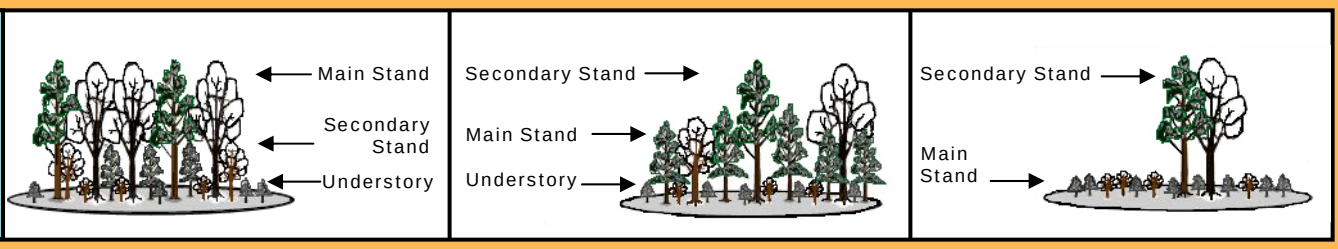
Forestry Clipboard Tables

Procedure – Forest Stand Stocking and Site Assessment

1. Compute average spacing and diameter-at-breast-height using zig-zag, fixed or variable plots for stand layers. [1] [2] [3]
2. Determine desired "D+" spacing and desired spacing for each stand layer. [4] [5] [6]
3. Continue and complete an environmental evaluation of all benchmark conditions.
4. Discuss management options and conservation treatment alternatives:
   - Forest stand enhancement – growth, thinning, harvest-reforestation, pests, aesthetics, wildlife, grazing, recreation
   - Marketing -- forest product types [7] [8], mills, recreational and other opportunities
   - Access and erosion control -- access roads, trails and landings, cross-drain spacing [9], critical area planting
   - Wildfire risk reduction -- firebreaks, fuel breaks, forest slash treatment, integration of access roads and trails
5. Return to plots and mark/flag "leave" trees to demonstrate desired spacing.
6. Determine gross tree volumes to be removed, need for tree planting, pest management strategies, and other treatments indicated by the environmental evaluation. Initiate a conservation plan, contact the state forestry agency, and advise client on using consultants.

[1] Common Forest Stand Layers or Strata



[2] Average Spacing and Trees/Acre

3' = 4840	14' = 222	25' = 70	36' = 34
4' = 2722	15' = 194	26' = 65	37' = 32
5' = 1742	16' = 170	27' = 60	38' = 30
6' = 1210	17' = 151	28' = 55	39' = 29
7' = 888	18' = 135	29' = 52	40' = 27
8' = 681	19' = 121	30' = 48	50' = 17
9' = 538	20' = 109	31' = 45	60' = 12
10' = 436	21' = 99	32' = 43	70' = 9
11' = 360	22' = 90	33' = 40	80' = 7
12' = 304	23' = 83	34' = 38	90' = 5
13' = 258	24' = 76	35' = 36	100' = 4

[3] Forestry Conversion Factors

- 1 acre = 43,560 sq. ft. = 4,047 sq. meters = 0.405 hectares
- 1 cord = 85 cubic feet wood or 128 cuft wood + voids
- 1/1000-acre plot = 3.7 feet radius or 6.6 feet x 6.6 feet
- 1/500-acre plot = 5.3 feet radius or 9.3 feet x 9.3 feet
- 1/250-acre plot = 7.4 feet radius or 13.2 feet x 13.2 feet
- 1/100-acre plot = 11.8 ft. radius or 20.9 feet x 20.9 feet
- 1/20-acre plot = 26.3 feet radius or 46.7 feet x 46.7 feet
- 1/10-acre plot = 37.2 feet radius or 66 feet x 66 feet
- 1/4-acre plot = 58.9 feet radius or 104.4 feet x 104.4 feet
- 1/2-acre plot = 83.3 feet radius or 147.6 feet x 147.6 feet
- 1-acre plot = 118' radius or 209' x 209'; 1 meter = 39.37"

[4] Basal Area per Acre by Average Diameter-breast-height (DBH-left column) and Computed "*D+X*" Spacing (top row)

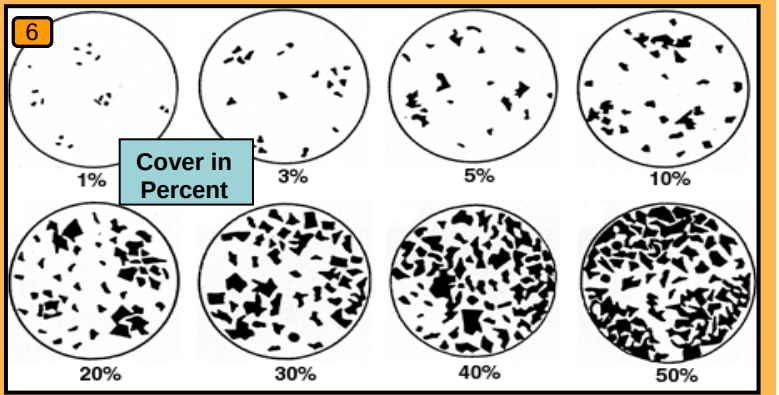
DBH	*-5*	*-4*	*-3*	*-2*	*-1*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
4	--	--	--	950	422	238	152	106	78	59	47	38	31	26	22	19	17	15
5	--	--	--	660	371	238	165	121	93	73	59	49	41	35	30	26	23	21
6	--	--	950	535	342	238	175	134	106	86	71	59	51	44	38	33	30	26
7	--	--	728	466	323	238	182	144	116	96	81	69	59	52	45	40	36	32
8	--	950	608	422	310	238	188	152	126	106	90	78	68	59	53	47	42	38
9	--	770	535	393	301	238	192	159	134	114	98	86	75	67	59	53	48	44
10	950	660	485	371	293	238	196	165	141	121	106	93	82	73	66	59	54	49
11	799	587	449	355	287	238	200	170	147	128	112	99	89	80	72	65	59	54
12	698	535	422	342	283	238	202	175	152	134	118	106	95	86	78	71	65	59
13	627	496	402	332	279	238	205	178	157	139	124	111	100	91	83	76	70	64
14	575	466	385	323	276	238	207	182	161	144	129	116	106	96	88	81	75	69
15	535	442	371	316	273	238	209	185	165	148	134	121	110	101	93	86	79	73
16	503	422	360	310	270	238	210	188	168	152	138	126	115	106	97	90	83	78
17	477	406	350	305	268	238	212	190	172	156	142	130	119	110	102	94	88	82
18	455	393	342	301	266	238	213	192	175	159	146	134	123	114	106	98	92	86
19	438	381	335	297	265	238	214	194	177	162	149	137	127	118	109	102	95	89
20	422	371	329	293	263	238	215	196	180	165	152	141	130	121	113	106	99	93

[5] D+ Thinning Spacing Guide* (stands ≥10" avg. DBH)

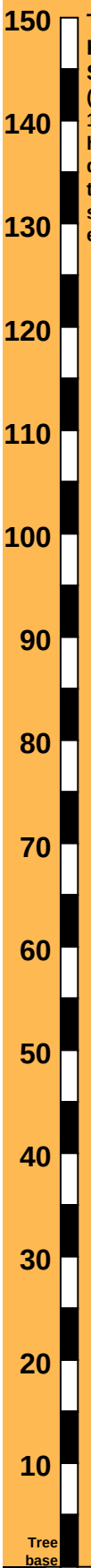
Species Group	*Thin** when:*	*Thin** to:*
1) Very shade tolerant	D+1	D+4
2) Shade tolerant	D+2	D+5
3) Somewhat shade tolerant	D+3	D+6
4) Shade intolerant	D+4	D+7
5) Very shade intolerant	D+5	D+8

*Applicable for an even-aged stand or "main stand" in multi-story stands.
**Add up to 3+ feet for low prod. sites, if prescribed grazing occurs, or for other silvicultural objectives, e.g., shelterwood-regen.-harvest.

[6]



10
20
Basal Area Factor
at 24" reach from eye



Tree Height Scale (read direct at 100 feet horizontal distance from tree holding scale 6" from eye)

7 **Gross Tree Volume***

Total Tree Height (feet)

Dbh (in.)	30			50			70			90			110			130			150		
	Cft	*Scr*	*Int*	*Cft*	*Scr*	*Int*	*Cft*	*Scr*	*Int*	*Cft*	*Scr*	*Int*	*Cft*	*Scr*	*Int*	*Cft*	*Scr*	*Int*	*Cft*	*Scr*	*Int*
5	0.8	-	-	1.5	-	-	2.2	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-
6	1.6	-	-	2.9	-	-	4.3	-	-	5.8	-	-	7.4	-	-	-	-	-	-	-	-
7	2.3	0	0	4.2	5	7	6.4	8	13	8.6	11	18	11	15	24	-	-	-	-	-	-
8	3.2	5	7	5.7	11	16	8.6	19	27	12	27	39	15	36	53	-	-	-	-	-	-
9	3.9	8	11	7.2	18	25	11	31	43	15	45	62	18	60	83	-	-	-	-	-	-
10	-	-	-	8.8	26	35	13	43	58	18	65	85	23	87	114	-	-	-	-	-	-
11	-	-	-	10	33	44	16	58	75	21	84	108	27	115	146	-	-	-	-	-	-
12	-	-	-	12	42	54	18	72	91	25	105	131	31	143	177	38	182	224	-	-	-
13	-	-	-	14	51	65	21	86	108	28	127	156	36	173	210	44	220	265	-	-	-
14	-	-	-	16	59	75	24	99	123	32	149	181	41	202	242	50	260	308	59	317	375
15	-	-	-	18	68	85	27	115	142	36	171	206	46	235	278	56	300	351	67	368	430
16	-	-	-	20	76	95	30	131	161	40	192	230	51	262	308	62	339	393	74	416	479
17	-	-	-	22	83	105	33	142	174	45	218	260	57	299	349	69	383	440	82	473	539
18	-	-	-	24	91	114	37	163	199	49	238	283	63	331	384	76	427	488	90	524	593
19	-	-	-	27	103	130	40	179	218	54	264	313	68	362	419	84	472	535	99	582	654
20	-	-	-	29	110	139	44	195	237	59	290	343	75	401	461	91	516	583	108	641	716
21	-	-	-	-	-	-	-	-	-	64	316	373	81	440	505	99	568	640	117	700	778
22	-	-	-	-	-	-	-	-	-	69	343	403	87	469	538	106	612	688	126	758	840
23	-	-	-	-	-	-	-	-	-	74	368	434	94	508	582	115	666	747	136	828	914
24	-	-	-	-	-	-	-	-	-	79	394	464	100	547	626	124	721	806	146	887	977

* Cft = cubic feet to a 4" top (inside-bark); Scr = Board feet using the Scribner rule -16' logs to a 6" top (inside-bark); Int = Board feet using the International 1/4-inch rule - 16' logs to a 6" top (inside-bark); Source: Average tarif values for conifer and hardwood tree forms - Comprehensive Tree-Volume Tarif Tables (Turnbull et al, 1980).

**For tree heights not shown, interpolate between table values.

8 **Estimated Wood Weights by Species or Species Group*** (Wood Handbook, GTR-113, 1999)

Species	*Green* (lbs/ft³)	*Air-dry* (lbs/cord)	*Species*	*Green* (lbs/ft³)	*Air-dry* (lbs/cord)
Alder (red)	35	2435	Maple (bigleaf, silver)	41	2914
Aspen (quaking)	33	2299	Maple (other), Ash	49	3469
Birch (paper)	45	3190	Oak (live)	75	5479
Cedar (a.white,w.red)	29	2029	Oak (other), Tanoak	52	3750
Cottonwood, Willow	31	2163	Pine (white, sugar)	33	2299
Douglas-fir	42	2983	Pine (slash, longleaf)	51	3609
Elm (American)	43	3052	Pine (other), Hemlock	37	2639
Fir	33	2299	Redwood	34	2367
Hickory, Locust	60	4318	Spruce	33	2299
Juniper, E. redcedar	41	2914	Sweetgum	43	3052
Larch, Tamarack	45	3190	Walnut (black)	34	2367

*Actual weights will vary by moisture content and particularly within a species group. Green weight is based on a 50% moisture content. Air-dry assumes a 20% moisture content. A cord equals 85 cubic-feet of solid wood (128 cubic-feet of wood and void spaces) consisting of relatively straight stem wood.

9 **Road/Trail Drainage Guide**

Spacing between cross-drains by % grade

% Grade	*Distance* (ft)*
2	500
3	333
4	250
5	200
6	167
7	143
8	125
9	111
10	100
12	83
14	71
16	62

*Measured on/along road slope.