

An evaluation of species richness estimators for tardigrades of the Great Smoky Mountains National Park, Tennessee and North Carolina, USA

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ABSTRACT

For the past 5 years we have been conducting a large-scale, multi-habitat inventory of the tardigrades in the Great Smoky Mountains National Park (U.S.A.) as part of the All Taxa Biodiversity Inventory (ATBI) (see www.dlia.org). In terrestrial habitats, we collected moss, lichen, and soil samples from 19 permanent ATBI plots, representing all major land cover types within the park. Each ATBI plot is 100 × 100 m. In each plot, when available, 16 moss samples, 16 lichen samples, and 4 soil samples were collected in paper bags and air dried in the laboratory. Specimens were isolated with LudoxAM centrifugation, and for each sample up to 50 adults plus eggs were individually mounted on microscope slides in Hoyer's medium and identified using phase contrast and DIC microscopy. Additional collections were made in the limestone caves of the Cades Cove region of the park, bird nests, and 13 different streams. To date (1-Jun-06), 589 samples have been collected, and of these 401 have been analyzed, yielding a total of 8133 identifiable tardigrades or, in some cases, species groups. A total of 73 species have been found in the park, 14 of which we believe are new to science. Seven species richness estimators have been developed to predict total species richness (see EstimateS 7.5 software, viceroy.eeb.uconn.edu/estimates), and these were evaluated by comparing predictions from half of our data to the actual numbers from the total database. The results of this comparison indicate that different estimators work best in different habitats. Using the best estimators in each habitat, EstimateS 7.5 indicates that a total of 96 species are likely to occur throughout the park. Thus, Great Smoky Mountains National Park tardigrade diversity represents 10% of the world's known tardigrade fauna.

Key words: Meiofauna, biodiversity, species richness, biological inventory, Southern Appalachians
