

BIGHORN NATIONAL FOREST

Final Environmental Impact Statement

for the

Revised Land and Resource Management Plan

Errata 06-15-2007

Description of the Analysis

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as slumps or slides using standard road building and logging methods currently practiced on the Forest.” The soil and slope combinations listed in the 1993 “Draft Suitability Key” are used in conjunction with the “landslide” coverage from the IRI product to produce the IRI column below. Even though it appears that many additional acres were removed with this process, a close review shows that most of the acres removed due to soil and slope combinations are on inoperable slopes with conventional harvesting technologies.

Table B-6. Irreversible damage acres by the different sources.

Land Category	EA Acres	ORA-RIS	GIS-RIS	IRI
Total Industrial wood species	579620	578996	574568	622708
Soil and slope combinations	N/A	N/A	N/A	73949
Landslide coverage area	N/A	N/A	N/A	26147
RIS Component 722	-13920	-14236	-14031	N/A
Industrial wood on stable soils	565700	564760	560537	522612

6. Restocking Assurance Assurance of restocking was the focus of an amendment to the Bighorn National Forest’s 1985 Forest Plan. Accordingly, greater detail is included in this criteria and that detail is included in the table below.

For the IRI analysis, elevation and aspect information was drawn from a Digital Elevation Model with 30-meter resolution. This data results in numerous small polygons, which were removed if they were less than 5 acres.

Table B-7. Restocking assurance acres by the different sources.

Land Category	EA Acres	ORA-RIS	GIS-RIS	IRI
Industrial wood on stable soils	565700	564760	560537	522612
Sites above 9200 feet	55225	56318	56329	58304
Sites below 7400 feet	76133*	81049	80245	80988
7400’–7900’ on S or W slope	18149	17180	16993	19061
Bottle or Foxton Soils	4782	6576	6575	2303
33% or more surface rock	2841	23591	22896	5518
Sub-Total	-157130	-184702	-183038	-166174
Site-specific additions	+2086	+N/A**	+N/A**	
Site-specific deletions	-16459	-28694	-28433	
Industrial, assured restocking	394197	351364	349067	356438

* I assumed that the number “176133” in the Restocking EA was a typographical error.

** Site-specific additions could not be separated out in this process. Site-specific deletions were counted as any sites that had made it through the key, but were still classified as timber component 710 in RIS.

7. Inadequate Response Information Lands that are excluded with this step include sites where the information that is available cannot adequately predict the sites response to timber management practices. Although some of our suitability keys disagree, the EA titled, "Amendment to Restocking Standards, Bighorn National Forest, Land and Resource Management Plan" includes the following statements on page E-16:

*"Category 7 - Lands for which current information is inadequate to project responses to timber management. This includes Douglas-fir stands on south west aspects. The Forest Service has had more time to evaluate management on **these sites** since the original Forest plan suitability analysis and has found that regeneration is not predictable. Douglas-fir is a species used by industry and on many sites regeneration can be assured in the five-year time limit."* (emphasis added)

In the wording, which is quoted above, the words "these sites" is assumed to refer to "stands on south west aspects". Aspects included in "south west" are a DEM generated aspect ≥ 180 and aspect ≤ 270 . (That includes everything between due south and due west.)

Ponderosa pine is not mentioned, so all of the Ponderosa acres that have passed the other filters are removed here.

Table B-8. Inadequate response acres using the different sources.

Land Category	EA Acres	ORA-RIS	GIS-RIS	IRI
Industrial, assured restocking	394197	351364	349067	356438
Douglas fir on south west				6516
Ponderosa Pine	-42281	-39459	-39324	302
Historic Tentatively Suitable	351916	311905	309743	349620

8. Non-Forested Sites – Revisited The latest Regional process describes removing a buffer of non-productive land around highways, Forest Development Roads, and streams. These buffers consist of the highway right-of-way (66 feet on either side of the center line), the FDR road profile (8 feet on either side of the center line), and an average stream width (3 feet on either side of the center line for a perennial stream). The regional process buffer widths were used for the Draft EIS analysis. **For the Final EIS the buffer widths shown in Table B-3 were used. The buffer widths in Table B-3 were developed in consultation with the Forest Engineer and Forest Hydrologist.**

Table B-9. Non-forested buffer acres of roads and streams using the different sources.

Land Category	EA Acres	ORA-RIS	GIS-RIS	IRI
Historic Tentatively Suitable	351916	311905	309743	349620
Road buffered area				1626
Stream buffered area				475

Total buffered areas				-2101
Current Tentatively Suitable	351916	311905	309743	347519

Analysis and Implications

There can be no doubt that many of the suitability categories have seen changes with the change in the data sources. There was a lot of effort that went into the timber component data in RIS.

The conversion to GIS generated acreages has separated our calculated acreage from our declared acreage. The declared acreage is based upon an accumulation of surveying data known as Public Land Survey Sections. The GIS generated acreage depends upon cartographic calculations that are generated from geographic projections of a round earth on a flat surface.

National Forest System Lands This data is dependent upon the Automated Lands Project (ALP). ALP is designed to follow the Public Land Survey Sections (PLSS) and the National Forest boundary follows these lines, which should be tied to surveying monuments on the ground.

Non-forested cover types Cover type calculations are based on an interpretation of the stand components in the Integrated Data Solutions, Common Vegetation Unit data (CVU). The RIS data system only includes areas that are ten percent “occupied” by trees or greater. This 10% is related to a fully stocked timber stand. In the IRI data, we only measured the timber canopy, not the basal area of trees. It appears that the IRI definition of Forested Lands is more liberal than the RIS definition.

Non-industrial wood Some stands may have an incorrect cover type label from the CVU photo interpretations. Other changes may be caused by modifications in the way that mixed stands are classified to fit cover types.

Irreversible damage There were many discrepancies between the various sources that could have been used for the “irreversible damage” component. The primary options considered were the sites in RIS that were previously classified as timber component ‘722’, a ‘landslide’ coverage that was generated in conjunction with our “Common Land Unit” (CLU) data, and a group of soil and slope combinations that were listed in the 1993 “Draft Suitability Key”. In the end we used the landslide and “Key” data. Many sites that were classified as timber component 722 in RIS were in areas that had poor regeneration, but were not areas where irreversible damage occurred following our existing harvests.

Restocking assurance – elevation and aspect The restocking classification has historically been defined based on elevation, aspect and soils. Many of the soils are identified because they are well drained and tend to be droughty. Data sources, and some site-specific changes, that were not available during the era of the RIS database have changed the way that we look at restocking assurance.

Restocking assurance – percent rock The percent rock analysis was based on soil types. There are several “unmapped components” to a soil classification and the soils that were

excluded at this step may have had excessive rock in any of the top three soil components. The definition of excessive rock that I used was the presence of a “V” as the third character of the “surface modifier” code. According to Eric Winthers, past soil scientist for the Rocky Mountain Region, the “V” code implied the surface modification affected 35 to 60 percent of the soil texture.

Inadequate response information At present, all Douglas fir and Ponderosa Pine are excluded in this category. Documentation in the restocking Environmental Analysis (November, 1991) indicates that only Douglas fir stands on “south west” aspects are unsuitable. Sites on south to west aspects are given a separate code from other Douglas fir or Ponderosa Pine.

Table B-10. Reference Codes used in GIS analysis

000	Other Ownership & Unknown	714	Bottle or Foxton Soils
001	Water bodies over 40 acres	715	33% or more surface rock
100	Water bodies under 40 acres	722	Irreversible resource damage
200	Non-forested areas	723	Soil and slope combinations
201	Highway buffered area	724	Landslide coverage area
202	FDR buffered area	740	Douglas fir on SW slopes
203	Stream buffered area	742	Ponderosa Pine
310	Forested Wilderness	901	Aspen (TAA – 901)
311	Forested Bull Elk Park	902	Cottonwood (TCW - 902)
312	Forested Shell Canyon	903	Limber pine (TLI - 903)
711	7400' – 7900' on S or W slope	904	“Pinyon/Juniper” (TPJ - 904)
712	Sites below 7400 feet	998	Tentatively Suitable Douglas fir
713	Sites above 9200 feet	999	Tentatively Suitable Timberlands

Restocking Analysis Review

The Forest reviewed the criteria used to previously identify lands where restocking could not be assured within five years follows final harvest.

The criteria used to identify lands incapable of regenerating within five years of final harvest are:

1. Elevations above 9200 feet were identified because of low temperatures; short growing seasons, and rocky soils. Monitoring has not identified a need to change this. The analysis process describes how this was modeled with the new Forest database.
2. Elevations below 7400 feet were identified because of lack of precipitation, high temperatures, and droughty soils. The analysis process describes how this was modeled with the new Forest database.

- a. Monitoring has identified that elevation doesn't always reflect precipitation accurately. Precipitation maps and field monitoring are still necessary at the site-specific analysis phase to evaluate this factor.
3. Elevations between 7400 and 7900 feet on south and west aspects were identified because of lack of precipitation, high temperatures, and droughty soils. Monitoring has not identified a need to change this. The analysis process describes how this was modeled with the new Forest database.
4. Soil Series – The Foxton and Bottle soil series are soils that have severe limitation for reforestation. The analysis process describes how this was modeled with the new Forest database. Monitoring did identify some concerns with this criteria:
 - a. On the ground observations have shown a concern with the suitability criteria of eliminating all of soil map unit 38 (Sapphire-Bottle-Foxton). The Soil survey of the Bighorn National Forest, Wyoming (1986) is the basis for this discussion, it describe the Bottle and Foxton soils as having severe limitations for regeneration due to the soils moisture holding ability, with the Bottle soils too well draining, and the Foxton holding the moisture too tight. The Bottle and Foxton soils are of moderate production (32 and 35 cubic ft./acres/year). However, the largest proportion of the soil series is Sapphire at 35%, with Bottle comprising 30%, Foxton 20%, and 15% inclusions of Cloud Peak and Rock outcrops.
 - b. The Sapphire soils are the third most productive soil, producing 53 cubic ft./acres/year, with moderate limitations for reforestation. Monitoring has shown these soils to regenerate and produce well, with natural regeneration, with lodgepole saplings putting on over a foot of height growth each year.
 - c. The current soil survey doesn't separate out these soil types from the general soil map unit 38 (Sapphire-Bottle-Foxton). Because 50% of the soil map unit has severe limitations for reforestation, in the suitability analysis, the entire soil map unit was deemed unsuited for inadequate response. As a result, an estimated 3,700 acres of Sapphire soils were considered unsuited out of the total map unit estimate of 10,542 acres.
 - d. Field observations have identified Sapphire soils in the Ghastly, Garland, Dayton Gulch, and Fool creek sale areas that have shown good regeneration. Because of this new information, these areas were not dropped in step 6 of stage I suitability analysis. If during site-specific analysis areas of Bottle and Foxton soils are identified, a decision to remove these areas from suitability can be made at that time.
5. Percent rock – 33 percent or more surface rock physically limits soil surface available for seedlings establishment. Monitoring has not identified a need to change this. The analysis process describes how this was modeled with the new Forest database.

At the Forest Planning scale, assumptions are made which may not apply to on the ground conditions. Individual site-specific decisions based on field reviews may modify these assumptions and make site-specific changes to timber suitability.

Display of Timber Suitability in the FEIS

A detailed description of the analysis process used in determining tentatively suitable timber lands is described above. A summary of the results from this analysis is included in the Timber Environmental Consequences section of Chapter 3, with a reference to Appendix B for more information.

Table B-11 compares the various tentative timber suitability analyses for the Bighorn Forest since 1975 to the current Plan revision. Maps of the suitable timberlands on the forest are in the project file.

Stage III suitable land determination is displayed in Table B-12. Acres removed for multiple use objectives include: i.) Management area with only management areas 5.11, 5.12, 5.13, 5.4, 5.5 and MW containing suited lands, ii.) In management area 5.4 blocks of contiguous timber had to be greater than 250 acres to be suited., iii.) Lands within 100' of the riparian were removed and iv.) In management area 5.4 lands within 100' - 300' of perennial streams were removed.

All lands that made it this far were operable with current conventional harvesting technologies, so no acres were removed for “logging methods”.

In management area MW, what was designated as suited lands in the 1985 Forest Plan continue to be designated suited. The Historic Preservation Plan did not change timber land suitability in this area.