

Conserving the Mission and Two Rare Plant Species at Fort A.P. Hill

by Jason Applegate,
Robert Floyd, and
Stefanie Ferrazzano

Small whorled pogonia in flower; flowers typically only persist a few days before senescing. Photo Credit: USFWS

Nestled between Virginia's inner Coastal Plain and Piedmont regions – roughly 80 miles (129 kilometers) south of our nation's capital – U.S. Army Garrison, Fort A.P. Hill is well known for providing premier military training lands. The installation's 76,000 acres (30,756 hectares) also constitute an island of biodiversity within an increasingly developed landscape. The base harbors a range of unique habitats, including old-growth forests, swamps, bogs, and pine savannahs—all within a larger landscape mosaic of mature forests and high-quality wetlands. These habitats support a rich diversity of life, including two rare plant species—swamp pink (*Helonias bullata*) and small whorled pogonia (*Isotria medeoloides*).

The habitat requirements of these two federally threatened species provides some challenges and opportunities for Fort A.P. Hill, as it looks to balance its training mission and the conservation of these species. While swamp pink grows in forested, low nutrient swamps that are typically small in size and widely scattered across most of the installation, small whorled pogonia can be found in a variety of habitat types across its natural range. On Fort A.P. Hill, the diminutive orchid prefers mid-successional hardwood forests with a semi-open understory. However, small whorled pogonia's dependency on a subterranean, ectomycorrhizal fungus is believed to be a limiting factor—without the fungus and the trees that support it, the species cannot survive.

The elusive nature of these two plant species adds another challenge in finding and monitoring populations. Swamp pink is a fairly nondescript plant throughout much of the year—only in early spring does it develop a distinctive, tall pink-flowered stalk. Meanwhile, periodic and unpredictable dormancy makes small whorled pogonia one of the most elusive orchids in North America. Fort A.P. Hill biologists have documented individual plants that remained dormant for one to eight years before re-emerging.

Since swamp pink and small whorled pogonia both tend to occupy relatively small spatial areas, land managers cannot readily determine their distribution across the installation

by looking at aerial photographs or topographic maps. In fact, the total acreage with known populations of the federally endangered plants makes up less than one percent of Fort A.P. Hill's total land area. Personnel survey approximately three percent of the property annually, to monitor the status of these populations.

Fort A.P. Hill's Endangered Plants Program, in partnership with federal and state agencies, has developed and standardized monitoring techniques that have resulted in the collection of some of the most detailed population demographic data for these species in the region, including population numbers, flower and seed development, and indicators of plant vigor at each occurrence site. Additionally, the installation's recently developed Geographic Information System-based swamp pink habitat predictability model has greatly improved the efficiency of field surveys in training areas that are difficult to access due to

the frequency of military use. Using local spatial data of vegetation cover type, wetlands, streams, and known occurrences of swamp pink, installation personnel built a custom model that ranks existing stream system habitat and prioritizes areas for field surveys, which has resulted in the discovery of seven new swamp pink populations just in the last two years.

Efforts to locate and monitor existing populations of swamp pink and small whorled pogonia are just one part of Fort A.P. Hill's active role in the conservation of these species. The installation actively manages its forested maneuver and range areas through a variety of techniques, including timber harvesting and prescribed burning. These land management practices establish and maintain the training environment most conducive to military maneuvers, while promoting a healthy ecosystem where native species can thrive. The implementation of additional, targeted

management activities have enhanced habitat conditions, removed threats, and increased survival of swamp pink and small-whorled pogonia.

Fort A.P. Hill partners with the Smithsonian Environmental Research Center (SERC) to determine optimum light levels for small whorled pogonia habitat management. Under SERC's auspices, the installation selectively thinned mid-story tree limbs within a few of the installation's small whorled pogonia populations. Biologists monitored light conditions with hemispherical photography and light level meters to quantify the change in light levels. Initial results showed that small-whorled pogonia responded well to the changes. This knowledge will guide future management of the installation's mid-successional forests where the species occurs.

The installation has also worked to improve transportation infrastructure, specifically obstructed or outmoded culverts and low water crossings, to allow better drainage and safeguard swamp pink against flooding events. Approximately 60 percent of Fort A.P. Hill's swamp pink sites are located near culverts or low water crossings that were built before the species gained federal protection. Fort A.P. Hill biologists, in partnership with facility engineers and the Integrated Training Area Management Program, have worked to address natural hydrology maintenance and restoration.

Biological stressors are also managed to ensure conservation of these two plant species. Small whorled pogonia is vulnerable to white-tailed deer (*Odocoileus virginianus*) herbivory. To address this threat, motion-activated trail cameras help determine the frequency of deer visitation to small whorled pogonia sites. In those areas identified to have higher deer activity, the staff installs cages that physically protect individual plants during the

Dr. Dennis Whigham, Smithsonian Environmental Research Center, inspecting a fully developed Small whorled pogonia seed capsule. Photo Credit: U.S. Army, Fort A.P. Hill





Swamp pink in flower. Photo Credit: U.S. Army, Fort A.P. Hill

growing season. This has resulted in greater retention of small whorled pogonia.

Meanwhile, swamp pink is highly vulnerable to the effects of American beaver (*Castor Canadensis*) activities—specifically dam building and tree felling. To limit these effects, staff use seasonal surveys to identify beaver activity in proximity to swamp pink populations. Problem areas are then managed through close coordination and collaboration with the Wildlife Management and Pest Management Programs. This approach pre-empts negative impacts to swamp pink from beaver activity.

Through holistic planning and a proactive approach, Fort A.P. Hill has successfully maintained high-quality military training lands, while conserving two of the nation's rarest plants.

Jason Applegate, a natural resources specialist at the U.S. Army Garrison, Fort A.P. Hill, can be reached at jason.r.applegate.civ@mail.mil or 804-633-8465. Robert Floyd, a natural resources specialist for the Colorado State University, Center for Environmental Management of Military Lands, can be reached at robert.h.floyd.ctr@mail.mil or 804-633-8473. Stefanie Ferrazzano, a biologist with Clark County, Nevada, can be reached at stefanie.ferrazzano@clarkcountynv.gov or 702-455-6386.