

APPENDIX D
SILVICULTURAL FINDINGS
CMAI
SITE DATA

APPENDIX D: PRAIRIE PROJECT AREA SILVICULTURAL FINDINGS, CMAI

Silviculture “Findings” Report - Prairie Planning Area

Based on my analysis and prescriptions for the stands in the Prairie Project Area, I recommend the following finding of facts pursuant to NFMA be made in project decisions:

- I. There is reasonable assurance that if prescriptions are implemented as described:
 - A. Soil, slope, or other watershed conditions will not be irreversibly damaged by proposed harvest actions in the area (16 USC 1604(g)(3)(5)(i)). Refer to Watershed and Soils report. Also, refer to mitigation and monitoring appendices of the Prairie EIS.
 - B. All stands within the project area to receive patch clearcuts; shelterwood seed-cuts, seed tree cuts or shelterwood removals can be adequately restocked within 5 years of harvest. The minimum tree stocking standards for Region 2 will be met. Region 2 minimum stocking standards are described in FSH 2409.26b Reforestation Handbook R2 Amendment No. 2409.26b - 93-2. Adequate restocking of lands within 5 years after final harvest will occur (16 USC 1604 (g)(3)(e)(ii) and 36 CFR 219.27 c3).

II. I further find that:

The law generally prohibits the harvest of stands before they reach their maximum growth rate (National Forest Management Act (NFMA), 16 U.S.C. 1604(m)). Exceptions in the law allow the harvest of individual trees, or even parts or whole stands of trees, before this time to thin and improve timber stands, and salvage damaged stands of trees (part m1 of the law). Further exceptions are allowed in order to achieve multiple-use objectives other than timber harvest (part m2).

The proposed action and action alternatives would harvest some trees before the maximum potential growth rate of some stands in the project area has been reached. These harvest treatments are consistent with the exceptions provided in part m2 of the law, and include the following:

Sanitation Treatments, Special Treatments, Precommercial Thinning, Commercial Thinning, Liberation Harvests, Patch Clearcuts, Meadow Retention and Restoration Treatments, Hardwood Regeneration Treatments and Hardwood Restoration and Retention Harvests which are designed to meet other than timber objectives. These treatments are proposed to meet the Forest Plan multiple-use objectives stated in this analysis.

A. All stands scheduled for commercial harvest are suitable for timber production except as noted below:

Timber harvest on lands classified as not suited for timber production (36 CFR 219.27cl). Pine removal will occur in hardwood stands where pine has invaded to conserve existing hardwood communities and restore historic hardwood communities (Forest Plan objective 201). Existing meadows and some historic meadows will be restored through the removal of pine from within

those sites (Forest Plan objective 205). These treatments are being performed to serve multiple use objectives (16 USC m c 2) and provide diversity and browse for wildlife and cattle and are not required to meet CMAI. (36 CFR 219.16a2iii).

The following stands or parts of stands, previously listed as suitable, have been found to be unsuitable for timber production due to species changes from pine stands to hardwoods and/or meadows.

Meadow Restoration:

Location-Site	Area
091904-0094	13 ac.
091904-0095	36 ac.

Hardwood Restoration:

Location-Site	Area
090602-0015	19 ac.
091904-0080	16 ac.
091008-0001	13 ac.

The following are stands of meadows and hardwood sites where retention treatments of pine removal will occur:

Meadow Retention:

Location-Site	Area	Location-Site	Area	Location-Site	Area
090601-0017	14 ac.	091904-0014	52 ac.	091904-0063	50 ac.
090704-0005	46 ac.	091904-0018	6 ac.	091904-0069	11 ac.
091005-0021	11 ac.	091904-0022	23 ac.	091904-0071	6 ac.
091007-0025	11 ac.	091904-0023	32 ac.	091904-0074	13 ac.
091008-0010	9 ac.	091904-0025	11 ac.	091904-0076	11 ac.
091801-0012	43 ac.	091904-0029	13 ac.	091904-0081	6 ac.
091801-0023	82 ac.	091904-0031	10 ac.	091905-0011	9 ac.
091801-0039	36 ac.	091904-0037	5 ac.	091905-0013	9 ac.
091803-0013	28 ac.	091904-0039	5 ac.	091905-0021	4 ac.
091803-0019	13 ac.	091904-0046	5 ac.	091905-0038	7 ac.
091904-0007	67 ac.	091904-0048	11 ac.	091905-0040	9 ac.
091904-0008	40 ac.	091904-0060	21 ac.		

Hardwood Retention:

Location-Site	Area	Location-Site	Area	Location-Site	Area
090601-0023	14 ac.	091101-0031	8 ac.	091803-0025	16 ac.
090602-0022	9 ac.	091201-0023	24 ac.	091803-0026	32 ac.
091004-0008	30 ac.	091201-0038	16 ac.	091803-0027	33 ac.
091004-0009	11 ac.	091201-0040	25 ac.	091803-0028	34 ac.
091005-0025	5 ac.	091201-0048	9 ac.	091803-0037	10 ac.
091005-0035	23 ac.	091405-0009	31 ac.	091903-0020	17 ac.
091007-0005	31 ac.	091801-0007	26 ac.	091904-0051	22 ac.
091007-0027	8 ac.	091801-0017	14 ac.	091904-0066	11 ac.
091101-0012	26 ac.	091801-0035	11 ac.	091904-0086	21 ac.

Location-Site	Area	Location-Site	Area	Location-Site	Area
091101-0024	49 ac.	091802-0008	20 ac.	091905-0009	28 ac.
091101-0026	10 ac.	091803-0003	18 ac.	091905-0027	30 ac.
091101-0029	13 ac.	091803-0024	20 ac.	091905-0031	29 ac.

Some stands are not in the suitable base because they fall within Management Emphasis Areas that are withdrawn from timber production or were determined as unsuitable due to topography or access. Alternative development has determined that these stands will be commercially and/or non-commercially treated in order to address fuel/fire hazard and wildfire issues identified in the analysis process. The decision on this project may include some or all of these stands for treatment. The following stands were identified for treatment:

Location-Site	Area	Location-Site	Area	Location-Site	Area
090601-0001	6 ac.	091901-0003	6 ac.	091903-0023	15 ac.
090601-0007	28 ac.	091901-0031	3 ac.	091903-0025	49 ac.
090704-0007	36 ac.	091902-0001	13 ac.	091903-0028	21 ac.
091006-0021	9 ac.	091902-0003	2 ac.	091903-0036	20 ac.
091007-0015	15 ac.	091902-0004	4 ac.	091903-0049	13 ac.
091008-0021	15 ac.	091902-0008	28 ac.	091903-0051	6 ac.
091008-0025	8 ac.	091902-0014	21 ac.	091903-0053	10 ac.
091008-0026	5 ac.	091902-0016	5 ac.	091903-0054	16 ac.
091008-0035	4 ac.	091902-0017	16 ac.	091904-0050	36 ac.
091008-0036	4 ac.	091902-0019	16 ac.	091904-0073	21 ac.
091101-0001	12 ac.	091902-0020	6 ac.	091904-0079	23 ac.
091101-0033	9 ac.	091903-0002	32 ac.	091904-0095	36 ac.
091101-0034	9 ac.	091903-0010	13 ac.	091903-0023	15 ac.
091201-0008	65 ac.	091903-0022	13 ac.	091903-0025	49 ac.

B. The shelterwood regeneration method prescribed for the following stands of the Prairie Project Area is appropriate because:

1. It best meets the objectives of the Forest Land Management Plan (FLMP) for the Management Areas within the project area. Black Hills Land and Resource Management Plan (Forest Plan page II-31).
2. It is a scientifically sound method of regeneration for Ponderosa pine as described in Agriculture Handbook #445(revised 12/83) pages 80-83.
3. Research and experience indicate this method should be the primary regeneration method and is ideally suited and widely applicable in the Black Hills (USDA-FS Research Paper RM-124, 6/74).
4. The stands or portions of stands receiving shelterwood regeneration harvest treatments have generally reached the culmination of mean annual increment (CMAI).

Regulations contained in 36 CFR 219.16(2)(iii) require that all even-aged stands scheduled to be harvested during the planning period generally have reached the culmination of mean annual

increment of growth (CMAI). The accepted definition of the term “generally” is that PAI is within 95%+ of MAI. The CMAI requirement is applicable to actual even-aged stands that are being managed by even-aged treatment methods for timber purposes. In general, stands scheduled for a regeneration cut (e.g. shelterwood seedcuts) for timber purposes need to have reached CMAI. The regulation goes on to say “...exceptions to these standards shall be evaluated if it is reasonable to expect that overall multiple use objectives would be better attained.’

CMAI occurs when periodic annual growth of a stand decreases to the level of the average annual growth since the establishment of the stand. The average annual growth includes standing volume and all volume that has been removed from the stand since it was established. This often requires some assumptions about how much volume was removed in past harvests, since detailed record may not be available.

The silvicultural system most commonly used for ponderosa pine in the Black Hills is a shelterwood system, which is defined by the Regional Guide as an even-aged system. The seed cut step of this system is the regeneration cut for timber purposes. There are 368 stands where mean annual increment has attained or exceeded the periodic annual increment. Not all of these stands will be regenerated at this time due to the need for diversity or other resource objectives. Many of the stands that were identified as having reached CMAI have a multi-storied structure or are all-aged. These stands have over-mature inclusions or stories within them. Treating these stands at this time using a silvicultural regeneration method, while appropriate for the overmature components of the stand, would not be appropriate for the mature or immature components of the stand.

The following stands has generally reached CMAI and will be Seed Cut depending on the alternative chosen:

Location-Site	Acres	Location-Site	Acres	Location-Site	Acres
090601-0005	20 ac.	091201-0016	62 ac.	091904-0021	15 ac.
090601-0013	27 ac.	091201-0037	55 ac.	091904-0045	11 ac.
090601-0022	13 ac.	091404-0032	11 ac.	091904-0067	7 ac.
090602-0008	55 ac.	091801-0032	12 ac.	091904-0079	23 ac.
090704-0018	19 ac.	091803-0014	91 ac.	091904-0083	7 ac.
090704-0012	25 ac.	091803-0038	37 ac.	091904-0087	1 ac.
091005-0019	63 ac.	091803-0042	30 ac.	091905-0003	87 ac.
091005-0040	50 ac.	091804-0003	43 ac.	091905-0005	31 ac.
091005-0049	12 ac.	091903-0016	25 ac.	091905-0029	18 ac.
091006-0005	30 ac.	091904-0001	31 ac.	091905-0045	22ac.
091201-0005	52 ac.	091904-0005	26 ac.	091903-0016	25 ac.
091201-0015	69 ac.	091904-0020	26 ac.		

The stands being harvested with an overstory removal have previously reached CMAI and management is being done to release the remaining stand as a stand improvement measure (sound silviculture practice 16 USC 1604 (m) (i)). Most of the overstory removal cuts are in multi-aged stands or stands that have advanced regeneration. These treatments can also be

considered as liberation cuts or stand improvements cuts. The following stands are proposed for overstory removals, depending on the alternatives chosen:

Location-Site	Acres	Location-Site	Acres	Location-Site	Acres
090601-0008	57 ac.	091005-0023	36 ac.	091904-0021	15 ac.
090602-0014	13 ac.	091101-0021	79 ac.	091904-0028	58 ac.
090602-0018	43 ac.	091801-0002	44 ac.	091904-0040	13 ac.
090602-0020	45 ac.	091801-0009	259 ac.	091905-0002	51 ac.
090602-0023	39 ac.	091803-0011	23 ac.	091905-0012	108 ac.
091004-0003	33 ac.	091902-0004	4 ac.	091905-0033	69 ac.
091004-0006	73 ac.	091903-0045	20 ac.	091905-0044	59 ac.
091005-0022	38 ac.	091904-0020	26 ac.		

C. The Clearcut regeneration method in the project area is ideal because it:

1. Best meets the objectives of the FLMP for the management areas within the project area. Black Hills Land and Resource Management Plan (Forest Plan pages II-31)
2. It is a scientifically sound method of regeneration for Ponderosa pine as described in USDA Forest Service Research Paper RM-124 pages 34. Patch Cut harvests of 1 to 10 acres have also been identified in various action alternatives to increase the grass/forb structural stage for wildlife forage and for habitat diversity, in accordance with Forest Plan objective 209 and as discussed in the Forest Plan EIS. These patch cuts serves multiple-use objectives other than timber production and need not meet the CMAI requirements. Under 36 CFR 219.16(2)(iii) when treatments are needed to obtain overall multiple-use objectives the requirement for stands to meet CMAI does not apply. This is the case for the patch cuts within the planning area. They have been designed to increase horizontal diversity and provide forage for wildlife.

Patch clearcuts will be created in the following sites within one or more of the action alternatives:

Location-Site	Acres	Location-Site	Acres	Location-Site	Acres
091008-0037	10	091901-0031	3	091902-0020	6
091101-0037	21	091901-0032	6	091903-0010	13
091901-0003	6	091902-0001	13	091903-0055	7

D. Regeneration harvests will not create any permanent opening, larger than 40 acres, as defined in the R2 Regional Guide.

E. Commercial and precommercial thinnings prescribed for the Prairie Project are sound silvicultural practices used to improve forest health, increase merchantable growth and reduce the potential for catastrophic crown fires. These treatments are proposed to meet the Forest Plan multiple-use objectives stated in the analysis. As such, these treatments are exceptions to the 36 CFR 219.16(2) (iii) requirements that all even-aged stands scheduled for harvest will generally have met CMAI. The following stands are proposed for commercial or precommercial

thinnings. Many of the stands scheduled for precommercial thinnings will also have the overstory removed and are listed above.

Location-Site	Location-Site	Location-Site	Location-Site	Location-Site
090601-0004	090704-0006	091007-0009	091405-0030	091904-0026
090601-0006	090704-0007	091007-0010	091801-0008	091904-0027
090601-0007	090704-0010	091007-0011	091801-0010	091904-0030
090601-0008	091004-0003	091007-0013	091801-0016	091904-0033
090601-0009	091004-0005	091007-0015	091801-0021	091904-0034
090601-0011	091004-0006	091007-0016	091803-0001	091904-0035
090601-0012	091004-0007	091007-0017	091803-0002	091904-0036
090601-0016	091004-0010	091007-0023	091803-0006	091904-0052
090601-0029	091004-0013	091008-0002	091803-0008	091904-0053
090601-0030	091005-0020	091008-0003	091803-0009	091904-0062
090601-0031	091005-0022	091008-0004	091803-0012	091904-0068
090601-0032	091005-0023	091008-0005	091803-0015	091904-0070
090601-0032	091005-0024	091008-0006	091803-0018	091904-0073
090602-0003	091005-0030	091008-0007	091803-0020	091904-0075
090602-0004	091005-0042	091008-0008	091803-0023	091904-0077
090602-0005	091005-0044	091008-0009	091803-0029	091904-0082
090602-0006	091005-0047	091008-0012	091803-0030	091905-0002
090602-0007	091005-0048	091008-0013	091803-0031	091905-0004
090602-0009	091006-0001	091008-0014	091803-0035	091905-0006
090602-0010	091006-0003	091008-0016	091804-0005	091905-0010
090602-0011	091006-0006	091008-0021	091804-0015	091905-0012
090602-0012	091006-0009	091008-0024	091901-0004	091905-0020
090602-0020	091006-0010	091101-0001	091901-0020	091905-0022
090602-0024	091006-0013	091101-0004	091903-0011	091905-0025
090602-0025	091006-0014	091101-0005	091903-0013	091905-0030
090602-0026	091006-0015	091101-0028	091903-0015	091905-0033
090602-0028	091006-0016	091201-0002	091903-0021	091905-0036
090602-0030	091006-0021	091201-0008	091904-0002	091905-0036
090602-0030	091007-0002	091201-0019	091904-0003	091905-0041
090602-0031	091007-0004	091201-0020	091904-0004	091905-0042
090602-0033	091007-0007	091405-0028	091904-0024	091905-0043

CMAI Discussion

There are 368 sites where the mean annual increment (MAI) generally has attained or exceeded the periodic annual increment (PAI). Where MAI equals PAI, culmination of mean annual increment (CMAI) occurs and by regulation (36 CFR 219.16a 2iii) regeneration of that stand can occur. The accepted definition of the term generally is that PAI is within 95% of MAI.

The analysis was done by taking the existing net cubic foot volume of each site and adding an additional volume that was removed by either past harvests or mortality. The volume that has been either removed through harvesting or lost to mortality over the time since the stands were established is not known and an approximation was used. The approximation was based on historical harvest levels. Timber sales within the area have been averaging 750-1250 cf/ac per entry. As evidenced by old stumps and slash, at least 2 entries or 1500-2500 cf has been removed within the last 100 years with additional volume lost to mortality. Volumes removed during timber stand improvement projects (precommercial thinning) are also not included. This is conservative considering the intensive management that has occurred on the Black Hills over the last 100 years.

Many of the sites are multi-storied or patchy containing components (overstory, understory, inclusions etc.) that are individually either below or above CMAI. When inventoried these components are all combined and an average for the stand is computed. Since the PAI and MAI for the stand is an average of the PAI and MAI of each of its components, the stand average may fall above or below the CMAI of each of its components. Since the regulations speak to even-aged sites, and these sites are not, then CMAI may not apply, however the management objectives are to manage these sites as evenaged sites so CMAI should be considered. Although it is difficult to calculate CMAI on components of a stand, portions receiving regeneration treatments are similar to other evenaged mature stands in the area that are at CMAI and therefore have reached CMAI. Most of the stands that are at CMAI have structures that are all-aged and regeneration treatments would not be appropriate at this time. The recommended treatments will remove (or regenerate in the case of inclusions) those components that show similarities with stands known to be at or beyond CMAI and manage those components below CMAI with intermediate treatments (i.e. precommercial thinning, intermediate thinning).

I certify the stands receiving harvest treatments that are not exceptions to 36 CFR 219.16a (2) (iii) have met the culmination of mean annual increment. Discussions of CMAI and exceptions to CMAI requirements can be found in the Silviculture 'Findings' Report and/or CMAI Calculations Table.

/s/ Gale S. Gire April 25, 2003
Region 2, Certified Silviculturist