

# SAWTIMBER INVENTORY ESTIMATES BY SLOPE AND LAND CLASS

## BLACK HILLS NATIONAL FOREST

April 16, 2020

### Parameters and Sources

- Volume and timber suitability area estimates are derived from 2020 Forest Inventory & Analysis (FIA) database “562019N Black Hills National Forest 2011-2020”.
- Volume estimates are for sawtimber size ( $\geq 9$  inches DBH) ponderosa pine only.
- Timberland vs. Suitable Acres:

FIA Timberland = Suitable land except FIA timberland excludes ground that is currently non-forested regardless of site productivity (44,000 acres per the 2019 inventory). The forest vegetation layer does not exclude these areas.

Adjustments to suitable land base area estimates:

- **867,023** acres. Source = 1997 Forest Plan Revision Suitable land base.
- **824,240** acres. Source = Forest 2015-2016 vegetation layer (FSVeg). Changes from 1997 are due to expansion of wilderness area, land exchanges, and designation of a Research Natural Area.
- **765,733** acres. Source = 2019 FIA data. This estimate was derived from the 2015-2016 forest vegetation layer which was provided to FIA. The total area = **823,469** acres if 44,000 acres of estimated non-forest area is included.
- Area and inventory estimates were queried by slope to classify results by feasible logging systems:
  - $\leq 40\%$  slope = conventional ground based logging systems
  - $> 41\%$  slope = cable, helicopter, or other unconventional logging systems.
- Potentially accessible volume is defined as volume within  $\frac{1}{4}$  mile of existing road infrastructure. Ratios derived from the forest vegetation layer were applied to total volume.

### Results

1. Summary of acres, total volume, and potentially accessible volume slope and suitability.

Attribute	$\leq 40\%$ Slope			$> 41\%$ Slope			All Slopes		
	Total	Suitable	Not suitable	Total	Suitable	Not suitable	Total	Suitable	Not suitable
Acres	900,392	687,488	212,903	162,384	78,245	84,139	1,062,776	765,733	291,148
Volume (CCF)	6,900,173	5,090,988	1,809,185	1,748,493	904,440	844,053	8,648,666	5,995,428	2,653,238
Accessible Volume (CCF)	5,946,773	4,734,619	1,212,154	1,334,289	768,774	565,515	7,281,062	5,503,393	1,777,669

2. Area by slope, suitability, and structure stage, all forest cover types.

BHNH Habitat Structure Stage Code	≤ 40% Slope			> 41% Slope			All Slopes		
	Total	Suitable	Not suitable	Total	Suitable	Not suitable	Total	Suitable	Not suitable
<b>Total</b>	900,392	687,488	212,903	162,384	78,245	84,139	1,062,776	765,733	291,148
<b>1</b>	58,890	49,693	9,197	3,981	0	3,981	62,871	49,693	9,197
<b>2</b>	55,511	44,784	0	6,337	0	6,337	61,848	44,784	10,728
<b>3A</b>	100,378	70,973	29,405	17,122	7,810	9,311	117,500	78,783	37,215
<b>3B</b>	49,433	30,123	19,310	6,776	3,763	3,012	56,209	33,886	23,073
<b>3C</b>	17,469	5,000	12,470	15,527	3,763	11,763	32,996	8,763	16,233
<b>4A</b>	321,295	291,860	29,435	33,558	16,990	16,568	354,853	308,850	46,425
<b>4B</b>	183,922	134,531	49,391	35,449	19,115	16,334	219,371	153,646	68,506
<b>4C</b>	78,244	55,044	23,200	40,622	26,803	13,820	118,866	81,847	50,003
<b>5</b>	5,560	0	5,560	0	0	0	5,560	0	5,560
<b>not measured</b>	29,689	5,480	24,208	3,012	0	3,012	32,701	5,480	24,208

3. Ponderosa pine volume (CCF) by slope, suitability, and structure stage.

BHNH Habitat Structure Stage Code	≤40% Slope			> 41% Slope			All Slopes		
	Total	Suitable	Not suitable	Total	Suitable	Not suitable	Total	Suitable	Not suitable
<b>Total</b>	6,900,173	5,090,988	1,809,185	1,748,493	904,440	844,053	8,648,666	5,995,428	2,653,238
<b>1</b>	96,323	87,231	9,092	12,074	0	12,074	108,396	87,231	21,165
<b>2</b>	163,857	158,994	4,862	18,899	0	18,899	182,756	158,994	23,762
<b>3A</b>	519,034	292,133	226,902	45,005	37,207	7,798	564,039	329,339	234,700
<b>3B</b>	206,604	125,718	80,886	17,589	7,776	9,813	224,193	133,494	90,699
<b>3C</b>	198,792	41,250	157,542	219,097	34,806	184,292	417,890	76,056	341,833
<b>4A</b>	2,152,150	1,904,243	247,907	283,591	198,061	85,530	2,435,741	2,102,304	333,437
<b>4B</b>	2,208,365	1,651,343	557,022	470,665	228,173	242,492	2,679,030	1,879,516	799,514
<b>4C</b>	1,144,727	788,998	355,729	655,718	398,418	257,300	1,800,445	1,187,416	613,029
<b>5</b>	39,979	0	39,979	0	0	0	39,979	0	39,979
<b>not measured</b>	170,344	41,079	129,265	25,855	0	25,855	196,199	41,079	155,120

4. Ponderosa pine volume (CCF) that is accessible by slope, suitability, and structure stage.

BHNH Habitat Structure Stage Code	≤40% Slope			> 41% Slope			All Slopes		
	Total	Suitable	Not suitable	Total	Suitable	Not suitable	Total	Suitable	Not suitable
<b>Total</b>	5,946,773	4,734,619	1,212,154	1,334,289	768,774	565,515	7,281,062	5,503,393	1,777,669
<b>1</b>	87,216	81,125	6,091	8,089	0	8,089	95,305	81,125	14,181
<b>2</b>	151,123	147,865	3,258	12,663	0	12,663	163,785	147,865	15,920
<b>3A</b>	423,708	271,683	152,024	36,850	31,626	5,225	460,558	303,309	157,249
<b>3B</b>	171,111	116,918	54,193	13,184	6,609	6,575	184,295	123,527	60,768
<b>3C</b>	143,916	38,363	105,553	153,060	29,585	123,475	296,976	67,948	229,028
<b>4A</b>	1,937,043	1,770,946	166,098	225,657	168,352	57,305	2,162,700	1,939,298	223,403
<b>4B</b>	1,908,954	1,535,749	373,205	356,416	193,947	162,470	2,265,370	1,729,696	535,674
<b>4C</b>	972,106	733,768	238,339	511,046	338,655	172,391	1,483,153	1,072,423	410,730
<b>5</b>	26,786	0	26,786	0	0	0	26,786	0	26,786
<b>not measured</b>	124,811	38,203	86,608	17,323	0	17,323	142,134	38,203	103,931

Statistical Considerations – Slope Classes

- The sampling error percent for the FIA calculations for area by slope class is low for slopes less than 20% but steadily increases as slope class increases.
- There are far fewer plots for the steeper slope classes.
- Sampling error percent is also higher for the unsuitable gentler slope classes.

**Estimate:**

	Slope					
BHNF Suitability	Total	0-20 percent	21-40 percent	41-60 percent	61-80 percent	81-100 percent
<b>Total</b>	1,062,776	579,894	320,498	121,886	40,406	93
<b>Suitable</b>	765,733	477,268	210,220	62,662	15,583	-
<b>Not suitable</b>	297,042	102,626	110,278	59,223	24,823	93

**Sampling error percent (Confidence level 68%):**  
 Note: for 95% confidence level multiply SE pct by 1.96

	Slope					
BHNF Suitability	Total	0-20 percent	21-40 percent	41-60 percent	61-80 percent	81-100 percent
<b>Total</b>	+1.54	+4.68	+7.83	+13.92	+25.59	+95.68
<b>Suitable</b>	+1.71	+4.88	+9.80	+19.22	+39.36	-
<b>Not suitable</b>	+4.66	+14.39	+13.29	+20.49	+33.53	+95.68

## Number of non-zero plots in estimate:

Note: total number of plots in selected evaluations=438

	Slope					
BHNF Suitability	Total	0-20 percent	21-40 percent	41-60 percent	61-80 percent	81-100 percent
<b>Total</b>	391	224	126	43	16	1
<b>Suitable</b>	281	183	83	22	7	-
<b>Not suitable</b>	110	41	43	21	9	1

Source: USDA Forest Service, Forest Inventory and Analysis Program, Fri Feb 21 2020 11:06:50 AM. Forest Inventory EVALIDator Desktop Version 1.7.2.00. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station.