

Final report for Black Rock Forest Consortium funded project
“Floristic inventory and development of monitoring programs for rare and invasive
plant species at Black Rock Forest”

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This project was initiated on 15 April 1997 and continued through the growing seasons of 1997 and 1998. Preliminary descriptions of these results can be found in the Fall/Winter 1997 Black Rock Forest Newsletter, (Vol. VII, No. 3. Page 6).

The primary goals of the project were:

1. To add to the existing floristic inventory of Black Rock Forest (BRF), specifically through surveys of unusual or unique habitats.
2. To explore the BRF property for plant species listed as rare or endangered at the state, federal, or global level.
3. To inspect the BRF for the presence and distribution of plant species with known invasive properties.

For each of these goals, a conservation and management mandate was assumed and it was a particular aim to promote the conservation value of the property.

Approximately 40 man-days were spent on the property, largely through the efforts of James (Spider) Barbour, noted expert on the botany and natural history of the Hudson Highlands. The general protocols used were 1) to inspect maps and aerial photos to identify regions of interest, and 2) to traverse and inspect as many of these sites as possible throughout the growing season. Because the summer of 1997 was rather dry and hot, we extended our surveys through the summer of the following year.

BOTANICAL SURVEYS

An initial list of approximately 575 species of plants known from the property (Barringer and Clemants, 1993) was used as a baseline for our studies. We identified another 500+ species that might possibly occur on the property based on known habitat types, range of the various species under study, the state of previous survey work, and knowledge of the general flora of the Hudson Highlands and nearby areas such as West Point. Among these potential additions, 36 species are listed as rare at the state level (Natural Heritage Program).

The results of our broad survey work include the addition of approximately 60 species new to the flora of BRF with a few collections still in need of complete identification (see attached for list of additions). Many of these species were expected and their presence at BRF is not particularly unusual or noteworthy. Nonetheless, several species present at BRF represent significant new extensions of previously known ranges.

Although our expectations were quite high that many new additions would be made to the Flora of BRF, we encountered only slightly more than 10% of the taxa on our search list. While we feel that some portions of the BRF are in need of additional survey work, we also feel that well over 90% of the species present on the property have been collected. The main reason for the relatively limited success in adding to the Flora of BRF is the comparatively low diversity of habitat types on the property.

A comparison of the Black Rock Forest with nearby areas such as the US Military Reservation at West Point, Harriman and Storm King State Parks, and regions of the Shawgunks illustrates many differences in the diversity of habitats and vegetation types present. In general, Black Rock Forest appears to be higher in elevation, drier, and possibly suffering the long-term effects of more extensive and complete habitat modification dating to the earlier years of the property's history. In all, BRF contains what might be considered a subset of habitat types present at these other localities with few or no unique habitat types present. Completely lacking are lowland riparian and tidal-influenced habitat, extensive acidic bogs, significant outcrops of limestone and other mineral types, and some types of mature forest. Some of these habitat types are missing due to human influences (the loss of some wetland types, the relatively young age of the forest, extensive areas of former farmland, etc.) while others probably never existed on the property, at least since European colonization.

While these factors may limit the nature and composition of the flora of BRF, they also provide excellent opportunities for the study of forest recovery, restoration, and management. Further study of the various factors determining or limiting the flora and vegetation of BRF will provide valuable insight into the ecology and management of the forest resources. This is particularly true in areas of more extensive impact such the reservoirs, the various plots of silvicultural experimentation, former sites of cultivation, and portions of BRF experiencing more recent disturbance such as fire and construction.

RARE AND ENDANGERED PLANT TAXA

Of the approximately 60 additions to the Flora of BRF, 9 positively identified species are state-listed taxa. These are (with Natural Heritage Program ranking):

Aster schreberi (S3W)
Carex seorsa (S2)
Corydalis flavula (S3)
Cunila origanoides (S3S3)
Lespedeza violacea (S2)
Ranunculus micrantha (S1S2)
Hottonia inflata (S1)
Aster pilosus var. *pringlei* (S1)
Aristolochia serpentaria (S1)

No single habitat type was responsible for a majority of the taxa as some were found in moist forested sites (*Aster schreberi* aquatic habitats (*Carex seorsa* and *Hottonia inflata*),

rocky outcrops with high iron content (*Cunila origanoides*), and relatively dry, rocky, outcrops with fire histories (*Corydalis flavula*, *Lespedeza violacea*, *Ranunculus micrantha*).

The forest dwellers will probably continue to exist in reasonable numbers assuming that forest cover is not extensively lost through fire or other disturbance. The iron-rich outcrop is a relatively unique habitat type and the species growing there (*Cunila origanoides*) is actually growing in a road cut with evidence of dumping (numerous deer heads and a ceramic sink were noted at the site). The aquatics will probably persist as long as the aquatic systems are allowed to continue in a relatively untouched fashion although prolonged periods of drought or other disruption might compromise their existence. The species found on the rocky outcrops are probably the only significant management concern. Our impression is that occasional fires clear the grasses and woody plants that take hold and come to dominate these sites in the absence of fires. With fire prevention programs in place, the rare species are probably suppressed in numbers and distribution. Persistent seed banks are evident, however, as some of these species respond very well to the biomass clearing effects of ground fires. We strongly suggest that some of these sites be considered for managed fire treatment to encourage the growth and reproduction of the rare plant species dependent upon open rocky outcrops.

A particularly interesting find that occurred during the second summer of inventory work was that of *Aristolochia serpentaria*, the Virginia Snakeroot. This species, distributed from New York to Georgia, had not been collected in New York State for almost 100 years. Based on inspection of specific habitat types in the southeastern corner of the forest, a population of approximately 75 individuals was discovered (see BRF Newsletter, Fall 1998, Vol. VIII, No. 2, p 6). This population, which included several individuals with mature fruit, is by far the largest known population of the species in New York State. Continued monitoring of the species as well as an examination of its largely unknown pollination biology would be of paramount importance.

INVASIVE PLANT TAXA

Many of the existing habitat types are non-natural or present strong indications of persistent effects of human-mediated disturbance. For example, the aquatic systems on the property are largely composed of impoundments built for the water supply of nearby Cornwall, NY. In addition to the extensive to complete modification of the aquatic systems that existed before impoundment, these reservoirs also influence existing habitats via changes in run off, erosion, and lakeside dynamics. As a result, what would normally harbor extensive stream or marsh vegetation has been mostly converted to comparatively low diversity artificial ponds. The extensive changes in water level do not permit the establishment of comparatively natural vegetation along the banks of these reservoirs and the resultant plant species diversity remains relatively low. Further complicating the loss of diversity is the establishment and success of aggressive invasive aquatic plant species such as Purple Loosestrife (*Lythrum salicaria*), Japanese Knotweed (*Polygonum cuspidatum*), and, in a few spots, the Common Reed (*Phragmites australis*).

Many areas of the property show persistent effects of previous human activities (direct or indirect). Old farm plots are still clearly visible in many sections of the forest and are easily identified by the presence of indicator species such as Cedar (*Juniperus virginiana*), invasive or weedy taxa such as Japanese Barberry (*Berberis thunbergii*) and Garlic Mustard (*Alliaria petiolata*) as well as feral cultivars such as apples (*Malus spp.*) and exotic pines. Because most of these taxa do not successfully compete in areas that are comparatively untouched or that possess advanced successional stages or seres, the chance of these taxa becoming threats outside of long-disturbed areas is relatively minor.

We also identified some invasive taxa such as Japanese Stiltgrass (*Microstegium vimineum*) along several of the roads in the forest. Since the majority of invasives will be brought in via such roads, we urge continued monitoring of these localities and of the road system in general.

SUMMARY

The results of our research suggest that the vascular flora of Black Rock Forest has been well surveyed and that at least 90% of the existing flora has been documented. Further search for additional taxa and rare species will probably produce results but such survey work should be focused on relatively underrepresented habitat types such as along Mineral Spring Creek. The physical nature of the forest property and the history of forest use provide interesting opportunities for the study of forest regeneration but also limit the composition of the forest flora. We encourage active management of the property to maintain populations of some of the rare plant species and to monitor the growth and abundance of some of the more aggressive invasive plant taxa.