

Preserving Rare Forms of *R. calendulaceum* on Hooper Bald

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Abstract

This article describes a project initiated by the Middle Atlantic Chapter ARS designed to preserve a rare population of large flowered forms of *Rhododendron calendulaceum* found on Hooper Bald, a mountaintop in the Southern Appalachians in North Carolina. It describes various phases of the project including identification of superior plants, working with the U. S. Forest Service to remove competing vegetation, hand pollinating selected forms to produce seed, and replanting seedlings back into the wild. We hope this project can serve as a model for other groups who have similar concerns about threatened rhododendron populations in the wild.

Introduction

The Red List of Rhododendrons [1] indicated that approximately one fourth of all rhododendron species are threatened with extinction. They identify 317 species at risk, and 76 of them are critical. We must be proactive to protect rare plants.

Other rhododendron species deserve our attention, too. Even *R. calendulaceum* that is so abundant and widespread in the Southern Appalachians concerns some of us. It is not that the entire species is at risk, but rare forms and isolated populations with unique qualities can be lost if we are not careful. They need our stewardship, too.

The stands of *R. calendulaceum* and other native azaleas that adorn the open balds of the Southern Appalachians are spectacular. The origin of the balds is not clear but we do know that they are not permanent. The mountains are not high enough to have a timberline, so these open areas will eventually transition back to forest. As competition and shade alter the growing conditions on the balds, not only will the scenic views be lost, but so will their rich botanical diversity. National Park and National Forest employees, often working with volunteer groups, are able to keep forests from reclaiming many popular areas like Gregory Bald and the Appalachian Trail through the Roan Highlands. However, other balds are not so fortunate and they are quickly becoming reforested.

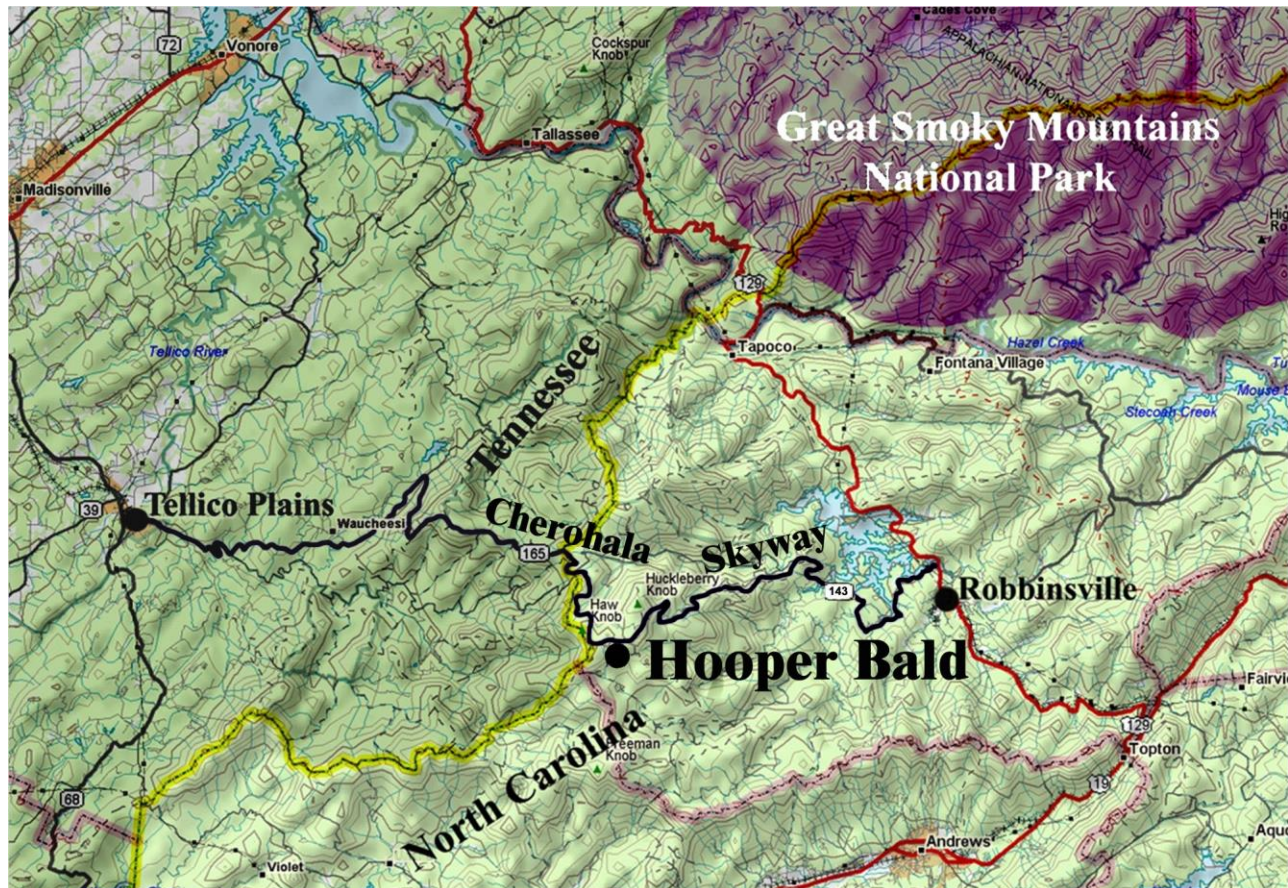
Documenting Species Diversity

In 1989, the Middle Atlantic Chapter of the American Rhododendron Society (MAC) formed a Species Study Group designed to focus attention on the full range of rhododendron species, most of which will not grow in our area. After studying materials provided by the American Rhododendron Society, the group continued to discuss botanical topics and became more focused on rhododendron species native to the Eastern United States. Soon we were making field trips into the wild to observe and photograph our own native rhododendron species.

We quickly learned that a single specimen does not represent the full spectrum of flower and form that exists in nature. In June of 1995, George McLellan, chair the MAC Species Study Group, organized a week-long trip to prime spots in the Southern Appalachians where many of our native azaleas and rhododendrons grow. We wanted to photograph the species in a natural setting and document the natural variations. We have continued these field trips nearly every year since that initial encounter.



Rhododendron calendulaceum is abundant in many open balds of the Southern Appalachians.



Cherokee Skyway at Hooper Bald

In addition to Roan Mountain and Gregory Bald, one of our destinations was Hooper Bald (elevation 5,429 ft/1,655 m), an open mountain top south of the Great Smoky Mountains National Park. On the border of North Carolina and Tennessee, that region was fairly remote and hard to reach until the completion of a new scenic byway called the Cherokee Skyway which had just been opened and dedicated that year. The road traverses high mountain ridges in the Nantahala National Forest near Robbinsville, NC, through in the Cherokee National Forest to Tellico Plains, TN.

Hooper Bald is now very easy to access. From a parking area on the Cherokee Skyway, a short gravel path (0.5 mi/800 m) leads to the opening of the bald. Most of the azaleas are *R. calendulaceum* and grow to the left of the opening. Some of those plants have the largest flowers we have ever observed in the wild. Individual blossoms can measure more than 3 inches (8 cm) across. A few azaleas have yellow to gold flowers, and one is salmon pink, but most are in the orange to orange-red color range. There are also some outstanding reds in that population, and red forms of *R. calendulaceum* are rather rare in the wild. We have identified and photographed many superior plants, and labeled some with numbers. We often refer to our favorites by name.

Some *R. calendulaceum* Selections on Hooper Bald



FS-11-17



FS-11-20



"Best Red"



"Best Red"



FS-11-07



"Salmon Pink"



FS-11-11



FS-11-19

At one time, Hooper Bald was an expansive grassy meadow bordered in places by stands of *R. calendulaceum*. The bald still has open areas but the regions where the azaleas are located were getting overgrown. We didn't visit the bald every year since there are many other places in the Southern Appalachians to explore. However, after several return trips during a period of about 10 years, we became concerned about the survival of some of the more spectacular plants growing there. The azaleas were being engulfed by a thicket of small trees and shrubs growing about them, and were in obvious decline.

The azalea on Hooper Bald that attracted most attention is one we called 'Hooper's Copper'. It had huge blossoms that could reach 3.5 inches (8.9 cm) in diameter. The flowers open a bright gold color but quickly change to a deep coppery orange as they age. The plant was growing in a tangle of brush in a shaded corner of the bald, and was entwined with a rather ordinary azalea in front. With more light, that azalea became more vigorous, so 'Hooper's Copper' was threatened not only by nearby trees but by one of its own kind.

At first, we tried to break off branches of encroaching vegetation to keep plants from competing with 'Hooper's Copper'. It did help, but in 2004, MAC member Jim Brant decided to organize a formal Hooper Bald Project. Jim and George McLellan met with the chief botanist for the Nantahala National Forest, Dr. Duke Rankin, and wanted to know if the Forest Service would allow the ARS to do something more robust to protect the rare azaleas on Hooper Bald.

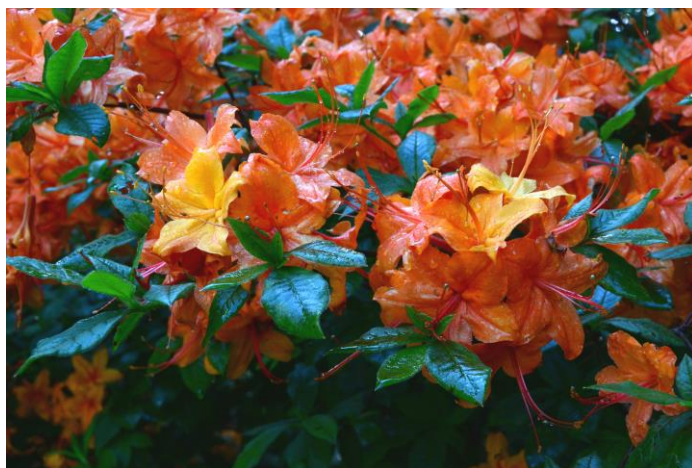
Dr. Rankin was very supportive. He explained federal policies and arranged meetings with other parties to make us aware of the delicate and complex ecosystem on Hooper Bald. It had other endangered residents besides the azaleas, such as a rare population of the Northern Flying Squirrel, *Glaucomys sabrinus*. That animal requires specific plants for its survival including the Yellow Birch (*Betula alleghaniensis*) and Red Spruce (*Picea rubens*). We needed to be sure we did not remove plants and trees that the squirrels needed. Naturally,



Many azaleas on the bald were becoming threatened as the open areas transitioned to forest.



In 2004, Jim Brant (left) and George McLellan (right) stand beside the azalea we call 'Hooper's Copper'.



The huge blossoms of 'Hooper's Copper' open golden yellow but soon turn to a dark coppery orange as they age.

we had guidelines to follow and needed to be careful about botanical sanitation so as not to introduce alien weed seeds, especially if we used mowing equipment. Without his trust and guidance, we would not have been able to accomplish anything substantial. We were ready to go, and the renovation of Hooper Bald became a chapter project.

Phase 1: Remove Competing Vegetation

The first phase required the removal of competing trees and shrubs encroaching on existing azaleas. Some did question why we chose a site so far away from home since Hooper Bald is located at least 500 to 600 miles (800 to 960 km) away from where we live. It usually takes a day's travel by car just to get there. We chose this bald because of the urgent need to save some very rare plants.

We tried to arrange at least three work sessions each year. Jim and George have been able to get some other groups who live closer involved at times including members of the Azalea Society, other ARS Chapters, the Sierra Club, local residents, and even some Boy Scouts. When visitors join us on our annual hikes like RSF President Mike Stewart and his wife Maria did in June of 2009, they are always very willing to help us clear brush around the azaleas.

The first cleanup session of the year and probably the most productive is usually held in late March or early April when plants are dormant. It is easier for people to see the structure of the plants and their relationship to the bald. We can identify other areas that are overgrown and might contain azaleas that need attention. Sometimes it is hard to tell a dormant deciduous azalea without flower buds from some other deciduous shrubs, but we usually tried to label the azaleas with ribbons during the growing season to be sure they were not cut down by mistake.

The second session is usually held in June when the azaleas are in bloom. It is a wonderful time to admire the flowers, but a good time to do additional pruning, especially unwanted vegetation regenerating from the stumps. We look for plants that may have been shaded out but are blooming for the first time, and we can also identify other places to focus on later.



Checking on the azaleas. Brush pile from earlier clearing to the right.



Mike and Maria Stewart help trim brush around the azaleas.

An Azalea Responds to Bald Renovation



2008: FS-11-20 is getting overgrown



2011: FS-11-20 is recovering



2013: FS-11-20 puts on a show

A final session is usually held in the fall, preferably in early October. At that time of year, the region is usually experiencing peak fall color which is an additional attraction. That is also when some of us try to collect rhododendron and native azalea seed for the various seed exchanges. It does give us an opportunity to check on the bud set of plants we want to be sure to see the next season.

The Forest Service erected a very nice sign at the parking area paying tribute to the Middle Atlantic Chapter ARS and this project. By focusing our efforts on Hooper Bald over a number of years, we do have a great feeling of accomplishment when we see how well the azaleas have responded to the clearing we have done. The images to the left illustrate how one plant, an orange-red selection we have labeled FS-11-20, has rebounded over a 5 year period. In 2008, it was rapidly being overtaken by trees and other shrubs. By 2011, it was beginning to fill out and by 2013, the plant was spectacular.

Every spring, it is exciting to see plants that are blooming for the first time in areas that we have recently cleared. We were ecstatic in 2012 when we indentified a plant with huge deep red flowers and wondered if it was an azalea we admired in 2000 that we had not seen since. We have not tagged or numbered this plant because we hesitate to draw attention to it. We just refer to it as "Best Red". It truly is the best red form of *R. calendulaceum* on Hooper Bald, or any other location we have ever seen for that matter. The plant, nearly 10 ft. tall (3 m), was in dense shade and consisted of three spindly branches originating from a single crown. The azalea still has much recovery to do but looks better each year. We can only imagine the show it will put on when it fully recovers. We have hand pollinated its flowers and now have vigorous seedlings on the way. Some have red new leaves and all have bright red fall foliage. None have bloomed yet, but we have no doubt they will have red flowers!

We are certainly not done yet. There are other areas that we need to clear and some may hold other treasures. We also need to keep places we have cleared from reverting back to their former state. In the long term, we want to get local volunteers involved in helping to maintain the bald. Of course, there are other rhododendron populations that could use assistance, too.

Phase 2: Preserve Genetic Diversity

The first phase of our project was to rescue some rare plants so they would not become overgrown. The next stage was to find other ways to preserve the unique genetic diversity that exists on that bald. We have been collecting and sharing seed with many groups, but one concept was to plant seedlings back into the wild from the best plants on Hooper Bald. They could serve as a backup should something happen to the original site. We got permission from Dr. Rankin to put seedlings on nearby Huckleberry and Oak Knobs. They had a few azaleas, but certainly not the quality of the plants we had identified on Hooper Bald.

In 2010, we planted a test plot of 30 two-year old azaleas on Oak Knob. We tried various planting techniques including pruning back in the fall, or the spring, or not pruned at all. We also provided some with slow release fertilizer in the planting hole and others not. Surprisingly, all the plants survived the winter and leafed out well the next year. By the end of the growing season, we could see no noticeable differences between any of them.

Encouraged by test plot results, Jim set the date for our “Great Azalea Planting”, the Columbus Day weekend of October 8-10, 2011. In 2009, we had provided open pollinated seed to the Southern Highlands Reserve, a non-profit organization whose mission is to preserve the flora of the Blue Ridge. Located not far from Hooper Bald at Lake Toxaway, NC, they had offered to raise 800 seedlings at no charge for our project. They delivered 800 native azaleas that weekend and we had helpers from seven states and the District of Columbia, and even a nearby troop of Boy Scouts ready to plant.

The only problem was that the seedlings were small, comparable to 1-year old plant, and many pots had multiple seedlings in them, but we planted them anyway. We estimated that 70% of the seedlings survived the winter and grew the next season, but the following year, most of them got lost in the tall grass and weeds. Some may still be alive but we are doubtful.



Boy Scouts help plant azaleas on Oak Knob in the first planting in October 2011.



Most of the one-year old seedlings (left) set out in 2011 did not survive, but the two-year seedlings (right) used in 2010 and 2014 have done very well.



Flat of azaleas to be used in second planting and coconut fiber disk used to help deter weeds.

The Second Planting



George McLellan cuts the grass very close to the ground with a weed eater before we plant.



Karel Bernady digs a wide hole for the plant and carefully prepare the soil before planting.



The planted azalea has a Coco Disk weed barrier positioned around it and a rock to protect from wind.

Not discouraged, we decided to try a second planting. Some of the finest plants on the bald were reluctant to set seed and since we wanted to be sure to focus on those, we started hand pollinating (selfing) those plants. Planting open pollinated seed from the wild is great for maintaining genetic diversity, but planting seed from hand pollinated crosses of selected clones would ensure that genes from those superior forms will be replicated and preserved. ‘Hooper’s Copper’ was always reluctant to set seed on its own but when hand pollinated its flowers, we got abundant seed. We now had seed of “Best Red” to use as well.

This time, J. Jackson and his wife Lindy Johnson of Appalachian Native Plants offered to grow the seedlings. For seed sources, we used the two best azalea forms on the bald, ‘Hooper’s Copper’ and “Best Red’. They donated many flats of robust two-year old seedlings in quart pots to our cause, and also gave us some biodegradable coconut fiber disks called Coco Disks™ that we could put around each plant. It would reduce competition from weeds and grass while the plants established.

We were ready set to plant another 200 seedlings again in the fall of 2013 and in the same areas as before, but due to a government shutdown, we were not allowed into the National Forest. We had to delay planting until March of 2014. In the fall of 2014, we set out an additional 100 plants.

We devised a different procedure this time to help give the plants an upper hand against weed competition. First, we used a weed eater to cut grass in the region back to soil level in the spot where we intended to put an azalea. We dug a large hole, broke up the soil clumps with our hands, and shook all the dirt off of the sod clumps. Then we disturbed the root system of the seedling slightly so it would more easily contact the soil. We planted the azalea and placed one of the Coco Disk™ weed barriers around each plant. When possible, we would try to place a rock on the disk to keep it from blowing away in strong winds, and we also placed the sod clumps upside down with roots exposed for additional mulch. Because of the remote location, we could not water the azaleas after planting, but the soil was moist from prior rains and

more rain was due. We let nature take full control after that. Fortunately, in a normal year those mountain areas get significant rainfall, usually from 50 to 80 inches (127 to 203 cm) or more annually. There should be no need for supplemental watering.

The results of the March 2014 planting were very promising, except for a few plants that were damaged by a late freeze. Some had broken dormancy prior to planting and they were more vulnerable to

late frosts. The azaleas set out in the fall of 2014 came through the winter well. Plants on Hooper Bald were growing vigorously in June of 2015, but the ones in the meadow on Oak Knob where there had been no *R. calendulaceum* before showed signs of deer browsing. We are now considering ways to remedy that problem until they become established.

Conclusions

There is much variation in wild rhododendron populations. Even when a species is not threatened with extinction, it is important to identify the rare and superior forms that exist in nature and find ways to preserve them.

We are pleased and honored to have been involved in the restoration of Hooper Bald. Some rhododendron populations are difficult to reach, but Hooper Bald has relatively easy access so we feel it can become an excellent place for people to appreciate one of our most spectacular native azalea species, *Rhododendron calendulaceum*. We hope local groups will adopt this scenic location for continued preservation efforts in order to assure that the rich botanical resources on this mountain can be appreciated by future generations.

We encourage others to use Hooper Bald as a model as to what can be done when concerned individuals, plant societies, and public officials work together to preserve endangered plant communities.

Acknowledgements

We owe Dr. Duke Rankin our sincerest gratitude for his assistance in this project. Without his trust and guidance, members of the MAC Species Study Group would never have been able to attempt a formal project to help restore the native azalea population on Hooper Bald. He assisted onsite during the initial phases of this project, but we so miss seeing him regularly now since he no longer represents just the Nantahala National Forest. He has moved to Atlanta to serve as Program Leader for Threatened and Endangered Species in the U.S. Forest Service for the entire Southern Region. We wish him well.

We want to thank the Southern Highlands Reserve for their donation of the azalea seedlings used in the first planting. We also gratefully thank J. Jackson and Lindy Johnson of Appalachian Native Plants for generously providing robust seedlings for subsequent plantings, as well as for the weed barrier disks we used to around each plant.

Finally, we are very grateful to Jim Brant for organizing the Hooper Bald project, and for the dedicated efforts of George McLellan and all the volunteers who have helped over the years.

Bibliography

[1] Douglas Gibbs, David Chamberlain, and George Argent, The Red List of Rhododendrons, Botanic Gardens Conservation International, Richmond, UK, 2011.