DISTRIBUTION OF FOREST TYPES IN THE SOUTHERN BLUE RIDGE ESCARPMENT

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Abstract

The 859,000 acres that constitute the Southern Blue Ridge Escarpment (SBRE) contain some of the highest natural diversity found anywhere in the world. Over 300 rare species and natural communities have been recorded in the Southern Blue Ridge Escarpment – a number equal to those recorded in the entire Great Smoky Mountains National Park. The Nature Conservancy (TNC) has protected nearly 70,000 acres in the SBRE, and continues to conserve the area through conservation easements and land purchases. This project researched and reclassified available land cover data to delineate the forest types that TNC has identified as high-priority to SBRE biodiversity. Simple statistics were then used to generate data that will be helpful as TNC continues to protect this precious area.

Introduction

Encompassing less than 2% of the state's land mass, the SBRE harbors 40%of South Carolina's rare plant species, including 200 rare plant and animal species tracked by the South Carolina Heritage Program (TNC, 2006). Accordingly, many nonprofit organizations, government agencies, and individuals have united to protect the SBRE. Approximately 43% of the SBRE currently qualifies as "protected land," a percentage that continues to grow as more territory falls under government protection or conservation easements (see map).

The Nature Conservancy has played an important role in the SBRE, conserving nearly 70,000 acres in the past 30 years (TNC 2009). Recently, TNC's SBRE-specific "Conservation Action Plan" (CAP) enabled the organization to identify high-priority land factors crucial to the ecological values of the SBRE region (TNC 2006). However, while the CAP has determined which landscape features contribute to the ecological integrity of the SBRE, there exists a need for research into the distribution and specific locations of these features – including the forest habitats that foster much of the area's biodiversity.

In the 2006 CAP, TNC identified the "SBRE forest matrix" as a high-priority contributor to SBRE biodiversity. The SBRE forest matrix draws its value from the unusually wide array of forest types that occupy the escarpment's steep, moisture-laden slopes. The dense combination of forest communities increases the biodiversity of the area, providing a range of habitat and conditions that encourage species variety. This study utilized satellite data to delineate the various communities that comprise the SBRE forest matrix, breaking down and analyzing their presence in the SBRE for ease of reference in future purchase decisions.

Methodology

Land Cover Data Collection/Analysis: After researching available land cover data and narrowing the options, both NLCD (2001) and GAP (2001) data were downloaded and their compatibility with this project assessed. These data were compared in terms of resolution, processing, classification, and accuracy via metadata analysis and rough "on-site" testing. The finer classification system of GAP dataset was determined to be most compatible with project objectives.

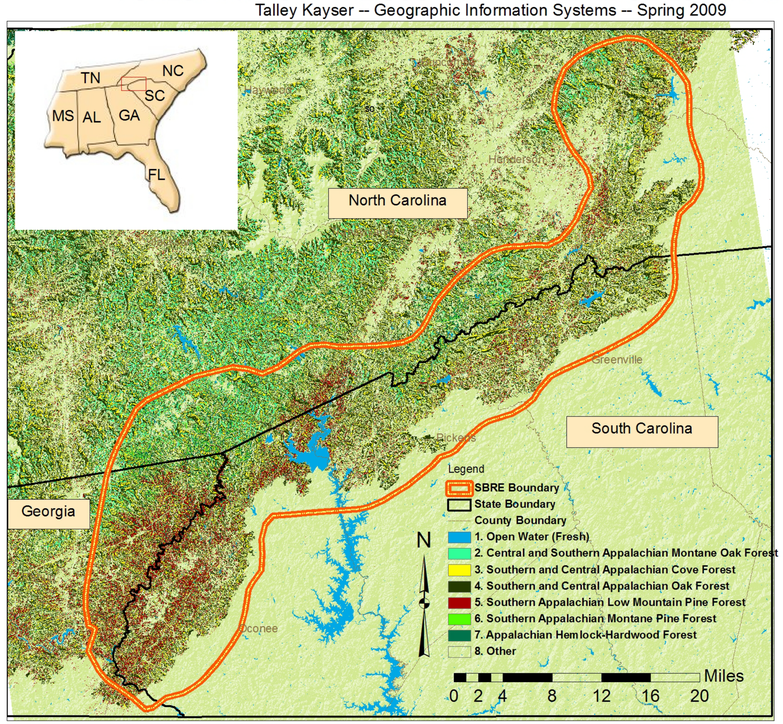
Reclassification of Forest Types: The fifteen GAP forest classifications present in the SBRE were reclassified according to CAP standards and delineations, resulting in the following forest types (NatureServe 2007):

Central and Southern Appalachian Montane Oak Forest
Central and Southern Appalachian Cove Forest
Southern and Central Appalachian Oak Forest
Southern Appalachian Low Mountain Pine Forest
Southern Appalachian Montane Pine Forest
Appalachian Hemlock-Hardwood Forest

GIS technology and GAP data were then used to delineate these forest types throughout the SBRE. An "Open Water" classification was also incorporated into the spatial analysis for ease of reference.

Statistical Analysis: Using mask operations, statistical tools, and information about currently protected lands, various pertinent statistics relevant to TNC's future conservation action planning were calculated from the raster data (see graphs).

Figure 1



This map shows the distribution of forest types throughout the Southern Blue Ridge Escarpment (SBRE), illustrating the fine-scale variability and diversity of this unique area. Such wide variety of habitat helps foster the high level of biodiversity that characterizes the SBRE.

DATA SOURCES:

Kristen Austin
(The Nature Conservancy)

Steve Springs
(Caliber Consulting)

ESRI
(Data/USA)

seamless.usgs.gov

Figure 2

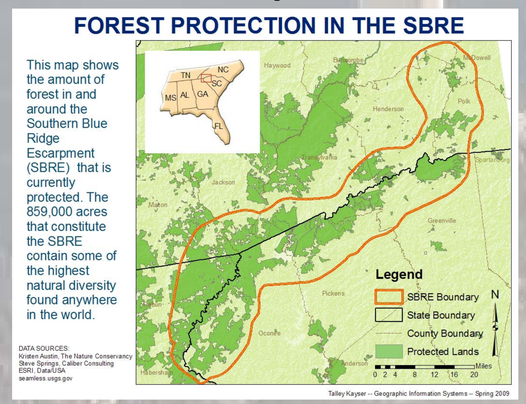


Figure 3

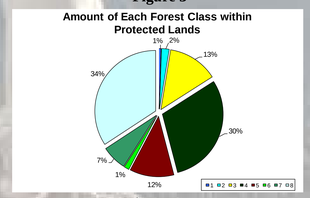
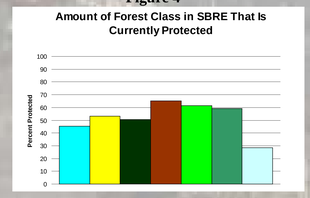


Figure 4



Acknowledgments

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Results/Discussion

The nature of this study resists in-depth discussion of spatial patterns within the SBRE matrix. While forest trends can be identified in Fig. 1, these results are intended primarily as a "shopping aid" for TNC as it continues to protect the SBRE. As such, the figures and statistics emphasize forest distribution relative to protected lands. Through spatial and statistical analysis, the study gives TNC a clear perspective on what areas of forest are both scarce and vulnerable, enabling the organization to set effective and efficient goals for its forest protection.

The study successfully portrayed the distribution of forest communities throughout the SBRE matrix, revealing the percentages of each forest class within the SBRE (Fig 5). In addition, a mask function and statistics were used to calculate the proportion of each forest class within protected lands (Fig. 3) and the percentage of each forest class that is currently protected (Fig 4). Further analysis computed the proportion of protected SBRE area per state– possibly the most enlightening trend, as it demonstrates that only 26.7% of the North Carolina SBRE territory is protected (Table A).

Figure 5

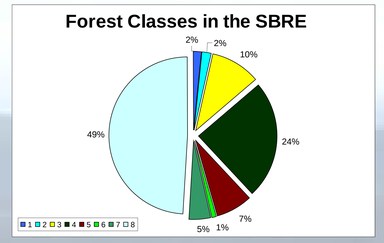

Table A

State	Protected Area in the SBRE (acres)	Acres of State in SBRE	SBRE Protected by State
SC	200,216	415,887	48.1%
NC	93,143	349,109	26.7%
GA	81,448	100,200	81.3%
Total	374,807	865,196	43.3%

It is important to acknowledge that the SBRE forest matrix is only one of seven "conservation targets" that TNC has identified as crucial contributors to the SBRE's biodiversity. Other targets, such as "talus and fissure caves" and "gorge assemblages," foster habitats that some of the rarest plants and animals in the SBRE need to survive. However, accurately locating these important areas necessitates research beyond the confines of this particular study.

Conclusion

- The SBRE forest matrix creates a diverse assemblage of forest communities, offering a wide variety of habitat for plant and animal species.
- Specific communities within the SBRE matrix, including Southern Appalachian Montane Pine Forest (1%) and Central/Southern Appalachian Montane Oak Forest (2%) seem particularly underrepresented, and may require special attention from the CAP.
- The conservation efforts of past decades have resulted in significant forest protection; however, much remains to be done, particularly in North Carolina/the northeastern corner of the SBRE.
- In order to make fully informed land purchasing decisions, further study of the additional CAP conservation targets and the relationships among them is recommended.

References/Data Sources

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Datum: NAD 1983; Projection: UTM