

**Burned Area Emergency Rehabilitation
Monitoring and Treatment of Nonnative Invasive Vegetation**

Great Smoky Mountains National Park

2002-2004

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BACKGROUND

The National Park Service has placed priority on the removal of invasive non-native species. These nonnative, or exotic species are of concern because they are typically fast growing, early successional species, prolific seed producers and lack natural control agents present in their native range. These characteristics of the exotic plants enable them to out-compete native species on newly disturbed sites. Spread of these species is common along corridors and in areas of disturbance such as those at the interface between Park property and private landholdings bordering the park. Except for some shade tolerant species, exotics are typically not a problem in closed canopy forests found within the interior of the park. However, major disturbances, like fire, can create the avenue for exotics to take hold, where otherwise the seeds would not be likely to germinate. Nonnative plants become more prevalent in fire sites due to removal of duff and litter layers, and creation of open areas where these species can easily take hold and out-compete the native species. Some of the more common invasive nonnative species found within Great Smoky Mountains National Park fire sites include Royal Paulownia or Princess Tree (*Paulownia tomentosa*), Common Mullein (*Verbascum thapsus*), and Mimosa (*Albizia julibrissin*).

The fall of 2001 was an active fire season in the park due to a usually large number of arson set fires. Two of these fires presented more concern than others because of their location, size and intensity. The Green Mountain fire started on adjacent USFS land on November 10th and spread onto Foothills Parkway land near Cosby, TN, burning approximately 2350 acres, 153 of which was NPS acreage (Attachment 1). This acreage was parallel to the Foothills Parkway and spread over several miles, ranging in width from 50 meters to 500 meters. The area contained a mature mixed pine hardwood forest with mountain laurel and rhododendron understory. The fire was contained on three sides by roadways and on the fourth by a creek drainage. The Green Mountain fire perimeter borders NPS, USFS, Interstate 40, and private property. Nonnative seed sources existed along these corridors prior to the fire. However, due to the closed canopy, seed establishment has been limited. The roadside areas along the Foothills Parkway have been intensively managed for over a decade for these nonnative species. In addition, in 1990, the Rabbit fire burned approximately 25 acres within the 2001 Green Mountain fire boundary. This area was monitored and treated for Paulownia for several years following the Rabbit fire.

The Sharp fire was also started by an arsonist on November 10th, in the Bryson City, NC area of the park, and is located between Noland Creek and Deep Creek. The fire burned 7580 acres, with approximately 100 acres being on private land used for the Bryson City Reservoir (Attachment 2). The fire extended to the interior of the park primarily along Noland Divide and adjoining spur ridges. This area transitions from mixed pine hardwood forest on the ridgelines to cove hardwood forest in the drainages, both with an understory of mountain laurel and rhododendron. Some scattered pockets of Southern Pine Beetle kill were present along ridge lines and higher elevations of drainages. The fire ranged in elevation from 2000' to 4600', covered all aspects and a range of slopes. Due to this variety several smaller habitats occur within the overall mixed hardwood and cove hardwood forests. The fire was contained by a park maintained trail to the north, creeks on two sides, and by handline on the south. Nonnative seed sources were present prior to the fire along the southern fire perimeter in areas adjoining private property, but due to the closed canopy, seed establishment was limited. The park has managed

nonnative plants in the Deep Creek area for over 40 years, especially the developed campground, along Lakeshore Drive at old home sites, and along the creek corridors.

The fiscal year 2002 to 2004 project was funded by Burned Area Emergency Rehabilitation (BAER) funding. The purpose of this project was to survey and treat the two above named fire sites for invasive nonnative species.

METHODS

SCOUTING - Green Mountain Fire

Survey and treatment logistics were relatively simple, since park property is narrow and adjoining the road. The fire was scouted in sections, starting and ending each section at obvious natural barriers. The sections were scouted by gridding with three or four personnel walking individual transects parallel to the roadway and to each other. Spacing of transects varied from five to twenty meters, depending on vegetation density to allow for visual contact between personnel. Personnel continued to walk transects until all areas between the roadway and the park boundary were scouted.

SCOUTING – Sharp Fire

The vast area, limited number of personnel, and time constraints did not allow for complete coverage of the Sharp Fire. Sites were selected for scouting based on personal communications and extrapolating information through topographic maps of the fire. Efforts were focused on ridgelines, areas of Southern Pine Beetle kill, and along southern aspects. Using a computer based topographic map, specific coordinates of such areas were loaded into a GPS unit to aid in land navigation. The fire was broken into smaller topographic sections and scouted by two to four personnel walking transects through these areas. While scouting, coordinates were recorded from a GPS of areas scouted, the fire edge, and nonnative species locations (Attachment 2).

TREATMENT

As nonnative species were found they were hand pulled out of the ground with their root system. Once the root system was removed, the plant was hung upside down in surrounding vegetation to prevent the possibility of rerooting. If the nonnative species were too large to remove the entire tap root the stem was cut and the stump was sprayed to saturation with 50% Accord. On the Sharp Fire, due to the vast area, and for future monitoring, coordinates were collected with a GPS when nonnative species were located.

RESULTS

Green Mountain Fire

The primary exotics found where Royal Paulownia, distributed evenly throughout the interior of the fire and Common Mullein limited to the roadside perimeter of the fire. Mimosa was also found in much smaller quantities (Table 1). Higher densities of exotics were not found until the second year of scouting.

Sharp Fire

The primary exotic found in the southern portion of the fire site was Royal Paulownia along ridgelines, areas of Southern Pine Beetle kill, and intensely burned slopes where the majority of the canopy was removed (Table 1). Higher densities of Royal Paulownia were not found until the second year of scouting. The greatest density of Royal Paulownia was in the Lands Creek area, adjacent to private property. A few Royal Paulownia were also found along the Deep Creek stream corridor (Attachment 2). Areas that burned more intensely and have no canopy cover continue to support Royal Paulownia annual germination of seedlings, whereas areas that burned intensely and have canopy cover have fewer first year seedlings. The ridgelines immediately west of Deep Creek support moderate populations of Royal Paulownia despite a low intensity burn and a primarily closed canopy. Seedlings of up to two years in age were much easier to pull and get the entire root system. Most older trees had to be cut and stump treated. The only seed tree found within park boundaries was directly across Deep Creek from the Sharp Fire. Some incidental Common Mullein were killed along the fire perimeter.

TABLE 1

Nonnative Species	Green Mountain Fire (153 Scouted Acres)			Sharp Fire (2155 Scouted Acres)		
	Treatment Method		Total Personnel Hours	Treatment Method		Total Personnel Hours
	# Pulled	# Cut and Stump Treated		# Pulled	# Cut and Stump Treated	
Royal Paulownia (<i>Paulownia Tomentosa</i>)	237	528	104.5	250	74	646
Common Mullein	116	--	7.5	2	--	.5
Mimosa	--	1	.5	--	--	--

DISCUSSION

Green Mountain Fire

Royal Paulownia is likely the most prevalent exotic present due to the proximity of abundant seed sources land outside the park. Common Mullein was frequently a problem closest to the roadway because of its presence along the Foothills Parkway and Interstate 40 corridors prior to the fire.

Although the site was thoroughly scouted and treated, seed sources are still in place and site conditions are still favorable for seed germination. Therefore, there is a need for future monitoring.

Sharp Fire

Royal Paulownia is likely the most prevalent exotic present due to the proximity of abundant seed sources in bordering areas. While areas of similar fire intensity and regeneration showed very minimal exotics, Lands Creek had a higher density of Royal Paulownia likely due to the proximity of seed sources on the adjacent private property. In addition, the prevailing winds are likely carrying seeds up the Deep Creek drainage, allowing areas of less intensity burn to be colonized with Royal Paulownia.

Although the fire site was scouted along transects in areas where exotics were likely, it was nearly impossible to locate all exotics due to the size, difficult terrain, and dense vegetation. Scouting of potentially infested areas was prohibitive due to steep, loose rocky slopes with extremely poor footing, numerous stinging insect nests, and impenetrably dense regeneration. The small seedlings easily go unnoticed in thicker, steeper, hard to navigate areas. Until these seedlings grow to a height where they can be seen they will continue to be overlooked.

Time constraints and site conditions did not allow for the entire area to be scouted. In addition, seed sources are still in place and site conditions are still favorable for seed germination. Therefore, additional monitoring is needed to survey the remainder of the fire as well as revisit areas with Royal Paulownia. Future efforts will require a greater number of personnel and more time.