

Accelerated Watershed/Vegetation Restoration Plan 10-Year Strategy

***Black Hills National Forest
Rocky Mountain Region, USDA-Forest Service***

***REVISED
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Ponderosa pine on the Black Hills National Forest.

Abstract

This revision of the 1/13/2004 document includes corrections and additional explanation and discussion throughout report. The three program levels did not change.

An estimated 450,000 acres of National Forest System land within the 1.2-million-acre Black Hills National Forest are currently overcrowded with ponderosa pine trees and at high fire hazard and insect risk. This acreage is predicted to increase to 585,000 acres in 10 years. About 200,000 acres are infested with pine beetles. Three program levels are presented that treat 252,700 to 411,390 acres over a 10-year period. Treatments include trapping or other control of insects, tree thinning, timber harvesting, and fuel treatments including mechanical, prescribed burning, and fuel breaks. Treatment priorities would be the wildland-urban interface (WUI), areas of high resource values, and areas of high insect risk. Additional forest and rangeland restoration would occur through wildlife and range habitat improvement projects. Annual funding needed would increase from \$16.3 million at present to \$34.8 million in year 10 of the most aggressive option.

I. Introduction

This paper presents a strategy to accelerate vegetation restoration on the Black Hills National Forest. The current insect infestation and fuels situation are discussed. Three program levels to address the problem over the next 10 years are proposed.

Legal and policy guidance

- ?? Western Governor's Association 10-Year Comprehensive Strategy,¹
- ?? Interagency Cohesive Strategy²
- ?? Healthy Forest Restoration Act of 2003
- ?? Region 2 National Fire Plan Strategy

This strategy addresses two of the four Western Governor's Comprehensive Strategy Goals: Goal 2 - Reduce Hazardous Fuels, and Goal 3 - Restore Fire-adapted Ecosystems. Goal 1 - Improve Fire Prevention and Suppression, and Goal 4 - Promote Community Assistance, include provisions for firefighter and community safety and are addressed in other program reports and/or by other agencies.

Vision/Forest Plan Direction

It is our vision to protect communities and restore fire-adapted ecosystems across the Black Hills. The strategy will be guided by the Amended Revised 1997 Land and Resource Management Plan ("Forest Plan" 2001), laws and regulations, collaboration, and principles of cost effectiveness.

The Black Hills National Forest is favorably positioned to address this problem with an adequate transportation system, skilled staffing, commercial/industrial capacity, and a supportive and expectant public. The Forest Plan contains direction, standards and guidelines sufficient to implement this strategy while the Plan is being amended (Phase II). Phase II includes alternatives that address fuels and insect issues identified in this strategy.

Goals (from 10-Year Implementation Plan)

Goal 2 – Fuels Reduction

- ?? The 10-year goal is to treat a significant amount of the high hazard acreage currently existing and expected to develop over the next 10 years.³

¹ *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment – 10-Year Comprehensive Strategy Implementation Plan.* May 2002

² *Restoring Fire-Adapted Ecosystems on Federal Lands – A cohesive fuel treatment strategy for protecting people and sustaining natural resources.* USDA Forest Service and USDI. August 2, 2002.

³ Control of the most destructive "heading" fires can be achieved without treating 100% of the acreage. Control has been achieved in simulations with as little as 20% carefully placed across the landscape; however, 50-60% would be needed with random fuel placement. See Finney, M.A. 2001. Design of regular landscape fuel treatment patterns for modifying fire growth and behavior. *Forest Science* 47:219-228. Or, Finney, M.A. 2003. Calculating fire spread rates across random landscapes. *Intl. J. Wildl. Fire.* 12(2):167-174. Or, Figure 19, pg. 30, Graham, McCaffrey and Jain, 2004. Rocky Mountain Res. Sta. GTR-120.

- ?? Implement 50-70 percent of the budgeted fuels (WFHF) treatments in the wildland-urban interface (WUI), depending on funding.
- ?? Reduce stand-level fire hazard to a low rating through silvicultural and fuels treatments.

Goal 3 – Restore Fire-adapted Ecosystems

- ?? The 10-year goal is to improve vigor and resistance to insect infestation on a significant amount of the current high-risk acreage.
- ?? Return fire or similar treatments across the estimated 1,059,937 acres of ponderosa pine forest to an approximate natural disturbance cycle of 20-26 years.⁴
- ?? Restore ecosystem components, e.g. aspen, and processes that are limited or lost by exclusion of fire over the last century.



Driptorch use in prescribed burns.

Coordination with Others

The initial strategy and program options have involved the State of South Dakota – Department of Agriculture, the South Dakota Interagency Fire Council, and the Black Hills National Forest Advisory Board.

II. Insects and forest fuels – the problem

Current beetle infestations and fire risk are linked by a common factor of overly dense forests caused by 100 years of fire suppression and prolific ponderosa pine growth. Cycles of drought exacerbate the stress caused by overcrowding. Areas of fire hazard and insect risk largely overlap. This paper integrates insect problems, fire hazard problems, and loss of natural fire regimes into a single strategy.

- a) Approximately 450,000⁵ acres of moderate and overly dense ponderosa pine is at moderate or high risk for serious infestation or is rated as a high fire hazard (see Appendix Map A – *Fire Hazard*). This acreage is predicted to increase by 30 percent to 585,000 acres through the decade as forests grow.
- b) About 200,000 acres are currently infested with mountain pine beetles (*Dendroctonus ponderosae*) and pine engraver (*Ips pini*). Concentrations are located in the Beaver Park, Deerfield, and other areas. Infestations vary from zero to eight-

⁴ Mid-elevation range taken from Brown, P. 2003. Fire, climate, and forest structure in ponderosa pine forests of the Black Hills. Ph.D. dissertation. Colo. State Univ., Fort Collins, CO. Spring 2003.

⁵ 450,000 acres is considered high fire hazard and high risk of insect infestation. 429,660 acres are moderate or high risk of insect infestation and 466,344 acres are considered a “high” fire hazard (2002 Forest Monitoring Report). These acres largely overlap. Acreages vary depending on criteria used.

or-more trees per acre in clumps across the forest (see Appendix Map B – *Insect Damage Survey*).

- c) Recent drought has stressed the overcrowded trees, leading to increased beetle infestations. Recurring wind damage, snow breakage, and wildfires have added additional habitat for a sustained population increase of pine engraver beetles.
- d) Mountain pine beetle epidemics are cyclic, occurring every 20 to 30 years since 1900. Beetle populations will not be eliminated; however, treatment actions would reduce the infestation and the level of damage.
- e) Beetle-killed trees add to the fire hazard for 3 to 4 years while needles are brown. Hazard subsides once the dead needles fall to the ground but increases again when the dead trees fall.



Mountain pine beetle and tree pitch-out.

- f) Most of the Black Hills National Forest is in Condition Class 3, i.e. fire regimes are significantly altered from historical ranges; there is a high risk of losing key ecosystem components from fire; fire frequencies are altered leading to changes to size, frequency, intensity or severity of fire; or landscape pattern.⁶
- g) Fires are integral to the ponderosa pine ecosystem and occurred on a 10 to 40 year frequency through history (*Fire Regime 1*). Approximately 160 fires consuming about 2,400 acres occur annually (prior to year 2000). A small percentage escape initial attack and grow larger, the largest ranging from 10,000 to 20,000 acres historically with a recorded maximum of 83,000 acres in 2000 (see Appendix Map C - *Large Fire History*) and an average of 35,000 acres each year in the past 4 years.
- h) Pine encroachment into aspen communities, meadows, and other non-forest areas over the last 100 years has reduced available forage and diminished natural grassland and forest diversity important for many plant and animal species.
- i) Increasing housing developments in or near forest areas, the WUI, has made fire fighting more difficult and far more costly. Firefighters and equipment focus on structure protection as a priority over forested land, often resulting in additional burned acreage.

⁶ Definition from Rocky Mountain Research Station report RMRS-GTR-87. April 2000.

- j) Treating fuels would not reduce fire occurrence but would reduce fire intensity and severity and the threat to resources and structures.



Area before thinning.



Area after thinning.

III. Past program levels

The Forest Land and Resource Management Plan was revised in 1997. Table 1 shows the acres treated annually since that time. Fuel treatment included prescribed fire on 1,073 to 2,600 acres annually.

Table 1 – Annual Vegetation/Fuel Treatment Accomplishments (FY1998-2003)

Fiscal Year	Fuel⁷ Treatment (acres)	Tree Thinning (acres)	Timber Harvest (acres)	Forest Health Program (acres)	Total Treated Acres
98	3,958	9,247	14,307	300	27,812
99	4,414	4,579	14,238	300	23,531
00	6,532	7,003	13,567	500	27,602
01	8,708	2,277	12,442	1,500	24,927
02	8,603	4,577	15,123	400	28,703
03	10,186	4,545	16,500	200	31,431
Total FY98-03	42,401ac	32,228 ac	86,177 ac	3,200 ac	164,006 ac
Forest Plan⁸	31,500 ac (+ 8,000 Px)	5,400	25,500	-	31,500 ac. (trmts overlap nearly 100%)

⁷ Includes only those acres treated with appropriated fuels dollars (WFHF) and does not include acres treated through timber harvest or thinning.

⁸ Annual projections (not targets) from Forest Plan FEIS II-33, 34 and 36. Fuel treatment on 31,500 acres includes 2,600 acres of natural fuel treatment. 8,000 acres of prescribed burning was anticipated.

IV. Future program options

The strategic plan is based on three budget/target options: (1) current level, (2) increased level, and (3) aggressive level. Considerations common to each option include:

- a) The strategy integrates six programs (items in parentheses are budget program codes) to achieve overlapping program objectives in forest and rangeland vegetation management: hazardous fuels (WFHF), thinning (KV and NFVW), timber sales (NFTM and SSSS), Forest Health Program (SPFH), wildlife habitat (NFWF and KV), and rangeland vegetation (NFRG, NFVW, and KV).
- b) Fuel treatment prescriptions will focus on (1) reducing surface fuels, (2) increasing height to live crown, (3) reducing canopy bulk density, and (4) reducing continuity of the forest canopy.⁹
- c) Wildlife habitat and rangeland improvement projects include vegetation treatments such as prescribed burns, patch cuts, aspen regeneration cuts, thinning, and conifer removal from hardwoods and meadows.
- d) Timber harvest, thinning, fuel, and forest health treatments will change the fuel situation from Condition Class 3 to 2 or 1. The range and wildlife projects are very important for ecological restoration and will change Condition Class to 1 or 2, however, they will not be included in the acreage of “high hazard” treated.
- e) Priority for treatment will be WUI, facilities/structures, sensitive watersheds, scenic and recreational areas, and important habitats. Projects with cooperative contributions and/or adjacent to such projects will receive higher priority.
- f) Options for increased use of biomass should be sought. Appendix E, Tables 1-3 show biomass produced at respective program levels. Lack of these additional biomass opportunities do not preclude implementing this strategy, however increased biomass markets may reduce project costs.
- g) The Forest Health Program (SPFH) includes sanitation, direct treatment, and detection and support to on-going projects.

Option 1 – Current program level (see Table 2):

Total area treated (all programs)	=	393,080 acres
Total effective fuel treatment	=	252,700 acres
Percent of unburned high hazard acres ¹⁰	=	66 percent
Total funding needed over 10 years	=	\$178.7 million

⁹ From page 24, Graham et al, USDA Forest Service Gen. Tech. Rep. RMRS-GTR-120. 2004.

¹⁰ Wildfire acreage removed, i.e. 252,700 treated acres/(585,000 high hazard acres – 200,000 acres of projected wildfire)x100 = 66%

This option falls short of the goal to treat significant high hazard acreage, improve insect resistance, and restore ecosystem components. Even though the percent of unburned high hazard acres is relatively high, it is based on a rough assumption that 200,000 acres could burn in wildfire over the decade. If wildfires did not consume 200,000 acres, the treatments would be about 43 percent of the high hazard acreage.

Option 2 – An increased level (see Table 3):

Total area treated (all programs)	=	540,730 acres
Total effective fuel treatment	=	332,640 acres
Percent of unburned high hazard acres	=	86 percent
Total funding needed over 10 years	=	\$231.7 million

This treatment level, if properly located in the WUI and across the landscape, would reduce crown fire potential within treated areas, increase resistance to insect attack, restore fire to the ecosystem, and improve habitats. Without the projected 200,000 acres of wildfire over the decade, this program would treat about 57 percent of the high hazard acres. This option roughly approximates the annual projected fuel, thinning, and timber harvest acreage in the 1997 forest plan.

Option 3 – Aggressive plan (see Table 4)

Total area treated (all programs)	=	717,230 acres
Total effective fuel treatment	=	411,390 acres
Percent of unburned high hazard acres	=	106 percent
Total funding needed over 10 years	=	\$294.5 million

This option was developed upon request of the Black Hills Forest Advisory Board. It treats 100 percent of the high hazard acreage remaining after projected wildfires consume 200,000 acres. Plus, it treats additional areas (6 percent). Without the projected 200,000 acres of wildfire over the decade, this program would treat about 70 percent of the high hazard acres¹¹. Of the three options, it treats the most high risk mountain pine beetle acreage. It exceeds current Forest Plan annual projections for acreage treated. Agency and contractor capability would have to significantly increase to handle this program.

¹¹ (411,230 acres/585,000 acres)x100 = 70% of high hazard acreage.

Table 2 – Watershed/Vegetation Restoration Program (FY04-13) – Current program

FY	Fuel Treatment ¹²		Tree Thinning		Timber Harvest		Forest Health Program		Total ¹³ Effective Fuel Treatment (70% of total)	Wildlife Habitat Improvement		Rangeland Vegetation Improvement		Total Treated Area	Total Funding ¹⁴
	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$) (\$370/ac)	Acres ¹⁵	Funds ¹⁶ (mil. \$) (\$580/ac)	Acres	Funds (mil. \$) (\$400/ac)	Acres	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$)
4	12,100	4.2	4,900	1.8	15,000	8.7	1,700	0.7	23,590	2,500	0.9	30	0.01	36,230	16.3
5	12,100	4.2	4,900	1.8	16,000	9.3	1,700	0.7	24,290	3,000	1.1	50	0.02	37,750	17.1
6	12,100	4.2	4,900	1.8	17,000	9.9	1,700	0.7	24,990	3,000	1.1	100	0.04	38,800	17.7
7	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	100	0.04	39,800	18.3
8	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	200	0.1	39,900	18.3
9	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	300	0.1	40,000	18.3
10	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	300	0.1	40,000	18.3
11	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	500	0.2	40,200	18.4
12	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	500	0.2	40,200	18.4
13	12,100	4.2	4,900	1.8	18,000	10.4	1,700	0.7	25,690	3,000	1.1	500	0.2	40,200	18.4
Total	121,000	\$42.4	49,000	\$18.1	174,000	\$100.9	17,000	\$6.1	252,700	29,500	\$10.3	2,580	\$0.9	393,080	\$178.7

¹² The target increased to 15,369 acres since 1/13/04. Unit cost for FY04 is about \$263/ac. The unit cost beginning in FY05 (\$350/ac) accounts for more NEPA and WUI.

¹³ Total “effective treatment” acreage accounts for an estimated 30% reduction due to overlap between the treatments.

¹⁴ Unit cost estimates are for FY04 and held constant for the decade. The BFES program automatically adds inflationary increases.

¹⁵ Acreage harvested increases as annual sell increases to 70 mmbf annually.

¹⁶ The unit cost of timber harvest includes all sale planning, preparation, administration, and miscellaneous permits. Timber sale NEPA usually includes fuel treatments and post-sale thinning. The unit cost for those activities would be considerably higher if NEPA was not funded by NFTM. Revenues from sales are not included.

Table 3 – Watershed/Vegetation Restoration Program (FY04-13) – Increased program

FY	Fuel Treatment		Tree Thinning		Timber Harvest		Forest Health Program		Total ¹¹ Effective Fuel Treatment (70% of total)	Wildlife Habitat Improvement		Rangeland Vegetation Improvement		Total Treated Area	Total Funding ¹²
	Acres	Funds (mil. \$) (\$350/ac) ¹³	Acres	Funds (mil. \$) (\$370/ac)	Acres ¹⁴	Funds ¹⁵ (mil. \$) (\$580/ac)	Acres	Funds (mil. \$) (\$400/ac)	Acres	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$)
4	12,100	4.2	4,900	1.8	15,000	8.7	1,700	0.7	23,590	2,500	0.9	30	0.01	36,230	16.3
5	14,000	4.9	8,000	3.0	16,000	9.3	2,000	0.8	28,000	3,000	1.1	1,000	0.4	44,000	19.3
6	16,000	5.6	9,000	3.3	17,000	9.9	2,500	1.0	31,150	4,000	1.4	1,000	0.4	49,500	21.5
7	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	1,000	0.4	58,000	24.9
8	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	1,000	0.4	58,000	24.9
9	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	2,000	0.7	59,000	25.2
10	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	2,000	0.7	59,000	25.2
11	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	2,000	0.7	59,000	25.2
12	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	2,000	0.7	59,000	25.2
13	17,000	6.0	13,000	4.8	18,000	10.4	3,000	1.2	35,700	6,000	2.1	2,000	0.7	59,000	25.2
Total	161,100	\$56.4	112,900	\$41.8	174,000	\$100.9	27,200	\$9.7	332,640	51,500	\$18.0	14,030	\$4.9	540,730	\$231.7

¹¹Total “effective treatment” acreage accounts for an estimated 30% reduction due to overlap between the treatments.

¹²Unit cost estimates are for FY04 and held constant for the decade. The BFES program automatically adds inflationary increases.

¹³Unit cost for FY04 is about \$263/ac. The unit cost beginning in FY05 (\$350/ac) accounts for more NEPA and WUI. Target is revised to 15, 369 acres for FY04.

¹⁴Acreage harvested increases as annual sell increases to 70 mmbf annually.

¹⁵The unit cost of timber harvest includes all sale planning, preparation, administration, and miscellaneous permits. Timber sale NEPA usually includes fuel treatments and post-sale thinning. The unit cost for those activities would be considerably higher if NEPA was not funded by NFTM. Revenues from sales are not included.

Table 4 – Watershed/Vegetation Restoration Program (FY04-13) – Aggressive program

FY	Fuel Treatment		Tree Thinning		Timber Harvest		Forest Health Program		Total ¹¹ Effective Fuel Treatment (70% of total)	Wildlife Habitat Improvement		Rangeland Vegetation Improvement		Total Treated Area	Total Funding ¹²
	Acres	Funds (mil. \$) (\$350/ac) ¹³	Acres	Funds (mil. \$) (\$370/ac)	Acres ¹⁴	Funds ¹⁵ (mil. \$) (\$580/ac)	Acres	Funds (mil. \$) (\$400/ac)	Acres	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$) (\$350/ac)	Acres	Funds (mil. \$)
4	12,100	4.2	4,900	1.8	15,000	8.7	1,700	0.7	23,590	2,500	0.9	30	0.0	36,230	16.3
5	16,000	5.6	10,000	3.7	16,000	9.3	2,000	0.8	30,800	3,000	1.1	2,000	0.7	49,000	21.1
6	20,000	7.0	14,000	5.2	17,000	9.9	3,000	1.2	37,800	4,000	1.4	5,000	1.8	63,000	26.4
7	22,000	7.7	16,000	5.9	18,000	10.4	3,000	1.2	41,300	6,000	2.1	5,000	1.8	70,000	29.1
8	23,000	8.1	19,000	7.0	18,000	10.4	3,000	1.2	44,100	8,000	2.8	5,000	1.8	76,000	31.3
9	25,000	8.8	19,000	7.0	18,000	10.4	3,000	1.2	45,500	10,000	3.5	7,000	2.5	82,000	33.4
10	26,000	9.1	19,000	7.0	18,000	10.4	3,000	1.2	46,200	10,000	3.5	8,000	2.8	84,000	34.1
11	26,000	9.1	20,000	7.4	18,000	10.4	3,000	1.2	46,900	10,000	3.5	8,000	2.8	85,000	34.4
12	27,000	9.5	20,000	7.4	18,000	10.4	3,000	1.2	47,600	10,000	3.5	8,000	2.8	86,000	34.8
13	27,000	9.5	20,000	7.4	18,000	10.4	3,000	1.2	47,600	10,000	3.5	8,000	2.8	86,000	34.8
Total	224,100	\$78.4	161,900	\$59.9	174,000	\$100.9	27,700	\$9.9	411,390	73,500	\$25.7	56,030	\$19.6	717,230	\$294.5

¹¹Total “effective treatment” acreage accounts for an estimated 30% reduction due to overlap between the treatments.

¹²Unit cost estimates are for FY04 and held constant for the decade. The BFES program automatically adds inflationary increases.

¹³Unit cost for FY04 is about \$263/ac. The unit cost beginning in FY05 (\$350/ac) accounts for more NEPA and WUI.

¹⁴Acreage harvested increases as annual sell increases to 70 mmbf annually.

¹⁵The unit cost of timber harvest includes all sale planning, preparation, administration, and miscellaneous permits. Timber sale NEPA usually includes fuel treatments and post-sale thinning. The unit cost for those activities would be considerably higher if NEPA was not funded by NFTM. Revenues from sales are not included.

IV. Action plan

The Five-Year Action Plan is appended to this strategy and will be revised annually. About 50-70 percent of the fuels (WFHF) projects would be in the WUI depending on funding. Other projects will be located across the Forest where needed to maintain healthy forest conditions, improve habitats, and protect watersheds and other values.

Short-term actions

- a) Existing timber sales - Evaluate existing timber sale contracts to remove infested trees and thin surrounding trees.
- b) Beaver Park – Continue to implement projects authorized by legislation.
- c) Critical facilities – Treat insects and create defensible space by reducing stand density and removing infested trees within and surrounding the Deerfield area campgrounds, other recreation areas, and administrative sites (FY04). Individual tree protection treatments would be used where appropriate.
- d) Small contracts - Award 6 to 8 contracts of up to 1,000 acres each to sanitize timber stands via miscellaneous small product sales in FY04. These and other small projects could be planned under recently approved expedited environmental analysis procedures.
- e) Focus areas – A joint Forest Service/State team identified these high priority areas for treatment. Other important areas will be added:
 - ?? Deadwood/Lead - Area within 3 miles of the Deadwood/Lead exemption area. Thin stands, mechanically pile slash, or use prescribed fire to reduce fuel loadings. Area is included in the Mineral EA.
 - ?? Deerfield – Area within 1 mile of Deerfield Lake, plus active timber sales within 10 miles of Deerfield Lake.
 - ?? Custer - Area within 3 miles of the City of Custer. Thin stands, pile slash, or use prescribed fire to reduce fuel loads.
 - ?? Spearfish Canyon scenic corridor - Thin trees, pile and/or use prescribed fire to reduce fuel loading. This project will be included in the Rubicon or an adjacent analysis area.
 - ?? US Highway 385 scenic corridor - Thin trees, pile slash, and/or use prescribed fire to reduce fuel loads and treat insects where needed.
 - ?? Norbeck Wildlife Preserve - Dense pine forests would be thinned and habitat restored via the Grizzly2 and Needles2 timber sales and subsequent thinning and burning treatments.

- f) Forest planning - Fully consider and integrate fuel and insect conditions, treatment needs, communities, and WUI areas in the Phase II Amendment of the Revised Forest Plan.

Long-term actions

The most effective long-term strategy is reducing tree density and restoring fire across the Forest, focusing on areas with the highest public risk and resource values. A rough estimate to maintain conditions once restored would be to treat about 42,000 acres of ponderosa pine forest annually (1,059,937 acres of pine divided by a 25 year natural fire return interval).

- a) Existing timber sales – Sanitize, reduce crown density, and improve tree vigor on about 134,000 acres currently under contract. Review insect conditions on the remaining 347,000 acres within timber sale boundaries. Priority would be those sales within the WUI.
- b) Five year project planning - Plan and implement fuels, insect, thinning, and timber sale projects within the project areas shown on *Vegetation and Fuels Planning Areas* map (Appendix Map D). Treatments within the WUI are priority.
- c) Biomass development – The treatment options above could yield an annual average of 208,000 to 269,000 green tons of woody biomass over the 10-year period. Feasibility studies of various alternative uses are in progress. The Black Hills National Forest would continue to participate in such studies.

Collaboration with others

Forest-wide coordination will be done annually with the National Forest Advisory Board at a programmatic level and the South Dakota Interagency Fire Council (includes WY as a cooperator) on a programmatic, tactical, and cross-jurisdictional basis. District rangers will coordinate with local interested agencies, groups, and individuals during project planning. Tribal governments will be consulted at periodic meetings with tribal historic preservation officers and tribal officials.

Funding, operational needs, accountability, and monitoring

- a) Annual funding needed would increase from the current level (\$16.3 million) to \$25.2 under Option 2 and \$34.8 million under Option 3.
- b) Use the “Stewardship End Result Contracting” authority to gain efficiency in program delivery. The “Balm of Gilead Stewardship Project” is approved for FY04.
- c) The Forest should consider reducing the sawtimber utilization specifications to 7-inch diameter breast height, 5-inch top, and/or requiring “products other than logs” (POL) removal. Appraisal allowances and use of tree-measurement contracts would be needed. More woody material would be removed commercially, saving appropriated dollars spent on service contracts.
- d) Pursue additional funding for using small diameter trees through regional initiatives.

- e) Progress towards goals will be monitored by NFPORS, RMRIS, or other data bases and reported in respective program areas and the annual Forest monitoring report.
- f) Heritage resource assessments will be needed in advance of treatment. Region or state-wide programmatic agreements for fuels treatments should be completed with state historic preservation offices as soon as possible.
- g) Support for landline re-location and maintenance and for review of transportation facilities near projects will be needed.
- h) This strategy is adaptive, i.e. it will be adjusted with changes in forest condition, new information, and funding level. Adjustments would likely be made in treatment acreage and location.

V. Summary

The **current budget level** does not provide funds needed to adequately treat high hazard forest stands and restore ecological functions to other areas across the Black Hills National Forest. Funding under **Option 2, an “increased level,”** provides for sufficient fuel treatment to stop the most destructive crown fires if the treatments are strategically located across the landscape. It leaves a large acreage of overcrowded, low vigor pine forest at high risk to mountain pine beetle infestation. The alternative could be implemented with modest additions to the workforce. The increased acreage would require more project-level environmental review. **Option 3, an aggressive program,** would require significant funding increases and additions to the workforce, and the accomplishment level would require careful monitoring under the current Forest Plan. The option treats most of the high risk mountain pine beetle acreage and treats all of the high hazard fuels acreage.

VI. Appendix

Appendix A - Fire Hazard (map)

Appendix B - Insect Damage Survey (map)

Appendix C - Large Fire History (map)

Appendix D – Vegetation and Fuels Planning Areas (map)

Appendix E – Biomass Tables 5-7

Appendix F – 5-Year Action Plan (to be finalized 5/04 and revised annually)

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Appendix E Table 1. Black Hills National Forest Biomass Yields – Current program

FY	Fuel Treatment-WFHF		Tree Thinning		Timber Harvest		Forest Health		Total Acres	Total green tons	
	Acres	Biomass 20% acres 1/	Biomass green tons	Acres	Biomass green tons 2/	Harvest Acres	Biomass green tons 3/	Acres			Biomass green tons 4/
2004	12,100	2,420	20,812	4,900	17,086	15,000	154,970	1,700	5,928	24,020	198,796
2005	12,100	2,420	20,812	4,900	17,086	16,000	165,460	1,700	5,928	25,020	209,286
2006	12,100	2,420	20,812	4,900	17,086	17,000	165,460	1,700	5,928	26,020	209,286
2007	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
2008	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
2009	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
2010	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
2011	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
2012	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
2013	12,100	2,420	20,812	4,900	17,086	18,000	165,460	1,700	5,928	27,020	209,286
Total	121,000	24,200	208,120	49,000	170,863	174,000	1,644,110	17,000	59,279	264,200	2,082,372
		acres	tons	acres	tons	acres	tons	acres	tons	acres	tons
Average/year =										26,420ac	208,237 tons

1/Estimated 20% of total fuel treatment will be mechanical methods that yield biomass. For a conservative biomass estimate it is assumed 80% will be burned and not yield biomass (or was previously removed).

-12,100 acres x 20% = 2,420 acres

- Mechanical treatment assumed to yield 8.6 green tons/acre based on a 6-inch diameter tree.

2/Estimated 3.487 green tons per acre yield. (Source: McNeill Technologies, Sept.2002)

3/65 million board feet in FY2004, then 70 million board feet per year thereafter.

-2,098 green tons of slash per million board feet.

-18,600 green tons per year of POL (products other than logs). Source: McNeill Technologies Sept.2002

4/Forest health treatment similar to tree thinning for biomass yield of 3,487 green tons per acre

Appendix E Table 2. Black Hills National Forest Biomass Yields — Increased program

FY	Fuel Treatment		Tree Thinning		Timber Harvest		Forest Health		Total Acres	Total green tons	
	Acres	Biomass 20% acres 1/	Biomass green tons	Acres	Biomass green tons 2/	Harvest Acres	Biomass green tons 3/	Acres			Biomass green tons 4/
2004	12,100	2,420	20,812	4,900	17,086	15,000	154,970	1,700	5,928	24,020	198,796
2005	14,000	2,800	24,080	8,000	27,896	16,000	165,460	2,000	6,974	28,800	224,410
2006	16,000	3,200	27,520	9,000	31,383	17,000	165,460	2,500	8,718	31,700	233,081
2007	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
2008	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
2009	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
2010	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
2011	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
2012	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
2013	17,000	3,400	29,240	13,000	45,331	18,000	165,460	3,000	10,461	37,400	250,492
Total	161,100	32,220	277,092	112,900	393,682	174,000	1,644,110	27,200	84,385	346,320	2,409,731
		acres	tons	acres	tons	acres	tons	acres	tons	acres	tons
Average/year =										34,632 ac.	240,973 tons

1/Estimated 20% of total fuel treatment will be mechanical methods that yield biomass. For a conservative biomass estimate it is assumed 80% will be burned and not yield biomass (or was previously removed).

-For example, 12,100 acres x 20% = 2,420 acres

-Mechanical treatment assumed to yield 8.6 green tons/acre based on a 6 inch diameter tree.

2/Estimated 3.487 green tons per acre yield. (Source: McNeill Technologies, Sept.2002)

3/65 million board feet in FY2004, then 70 million board feet per year thereafter. 2,098 green tons of slash per million board feet. 18,600 green tons per year of POL (products other than logs). Source: McNeill Technologies Sept.2002

4/Forest health treatment similar to tree thinning for biomass yield of 3,487 green tons per acre

Appendix E Table 3 — Aggressive program

FY	Fuel Treatment			Tree Thinning		Timber Harvest		Forest Health Program		Total Acres	Total green tons
	Acres	Biomass 20% acres 1/	Biomass green tons	Acres	Biomass green tons 2/	Harvest Acres	Biomass green tons 3/	Acres	Biomass green tons 4/		
2004	12,100	2,420	20,812	4,900	17,086	15,000	154,970	1,700	5,928	24,020	198,796
2005	16,000	3,200	27,520	10,000	34,870	16,000	165,460	2,000	6,974	31,200	234,824
2006	20,000	4,000	34,400	14,000	48,818	17,000	165,460	3,000	10,461	38,000	259,139
2007	22,000	4,400	37,840	16,000	55,792	18,000	165,460	3,000	10,461	41,400	269,553
2008	23,000	4,600	39,560	19,000	66,253	18,000	165,460	3,000	10,461	44,600	281,734
2009	25,000	5,000	43,000	19,000	66,253	18,000	165,460	3,000	10,461	45,000	285,174
2010	26,000	5,200	44,720	19,000	66,253	18,000	165,460	3,000	10,461	45,200	286,894
2011	26,000	5,200	44,720	20,000	69,740	18,000	165,460	3,000	10,461	46,200	290,381
2012	27,000	5,400	46,440	20,000	69,740	18,000	165,460	3,000	10,461	46,400	292,101
2013	27,000	5,400	46,440	20,000	69,740	18,000	165,460	3,000	10,461	46,400	292,101
Total	224,100	44,820	385,452	161,900	564,545	174,000	1,644,110	27,700	86,129	408,420	2,690,697
		acres	tons	acres	tons	acres	tons	acres	tons	acres	tons
Average/year = 40,842 ac. 269,070 tons											

1/Estimated 20% of total fuel treatment will be mechanical methods that yield biomass. For a conservative biomass estimate it is assumed 80% will be burned and not yield biomass (or was previously removed).

-i.e. 12,100 acres x 20% = 2,420 acres

- Mechanical treatment assumed to yield 8.6 green tons/acre based on a 6 inch diameter tree.

2/Estimated 3.487 green tons per acre yield. (Source: McNeill Technologies, Sept.2002)

3/65 million board feet in FY2004, then 70 million board feet per year thereafter.

-2,098 green tons of slash per million board feet.

-18,600 green tons per year of POL (products other than logs). Source: McNeill Technologies Sept.2002

4/Forest health treatment similar to tree thinning for biomass yield of 3,487 green tons per acre