

# National Forests in North Carolina

## Nantahala & Pisgah National Forests

### Plan Revision

### Suitability Analysis Process Paper

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## What are lands suitable for timber production?

Forest Service Handbook 1909.12 CH 60.5<sup>1</sup> provides key definitions used in developing and revising Forest Plans in regards to forest vegetation resource management. An understanding of “suitability of lands for timber production” may be gained from two definitions within this chapter.

- 1) Suitability of lands: *A determination made regarding the appropriateness of various lands within a plan area for various uses or activities, based on the desired conditions applicable to those lands. The terms suitable and suited and not suitable and not suited can be considered the same (CH 60.5).*
- 2) Timber production: *The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (CH 60.5)(36 CFR 219.19).*

During Forest Plan development and revision, assessment of the suitability of lands for timber production is required under the 2012 planning rule. Lands identified as suitable for timber production have a regularly

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<sup>1</sup> [http://www.fs.fed.us/im/directives/fsh/1909.12/wo\\_1909.12\\_60.docx](http://www.fs.fed.us/im/directives/fsh/1909.12/wo_1909.12_60.docx)

scheduled timber harvest program that contributes to forestwide desired conditions and multiple use goals, such as providing mosaics of habitats for wildlife and plant species and contributing to the economic sustainability of local communities by producing timber, pulp, specialty woods, and fuelwood as renewable resources.

Identification of lands as suitable for timber production does not mean that those lands meet only the objective of growing trees on a rotation or that it has to be the primary objective. In many cases, these same lands contribute to desired young forest habitat or ecological restoration as the primary objective during district resource management projects with timber production as the secondary objective (CH. 61.2).

## Why is the Nantahala and Pisgah identifying lands suitable for timber production?

Two laws and regulations require the Forest Service to assess National Forest lands for timber production suitability.

- 1) Renewable Resource Planning Act of 1974 as amended by the National Forest Management Act of 1976 (16 U.S.C. 1600 et seq.)
- 2) Title 36, Code of Federal Regulations, Part 219—Planning, Subpart A—National Forest System Land Management Planning (36 CFR part 219)

## What are the steps of identifying lands suitable for timber production?

The steps for identification of lands as not suitable and suitable for timber production is detailed in Forest Service handbook 1909.12 § 61 via a two-step approach.

Step 1: First, the analysis identifies lands that are not suitable for timber production, based on legal and technical factors. The following four categories of lands are subtracted from the full forest acreage to identify “lands that may be suitable for timber production.”

- Factor 1. Lands on which timber production is prohibited or lands withdrawn from timber production (section 61.11 and 36 CFR 219.11(a)(i & ii);
- Factor 2. Lands on which technology to harvest timber is not currently available without causing irreversible damage (section 61.12 and 36 CFR 219.11(a)(iv);
- Factor 3. Lands on which there is no reasonable assurance that lands can be adequately restocked within 5 years of final regeneration harvest (section 61.13 and 36 CFR 219.11(a)(v);
- Factor 4. Land that is not forest land (section 61.14 and 36 CFR 219.11(a)(vi).

Factor 1 identifies lands that are not suited for timber production based on statute, executive order, or regulation that prohibit timber production on certain types of lands and lands withdrawn from timber production by the Secretary of Agriculture or the Chief of the Forest Service (*factors (i) and (II) in FSH 1909.12 CH. 61*). For example wilderness that has been designated by Congress is withdrawn from timber production.

Factors 2, 3 and 4 are technical factors that assess the ability of National Forest lands to support timber production activities.

Forest lands that remain after this 4-factor screening (Step1) are termed “Lands that may be suitable for timber production.” This classification does not vary by Forest Plan alternative. These lands are not immediately available for timber production but must first be considered in Step 2 of the suitability analysis.

Step 2: In the second step, the analysis considers whether timber production on the lands identified in Step 1 are compatible with desired conditions and objectives of each alternative. Whether land is suitable for timber production in an alternative depends on two processes: 1) whether the desired conditions and other plan components for each management area are compatible with lands suitable for timber production and 2) whether those lands contribute to a long term sustained yield of timber, which is calculated for each alternative. Please note, due the type of terrain across the forests, the management areas that have plan components that are compatible with timber production will also have some lands that were identified in Step 1. For example, lands that are “not forested” could occur in every management area.

As a result of Step 2, the analysis identified lands that are “Suitable for Timber Production, based on compatibility with Desired Conditions and Objectives.” Because management area allocations will likely differ by the alternatives analyzed in the environmental impact statement (EIS) the final number of acres suitable for timber production across the whole forest will vary by alternative.

### What process was used to complete the two required timber suitability steps used for the Nantahala and Pisgah forest plan revision?

For the Nantahala and Pisgah plan revision, Step 1 generated an acreage of lands that are not suited for timber production based on technical and legal factors (see FSH 1909.12 § 61.1). The remaining acres rolled into Step 2 of the suitability analysis, which will remove further acres from the timber suitability estimate based on compatibility with the desired conditions, objectives, standards, or guidelines. (see FSH 1909.12 § 61.2).

The Step 1 analysis completed for the Nantahala and Pisgah Forest Plan revision utilized FsVeg, INFRA, LIDAR, Aerial Imagery, and GIS analysis to generate the estimated acres. Starting with a spatial layer of the entire Nantahala and Pisgah National Forest Ownership, individual categories that made up each factor were subtracted. Where categories or factors overlapped, they were only subtracted once. This was accomplished using the “Erase (polygon) tool” in ARC Map 10 (*ESRI software*). Methods and assumptions associated with each step are further detailed in Appendix A.

Table 2: Step 1 Results from The Nantahala and Pisgah Forest Plan Revision Timber Production Suitability Analysis.

<b>Suitability Analysis Subtraction – Step 1</b>	Total Acres in Layer	Acres Subtracted	Acres Total
Run 1 - 4/4/2016			
Starting Acres from Ownership-ALPs			1,042,096
<b>Step 1 / Factor 4 Subtractions - Non-Forest</b>			
Railroad Buffers	92	91	1,042,005
FS Road Buffers	8,734	8,359	1,033,646
Special Uses	7,297	7,196	1,026,449

Concentrated Uses	2,304	1,871	1,024,578
Waterbodies	901	866	1,023,712
WL Openings/Balds	2,741	2,586	1,021,126
NFS Facilities	549	511	1,020,614
NCDOT Buffers	3,022	2,729	1,017,885
Subtotal S1F4	25,640	24,211	
Step 1 / Factor 1 Subtractions – Designations			
Wild Rivers	2,496	2,496	1,015,390
Wilderness	66,337	65,839	949,550
Wilderness Study Areas	27,171	27,123	922,427
Research Natural Areas	1,459	1,458	920,969
Subtotal S1F1	97,463	96,917	
Step 1 / Factor 2 Subtractions – Lack Technology			
Slopes Greater than 70%	113,786	99,252	821,717
FSVeg Irreversible Damage	24,486	16,408	805,309
Bogs	1,256	1,216	804,093
Rock Outcrops	4,580	1,030	803,063
Hydric Soil Ratings	595	522	802,541
Subtotal S1F2	144,703	118,428	
Step 1 / Factor 3 Subtractions – Restocking Concerns			
FSVeg SI < 40	813	597	801,944
Unproductive LSC or Forest Type	28,218	8,911	793,034
Subtotal S1F3	29,031	9,507	
Grand Total: All Factors in Step 1	296,837	249,063	793,034

**Step 1 Results:** The results of Step 1 of the Nantahala and Pisgah Forest Plan Revision Suitability Analysis is displayed in Table 2. Detailed information regarding the categories identified for each factor is available in Appendix A. Differences between columns “Total Acres in Layer” and “Acres Subtracted” relate to overlap in shapefiles subtracted where a single acres matched multiple rows shown above. Acres of overlap were not subtracted twice using the ARC Map Erase tool.

The Nantahala and Pisgah Forest is 1,042,096 acres. Step 1 of the Nantahala and Pisgah Revised Forest Plan suitability analysis found 793,034 acres that may be suitable and will be carried into Step 2. In comparison, the suitability analysis for Amendment 5 of the current Nantahala and Pisgah Forest Plan’s suitability analysis started with 1,024,902 acres and ended with 796,030 acres during stage 1 (LMRP A5 Table E-5 Land Classification).

Notably, the starting point for the two suitability analyses differs by 17,194 acres due to the net change in National Forest ownership over the last 20 years.

**Step 2 Results:** The results from Step 2 are not complete at this time because the management area allocations are not finalized, nor is the range of alternatives to be analyzed in the Forest Plan revision environmental impact statement (EIS) defined. We will use criteria to identify suitable lands using the best information available to the planning team. The framework of step 2 and portions that are complete are displayed in Table 3.

Detailed information regarding the categories identified for in Step 2 are available in Appendix A.

Table 3: Incomplete Results from Step 2 of the Nantahala and Pisgah Timber Production Suitability Analysis.

Suitability Analysis Subtraction – Step 2	Acres Total
Acres of Land that <u>May</u> Be Suited for Timber Production (Step 1)	793,034
<i>Category of subtracted acres</i>	<i>Explanation</i>
Designated Old Growth	Old growth areas identified in each alternative.
Riparian Areas	Perennial, Intermittent, Reservoir Shorelines
Critical Habitats	USFWS Critical Habitat
Non-Compatible Ecological Communities	Pine Oak Heath, Dry Oak, Spruce/Fir, Floodplain Ecozones
MAs with In-compatible DOGS#	May vary by alternative
Suitable Acres for Timber Production (End of Step 2)	To be calculated in the EIS

The final estimation of acres suitable for timber production will be reported for each alternative analyzed under the Forest Plan Revision EIS.

While the final acreage is not certain, it is likely that the acres determined to be suitable for timber production in this revision process will be larger than the 276,000 acres identified in Amendment 5 of the current Nantahala and Pisgah Forest Plan. Rough estimates indicate a range from 325,000 to 450,000 acres depending on the EIS alternatives. *(Note: These numbers are rough because the analysis is not complete.)* We expect an increase in suitable acres when compared to Amendment because of the following differences:

- Cost efficiency was a focus in the 1994 amendment, while the revised plan has a restoration focus;
- The revised plan has fewer management areas, which could provide larger land areas for potentially suitable acreages;

- The criteria and databases used to identify the lands suitable for timber production are more refined than those used in the early 1990s.

After the revised plan is signed, district level vegetation management and restoration projects will confirm acres available as suitable for timber production during site specific analysis.

## What is different between current timber suitability analysis under the 2012 planning rule (ongoing plan revision) and the planning rule that governed the 1994 Nantahala and Pisgah plan amendment?

A difference between the analysis for suitability of timber production under the 2012 planning rule and the 1982 planning rule is the inclusion of a cost efficiency requirement under the 1982 planning rule. This cost efficiency analysis was applied to the lands that were considered tentatively suitable for timber production (FSH 2409.13-92-1, effective 8/3/92).

Step one, which removed lands for technical and legal factors is generally similar between both planning rules (see Table 1).

*The answer to this question includes reference to two Forest Service handbooks (FSH). FSH 2409.13-92-1 is a superseded handbook associated with the 1982 Planning Rule. FSH 1909.12 is the current handbook associated with the 2012 Planning Rule.*

Table 1: Comparison of Step 1 of the timber Suitability Analysis between the 1982 and 2012 Planning Rules and their respective handbooks.

1982 Planning Rule Requirements		2012 Planning Rule Requirements	
Factor*	Handbook Section	Factor*	Handbook Section
Non-forest land	FSH 2409.13-92-1 § 21.1	Non-forest land	FSH 1909.12 § 61.14
Lands Withdrawn	FSH 2409.13-92-1 § 21.2	Lands Prohibited or Withdrawn	FSH 1909.12 § 61.11
Incapable of Producing Industrial Wood	FSH 2409.13-92-1 § 21.3	NA – covered indirectly based on categories selected for factor FSH 1909.12 § 61.13 (see appendix A)	
Irreversible Resource Damage	FSH 2409.13-92-1 § 21.41	Irreversible Resource Damage	FSH 1909.12 § 61.12
Adequate Restocking Assured	FSH 2409.13-92-1 § 21.42	Adequate Restocking Assured	FSH 1909.12 § 61.13
Inadequate Response	FSH 2409.13-92-1 § 21.5	NA	

\*The two handbooks approached several of the factors from different viewpoints. The following is an example using non-forest lands: *FSH 2409.13-92-1 § 21.1 (1982 Rule) contains reference to forest lands being initially*

*suitable for timber production the converse (non-forest lands) would need to be subtracted. FSH 1909.12 § 61.14 (2012 Rule) contains Non-forest reference directly.*

Step 2 from the 1982 planning rule involved completing an analysis that incorporated identifying lands where other management objectives (including multiple-use objectives) minimized the success of the timber production objective. For those lands that other management objectives could be met with the timber production objective present, they still had to maximize the present net value by being the most cost efficient lands for timber production (FSH 2409.13-92-1 § 23).

Step 2 under the 2012 planning rule focuses the lands suitable for timber production based on timber production's compatibility with other desired conditions and objectives (FSG 1901.12 § 61.2) and includes five considerations. The remaining lands are not suited for timber production. Step 2 is completed during the Forest Plan EIS assessment of alternatives.

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# Appendix A – Data Preparation for Steps one and two of the Nantahala and Pisgah Timber Production Suitability Analysis

## Base Ownership Preparation

- 1) As a starting point the Forest RIM Coordinator provided a base map template which contained key spatial data layers identified during preparatory IDT meetings. The base map contained two ownership layers:
- 2) *FS\_Own\_by\_RD\_Cnty* and *FSOwn (ALPS)*
- 3) Upon their comparison, discrepancies were present requiring examination of the Forest land status atlas maps. This analysis indicated that *FSOwn (ALPS)* was the more complete starting point.
- 4) The RIM coordinator re-clipped the ALPS data to provide the most recent and accurate copy of the ownership.
- 5) The new clip was called *np\_fs\_own* and after calculation of geometry, the starting ownership size was set at 1,042,096 acres.
- 6) *Np\_fs\_own* was cross-checked with recent acquisitions dating 1992 to 2012 within identification of major differences noted from step 3 above.

## Step 1 Factor and Category Data Preparation<sup>2</sup>

A summary of the categories developed for each factor in Step 1 is located in the table at the beginning of factor description. Ideas for categories to include in the four factors were developed from the handbook direction and supplemented/confirmed during Forest Plan IDT meetings.

### Step 1 Factor 4: Land that is Non-Forest Land (Non-forest) (FSH 1909.12 § 61.14)

Factor 4 refers to National Forest System lands that do not meet the definition of forest lands, meaning they have less than 10 percent occupied by forest trees, are currently developed for non-forest uses (i.e. administrative areas, powerlines, etc.), or are unimproved roads, trails, clearings, or streams greater than 120 feet in width. Refer to table A-1 for a summary of the categories included.

Table A-1: Summary of categories developed for use under Factor 4

Categories	Description	Data Source
Waterbodies	> 120 feet wide	GIS Analysis and Layer
Wildlife Openings	Openings, Perm/Semi-perm	WL Openings (Linear, Regular, Balds)
Balds, Improved Pasture		
Administrative Areas	Offices & Compounds	Old MA12 Shapefile (including additions)

<sup>2</sup> Data preparation steps will follow the order of factors identified and used in the analysis. The order of factors was recommended by the Regional Planner during his review of earlier version of this process.

Improved Roads	Fed, State, County, Muni, FS ROW	FS Infra Road Shapefile NCDOT Road Maintenance Shapefile
Railroads	ROW	NCDOT Railroad Shapefile
Concentrated Use Areas	Developed Recreation	Concentrated Use Shapefile - Rec
Powerlines	Major	Digitized Shapefile
Recreation Residences	Stony Fork, Highlands Rd, etc.	PSG Zone SU Shapefile Nan Zone SU Shapefile
Cemeteries	Not managed as forest	
Communication Sites	Pisgah, Frying Pan, etc.	
Mines/Quarries	Massey Branch & Harrison Quarries	
Nantahala Outdoor Center (NOC)		
NC Arboretum		
Snowbird Youth Center		
Pisgah Stables		
Marinas		
Outward Bound		
Fish Hatcheries/ Pisgah WL Center		

*Waterbodies*<sup>34</sup>

- 1) The existing statewide layer *NHD\_Waterbody* was clipped to the 18 county Nantahala and Pisgah forest area creating *NHD\_Waterbody\_County\_Clip*.

<sup>3</sup> The vast majority of the acreage contained in *NHD\_Water\_Ownership\_Int* is related to differences in shoreline mapping around reservoirs on the National Forests.

<sup>4</sup> The LSC 150 and 160 (streams and wetlands) would be identified during the Riparian Areas analysis in Step 2.

- 2) *NHD\_Waterbody\_County\_Clip* was clipped by the *np\_fs\_own* to eliminate waterbodies outside the FS Ownership. This process created *NHD\_Water\_Ownership\_Int* shapefile.
- 3) Further examination of *NHD\_Water\_Ownership\_Int* identified existing waterbodies not in the data. These were digitized and added to the *NHD\_Water\_Ownership\_Int* shapefile (examples include the Highlands Country Club and several ponds on the Grandfather Ranger District).
- 4) FSVeg was queried for Forest Service Land Suitability Codes (LSC) 100, 110, 120, 125, and 140 (water, natural lake, reservoir, pond, and river respectively) and examined using recent imagery. The query returned six polygons which were assessed individually to ensure they met the opening definition within FSH 1909.12 § 61.14 (> 120ft in width). Two of the six polygons were added to the *NHD\_Water\_Ownership\_Int* shapefile. Of the other four identified:
  - a) One was less than 75 feet wide,
  - b) Two were already in the *NHD\_Water\_Ownership\_Int* shapefile
  - c) One was a LSO coding error actually being a forested stand.
- 5) An additional waterbody was identified and added to the *NHD\_Water\_Ownership\_Int* shapefile during review of the administrative sites layer representing the fish hatchery ponds on the Grandfather Ranger District.

#### Wildlife Openings

- 1) The Forest Biologist and Forest Ecologist/Botanist developed a combined wildlife opening and balds shapefile and was named *wildlife\_openings\_balds\_updated\_NP*.
- 2) *wildlife\_openings\_balds\_updated\_NP* was clipped to the *np\_fs\_own* layer and the Beech Creek Seed Orchard which is contained in the administrative sites layer was removed to reduce confusion. The final shapefile was named *wildlife\_openings\_balds\_updated\_NP\_Minus GMRA*.
- 3) *wildlife\_openings\_balds\_updated\_NP\_Minus GMRA* also includes hayfields which was determined after review by the Forest Special Uses Officer.

#### Administrative Areas

- 1) The base layer *Existing MgmtAreas NP* was selected for current Forest Plan management area 16 (admin areas) and converted to a shapefile called *Existing\_MgmtAreaNP\_MA16\_Suitability*.
- 2) Two polygons were found to be included due to mislabeling as administrative areas: (1) the old (and sold) Highlands Ranger District office and (2) the Grandfather Fish hatchery ponds. There were deleted.
- 3) Polygons representing the PSG Ranger District Office and Work Center (RDOWC), Cheoah RDOWC, Appalachian RDOWC, Grandfather RD Office, Grandfather Work Center, Nantahala RDOWC, Tusquitee RDOWC, and Bald Mountain Administrative site were added.

#### NFS System Roads

The Plan Revision Team transportation engineer was consulted on NFS roads information for use Step 1 of the suitability analysis. The *FS\_Roads* layer was recommended as the starting point.

- 1) The *FS\_Roads* layer contains a field (*Oper\_Maint*) which lists the system maintenance levels (1 through 5). The transportation engineer also identified a field (*buffer\_ML*) that contained the recommended clearing limit width based on maintenance level.

- 2) After review of this field, the engineer recommended changing the clearing limit width on maintenance Level 1 roads to 20 feet. The distance in the *buffer\_ML* field was total width distance. Consequently, in order to use the buffer tool in ARC Map a new field was created that divided the *buffer\_ML* by 2 (*1\_2\_Buffer*).
- 3) The buffered roads were re-clipped by *np\_fs\_own* to remove any portions of the new buffers that fell off the property and named *FS\_Road\_Buf\_Clip\_Own\_Final\_B.shp*.

#### *NCDOT Roads*

Spatial data was obtained from NCDOT by contacting their staff online. The staff sent a link to relevant information sources ([connect.ncdot.gov/resources/gis/pages/gisdata\\_layers.aspx](http://connect.ncdot.gov/resources/gis/pages/gisdata_layers.aspx)).

- 1) Data from *RD\_Char\_MLPST\_SHP.zip* was selected based on the field (*RW\_WID*). This field contains Rights of Way (ROW) width of roads in feet. The spatial layer was a line feature.
- 2) The NCDOT data was clipped by *np\_fs\_own* to limit its extent, converted into a shapefile, and examined. Review of the attribute table identified some roads that had a 0 entered in the *RW\_WID* field. Review of the meta data explained that the data is “as available”.
- 3) A field was entered to calculate the ½ ROW widths and address those roads with a 0 in the *RW\_WID* field. The average ½ ROW width for all non-zero roads in the clipped data was 26 feet on a side. The zero fields in the *RW\_WID* were replaced with a conservative 10 foot ½ width to represent a ROW on non-filled data. The line shapefile was buffered in ARCMAP and then re-clipped by the *np\_fs\_own*.
- 4) The completed shapefile was named: *NP\_NCDOT\_Road\_JAR\_Clip\_Buffer\_10final1\_Reclip1.shp*

#### *Railroad ROWs*

While on the NCDOT data layer website, data covering railroads was also obtained.

- 1) The NCDOT railroad spatial data did not contain ROW width information so two fields were added to the shapefile that had been clipped by *np\_fs\_own*.
- 2) Those Railroads on NFS ownership were examined with imagery and the apparent ROW was measured using the measure tool in ARCMAP to create and average ROW width per railroad segment. Several measurements were taken along the railroad length within the National Forest and an average was obtained.
- 3) This average width was used to populate one of the fields added to the shapefile. The second field was the ½ width calculation used in the buffer process for the railroad line shapefile data.
- 4) Final processing included re-clipping by *np-fs-own*. The shapefile was named *NP\_Rail\_Road\_OWN\_JAR\_Clip\_Buff1\_Clip.shp*.

#### *Concentrated Use Areas*

Locally named “Concentrated Use Areas” were created by the developed recreation program manager who recommended the use of the *Admin\_newMA* shapefile located in the Recreation/data folder within the plan revision GIS drawer.

- 1) The *Admin\_newMA* shapefile was clipped to *np\_fs\_own* to reduce the coarse polygons present around lake features.

- 2) This file also included large areas that still meet the definition of forest land (FSH 1909.12 § 61.14) and areas that are removed due to area assignments that are non-suitable for timber production based on desired conditions (e.g. Cradle of Forestry) in Step 2.
- 3) Manual editing of the shapefile removed concentrated use areas or forested portions of concentrated use areas (Table A-2).
- 4) The new shapefile was named *Concentrated\_Use\_Clip\_JAR1*.

Table A-2: Disposition of Concentrated Use Areas Requiring Modification.

Location	Action	Remaining in Shapefile
TSALI	Reduce	Polygon around Development
Cradle of Forestry	Drop	None – Separate MA Subtraction
Brown Mtn. ORV	Reduce	Trailhead & Parking
Wayehutta ORV	Drop	No parking area located
Jack Rabbit	Reduce	Camping and Parking
Beech Creek	Drop	None – Admin Area Subtraction
Cliffside	Reduce	Camping and Parking
Bridal Vail Falls	Reduce	Camping and Parking
VanHook Glade	Reduce	Camping and Parking
Black Mtn Camp Grd	Reduce	Camping and Parking
Lake Powatan	Reduce	Camping and Parking
Boone Fork	Reduce	Camping and Parking
Admin Areas	Delete	None – Admin Area Subtraction
Rocky Bluff	Reduce	Camping and Parking
White River Falls	Reduce	Camping and Parking
FID 247	Reduce	Camping and Parking
Cradle of Forestry	Delete	None – Separate MA Subtraction
Glenn Falls	Reduce	Camping and Parking
Joyce Kilmer	Reduce	Camping and Parking
FID 9 – Job Corps	Delete	None – Admin Area Subtraction
PSG Fish Hatchery	Delete	None
FID 8	Delete	None

Tusquitee Office	Delete	None – Admin Area Subtraction
Lost Cove Picnic Area	Reduce	Camping and Parking
FID 18 - Office	Delete	None – Admin Area Subtraction

### Special Uses and Powerline ROWs

Initial direction for special use areas on the forest was sought from the Forest Special Use Coordinator. Their recommendation included contacting the Pisgah and Nantahala Zone RIM coordinators who were tasked with creating a new layer containing forest areas under special use permits.

- 1) A new combined forest file, validated by Linda Randolph (Aiken) and Amber Vanderwolf, was named *S\_R08\_NFSNC\_SpecialUseP*.
- 2) The layer was clipped by *np\_fs\_own* because one transmission line buffer (object ID 333) is mostly on non-NFS lands but does cross onto NFS in a few spots. The new shapefile was called *N\_P\_SpecialUses\_ClipJAR2*.
- 3) Further review of the shapefile revealed that other transmission lines were not included in the layer. A second layer called *N\_P\_SpecialUses\_ClipJAR* was created to digitize powerline ROWs that exist on NFSNC lands. A process was developed to systematically cover both forests and capture the powerline ROWs and other discernable features like cell towers installations.
- 4) The forest was reviewed in ARC Map with the scale window set to 1:25,000. In many cases, transmission line ROWs present a distinct visual character on the landscape (the straightest line regardless of topography) and at a fine scale view of imagery data the actual “line” can be identified. Where this was evident the line opening was digitized at the finer scale until it left the Forest property. The coarse (1:25,000) scale search was resumed from the starting location until the entire forest was covered. It was helpful to identify sections of the forest bound by state roads or other notable features and then scan an area systematically until all features were identified and captured with polygons.
- 5) Upon completion of the visual check of the forest ownership, the layers related to special uses were combined (*N\_P\_SpecialUses\_Clip\_JAR2* with *N\_P\_SpecialUses\_Clip\_JAR*) to get *N\_P\_SpecialUses\_Merg\_JAR*.
- 6) This new, combined layer was clipped by *np\_fs\_own* again to finalize the process.
- 7) The layer added to the model was called *N\_P\_SpecialUses\_Merg\_JAR\_Clip*.

Step 1 Factor 1: Lands on which Timber Production is Prohibited or Lands Withdrawn from Timber Production (FSH 1909.12 § 61.11)

### Wilderness Areas

The national coverage *S\_USA\_Wilderness* (SDE Feature Class) was selected for existing wilderness boundaries on the Nantahala and Pisgah National Forests. This is a nationwide database so it was clipped by the *np\_FS\_own* layer to capture those on the NFSNC. Post clipping it was re-named *Wilderness\_N\_P\_Clip\_JAR*.

### *Wilderness Study Areas*

The layer *Wilderness Study Areas* from the R8-NFsNC/data/planningNFsNC.gdb was selected to represent wilderness study areas in the Nantahala and Pisgah plan revision area. This layer was also clipped by *np\_FS\_own* and re-named *Wilderness\_Study\_N\_P\_Clip\_JAR*.

### *Research Natural Areas*

The Research Natural Areas (Walker Cove and Black Mountain) are not currently scheduled to change during plan revision. The base layer representing the current management areas (*Existing MgmtAreas NP*) was selected for management areas 10 & 11 (RNAs and Cradle of Forestry) and converted to a shapefile called *Cradle and RNAs\_JAR*. Further work on the Cradle of Forestry determined that the designation language did not preclude timber production. The *Cradle and RNAs\_JAR* shapefile was copied and the Cradle of Forestry deleted leaving a new shapefile with only the Research Natural Areas (called *RNA\_JAR*).

### *Wilderness Rivers (Wild and Scenic)*

The *S\_USA\_WildScenicRiver* layer (*edwdb.fs.fed.us*) contains all classes of river designation. To address timber suitability, FSH 1909.12 § 61.11 references river segments with the “Wild” designation as unsuitable for timber production in Step 1. The *S\_USA\_WildScenicRiver* layer was clipped by *np\_FS\_own* and a new layer created (*WildScenicRiver\_Clip\_JAR*). The classification “Wild” was selected from attributes table and a shapefile was created of the selection keeping the same file name. The *WildScenicRiver\_Clip\_JAR* shapefile contains one segment of Wilson Creek and two segments on the Chattooga River.

Step 1 Factor 2: Lands on which Technology to Harvest Timber is Not Currently Available without Causing Irreversible Damage (FSH 1909.12 § 61.12).

### *Slopes Greater Than 70 Percent*

The original LIDAR generated raster dataset was processed for slope by J. Kelly of Mountain True. After obtaining the dataset from Mountain True, it was reclassified by the Pisgah Zone GIS Coordinator and the Forest Botanist/Ecologist. An attempt was made to convert the raster data to a polygon data but success proved problematic because of the dataset’s size. The raster dataset was masked with *np\_fs\_own* to reduce its size before it could be successfully converted into polygons. The polygon dataset was selected for slopes greater than 70 percent (grid code 4) and converted into a separate shapefile called: *npsloperclass\_gk\_selection*

### *FSVeg Stand Data Representing Irreversible Damage*

National Forest Service land suitability class codes representing irreversible damage were examined in FSVeg. LSCs examined included 720, 740, 827, 825, 822, 823, 824, 821, and 826. Codes selected represented the possibility for some overlap with other criteria within Factor 2. This ensured that duplicates would be captured but not double counted in the analysis. The analysis revealed that relevant data was only found in the 821, 824, and 826 codes. All others were not present in the version of FSVeg used during the analysis. A shapefile was created called *FSVeg\_JAR\_Irreversible\_Dam.shp*.

### *Bogs Rock Outcrops*

The Forest Botanist provided data which covered bogs and rock outcrops on the Nantahala and Pisgah National Forests. These two shapefiles were incorporated directly into the timber production suitability analysis.



- 1) Bogs – *All\_NP\_Bogs\_suitability\_analysis.shp*
- 2) Rock Outcrops – *All\_Final\_NP\_Rock\_Outcrops\_suitability\_analysis.shp*

### Hydric Soil Ratings

Hydric soil information was obtained from the NRCS website based on the recommendation of the Forest Hydrologist/Soil Scientist. The NRCS data for just full hydric soil rating was selected and a shapefile (*Hydric\_Rating\_selection*) was created. During this process, the partially hydric soils rating was also examined for inclusion in the timber production suitability analysis. Based on conversations with the Forest Hydrologist/Soil Scientist, the partially hydric soils rating was described in a more coarsely mapped dataset and covered much larger parts of the landscape overlapping heavily with riparian areas that are scheduled to be removed in Step 2 of the Timber Suitability Analysis.

Table A-3: Land Suitability Codes\* examined for inclusion in Step 1 Factor 3 (Lack of Technology)

Code	Definition
720	Irreversible Damage
740	Lacking Response Information
821	Steep Slopes
822	Inadequate Markets
823	ROW Needed
824	Sensitive Soils
825	Low Level Management
826	Physical Barriers
827	Road Costs Exceed Value
*USDA-FS Silvicultural Examination & Prescription Field Book R-8-MR 46, 2009.	

Step 1 Factor 3: Lands on Which There is No Reasonable Assurance that Lands can Adequately Restocked within 5 years of Final Regeneration Harvest(FSH 1909.12 § 61.13).

### FSVeg Site Index Data

Low site indices (Measured site indices less than 40 feet of height growth over a base age (usually 50 years)) was selected as a measure of Factor 3. The *FSVeg12\_2014* shapefile was examined for use of the site index field. The shapefile was clipped by *np\_fs\_own* to exclude the Uwharrie NF and Croatan NF. Examination indicated some problems associated with the FSVeg site index data. Only a small amount of the forest stands had site index data listed below site index 40 (15 out of 28,223). Stands populated with a zero (4,241 stands) were considered “no data” and left within the dataset. Additionally, the entire Coweeta Experimental Forest was listed with a site index below 40. Though the site index field in FSVeg for the Nantahala and Pisgah appears to need updating, it was included as an available data option. The 15 stand shapefile was called: *FSVeg\_SI\_40\_JAR\_Actual*.

### FSVeg Land Suitability Code 99 (Unproductive), Forest Type 99 (Brush Species) or Condition Class 15 (Non-stocked)

Due to the apparent “out-of-date nature” of the site index field within the FSVeg Data of the shapefile *FSVeg12\_2014*, three other indicators in FSVeg of low stocking potential were examined (unproductive LSC, Forest Types, and Condition Classes).

A shapefile was derived from the *FSVeg12\_2014 shapefile* and named *FS\_Veg\_LAS\_FT\_CC\_Clip*. The data was queried for LSC 900 (unproductive), Forest Type 99 (brush species), and condition class 15 (non-stocked). The query resulted in 301 records being identified. Further analysis indicated that many of the records were identified as unproductive due to their association with non-timber production management areas like wilderness, Research Natural Areas, and the Appalachian Trail corridor.



In summary, the best data we have on unproductive lands in FSVeg has obvious limitations. The two shapefiles (FSVeg\_SI\_40\_JAR\_Actual and FS\_Veg\_LSC\_FT\_CC\_Clip) were included in this analysis. For comparison, in the current Forest Plan Amendment 5, Factor 3 identified roughly 9,000 acres. This current analysis identifies 29,031 acres.

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