FOREST LAND ENHANCEMENT PROGRAM PLAN

for

HORSESHOE SPRINGS ASSOCIATION

JULY 2004

Prepared By: Eldorado Environmental Consultants
David D. Brown, Forester

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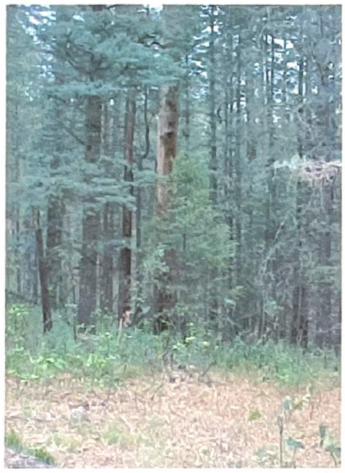
INTRODUCTION:

Horseshoe Springs is an association of mostly second homes in the La Cueva, New Mexico area. The homes are nestled in the forest, either north or south of the main entrance road from the east (NM 126). The northern portion will be called the Horseshoe Loop Area, and the southern portion will be called the Horseshoe Hollow Area for the purposes of this report. There are privately owned lots and association, common lands, totaling 130 acres. There are about 60 acres in private tracts, 6 acres of roads, and 64 acres of common area at Horseshoe Springs.



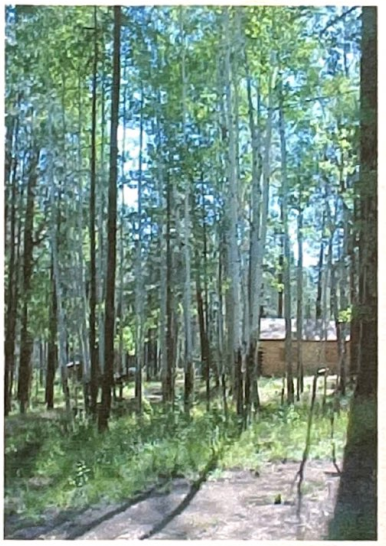
Goals: The primary goal is fire safety. Closely tied to this goal is forest health. The two areas of concern for fire protection are the canyon on the north, and the east side of the property. These areas are adjacent to, and uphill from probable ignition sources. Those ignition sources are private land and houses to the east, and San Antonio Campground directly east of the canyon. A sanitation harvest is nearly complete throughout the property. The harvest took large pines and Douglas-firs, which were either hazard trees or "faders." The final goal is safe recreation opportunities for the Horseshoe Springs community.

History: Horseshoe Springs was established as an area for private summer vacation homes in the Santa Fe National Forest in the 1950's, when the policies of the USDA Forest Service encouraged use of the forests. Fifty-three 'lots' were established, but only 50 were used for summer homes in the area. The lots were property of the Forest, and the cabins were property of the permittees. A rumor in the 1990's that the Forest Service was to phase out all summer home permits prompted Horseshoe Springs permittees to investigate the possibility of a land exchange. The Forest Service was called to designate a comparable piece of private land in the National Forest that they wished to acquire. The Association would purchase the land which was to be of equal value to Horseshoe Springs, which would then be exchanged with the Forest Service. After five years, the project was completed with the land becoming both private and corporately owned. Each cabin had to purchase at least ¾ of an acre to meet Sandoval County septic tank laws, but could purchase up to 2 acres. The rest of the land became 'common ownership land.' A set of covenants and restrictions were drafted based on the Forest Service lease restrictions. The Association reorganized to oversee the operation and ownership of the land, and is governed by the by-laws and a Board of Directors.

Archaeological Sites: There are three ancestral Jemez archaeological sites at Horseshoe Springs. A detailed site identification and analysis has been prepared for the Horseshoe Springs Association, as a condition for the land exchange with the Forest Service. The plan was prepared by TRC from Albuquerque in September 1999 and submitted to the Forest Service. This is on file with the Horseshoe Springs Association.

These sites have been excavated and are protected from disturbances. (Please see the report from TRC for further information.)

PROPERTY DESCRIPTION:



The Horseshoe Springs property is located approximately one mile northwest of La Cueva, in Township 19 North, Range 3 East, Sections 17 and 18. The total acreage is approximately 130 acres. The property is bordered by Santa Fe National Forest on the north, south and west; and private lands on the east.

Soils: There are four soils types (see soils map). The predominate type, covering most of Horseshoe Springs, is Mollic Eutroboralfs (SFNF TES Unit 630). It is a loamy-skeletal mixed soil of deep, cindery, sandy loam on 0-15% slopes. The northern edge of the property (Canyon North) is Eutric Glossoboralfs (SFNF TES Unit 137). This soil is a deep, fine, mixed loam on 15-40% slopes. A small portion of the north east portion of the property is Typic Eutroboralfs (SFNF TES Unit 626). This is a deep, fine-loamy mixed, cindery, sandy loam on 15-40% slopes. Two small intrusions on the southwest and west sides are Andic Dystrochrepts (658). This is an ashy sandy loam.

The properties of the Mollic Eutroboralfs (630) include high potential for revegetation and moderate potential for reforestation. The erosion hazard is severe and windthrow hazard slight. The average site index for ponderosa pine (*Pinus ponderosa*) is 70 on this soil. Potential tree and shrub canopy cover is 65% for ponderosa pine, 6% for Gambel oak (*Quercus gambelii*), 1% Fendler ceanothus (*Ceanothus fendleri*), 2% Oregon grape (*Berberis repens*) and a trace of kinnickinick (*Arctostaphylos uva-ursi*). Potential forb and graminoid canopy cover is about 20%, with Arizona fescue (*Festuca arizonica*) the highest at 5%.

The properties of the Eutric Glossorboralfs (137) include moderate potential for revegetation and moderate potential for reforestation. The erosion hazard is moderate and windthrow hazard is severe. The average site indexes for ponderosa pine is 65 and for Douglas-fir (*Pseudotsuga menziesii*) is 70 on this soil. Potential tree canopy cover is 30% for white fir, 15% for ponderosa pine, 10% for aspen, and 30% for Douglas-fir. Potential shrub canopy cover is about 18%, with 8% Gambel oak highest. Potential forb and graminoid canopy cover is about 17%, with the greatest amount being forbs.

The properties of the Typic Eutroboralfs (626) include moderate potential for revegetation and moderate potential for reforestation. The erosion hazard is moderate and windthrow hazard slight. The average site index for ponderosa pine 65 on this soil. Potential tree canopy cover is about 68% with 65% from ponderosa pine. Potential shrub

cover is about 8% with 5% Gambel oak. Potential forb and graminoid canopy cover is about 20% with the greatest amount of an individual 5% of Arizona fescue.

The properties of the Andic Dystrochrepts (658) include moderate potential for revegetation and moderate potential for reforestation. The erosion hazard is severe and windthrow hazard slight. The average site index for ponderosa pine is 62, and the average site index for Douglas-fir is 65 on this soil. Potential tree canopy cover is 85% with 30% from white fir, 15% from ponderosa pine, 10% from aspen (*Populus tremuloides*) and 30% from Douglas-fir. Potential shrub cover is about 18% with Gambel oak at 8%. Potential forb and graminoid canopy cover is about 17% with fleabane (*Erigeron eximius*) at 5%.

Insects and Disease: The white fir (*Abies concolor*) and Douglas-fir show evidence of past western spruce budworm (*Choristoneura occidentalis*) infestations. This evidence includes branch and tip mortality, as well as whole tree mortality. Multi-storied stands with these species as major components are particularly susceptible to damage. Thinning to reduce these species, favoring the ponderosa pine, will reduce the risk of further western spruce budworm infestations. A single-storied stand of these species reduces the potential damage of individual trees during an infestation.

Additional insect activity, which is evidenced, includes the pine bark beetle (*Dendroctonus spp.*). Several ponderosa pine in the area show evidence, pitch tubes and boring dust, of bark beetle attack. This insect is a natural component of the ponderosa pine type, but rarely goes to epidemic stages. Maintaining good forest health, including individual tree vigor, is a key in reducing damage from this insect.

A major disease of coniferous trees is dwarf mistletoe (*Arceuthobium spp.*). Two dwarf mistletoes are common in the Southwest. The first is ponderosa pine dwarf mistletoe. There is no evidence of ponderosa pine dwarf mistletoe in Horseshoe Springs. The second is Douglas-fir dwarf mistletoe. Some of the Douglas-fir throughout the area is infested with the disease. This disease is relatively virulent and can cause major branch mortality and whole tree mortality. Whole tree mortality is especially common in saplings and poletimber. Again, good forest health, including individual tree vigor, is important in reducing the potential for damage from these diseases.

No other insect pests or diseases were noted.

Wildfires: The Southwest, in particular the ponderosa pine type, is a fire-related ecosystem. This ecosystem depended on periodic, low intensity wildfires to maintain the health of the stand and the ecosystem as a whole. This type of wildfire has largely been withheld from the ecosystem for the past 150 years or so. The structure of the ecosystem has changed considerably during that period. It has changed to the point that during certain times of the year, wildfires have the potential of becoming catastrophic. Catastrophic = high intensity and stand replacement, compared to low intensity and stand maintenance. The Jemez Mountains have a history over the last 30 years of high intensity, stand replacement fires (Cerro Grande Fire, Dome Fire, Porter Fire, etc.).

Portions of Horseshoe Springs are conducive for a catastrophic fire. See the following section for the state of overstory vegetation at Horseshoe Springs and the recommendations for reducing the risk of a catastrophic fire.

Threatened and Endangered Animals: Only one endangered invertebrate is found in Sandoval County, the *Stagnicola caperata* (wrinkled marshsnail). It has been documented only near Cerro La Jara.

There are no threatened or endangered fishes in Sandoval County. There is one threatened amphibian found in Sandoval County, *Plethodon neomexicanus* (Jemez Mountains salamander). It is found between 7200 and 9550 feet in elevation in mixed conifer dominated by Douglas-fir, white fir, Engelmann and blue spruces, Rocky Mountain maple, ponderosa pine and New Mexico locust.

There are no threatened or endangered reptiles found in Sandoval County. Two threatened birds are found in Sandoval County, *Falco peregrinus* (peregrine falcon) and *Aegolius funereus* (boreal owl). The boreal owl reaches its southernmost limits in the mountains of northern New Mexico. This species is resident in the Jemez Mountains in small numbers.

One endangered mammal occurs in Sandoval County, *Tamias minimus atristriatus* (Penasco least chipmunk). This chipmunk occurs from central Yukon southward to New Mexico. They occur in the northern mountains, including the Jemez Mountains (endangered in Penasco Canyon in the Sacramento Mountains). There are three threatened mammals, which may occur in the Jemez Mountains. *Euderma maculatum* (spotted bat) occurs locally in the Jemez Mountains. It has been recorded in a variety of forest types, from woodlands to spruce-fir, 3,900 to 10,600 feet in elevation. *Zapus hudsonius* (meadow jumping mouse) occurs in the upper Guadalupe River drainage of the Jemez Mountains. Vegetation in the mouse's habitat include *Caryx* spp. (sedges), numerous grasses (*Poa*, *Bromus*) and *Juncus* spp. along stream sides. *Martes americana* (American marten) may occur, without verification, in the Jemez Mountains. The American marten prefers mature spruce, Douglas-fir, and fir forests with fallen logs and stumps.

FOREST DESCRIPTION:

Historically, this area was probably a relatively open-grown stand of ponderosa pine, as evidenced by the number of large, old growth pine scattered throughout the area, and the lack of large, old growth white fir and Douglas-fir. This changed, as did much of the western United States, with grazing and fire exclusion. Species, which do well as intermediate and understory trees began to thrive. This lead to an increase in the mix of white fir and Douglas-fir, decreased vigor in the stand, and increased potential for catastrophic wildfire events. This is the situation in areas such as Horseshoe Springs. The level of individual tree stress in the stands is evidenced by the amount of mortality in the saplings. Additional insight into the health of the stands can be made from observation of the Douglas-fir and white fir, particularly in the stands marked MID-MC

and SW on the map. These species have evidence of Western spruce budworm activity. This insect pest causes branch, tip and whole tree mortality over successive infestations. The multi-storied stand with these tree species is particularly susceptible to the budworm.

There are two distinct vegetative habitat types in the Horseshoe Springs Association lands. The first is PIPO/FEAR, ponderosa pine/Arizona fescue (maybe leaning toward the Gambel oak phase). This type occurs around the home sites on flat to gentle, east-facing slopes (Horseshoe Loop Area and Horseshoe Hollow Area). The predominate overstory species is ponderosa pine. Lesser amounts of Douglas-fir and white fir occur in these areas. A significant amount of thinning has occurred in these areas, reducing the sapling and pole-sized white fir and Douglas-fir.

The second vegetative habitat type is PSME/QUGA, Douglas-fir/Gambel oak. This type occurs around the southwest corner on the property, the canyon on the north side of the property, and in a wide, east-west band through the middle of the property (Canyon North, SW, and MID-MC Areas). It is suspected that much of the Horseshoe Hollow Area could be part of this association. The predominate overstory species is ponderosa pine, with a smattering Douglas-fir. These areas are the only ones where large, old Douglas-fir occur.

Data were taken in each of the areas identified as **Horseshoe Loop Area** (61.5 Acres), **Horseshoe Hollow Area** (24.6 Acres), **MID-MC** (33.1 Acres), **Canyon North** (6.7 Acres), and **SW** (4.1 Acres). Data included basal area per acre, and number of trees by species by diameter class. The total basal area per acre in each area is remarkably similar. The differences between the areas are in the amount of saplings versus the amount of larger, older trees.

Table 1. Basal Area (sq. ft. per acre) by Saplings, Poletimber and Sawtimber in each of the five areas identified on the map. The basal area in parentheses is mortality.

Area	Saplings	Poletimber	Sawtimber	TOTAL
Horseshoe Loop Area	4.0	53.5	81.0	138.5 (0)
Horseshoe Hollow Area	1.7	61.7	76.6	140 (0)
MC-MID	18.2 (0.9)	38.2	80.9 (2.7)	137.3 (3.6)
SW	20.0 (10)	77.5 (2.5)	45	142.5 (12.5)
Canyon North	10.0	31.4 (2.9)	65.7 (5.7)	107.1 (8.6)

Basal area is defined as the cross-sectional area of each tree at breast height (4.5'). It is interpreted as tree and crown density. Saplings include 0-4 inch diameter classes. Poletimber include 6-10 inch diameter classes. Sawtimber include 12 inch and over diameter classes.

The mortality, which shows in the sawtimber portion of the table above, consists of mainly large, old snags. Snags serve several purposes. They are reserves for insects and provide excellent habitat for wildlife, especially avian insectivores and cavity nesting birds. They also provide valuable perches for raptors. Snags, which are away from buildings and areas where people congregate should be left. When they fall, they could be left in place to provide even more benefit to the ecosystem (provided they do not increase potential for catastrophic wildfires). Small diameter mortality, those dead trees in either the sapling or pole-timber classes, should be removed.

The mix of species (see Table 2) in each stand shows the trend for increased reproduction of white fir and Douglas-fir under an overstory of mainly ponderosa pine. The Horseshoe Loop and Horseshoe Hollow Areas, which have had much of the small diameter sapling or poletimber removed or thinned show a much reduced percentage of white fir and Douglas-fir. Much of the Douglas-fir and white fir sawtimber, with the exception of that in the Canyon North and MC-MID Areas, are in the small sawtimber diameter classes (12-14 inches). Again, this is an indication that these species have aggressively moved into which probably was historically a ponderosa pine stand.

Table 2. Species mix in each of the five areas identified on the map (percent of basal area per species per size class). (Saps = saplings, PT = poletimber, ST = sawtimber.) May not total to 100% due to exclusion of aspen (e.g. MC-MID had 1 aspen tallied in poletimber for 2.5%, and Horseshoe Loop Area had 1 aspen tallied in saplings for 12.5%). Limber pine (*Pinus flexilis*) was observed in the MC-MID and SW Areas, but none of the species fell within the variable plot samples.

Area	White Fir (%)			Douglas-fir (%)			Ponderosa Pine (%)		
	Saps	PT	ST	Saps	PT	ST	Saps	PT	ST
Horseshoe Loop Area	0	0	0.6	0	1	0	77.5	99	99.4
Horseshoe Hollow Area	0	4	5	50	19	11	50	77	84
MC-MID	35	31	17	65	64	18	0	2.5	65
SW	0	10	28	50	40	11	50	50	79
Canyon North	29	9	11	71	59	11	0	32	78

Table 3. Average diameter (inches) by Saplings, Poletimber and Sawtimber in each of the five areas identified on the map.

Area	Saplings	Poletimber	Sawtimber	TOTAL
Horseshoe Loop Area	4.0	7.9	15.8	9.9
Horseshoe Hollow Area	4.0	7.7	15.0	9.7
MC-MID	2.8	7.3	19.8	6.5
SW	3.0	7.3	16.1	6.1
Canyon North	2.9	7.6	18.0	7.5

Table 4. Average number of trees per acre by Saplings, Poletimber and Sawtimber in each of the five areas identified on the map.

Area	Saplings	Poletimber	Sawtimber	TOTAL
Horseshoe Loop Area	46	156	60	262
Horseshoe Hollow Area	19	189	62	270
MC-MID	429	132	38	599
SW	403	266	32	701
Canyon North	213	100	37	350

Tables 3 and 4 illustrate that as the number of saplings are reduced, the average stand diameter increases. As the average stand diameter increases, and the basal area is reduced further toward Firewise standards, the spacing between the trees and between the crowns of the trees increases. The result is a more catastrophic fire resistant stand, and therefore a more catastrophic fire resistant community.

Noxious Weeds: Class A weeds are not native to this ecosystem and have a limited distribution within New Mexico. Prevention of new infestations and eliminating infestations has high priority. Class A weeds found in Sandoval County include *Cardaria draba* (hoary cress), *Cirsium arvense* (Canada thistle), and *Onopordum acanthium* (Scotch thistle).

Class B weeds are not native to this ecosystem and are limited to a particular area in New Mexico. The priority is to contain them within their current areas of infestation. Class B weeds found in Sandoval County include *Acroptilon repens* (Russian knapweed) and *Carduus nutans* (musk thistle).

Class C weeds are not native to this ecosystem, but are widespread throughout New Mexico. Long-term programs of suppression are encouraged. Class C weeds found in Sandoval County include *Convolvulus arvenis* (field bindweed) and *Aegilops cylindrica* (jointed goatgrass).

None of the above listed weeds were observed during field data collection.

Endangered Plants: State listed endangered plants, which occur in Sandoval County and may occur in the Horseshoe Springs area includes: *Abronia bigelovii* (tufted sand verbena) which is limited to gypsiferous soils to 7,400'. *Astragalalus knightii* (Knight's milkvetch) which grows on Dakota sandstone ledges in pinon-juniper

woodlands. *Delphinium robustum* (robust larkspur) which grows in canyon bottoms and aspen from 7,200-11,200'. *Delphinium sapellonis* (Sapello Canyon larkspur) which grows in canyon bottoms and aspen from 8,000-11,500'. *Hackelia hirsuta* (New Mexico stickweed) which grows on dry sites in montane forests usually with Gambel oak from 7,700-10,200'. *Huechera pulchella* (Sandia alumroot) which grows on limestone cliffs from 8,000-10,700'. *Mentzelia springeri* (Springer's blazing star) which grows on pumice and ash in lower montane forests from 7,000-8,000'. *Puccenellia parishii* (Parish's alkalai grass) which grows on gentle slopes near alkaline seeps from 2,600-7,200'. *Silene plankii* (Plank's campion) which grows on igneous rock outcrops from 5,000-9,200'.

RECOMMENDATIONS:

1. Thin the trees around each structure to a basal area of 40 square feet per acre. This should be done on the acre surrounding each structure. Remove trees immediately adjacent to each structure. This provides for defensibility in the event of a wildfire. See the spacing guide provided in the appendix. The growth characteristics of ponderosa pine include clumps of trees, surrounded by relatively open space. Stand density should not be envisioned as crop spacing, but aesthetically pleasing clumps and open spaces. Horseshoe Loop and Horseshoe Hollow Areas. **FLEP Practice – Heavy Thinning and Chipping.**

2. Thin the areas of greatest potential for fire starts on adjacent lands. These areas include the east boundary and the northern canyon. These areas can be thinned to 60-80 square feet of basal area per acre. The Canyon North Area should be thinned to the upper end of this range (80-90 square feet per acre) due to severe potential for windthrow. Constructing a "shaded" fuel break along these boundaries can provide additional protection from catastrophic wildfire. A "shaded" fuel break is a thinned stand of trees with all ground fuels removed (except forbs and grasses). Horseshoe Loop, Horseshoe Hollow and Canyon North Areas. **FLEP Practice – Heavy Thinning, and Piling and Burning, or Chipping.**

3. Thin the remaining areas to a basal area of 80-100 square feet per acre to improve forest health and decrease the risk of catastrophic wildfire. Concentrate on the removal of white fir and Douglas-fir to reduce the ladder fuels from these species, reduce the foliar biomass, and reduce the potential for additional western spruce budworm infestation. This should bring the area into a state, which may be more historically correct in terms of species composition and stand density. MC-MID and SW Areas. **FLEP Practice – Medium Thinning and Chipping or Piling and Burning.**

4. During data collection at Horseshoe Springs, many piles of fuelwood were observed stacked close to structures, and trees used to confine piles. Recommendations are to remove the fuelwood piles at least 30 feet from structures and use either steel posts or fuelwood racks to stack wood. Removing fuelwood from around structures will remove "jackpots" of fuel, lessening potential fire intensities from the structures. Piling the fuelwood between trees, especially green pine, increases the risk that bark beetles will

move from the fuelwood to live trees. Secondary invaders of the wood such as round-headed beetles are no danger to live trees. Piling the wood between steel posts or on fuelwood racks reduces the risk of spreading bark beetles to live trees. Green pine should be stacked and covered with clear plastic of 8-mil thickness to sanitize the wood of insect pests. **No FLEP Practice.**

5. Leave large diameter snags for wildlife habitat. Remove any snags which are classed as hazard trees around structures or in areas where people congregate. **No FLEP Practice.**

APPROVAL SHEET NM EMNRD, Forestry Division

FOREST LANDS ENHANCEMENT PROGRAM PLAN

I have read the attached Forest Management Plan and find that the document will provide assistance in accomplishing the goals and objectives that I have for my property. It is my intention to implement the plan recommendations to the best of my ability, as time and circumstances permit. **I plan to maintain any cost shared practices for at least ten years.**

[signature]	12 August 2004
Landowner Signature	Date

[signature]	12 AUGUST 2004
Planner Signature	Date

Approved by:

[signature]	9/17/2004
District TMO Signature	Date

[signature]	11-5-04
District Forester Signature	Date

APPENDIX

Landowner Contact Information:

Horseshoe Springs Association
Brent Bonwell, President
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Plan Preparation Consultant

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Santa Fe, NM

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Email: dave@eldoradoconsultants.net

FORESTRY DIVISION
POINT SAMPLING TALLY SHEET
DIAMETER CLASS CRUISING

× WF
○ DF
· PP
A ASPEN

CASE NO. ______

LANDOWNER: Horseshoe Springs Association

ADDRESS: ______

TRACT LOCATION: La Cueva, NM

DATE: 7-21-04

FOREST TYPE: PSME / QUGA | PIPO / FEAR

TRACT ACRES: 6.7

POINT NO.	DIAMETER CLASS (INCHES)																	6.8' FIXED PLOT
	SAPLINGS			POLETIMBER			SAWTIMBER											
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32+	<4.5
1																		
2						MORT									MORT			
3																		LOGGED
4														MORT				
5										MORT							MORT	
6				MORT														E SLOPE
7																		
8																		EAST
9																		
10				MORT														
11																		
12																		
13																		
14																		
15			A															
16																		
17																		
18																		
19																		
20																		
TOTAL	/	2	5 / 3	5 / 18	13 / 54	4 / 35	5 / 37	9 / 35	2 / 13	4 / 15	4 / 13	4 / 11	4 / 10	4 / 13	2 / 10	3 / 7	5 / 8	
Expansion Factor	617	46.1	11.5	5.10	2.87	1.84	1.27	.936	.717	.566	.459	.379	.318	.271	.234	.204	.179	300
BAF																		X
No. Pts.																		
Trees/Ac.	/	131.7	82.1 / 46	36.43 / 45.9	53.3 / 97.49	10.51 / 32.2	9.07 / 23.5	12.03 / 16.38	2.03 / 4.66	3.23 / 4.25	2.62 / 2.98	2.17 / 2.08	1.82 / 1.59	1.55 / 1.76	0.67 / 1.17	0.87 / 0.71	1.28 / 0.72	
Class Tot.	213.8 / 46			100.24 / 155.59			37.34 / 59.8											

Left margin notes: Canyon and N (points 1–7); Horseshoe ... of A (points 8–20)

BASAL AREA

	SAPS		PT		ST		TOT.	
Tallied	7	8	22	107	46	162	75	277
BAF	70	80	220	1070	460	1620	750	2770
No. Pts.	7	20	7	20	7	20	7	20
Acre	10	4	31.43	53.5	65.71	81	107.14	138.5

AVERAGE DIAMETER

	SAPS		PT		ST		TOT.	
BA/Acre	10	4	31.43	53.5	65.71	81	107.14	138.5
÷ Trees/Ac.		46						
÷ .005454								
Square Root								
Avg. Dia.	2.9	4	7.58	7.94	7.96	15.76	7.48	9.86

SITE INDEX

	AGE	HGT.	S.I.	R/I
Tree 1				
Tree 2				
Tree 3				
Tree 4				
Tree 5				
Avg.				

SPECIES COMPOSITION

PP ____% DF ____% WF ____% SP ____%

× WF
O DF

OM
· M
AM } MORTALITY

FORESTRY DIVISION
POINT SAMPLING TALLY SHEET
DIAMETER CLASS CRUISING

CASE NO. ______________________

LANDOWNER: *Horseshoe Springs Association*

ADDRESS: ______________________

TRACT LOCATION: *LaCueva, NM*

DATE: *July 21, 2004*

FOREST TYPE: *PSME/QUGA* | *PSME/QUGA*

TRACT ACRES: ______________________

Handwritten above diagram header: Tot MID 20 | HH 2 | SW 8 | 42 | 78 | 30 ... 89 | 92 | 18

POINT NO.	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32+	6.8' FIXED PLOT <4.5
	SAPLINGS			POLETIMBER			SAWTIMBER											
1 (MID AC 11 PTS)																		
2																		
3																		
4																		
5																		
6																		
7 (Horseshoe Hollow Area 12 PTS)																		
8																		
9																		
10																		
11																		
12																		
13 (SW ... PTS)																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
TOTAL (MID / HH)	MID HH	7 ∅	13 2	14 16	22 38	6 20	5 30	5 20	11 7	9 7	9 7	13 7	6 6	9 1	7 1	4 1	11 2	
TOTAL (SW)	SW	2	6	12	10	9	5	4	-	1	3	2	∅	∅	∅	∅	∅	
Expansion Factor	617	46.1	11.5	5.10	2.87	1.84	1.27	.936	.717	.566	.459	.379	.318	.271	.234	.204	.179	300
BAF																		X
No. Pts.																		
Trees/Ac.																		
Class Tot.																		

BASAL AREA

	SAPS	PT	ST	TOT.
Tallied				
BAF				
No. Pts.				
Acre MID	18.2	38.2	80.9	137.3
HH	1.7	61.7	76.6	140
SW	20	77.5	45	142.5

AVERAGE DIAMETER

	SAPS	PT	ST	TOT.
BA/Acre				
÷ Trees/Ac.				
÷ .005454				
Square Root				
Avg. Dia.				

SITE INDEX

	AGE	HGT.	S.I.	R/I
Tree 1				
Tree 2				
Tree 3				
Tree 4				
Tree 5				
Avg.				

SPECIES COMPOSITION

PP____% DF____% WF____% SP____%

FOREST MANAGEMENT STOCKING GUIDE

TARGET SQUARE FOOT BASAL AREA PER ACRE

	40	50	60	70	80	90	100
DBH (inches)			NUMBER	OF TREES	PER ACRE		
1	7334	9168	11001	12835	14668	16501	18335
2	1834	2292	2750	3209	3667	4125	4584
3	815	1019	1222	1426	1630	1834	2037
4	458	573	688	802	917	1031	1146
5	293	367	440	513	587	660	733
6	204	255	306	357	407	458	509
7	150	187	225	262	299	337	374
8	115	143	172	201	229	258	286
9	91	113	136	158	181	204	226
10	73	92	110	128	147	165	183
11	61	76	91	106	121	136	152
12	51	64	76	89	102	115	127
13	43	54	65	76	87	98	108
14	37	47	56	65	75	84	94
15	33	41	49	57	65	73	81
16	29	36	43	50	57	64	72
17	25	32	38	44	51	57	63
18	23	28	34	40	45	51	57
19	20	25	30	36	41	46	51
20	18	23	28	32	37	41	46
22	15	19	23	27	30	34	38
26	11	14	16	19	22	24	27
30	8	10	12	14	16	18	20

FOREST MANAGEMENT SPACING GUIDE

TARGET SQUARE FOOT BASAL AREA PER ACRE

	40	50	60	70	80	90	100	110	120	140
DBH (inches)	⌐ "	AVERAGE	SQUARE	SPACING	BETWEEN	TREES	TO	NEAREST	FOOT	⌐
2	5	4	4	4	3	3	3	3	3	3
3	7	7	6	6	5	5	5	4	4	4
4	10	9	8	7	7	6	6	6	6	5
5	12	11	10	9	9	8	8	7	7	7
6	15	13	12	11	10	10	9	9	8	8
7	17	15	14	13	12	11	11	10	10	9
8	19	17	16	15	14	13	12	12	11	10
9	22	20	18	17	16	15	14	13	13	11
10	24	22	20	18	17	16	15	15	14	13
12	29	26	24	21	21	19	18	18	17	16
14	34	31	28	26	24	23	22	21	20	18
16	39	35	32	29	28	26	25	24	24	21
18	44	39	36	33	31	29	28	26	25	23
20	49	44	40	37	34	32	31	29	28	26
22	54	48	44	40	38	36	34	33	32	29
26	63	56	52	48	44	43	40	38	37	34
30	74	66	60	56	52	48	47	44	42	39

DBH = Diameter at Breast Height (4.5 feet or 54" above ground)

Basal area is the amount of wood in square feet of the trunk of the tree as measured at breast height (54"). For example, the basal area of a 14" DBH tree is about one square foot.

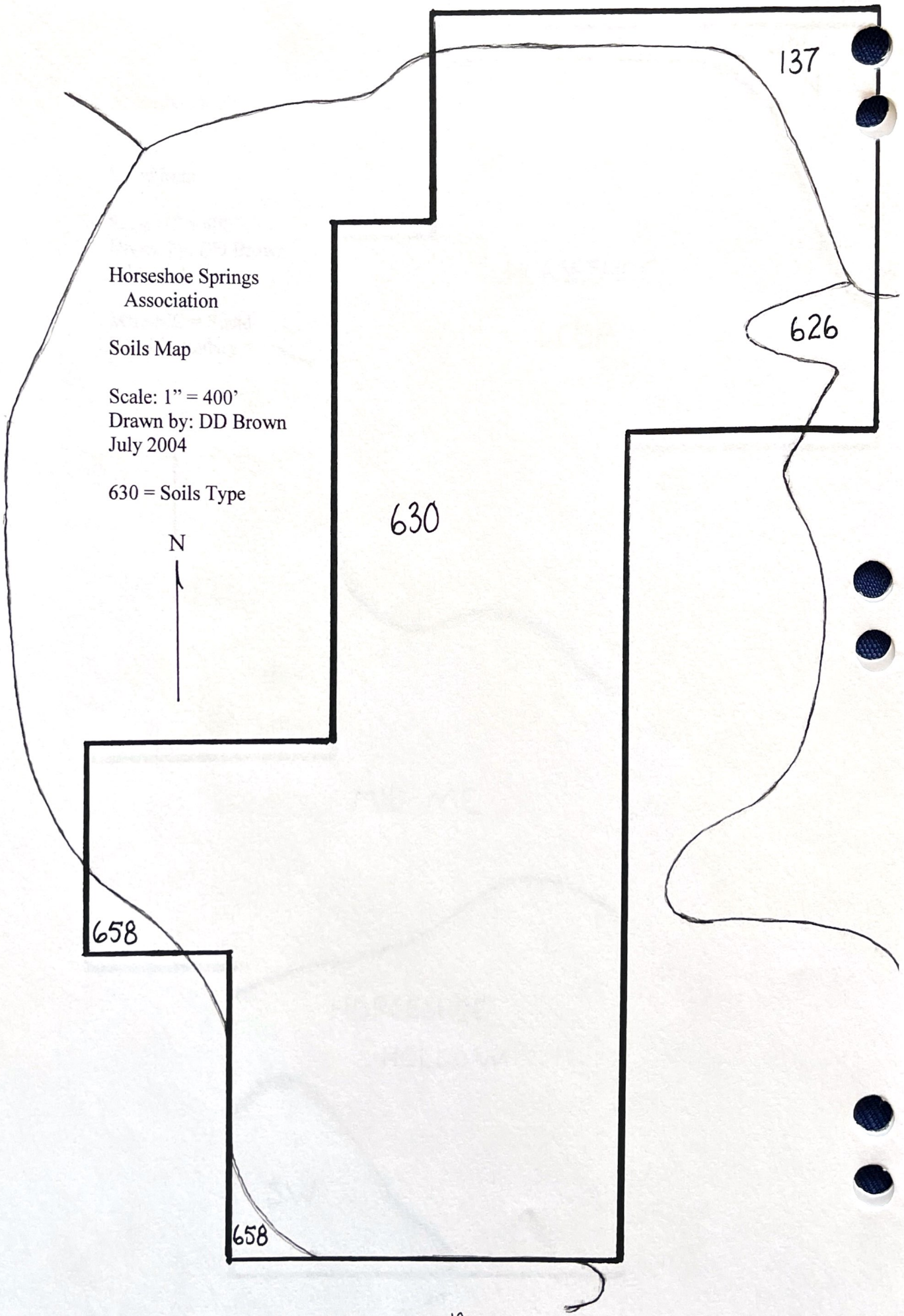
This table is most helpful when used with the Stocking Guide table.

Horseshoe Springs
Association

Soils Map

Scale: 1" = 400'
Drawn by: DD Brown
July 2004

630 = Soils Type

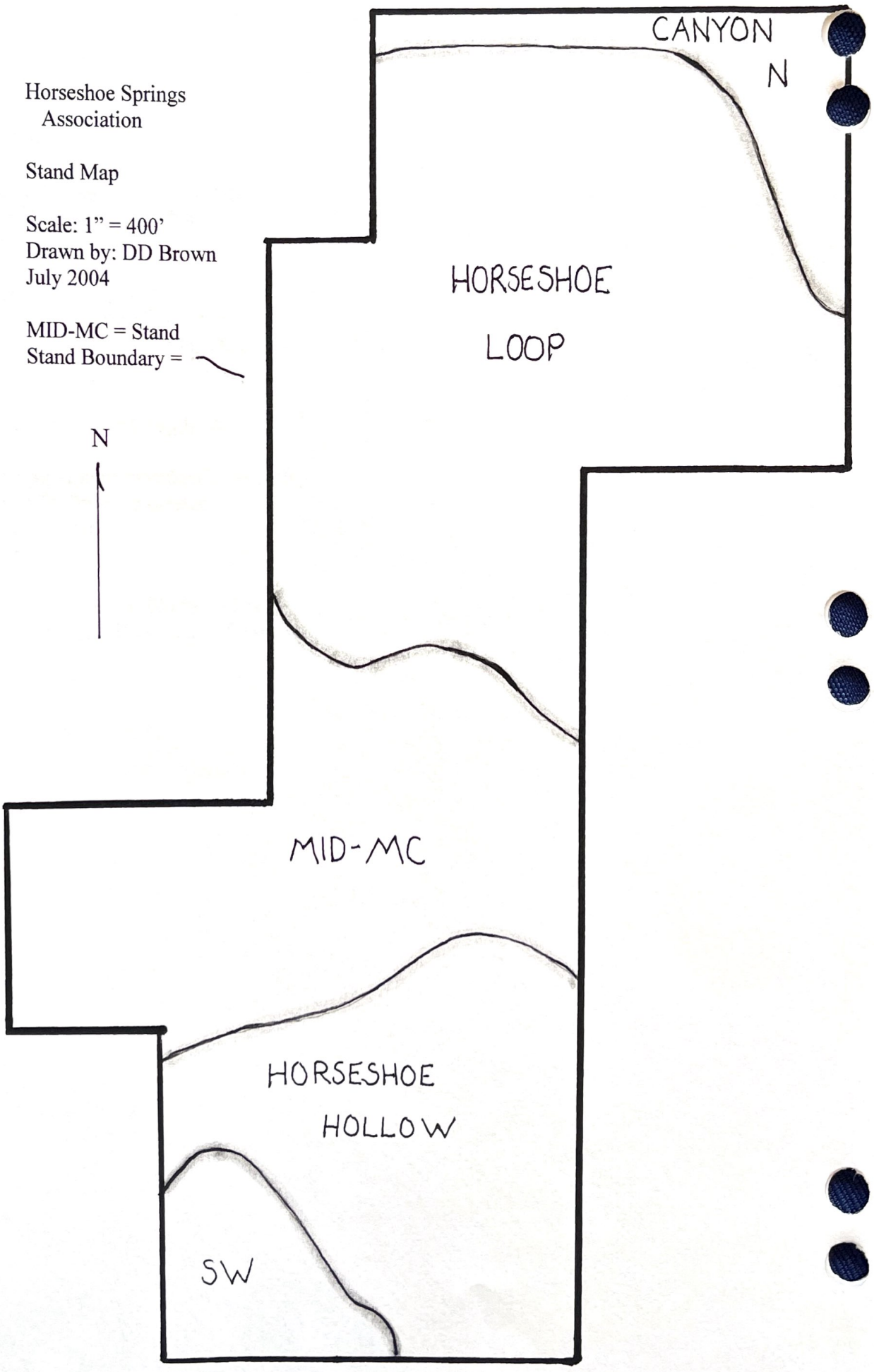


Horseshoe Springs
Association

Stand Map

Scale: 1" = 400'
Drawn by: DD Brown
July 2004

MID-MC = Stand
Stand Boundary =



APPENDIX

Landowner Contact Information:

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