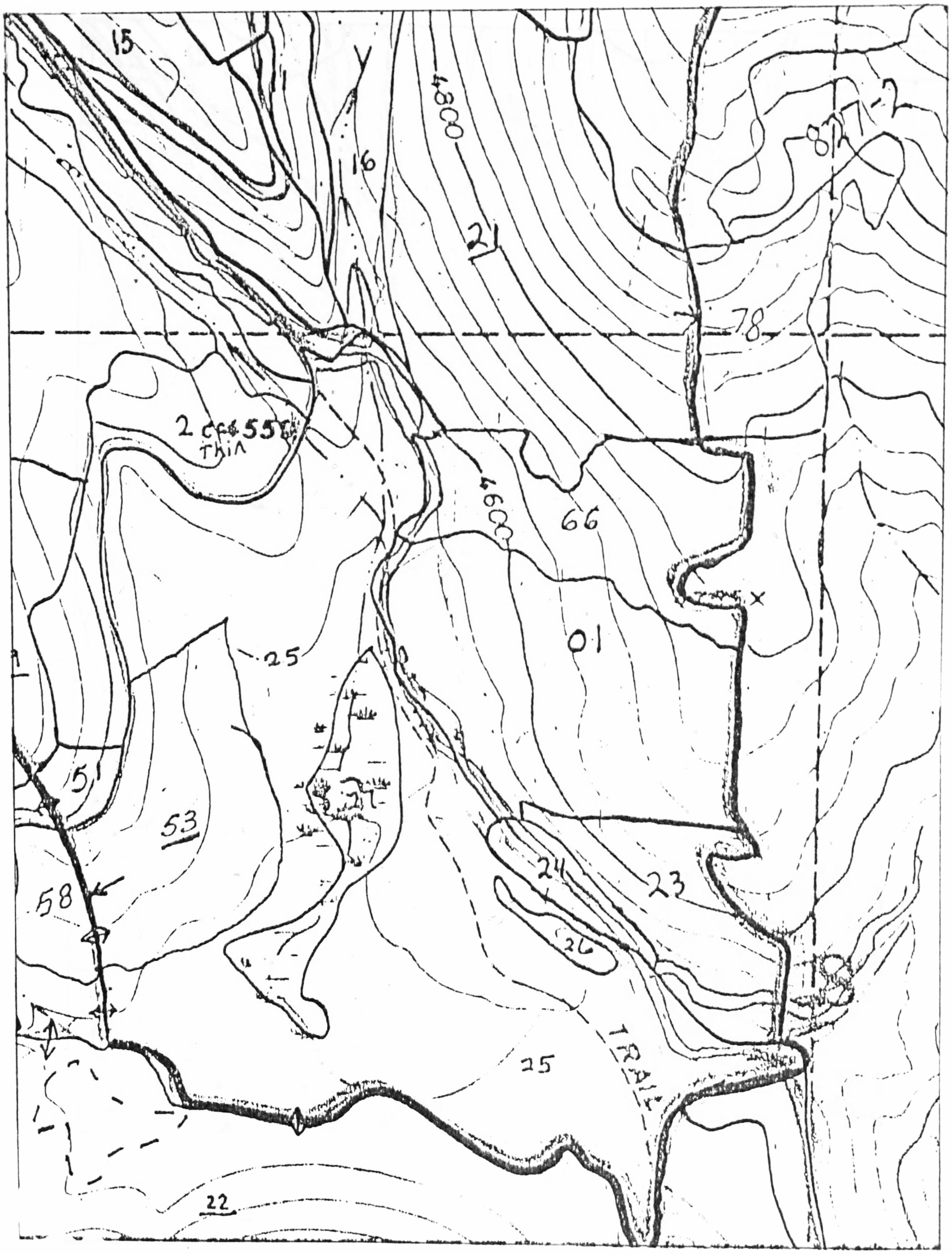
HAND CREEK MAPS AND AERIAL PHOTOGRAPHS



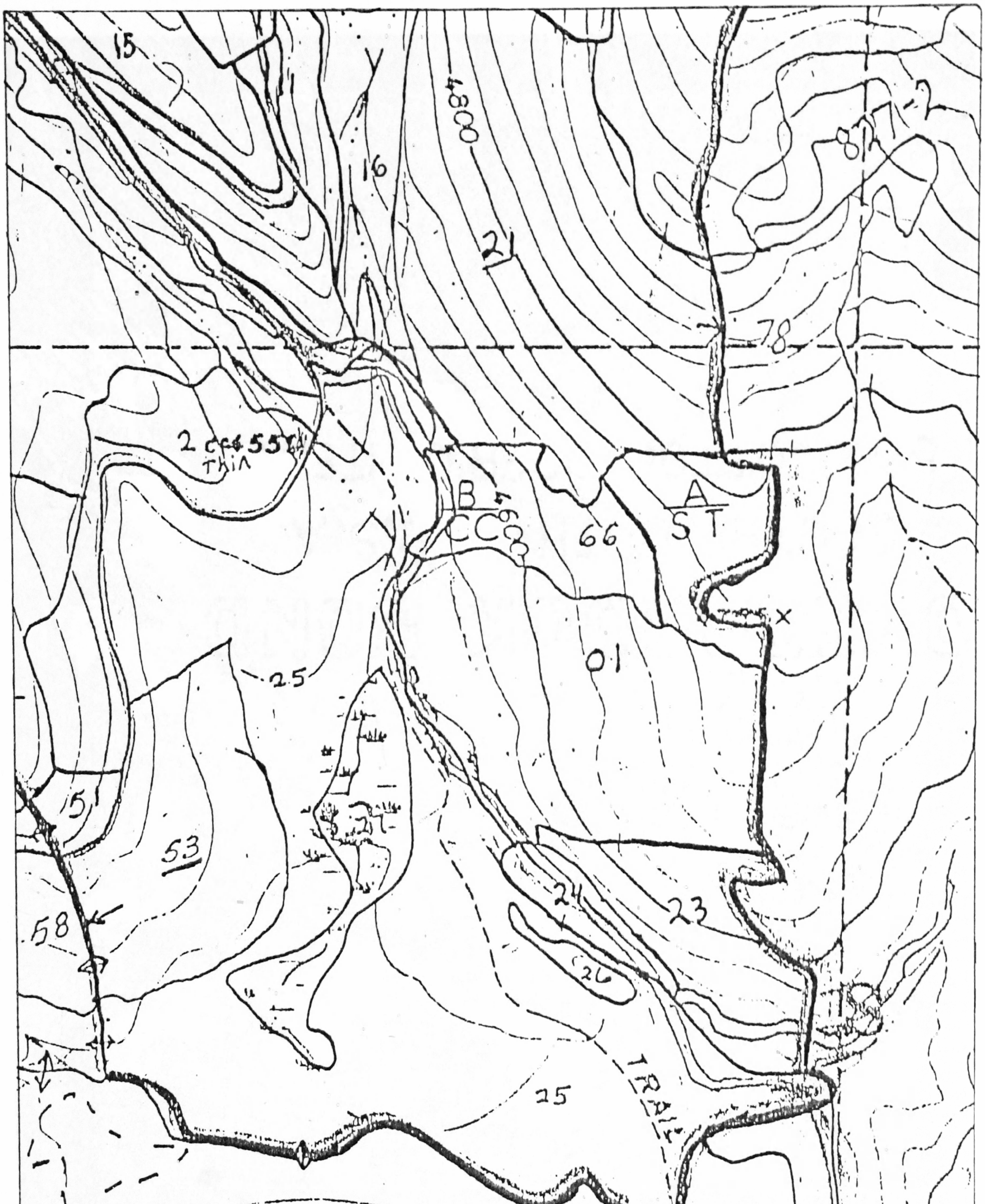
VICINITY MAP



SUBCOMPARTMENT MAP

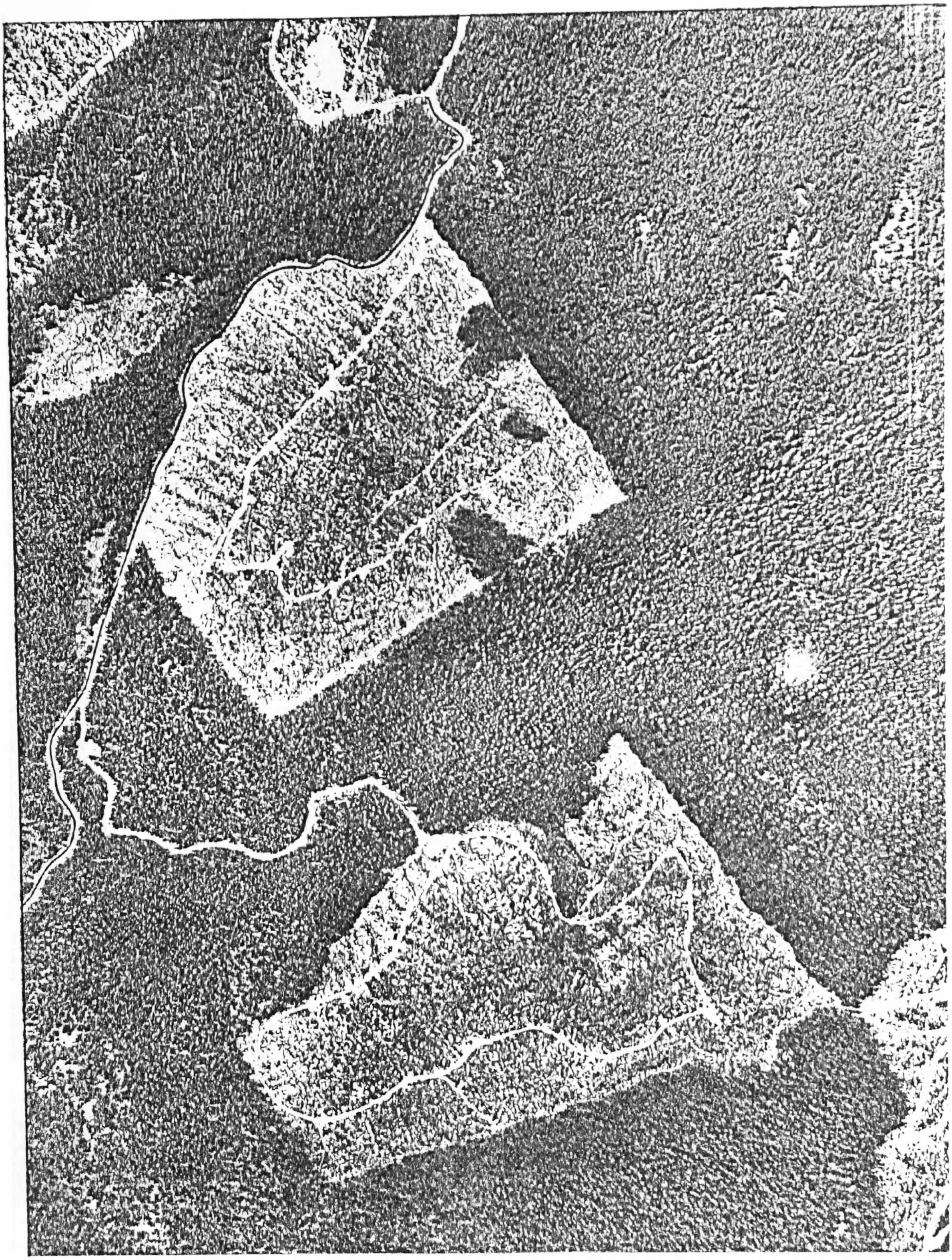


TOPOGRAPHIC MAP



LOGGING SYSTEMS MAP

1971 AERIAL PHOTO



1975 AERIAL PHOTO

1978 AERIAL PHOTO

APPENDIX B

STAND 82701066 STAND EXAM DATA

R1 EDIT BASIC STAND TABLES FOR: 10 SLR: 45 DIST: 8 COMP: 27 SUBCOMP: 1 STAND: 66

TABLE #2 - STOCKING BY SPECIES AND DIAMETER CLASS OPTION 1

		SPECIES					
DBH CL		LP	DF	WWP	ES	SAF	ALL SP
0- .9	TA	1300.0	75.0	25.0	75.0	100.0	1575.0
	PCC	10.2	.2	.1	.4	.5	11.4
1- 2.9	TA	950.0	.0	.0	.0	.0	950.0
	CCF	23.1	.0	.0	.0	.0	23.1
	PCC	35.5	.0	.0	.0	.0	35.5
	BA	15.9	.0	.0	.0	.0	15.9
3- 4.9	TA	400.0	.0	.0	.0	.0	400.0
	CCF	31.7	.0	.0	.0	.0	31.7
	PCC	22.6	.0	.0	.0	.0	22.6
	BA	25.4	.0	.0	.0	.0	25.4
TOTAL	TA	2650.0	75.0	25.0	75.0	100.0	2925.0
	CCF	54.8	.0	.0	.0	.0	54.8
	PCC	68.3	.2	.1	.4	.5	69.6
	BA	41.3	.0	.0	.0	.0	41.3
	CFV	.0	.0	.0	.0	.0	.0
	BFV	.0	.0	.0	.0	.0	.0

R1 EDIT BASIC STAND TABLES FOR: 10 SLR: 45 DIST: 8 COMP: 27 SUBCOMP: 1 STAND: 66

TABLE #7 INSECT DAMAGE OPTION 1

SPP/DBH CLASS	OTHER INSECTS MINOR	OTHER INSECTS SEVERE	LIVE STAND TOTAL
** LP **			
0- .9 TA	0.	0.	1300.
1- 2.9 TA	200.	0.	950.
BA	4.	0.	16.
3- 4.9 TA	100.	100.	400.
BA	6.	8.	25.
NO DAMAGE FOR SPECIES ** DF **			
NO DAMAGE FOR SPECIES ** WWP *			
** ES **			
0- .9 TA	25.	0.	75.
NO DAMAGE FOR SPECIES ** SAF *			
*ALL SPC			
0- .9 TA	25.	0.	1575.
1- 2.9 TA	200.	0.	950.
BA	4.	0.	16.
3- 4.9 TA	100.	100.	400.
BA	6.	8.	25.
* TOTAL			
TA	325.	100.	2925.
BA	10.	8.	41.
CFV	0.	0.	0.
RCF	0.	0.	0.
BFV	0.	0.	0.

R1 EDIT BASIC STAND TABLES   FOR: 10 SUR: 45 DIST: 8 COMP: 27 SUBCOMP: 1 STAND: 66

TABLE #5 - POPULATION AND SAMPLE VARIABILITY (SAMPLE SIZE N = 12)

BAF 10. BREAKPOINT DBH 5.0 FIXED PLOT SIZE 300.

ATTRIBUTE	MEAN	STANDARD DEVIATION (S)	COEFFICIENT OF VARIATION (CV)	STANDARD ERROR OF THE MEAN (SE)	95 PERCENT CONFIDENCE INTERVAL (MEAN +OR- T*SE)	STANDARD ERROR OF THE MEAN (%SE)	(
TREES PER ACRE LT 5.0	2925.00	1773.09	61.%	511.85	1798.42 TO 4051.58	17.%	N=
TREES PER ACRE GE 5.0	.00	.00	0.%	.00	.00 TO .00	0.%	N=
BASAL AREA PER ACRE	41.36	36.64	89.%	10.58	18.03 TO 64.64	26.%	N=
CUBIC FOOT PER ACRE	.00	.00	0.%	.00	.00 TO .00	0.%	N=
BOARD FOOT PER ACRE	.00	.00	0.%	.00	.00 TO .00	0.%	N=
FAI-CF PER ACRE	.00	.00	0.%	.00	.00 TO .00	0.%	N=

IN THE ABOVE FORMULA FOR SAMPLE SIZE(N), E EQUALS THE + OR - ERROR EXPRESSED IN TERMS OF T/A,BA/A ETC.TH ARE WILLING TO ACCEPT ABOUT THE POPULATION MEAN.

SEE RUSTAGI,KRISHNA P.,1983,DETERMINATION OF SAMPLE SIZE IN SIMPLE RANDOM SAMPLING-FOREST SCIENCE VOL.29

TABLE #5A - PERCENT OF AREA BY STOCKING CLASSES

LIVE TREES LESS THAN 5.0 DBH		***************** ALL LIVE TREES *****************			
TREES PER ACRE	% OF AREA	TREES PER ACRE	% OF AREA	BASAL AREA	% OF AREA
0	.0%	0 - 100	.0%	0 - 40	66.7%
300	8.3%	101 - 200	.0%	41 - 80	25.0%
600	.0%	201 - 300	.0%	81 - 120	.0%
900	.0%	301 - 400	8.3%	121 - 160	8.3%
1200	8.3%	401 - 500	.0%	161 - 200	.0%
1500	16.7%	501 - 600	.0%	201 - 240	.0%
1800	8.3%	601 - 700	.0%	241 - 280	.0%
2100	.0%	701 - 800	.0%	281 - 320	.0%
2400	.0%	801 - 900	.0%	321 - 360	.0%
2700 +	58.3%	901 +	91.7%	361 +	.0%

APPENDIX C

HAND CREEK GEOLOGY AND HYDROLOGY REPORT

HAND CREEK GEOLOGY AND HYDROLOGY REPORT

LOCATION

Hand Creek lies in the Salish Mountains of northwestern Montana. It is in the headwaters of the western side of the Flathead drainage. Water from Hand Creek flows into Griffin Creek and on to Logan Creek, the Stillwater River, and the Flathead River.

GEOLOGIC STRUCTURE

The Salish Mountains were formed about 60 million years ago during the Laramide Orogeny--the mountain building episode when the Rocky Mountains were formed. Bedrock was gently uplifted and folded into an arch with many faults crossing the mountains. One fault crosses the Hand Creek watershed in a northwest-southeast direction a little east of the center of the watershed. Several small faults cross the watershed.

ROCK TYPES

The Hand Creek watershed is underlain by Precambrian argillite and quartzite. West of the main fault bedrock is comprised of siliceous argillite of the Burke and Prichard formations; east of the fault it is argillite of the Spokane and Empire formations. West of the fault bedrock dips gently westward and east of the fault it dips gently eastward.

Glacial material overlies bedrock for most of the watershed except the highest parts. Ground moraine was deposited by the lobe of ice that moved south from Canada over the Kalispell area and on to the south. The ice left deposits of 5 to 20 feet on the valley floor but almost no deposits on the high ridges. Lacustrine (lake) deposits veneer the ground moraine in places. These deposits were formed when the ice lobe from Canada cammed small streams, including Hand Creek, in the Salish Mountains. Lacustrine deposits are very fine-grained (silt and clay).

Recent alluvium has been deposited from present-day streams along and in stream channels.

GEOLOGIC HISTORY

The geologic history of this area includes several chapters. The sediments that became the present bedrock of northwestern Montana were deposited in a shallow ocean about 600 million years ago. These were compacted into shale, limestone, and sandstone.

The geologic record has a gap from about 600 million years ago to about 70 million years ago. Probably the land surface during this time was about at sea level or slightly higher and either very little sediment was deposited or what sediment was deposited was later eroded.

About 70 million years ago bedrock was uplifted during the Laramide Orogeny. Most of the mountain building occurred during the beginning of the orogeny. Crustal unrest of that mountain building episode is not completely stopped, though, as is expressed by present-day earthquakes in the Flathead Valley. Pressures associated with the mountain building caused the rocks to become denser than when they were first formed. The rocks are classified as metasedimentary because they are denser than sedimentary but not as dense or with the mineralogic changes expected in metamorphic rocks.

About 10,000 years ago a lobe of ice from one of the main glaciations in North America moved south from Canada over Eureka, over Kalispell and on south to about Polson. Ice in the study area was probably 1000-1500 feet thick. Both glacial scouring and glacial deposition occurred in the study area. Scouring was dominant on the high ridges and deposition was dominant in the low areas. As the ice fluctuated in thickness and lateral extent due to changes climate, glacial scouring and deposition occurred when the ice advanced and erosion from meltwater occurred when the weather was warm enough for the ice to melt. During times when the area was subjected to erosion by running water fine material--sand, silt, and clay--in the previously deposited ground moraine was eroded leaving numerous boulders (up to about 1 foot in diameter) on the bedrock pavement. At times when the ice advanced lakes were formed where the ice dammed tributary valleys. This happened in valleys like Hand Creek. Very fine-grained sediment was deposited in these glacial lakes (lacustrine deposits).

STABILITY OF ROCKS TO MASS WASTING AND EROSION

Bedrock is resistant to erosion because it is slightly metamorphosed and because some of the formations contain silica particles that, during the process of metamorphism, acted to produce a particularly dense, erosion-resistant rock mass. The glacial deposits are easily eroded except for boulders that may be in the ground moraine. When subjected to stream or overland flow erosion such boulders are commonly left where they were deposited in the ground moraine because the water or overland flow does not have enough power to move them. The lacustrine deposits are very easily eroded--particularly wherever the vegetative cover of grasses, forbes and shrubs is broken.

Bedrock in this study area is stable to mass wasting because it is dense, is generally gently dipping, has relatively gentle topographic slopes, has had loose masses of rock removed by glaciation, and is relatively resistant to chemical weathering. The other rock materials are prone to mass wasting if they lie in steep slopes or have been undercut by stream erosion or man's activities.

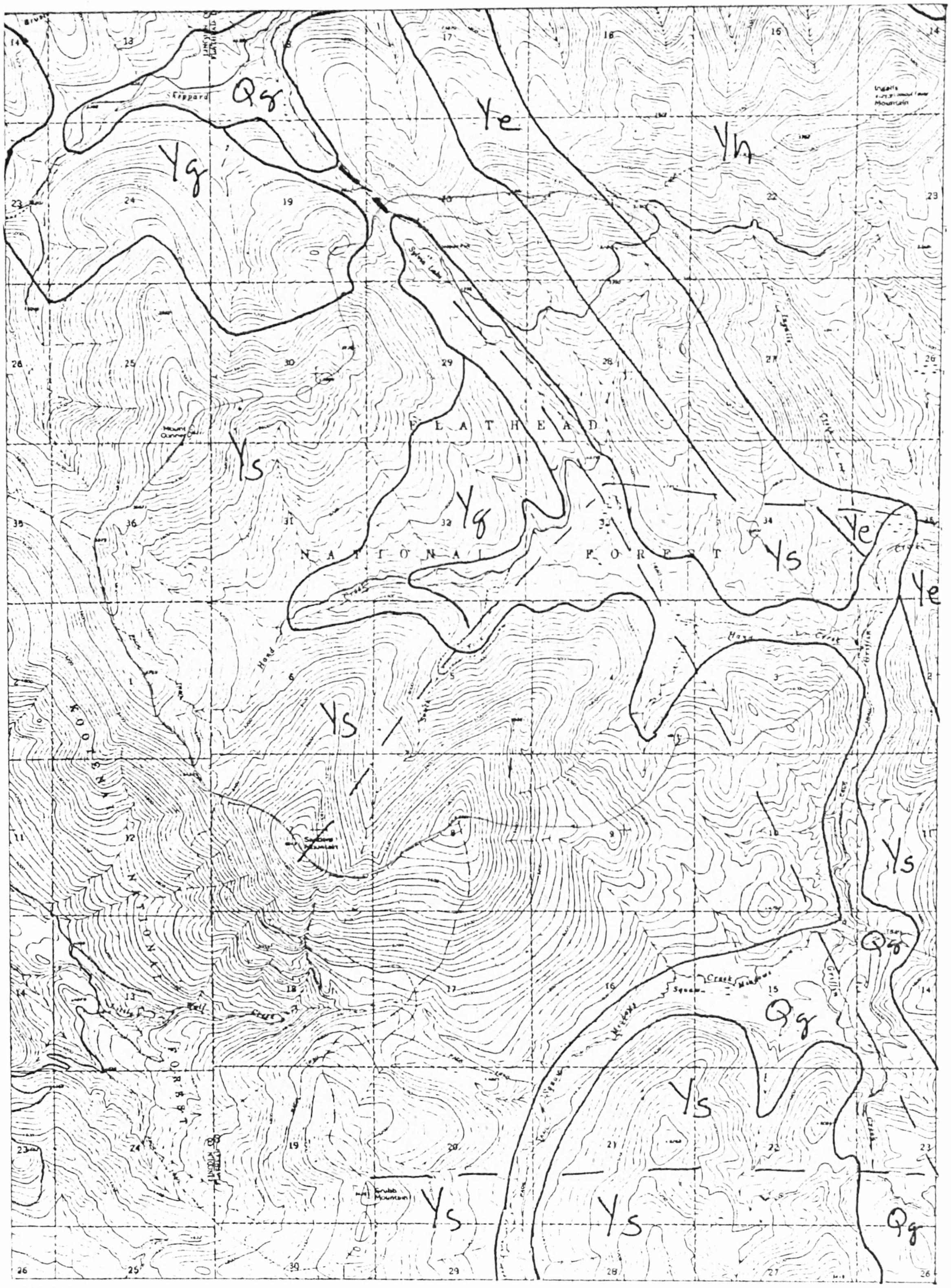
PRECIPITATION AND RUNOFF

Average annual precipitation of the watershed ranges from about 27 inches at the mouth of Hand Creek to about 31 inches at the high parts of the watershed. Corresponding average annual runoff is 8.2 and 10.8 inches. About 50 percent of the average annual precipitation falls as snow. Snow usually melts relatively early for northwestern Montana because the elevations are low and snowfall is moderate in amounts. In the study area snow begins to melt in March and is mostly melted by late April or early May.

Temperatures are moderate throughout the year. Some of the lowest parts of the watershed have frost pockets and these can be large areas.

PHYLLIS SNOW

Flathead N.F. Hydrologist/Geologist


Qg
Ye
Yh
Yg
Ys
FLATHEAD
NATIONAL FOREST
KOOTENAI NATIONAL FOREST
Yg
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Qg
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GEOLOGY MAP

GRIFFIN CREEK

No.	Drainage Name	Drainage Area-AC	Harvested Area-AC	ECA 1990	ECA 1995	Stream Order	CSR*	Water Yield Natural R.O.-AF	Water Yield Increase-AF '90	Water Yield Increase-AF '95'	Water Yield Increase-AF Limit	Addn'l Water Yield Increase-% '90	Addn'l Water Yield Increase-% '95	Addn'l Water Yield Increase-% Limit	Planned Increase AF	Planned Increase ECA	1990 Available AF	1990 Available ECA
I	UNNAMED TRIB.	607	357	207	172	2	E	504	69	57	60	13.7	11.4	12.0			-0-	-0-
II	UNNAMED TRIB.	952	281	173	145	2	G	790	54	45	95	6.8	5.7	12.0			41	124
III	UNNAMED TRIB.	866	296	187	156	2	E	684	58	48	82	8.5	7.1	12.0			24	73
IV	INGALLS	1541	570	341	283	2	G	1279	106	87	153	8.3	6.9	12.0			47	142
V	SYLVIA LK. TRIB.	2144	886	633	517	2	E	1780	201	164	214	11.3	9.2	12.0			13	39
VI	UPPER HAND	2546	648	317	253	3	G	2266	98	76	271	4.3	3.5	12.0			173	486
VII	SO.FK.HAND	943	295	131	110	2	E	839	41	34	101	4.9	4.1	12.0			60	168
VIII	LOWER HAND	2740	1246	888	725	3	G	2165	274	224	260	12.7	10.4	12.0			-0-	-0-
IX	SQUAW MEADOWS	8614	3222	2553	2013	3	F	7150	775	611	572	10.8	8.5	8.0			-0-	-0-
X	TRIB. OF SQUAW MDWS	1297	181	153	122	1	-	1012	45	36	121	4.4	3.5	12.0			76	243
XI	UPPER GRIFFIN	1846	434	249	209	2	F	1532	71	59	77	4.6	3.9	5.0			6	18
XII	McGOVERN	1549	31	30	23	2	F	1379	8	7	110	.6	.5	8.0			102	286
XIII	MIDDLE GRIFFIN	7242	787	498	398	3	F	6011	147	117	481	2.5	1.9	8.0			334	1012
XIV	LUPINE LK. TRIB.	975	93	61	50	2	G	809	19	15	81	2.3	1.9	10.0			62	188
XV	TRIB.NO.OF LUPINE LK.	1079	610	516	391	1	F	896	156	119	90	17.5	13.2	10.0			-0-	-0-
XVI	TRIB.NO.OF ASHLEY DIV.	767	326	214	172	1	F	637	66	53	51	10.4	8.3	8.0			-0-	-0-
XVII	SULLIVAN	646	202	127	106	1	F	478	41	34	48	8.5	7.1	10.0			7	24
XVIII	LOWER GRIFFIN MAINSTEM	4521	2518	1533	1251	4	F	3119	482	392	374	15.4	12.6	12.0			-0-	-0-
	TOTALS	40875	12983	8811	7094			33330	2710	2183							945	2803
	GRIFFIN CREEK, ALL:	40875	12983	8113	7094	4	F	33330	2710	2183	2666	8.1	6.5	8.0			-0-	-0-
	HAND CREEK SUMMARY:																	
V	SYLVIA LK. TRIB.	2144	886	633	517	2	E	1780	201	164	214	11.3	9.2	12.0			13	39
VI	UPPER HAND	2546	648	317	253	3	G	2266	98	79	271	4.3	3.5	12.0			173	486
VII	SO.FK.HAND	943	295	131	110	2	E	839	41	34	101	4.9	4.1	12.0			60	168
VIII	LOWER HAND	2740	1246	888	725	3	G	2165	274	224	260	12.7	10.4	12.0			-0-	-0-
	TOTALS	8373	3075	1969	1605			7050	614	501	846						246	693
	HAND CREEK, ALL:	8373	3075	1969	1605	3	G	7050	614	501	846	8.7	7.1	12.0			246	693
	SQUAW MEADOW CREEK SUMMARY:																	
IX	SQUAW MEADOWS	8614	3222	2553	2013	3	F	7150	775	611	572	10.8	8.6	8.0			-0-	-0-
X	TRIB. OF SQUAW MDWS	1297	181	153	122	1	-	1012	45	36	121	4.4	3.5	12.0			76	243
	TOTALS	9911	3403	2706	2135			8162	820	647	653						76	243

Station : MT14, HAND CREEK

Unit = inches

yr	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	SUM
77	0.75	3.20	1.53	1.32	2.15	3.02	3.39	4.13	3.54	1.91	1.51	1.39	22.55
78	0.94	4.32	6.53	3.74	1.14	1.25	4.00	4.36	1.13	4.17	3.32	4.15	40.20
79	0.24	3.13	4.13	2.32	4.37	2.17	3.54	2.12	1.12	0.58	1.17	0.32	25.71
80	1.30	1.50	3.90	3.10	1.70	3.00	2.50	5.20	5.10	2.90	1.80	1.20	33.50
81	0.30	1.50	4.40	2.70	2.30	2.30	4.70	3.90	5.40	0.50	0.70	1.00	30.30
82	0.90	2.20	3.70	6.00	4.20	4.90	5.60	1.90	3.10	2.80	1.30	2.00	36.60
83	1.20	2.60	3.40	4.30	2.30	3.70	4.70	1.50	3.70	2.30	1.50	1.60	32.20
84	1.10	3.70	1.50	2.10	1.50	3.20	3.70	2.50	3.90	0.00	0.80	2.70	27.00
85	3.30	3.40	4.50	3.70	2.10	2.10	1.20	2.10	2.70	0.20	2.30	6.00	31.90
86	3.70	4.70	0.50	3.50	4.40	1.90	2.50	2.80	1.70	1.50	1.00	4.30	32.30
87	1.10	4.20	1.50	1.40	1.90	4.40	1.70	2.20	1.90	4.70	1.30	1.50	27.80
88													24.8
all years ave	1.44	3.19	3.30	2.77	2.57	2.79	3.32	2.97	2.76	1.96	1.52	2.42	30.91
yrs	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)

1961-1985 average :

	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	SUM
	1.25	2.91	3.52	2.36	2.44	2.35	3.23	3.35	2.97	1.71	1.60	2.32	31.11
yrs	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)

Station : MT14, HAND CREEK

Enter a file name if output is to disk - CR if output is to terminal

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14113

APPENDIX D

HAND CREEK WILDLIFE REPORT

WILDLIFE REPORT

BIG GAME

The Hand Creek drainage lies between the Ingalls Mountain and Mt. Conner ridge systems. Elk migrate through the area in the spring and fall periods as they move from winter ranges to the west. The area is used by elk, moose, black bear, muledeer, and whitetail deer during the summer period.

Timber harvest in the area has increased habitat diversity, but habitat effectiveness for some big game species has not increased as it could have due to creation of large openings with long distances to cover. If the distance to cover exceeds 500' in a roaded environment, forage will not be fully utilized by elk. For whitetail, the optimum distance to cover is 130' or less. Muledeer and moose are more tolerant of large openings. This effect generally lasts 15-20 years, until cutover areas have reached the point where they provide hiding cover.

Hiding and thermal cover are adequate throughout most of the area. Road 538 is a popular loop road connecting the Sheppard and Griffin Creek drainages and receives a high degree of use by hunters during the fall. Road closures in Hand Creek, Ingalls Mtn., and Mt. Conner help to increase habitat security.

A marsh/beaver pond complex near the mouth of Hand Creek provides good habitat for moose and adds to the diversity of the area. The upper Sheppard Creek area, to the north of Hand Creek, has high moose densities during May and June.

SMALL GAME/NON-GAME

The area is inhabited by three species of grouse; blue, spruce, and ruffed grouse. Blue grouse use open grassy areas along the ridges, ruffed grouse use moist habitats, and spruce grouse are often found in lodgepole stands.

Numerous woodpecker species are found in the area. Three-toed woodpeckers are frequently observed in stands of dying lodgepole, where they find an abundant food source. Three-toed woodpeckers nest most frequently in clumps of snags which exceed 10" DBH. Flickers nest in single snags left in cutover areas, while pileated woodpeckers prefer snags exceeding 20" DBH which are surrounded by a timber canopy. Other cavity-nesting birds, such as chickadees and nuthatches, are also common in the area. The Flathead Forest Plan specifies that snags and snag replacement trees are to be left in cutting units. The minimum standard is to retain the following number of snags per 100 acres:

5 snags>20" DBH

55 snags>12"

30 snags >10"

This level of snag retention has not been achieved in past cutting units within the area. It is desirable to compensate for this lack of snags by leaving a greater number in stands to be cut in the future.

Several birds of prey are also found in the area. Red-tailed hawks and sawhet owls are common, while goshawks, great grey owls, and boreal owls are uncommon.
Great grey owls often nest in large, broken-topped larch snags surrounded by lodgepole stands and feed in open meadows. A pair of great grey's has been sighted in the Sylvia Lake area during the past several years. Boreal owls nest in Spruce/fir stands above 5000', and have been heard from monitoring stops along road 538B. Boreal owls are listed as a sensitive species on the Flathead Forest. No other sensitive or threatened/endangered species are known to occur in the area.

Furbearers are not common in the area, although a few beaver, ermine, and marten do occur.

STAND 82701066

This stand is dominated by sapling-sized lodgepole pine, with minor amounts of Douglas-fir, western larch, white pine, spruce, and sub-alpine fir. Regeneration is sparse where slash was windrowed and burned following past harvest. These poorly-stocked strips increase within-stand diversity and help maintain forage productivity for wildlife. Vaccinium caespitosum and vaccinium scoparium berries provide good forage for grouse and black bear.

This stand also has high value in providing cover, particulary in the eastern part of the unit. This portion of the unit occurs along a gently sloping ridge-- a topographic type which is heavily used by big game animals for travel and bedding.

If this stand is not precommercially thinned, it may become so dense that its use by wildlife will decrease in the future. If it is precommercially thinned, several wildlife objectives should be considered. It is desirable to keep slash depths to less than 1 1/2 feet, particularly along the ridge. Varying the spacing of leave trees a little helps to maintain better hiding and thermal cover for big game. Dense leave patches may be used to avoid being seen or to reduce exposure on hot sunny days, while more open portions of the stand may be selected on days when winds help to keep insects away. Retention of other species besides lodgepole will help to increase habitat diversity. Retention of larch, Douglas-fir, and sub-alpine fir is important for improving cavity habitat in the future.

During commercial thinning, it is important to leave some larch, Douglas-fir, and sub-alpine fir with defect to provide habitat for cavity nesters. Leaving portions of logs on the ground would also help to improve habitat for small mammals.

Tree damage by rodents and black bear will probably decrease as canopy closure and tree size increase.

REED KUENNEN

Tally Lake District Biologist

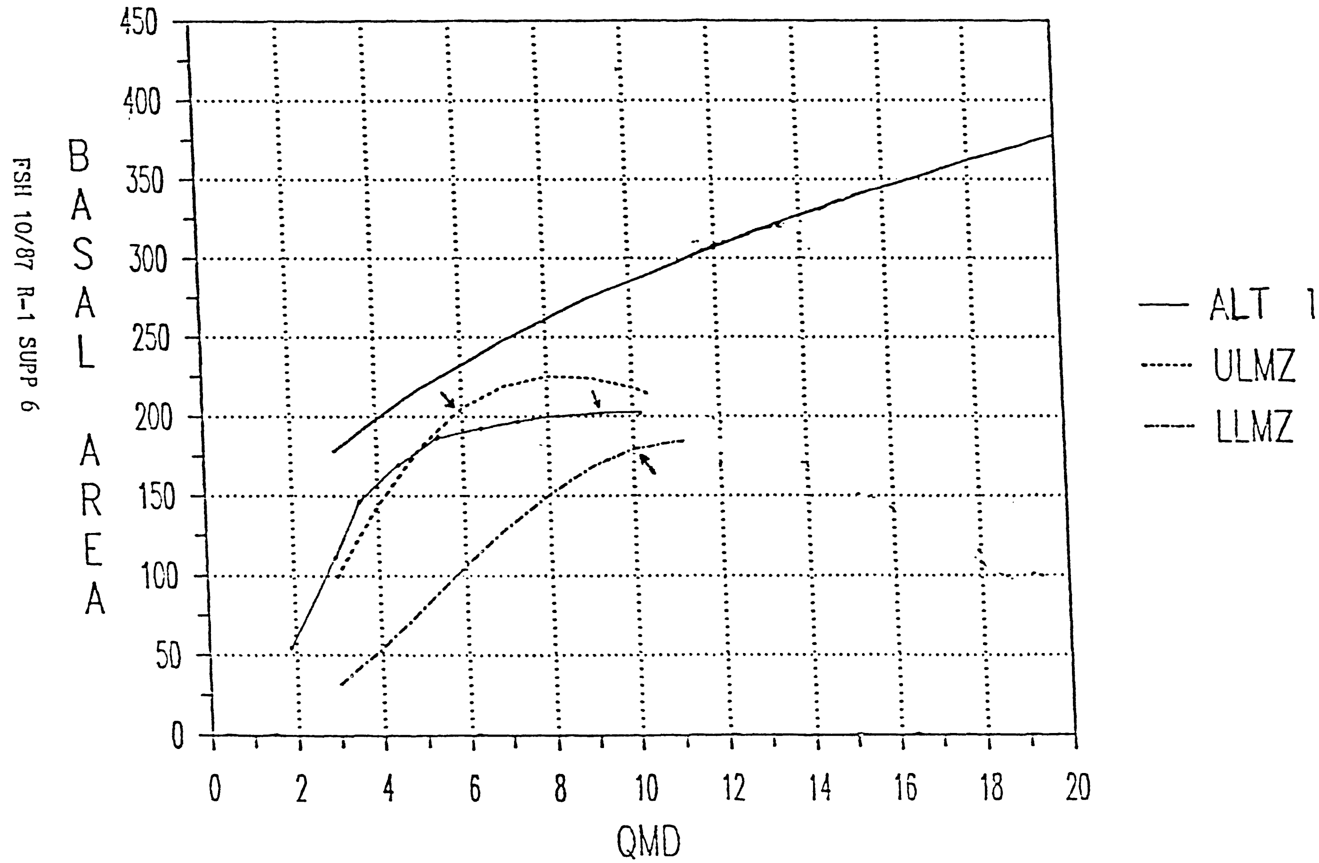
APPENDIX E

PROGNOSIS MODEL OUTPUTS

ALTERNATIVE 1

STOCKING CHART-REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



ALTERNATIVE 1

STAND GROWTH PROGNOSIS SYSTEM | VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.6	346	0	0	0	0	0	0						0	0	0	.0
1989	2	2766	54	191	71	25	1.9	535	0	0	0	0	0	0						2	78	3	.0
1999	12	2673	112	341	137	32	2.4	1481	124	419	0	0	0	0						10	97	2	.0
2009	22	2104	149	403	172	38	3.6	2334	943	2998	0	0	0	0						10	106	16	.0
2019	32	1538	170	427	187	43	4.5	3176	1852	5901	0	0	0	0						10	117	38	.0
2029	42	1142	185	431	197	49	5.4	3922	2768	10049	0	0	0	0						10	125	49	.0
2039	52	863	192	425	194	55	6.4	4527	3596	13749	0	0	0	0						10	116	57	.0
2049	62	665	197	407	199	60	7.4	5074	4315	17414	0	0	0	0						10	117	62	.0
2059	72	525	200	394	197	64	8.3	5565	4954	20752	0	0	0	0						10	116	65	.0
2069	82	432	201	380	194	68	9.2	6005	5473	23436	0	0	0	0						10	105	63	.0
2079	92	356	201	365	191	73	10.2	6381	5925	25958	0	0	0	0						10	105	67	.0
2089	102	303	201	354	187	77	11.0	6730	6326	28313	0	0	0	0						10	101	67	.0
2099	112	260	199	341	182	80	11.6	7022	6641	30293	0	0	0	0						10	95	67	.0
2109	122	224	196	327	177	84	12.7	7262	6930	31964	0	0	0	0						10	93	69	.0
2119	132	196	193	315	173	87	13.5	7432	7174	33453	0	0	0	0						10	92	70	.0
2129	142	173	190	303	168	90	14.2	7552	7372	34606	0	0	0	0						10	83	66	.0

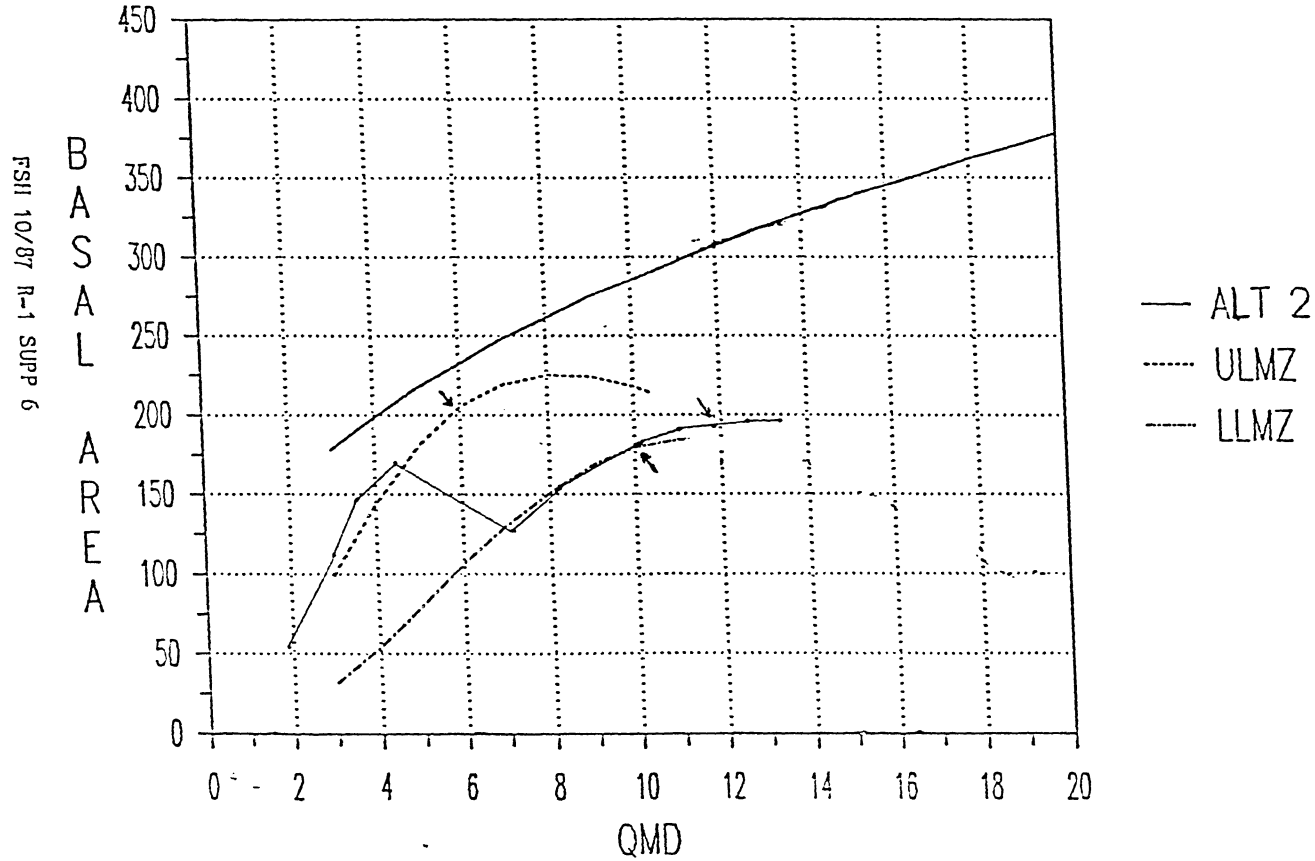
```
@ASG,A PROGNOSIS*WOSUBHIT.
W:120133 file is already assigned.

@XQT PROGNOSIS*WOSUBHIT.RERESD

@USE 2.,RG1-FOR10*D-45327010bc.

@XQT TAYIELD*PROGNOSIS52.PROD
```

81

ALTERNATIVE 2

STOCKING CHART—REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM 2 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	23	1.6	356	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	0	0	0	0						2	73	3	.0
1999	12	2675	112	341	137	32	2.8	1431	124	[illegible]	0	0	0	0						10	97	2	.0
2009	22	2134	149	405	172	35	3.6	2334	943	2929	0	0	0	0						10	106	16	.0
2019	32	1535	170	427	127	43	4.5	3176	1352	5991	1061	635	0	0	125	262	130	43	7.1	10	117	33	.0
2029	42	436	131	295	133	50	6.2	3458	2928	10815	0	0	0	0						10	116	23	.0
2039	52	350	170	317	167	55	9.2	4728	3952	15594	0	0	0	0						10	122	35	.0
2049	62	315	151	323	175	61	10.2	5010	4672	19508	0	0	0	0						10	111	43	.0
2059	72	231	157	330	173	65	11.1	5562	5244	22726	0	0	0	0						10	105	50	.0
2069	82	246	141	327	174	71	11.9	6047	5749	25536	0	0	0	0						10	105	56	.0
2079	92	221	144	323	173	75	12.7	6476	6193	28114	0	0	0	0						10	100	57	.0
2089	102	197	194	316	176	78	13.4	6805	6535	30033	0	0	0	0						10	94	61	.0
2099	112	176	194	305	175	81	14.2	7135	6876	32021	0	0	0	0						10	98	65	.0
2109	122	158	194	302	171	85	15.0	7471	7223	34013	0	0	0	0						10	99	65	.0
2119	132	143	192	293	168	88	15.7	7739	7550	35520	0	0	0	0						10	90	63	.0
2129	142	129	190	286	164	91	16.5	7945	7715	36643	0	0	0	0						10	87	66	.0

ACTIVITY SUMMARY

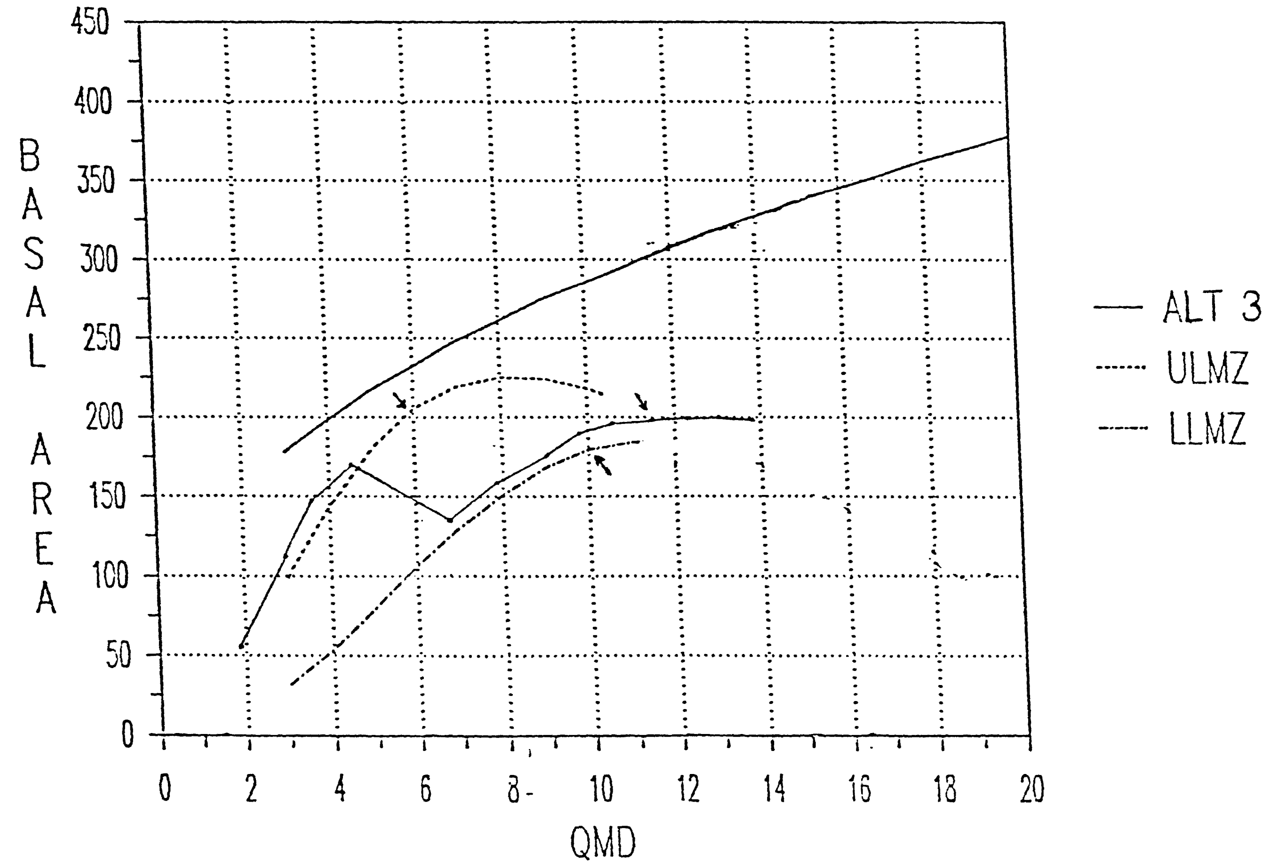
STAND ID= 62701056 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
3	1999								
4	2009								
5	2019								
		BASE	THINBBA	2020	DONE IN 2019	125.00	.98	.10	999.90
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE 2

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSH 10/87 R-1 SUPP 6

STAND GROWTH PROGNOSIS SYSTEM 3 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MERCH CU FT
1987	0	2925	41	155	55	23	1.6	346	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	25	1.9	535	0	0	0	0	0	0						2	78	3	.0
1999	12	2623	112	341	137	32	2.8	1481	124	439	0	0	0	0						10	97	2	.0
2009	22	2104	149	403	172	38	3.6	2344	943	2938	0	0	0	0						10	106	16	.0
2019	32	1536	170	427	157	43	4.5	3176	1152	5901	1007	465	0	0	135	287	142	43	6.8	10	117	33	.0
2029	42	457	159	320	153	49	7.9	3619	2949	10658	0	0	0	0						10	119	23	.0
2039	52	406	175	336	175	55	8.9	4375	3846	15096	0	0	0	0						10	114	39	.0
2049	62	357	187	345	185	60	9.9	5131	4728	19336	0	0	0	0						10	122	49	.0
2059	72	313	194	345	185	65	10.6	5673	5327	22698	0	0	0	0						10	110	53	.0
2069	82	275	197	342	185	69	11.5	6155	5833	25507	0	0	0	0						10	107	59	.0
2079	92	243	199	337	184	74	12.3	6599	6226	28257	0	0	0	0						10	107	62	.0
2089	102	214	200	329	182	78	13.1	6999	6712	30722	0	0	0	0						10	107	67	.0
2099	112	191	199	320	177	81	13.8	7269	6998	32463	0	0	0	0						10	90	63	.0
2109	122	169	196	309	174	85	14.6	7434	7226	33392	0	0	0	0						10	92	70	.0
2119	132	152	193	293	170	88	15.3	7693	7448	35132	0	0	0	0						10	89	63	.0
2129	142	136	191	290	166	91	16.0	7906	7670	36403	0	0	0	0						10	88	67	.0

ACTIVITY SUMMARY

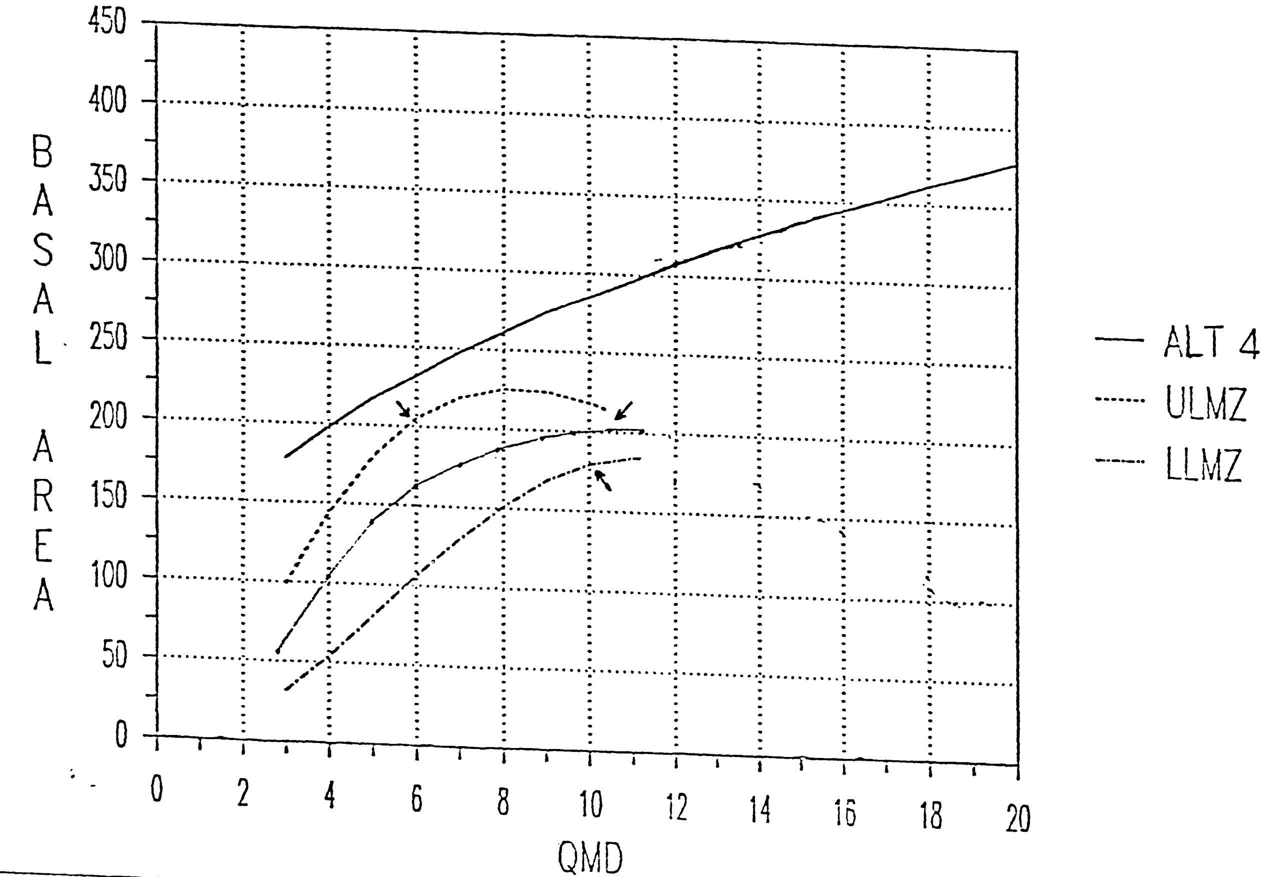
STAND ID= 32701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
3	1999								
4	2009								
5	2019								
		BASE	THINBBA	2020	DONE IN 2019	135.00	.98	.10	999.90
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE 3

STOCKING CHART-REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSII 10/87 R-1 SUPP 6

ALTERNATIVE 4

STAND GROWTH PROGNOSIS SYSTEM 4 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.5	356	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	1556	14	0	0	51	155	66	23	2.8	2	78	3	.0
1999	12	1161	103	264	121	32	4.0	1427	128	472	0	0	0	0						10	93	2	.0
2009	22	1012	140	335	155	35	5.0	2349	974	3030	0	0	0	0						10	106	14	.0
2019	32	817	161	361	173	45	6.0	3137	1920	6179	0	0	0	0						10	111	33	.0
2029	42	661	177	372	184	51	7.0	3830	2911	10041	0	0	0	0						10	119	45	.0
2039	52	546	185	373	188	56	7.9	4478	3642	13333	0	0	0	0						10	110	50	.0
2049	62	457	193	372	192	61	8.8	5091	4444	17946	0	0	0	0						10	119	53	.0
2059	72	338	198	367	193	65	9.7	5638	5117	21439	0	0	0	0						10	116	61	.0
2069	82	335	200	363	191	70	10.5	6093	5655	24354	0	0	0	0						10	103	62	.0
2079	92	290	200	355	185	74	11.3	6457	6095	26759	0	0	0	0						10	102	66	.0
2089	102	253	200	343	185	73	12.0	6816	6491	29054	0	0	0	0						10	105	69	.0
2099	112	223	200	331	182	81	12.9	7158	6667	31345	0	0	0	0						10	102	66	.0
2109	122	196	197	320	177	84	13.6	7426	7147	33092	0	0	0	0						10	94	69	.0
2119	132	175	194	305	172	87	14.3	7601	7339	34290	0	0	0	0						10	88	71	.0
2129	142	153	191	297	168	91	15.1	7200	7552	35538	0	0	0	0						10	90	70	.0

ACTIVITY SUMMARY

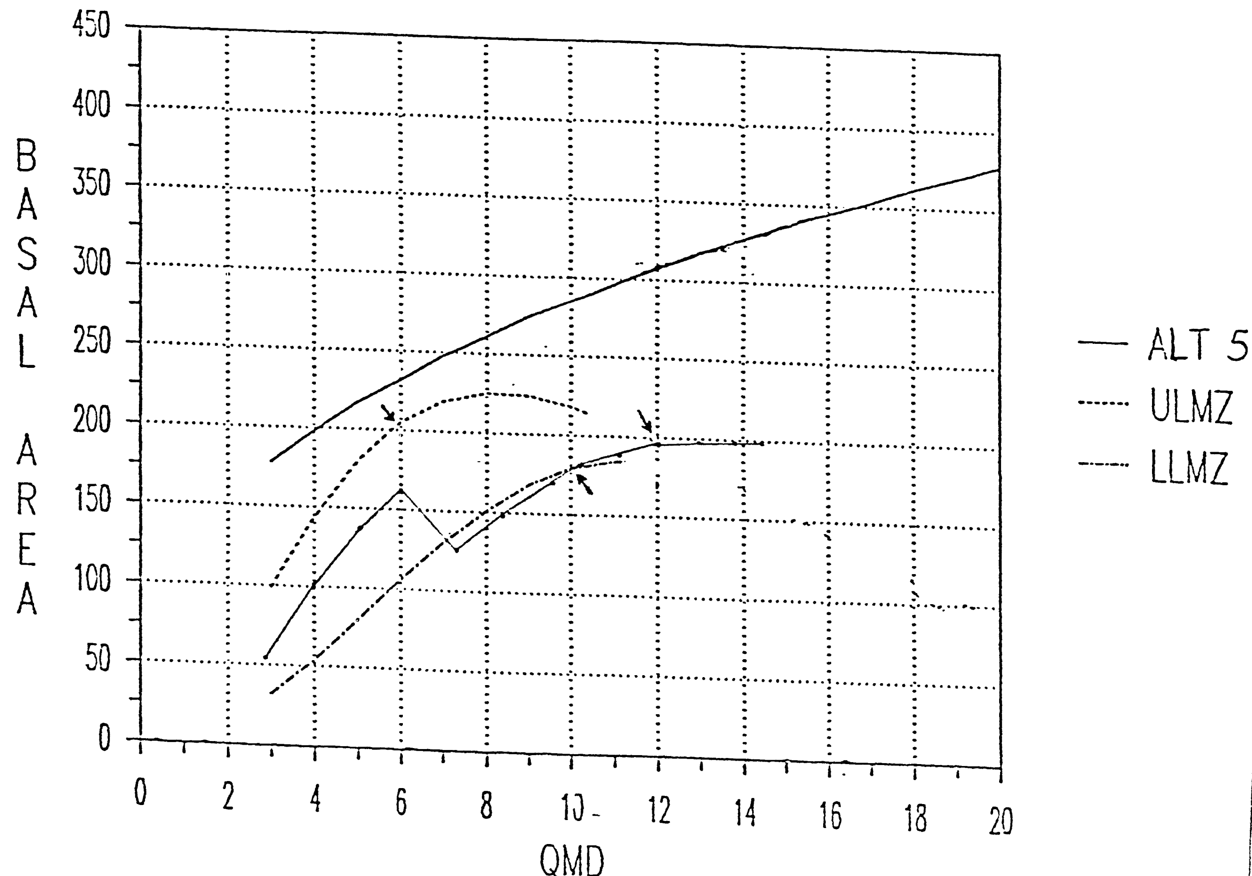
STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE 4

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSII 10/87 R-1 SUPP 6

STAND GROWTH PROGNOSIS SYSTEM 5 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2935	41	155	53	20	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	1556	14	0	0	51	155	66	23	2.8	2	78	3	.0
1999	12	1151	133	269	121	32	4.0	1427	128	422	0	0	0	0						10	93	2	.0
2009	22	1012	140	335	155	38	5.0	2349	974	3030	0	0	0	0						10	105	14	.0
2019	32	617	151	361	173	45	6.0	3137	1920	6172	333	575	0	0	125	260	130	45	7.3	10	111	33	.0
2029	42	340	149	292	150	52	8.4	3432	2945	10620	0	0	0	0						10	111	24	.0
2039	52	346	167	312	165	57	9.4	4273	3912	13216	0	0	0	0						10	119	35	.0
2049	62	309	175	323	173	64	10.3	4945	4619	19231	0	0	0	0						10	109	41	.0
2059	72	274	187	327	175	69	11.2	5569	5260	22874	0	0	0	0						10	113	50	.0
2069	82	245	193	324	180	72	12.0	6112	5819	25929	0	0	0	0						10	109	54	.0
2079	92	216	197	325	181	75	12.9	6619	6338	28815	0	0	0	0						10	112	62	.0
2089	102	176	199	322	180	77	13.7	7054	6744	31324	0	0	0	0						10	105	61	.0
2099	112	175	199	315	175	83	14.4	7416	7156	33457	0	0	0	0						10	101	65	.0
2109	122	156	193	303	175	87	15.1	7677	7426	35027	0	0	0	0						10	92	66	.0
2119	132	143	195	293	170	90	15.8	7565	7625	36206	0	0	0	0						10	88	69	.0
2129	142	129	192	283	166	92	16.6	8047	7816	37256	0	0	0	0						10	88	70	.0

ACTIVITY SUMMARY

STAND ID= 32701066 MANAGEMENT ID= NONE

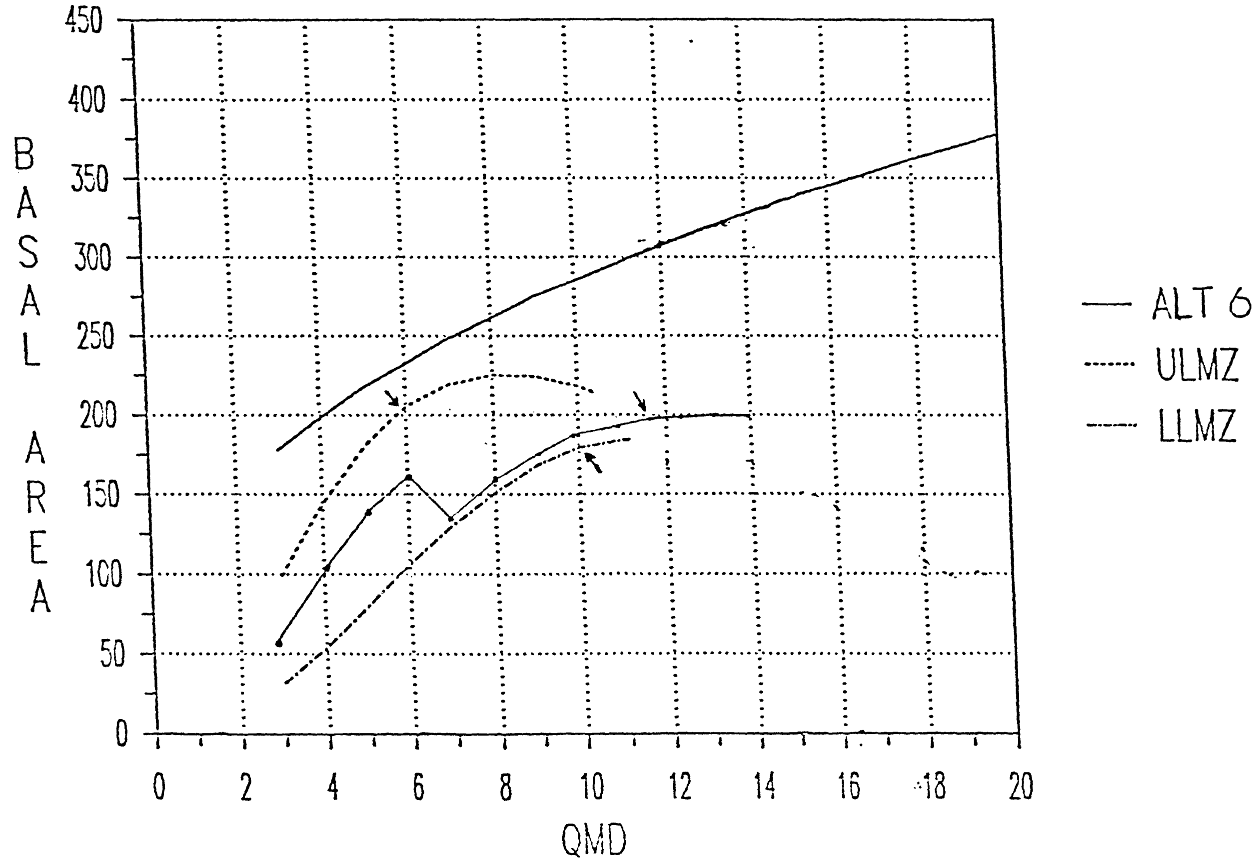
CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
		BASE	THINBBA	2020	DONE IN 2019	125.00	.98	.10	999.90
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								

ALTERNATIVE 5

FSH 10/87 R-1 SUPP 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM 6 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER YEAR	MORT PER YEAR	MERCH CU FT
1987	0	2925	41	155	53	20	1.6	326	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	1556	14	0	0	51	155	66	23	2.8	2	73	3	.0
1999	12	1151	103	269	121	32	4.0	1427	125	422	0	0	0	0						10	93	2	.0
2009	22	1012	140	335	156	36	5.0	2349	974	3030	0	0	0	0						10	106	14	.0
2019	32	317	161	361	173	45	[illegible]	3137	1920	6173	312	401	0	0	135	285	141	45	7.0	10	111	33	.0
2029	42	445	157	313	163	52	8.0	3536	2935	10526	0	0	0	0						10	113	28	.0
2039	52	391	172	331	173	56	9.0	4365	3936	15134	0	0	0	0						10	117	39	.0
2049	62	344	185	339	181	62	9.9	5055	4690	19297	0	0	0	0						10	116	47	.0
2059	72	303	193	342	185	67	10.5	5676	5340	22857	0	0	0	0						10	116	54	.0
2069	82	259	197	340	185	70	11.5	6147	5833	25655	0	0	0	0						10	104	57	.0
2079	92	235	199	335	184	74	12.4	6605	6308	28347	0	0	0	0						10	110	64	.0
2089	102	213	200	329	183	77	13.1	6995	6712	30731	0	0	0	0						10	100	61	.0
2099	112	189	200	321	180	81	13.9	7341	7072	32831	0	0	0	0						10	104	69	.0
2109	122	157	200	314	177	85	14.7	7677	7418	34820	0	0	0	0						10	101	68	.0
2119	132	151	197	303	173	89	15.4	7875	7628	36057	0	0	0	0						10	87	63	.0
2129	142	136	193	292	167	91	16.1	8002	7756	36864	0	0	0	0						10	84	72	.0

ACTIVITY SUMMARY

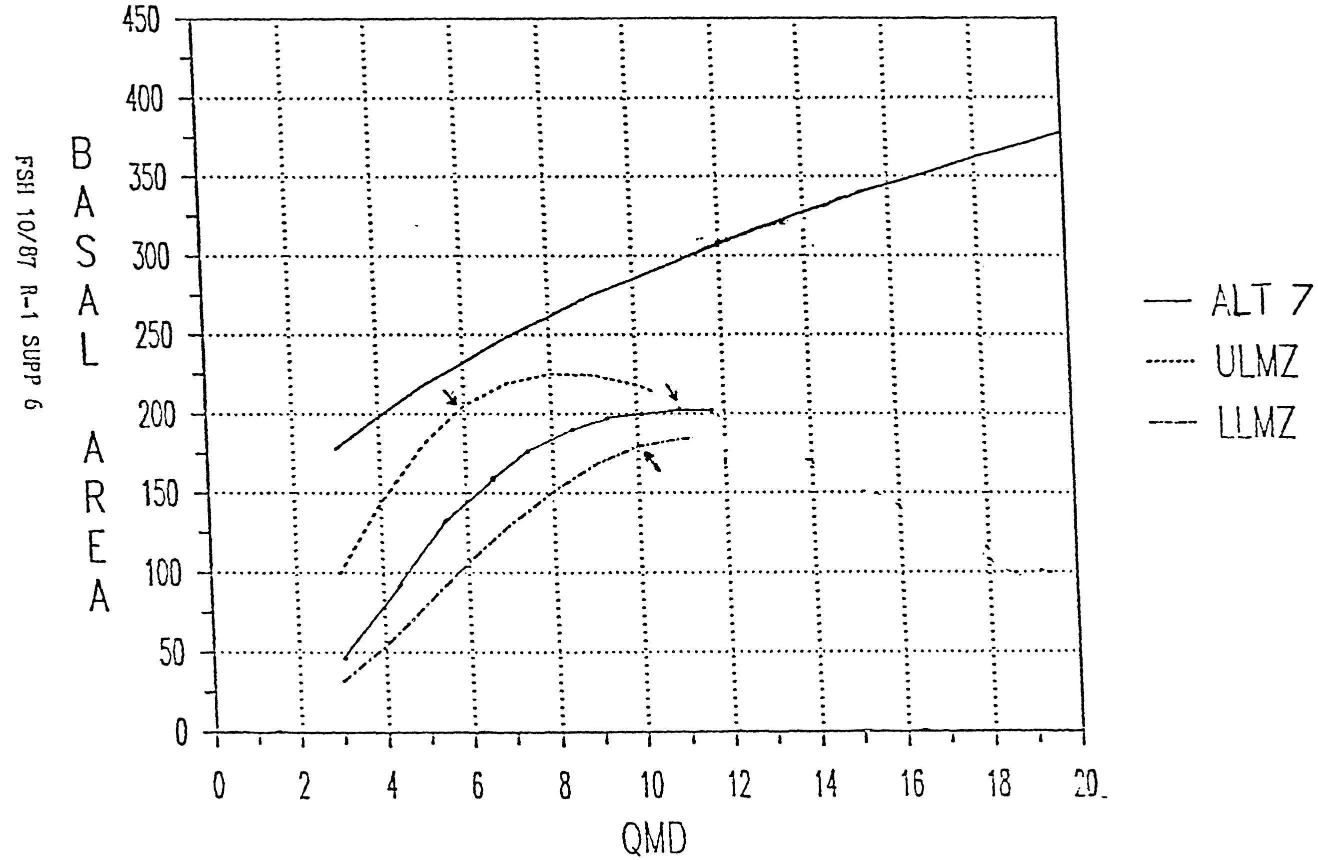
STAND ID= 32701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
		BASE	THINBBA	2020	DONE IN 2019	135.00	.98	.10	999.90
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								

ALTERNATIVE 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



ALTERNATIVE 7

STAND GROWTH PROGNOSIS SYSTEM 7 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

	START OF SIMULATION PERIOD										REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER YEAR	MORT PER YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	1377	55	0	0	45	132	57	23	3.1	2	78	3	.0
1999	12	854	93	234	105	32	4.5	1356	146	506	0	0	0	0						10	90	2	.0
2009	22	770	132	304	145	39	5.6	2319	1036	3285	0	0	0	0						10	107	11	.0
2019	32	654	158	339	165	47	6.6	3192	2148	7053	0	0	0	0						10	115	28	.0
2029	42	553	175	353	180	54	7.6	3936	3177	11311	0	0	0	0						10	119	40	.0
2039	52	475	187	365	187	59	8.5	4654	4041	15594	0	0	0	0						10	114	48	.0
2049	62	410	195	367	192	63	9.3	5258	4734	19265	0	0	0	0						10	117	56	.0
2059	72	357	200	364	193	67	10.1	5791	5392	22548	0	0	0	0						10	112	60	.0
2069	82	312	202	357	192	70	10.9	6221	5363	25195	0	0	0	0						10	105	62	.0
2079	92	273	202	343	189	74	11.7	6596	6253	27694	0	0	0	0						10	105	67	.0
2089	102	239	201	333	185	77	12.4	6910	6606	29802	0	0	0	0						10	100	63	.0
2099	112	211	199	327	181	81	13.2	7206	6920	31745	0	0	0	0						10	99	70	.0
2109	122	188	197	317	177	85	13.9	7453	7133	33339	0	0	0	0						10	93	68	.0
2119	132	166	194	305	172	83	14.6	7635	7380	34531	0	0	0	0						10	89	71	.0
2129	142	148	190	294	167	91	15.3	7798	7556	35560	0	0	0	0						10	87	71	.0

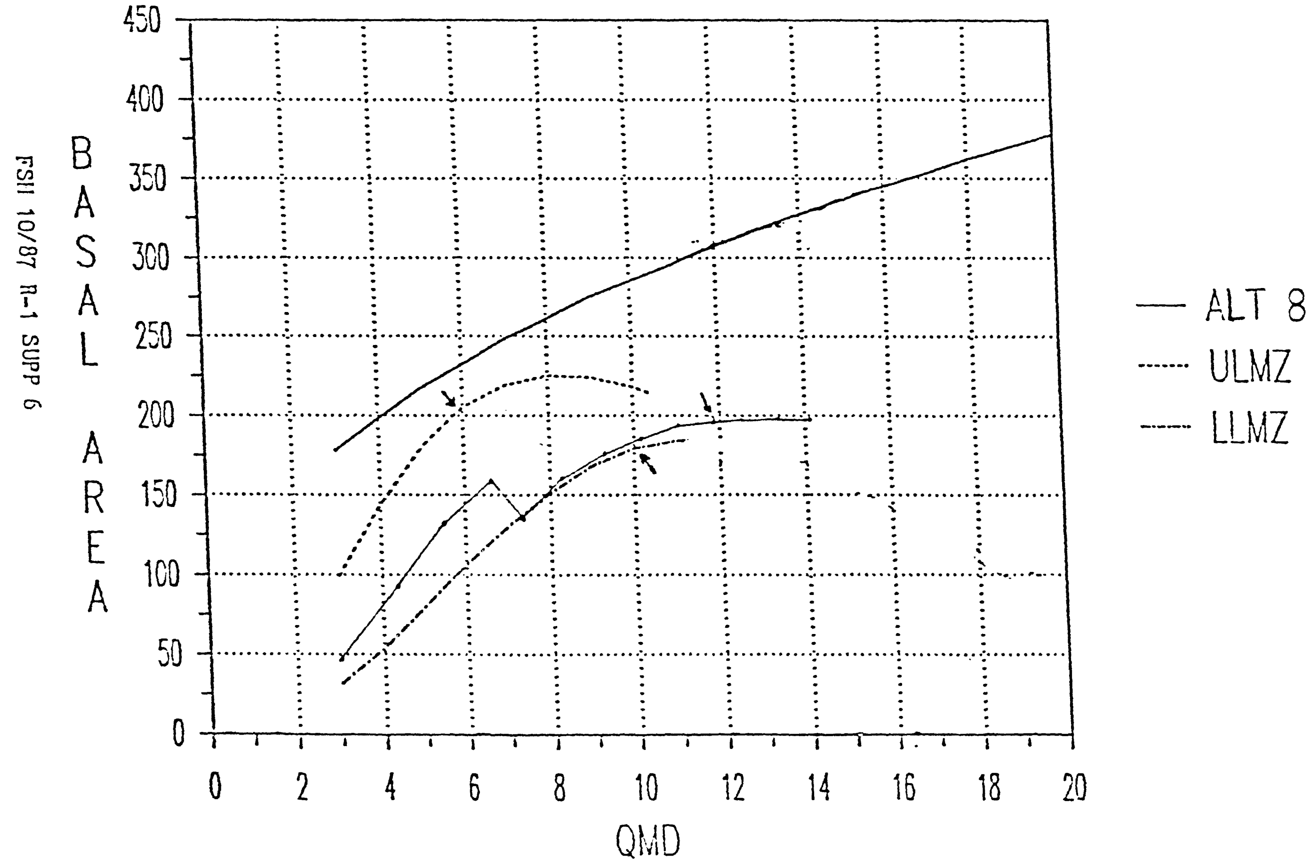
ACTIVITY SUMMARY

STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	889.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



ALTERNATIVE 8

ALTERNATIVE 8

STAND GROWTH PROGNOSIS SYSTEM 8 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MERCH CU FT
1987	0	2925	41	155	55	21	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	1877	55	0	0	45	132	57	23	3.1	2	78	3	.0
1999	12	854	93	234	103	32	4.5	1756	146	536	0	0	0	0						10	90	2	.0
2009	22	770	132	304	145	39	5.6	2319	1086	3235	0	0	0	0						10	107	11	.0
2019	32	654	158	339	155	47	6.6	3192	2145	7053	196	377	0	0	135	279	140	47	7.4	10	115	23	.0
2029	42	412	153	313	159	54	8.4	3693	3259	11656	0	0	0	0						10	114	27	.0
2039	52	366	174	327	172	58	9.3	4459	4094	16034	0	0	0	0						10	115	33	.0
2049	62	326	184	334	174	63	10.2	5073	4753	19658	0	0	0	0						10	108	45	.0
2059	72	287	191	335	182	68	11.0	5651	5262	23086	0	0	0	0						10	114	55	.0
2069	82	255	195	334	183	71	11.8	6156	5854	25832	0	0	0	0						10	103	55	.0
2079	92	226	197	325	181	75	12.5	6534	6298	23430	0	0	0	0						10	106	63	.0
2089	102	202	198	322	180	79	13.4	6972	6699	30852	0	0	0	0						10	102	63	.0
2099	112	180	198	315	177	82	14.2	7324	7062	32937	0	0	0	0						10	101	65	.0
2109	122	161	196	307	174	85	14.9	7605	7354	34641	0	0	0	0						10	94	66	.0
2119	132	145	194	297	173	89	15.6	7812	7572	35792	0	0	0	0						10	88	67	.0
2129	142	131	190	287	165	93	16.4	7935	7755	36773	0	0	0	0						10	83	70	.0

ACTIVITY SUMMARY

STAND ID= 32701066 MANAGEMENT ID= NONE

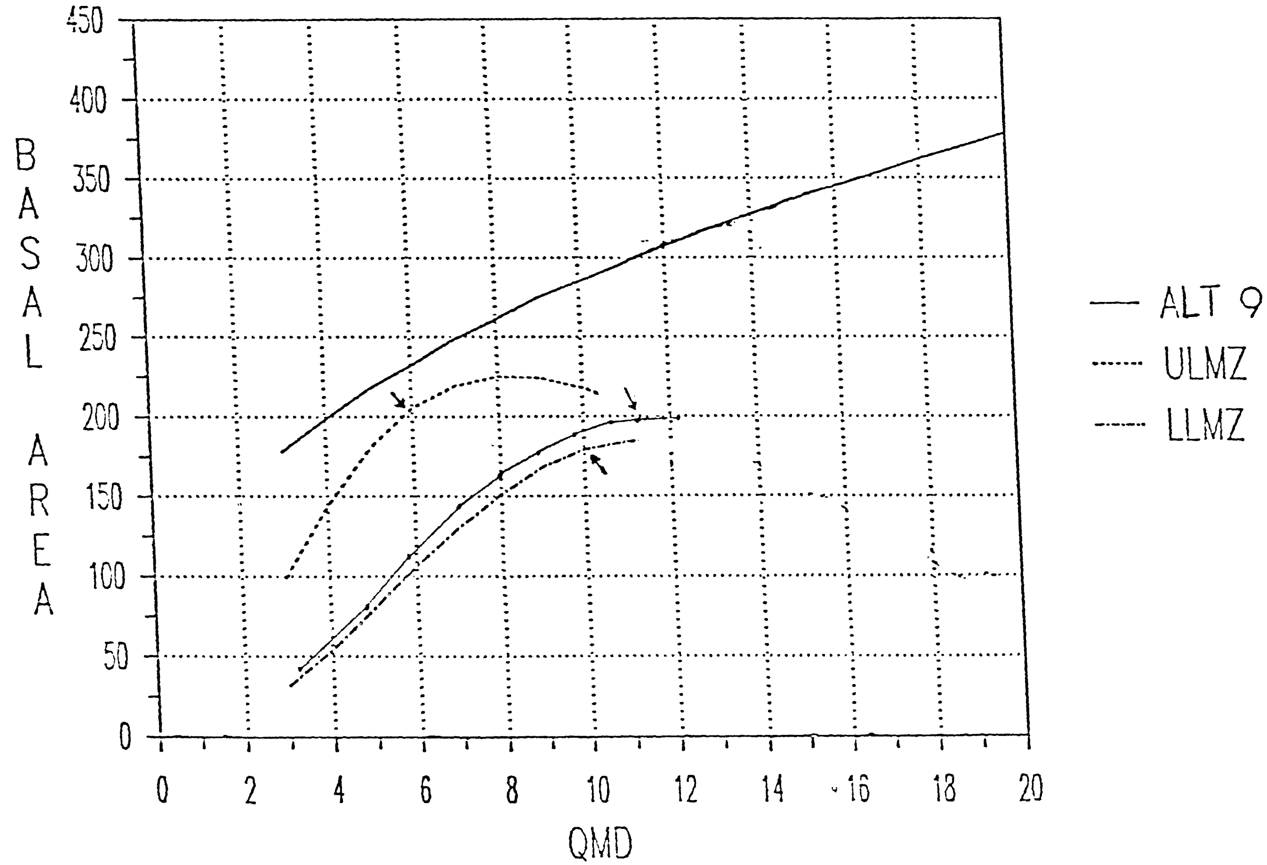
CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINSTA	1990	DONE IN 1989	339.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
		BASE	THINBBA	2020	DONE IN 2019	135.00	.98	.10	999.90
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								

4

ALTERNATIVE 9

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSH 10/87 R-1 SUPP 6

STAND GROWTH PROGNOSIS SYSTEM 9 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.6	336	0	0	0	0	0	0						0	0	3	.0
1989	2	2750	54	191	71	23	1.9	535	0	0	2045	103	0	0	39	112	49	23	3.3	2	75	3	.0
1999	12	657	82	200	93	32	4.8	1223	159	607	0	0	0	0						10	81	2	.0
2009	22	615	114	253	125	41	5.9	2051	1024	3139	0	0	0	0						10	91	8	.0
2019	32	531	142	299	145	45	7.0	2923	2145	6852	0	0	0	0						10	108	20	.0
2029	42	456	152	324	165	53	8.0	3723	3155	11191	0	0	0	0						10	110	30	.0
2039	52	410	170	333	175	53	8.9	4453	4003	15305	0	0	0	0						10	113	40	.0
2049	62	359	186	344	182	62	9.7	5092	4712	19150	0	0	0	0						10	112	48	.0
2059	72	314	193	345	185	65	10.6	5667	5321	22602	0	0	0	0						10	114	56	.0
2069	82	277	196	341	185	70	11.4	6132	5811	25335	0	0	0	0						10	104	53	.0
2079	92	245	198	335	184	74	12.2	6555	6253	27970	0	0	0	0						10	105	63	.0
2089	102	217	199	328	182	73	13.0	6951	6605	30423	0	0	0	0						10	105	66	.0
2099	112	193	199	321	179	82	13.7	7318	7045	32597	0	0	0	0						10	103	66	.0
2109	122	172	198	313	175	86	14.5	7633	7373	34497	0	0	0	0						10	100	68	.0
2119	132	154	197	304	173	89	15.3	7874	7644	36065	0	0	0	0						10	96	69	.0
2129	142	139	194	295	169	93	16.0	8125	7835	37389	0	0	0	0						10	92	69	.0

ACTIVITY SUMMARY

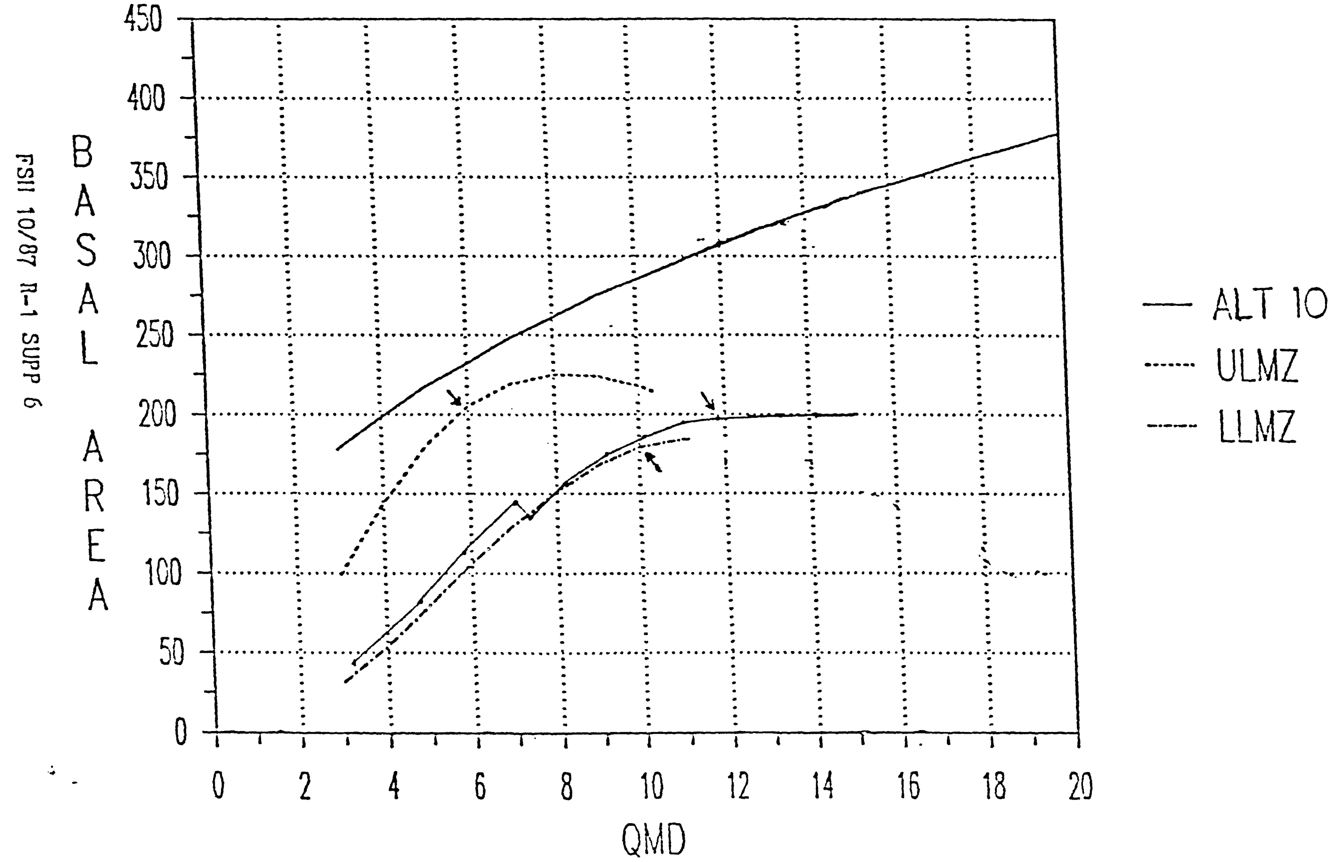
STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	681.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE 9

STOCKING CHART-REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



ALTERNATIVE 10

ALTERNATIVE 10

STAND GROWTH PROGNOSIS SYSTEM 10 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MERCH CU FT
1987	0	2925	41	156	53	20	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	2045	133	0	0	39	112	49	23	3.3	2	73	3	.0
1999	12	637	32	200	93	32	4.3	1223	150	607	0	0	0	0						10	81	2	.0
2009	22	605	114	253	125	41	5.9	2051	1924	3139	0	0	0	0						10	91	8	.0
2019	32	551	142	293	143	45	7.0	2923	2145	5551	57	110	0	1	135	280	140	45	7.3	10	105	20	.0
2029	42	417	156	308	153	53	8.3	3627	3152	11223	0	0	0	0						10	107	25	.0
2039	52	321	173	325	172	55	9.2	4410	4044	15534	0	0	0	0						10	115	33	.0
2049	62	309	184	335	180	63	10.1	5110	4759	19633	0	0	0	0						10	116	46	.0
2059	72	291	193	339	184	67	11.0	5741	5420	23277	0	0	0	0						10	118	54	.0
2069	82	259	196	335	184	71	11.3	6213	5909	26134	0	0	0	0						10	104	57	.0
2079	92	230	192	331	183	75	12.6	6629	6340	28670	0	0	0	0						10	104	62	.0
2089	102	204	196	324	180	79	13.3	6992	6717	30844	0	0	0	0						10	101	65	.0
2099	112	182	199	315	17	82	14.2	7392	7128	33217	0	0	0	0						10	103	63	.0
2109	122	164	199	312	177	85	14.9	7737	7432	35224	0	0	0	0						10	93	63	.0
2119	132	146	197	303	173	89	15.6	7957	7722	36631	0	0	0	0						10	92	69	.0
2129	142	133	195	293	169	93	16.4	8276	7975	37976	0	0	0	0						10	97	73	.0

ACTIVITY SUMMARY

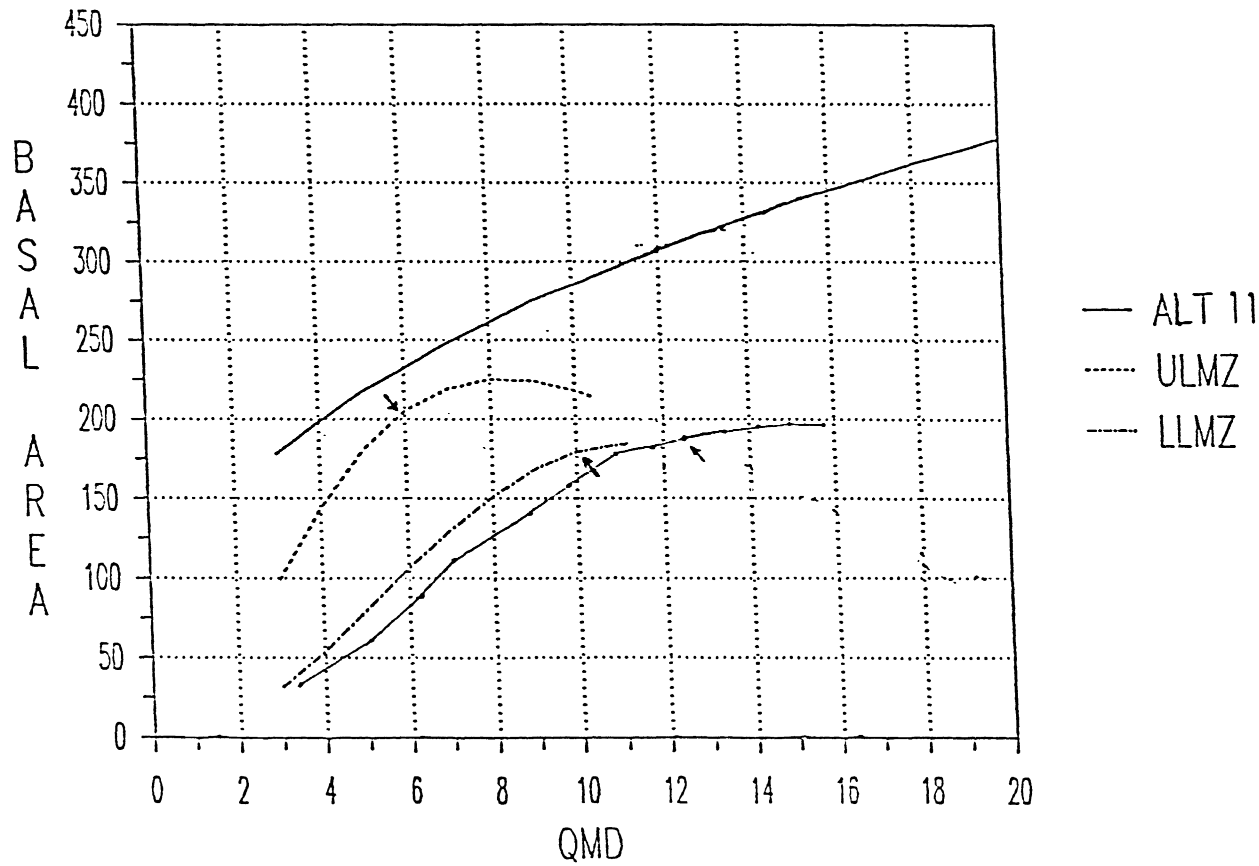
STAND ID= 82ZC1066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	681.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
		BASE	THINBBA	2020	DONE IN 2019	135.00	.98	.10	999.90

* ERROR: BAD DATA RECORD

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSH 10/87 R-1 SUPP 6

ALTERNATIVE 11

STAND GROWTH PROGNOSIS SYSTEM 11 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	23	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	2330	192	0	0	31	83	37	23	3.6	2	73	3	.0
1999	12	420	58	145	65	33	5.1	893	135	652	0	0	0	0						10	56	1	.0
2009	22	391	87	193	95	43	6.4	1598	1052	3248	0	0	0	0						10	75	4	.0
2019	32	361	115	234	115	47	7.7	2452	2074	6814	0	0	0	0						10	95	10	.0
2029	42	324	139	263	134	54	8.3	3332	3012	11033	0	0	0	0						10	106	13	.0
2039	52	298	157	292	154	57	9.3	4130	3824	15464	0	0	0	0						10	103	23	.0
2049	62	258	171	303	165	63	10.8	4875	4591	19574	0	0	0	0						10	112	38	.0
2059	72	242	180	313	173	68	11.7	5491	5207	23058	0	0	0	0						10	104	42	.0
2069	82	216	188	314	174	72	12.6	6118	5844	26546	0	0	0	0						10	113	55	.0
2079	92	196	191	312	175	75	13.4	6550	6265	28929	0	0	0	0						10	94	51	.0
2089	102	176	193	303	174	80	14.2	6987	6732	31368	0	0	0	0						10	103	65	.0
2099	112	150	195	304	173	83	14.9	7268	7119	33530	0	0	0	0						10	97	59	.0
2109	122	145	194	293	170	87	15.7	7635	7444	35228	0	0	0	0						10	93	66	.0
2119	132	132	194	292	165	90	16.4	8004	7770	36890	0	0	0	0						10	95	63	.0
2129	142	120	192	285	165	93	17.1	8208	7951	33011	0	0	0	0						10	86	66	.0

ACTIVITY SUMMARY

STAND ID= 8270106c   MANAGEMENT ID= NONE

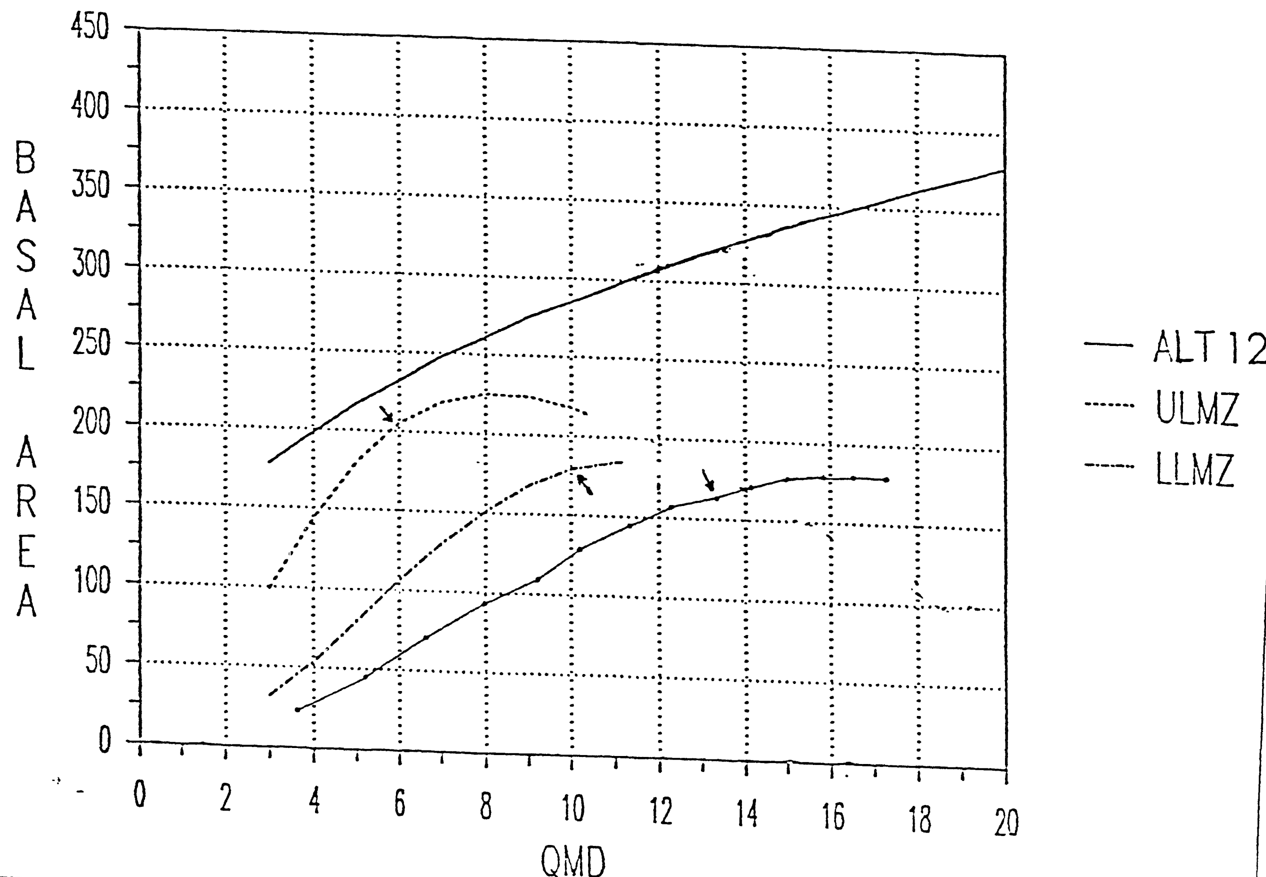
CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINSTA	1990	DONE IN 1989	436.90	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE 11

FSH 10/87 R-1 SUPP 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM 12 VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2766	54	191	71	23	1.9	555	0	0	2454	271	0	0	23	61	27	23	3.7	2	78	3	.0
1999	12	294	43	102	43	33	5.2	634	197	794	0	0	0	0						10	43	1	.0
2009	22	276	58	145	71	41	6.7	1294	952	2923	0	0	0	0						10	63	2	.0
2019	32	260	90	130	91	48	8.0	1974	1722	5814	0	0	0	0						10	73	5	.0
2029	42	243	112	211	111	54	9.2	2752	2509	9569	0	0	0	0						10	89	11	.0
2039	52	224	130	235	127	59	10.3	3534	3291	13300	0	0	0	0						10	96	13	.0
2049	62	206	145	252	134	65	11.4	4272	4032	17718	0	0	0	0						10	99	25	.0
2059	72	188	156	263	145	70	12.3	4745	4709	21276	0	0	0	0						10	100	33	.0
2069	82	171	164	269	150	74	13.3	5540	5308	24433	0	0	0	0						10	100	40	.0
2079	92	157	171	272	153	79	14.1	6071	5843	27250	0	0	0	0						10	94	41	.0
2089	102	144	175	273	155	82	14.9	6551	6327	29813	0	0	0	0						10	95	47	.0
2099	112	131	177	271	155	86	15.9	6943	6724	31893	0	0	0	0						10	93	53	.0
2109	122	120	179	263	154	90	16.5	7297	7033	33823	0	0	0	0						10	89	53	.0
2119	132	110	179	264	153	94	17.3	7603	7393	35357	0	0	0	0						10	89	53	.0
2129	142	101	176	259	151	97	18.0	7845	7640	36537	0	0	0	0						10	81	57	.0

ACTIVITY SUMMARY

STAND ID= 32701056 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINSTA	1990	DONE IN 1999	302.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE 12

APPENDIX F

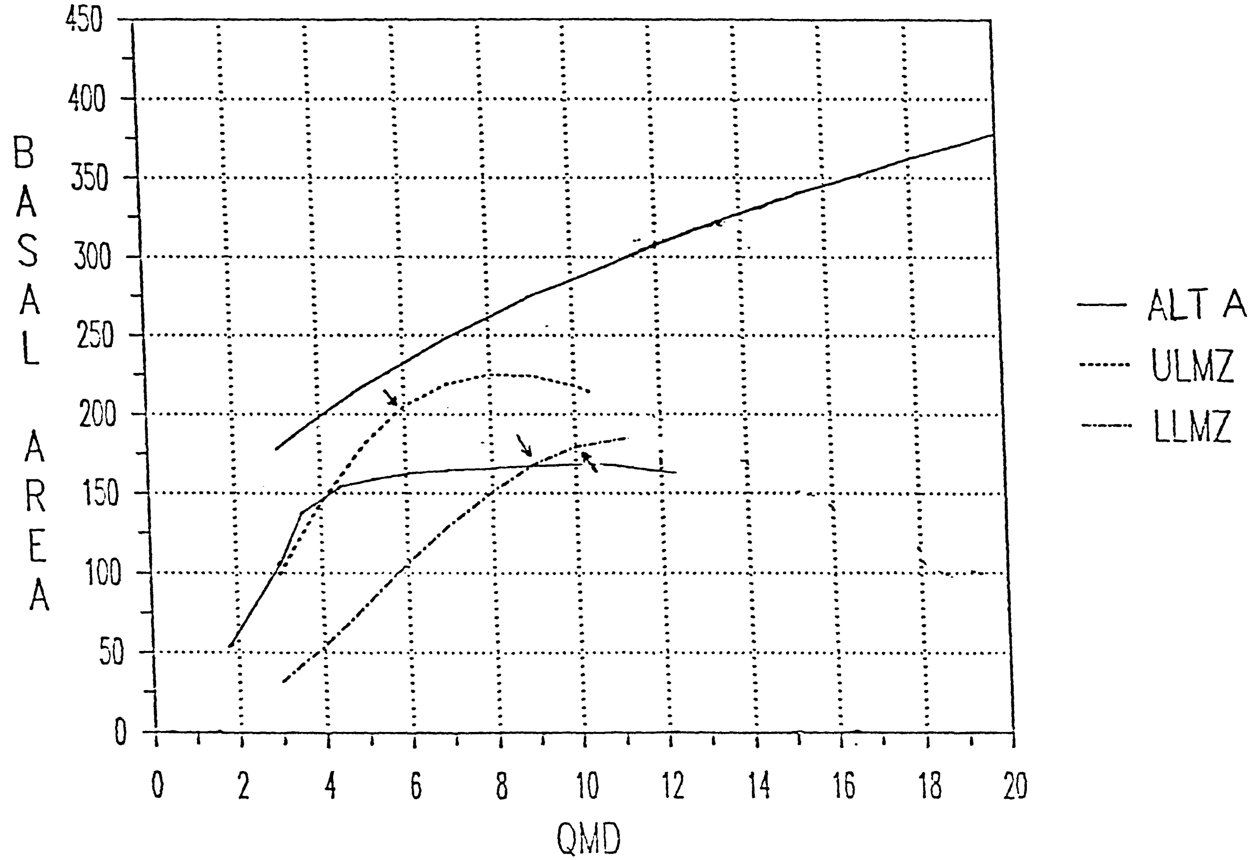
PROGNOSIS MODEL CALIBRATIONS

ALTERNATIVE A

FSH 10/87 R-1 SUPP 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM A VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2765	54	190	71	23	1.9	534	0	0	0	0	0	0						2	78	4	.0
1999	12	2613	110	334	134	32	2.8	1448	121	399	0	0	0	0						10	95	3	.0
2009	22	2005	140	384	161	38	3.6	2225	872	2687	0	0	0	0						10	100	22	.0
2019	32	1448	152	386	169	44	4.4	2828	1647	5348	0	0	0	0						10	104	44	.0
2029	42	1058	159	375	170	49	5.2	3325	2237	8021	0	0	0	0						10	104	54	.0
2039	52	795	162	360	169	55	6.1	3755	2888	10868	0	0	0	0						10	101	53	.0
2049	62	613	164	345	167	60	7.0	4141	3429	13536	0	0	0	0						10	100	62	.0
2059	72	435	165	332	165	64	7.9	4536	3944	16241	0	0	0	0						10	103	64	.0
2069	82	394	166	320	162	69	8.8	4879	4365	18479	0	0	0	0						10	96	62	.0
2079	92	327	166	303	159	74	9.6	5184	4739	20545	0	0	0	0						10	91	61	.0
2089	102	276	166	297	156	77	10.5	5479	5095	22567	0	0	0	0						10	91	62	.0
2099	112	238	165	283	153	81	11.3	5753	5405	24376	0	0	0	0						10	87	60	.0
2109	122	207	164	279	150	84	12.1	5985	5673	25946	0	0	0	0						10	82	59	.0
2119	132	131	162	269	146	87	12.8	6164	5838	27178	0	0	0	0						10	75	57	.0
2129																							

ALTERNATIVE A

ALTERNATIVE B

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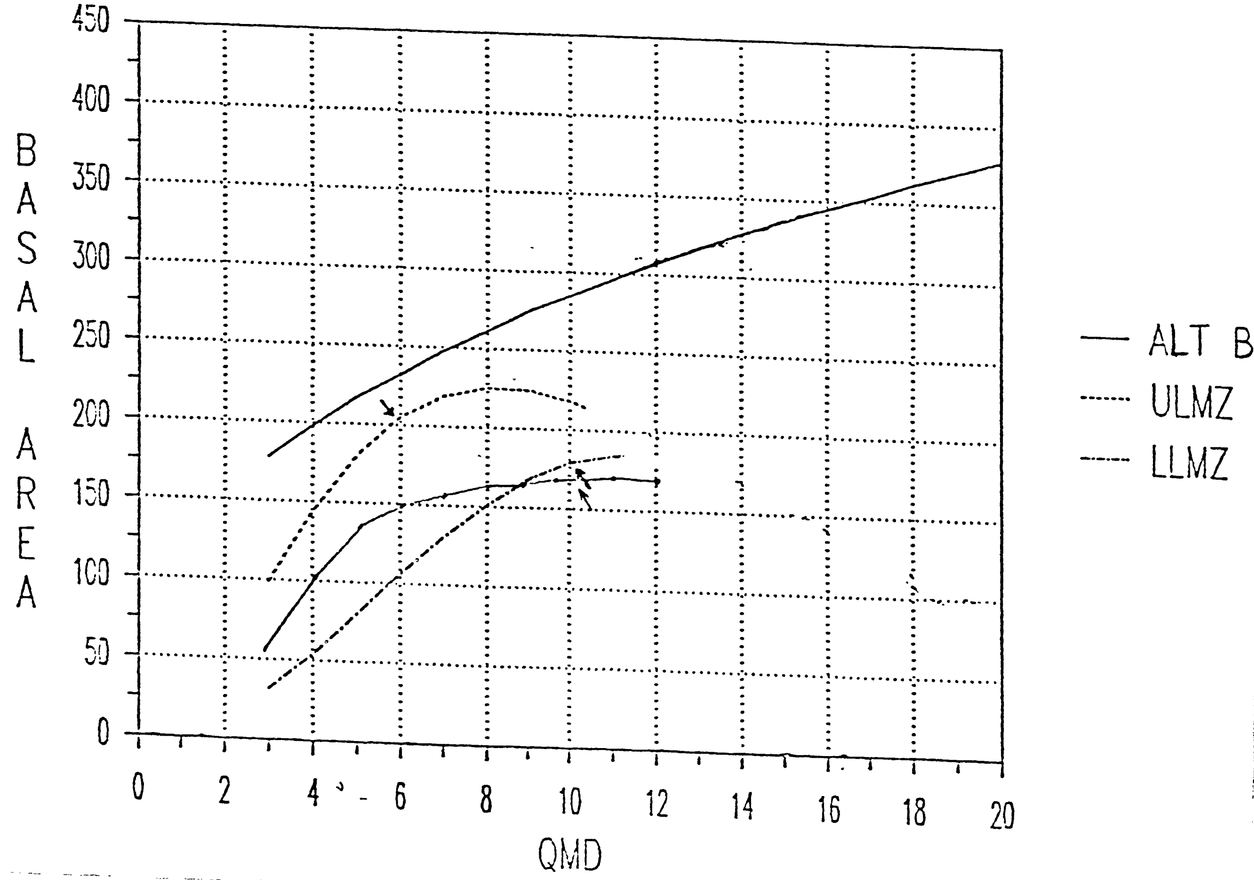
FSII 10/87 R-1 SUPP 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM B VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2765	54	190	71	23	1.9	534	0	0	1555	14	0	0	51	155	66	23	2.8	2	78	4	.0
1999	12	1140	101	264	119	32	4.0	1400	125	414	0	0	0	0						10	91	3	.0
2009	22	961	132	317	143	38	5.0	2218	928	2679	0	0	0	0						10	101	19	.0
2019	32	756	147	330	158	45	6.0	2856	1722	5535	0	0	0	0						10	103	39	.0
2029	42	596	156	329	162	49	6.9	3406	2434	8759	0	0	0	0						10	106	51	.0
2039	52	433	160	324	163	55	7.8	3865	3134	11926	0	0	0	0						10	100	54	.0
2049	62	398	163	317	163	60	8.7	4305	3738	14940	0	0	0	0						10	102	53	.0
2059	72	335	165	309	162	64	9.5	4696	4244	17574	0	0	0	0						10	99	60	.0
2069	82	287	167	301	160	69	10.3	5052	4689	20015	0	0	0	0						10	96	60	.0
2079	92	247	167	293	157	73	11.1	5397	5079	22191	0	0	0	0						10	94	61	.0
2089	102	217	167	285	154	77	11.9	5686	5407	24188	0	0	0	0						10	88	59	.0
2099	112	189	166	277	152	81	12.7	5992	5737	26151	0	0	0	0						10	93	63	.0
2109	122	167	165	269	149	85	13.5	6233	5995	27682	0	0	0	0						10	83	59	.0
2119	132	148	163	259	145	88	14.2	6420	6198	28832	0	0	0	0						10	79	60	.0
2129	142	131	161	250	141	92	15.0	6606	6395	30037	0	0	0	0						10	80	61	.0

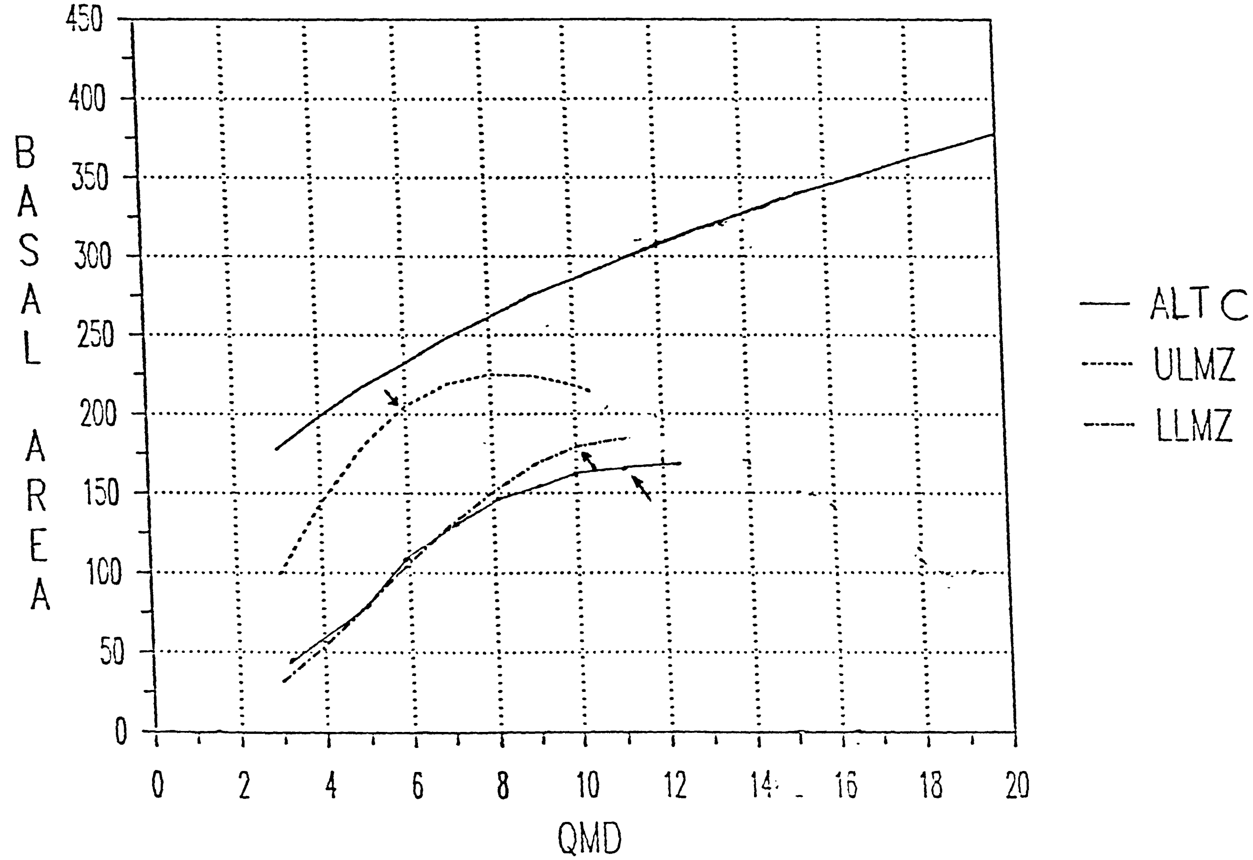
ACTIVITY SUMMARY

STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSH 10/87 R-1 SUPP 6

STAND GROWTH PROGNOSIS SYSTEM C VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2765	54	190	71	23	1.9	534	0	0	2084	103	0	0	39	112	49	23	3.2	2	73	4	.0
1999	12	651	81	198	93	32	4.8	1210	157	600	0	0	0	0						10	80	2	.0
2009	22	585	109	247	119	40	5.9	1950	924	2952	0	0	0	0						10	85	11	.0
2019	32	499	132	278	133	46	7.0	2702	2025	6413	0	0	0	0						10	101	26	.0
2029	42	424	146	293	149	52	8.0	3366	2842	9979	0	0	0	0						10	104	37	.0
2039	52	360	156	293	155	58	8.9	3939	3533	13439	0	0	0	0						10	105	47	.0
2049	62	307	162	293	158	62	9.8	4453	4117	16805	0	0	0	0						10	106	55	.0
2059	72	266	165	294	158	66	10.7	4872	4578	19494	0	0	0	0						10	93	56	.0
2069	82	232	166	288	157	70	11.5	5230	4958	21702	0	0	0	0						10	94	58	.0
2079	92	202	167	281	154	75	12.3	5569	5315	23927	0	0	0	0						10	94	61	.0
2089	102	179	167	275	152	78	13.1	5885	5645	25849	0	0	0	0						10	91	59	.0
2099	112	159	166	268	150	82	13.8	6140	5912	27408	0	0	0	0						10	83	53	.0
2109	122	142	166	261	147	86	14.6	6419	6202	29048	0	0	0	0						10	89	61	.0
2119	132	127	165	254	144	89	15.4	6648	6439	30374	0	0	0	0						10	82	59	.0
2129	142	114	163	245	141	92	16.1	6837	6637	31304	0	0	0	0						10	78	59	.0

ACTIVITY SUMMARY

STAND ID= 82701066 MANAGEMENT ID= NONE

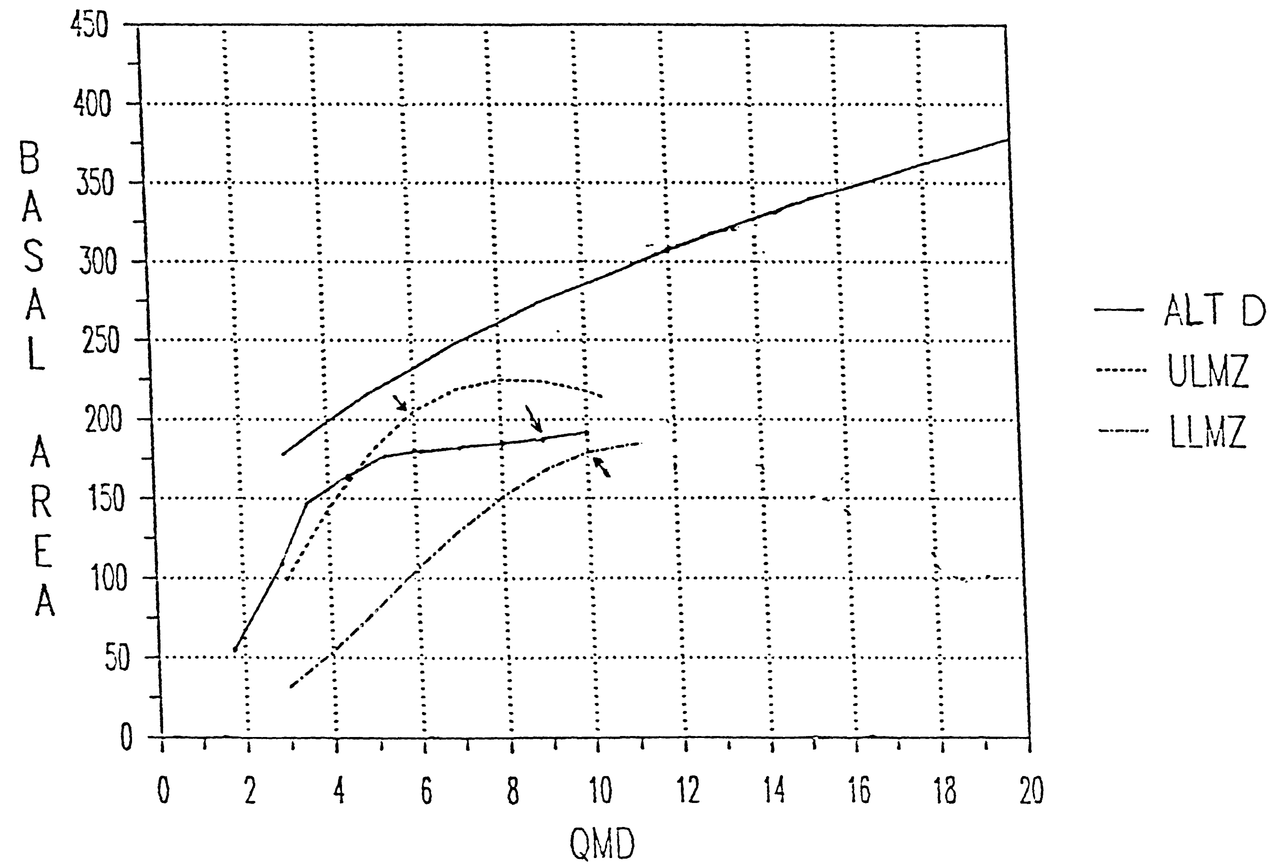
CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	681.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE C

FSH 10/87 R-1 SUPP 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM D VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	356	0	0	0	0	0	0						0	0	0	.0
1989	2	2766	54	191	71	23	1.9	535	0	0	0	0	0	0						2	73	3	.0
1999	12	2650	111	333	136	32	2.8	1468	123	405	0	0	0	0						10	96	3	.0
2009	22	2066	145	399	163	33	3.6	2323	915	2519	0	0	0	0						10	104	18	.0
2019	32	1506	163	411	180	44	4.5	3030	1765	5630	0	0	0	0						10	111	40	.0
2029	42	1111	174	403	136	49	5.4	3663	2535	9120	0	0	0	0						10	116	52	.0
2039	52	836	150	396	137	56	6.3	4200	3325	12606	0	0	0	0						10	113	59	.0
2049	62	644	133	381	135	61	7.2	4675	3927	15708	0	0	0	0						10	110	63	.0
2059	72	509	[illegible]	367	183	65	8.2	5115	4498	13679	0	0	0	0						10	110	66	.0
2069	82	415	156	353	180	69	9.1	5502	4998	21335	0	0	0	0						10	102	63	.0
2079	92	344	136	342	177	73	10.0	5394	5443	23847	0	0	0	0						10	106	67	.0
2089	102	290	135	329	173	77	10.6	6201	5804	25922	0	0	0	0						10	95	65	.0
2099	112	248	134	317	169	81	11.7	6474	6114	27756	0	0	0	0						10	91	64	.0
2109	122	215	132	305	165	84	12.5	6724	6408	29439	0	0	0	0						10	90	65	.0
2119	132	188	160	294	161	87	13.2	6932	6642	30815	0	0	0	0						10	85	65	.0
2129	142	165	178	235	157	91	14.0	7150	6379	32116	0	0	0	0						10	87	65	.0

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@ASG,A PROGNOSIS*WOSUBMIT.
W:120133 file is already assigned.

@XQT PROGNOSIS*WOSUBMIT.REREED

@USE 2.,R01-FOR10*D-4532701066.

@XQT TMYIELD*PROGNOSIS52.PMOD
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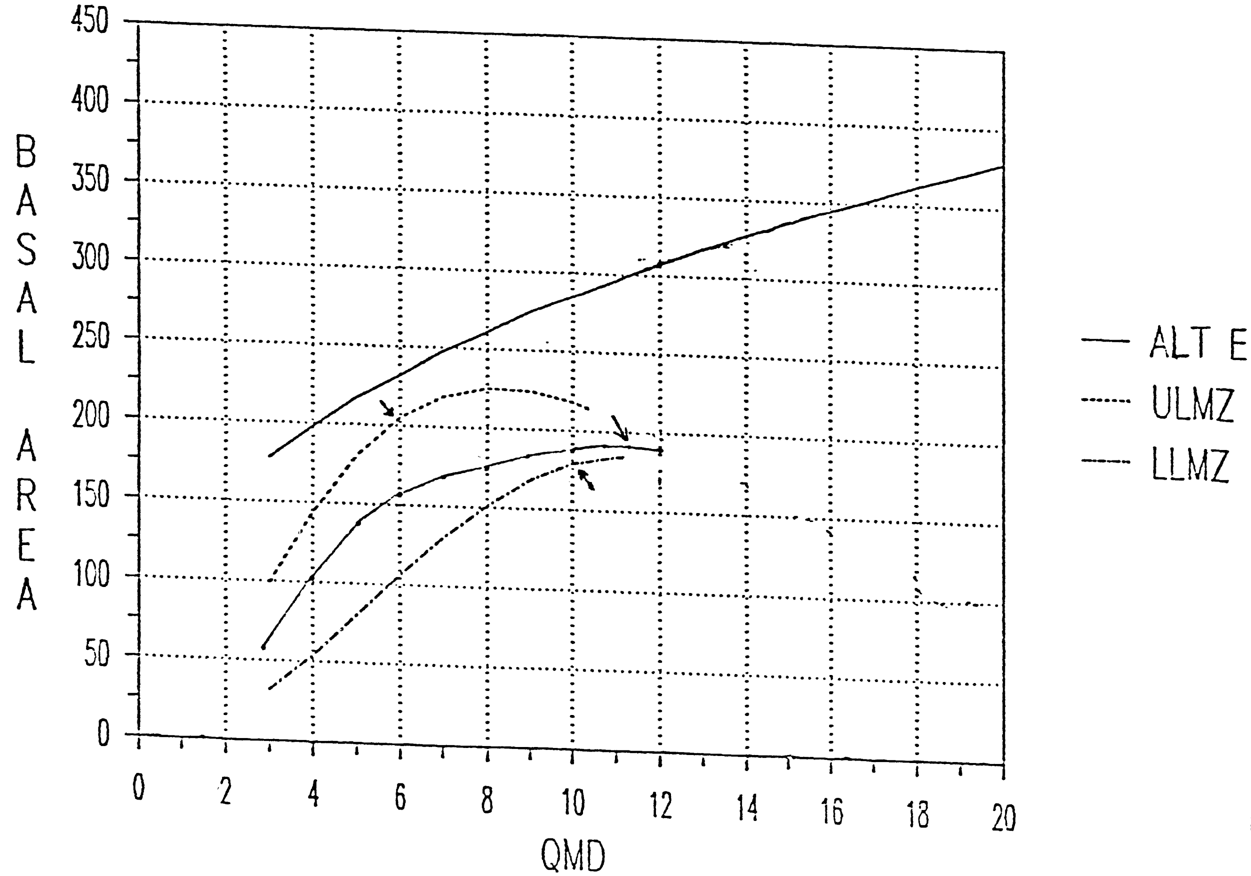
ALTERNATIVE D

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSII 10/87 R-1 SUPP 6

STAND GROWTH PROGNOSIS SYSTEM E VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	1556	14	0	0	51	155	66	23	2.8	2	73	3	.0
1999	12	1153	102	267	121	32	4.0	1417	127	419	0	0	0	0						10	92	3	.0
2009	22	992	137	323	153	38	5.0	2298	953	2937	0	0	0	0						10	104	16	.0
2019	32	793	156	349	167	45	6.0	3025	1837	5910	0	0	0	0						10	103	35	.0
2029	42	633	169	357	175	52	7.0	3727	2747	9738	0	0	0	0						10	119	49	.0
2039	52	519	176	354	179	56	7.9	4258	3468	13259	0	0	0	0						10	106	53	.0
2049	62	432	180	343	179	61	8.8	4756	4142	15705	0	0	0	0						10	103	59	.0
2059	72	365	184	342	179	66	9.6	5236	4736	19738	0	0	0	0						10	110	62	.0
2069	82	313	186	334	177	69	10.4	5647	5244	22439	0	0	0	0						10	103	62	.0
2079	92	270	187	326	175	74	11.3	6057	5717	25117	0	0	0	0						10	103	67	.0
2089	102	237	186	317	172	77	12.0	6378	6070	27132	0	0	0	0						10	94	62	.0
2099	112	207	185	307	163	81	12.8	6651	6381	29098	0	0	0	0						10	96	67	.0
2109	122	183	184	298	165	84	13.6	6931	6670	30539	0	0	0	0						10	92	65	.0
2119	132	162	181	287	161	88	14.3	7117	6872	32130	0	0	0	0						10	82	63	.0
2129	142	144	177	276	155	91	15.1	7259	7028	33072	0	0	0	0						10	81	66	.0

ACTIVITY SUMMARY

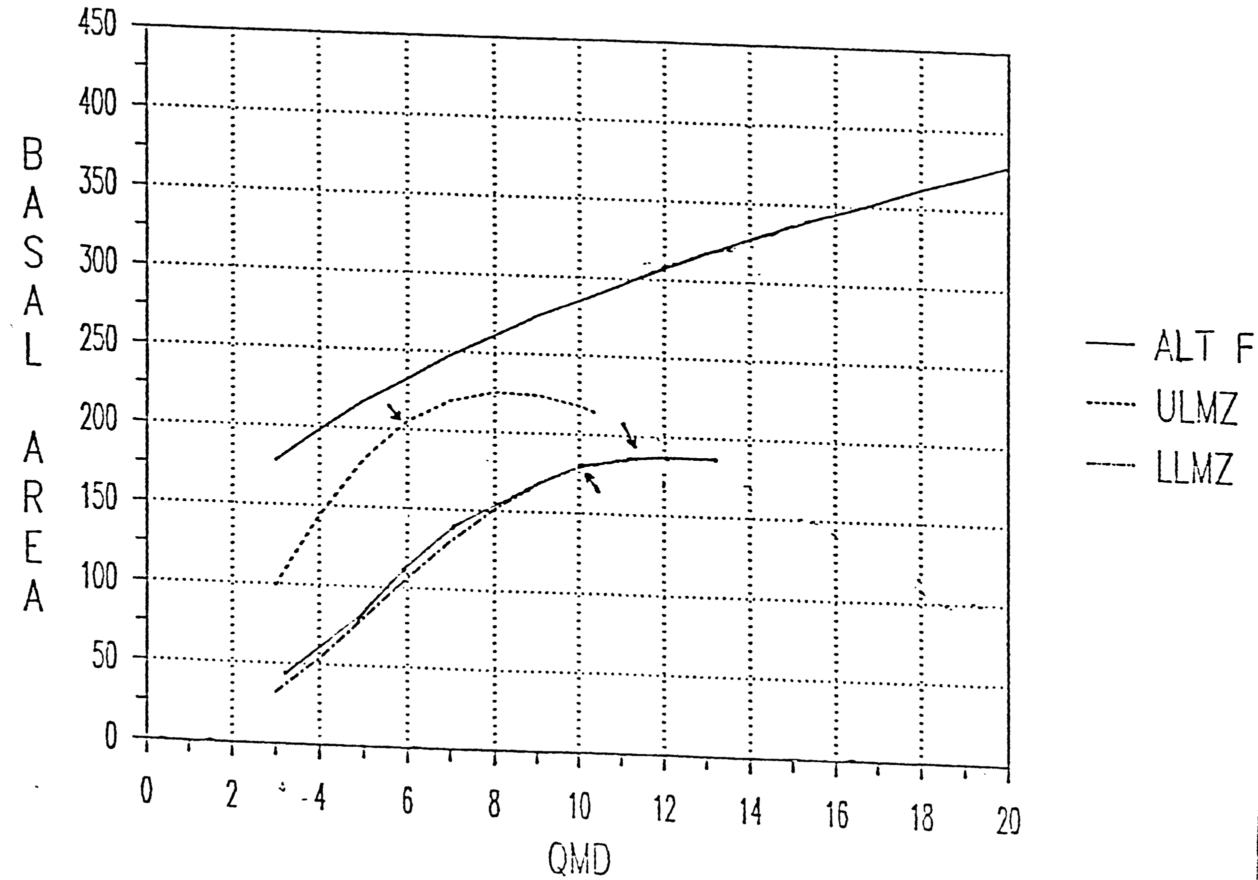
STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:		
1	1987							
2	1989							
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10 999.90
3	1999							
4	2009							
5	2019							
6	2029							
7	2039							
8	2049							
9	2059							
10	2069							
11	2079							
12	2089							
13	2099							
14	2109							
15	2119							

ALTERNATIVE E

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSII 10/87 R-1 SUPP 6

ALTERNATIVE F

STAND GROWTH PROGNOSIS SYSTEM F VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	2035	133	0	0	39	112	49	23	3.3	2	73	3	.0
1999	12	655	51	199	93	32	4.2	1218	159	634	0	0	0	0						10	80	2	.0
2009	22	597	113	255	123	41	5.9	2322	1098	3090	0	0	0	0						10	89	9	.0
2019	32	517	138	291	144	45	7.0	2843	2033	6651	0	0	0	0						10	105	23	.0
2029	42	446	155	311	155	52	8.0	3575	3027	10722	0	0	0	0						10	106	33	.0
2039	52	399	163	321	167	53	8.9	4238	3807	14536	0	0	0	0						10	110	43	.0
2049	62	335	177	326	175	62	9.8	4837	4531	18532	0	0	0	0						10	119	54	.0
2059	72	292	132	325	175	67	10.7	5391	5067	21573	0	0	0	0						10	107	57	.0
2069	82	253	135	321	174	71	11.5	5825	5523	24241	0	0	0	0						10	102	59	.0
2079	92	228	136	315	173	75	12.2	6293	5920	26556	0	0	0	0						10	99	61	.0
2089	102	201	136	307	170	79	13.0	6548	6231	28725	0	0	0	0						10	100	65	.0
2099	112	179	136	300	168	82	13.8	6876	6621	30734	0	0	0	0						10	96	64	.0
2109	122	161	135	292	165	86	14.5	7122	6878	32237	0	0	0	0						10	83	64	.0
2119	132	143	133	283	161	90	15.3	7342	7110	33556	0	0	0	0						10	90	68	.0
2129	142	129	130	274	157	93	16.0	7550	7328	34804	0	0	0	0						10	87	66	.0

ACTIVITY SUMMARY

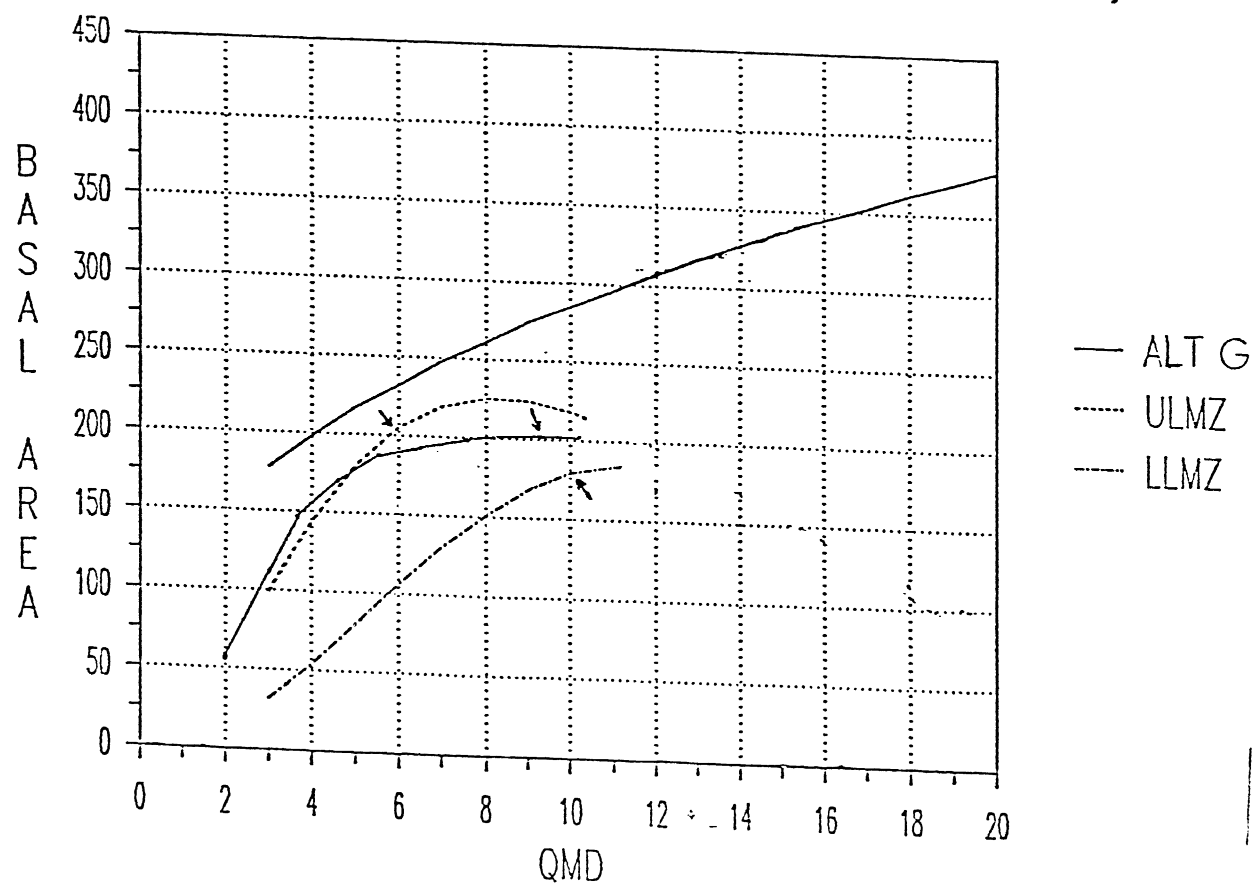
STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	681.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE F

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSH 10/87 R-1 SUPP 6

ALTERNATIVE G

STAND GROWTH PROGNOSIS SYSTEM G VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MERCH CU FT
1987	0	2925	41	155	55	20	1.6	346	0	0	0	0	0	0						0	0	0	.0
1989	2	2766	54	191	71	25	1.9	535	0	0	0	0	0	0						2	78	3	.0
1999	12	2073	112	341	137	32	2.4	1431	124	409	0	0	0	0						10	97	2	.0
2009	22	2134	149	405	172	38	3.6	2334	943	2936	0	0	0	0						10	106	16	.0
2019	32	1538	170	427	187	43	4.5	3176	1852	5901	0	0	0	0						10	117	33	.0
2029	42	1142	185	431	197	49	5.4	3928	2758	10049	0	0	0	0						10	125	49	.0
2039	52	863	192	425	194	55	6.4	4527	3570	13749	0	0	0	0						10	116	57	.0
2049	62	665	197	407	199	60	7.4	5074	4315	17414	0	0	0	0						10	117	62	.0
2059	72	528	200	394	197	64	8.3	5585	4954	20732	0	0	0	0						10	116	65	.0
2069	82	432	201	380	194	68	9.2	6005	5473	23436	0	0	0	0						10	105	63	.0
2079	92	356	201	365	191	73	10.2	6331	5925	25958	0	0	0	0						10	105	67	.0
2089	102	303	201	354	187	77	11.0	6730	6326	28313	0	0	0	0						10	101	67	.0
2099	112	260	199	341	182	80	11.8	7022	6651	30293	0	0	0	0						10	95	67	.0
2109	122	224	196	327	177	84	12.7	7262	6930	31954	0	0	0	0						10	93	69	.0
2119	132	196	193	315	173	87	13.5	7432	7174	33453	0	0	0	0						10	92	70	.0
2129	142	173	190	303	169	90	14.2	7652	7372	34606	0	0	0	0						10	83	66	.0

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@ASG,A PROGNOSIS*WOSUBHIT.
W:120133 file is already assigned.

@XQT PROGNOSIS*WOSUBHIT.RESEED

@USE 2.,R01-FOR10*D-4532706.

@XQT TMYIELD*PROGNOSIS52.PROD
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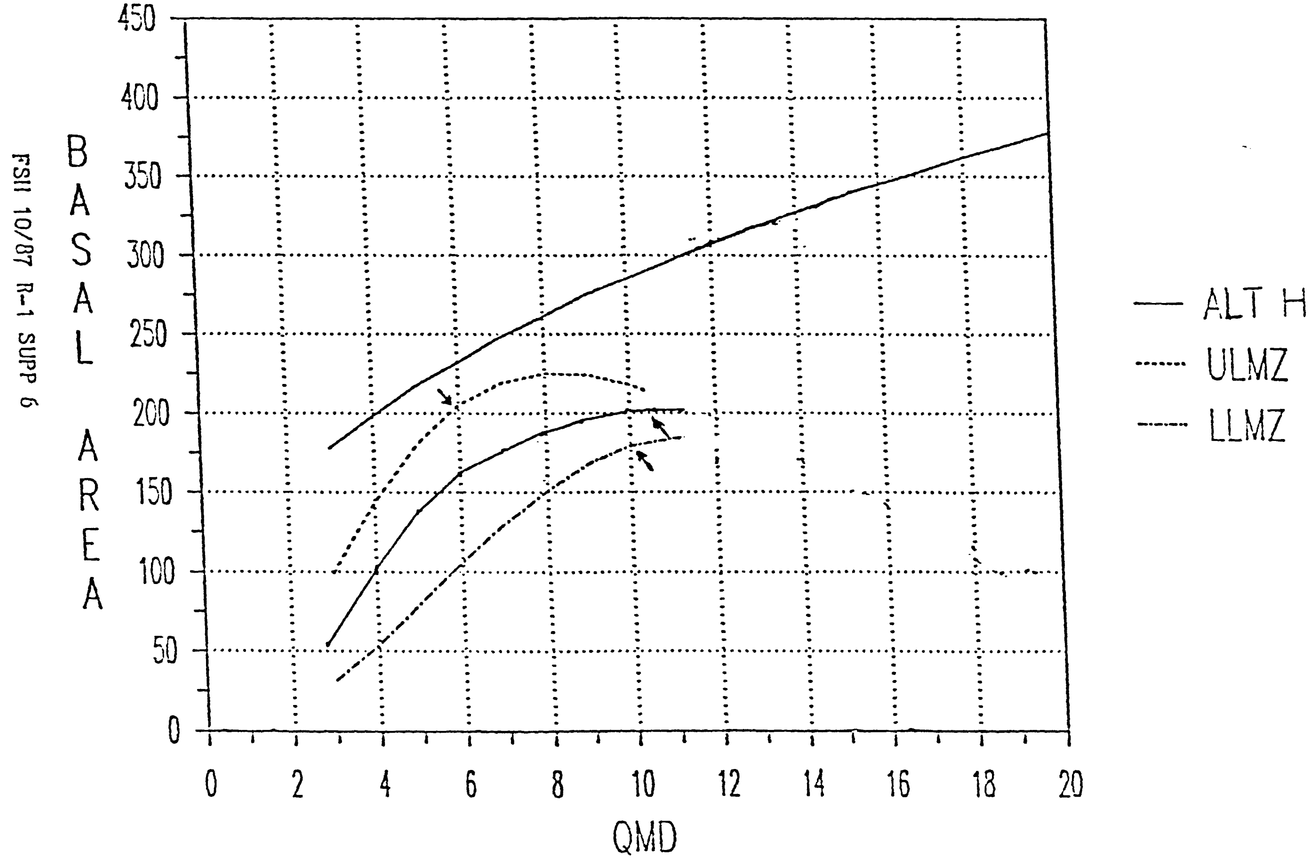
ALTERNATIVE G

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



STAND GROWTH PROGNOSIS SYSTEM **H** VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2766	54	191	71	23	1.9	535	0	0	1556	14	0	0	51	155	66	23	2.3	2	73	3	.0
1999	12	1151	133	269	121	32	4.0	1427	128	422	0	0	0	0						10	93	2	.0
2009	22	1012	140	335	155	38	5.0	2349	974	3030	0	0	0	0						10	106	14	.0
2019	32	817	151	361	173	45	6.0	3137	1920	6178	0	0	0	0						10	111	33	.0
2029	42	661	177	372	134	51	7.0	3830	2511	10041	0	0	0	0						10	119	45	.0
2039	52	546	185	373	183	56	7.9	4478	3642	13833	0	0	0	0						10	110	50	.0
2049	62	457	193	372	192	61	8.8	5091	4444	17946	0	0	0	0						10	119	53	.0
2059	72	388	198	367	193	66	9.7	5636	5117	21439	0	0	0	0						10	116	61	.0
2069	82	335	200	360	191	70	10.5	6093	5655	24354	0	0	0	0						10	103	62	.0
2079	92	290	200	350	188	74	11.3	6457	6095	26759	0	0	0	0						10	102	66	.0
2089	102	253	200	347	185	78	12.0	6816	6491	29054	0	0	0	0						10	105	69	.0
2099	112	223	200	331	182	81	12.8	7168	6667	31345	0	0	0	0						10	102	66	.0
2109	122	196	197	320	177	84	13.6	7426	7147	33092	0	0	0	0						10	94	69	.0
2119	132	173	194	308	172	87	14.3	7601	7339	34290	0	0	0	0						10	83	71	.0
2129	142	153	191	297	168	91	15.1	7800	7552	35538	0	0	0	0						10	90	70	.0

ACTIVITY SUMMARY

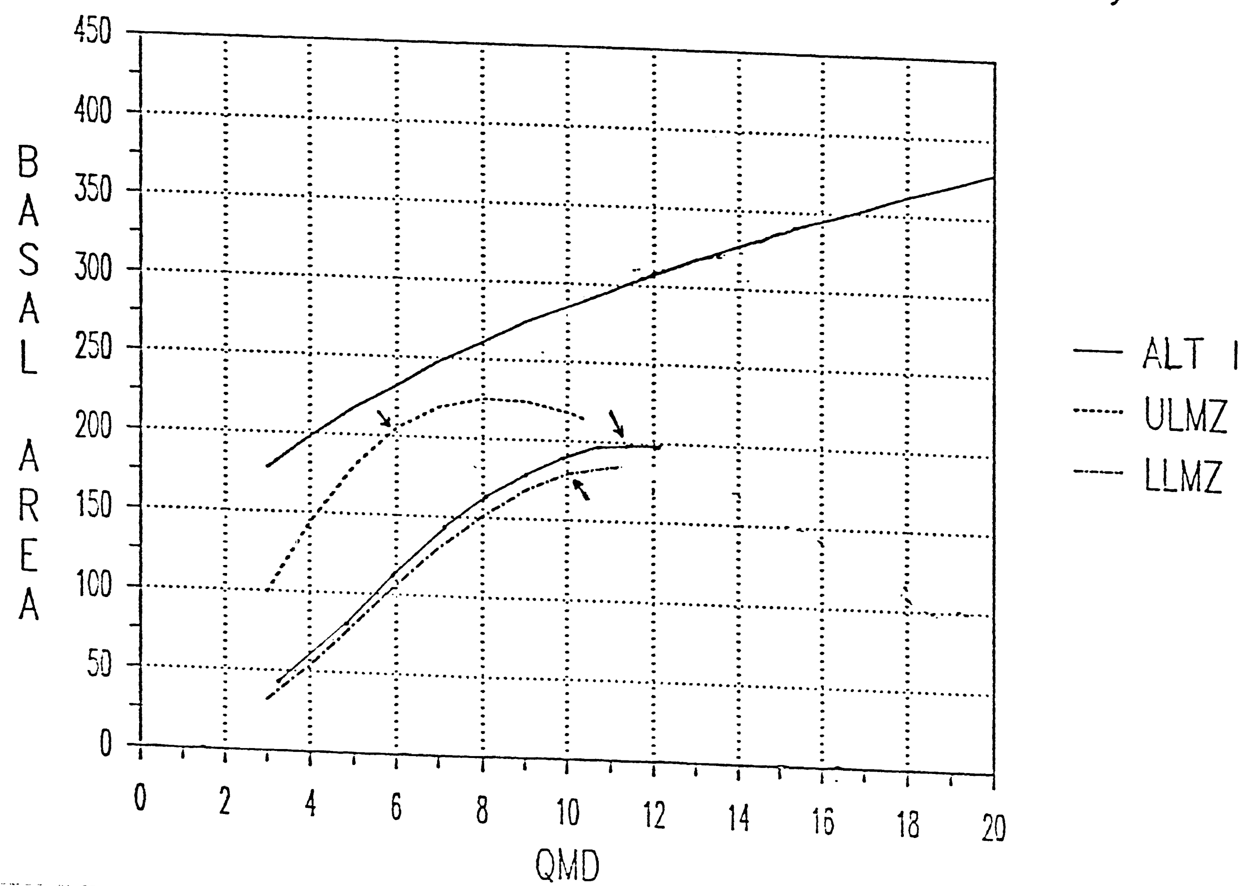
STAND ID= 82701056 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE H

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSII 10/87 R-1 SUPP 6

ALTERNATIVE I

STAND GROWTH PROGNOSIS SYSTEM | VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2756	54	191	71	23	1.9	535	0	0	2095	103	0	0	39	112	49	23	3.3	2	73	3	.0
1999	12	637	32	203	93	32	4.8	1223	139	607	0	0	0	0						10	81	2	.0
2009	22	605	114	258	125	41	5.9	2051	1024	3139	0	0	0	0						10	91	3	.0
2019	32	531	142	294	143	45	7.0	2923	2145	6858	0	0	0	0						10	103	20	.0
2029	42	466	162	324	165	53	8.0	3723	3138	11191	0	0	0	0						10	110	30	.0
2039	52	410	176	338	175	58	8.9	4453	4003	15305	0	0	0	0						10	113	40	.0
2049	62	359	186	344	182	62	9.7	5092	4712	19150	0	0	0	0						10	112	48	.0
2059	72	314	193	345	185	66	10.6	5667	5321	22608	0	0	0	0						10	114	56	.0
2069	82	277	196	341	185	70	11.4	6132	5811	25385	0	0	0	0						10	104	58	.0
2079	92	245	198	335	184	74	12.2	6555	6253	27970	0	0	0	0						10	105	63	.0
2089	102	217	199	328	182	78	13.0	6951	6665	30423	0	0	0	0						10	105	65	.0
2099	112	193	199	321	179	82	13.7	7313	7045	32597	0	0	0	0						10	103	66	.0
2109	122	172	198	313	176	86	14.5	7633	7373	34497	0	0	0	0						10	100	68	.0
2119	132	154	197	304	173	89	15.3	7894	7644	36065	0	0	0	0						10	96	69	.0
2129	142	139	194	295	167	93	16.0	8125	7855	37339	0	0	0	0						10	92	69	.0

ACTIVITY SUMMARY

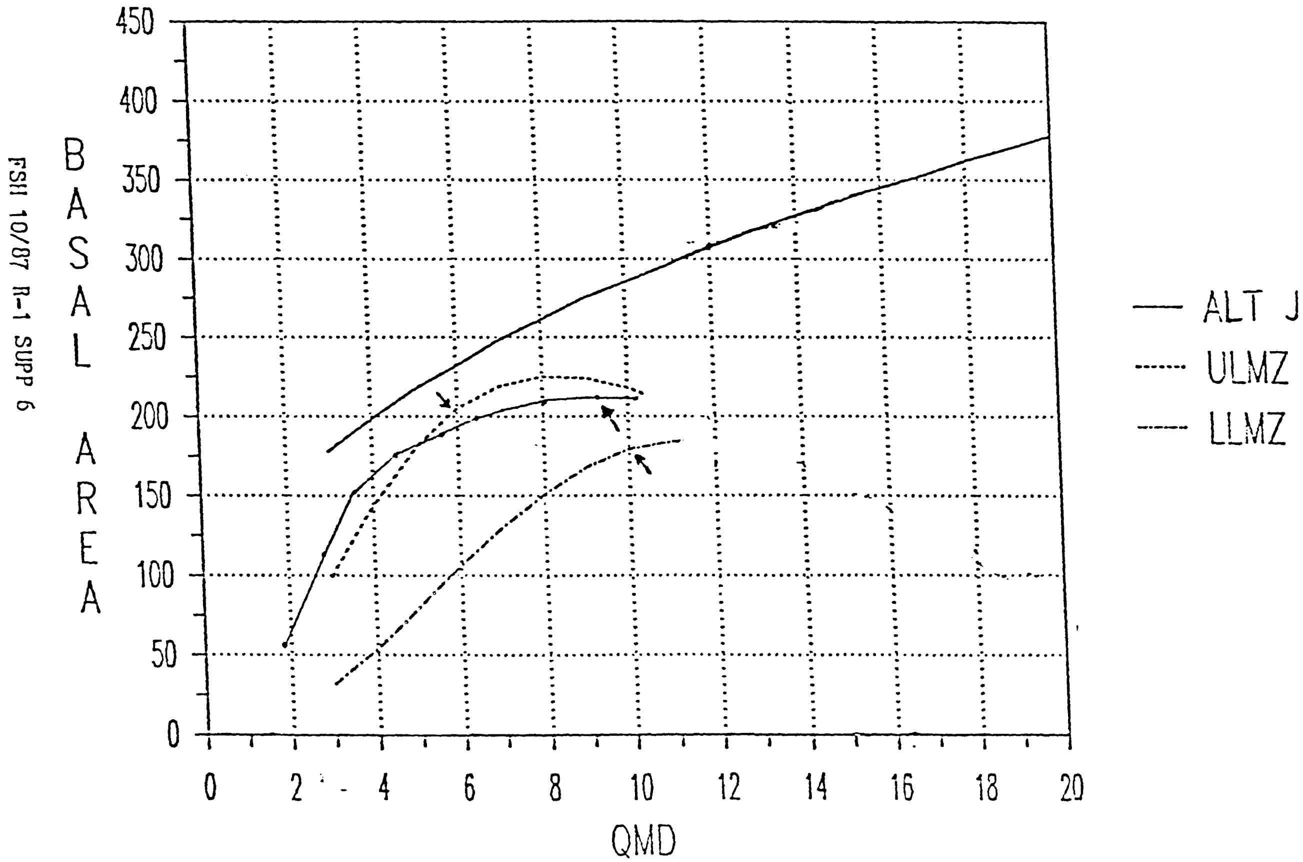
STAND ID= 82701066 MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINSTA	1990	DONE IN 1989	531.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

ALTERNATIVE I

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



ALTERNATIVE J

ALTERNATIVE J

STAND GROWTH PROGNOSIS SYSTEM J VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

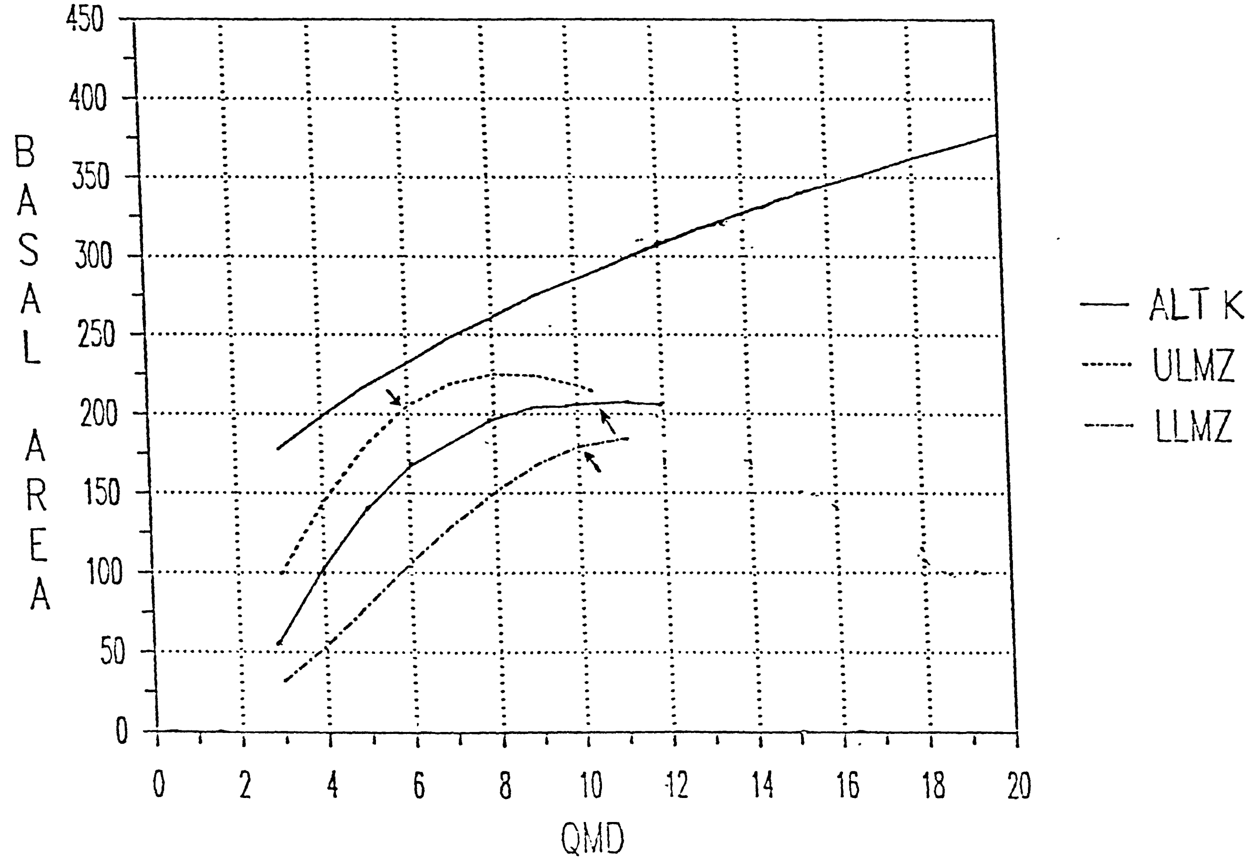
		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			MAI
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MERCH CU FT
1987	0	2925	41	156	55	20	1.6	336	0	0	0	0	0	0						0	0	0	.0
1989	2	2767	54	191	71	23	1.9	536	0	0	0	0	0	0						2	73	3	.0
1999	12	2639	113	343	138	32	2.8	1449	125	411	0	0	0	0						10	97	2	.0
2009	22	2129	151	415	175	38	3.6	2425	962	2956	0	0	0	0						10	103	14	.0
2019	32	1565	175	433	192	44	4.5	3256	1267	5963	0	0	0	0						10	119	35	.0
2029	42	1170	192	445	204	49	5.5	4072	2929	10439	0	0	0	0						10	126	46	.0
2039	52	889	202	439	209	55	6.5	4747	3730	14404	0	0	0	0						10	122	54	.0
2049	62	637	208	423	207	61	7.5	5364	4537	18495	0	0	0	0						10	123	61	.0
2059	72	548	211	415	203	65	8.4	5890	5232	21935	0	0	0	0						10	115	63	.0
2069	82	446	213	400	205	69	9.3	6341	5835	24994	0	0	0	0						10	110	65	.0
2079	92	371	214	383	203	73	10.3	6746	6332	27675	0	0	0	0						10			

* ERROR: BAD DATA RECORD

FSII 10/87 R-1 SUPP 6

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



ALTERNATIVE K

STAND GROWTH PROGNOSIS SYSTEM K VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER YEAR	MORT PER YEAR	MAI MERCH CU FT
1987	0	2925	41	155	55	20	1.6	356	0	0	0	0	0	0						0	0	0	.0
1989	2	2767	54	191	71	23	1.9	536	0	0	1557	14	0	0	51	155	66	23	2.3	2	72	3	.0
1999	12	1166	103	271	122	32	4.0	1434	128	424	0	0	0	0						10	93	2	.0
2009	22	1026	142	340	155	35	5.0	2333	991	3053	0	0	0	0						10	107	13	.0
2019	32	832	168	374	179	45	6.1	3277	2035	6515	0	0	0	0						10	121	31	.0
2029	42	634	184	387	191	49	7.0	4020	2996	10475	0	0	0	0						10	114	40	.0
2039	52	569	195	392	193	55	7.9	4711	3865	14738	0	0	0	0						10	113	49	.0
2049	62	479	202	390	201	60	8.3	5315	4679	18615	0	0	0	0						10	115	55	.0
2059	72	406	207	385	202	65	9.7	5954	5353	22316	0	0	0	0						10	119	62	.0
2069	82	350	210	377	200	69	10.5	6543	5832	25233	0	0	0	0						10	107	63	.0
2079	92	304	211	366	193	72	11.3	6773	6336	29064	0	0	0	0						10	109	65	.0
2089	102	255	209	355	193	75	12.0	7065	6721	30139	0	0	0	0						10	97	68	.0
2099	112	230	207	343	139	80	12.8	7338	7077	32305	0	0	0	0						10	105	74	.0
2109	122	204	205	333	185	83	13.6	7637	7392	34135	0	0	0	0						10	97	68	.0
2119	132	180	202	320	179	86	14.3	7876	7604	35524	0	0	0	0						10	92	73	.0
2129	142	159	198	303	174	90	15.1	8052	7795	36692	0	0	0	0						10	90	72	.0

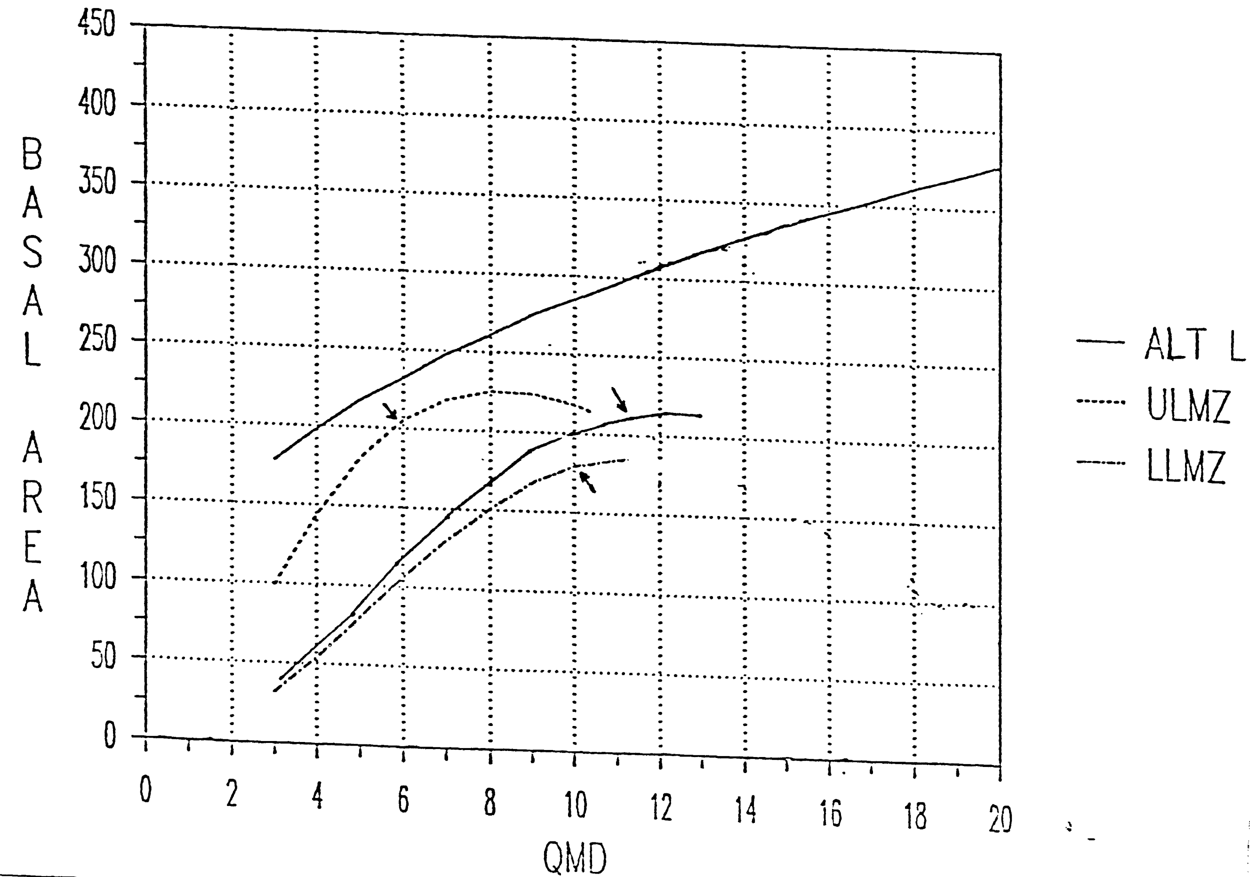
ACTIVITY SUMMARY

STAND ID= 82701066   MANAGEMENT ID= NONE

CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	1210.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



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ALTERNATIVE L

ALTERNATIVE L

STAND GROWTH PROGNOSIS SYSTEM — VERSION 5.2 -- INLAND EMPIRE

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	DOM HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	DOM HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1987	0	2925	41	156	55	20	1.6	386	0	0	0	0	0	0						0	0	0	.0
1989	2	2757	54	191	71	23	1.9	536	0	0	2036	133	0	0	39	112	49	23	3.3	2	73	3	.0
1999	12	659	82	201	94	32	4.8	1227	170	639	0	0	0	0						10	81	2	.0
2009	22	611	116	261	125	41	5.9	2071	1034	3172	0	0	0	0						10	91	7	.0
2019	32	540	144	304	151	45	7.0	2979	2139	7030	0	0	0	0						10	110	19	.0
2029	42	478	156	333	169	53	8.0	3829	3247	11511	0	0	0	0						10	112	27	.0
2039	52	424	164	352	184	58	8.9	4646	4173	15967	0	0	0	0						10	120	33	.0
2049	62	375	195	361	191	62	9.8	5352	4940	20112	0	0	0	0						10	116	46	.0
2059	72	329	204	364	195	68	10.7	6011	5641	24021	0	0	0	0						10	123	57	.0
2069	82	292	209	362	197	72	11.4	6548	6207	27139	0	0	0	0						10	111	57	.0
2079	92	259	211	357	196	75	12.2	7004	6683	29937	0	0	0	0						10	109	64	.0
2089	102	230	210	343	192	79	13.0	7351	7049	32160	0	0	0	0						10	105	70	.0
2099	112	203	209	337	183	82	13.7	7653	7367	34113	0	0	0	0						10	102	72	.0
2109	122	180	206	325	183	86	14.5	7875	7604	35601	0	0	0	0						10	96	74	.0
2119	132	161	202	314	176	89	15.2	8063	7806	36845	0	0	0	0						10	92	73	.0
2129	142	144	199	303	173	92	15.9	8247	8001	37974	0	0	0	0						10	92	73	.0

ACTIVITY SUMMARY

STAND ID= 82701066 MANAGEMENT ID= NONE

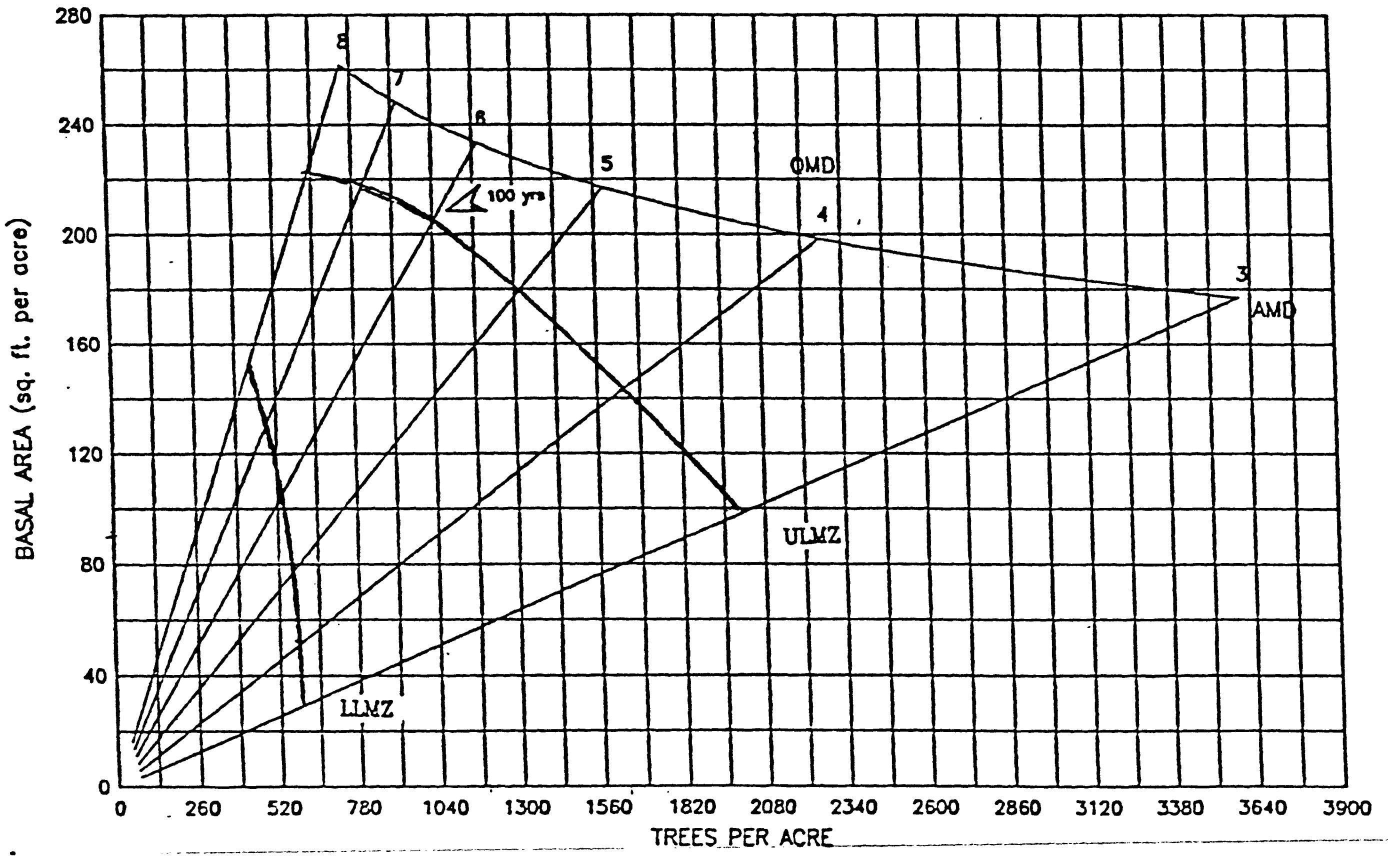
CYCLE	DATE	EXTENSION	KEYWORD	DATE	ACTIVITY DISPOSITION	PARAMETERS:			
1	1987								
2	1989								
		BASE	THINBTA	1990	DONE IN 1989	631.00	.98	.10	999.90
3	1999								
4	2009								
5	2019								
6	2029								
7	2039								
8	2049								
9	2059								
10	2069								
11	2079								
12	2089								
13	2099								
14	2109								
15	2119								

APPENDIX G

REGION ONE STOCKING GUIDES

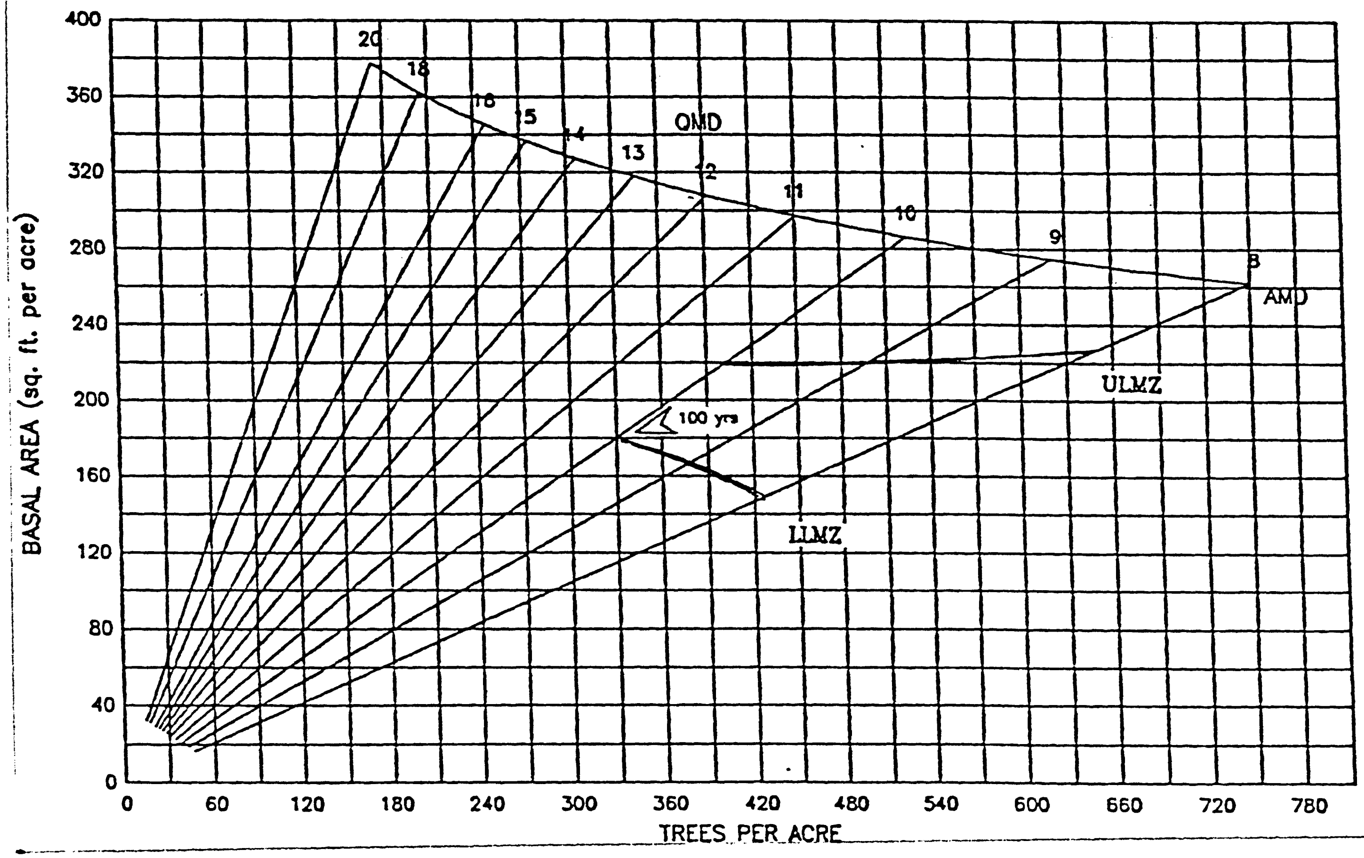
STOCKING CHART—REGION 1 ID/W MT LP

managed lodgepole pine stds or mixed spp stds with lpp
Mgt Zone: maximize bd ft volume at rotation of 100 yrs



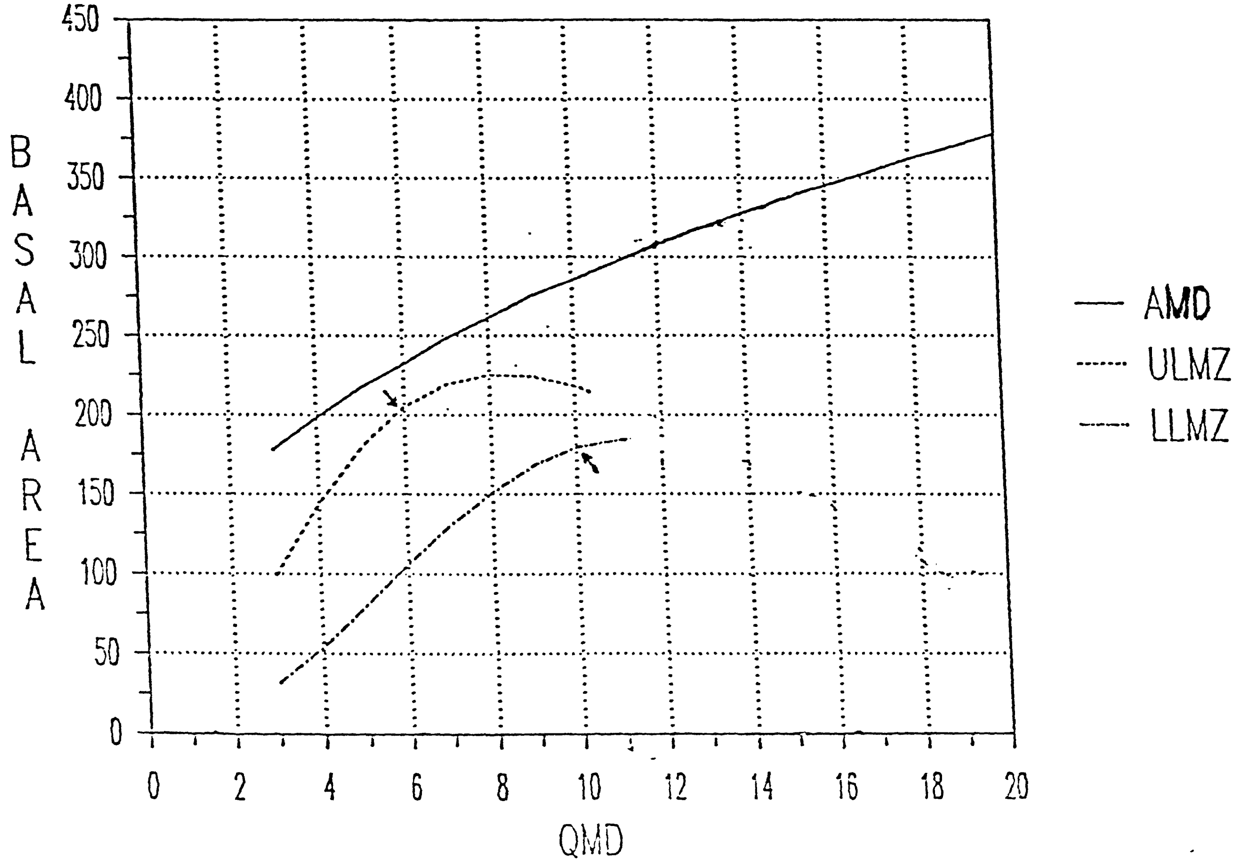
STOCKING CHART—REGION 1 ID/W MT LP

managed lodgepole pine stds or mixed spp stds with lpp
Mgt Zone: maximzie bd ft volume at rotation of 100 yrs



STOCKING CHART–REGION 1 ID/W MT LP

Mgt Zone: maximize bd ft vol at rotation of 100 yrs



FSII 10/87 R-1 SUPP 6

APPENDIX H

ECONOMIC ANALYSIS

ECONOMIC ANALYSIS 4

RX4

DATE: 89/04/21

ALL COSTS DISCOUNTED TO 1989
DISCOUNT RATE IS 4 %
REAL PRICE INCREASES ARE USED

NUMBER OF ENTRIES = 2

TOTAL PV COLLECTOR ROADS	($)	=	+0
TOTAL PV LOCAL ROADS	($)	=	+0
TOTAL PV PRECOMM THIN	($)	=	-2769
TOTAL PV SALE PREP	($)	=	-456
TOTAL PV PLANTING	($)	=	-18
TOTAL PV SITE PREP	($)	=	-83
TOTAL PV ROAD MTCE	($)	=	-284
TOTAL PV ENGINEERING	($)	=	+0
TOTAL PV OTHER COSTS	($)	=	-37
TOTAL ACRES ACCESSED	(ACRES)	=	32
TOTAL VOLUME REMOVED	(MBF)	=	781
TOTAL PV OF VALUES	($)	=	+4805
TOTAL PV OF COSTS	($)	=	-3647
TOTAL PRESENT NET VALUE(PNV)	($)	=	+1158
TOTAL PNV PER ACRE	($/ACRE)	=	+36
BENEFIT-COST RATIO		=	1.318

ALTERNATIVE 4

ECONOMIC ANALYSIS 6

RX-6
(CLI FILE NAME IS ALT5)

DATE: 89/04/21
ALL COSTS DISCOUNTED TO 1989
DISCOUNT RATE IS 4 %
REAL PRICE INCREASES ARE USED

NUMBER OF ENTRIES = 3

TOTAL PV COLLECTOR ROADS	($)	=	+0
TOTAL PV LOCAL ROADS	($)	=	+0
TOTAL PV PRECOMM THIN	($)	=	-2759
TOTAL PV SALE PREP	($)	=	-432
TOTAL PV PLANTING	($)	=	-8
TOTAL PV SITE PREP	($)	=	-38
TOTAL PV ROAD MTCE	($)	=	-203
TOTAL PV ENGINEERING	($)	=	+0
TOTAL PV OTHER COSTS	($)	=	-32
TOTAL ACRES ACCESSED	(ACRES)	=	64
TOTAL VOLUME REMOVED	(M3F)	=	1014
TOTAL PV OF VALUES	($)	=	+3758
TOTAL PV OF COSTS	($)	=	-3433
TOTAL PRESENT NET VALUE(PNV)	($)	=	+275
TOTAL PNV PER ACRE	($/ACRE)	=	+4
BENEFIT-COST RATIO		=	1.078

ALTERNATIVE 6

ECONOMIC ANALYSIS 7

RX7

DATE: 89/04/21

ALL COSTS DISCOUNTED TO 1989
DISCOUNT RATE IS 4 %
REAL PRICE INCREASES ARE USED

NUMBER OF ENTRIES = 2

TOTAL PV COLLECTOR ROADS	($)	=	+0
TOTAL PV LOCAL ROADS	($)	=	+0
TOTAL PV PRECOMM THIN	($)	=	-2769
TOTAL PV SALE PREP	($)	=	-471
TOTAL PV PLANTING	($)	=	-18
TOTAL PV SITE PREP	($)	=	-33
TOTAL PV ROAD MTCE	($)	=	-293
TOTAL PV ENGINEERING	($)	=	+0
TOTAL PV OTHER COSTS	($)	=	-39
TOTAL ACRES ACCESSED	(ACRES)	=	32
TOTAL VOLUME REMOVED	(M3F)	=	806
TOTAL PV OF VALUES	($)	=	+5026
TOTAL PV OF COSTS	($)	=	-3672
TOTAL PRESENT NET VALUE(PNV)	($)	=	+1353
TOTAL PNV PER ACRE	($/ACRE)	=	+42
BENEFIT-COST RATIO		=	1.369

ALTERNATIVE 7

ECONOMIC ANALYSIS 9

RX9

DATE: 89/04/21

ALL COSTS DISCOUNTED TO 1989
DISCOUNT RATE IS 4 %
REAL PRICE INCREASES ARE USED

NUMBER OF ENTRIES = 2

TOTAL PV COLLECTOR ROADS	($)	=	+0
TOTAL PV LOCAL ROADS	($)	=	+0
TOTAL PV PRECOMM THIN	($)	=	-2769
TOTAL PV SALE PREP	($)	=	-259
TOTAL PV PLANTING	($)	=	-8
TOTAL PV SITE PREP	($)	=	-38
TOTAL PV ROAD MTCE	($)	=	-161
TOTAL PV ENGINEERING	($)	=	+0
TOTAL PV OTHER COSTS	($)	=	-21
TOTAL ACRES ACCESSED	(ACRES)	=	32
TOTAL VOLUME REMOVED	(MBF)	=	973
TOTAL PV OF VALUES	($)	=	+2960
TOTAL PV OF COSTS	($)	=	-3257
TOTAL PRESENT NET VALUE(PNV)	($)	=	-297
TOTAL PNV PER ACRE	($/ACRE)	=	-9
BENEFIT-COST RATIO		=	.909

ALTERNATIVE 9