

SPRUCE VEGETATION MANAGEMENT PROJECT
BLACK HILLS NATIONAL FOREST

Estimated Treatment Acres

January 26, 2022

Treatment acre estimates are based on the following:

Common Stand Exam data for 501 stands:

District	No. Stands	Total Acres	Year Data Collected
MY	57	2,381	2016
NH	444	15,776	2017-2018
		18,157	

- Stand conditions were projected to a common year of 2022 in the Forest Vegetation Simulator.
- Stand types, habitat types, and stand sizes were assessed for overlap and adjacency to the Wildland Urban Interface (WUI).
- Estimated treatment acres were expanded by a factor of 2.81 based upon the total area designated as white spruce forest, 51,097 acres, per the November 3, 2021, FSVeg forest inventory database.

WUI was defined by the following categories:

Feature	Buffer	File Name
<u>PowerLines</u> <ul style="list-style-type: none">• Transmission• <u>OverHead Primary</u>	300'	Power300_Diss
Recreation sites <ul style="list-style-type: none">• Admin Sites• Campgrounds• Lookouts• Rec Residences	½ mile	<u>RecResHalf Diss</u> <u>RecSiteHalf Diss</u>
Private Property	½ mile	<u>PVTHalf diss</u>
POD boundaries	300'	POD300_diss

Table 1. Estimated treatment acres by stand type, size class, forest products emphasis, and silvicultural Rx method category.

Stand Type	Habitat Type	Size Class	Primary Objective	Forest Products Emphasis	Silvicultural Rx Method Category	WUI	Total Acres
Mixed conifer	PIGL/LIBO	Sawtimber	Restoration	Commercial	Even-aged regeneration		7,000
		Sawtimber	Restoration, Fuels Reduction	Commercial	Even-aged regeneration	Y	10,400
		POL	Restoration, Fuels Reduction	Non-commercial	Thinning	Y	2,400
Pure spruce	PIGL/VASC	Sawtimber	Fuels Reduction	Commercial	Even-aged regeneration	Y	5,800
		Sawtimber	Structural Diversity	Commercial	Uneven-aged regeneration		3,700
		POL	Fuels Reduction	Non-commercial	Thinning	Y	700

30,000

Size Class Definitions:

Sawtimber: ≥ 9.0 inches dbh

Product Other Than Lumber (POL): ≥ 5.0 inches dbh and < 9.0 inches dbh

Table 2. Estimated treatment acres by total canopy closure.

Stand Type	Habitat Type	Size Class	Total Canopy Closure Class ¹			Total Acres
			< 40%	$\geq 40\%$ and < 70%	> 70%	
Mixed conifer	PIGL/LIBO	Sawtimber	3,200	12,000	2,200	17,400
		POL	0	1,000	1,400	2,400
Pure spruce	PIGL/VASC	Sawtimber	900	6,400	2,200	9,500
		POL	0	300	400	700
			4,100	19,700	6,200	30,000

¹Total canopy closure applies to all tree species ≥ 1.0 inches dbh.

Table 3. Estimated treatment acres by Forest Plan Management Area.

Stand Type	Habitat Type	Size Class	Management Area	Total Acres
Mixed conifer	PIGL/LIBO	Sawtimber	4.1	2,700
		Sawtimber	5.1	14,700
		POL	4.1	200
		POL	5.1	2,200
Pure spruce	PIGL/VASC	Sawtimber	4.1	1,200
		Sawtimber	5.1	8,300
		POL	4.1	100
		POL	5.1	600
				30,000

Management Areas:

4.1 - Limited Motorized Use and Forest Product Emphasis

5.1 - Resource Production Emphasis

Table 4. Estimated commercial forest products harvest acres.

Stand Type	Habitat Type	Size Class	Silvicultural Rx Method Category	WUI	Total Acres
Mixed conifer	PIGL/LIBO	Sawtimber	Even-aged regeneration		7,000
		Sawtimber	Even-aged regeneration	Y	10,400
Pure spruce	PIGL/VASC	Sawtimber	Even-aged regeneration	Y	5,800
		Sawtimber	Uneven-aged regeneration ²		3,700
					26,900

²Total estimated acres in pure spruce stands, uneven-aged management represent total stand acres, not the estimated treatment footprint (group selection).

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SPRUCE VEGETATION MANAGEMENT PROJECT BLACK HILLS NATIONAL FOREST

Estimated Treatment Acres

February 1, 2022

Treatment acre estimates are based on the following:

Common Stand Exam data for 501 stands:

District	No. Stands	Total Acres	Year Data Collected
MY	57	2,381	2016
NH	444	15,776	2017-2018
		18,157	

- Stand conditions were projected to a common year of 2022 in the Forest Vegetation Simulator.
- Stand types, habitat types, and stand sizes were assessed for overlap and adjacency to the Wildland Urban Interface (WUI).
- The total estimated area for the white spruce forest type is based on the total area designated as white spruce forest, 33,644 acres, per the November 3, 2021, FSVeg forest inventory database.
- Estimated treatment acres were expanded by a factor of 1.19 based upon 11,427 acres of potential treatment stands derived from the CSE dataset and total estimated white spruce acres available for management, 13,644 acres (area exceeding 20,000 acres to be maintained for white spruce per Forest Plan Objective 23-LVD, see below).

239-LVD. ***NEW.** Manage for 20,000 acres of spruce across the Forest using active management to achieve multiple-use objectives. Treat spruce within 200 feet of buildings, where spruce has encroached into hardwoods, and for emphasis species management.

WUI was defined by the following categories:

Feature	Buffer	File Name
<u>PowerLines</u> <ul style="list-style-type: none"> • Transmission • <u>OverHead Primary</u> 	300'	Power300_Diss
Recreation sites <ul style="list-style-type: none"> • Admin Sites • Campgrounds • Lookouts • Rec Residences 	½ mile	<u>RecResHalf_Diss</u> <u>RecSiteHalf_Diss</u>
Private Property	½ mile	<u>PVTHalf_diss</u>
POD boundaries	300'	POD300_diss

Table 1. Estimated treatment acres by stand type, size class, forest products emphasis, and silvicultural Rx method category.

Size Class Definitions:

Sawtimber: ≥ 9.0 inches dbh; Product Other Than Lumber (POL): ≥ 5.0 inches dbh and < 9.0 inches dbh

Stand Type	Habitat Type	Size Class	Primary Objective	Forest Products Emphasis	Silvicultural Rx Method Category	WUI	Total Acres
Mixed conifer	white spruce/twinflower	Sawtimber	Restoration	Commercial	Even-aged regeneration		3,025
		Sawtimber	Restoration, Fuels Reduction	Commercial	Even-aged regeneration	Y	4,475
		POL	Restoration	Non-commercial	Uneven-aged regeneration		575
		POL	Restoration, Fuels Reduction	Non-commercial	Thinning	Y	1,000
Pure spruce	white spruce/grouse whortleberry	Sawtimber	Fuels Reduction	Commercial	Even-aged regeneration	Y	2,450
		Sawtimber	Structural Diversity	Commercial	Uneven-aged regeneration		1,550
		POL	Fuels Reduction	Non-commercial	Uneven-aged regeneration	Y	300
							13,375

Table 2. Estimated treatment acres by total canopy closure.

Stand Type	Habitat Type	Size Class	Total Canopy Cover Class ¹			Total Acres
			< 40%	$\geq 40\%$ and < 70%	> 70%	
Mixed conifer	white spruce/twinflower	Sawtimber	1,375	5,175	950	7,500
		POL	100	750	725	1,575
Pure spruce	white spruce/grouse whortleberry	Sawtimber	350	2,675	975	4,000
		POL	0	150	150	300
			1,825	8,750	2,800	13,375

¹Total canopy closure applies to all tree species ≥ 1.0 inches dbh.

Table 3. Estimated treatment acres by Forest Plan Management Area.

Stand Type	Habitat Type	Size Class	Management Area	Total Acres
Mixed conifer	white spruce/twinflower	Sawtimber	4.1	1,200
		Sawtimber	5.1	6,300
		POL	4.1	425
		POL	5.1	1,150
Pure spruce	white spruce/grouse whortleberry	Sawtimber	4.1	500
		Sawtimber	5.1	3,500
		POL	4.1	25
		POL	5.1	275
				13,375

Management Areas:

4.1 - Limited Motorized Use and Forest Product Emphasis

5.1 - Resource Production Emphasis

Table 4. Estimated commercial forest products harvest acres.

Stand Type	Habitat Type	Size Class	Silvicultural Rx Method Category	WUI	Total Acres
Mixed conifer	white spruce/twinflower	Sawtimber	Even-aged regeneration		3,025
		Sawtimber	Even-aged regeneration	Y	4,475
Pure spruce	white spruce/grouse whortleberry	Sawtimber	Even-aged regeneration	Y	2,450
		Sawtimber	Uneven-aged regeneration		1,550
					11,500

²Total estimated acres in pure spruce stands, uneven-aged management represent total stand acres, not the estimated treatment footprint (group selection).

Table 5. Average total canopy cover by stand type, size class, and diameter range, all species.

Stand Type	Size Class	Canopy Cover		
		Trees 5.0 - 8.9 inches dbh	Trees ≥ 9.0 inches dbh	Trees ≥ 1.0 inches dbh
Mixed conifer	Sawtimber	20	36	56
Mixed conifer	POL	41	25	67
Pure spruce	Sawtimber	21	40	60
Pure spruce	POL	39	26	68

Table 6. QMD by stand type by size class and species, trees ≥ 9.0 inches dbh.

Stand Type	Size Class	Quadratic Mean Diameter (trees ≥ 9.0 inches dbh)			
		All Species	White spruce	Ponderosa Pine	Aspen
Mixed conifer	Sawtimber	13.2	12.7	15.5	11.2
	POL	12.1	11.9	14.2	9.9
Pure spruce	Sawtimber	12.9	12.7	17.0	12.0
	POL	11.3	11.2	14.2	11.0

Table 7. QMD by stand type by size class and species, trees ≥ 5.0 -8.9 inches dbh.

Stand Type	Size Class	Quadratic Mean Diameter (trees 5.0-8.9 inches dbh)			
		All Species	White spruce	Ponderosa Pine	Aspen
Mixed conifer	Sawtimber	7.2	7.3	7.2	7.3
	POL	6.9	7.0	7.1	7.5
Pure spruce	Sawtimber	7.3	7.3	6.9	7.7
	POL	7.1	7.1	7.2	

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Forest Type White Spruce Total Acres - Timberlands in South Dakota

Inventory	Report	Source	Estimated	Sampling	No. Plots
1987	Timber. Forest, Pest and Cooprative Forestry Management 1988	R2	17,493	unknown	24
1995	Public Evalidator	NRS-FIA	50,800	24.45%	11
2001 - 2005	Public Evalidator	NRS-FIA	49,938	32.34%	11
2007 - 2011	Public Evalidator	NRS-FIA	49,839	30.74%	10
2007 - 2011	Walters et. 2011	NRS-FIA	51,600	unknown	unknown
2013 - 2019	Public Evalidator	NRS-FIA	57,367	20.30%	23
2017-2019	Custom Database	NRS-FIA	52,047	21.78%	23

Forest Type White Spruce Total Acres - Timberlands in South Dakota

Inventory Years	Report	Source	Estimated Acres	Sampling Error (68%)	Sampling Error (95%)	No. Plots	CI Range			
							L (68%)	H (68%)	L (95%)	H (95%)
1987	Timber, Forest, Pest and Cooperative Forestry Management 1988	R2	17,493	unknown	unknown	24	n/a	n/a	n/a	n/a
1995	Public Evaluator	NRS-FIA	50,800	24.45%	63.39%	11	38,379	63,221	18,600	81,592
2001 - 2005	Public Evaluator	NRS-FIA	49,938	32.34%	63.39%	11	33,788	66,088	18,284	81,592
2007 - 2011	Public Evaluator	NRS-FIA	49,839	30.74%	60.25%	10	34,518	65,160	19,811	79,867
2007 - 2011	Walters et. 2011	NRS-FIA	51,600	unknown	unknown	unknown	n/a	n/a	n/a	n/a
2013 - 2019	Public Evaluator	NRS-FIA	57,367	20.30%	39.79%	23	45,721	69,013	34,542	80,192
2017-2019	Custom Database	NRS-FIA	52,047	21.78%	42.69%	23	40,711	63,383	29,829	74,265

Appendix 2: Data for Table 2.1.10: Summary				
Variable	Mean	Standard deviation	Minimum	Maximum
Age	30.71	10.00	19	50
Gender	1.00	0.00	1	1
Marital status	1.00	0.00	1	1
Education	1.00	0.00	1	1
Occupation	1.00	0.00	1	1
Income	1.00	0.00	1	1
Health	1.00	0.00	1	1
Religion	1.00	0.00	1	1
Political	1.00	0.00	1	1
Family	1.00	0.00	1	1
Community	1.00	0.00	1	1
National	1.00	0.00	1	1
International	1.00	0.00	1	1
Global	1.00	0.00	1	1
World	1.00	0.00	1	1
Universe	1.00	0.00	1	1
Population	1.00	0.00	1	1
Sample	1.00	0.00	1	1
Group	1.00	0.00	1	1
Category	1.00	0.00	1	1
Class	1.00	0.00	1	1
Level	1.00	0.00	1	1
Stage	1.00	0.00	1	1
Phase	1.00	0.00	1	1
Period	1.00	0.00	1	1
Time	1.00	0.00	1	1
Space	1.00	0.00	1	1
Place	1.00	0.00	1	1
Location	1.00	0.00	1	1
Area	1.00	0.00	1	1
Region	1.00	0.00	1	1
Zone	1.00	0.00	1	1
Field	1.00	0.00	1	1
Domain	1.00	0.00	1	1
Range	1.00	0.00	1	1
Scope	1.00	0.00	1	1
Extent	1.00	0.00	1	1
Depth	1.00	0.00	1	1
Breadth	1.00	0.00	1	1
Height	1.00	0.00	1	1
Width	1.00	0.00	1	1
Length	1.00	0.00	1	1
Volume	1.00	0.00	1	1
Area	1.00	0.00	1	1
Perimeter	1.00	0.00	1	1
Surface	1.00	0.00	1	1
Volume	1.00	0.00	1	1
Mass	1.00	0.00	1	1
Weight	1.00	0.00	1	1
Force	1.00	0.00	1	1
Energy	1.00	0.00	1	1
Power	1.00	0.00	1	1
Speed	1.00	0.00	1	1
Velocity	1.00	0.00	1	1
Acceleration	1.00	0.00	1	1
Displacement	1.00	0.00	1	1
Distance	1.00	0.00	1	1
Time	1.00	0.00	1	1
Frequency	1.00	0.00	1	1
Wavelength	1.00	0.00	1	1
Amplitude	1.00	0.00	1	1
Phase	1.00	0.00	1	1
Period	1.00	0.00	1	1
Frequency	1.00	0.00	1	1
Wavelength	1.00	0.00	1	1
Amplitude	1.00	0.00	1	1
Phase	1.00	0.00	1	1
Period	1.00	0.00	1	1
Frequency	1.00	0.00	1	1
Wavelength	1.00	0.00	1	1
Amplitude	1.00	0.00	1	1
Phase	1.00	0.00	1	1
Period	1.00	0.00	1	1
Frequency	1.00	0.00	1	1
Wavelength	1.00	0.00	1	1
Amplitude	1.00	0.00	1	1
Phase	1.00	0.00	1	1
Period	1.00	0.00	1	1
Frequency	1.00	0.00	1	1
Wavelength	1.00	0.00	1	1
Amplitude	1.00	0.00	1	1
Phase	1.00	0.00	1	1
Period	1.00	0.00	1	1

Characteristic	Number of patients (n)	Percentage (%)
Age (mean ± SD)	65.2 ± 12.5	
Gender		
Male	102	50.0
Female	100	50.0
Ethnicity		
White	102	50.0
Black	100	50.0
Hispanic	102	50.0
Asian	100	50.0
Other	102	50.0
Education level		
High school or less	102	50.0
Some college	100	50.0
College graduate	102	50.0
Postgraduate	100	50.0
Other	102	50.0
Marital status		
Married	102	50.0
Single	100	50.0
Divorced	102	50.0
Widowed	100	50.0
Other	102	50.0
Insurance type		
Medicaid	102	50.0
Medicare	100	50.0
Private	102	50.0
Other	100	50.0
Comorbidities		
Hypertension	102	50.0
Diabetes	100	50.0
Cholesterol	102	50.0
Other	100	50.0

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