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Revisions to the 1995 Map of Ecological Subregions that Affect Users of the Southern Variant of the Forest Vegetation Simulator

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Abstract

The Southern Variant of the Forest Vegetation Simulator utilizes ecological units mapped in 1995 by the Forest Service, U.S. Department of Agriculture, to refine tree growth models for the Southern United States. The 2007 revision of the 1995 map resulted in changes of identification and boundary delineation for some ecoregion units. In this report, we summarize the major differences between the two maps and how the differences affect users of the Southern Variant of the Forest Vegetation Simulator. We also provide a table for converting ecoregions from their identifications on the 2007 map to their former identifications on the 1995 map.

Keywords: Ecological subregions, ecological units, ecoregions, ecosystem mapping, forest vegetation simulator, FVS-SN, hierarchical classification.

Introduction

The Forest Vegetation Simulator (FVS) is the nationally supported framework developed by the Forest Service, U.S. Department of Agriculture, for forest growth and yield modeling (Crookston and Dixon 2005). The basic model structure has been calibrated to unique geographic areas to produce individual FVS variants. The Southern Variant of FVS (FVS-SN) is applicable in forest types of the 13 Southern States.³ Accuracy of growth estimates in FVS-SN has been increased by developing models for ecosystems ranging in size from 20,000 to 200,000 square miles; these areas are termed provinces in the Forest Service hierarchical classification system.⁴ For example, FVS-SN estimates of 5-year diameter increment of loblolly pine (*Pinus taeda* L.)

range from 0.6 inches in the uplands of central Kentucky (province 222) to 1.2 inches in the Mississippi River Alluvial Valley of central Louisiana (province 234) (table 1). Similar information has been used to refine estimates of productivity for resource management in national forests (Keyser and Stephens 2002).

Table 1—Five-year diameter increment response predicted by the Forest Vegetation Simulator for a stand of loblolly pine averaging 164 square feet of basal area per acre and mean d.b.h. of 10 inches by ecoregion province

| Province ^a | Increment <i>inches</i> |
|-----------------------|----------------------------|
| 221 | 0.52 |
| 222 | 0.65 |
| 231A | 0.77 |
| 231B | 1.17 |
| 232 | 0.92 |
| 234 | 1.20 |
| 255 | 1.20 |
| 411 | 0.92 |
| M221 | 0.97 |
| M222 | 1.60 |
| M231 | 1.94 |

^a Source: Keys and others (1995).

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³ Keyser, C.E. 2008. (revised February 3, 2010). Southern (SN) Variant Overview—Forest Vegetation Simulator. 68 p. Internal Report. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Forest Management Service Center.

⁴ In the upper two levels of the four-tier classification system, the ecoregion level consists of three national scale nested ecosystems: (1) domains, (2) divisions, and (3) provinces. The subregion level includes two regional scale ecosystems: sections and subsections. An ecological unit is one of many ecosystems of any scale that is selected for study. Additional information is presented by Cleland and others (1998).

The FVS-SN growth models were based on provinces mapped by Keys and others (1995), which had been delineated using criteria relevant at that time.⁵ That map was revised in 2007 (Cleland and others 2007) as part of an ongoing process to better understand, delineate, and refine ecological units at a range of scales (Cleland and others 1997). Contemporary FVS-SN users of the 2007 map will find a small number of new ecological units, e.g. provinces and sections, that were not on the 1995 map, such as province 223. This new province is the southern part of a large map unit that was subdivided for ecological reasons; the other part (north of the Ohio River) retains its former designation as province 222 on the 2007 map. Also, the area occupied by several provinces on the 2007 map varies from the 1995 map because small parts were reassigned to adjoining provinces. Revisions such as these in the South have been part of the process used by the Forest Service for refining ecosystem delineations since production of the first national map of ecoregions (Bailey 1976).

Current users of FVS-SN who have no access to the 1995 ecoregion map might have questions about the effects of the revisions on application of the forest growth models. The purpose of this research note is to summarize revisions to the 1995 map and provide FVS-SN users with a means of converting ecological units on the 2007 map to their

equivalent identity on the 1995 map. Updating the 1995 FVS-SN models to follow changes displayed on the 2007 map would be costly and is largely unnecessary if a user simply knows their geographic location. Although a number of ecological units on the 1995 map were modified throughout the eastern United States, the scope of this note is limited to forested areas of the 13 Southern States, which is the primary area of interest for users of FVS-SN. Longitude 98° is an approximate dividing line between forests of closed canopy and the open woodlands in the transition zone with grasslands of the Great Plains.

The 2007 Ecoregion Map and Its Application for FVS-SN

Major differences between the 1995 and 2007 maps occurred primarily in a province, five sections and a subsection (fig. 1). As described earlier, the most extensive map revision occurred in province 222, which was subdivided in the glaciated region of the Midwestern States to form province 223 in the South. Several other new units on the 2007 map resulted from similar revisions. For example two large sections, 231A and 232A, were reduced in size by subdivision along existing map unit boundaries to form two new, smaller sections, 231I and 232H respectively. In contrast, province 231 increased in size with additions

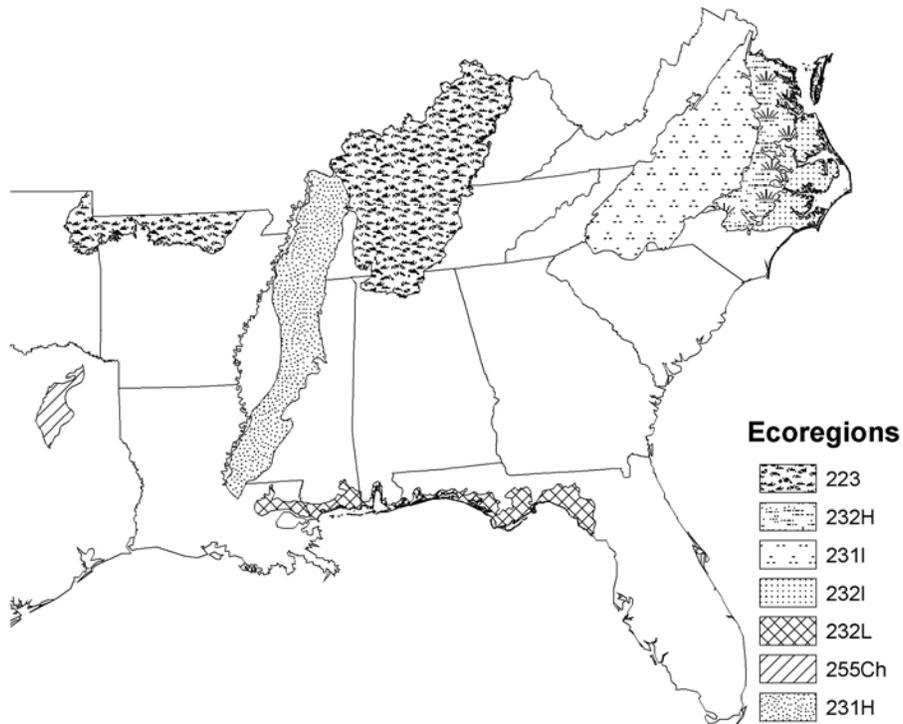


Figure 1—Noteworthy revisions were made to seven southern ecological units on the 1995 map.

⁵ Keys, J.E., Jr.; McNab, W.H. 1995. Process used to map subregions of the Southern U.S. 8 p. Unpublished report. On file with: U.S. Department of Agriculture, Forest Service, Southern Region, 1720 Peachtree Road NW, Atlanta, GA 30309.

of sections 222C and 232B from provinces 222 and 232, respectively, to form section 231H. The rationale for these and other changes to the 1995 map, and a brief history of ecoregion mapping in the South, is described elsewhere.⁶

Correspondence between ecological units shown on the 1995 map and the 2007 map is provided in table 2. For example, an FVS-SN user in east Texas with access to the 2007 map could determine that subsection 255Ch is equivalent to subsection 231En on the 1995 map. The FVS-SN software determines automatically the appropriate 1995 map unit from location information provided by users. Information in table 2 allows users to obtain descriptions of the physical and biological characteristics of ecological units that were prepared for ecoregions delineated on the 1995 map (McNab and Avers 1994). Other revisions of the 1995 map that do not affect FVS-SN users but may be important for other applications, included a major change in classification of large bodies of water, e.g., lakes, sounds, and bays.⁷

Table 2—Correspondence between southern ecological units on the 2007 and 1995 subregion maps

| Cleland and others (2007) ^a | Keys and others (1995) |
|--|------------------------|
| Province 221 | Province 221 |
| Subsections 221Dd, De ^b | Section 231A |
| Subsections 221Eg, Ej, En | Section 222E |
| Province 223 | Province 222 |
| Province 231 | Province 231 |
| Subsection 231Eo | Section 234A |
| Subsections 231Hd, He, Hf, Hg | Section 222C |
| Subsections 231Hh, Hi | Section 232B |
| Province 232 | Province 232 |
| Subsection 232Ff | Section 234A |
| Province 234 | Province 234 |
| Province 251 | Province 251 |
| Province 255 | Province 255 |
| Subsection 255Am | Section 251E |
| Subsection 255Ch | Section 231E |
| Province 411 | Province 411 |
| Province M221 | Province M221 |
| Province M223 | Province M222 |
| Province M231 | Province M231 |

^a Excluded are several ecological units on the 2007 map that increased in area by merging subsections in different provinces and sections on the 1995 map (e.g., 231Ha was formed from 222Cc, 231Bh, and 232Bb).

^b Subsections identify ecological units on the 2007 map of similar location and size on the 1995 map that were reclassified by province or section (e.g., 221Dd and 221De on the 2007 map were almost identical to 231Al and 231Ap on the 1995 map).

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⁶ McNab, W.H.; Keys, J.E., Jr. History and rationale for revisions of ecological map units in the South: 1976-2006. Manuscript in preparation. Author can be reached at USDA Forest Service, 1577 Brevard Road, Asheville, NC 28806.

⁷ U.S. Department of Agriculture, Forest Service. 2007. Delineation, peer review, and refinement of subregions of the conterminous United States. 11 p. Administrative report included with GTR WO-76A. On file with U.S. Department of Agriculture, Forest Service, Washington, DC 20250-0003.



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