

2010 TWNF Science and Advisory Committee Meeting

Program of Events



10:00 am: Welcome

Doug Coleman, The Wintergreen Nature Foundation, Director



10: 15 - 10:45 am: Life history of a long-lived fern, *Osmunda claytoniana*

Janet C. Steven, Sweet Briar College
Zoë Smith, Smithsonian Environmental Research Center

Interrupted ferns (*Osmunda claytoniana*) are native to northeastern forests in North America, and have horizontal, underground stems called rhizomes. At the tip of each rhizome, a plant sends up a clump of about 8 – 12 leaves. The rhizomes sometimes branch, resulting in a large number of leaf clumps in an area of the forest that are a single clone. Estimates of rhizome growth rates suggest that ferns grow about one to two centimeters a year; therefore, a patch of ferns in the forest has the potential to be hundreds of years old. Because connections between plants rot over time, we are developing genetic markers to use in determining the age and size of clones. The markers will also be used to describe patterns of genetic diversity within and among populations of interrupted fern. These investigations will provide important conservation information for this long-lived and slow-growing plant species.



10: 45 - 11:15 am: Managing the Wintergreen Environment: Past, Present and Future

Josh Palumbo, Forest Management Coordinator

TWNF is committed to providing a continuity in its research and management of the Wintergreen environment. This is evident through our yearly studies of gypsy moth, deer population and water quality. TWNF is also dedicated to filling in any current knowledge gaps which is apparent by the addition of two new studies, the hard mast survey and the Wintergreen hunters survey. With an eye on the future, TWNF will begin monitoring for Virginia's newest forest pest, emerald ash borer.



11:15 am - 11:40 am: TWNF Native Plant Propagation Program

Jean Bertelsen, plant propagation and TWNF board president

The TWNF Plant Propagation Program began as the Wildflower Germination Project in 1998, under the direction of Pam Gallery, with the involvement of several volunteers and staff. The program's purpose was to study and document the specific propagation requirements of wildflowers in this area. The group began collecting seeds in the fall of 1998 and planted their first seeds in the early spring of 1999. They studied 9 species of herbaceous plants and succeeded in propagating and growing approximately 450 plants from the seeds collected. Today, 15 volunteers, with the help of staff, Larry Steward of Ohio State University and a summer intern, propagate over 40 herbaceous, 13 fern and 15 woody plant species and produce over 3,000 plants annually. Propagation methods now include cutting as well as seed propagation. The group has learned and documented a great deal about how to handle each seed, spore or cutting, and, for several species, has increased the germination rate and/or reduced the time required to produce a saleable plant. Data has been collected for each species propagated and resides in a database maintained by the volunteers. Group members plan to synthesize data into publishable protocols from the data. The group continues to experiment with propagating additional species through seed and cutting propagation methods.



11:40 - 12:00 pm: Relationship of TWNF and OSU/ATI

Larry Steward, Ohio State University

Building on a previous relationship of the WGNF Director and an OSU/ATI Professor, a cooperative internship program was developed. This program started in 2002 and continues through to the present. The purpose originally was to assist WGNF volunteers with education in propagation procedures, activities and equipment construction. Further, this program has provided educational opportunities and hands-on problem solving for a total of seven students from OSU/ATI. This relationship has grown into providing student labor in construction of propagation and growing facilities for growing commercially, native plants at WGNF. One of ATI's students returned to change the greenhouse sales facility donated to WGNF into a propagation/growing facility. In addition, to propagation activities, one intern assisted in identifying plants in the Allen Creek Nature Preserve.



12:00 - 1:00 pm: Lunch Break

Lunch will be provided by TWNF at the Nature Center



1:00 - 1:30 pm: The Vascular Flora of the Allen Creek Preserve

Doug Coleman, TWNF Director

The Allen Creek Preserve is an approximate 7 acre wetland that was donated to The Wintergreen Nature Foundation in 2004 by the developer as a concession to adjacent golf course development that occurred on its northern edge. Located within the Wintergreen Community (N 37 53.982', W 078 51.904') along Allen Creek and due east of the Lake Monacan dam, it encompasses several plant communities and is accessible by boardwalk and a foot path. Seasonal flooding occasionally limits access.

Doug Coleman and Ohio State Intern Derrick Sheets mapped three ecosystems within the preserve with Arc view GIS, and collected and identified 243 species within the mapped area including 25 new Nelson County records. Specimens are stored and still need a final check with confirmed herbarium collections.



1:30 - 2:00 pm: Functional diversity of *Platanthera* orchid mycorrhizas

Zoë F. Smith, Smithsonian Environmental Research Center

Terrestrial orchids are dependent on mycorrhizal fungi during their lifecycle. Therefore successful orchid conservation requires an understanding the diversity and specificity of associating fungi. Further, understanding the functional ecology of mycorrhizas is important for maintaining these essential interactions in the face of environmental change. This study investigated the diversity and specificity of mycorrhizal fungi associated with the terrestrial orchid genus *Platanthera*, and the functional diversity of selected fungi based on the production of enzymes related to nutrient cycling. Fungi were isolated from 15 *Platanthera* species in 34 populations in eastern North America. Sequencing of two DNA regions revealed that *Platanthera* associates with diverse soil fungi, including known orchid mycorrhizas, ectomycorrhizas and ascomycete fungi. While the majority of fungal isolates were identified as orchid mycorrhizal fungi in the form genus *Tulasnella*, the broad diversity of fungal associations in *Platanthera* contrasts with most terrestrial orchids which associate with narrow fungal clades. Two hybrid taxa associated with fungi that were also identified in their parent species; however, one hybrid also associated with a novel fungus. Fungal enzyme activity was investigated colorimetrically based on enzymes that decompose organic substrates to release C, N and P. Enzyme activity was not related to genetic similarity of fungi or associated orchid species, suggesting that environmental conditions may be more influential than phylogenetic relationships. Some fungi consistently showed activity of all enzymes, while others remained inactive. This research provides novel information about the functional diversity of orchid mycorrhizal fungi and how they provide nutrients that orchids need for germination and survival.



2:00 - 2:15 pm: Break

Refreshments will be provided



2:15 - 2:45 pm: Small-whorled Pogonia –unraveling the mystery of its ecology

Dennis Whigham, Smithsonian Environmental Research Center

Isotria medeoloides is the rarest orchid in the eastern U.S; extinct in several states and threatened or endangered in others. Small populations exist at Prince William Forest Park (PWFP), at nearby federal military facilities (Fort A.P. Hill, Quantico) and along the Blue Ridge Parkway. Basic information exists for the species but additional knowledge is needed to effectively conserve and restore populations. We have augmented existing information with studies at PWFP and Fort A.P. Hill and will initiate studies along in Shenandoah National Park and the Blue Ridge Parkway in 2010. The research will focus on life history ecology and identification and characterization of mycorrhizal fungi, and studies of seed ecology in the laboratory and field. Most species' attributes that we have examined thus far indicate that many challenges lie ahead as we pursue conservation and restoration methods. No seeds, for example, have every been successfully germinated. Individual populations are very dynamic, dormancy appears to be an important element of its ecology, interactions with ectomycorrhizal fungi are complex, and germinating seeds and growing seedlings remain a technical challenge.



2:45 - 3:15 pm: Filling in the Gaps: Wintergreen Archaeology Project

Carole Nash, James Madison University

2010 marks the eighth year of the collaboration between The Wintergreen Nature Foundation and James Madison University on the Wintergreen Archaeology Project. In addition to training over four dozen JMU students TWNF volunteers, and students in the Archeological Society of Virginia Archeological Technican Certification Program, the survey and testing undertaken at Wintergreen is opening new doors for archaeological research in the Appalachian region. The 45 recorded prehistoric sites cover a 10,000 year time period and indicate intensive seasonal settlement and cultural interaction, undoing decades-old descriptions of mountains as peripheral to lowland occupations. Research questions on hunter-gatherer mobility, social networking and exchange are being explored through the analysis of site location and artifact assemblages.



3:15 - 3:30 pm: Closing Remarks

Doug Coleman, TWNF Director