Buttermilk Hill-Talbott Hollow Blowdown Project
Botany Biological Evaluation
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I. Introduction

The Forest Service has established direction in the Forest Service Manual to guide habitat management for Proposed, Endangered, Threatened, and Sensitive plant species. The direction establishes the process, objectives, and standards for conducting a Biological Evaluation (BE). This process ensures that these species receive full consideration in the decision making process.

The purpose of this BE is to review the Buttermilk Hill / Talbott Hollow Blowdown Project to determine whether the project may impact Threatened, Endangered, Proposed or Sensitive plant species or their habitats. This document tiers to the 2006 Final Environmental Impact Statement (FEIS) for the Land and Resource Management Plan for the Shawnee National Forest.

II. Project Description

One purpose of the Buttermilk Hill / Talbott Hollow Blowdown Project is to reduce current fuel loadings to decrease the intensity and severity of potential wildfires. Another purpose is to enhance the native hardwood forest ecosystem. Prescribed fire on Forest lands and portions of adjacent private lands is proposed (about 5600 acres). The proposed action would take place over the next ten years. Refer to the Environmental Assessment for the Buttermilk Hill / Talbott Hollow Blowdown Project for a more detailed description of the purpose and need for action, and the proposal.

III. Area Affected

The project area falls entirely within the Greater Shawnee Hills Section of the Shawnee Hills Natural Division. The Shawnee Hills Natural Division extends across the southern tip of Illinois. The unglaciated hill country is characterized by an east-west escarpment of sandstone cliffs and a series of lower hills. Topography of the Greater Shawnee Hills Section is characterized by broad ridgetops bearing deep loess deposits dissected by moderately steep side slopes opening onto broad flat valleys. Originally, the Shawnee Hills Natural Division was mostly forested, and is presently the most heavily forested of Illinois' Natural Divisions. The Shawnee Hills hosts outstanding biodiversity (Thompson 2004 and http://www.dnr.state.il.us/ORC/WildlifeResources/theplan/mapfiles/divisions.htm.)

Most of the Shawnee Hills at the time of settlement supported forest, and considerable land remains timbered. Most of the upland forests are dominated by white oak, black oak, and shagbark hickory with post oak, blackjack oak, scarlet oak, and pignut hickory on dry sites. Deep mesic ravines have a forest community of red oak, beech, tuliptree, bitternut hickory, sugar maple, and white ash with the occasional black walnut, butternut, Ohio buckeye, and basswood. The floodplain forests also contain sycamore, Kentucky coffeetree, sugarberry, and honey locust (Mohlenbrock 2002).

Pre-European settlement forests of this region were dominated by xerophytic species such as post oak, black oak, white oak, and northern red oak; mesophytic species such as tulip-poplar, American beech and sugar maple had low importance values across most sites. Of particular interest were the open savanna woodlands on exposed south-southwestern facing ridges maintained by recurring fire and intermittent droughts. At presettlement, a matrix of small isolated patches of post oak, chestnut oak, and eastern redcedar woodlands was found on uniquely xeric, edaphic sites within the surrounding oak-hickory forest. The open canopy structure of these xeric woodlands was probably maintained by recurring fire across this region resulting from Native American burning and lightning fires (Thompson 2004).

Following European settlement, the number of fires increased in the forests as did selective cutting and clearcutting of forested areas. By the early 1910's, long term harvesting and poor farming practices on highly erodable lands caused many farmers to abandon their farms. By the mid-1920s, timber quality had been reduced to the point that low value outputs were the only viable products (Thompson 2004).

Stands disturbed during the early 20th century by harvesting, fire, or grazing are 58 to 84 percent similar to presettlement oak hickory forests (Thompson 2004). However, the reduction of harvesting and the eventual near removal of fire from the landscape during the 20th century have caused a shift in importance particularly across northern aspects and low slope positions. Reduced disturbances have resulted in a distinct increase in sugar maple and American beech recruitment into the midstory and understory (Thompson 2004).

IV. Species Considered and Evaluated

Federally listed plant species:

The Illinois Endangered and Threatened Species list is provided by the Illinois Endangered Species Protection Board. The Board revises the list of protected species every five years and completed its most recent revisions in 2004 (http://dnr.state.il.us/espb/datelist.htm). This list includes Federally Endangered and Threatened Species listed by the U.S. Fish and Wildlife Service (USFWS) and those species proposed for listing. No Federally Endangered, Threatened or Proposed plant species are known to occur in Jackson County or within the Buttermilk Hill/ Talbott Hollow Blowdown project area.

Region 9 Sensitive plant species and other species of viability concern:

The Region 9 Sensitive species list was signed by the Regional Forester on October 5, 2006. The list was updated on January 10, 2007 (USDA 2007). Other species of viability concern are designated in the Forest Plan. The process used to identify other species of viability concern is described in Appendix F of the Final Environmental Impact Statement for the Land and Resource Management Plan. Table 1 contains the current R9 Sensitive plant species and other species of viability concern known to occur in Jackson County, Illinois, their habitats, and whether or not the species is known to be present in the project area; or suitable habitat for the species may be present in the project area. R9 plant species' habitats and other species of viability concern habitats were addressed when there was a recent reliable record of their presence and when there was reasonable evidence that they could occur within or near the project area. Species were excluded from further consideration in the BE if their occurrence in the project area is unlikely due to (1) unsuitable habitat conditions, (2) having no known populations within Jackson County. These species will not be discussed further because no impacts would occur.

A review of R9 Sensitive plant species and other species of viability concern was completed by consulting with Forest Service personnel and The Illinois Department of Natural Resources, Natural Heritage Database for reports of Sensitive plant species and other species of viability concern in or near

the project area and within Jackson County. Field reconnaissance of the project area was conducted on 12/11/07 and 1/11/08. Floristic surveys were conducted within the project area on 5/23/07, 5/24/07 and 5/25/07 (Shimp 2008). Appendix A includes a list of some of the species encountered. All reliable records are considered in this Biological Evaluation.

Table 1. Regional Forester Sensitive Species (plants) and other Species of Viability Concern (plants) known to occur, or with suitable habitat in Jackson County, Illinois.

Scientific Name	Common Name	Habitat Type	Known to occur	Suitable Habitat
Asplenium bradleyi	Bradley's spleenwort	primarily on sandstone cliffs and chert outcrops	No	Possible
Asplenium resiliens	blackstem spleenwort	limestone ledges	No	Possible
Berberis Canadensis	American barberry	sandstone bluffs	No	Possible
Carex gigantea	giant sedge	floodplain forests and swamp habitats	No	No
Carex lupuliformis	false hop sedge	wet woodland and swamp habitats	No	Possible
Chelone obliqua var. *speciosa*	red turtlehead	low woods, swamp edges and wet meadows	No	Possible
Cimicifuga rubifolia (=*Actaea rubifolia*)	Appalachian bugbane	mesic woodland	No	Possible
**Cirsium carolinianum*	Soft thistle	dry, open woods	No	Possible
Cypripedium pubescens (=*parviflorum* var. *pubescens*)	greater yellow lady's slipper	dry to moist woodland	No	Possible
Dodecatheon frenchii	French's shootingstar	dripline under sandstone cliffs	No	Possible
Dryopteris goldiana	Goldie's woodfern	moist shaded woods, springy ground	No	Possible
Festuca paradoxa	clustered fescue	old fields, prairies	No	Possible
Gentiana alba	plain gentian	old fields, prairies	No	Possible
Hexalectris spicata	spiked crested coralroot	dry forest, glade, and bluff top communities	No	Possible
Hottonia inflata	American featherfoil	swamp habitats	No	No
Hydrolea uniflora	oneflower false fiddleleaf	swampy woods	No	No
Juglans cinerea	butternut	rich woods, bottomlands and floodplains	No	Possible
Lilium superbum	turk's-cap lily	mesic woods and stream banks	Yes	Yes
Lonicera dioica var. *glaucescens* (=*L. dioica*)	limber honeysuckle	north-facing sandstone ledges	No	Possible
Lonicera flava	yellow honeysuckle	forested, moist sandstone cliffs	No	Possible
Panax quinquefolius	American ginseng	rich woods and low mesic woods	No	Possible
Plantago cordata	heartleaf plantain	streambed habitats	Yes	Yes
Poa alsodes	grove bluegrass	moist woods	No	Possible
**Polytaenia nuttallii*	Nuttall's prairie parsley	mesic and dry mesic prairies	No	No
Pycnanthemum torrei	Torrey's mountainmint	dry woods, dry-mesic barrens, sandstone glade	No	Possible
Stenanthium gramineum	eastern featherbells	rich mesic floodplains	No	No
Synandra hispidula	gyandotte beauty	cool, moist, wooded ravines	No	Possible
Trifolium reflexum	buffalo clover	dry-mesic savannas, flatwoods, prairies	No	Possible
Vitis rupestris	sand grape	rocky banks and floodplain forests of the Mississippi River	No	No
* Other species of viability concern				

V. Field Reconnaissance & Project Area Assessment Information

Assessment Methodology

This project area was assessed for R9 Sensitive, other species of viability concern and non-native invasive (NNIS) plant species and habitat using a combination of in-office tools and field

reconnaissance. In-office tools utilized to determine the possibility of the existence of R9 Sensitive plants and their habitats and NNIS include Forest databases, records, the Illinois Department of Natural Resources (IDNR), Natural Heritage database records, and professional judgment. Field visits were made to the project area on several occasions to assess plant species and plant communities within the project area.

Two R9 Sensitive plant species occurring on the Shawnee National Forest, are known to occur within the project area. In the Buttermilk Hill / Talbott Hollow Blowdown project area, treatment units may contain suitable habitat for additional R9 Sensitive plant species and other species of viability concern, although none of these species have been documented in the project area. These species, along with their habitats, are listed in table 1.

VI. Effects Analysis

The following assessment is based upon pre-existing information, field reconnaissance, professional knowledge and judgment, and consultation with peers. An analysis of effects was completed for those species which could be impacted by the proposed project. Two R9 Sensitive plant species are documented as occurring within the project area: *Lilium superbum* (turk's-cap lily) and *Plantago cordata* (heartleaf plantain). Several other R9 Sensitive plant species and other species of viability concern may have suitable habitat in or near the project area (see table 1).

Region 9 Sensitive Plant Species Known to Occur in the Project Area

Lilium superbum (turk's-cap lily)

The global status for turk's-cap lily is currently G5 (Secure). This global rank reflects an assessment of the condition of the species across its entire range. It is ranked S2 (imperiled) in Illinois (NatureServe 2007) because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province. *Lilium superbum* is a Region 9 Sensitive plant species.

Species Distribution:

Lilium superbum is widespread in portions of the temperate eastern United States and it is known to occur historically in twenty-six states. The species is relatively rare in the far western, far southern, and extreme northeastern portions of its range, and becomes more common in the central Appalachian Mountains of Pennsylvania, Virginia, West Virginia and North Carolina. Its range includes both formerly glaciated and unglaciated areas. In the east-central states, the species has been found in Illinois (where it is at its northwestern range limit in the southern tip of the state) and in Indiana, Kentucky, and Missouri. Sites in Illinois are located within the Shawnee Hills Natural Division, primarily in the Greater Shawnee Hills Section but also in the Lesser Shawnee Hills Section of Illinois (Hill 2007). There is an intermittent stream in the project area where this species was recently documented (Shimp 2008b).

Habitat: The turk's-cap lily has been given a national wetland indicator status of FACW or FACW+, indicating that the species usually, but not always, occurs in wetlands (estimated probability 67%-99%). *Lilium superbum* grows mainly in level wet meadows and swampy woodlands, though it can be found in some drier, sloping sites as well. This species tends to flower only in more open areas, and sterile stems, usually much shorter than flowering stems, predominate in more shaded habitats (Hill 2007). In Illinois, the turk's-cap lily grows in "low, moist woodlands" [mesic forest] and stream banks in the extreme southern tip of the state (Mohlenbrock 2002). The population documented within the project area occurs on the banks of an intermittent stream. The surrounding area is forested allowing

dappled light to reach the population. Indications are that the population does not flower and could benefit from increased sunlight to the site (Shimp 2008b).

***Plantago cordata* (heartleaf plantain)**
The rounded global status for heartleaf plantain is currently G4 (Apparently Secure). This global rank reflects an assessment of the condition of the species across its entire range. It is ranked S1 (critically imperiled) in Illinois (NatureServe 2007) because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province. *Plantago cordata* is a Region 9 Sensitive plant species.

Species Distribution:
Heartleaf plantain is known from the eastern and central United States and Ontario, Canada. It is historically documented in 20 states and Ontario, Canada, but is possibly extirpated in Iowa, Kentucky, Virginia, Maryland, District of Columbia, and Florida (NatureServe 2007). In southern Illinois it is known from Jackson, Johnson, Pope, and Saline counties (USDA 2006b). There is a documented occurrence within the Buttermilk Hill / Talbott Hollow Blowdown project area (Illinois Department of Natural Resources).

Habitat: Heartleaf plantain has been given a national wetland indicator status of OBL, indicating that the species occurs almost always in wetlands under natural conditions. Overall this semi-aquatic plant has a very narrow habitat preference. These habitats include the margins and beds of clear, clean water running streams in forested areas, generally on silt-free gravelly or rocky bars in these stream beds, as well as on their muddy floodplains. Heartleaf plantain grows mainly in level, wet, clear-running stream beds especially in areas of dolomitic limestone, running through heavily wooded areas. The soils where the heartleaf plantain grows are normally wet and alkaline to circumneutral and they are associated with basic rock or pebble substrates. It is generally reported that the heartleaf plantain usually occurs ins and or gravel bars of shallow, clear-water streams under a forest canopy. The stream beds at sites in Illinois are composed of neutral to basic gravelly outwash, sandstone rubble, or they are sandy-bottomed (Hill 2007b).

It is only very rarely found growing in full sun. It appears to be most common in the moderate and mesic climates of the topographically diverse Ozarks, in the moderate climates near the Great Lakes, and in the Hudson Valley of New York (Hill 2007b) .

<u>Alternative 1</u>
Alternative 1 is the No Action Alternative. Under Alternative 1, none of the proposed treatments would occur. Analysis of Alternative 1 is conducted for all R9 Sensitive plant species that may potentially inhabit or are known to occur in the project area since the effects of Alternative 1 on all evaluated R9 Sensitive plant species and their habitats are expected to be similar.

Direct Effects:
Since none of the proposed treatments would occur, there will be no direct impacts to R9 plant species and their habitats under the No-Action Alternative and current habitat conditions would remain relatively unchanged over the next 10 years or the life of the Buttermilk Hill Talbott Hollow Blowdown Project.

Indirect and Cumulative Effects:
The cumulative effects area for R9 Sensitive plant species known to occur and with suitable habitat but no known occurrences in the project area is the project boundary. This is the spacial extent to which

effects are likely to occur. The project is temporally bound by 15 years corresponding to the Forest Plan implementation period. This time frame is sufficient to gauge the effects of management on plant species. Soil disturbance, introduction and spread of invasive species, habitat changes due to succession, and changes in microsite moisture and hydrologic regimes can negatively affect Sensitive plant species and their habitats. Taking into account all present, past, and reasonably foreseeable future actions in or immediately adjacent to the project area including agriculture, timber harvest, timber stand improvement, residential developments, prescribed burning, wildfire, NNIS treatments (pulling, cutting, torching, herbicides), road and trail construction and maintenance, and recreational use; the following would be the cumulative effects of the planned actions for this project.

Over the long term, under Alternative 1, indirect and cumulative effects are expected to include continued changes in forest type due to succession and lack of fire on the landscape. Maintaining the oak-hickory forest type based on the historic range of variability is important for plant species and habitat diversity. Succession would continue to cause an increase in mesophytic species at the expense of the oak-hickory type since these species are not able to compete with faster growing shade tolerant species such as maple and beech in the understory. Thus, the absence of fire and other disturbances would continue the conversion of the oak-hickory forest type to the maple-beech type. Plant species that depend on open forest, natural openings or dry environments would likely decline due to the increase in canopy cover as woody shrub and tree species encroach upon open areas within the project area. Several R9 Sensitive plant species require open, dry conditions (see table 1). These species and their habitats could be affected by continued increases in forest canopy and/or encroachment of woody species into open habitats. A reduction in the diversity of vegetation would likely result from the absence of fire and other disturbance on the landscape.

Further indirect and cumulative effects such as a potential increase in NNIS populations are likely. Non-native invasive plant species are introduced species that can thrive in areas beyond their natural range of dispersal. These plants are characteristically adaptable, aggressive, and have a high reproductive capacity. Their vigor combined with a lack of natural enemies often leads to outbreak populations (http://www.invasivespeciesinfo.gov/plants/main.shtml). Invasive species can cause changes in fuel characteristics and microsite moisture as well as the chemical composition of the soil through allelopathic compounds. These changes can negatively affect Sensitive plant species and habitats. Plant NNIS have been documented within the project area. Some plant NNIS are considered to pose a more serious risk than others. Among them, garlic mustard (*Alliaria petiolata*), tree of heaven (*Ailanthus altissima*), autumn olive (*Elaeagnus umbellata*), Japanese honeysuckle (*Lonicera japonica*), bush honeysuckle (*Lonicera maackii*) and multiflora rose (*Rosa multiflora*) are documented in the project area.

Fire has been effective in native plant recovery on the Shawnee National Forest (USDA 2007b) and can be an effective management tool for enhancing native plant populations and habitats by giving conservative native plant species a competitive edge over more aggressive non-native invasive plant species. The response to fire has been evaluated and documented for some NNIS plant species. In general, control of invasive species populations using prescribed fire, especially as a single management tool, appears to be difficult, but some temporary control is likely. For increased control, repeated burns should be combined with other control methods including chemical and mechanical methods. Control methods including repeated application of fire can reduce or eliminate some invasive plant species. Garlic mustard is often top-killed when exposed to fire. Emergent seedlings may also be killed by fire (Nuzzo 1996). Japanese honeysuckle is top-killed by fire, but there are no published accounts of fire destroying entire plants (http://www.fs.fed.us/database/feis/plants/vine/lonjap/all.html#FIRE%20EFFECTS). Fire may top-kill bush

honeysuckle plants, and is likely to kill seedlings and unhealthy plants; however, perennating tissues on roots and root crowns are often protected from fire damage by soil (http://www.fs.fed.us/database/feis/plants/shrub/lonspp/all.html#FIRE%20EFFECTS).

There is some indication that autumn-olive is damaged by fire. However, there is no specific information available as of this writing (2003) describing the immediate effects of fire on autumn-olive. It appears that autumn-olive and multiflora rose will sprout in response to damage from fire, indicating a single burn is probably not sufficient to eradicate either species. It is unclear how effective multiple prescribed burns might be for controlling invasive autumn-olive or multiflora rose. While a single fire is unlikely to eradicate autumn-olive or multiflora rose, periodic burning might control their spread and eventually reduce their presence. Any management activity that removes aboveground tissue, prevents seed production, and depletes energy reserves is likely to reduce autumn-olive and multiflora rose invasiveness, especially when conducted persistently (http://www.fs.fed.us/database/feis/plants/shrub/elaumb/all.html#FIRE%20EFFECTS and http://www.fs.fed.us/database/feis/plants/shrub/rosmul/all.html#FIRE%20EFFECTS). As a thin-barked species, tree-of-heaven stems are probably easily killed by fire; however, burned trees are probably only top-killed. Although tree-of-heaven roots are shallow and may occur on the soil surface, many are probably insulated from heat damage by soil and likely to survive fire damage (http://www.fs.fed.us/database/feis/plants/tree/ailalt/all.html#FIRE%20EFFECTS).

In the absence of prescribed fire, under Alternative 1, these invasive species, if left unchecked, will likely continue to choke out native plants and threaten ecosystem diversity.

Conversely, the absence of ground disturbance associated with implementation of the proposed activities could reduce the spread and establishment of new populations of NNIS in the project area. Many NNIS species are disturbance adapted and more frequent in sites subjected to continued or repeated disturbance (Nuzzo 2000). Thus, the threat to native plant species and ecosystems including R9 Sensitive plants and habitats could be reduced.

Cumulative Effects

Lilium superbum* and *Plantago cordata

In the absence of prescribed fire, Alternative 1 would maintain higher fuel loads, increasing the threat of wildfires and the threat of higher intensity fires. Under these conditions, the known sites would be more likely to burn and burn hotter than under the controlled burn conditions of Alternative 2. Additionally, a wildfire within the project area could cause changes to non-native invasive plant populations. The project area could benefit in the short term from a decreased in non-native invasive plant individuals but would not reap the benefits of repeat fires as under Alternative 2. Cumulatively, a single wildfire within the project area could reduce some invasive plant species populations in the short term, but would likely facilitate the spread of existing populations by providing seedbeds for establishment over the long term.

Neither alternative would result in the either species trending toward federal listing.

Determination: Under Alternative 1 (No-Action), the risk of negative impacts to R9 Sensitive plant species and their habitat is present, given the following: (1) the two Sensitive plant species known to occur in the project area would likely benefit from prescribed fire (see analysis below for ***Lilium superbum* and *Plantago cordata*** – Alternative 2). (2) Long term negative effects in the absence of fire to Sensitive plant species and their suitable habitats are expected under Alternative 1. (3) Opportunities to reduce NNIS plant species using prescribed fire, will not be implemented. Based on

this rationale negative effects are expected to outweigh the positive effects of implementation of Alternative 1, and a determination of "May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing" is made for all listed plant species that may potentially inhabit the project area or are known to occur in the area.

Alternative 2

Alternative 2 is the Action Alternative. Under Alternative 2, the proposed actions in the Buttermilk Hill / Talbott Hollow Blowdown Project would be implemented. Analysis of Alternative 2 is conducted first for the two R9 Sensitive plant species known to occur in the project area followed by those R9 Sensitive plant species for which there are no known sites but they may have suitable habitat and therefore, the possibility of occurrences in the project area.

Direct Effects:

Lilium superbum* and *Plantago cordata

There is a documented occurrence of *Lilium superbum* within the Buttermilk / Talbott Hollow Blowdown project area. Several plants were documented in May, 2007 along a section of intermittent stream (Shimp 2008b) about 400 – 500 meters long . A portion of the occurrence is within a burn unit and the rest is outside of the same unit. Since this species occurs on the edge of an intermittent stream, it is unlikely that the immediate habitat will be directly exposed to fire, therefore, no direct effects are anticipated from implementation of Alternative 2. There is one documented occurrence of *Plantago cordata* within the Buttermilk / Talbott Blowdown project area (IDNR 2008). The occurrence is on the edge of a unit proposed for burning. Fire will not actually burn the immediate habitat that this species occurs in because its habitat stays wet year-round and has little or no fuel available (USDA 2006b), therefore, no direct effects are anticipated from implementation of Alternative 2.

Indirect and Cumulative Effects:

Plantago cordata* and *Lilium superbum

The spacial and temporal bounds of cumulative effects for the two species listed above are the same as that described for Alternaive 1. Taking into account all present, past, and reasonably foreseeable future actions in or immediately adjacent to the project area including all actions described under Alternative 1; the following would be the cumulative effects of the planned actions for this project.

Forested habitats adjacent to both R9 Sensitive plant species occurrences in the project area would be expected to burn so indirect and cumulative effects are possible. Indirect and cumulative effects are expected to result from a decrease in the canopy cover of adjacent forest stands subsequent to burning. These effects would likely benefit both *Lilium superbum* and *Plantago cordata* by opening up the canopy for more sun to reach the forest floor and adjacent habitats thus facilitating more optimum growing and reproduction conditions for both species. It has been shown that *Lilium superbum* will not reproduce well under low light conditions as seen in a mature forest with closed canopy. Openings, such a those caused by tree fall or fire, as well as those naturally occurring near streams and outcrops, tend to produce more flowering and seed production in this species. As the forest canopy closes, however, fewer individuals flower and eventually the population no longer flowers and fruits (Hill 2007). Similarly, few flowering individuals of *Plantago cordata* are ever seen in southern Illinois, and the plants often remain in a juvenile stage likely due to shading (Hill 2007b). Because both species require fairly open surroundings, a decrease in canopy cover in adjacent forest stands subsequent to burning would be expected to improve habitat for *Lilium superbum* and *Plantago cordata* by increasing the level of light allowed to reach these plants in their adjacent habitats.

Indirect and cumulative effects could also arise from the introduction and/or spread of plant NNIS within the project area. Competition from invasive plant species is a threat to both *Lilium superbum* and *Plantago cordata*. Exotic species encroachment may cause a reduction in health and vigor of *Lilium superbum* and *Plantago cordata* populations. *Lilium superbum* is potentially threatened by woody plant invasion and by honeysuckle species (*Lonicera* spp.) and multiflora rose (*Rosa multiflora*) in particular (Hill 2007). Autumn olive (*Elaeagnus umbellata*), Japanese honeysuckle (*Lonicera japonica*), tree of heaven (*Ailanthus altissima*), garlic mustard (*Alliaria petiolata*), and multiflora rose (*Rosa multiflora*) are some of the invasive plant species that have been observed within the project area. The ground disturbing activities connected to burning (fire line preparation, foot and vehicle travel) could result in the spread of plant NNIS to other parts of the project area that are currently not infested. On the other hand, with repeated applications, burning is expected to have a detrimental effect on invasive plant species over the long term benefiting the *Lilium superbum* and *Plantago cordata* occurrences and their habitats. Fire has been effective in native plant recovery on the Shawnee National Forest (USDA 2007b). Prescribed fire will likely stimulate and favor native vegetation and help reduce invasive species. In addition, fire is expected to help reestablish and maintain the open character of habitat for both species and to have a detrimental effect on invasive plant species.

Cumulative effects

Plantago cordata* and *Lilium superbum

Combined with the proposed action the effects of wildfire would be negligible because past wildfire occurrence has been rare in the analysis timeframe and wildfires are highly unlikely with the prescribed burning in the proposed action due to lack of fuels.

Several past, present, and reasonably foreseeable actions within the cumulative effects analysis area for turk's-cap lily and heartleaf plantain contribute to cumulative impacts to these RFSS known to occur in the project area. These actions may include ATV use (authorized and unauthorized), road maintenance, right of way maintenance, tree planting, utility right of way maintenance, trail maintenance and construction, horseback riding, non-system trials, and special use permits. These actions contribute to the introduction and spread of non-native invasive plant species by transporting seeds and plant parts on ATVs (particularly the wheels and undercarriage), footwear, equipment, vehicles and tools; and by disturbing the ground thereby creating corridors for introducing nonnative invasive species. It is difficult to quantify the extent of future damage that could be caused by these actions to turk's-cap lily and heartleaf plantain because of the nature of the use. Overall, combined with the effect of the proposed action it is difficult to predict a net beneficial or net negative effect to botanical resources from the introduction, spread and treatment of invasive plant species. This incomplete information has been examined using the procedure outlined in 40 CFR 1502.22. It is impossible to quantify how many plants or plant populations could be affected.

Additional cumulative effects result from non-native invasive plant treatments. Past and current treatments include pulling, cutting, and torching. Reasonably foreseeable treatments include the use of herbicides. These treatments combined with the proposed action are expected to have a net beneficial effect on turk's-cap lily and heartleaf plantain in the project area.

Neither alternative would result in the either species trending toward federal listing.

Determination: The risk of negative impacts to *Lilium superbum* and *Plantago cordata* and their habitats exists but is low, given the following: (1) these two species would likely benefit from prescribed fire. (2) The long term beneficial effects of the proposed actions to suitable habitat are

expected to outweigh any potential short term negative effects. Based on this rationale a determination of "May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing" is made for *Lilium superbum* (turk's-cap lily) and *Plantago cordata* (heartleaf plantain).

R9 Sensitive Plant Species with Suitable Habitat, No Known Occurrences
The Buttermilk Hill / Talbott Hollow Blowdown project area may contain suitable habitat for the R9 Sensitive species listed in Table 1, although none of the species are known to exist in the project area. Analysis for these species is conducted for all their habitats collectively.

Suitable habitat may exist in the project area for the R9 Sensitive plant species listed in table 1, however, it is limited and considered of marginal quality based on past and current disturbance levels. The project area is adjacent to and includes roads, recreational and residential sites.

Direct Effects:
R9 Sensitive Plant Species with Suitable Habitat, No Known Occurrences
Direct effects to Sensitive plant species with habitat but no known occurrences within the project area include the possibility for individual plants to be trampled, burned, or dug up in the process of constructing fire line and burning. This is unlikely since there are no known occurrences and that suitable habitat is considered marginal for most species due to the past and current disturbance levels within the project area.

Indirect and Cumulative Effects:
R9 Sensitive Plant Species with Suitable Habitat, No Known Occurrences
The spacial and temporal bounds of cumulative effects for R9 Sensitive plant species with suitable habitat but no known occurrences in the project area is the same as that described for Alternative 1. Taking into account all present, past, and reasonably foreseeable future actions in or immediately adjacent to the project area including all actions described under Alternative 1; the following would be the cumulative effects of the planned actions under Alternaive 2.

Over the long term indirect and cumulative effects are expected to include a shift in forest type resulting from prescribed fire. The fire-intolerant, mesophytic species in the understory will be expected to suffer higher mortality rates than the fire tolerant oak-hickory type creating a competitive edge for oak-hickory. Additionally, fire on the landscape will allow more sunlight to reach to forest floor and cause a decrease in shade tolerant species and an increase in the shade intolerant oak-hickory type in areas that are burned. Burning would allow oak and hickory to compete more effectively with mesophytic, shade tolerant species such as maple and beech in the mid and understory. In addition, fire has been effective in native plant recovery on the Shawnee National Forest (USDA 2007b). Prescribed fire will likely stimulate and favor native vegetation and help reduce invasive species.

Other plant species that depend on open forest, natural openings or dry environments would likely benefit from fire due to the resultant decrease in canopy cover in forested areas and a decrease of woody shrub and tree species encroachment on open areas. An enhancement of vegetation diversity could result from the presence of fire on the landscape. Burning ridgetop communities would be expected to remove some small-diameter fire intolerant species such as maples, beech, and elm. Burning would also move dry forest habitats towards a more open condition stimulating dry ridge and open forest species. Applying fire could begin to stem the loss of dry forest and ridgetop communities and help to affect a shift towards oak-hickory communities. Additional indirect and cumulative effects

upon implementation of Alternative 2 include a reduction in fuel loading which can decrease wildfire susceptibility and fire intensity.

Indirect and cumulative effects resulting from prescribed fire would include the possibility of increase in NNIS populations. In general, disturbance of soil may negatively affect areas of suitable Sensitive plant habitat by providing a seedbed for noxious weeds. The activities connected to burning (fire line preparation, foot and vehicle travel) could result in the spread of these species to other parts of the project area that are currently not infested. Many NNIS species including garlic mustard are disturbance adapted and more frequent in sites subjected to continued or repeated disturbance (Nuzzo 2000). Thus, disturbance of soil may negatively affect areas of suitable Sensitive plant habitat in the short term by providing a seedbed for noxious weeds.

Conversely, autumn olive, Japanese honeysuckle, tree of heaven, garlic mustard, and multiflora rose are some of the invasive plant species that have been observed within the project area. While the most effective control method for these highly invasive species is to prevent initial establishment, prescribed fire would be expected to contribute to a reduction of current infestations. With repeated applications, burning is expected to have a detrimental effect on invasive plant species.

Determination: Under Alternative 2, the risk of negative impacts to R9 Sensitive plant species with suitable habitat but no known occurrences within the project area is low, given that the long term beneficial effects to suitable habitat most likely outweigh any potential short term negative effects. Based on this rationale a determination of "May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing" is made for the species with habitat but no known occurrences within the project area:

***Other Species with Viability Concern*:**
Two other species of viability concern, *Cirsium carolinianum* (soft thistle) and *Polytaenia nuttallii* (Nuttall's prairie parsley), may have suitable habitat in or near the project area, but there are no known occurrences (see table 1).

Habitat-management guidelines for other plant species with viability concerns are included in the Shawnee National Forest, Land and Resource Management Plan; Appendix H, page 295. Implementation of these generalized, habitat-management guidelines will provide for viable populations of all native species on the Forest (USDA 2006). Implementation of Alternative 2 would comply with these guidelines for providing for viable populations.

The Buttermilk Hill / Talbott Hollow Blowdown Project Area is within the water-supply watershed management area (WW). The habitat-management guideline designated for the riparian deciduous forests within this management area is to maintain the quality and quantity of this habitat through Forest-wide standards and guidelines for filter-strip management, and through the WW management prescriptions.

Specific management strategies and guidelines for *Cirsium carolinianum* (soft thistle) and *Polytaenia nuttallii* (Nuttall's prairie parsley) are to maintain open canopy with use of prescribed fire and tree/shrub removal in dry to dry-mesic, upland woodlands and barrens. Avoid ground-disturbing activities that could adversely affect known locations of populations.

Since the standards and guidelines in the Forest Plan will be followed, and the specific management strategies and guidelines for *Cirsium carolinianum* (soft thistle) and *Polytaenia nuttallii* (Nuttall's

prairie parsley) would be implemented under Alternative 2, viability of the two other species with viability concern with possible habitat within the project area will be maintained in the project area under Alternative 2.

VII. Design Criteria, Mitigations and Monitoring

- Sources of weed seed and propagules would be avoided when possible to prevent new weed infestations and/or spread of existing sites. With the exception of service vehicles traveling solely on roadways; mud, dirt, and plant parts would be removed whenever possible from project equipment before moving it to the project area. All equipment would be cleaned before leaving the project site when operating in areas infested with weeds. Workers would inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.
- Two R9 Sensitive plant species are documented as occurring within the project area: *Lilium superbum* (turk's-cap lily) and *Plantago cordata* (heartleaf plantain). A portion of the *Lilium superbum* occurrence is within a burn unit and the rest is outside of the same unit. Since this species occurs on the edge of an intermittent stream, it is unlikely that the immediate habitat will be directly exposed to fire. The *Plantago cordata* occurrence is on the edge of a unit proposed for burning. Fire will not actually burn the immediate habitat that this species occurs in because its habitat stays wet year-round and has little or no fuel available. To avoid any other ground disturbance at the sites, both sites will be identified on the ground and implementation activities causing ground disturbance such as fire line construction will be avoided in these areas.

Monitoring for Alternative 2.

Monitoring Activity	Description	Location and Timing
Non-native Invasive Species (NNIS)	Documented garlic mustard sites within the project area will be monitored to determine increases or decreases in population size.	Garlic mustard locations within the Project Area will be mapped before and monitored after implementation.
	The project area will be monitored for spread of existing invasive species populations and establishment of new sites. The need to implement control measures within the project area will be evaluated periodically.	Periodically before, during and after project implementation in the Project Area.
Botanical Resources	Monitor the effects, if any, to known turk's cap-lily and heartleaf plantain populations within the project area.	Periodically before and after burning activities within the vicinity of the populations.

Non-Native Invasive Species (NNIS) Monitoring

Objective: Monitor and document changes in priority non-native invasive plant species populations within the project area and implement control measures when required.

Desired Result: Project design criteria to reduce disturbance near known non-native invasive plant species populations, and to reduce the spread of invasive species via equipment, vehicles, and personnel would be effective throughout implementation of the project and a reduction in known population would be observed and documented.

Methods: Monitor and document changes in selected known non-native invasive plant species sites within the project area prior to project implementation and on an annual basis thereafter. Conduct surveys for non-native invasive plant species within the project area periodically over the next 10 years.

Responsibility: District Botanist

Botanical Resources Monitoring
Objective: Ensure that Region 9 Sensitive plant species and habitat are maintained or enhanced throughout implementation of the project.
Desired Result: Project design criteria to reduce disturbance near Sensitive plant species populations would be effective throughout implementation of the project and known populations within the project area would be maintained or enhanced by project activities.
Methods: Monitor the effects, if any, to known *Lilium superbum* (turk's-cap lily) and *Plantago cordata* (hearleaf plantain) populations within the project area before and periodically after burning activities within the vicinity of the populations.
Responsibility: District Botanist

VIII. References Cited and Reviewed

Batcher, Michael S. and Stiles, Shelly A. Element Stewardship Abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle) The Bush honeysuckles. August, 2002. The Nature Conservancy. 4245 North Fairfax Drive, Arlington, Virginia 22203-1606..

Hill Steven R. 2007. Conservation Assessment for the turk's-cap Lily (*Lilium superbum* L.). USDA Forest Service, Eastern Region, Shawnee and Hoosier National Forests. 10 January, 2007. Illinois Natural History Survey, Division of Biodiversity and Ecological Entomology, 1826 South Oak Street, Champaign, Illinois 61820. 36 pp.

Hill Steven R. 2007b. Conservation Assessment for the Heartleaf Plantain (*Plantago cordata* Lam.). USDA Forest Service, Eastern Region, Shawnee and Hoosier National Forests. 31 July, 2007. Illinois Natural History Survey, Division of Biodiversity and Ecological Entomology, 1826 South Oak Street, Champaign, Illinois 61820. 37 pp.

Howard, Janet L. 2004. Ailanthus altissima. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, March 10]. FEIS ABBREVIATION: AILALT

Illinois Department of Natural Resources (IDNR), Natural Heritage Database. Data received 16 January, 2008.

Long Heikens, Alice. 2002 Conservation Assessment for Prairie Parsley (*Polytaenia nuttallii*). USDA Forest Service, Eastern Region, Hoosier National Forest. November 2002.

Mohlenbrock, R.H. 2002. Vascular Flora of Illinois. Southern Illinois University Press. Carbondale and Edwardsville, Illinois. 491 pp.

Munger, Gregory T. 2001. Alliaria petiolata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, March 10].

Munger, Gregory T. 2002. Lonicera japonica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, March 10].

Munger, Gregory T. 2002. Rosa multiflora. In: Fire Effects Information System, [Online]. USDA-FS, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, May 27].

Munger, Gregory T. 2003. Elaeagnus umbellata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, March 10].

Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, March 10].

Nuzzo, Victoria A.; McClain, William; Strole, Todd. 1996. Fire impact on groundlayer flora in a sand forest: 1990--1994. The American Midland Naturalist. 136(2): 207-221. [27303]

Nuzzo, Victoria. 2000. Element stewardship abstract for *Alliaria petioilata* (*Alliaria officinalis)* Garlic mustard. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/allipeti.html.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2 NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 14 - February 26, 2008).

Shimp, Elizabeth. 2008. Survey data for the Buttermilk Hill/Talbott Hollow Blowdown project area.

Shimp, Elizabeth. 2008b. February 11, 2008. Personal communication with Susan Corey concerning *Lilium superbum* occurrence in the Buttermilk Hill/Talbott Hollow Blowdown project area.

Thompson, Frank R., III, ed. 2004. The Hoosier-Shawnee Ecological Assessment. Gen. Tech. Rep. NC-244. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 267 p.

USDA Forest Service. 2006. Shawnee National Forest, Land and Resource Management Plan, Harrisburg, Illinois.

USDA Forest Service. 2006a. Shawnee National Forest, Final Environmental Impact Statement for the Land and Resource Management Plan, Harrisburg, Illinois.

USDA Forest Service. 2006b. Shawnee National Forest Land and Resource Management Plan; Final Environmental Impact Statement; Appendix H: Biological Evaluation of Regional Forester Sensitive Species. Harrisburg, Illinois.

USDA Forest Service. 2007. Regional Forester Sensitive Plants. Signed by Regional Forester on October 5, 2006, list maintenance update on January 10, 2007. (http://www.fs.fed.us/r9/wildlife/tes/docs/rfss_plants).

USDA Forest Service. 2007b. Shawnee National Forest 2006 Land and Resource Management Plan Monitoring and Evaluation Report, Fiscal Year 2006 available at http://www.fs.fed.us/r9/forests/shawnee/publications/monitoring_reports/

Appendix A
Buttermilk Hill / Talbott Hollow Blowdown Project
Botany Biological Evaluation

The blow-down project area was visited for floristic surveys on the following dates: Elizabeth Shimp, Scott Crist and Leslie Rodman May 23, 2007, Elizabeth Shimp, Scott Crist and Melissa Mead May 24, 2007, and Elizabeth Shimp May 25, 2007. Some of the species encountered are listed below.

Trees:
Acer negundo
Acer rubrum
Acer saccharinum
Acer saccharum
Ailanthus altissima
Albizzia julibrissin
Amelanchier arborea
Aralia spinosa
Asimina triloba
Betula nigra
Carpinus caroliniana
Carya cordiformis
Carya glabra
Carya ovata
Carya tomentosa
Cercis canadensis
Cornus florida
Crataegus sp.
Diospyros virginiana
Eleaegnus umbellata
Fagus grandifolius
Fraxinus americana
Gleditsia triacanthos
Ilex decidua
Juglans nigra
Juniperus virginiana
Liquidambar styraciflua
Liriodendron tulipifera
Morus alba
Nyssa sylvatica
Ostrya virginiana
Pinus echinata
Pinus strobus
Platanus occidentalis
Populus deltoides
Prunus serotina
Ptelea trifoliata
Quercus alba
Quercus imbricaria
Quercus marilandica
Quercus muhlenbergii
Quercus rubra
Quercus stellata
Quercus velutina
Rhus copallina
Rhus glabra
Robinia pseudo-acacia
Salix sp. (nigra?)
Ulmus alata
Ulmus rubra
Viburnum prunifolium
Shrubs,Vines,Woody plants:
Campsis radicans
Cunila origanoides
Dioscorea quaternata

Lindera benzoin
Lonicera japonica
Lonicera maackii
Parthenocissus quinquefolia
Rhus aromatica
Rosa multiflora
Rubus flagellaris
Smilax bona-nox
Smilax bona-nox var. hederaefolia
Smilax glauca
Smilax hispida
Smilax pulverulenta
Smilax rotundifolia
Toxicodendron radicans
Vaccinium arboreum
Vitis aestivalis
Vitis cinerea
Other Dicots:
Acalypha virginica
Actaea pachypoda
Agrimonia parviflora
Ambrosia artimisiifolia
Ambrosia trifida
Amphicarpa bracteata
Antennaria plantaginifolia
Apocynum cannabinum
Arctium minus
Arisaema dracontium
Arisaema triphyllum
Aristolochia serpentaria
Asarum canadensis
Asclepias quadrifolia
Asclepias variegata
Aster shortii
Aureolaria flava
Barbarea vulgaris
Bidens aristosa
Blephilia hirsuta
Boehmeria cylindrica
Cacalia atriplicifolia
Cacalia muhlenbergii
Cardamine hirsuta
Cassia nictitans
Celastrus scandens
Chenopodium alba
Chichoryum intubus
Cirsium arvense
Commelina communis
Conyza canadensis
Daucus carota
Daucus carota
Duchesnea indica
Elephantopus caroliniana
Erichtites hiericifolia
Erigeron annuus

Erigeron philadelphicus
Eupatorium rugosum
Euphorbia corollata
Galium aparine
Galium concinnum
Geranium robertianum
Geum vernum
Glechoma hederacea
Helianthus divaricatus
Hemerocallis fulva
Heuchera americana
Hibiscus lasiocarpus
Hybanthus concolor
Hydrastis canadensis
Impatiens capensis
Impatiens capensis
Ipomoea pandurata
Krigia dandelion
Lactuca floridana
Lespedeza cuneata
Lespedeza virginica
Lilium superbum*
Medicago lupulina
Menispermum canadense
Monarda bradburiana
Ophioglossum virginianum
Osmorhyza claytonii
Oxalis stricta
Oxalis violacea
Passiflora lutea
Penstemon digitalis
Penstemon pallidus
Phlox divaricatus
Phlox pillosa
Phryma leptostachya
Phytolacca americana
Pilea pumila
Plantago rugelii
Podophyllum peltatum
Polygonum pensylvanicum
Polygonum sp.
Polygonum virginianum
Potentilla simplex
Prenanthes altissima
Prunella vulgaris
Pycnanthemum incanum
Pycnanthemum tenuifolium
Rudbeckia hirta
Rumex acetosella
Rumex crispus
Sambucus canadensis
Sanicula canadensis
Scutellaria incana
Scutellaria ovata
Securigera varia
Silene stellata

Smilacina racemosa
Solanum carolinense
Solidago canadensis
Solidago flexicaulis
Solidago juncea
Sonchus uliginosa
Stellaria media
Taraxacum officinale
Thalictrum dasycarpon var. hypoglaucum
Thalictrum thalictroides
Thaspium trifoliatum
Tradescantia ohiensis
Trifolium campestre
Trifolium pratense
Trifolium repens
Triodanis perfoliata
Urtica dioica
Uvularia grandiflora
Verbascum thapsus
Verbena urticifolia
Verbesina alternifolia
Vernonia missurica
Veronica arvensis
Vinca minor
Viola bicolor
Viola dilatata
Viola sororia
Viola striata
Ferns and Fern allies:
Adiantum pedatum

Asplenium platyneuron
Botrychium dissectum var. obliquum
Diplazium pycnocarpon
Dryopteris marginalis
Onoclea sensibilis
Phegopteris hexagonoptera
Polystichum acrostichoides
Monocots:
Agrostis perennans
Allium vineale
Arisaema dracontium
Arundinaria gigantea
Avena sativa
Bromus inermis
Bromus pubescens
Carex careyana
Carex hirsutella
Carex retroflexa
Carex spp (no perigynia 6)
Chasmanthium latifolium
Cyperus georgiana
Dactylis glomerata
Danthonia spicata
Elymus hystrix
Glyceria striata
Hemerocallis fulva
Hordeum jubatum
Hordeum pussilum
Microstegium vimineum

Muhlenbergia sobolifera
Panicum boscii
Panicum dichotomum
Poa compressa
Poa pratensis
Schedonorus phoenix
Setaria faberi
Sorghum halepense
Zea mays
Animals noted:
Common yellowthroat
Deer
Eastern wood peewee
Fowler's toad
Hummingbird
Indigo bunting
Northern perula
Northern watersnake
Nuthatch
Phoebe
Red-eyed vireo
Rough green snake
Rufous-sided towhee
snake (resembles milksnake)
Summer tanager
Tufted titmouse
White-eyed vireo
Yellow billed cuckoo