

Natural Community Comparisons of Bryophyte Species Richness Found in Graham Cave State Park



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Introduction

Graham Cave State Park comprises 386 acres within Montgomery County, Missouri. The park boasts 13 terrestrial natural communities and 28 soil types (Missouri State Parks, n.d.). Detailed mapping of both the communities and soil types allows for comparison studies of species and species richness in and between these environments. Notably, the park has 188 acres of Sandstone-based communities, and 125.5 acres of Limestone/Dolomite (L/D) based communities.

Methods

A bryophyte survey of the park was conducted from May 2020 to June 2021 (Volenberg et al. 2021). Voucher specimens contain the date, collector, location, substrate, and community description from which they were found, and are deposited in the herbaria of the Missouri Botanical Garden and the Division of State Parks, Missouri Department of Natural Resources (MODNR). A total of 299 samples have been identified and recorded under the community in which they were found (Figure 1).

Results

During this survey, 116 taxa were identified, and an additional 15 taxa previously collected were included, giving a total of 131 taxa of bryophytes. Since the publication of the survey, an additional 4 species have been collected and vouchered, bringing the total to 135 taxa of bryophytes. Of the 135 taxa recorded thus far, 6 species are of conservation concern.

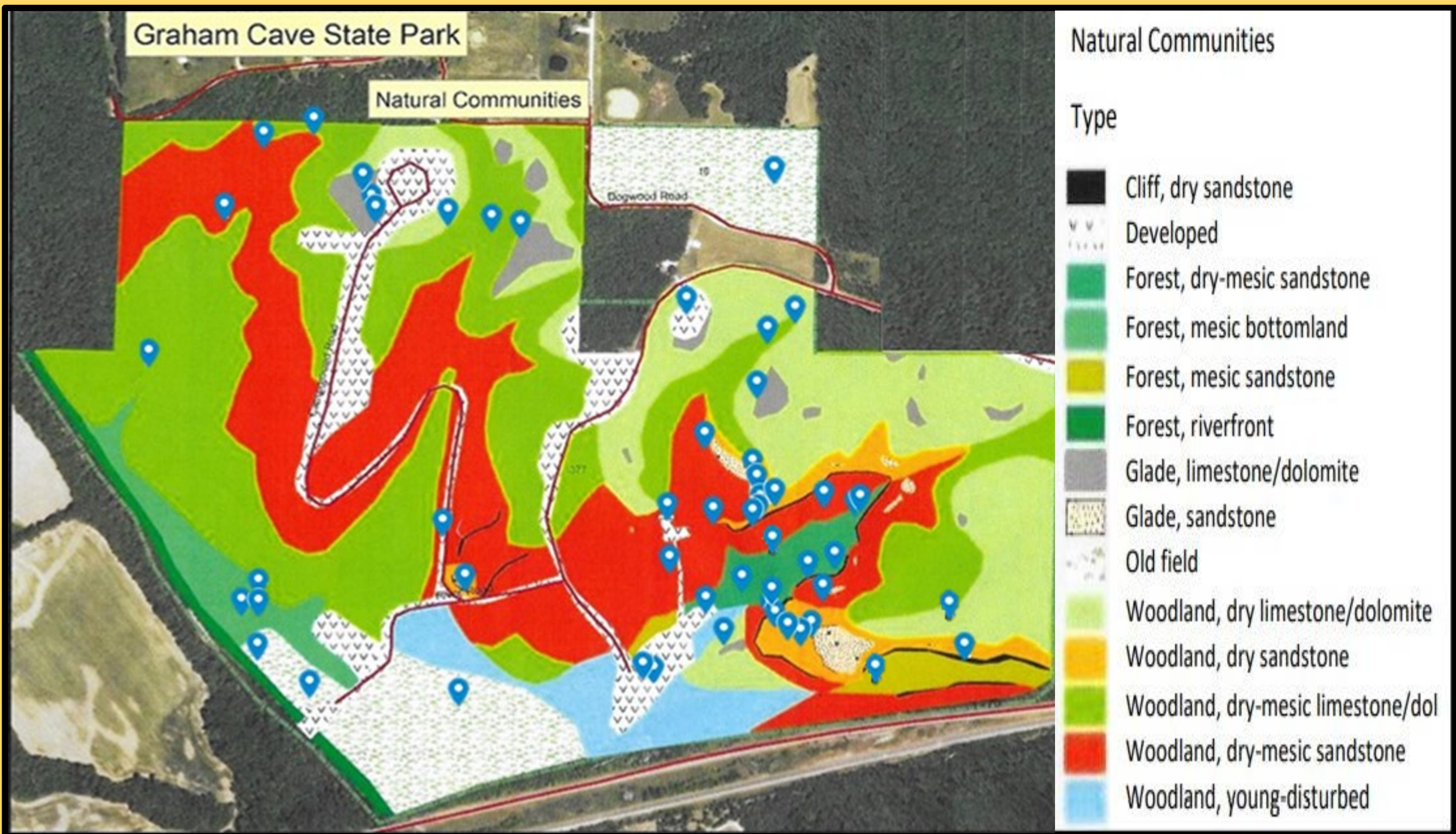


Figure 1. Graham Cave State Park Natural Communities map. GPS coordinates for each collection site are marked with blue flags.

Preliminary data of species richness within each community shows that the Dry Mesic Sandstone Woodland community had the greatest bryophyte richness with 38 taxa, followed by the Sandstone *Dry Cliff community with 34 taxa (Figure 2).

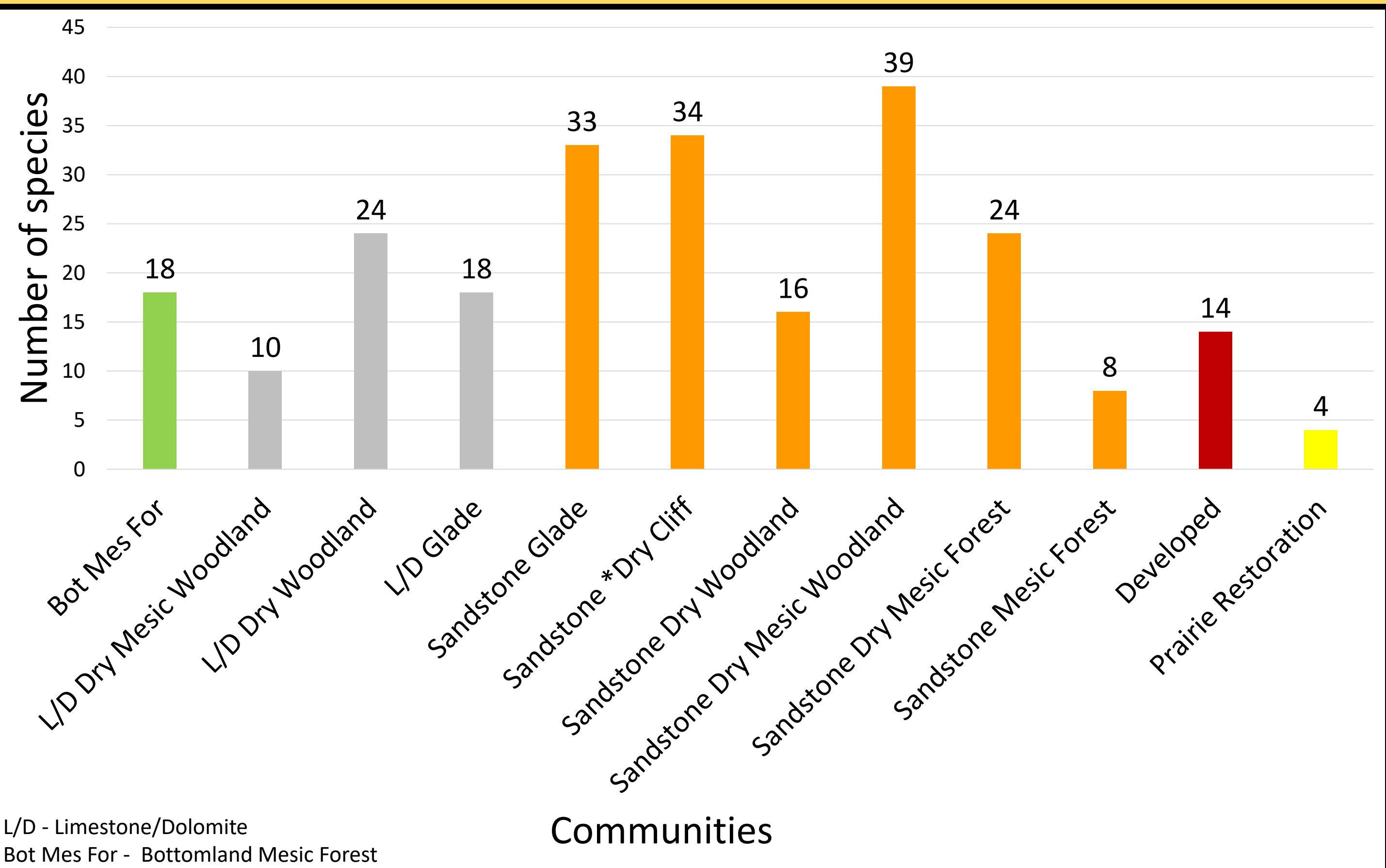


Figure 2. Number of species found within each community type. *There are several intermittent waterfall and seepage areas found within the Sandstone Dry Cliff community that do not meet the criteria to be designated as Sandstone Moist Cliff communities (Missouri Natural Resources n.d.) but will host bryophytes not typically found in a sandstone dry cliff community.

Although collecting was not equivalently thorough within every community, a modest comparison between combined Sandstone and L/D communities can be made. Data shows Sandstone communities as having a greater species richness with 101 bryophyte taxa reported compared to 42 for L/D communities (Figure 3). Twenty-four species were found in both communities giving them a 33% coefficient of similarity. If we focus only on those species found attached to soil or rock, 12 species would be removed from the counts leaving Sandstone communities with 97 species, L/D communities with 35 species, and 20 species in common. This would give the communities a %30 coefficient of similarity.

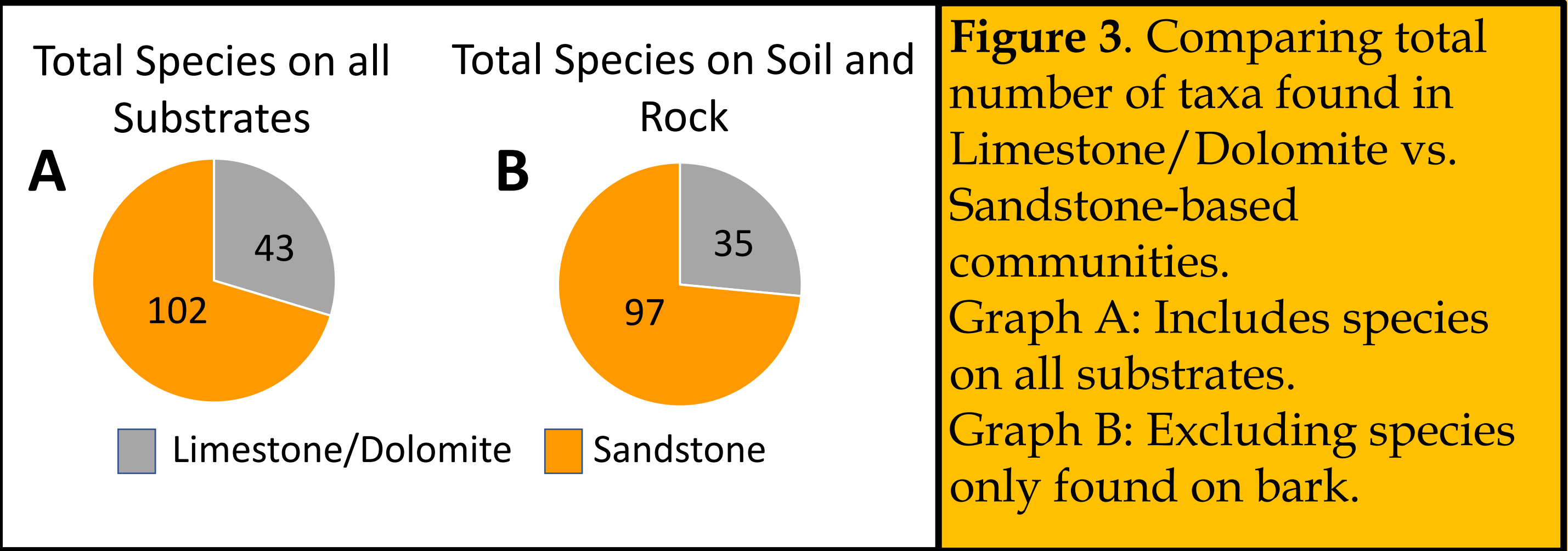


Figure 3. Comparing total number of taxa found in Limestone/Dolomite vs. Sandstone-based communities. Graph A: Includes species on all substrates. Graph B: Excluding species only found on bark.

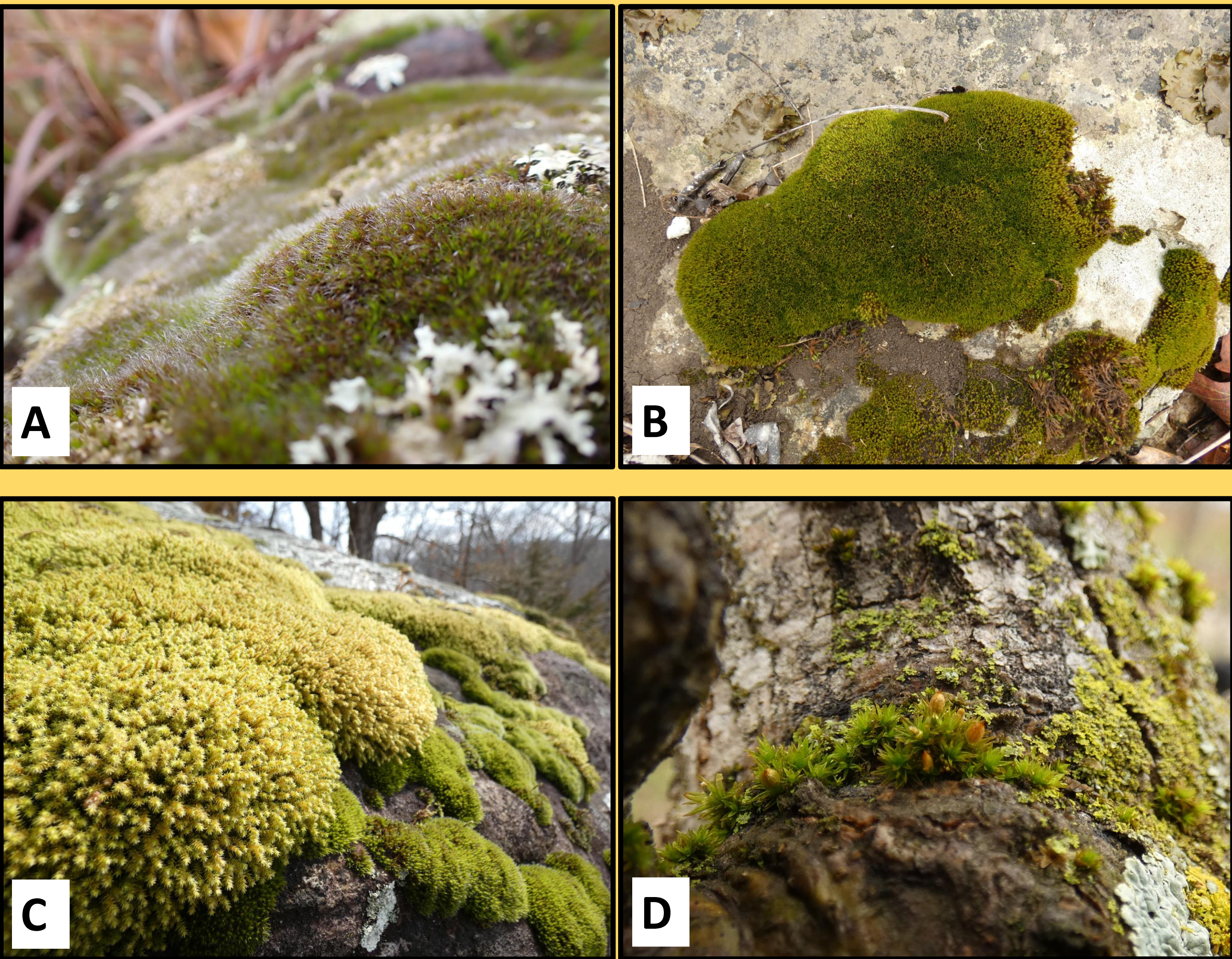


Figure 4. A) *Grimmia laevigata*, an acidic loving moss. B) *Schistidium viride*, a calcium loving moss. C) *Hedwigia ciliata*, a non-specific moss. D) *Orthotrichum ohioense*, a corticolous moss.

Results also showed that the bryophyte diversity at Graham Cave was comparable to several of Missouri's significantly larger state parks such as Taum Sauk at 7,500 acres with 123 taxa (Holmberg & Atwood 2014), Roaring River at 4,294 acres with 128 taxa (Hilton 1986), and Meramec at 6,896 acres with 148 taxa (Nels Holmberg, personal communication, 2021).

Conclusion

Continued documentation of the bryophyte flora throughout Missouri is important for a more complete view of the overall floristic quality of the natural communities. This would allow the opportunity to explore species richness within a natural community as an aid in evaluating the overall health of the natural community across locations and over time. Graham Cave's bryophyte species richness in such a small area is another example of how important our protected natural resources are, and the need for their continued preservation cannot be overstated (Figure 4).

References

Hetrick-Volenberg, Lorie, et al. 2021. Bryophytes of Graham Cave State Park, Montgomery County, Missouri. *Missouriensis*, 39: 13-23.
Hilton, T. 1986. Bryophytes of Roaring River State Park, Barry County, Missouri. *Missouriensis* 7(2): 41-50.
Holmberg, N.J. and J.J. Atwood. 2014. Bryophytes of Taum Sauk Mountain State Park. *Evansia* 31: 8-16.
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