
Blue Ridge Parkway Exotic Plant Management Plan

Environmental Assessment

August 2006



**National Park Service
U.S. Department of the Interior**



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1.0 INTRODUCTION

1.1 PURPOSE AND NEED FOR ACTION

The legislated purpose of the Blue Ridge Parkway under the Act of June 30, 1936, is to link Shenandoah National Park in Virginia with Great Smoky Mountains National Park in North Carolina and Tennessee by way of a recreationally oriented motor road. Inherent within this legislation and in the subsequent planning of the Parkway is a fundamental objective of providing opportunities to enjoy the scenic beauty of the Southern Appalachian Mountains. Parkway management further promotes public understanding, appreciation and knowledge of Appalachia by preserving and managing the natural, historic and cultural resources contained within Park lands.

The presence and spread of exotic plant species is a significant concern to park management. The term "exotic" is defined as "a species occurring in a given place as a result of direct or indirect, deliberate, or accidental actions by humans" (USDI 1991) and is used synonymously with "alien", "non-native" and "introduced. Many exotic plants are ecologically harmful. They can alter the natural and/or historic scene and impair the natural function of many native plant communities.

Executive Order (EO) 13112 requires Federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

During the past 20 years, only incidental attention has been given to control and eradicate exotic plant species within the Blue Ridge Parkway. Several species have spread vigorously due to this lack of attention (see Figure F-1). Dense mats of kudzu (*Pueraria lobata*), Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), Oriental bittersweet (*Celastrus orbiculatus*), and plume grass (*Miscanthus sinensis*) now exist in many locations. Princess tree (*Paulownia tomentosa*) and tree of heaven (*Ailanthus altissima*) have invaded many disturbed sites, including cut and fill slopes formed during Parkway construction and perpetuated through vista clearing and maintenance activities.

The Purpose of an Environmental Assessment (EA)

An EA is a study conducted by a Federal agency to determine whether an action the agency is proposing to take would significantly affect any portion of the human or natural environment. The intent of the EA is to provide project planners and Federal decision-makers with relevant information on a Proposed Action's impacts on the environment.

If the EA finds that no significant impacts would result from the action, the agency can publish a Finding of No Significant Impact (FONSI), and can proceed with the action. If the EA finds that significant impacts would result from the action, then the agency must prepare and publish a detailed Environmental Impact Statement (EIS) to help it decide about proceeding with the action.

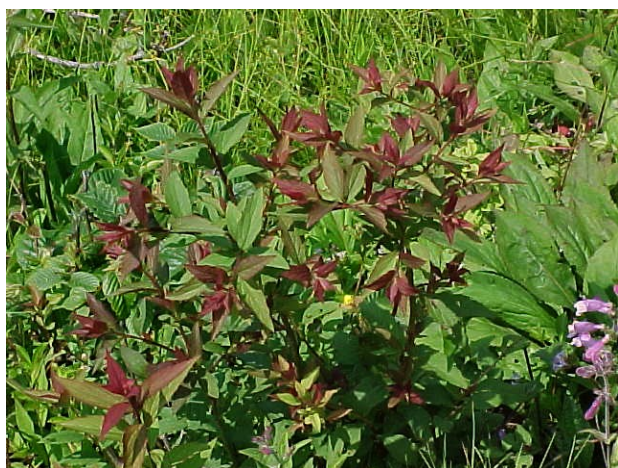
Figure F-1 Photos of exotic (non-native) plant species within the Blue Ridge Parkway



Multiflora Rose (*Rosa multiflora*)



Japanese Honeysuckle (vine) (*Lonicera japonica*)



Japanese Spirea (*Spiraea japonica*)



Oriental bittersweet (*Celastrus orbiculatus*)



Purple Loosestrife (*Lythrum salicaria*)

The Blue Ridge Parkway's *Exotic Plant Management Plan* was developed following National Park Service (NPS) guidelines for natural resource management and integrated pest management (IPM) procedures. According to the guidelines, "Management of populations of exotic plant and animal species, up to and including eradication, would be undertaken wherever such species threaten park resources or public health and when control is prudent and feasible." (Section 4.4.4.2, Management Policies 2001, p. 37). Managers would take action whenever such species interfere with natural processes and the perpetuation of natural features or native species, especially those that are endangered, threatened, or otherwise unique. IPM procedures have been and would continue to be used to determine when to control exotic plants and whether to use mechanical, physical, chemical, cultural, or biological means, or a combination of these.

1.2 THE ENVIRONMENTAL ASSESSMENT

This environmental assessment (EA) analyzes the environmental impacts that would result from the alternatives considered, including the No Action alternative. This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) 4321 et seq.), the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations (CFR) 1500 through 1508) for implementing NEPA, and the NPS NEPA compliance guidance handbook (Director's Order (DO)-12, *Conservation Planning, Environmental Impact Analysis, and Decision-making*).

1.3 PROJECT HISTORY AND BACKGROUND

Exotic species, also known as alien, introduced, non-indigenous, and non-native species or simply exotics, are plant or animal species that humans intentionally or unintentionally introduced into areas outside of the natural ranges of such species. The invasion of exotic species is one of the most serious problems of national parks. Exotics invade and colonize parks by every possible means and frequently harm or altogether displace native species. If exotics are not aggressively controlled, the National Park System is at risk of losing a significant portion of its native biological resources.

People have accidentally or intentionally introduced hundreds of exotic species into natural communities of North America. Although many died out, some persisted and have become pests. Exotic species disrupt complex native ecological communities, jeopardize endangered native plants and animals, and degrade native habitats. Hybridization with exotics alters the genetic integrity of native species. The management of exotics and their effects on the economy and the natural communities in the United States costs millions of dollars each year. Many exotics are well known to the general public.

The flora of the Blue Ridge Parkway includes at least 100 exotic species, most of which entered the Park and became established within the past 150 years. The term "exotic" is defined as "a species occurring in a given place as a result of direct or indirect, deliberate or accidental actions by humans" and is used synonymously with "alien", "non-native" and "introduced." However, only a relatively small number (20-30) of these exotic species are considered "invasive", that is,

they aggressively colonize sites and therefore threaten native species. There is potential for many more exotic plant species to enter the Park in the future, and for present populations to increase in number, area covered and density.

Many exotic plants are ecologically harmful. They can alter the natural and/or historic scene and harm the natural function of many native plant communities. The presence and spread of exotic plant species is a significant concern to Park management. The National Park Service is mandated to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for the enjoyment of future generations. Furthermore, the natural resources policies of the National Park Service are "...to maintain, rehabilitate, and perpetuate their inherent integrity."

Exotic plant management is a necessary part of each park's responsibility to protect our natural heritage. An exotic plant management program requires both a guiding plan and long-term, steadfast commitment. Short-term lapses can allow populations of invasive species to expand quickly and to negate previous control efforts. The threat of exotic species would not disappear. The keys to successful control are a systematic approach and consistent follow-up. Anything less would only provide the park with knowledge of an increasing problem.

The National Park Service is required by law to keep the parks as unaltered by human activities as possible. As early as 1933, National Park Service policy recognized the harmful effects of non-native plants and animals. Today, the National Park Service has a strong and clear policy on managing non-native species in the park. This policy is strengthened by a definition of non-native species that is unique. The National Park Service defines non-native species as any animal or plant species that occurs in a given location as a result of direct, indirect, deliberate, or accidental actions by humans. This definition allows the National Park Service to recognize and distinguish between changes to park resources caused by natural processes or animals and plants, such as natural range expansions, and those changes caused by animals and plants introduced by humans.

1.4 LOCATION AND GENERAL DESCRIPTION OF THE AFFECTED AREA

The Blue Ridge Parkway follows the high crests of the central and southern Appalachians for 469 miles from Shenandoah National Park in Virginia to the Great Smoky Mountains National Park in North Carolina. Its breathtaking scenic beauty, unbridled natural resources, and unique historic sites make it the showpiece rural parkway of the National Park Service. The Parkway extends almost 4 degrees in longitude and 2½ degrees in latitude, the third largest geographic range of any unit in the National Park System.

The Parkway occupies 88,000 acres of lands within the socio-political boundaries of two states, six congressional districts, 12 counties in Virginia, 17 counties in North Carolina, 185 miles within four national forests, 11 miles within the Qualla Boundary Reservation of the Eastern Band of Cherokee Indians (Cherokee Indian Reservation), two state parks, and three metropolitan areas. There are more than 1,200 miles of boundary and 4,500 adjacent property owners. Three interstates, 270 secondary roads, and 400 utility lines bisect natural features. Like beads on a necklace, 900 vistas, 275 paved overlooks, 18 recreational areas, 14 backcountry areas (ranging from 1,000 to 5,000 acres), and 13 maintenance facilities line the Parkway to accommodate visitors. With annual use approaching 20 million people, it is the most highly visited unit in the National Park System.

The primary activity is recreational driving, sight seeing and hiking. The Parkway also provides naturalist walks and talks, self-guided nature trails, roadside exhibits, picnicking, and camping.

1.5 ISSUES AND IMPACT TOPICS

This environmental analysis was prepared in accordance with the Council on Environmental Quality's (CEQ's) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 CFR Parts 1500-1508) and part 516 of the U.S. Department of the Interior's Department Manual (516 DM). Among other actions, the National Environmental Policy Act (NEPA) calls for an examination of the impacts on individual components of affected ecosystems. NPS *Management Policies 2001*, DO-12 (*Conservation Planning, Environmental Impact Analysis, and Decision Making*), DO-28 (*Cultural Resources Management*), and NPS-77 (*Natural Resources Management Guidelines*) provide general guidelines to manage and protect natural, cultural, visual and recreational resources within park units. Specific management plans developed by park staff further refine the goals, objectives, and management direction for the protection of natural abundance and diversity of the park's natural, cultural, recreational, and visual resources. These plans include: *Parkway Strategic Plan*, *Statement for Management*, *Resource Management Plan* and the *General Management Plan* that is currently being developed.

1.5.1 Impact Topics Analyzed

The following issues and impact topics are analyzed in this EA:

Natural Resources

Issues and concerns affecting this proposal were identified during discussions with groups and individuals. The major natural resource issues are: impacts to soils, impacts to vegetation, impacts to state- and federally-listed plant and animal species, impacts to wildlife, impacts to neo-tropical birds, impacts to wetlands, impacts to invertebrates, both terrestrial and aquatic, and impacts to water quality.

Soils

The proposed activities do have the potential to impact soil resources; therefore, this issue would be addressed in this document.

Vegetation

Proposed activities have the potential to impact vegetation resources; therefore, this topic would be briefly analyzed in this document.

Threatened and Endangered (T&E) Species

The Endangered Species Act of 1973 requires that any proposed federal action consider the potential for affecting the continued existence of any species (either flora or fauna) or its habitat listed by the U.S. Fish and Wildlife Service as threatened or endangered, or any species proposed to be listed. Also, *NPS Management Policies 2001* requires the National Park Service, to the greatest extent possible, to manage state and locally listed species in a manner similar to that of federally listed species. There are several rare state- and federally-listed species that are known to occupy sensitive habitats located on or near areas proposed for exotic plant treatment. The potential impacts to protected species would be analyzed in this document.

Wildlife

Proposed activities have the potential to impact wildlife resources; therefore, this topic would be briefly analyzed in this document.

Migratory Birds

Executive Order (E.O. 13186, January 2001) directs each Federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the U.S. Fish and Wildlife Service to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts or other agreements; and the creation of or revisions to land management plans. In addition to avoiding or minimizing impacts to migratory bird populations, agencies are expected to take reasonable steps that include restoring and enhancing habitat, preventing or abating pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. Efforts to treat and control exotic plants can both enhance and adversely impact neo-tropical birds; therefore, it would be analyzed in this document.

Wetlands

The purpose of Executive Order 11990, Protection of Wetlands (42 Fed. Reg. 26961), is to take action and provide leadership to minimize destruction, degradation or loss of wetlands, to avoid direct construction or support of construction in wetlands, and to enhance and preserve the natural values of wetlands (DO-77, 1998). Proposed activities have the potential to impact wetlands; therefore, this issue would be addressed briefly in this document.

Invertebrate Fauna

The proposed activities have the potential to impact invertebrate species; therefore, this topic would be analyzed in this document.

Water Quality

Proposed activities have the potential to impact water resources; therefore, this topic would be briefly analyzed in this document.

Cultural Resources

Consideration of cultural resource impacts is required under the National Historic Preservation Act (NHPA), NEPA, the 1916 NPS Organic Act, and NPS *Management Policies* (NPS, 2001a). All properties and districts listed in or eligible for listing in the National Register are considered in the planning of federal undertakings, including projects that are licensed or partially funded by the federal government.

Established by the National Historic Preservation Act of 1966, the National Register of Historic Places is the nation's official list of buildings, structures, objects, sites, and districts worthy of preservation for their significance in American history, architecture, archaeology, and culture. The purpose of the Act is to ensure that properties significant in national, state, and local prehistory or history are considered in the planning of federal undertakings. To achieve National Register Status a property must possess integrity of location, design, setting, materials, workmanship, feeling or association and meet at least one of the following National Register Criteria:

- Association with events that have made a significant contribution to the broad patterns of our history; or
- Association with the lives of persons significant in our past; or
- Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Yielding or potential to yield information important in prehistory or history.

Since management of exotics could affect the components of cultural landscapes, this topic would be discussed further.

Recreational/Visual Resources

The provision of a scenic highway, and scenic opportunities of the Appalachian Mountains, is contained within the Blue Ridge Parkway enabling legislation. The Blue Ridge Parkway is a designed landscape along its entire route. Proposed activities have the potential to impact recreational/visual resources; therefore, this topic would be briefly analyzed in this document.

Human Health & Safety

Proposed activities, including chemical mixing and storage, have the potential to impact human health and safety; therefore, this topic would be analyzed in this document.

1.5.2 Impact Topics Dismissed From Further Analysis

The following issues and impact topics were dismissed from further analysis in this EA:

Natural Resources

Prime and Unique Farmlands

Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. Although exotic plants may currently occupy soils classified as prime or unique, there would be no temporary or permanent conversion of these soils. Therefore, the topic of prime and unique farmland was dismissed as an impact topic in this document.

Floodplains

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains. The 2001 NPS Management Policies, DO-2 *Park Planning*, and DO-12 *Conservation Planning, Environmental Impact Analysis, and Decision-Making* provide guidelines on developments proposed in floodplains. Executive Order 11988, *Floodplain Management*, requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Certain construction within a 100-year floodplain requires that a Statement of Findings be prepared and accompany a Finding of No Significant Impact. Proposed activities do not include construction or development within floodplains. Therefore, floodplains were dismissed as an impact topic in this document.

Air Quality

Clean Air Act, as amended (42 USC 7401 et seq.). Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. The implementation of the proposed alternative would present no significant deterioration of ambient air since there would be minimal and sporadic use of motorized equipment, such as tractors. For this reason, air quality was dismissed as an impact topic.

Noise

The Noise Control Act of 1972, as amended, sets standards and procedures for limiting noise that jeopardizes Americans' health and welfare. There would be minimal noise produced during management of exotic plants with the use of chainsaws to remove woody shrubs and some trees. The disruption should not last more than several hours. Visitor disruption would be minor. For these reasons, noise was dismissed as an impact topic.

Aquatic Fauna

The proposed activities do not have the potential to impact aquatic fauna. Therefore, this topic would not be analyzed in this document.

Cultural Resources

Archeological resources

The Archaeological Resources Protection Act (ARPA) (16 USC 470a et seq.), ensures the protection and preservation of archeological resources on Federal lands and the Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq.), protects Native American human remains, burials, and associated burial goods. Because there is no ground disturbance associated with this project, there is little likelihood of affecting intact archeological resources or any Native American human remains or burials.

Historic and Prehistoric Structures

No structures, historic or prehistoric, are directly involved in this project, and thus, this topic has been dismissed.

Museum Collections

There are no museum objects that would be affected by this proposal, and thus it would be dismissed as an impact topic.

Ethnographic Resources

The National Park Service must be respectful of ethnographic resources, those cultural and natural features that are of traditional significance to traditionally associated peoples. These are contemporary peoples whose interest in the park began prior to its establishment (1936) and who have associated with the park for more than two generations (40 years) (Management Policies 2001, Sec. 5.3.5.3, page 57). The proposed project would not affect any ethnographic resources currently known to park staff, and thus would not be discussed as an impact topic.

Socioeconomic Environment

Environmental Justice/Protection of Children

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires Federal agencies to identify and address any disproportionate adverse human health or environmental effects of its projects on minority or low-income populations. Executive Order 13229, *Protection of Children from Environmental Health Risks and Safety Risks*, directs Federal agencies to “identify and assess environmental health risks and safety risks that may disproportionately affect children.”

Since the proposed project would take place on lands administered by the NPS, there would be no displacement or relocation of residents or elimination of jobs. Local and regional businesses would not be affected in the short- or long-term. There would be no activities occurring under the Preferred Alternative or its alternatives that would disproportionately and adversely affect minority or low-income populations or children. The Park would still be available to all

residents, regardless of income or race. Adverse effects on visitor use and experience and human health and safety that would result from the No Action alternative have the potential to affect all Park visitors, regardless of race, age, or income level. Likewise, beneficial impacts on these resource areas that would result from the Preferred Alternative would be experienced by all visitors, regardless of race, age, or income level. Therefore, this impact topic was dismissed from further consideration in this EA.

1.6 RELATIONSHIP TO OTHER DECISIONS AND LAWS

This Environmental Assessment has been prepared to comply with the National Environmental Policy Act of 1969 (P.L. 91190, 42 USC 4321 *et seq.*). This law requires detailed environmental analysis of a proposed Federal action that may affect the quality of the human environment. The selection of potential herbicides used for the control of exotic plants is regulated under the Federal Insecticide, Fungicide and Rodenticide Act of 1947 (7 U.S.C. 136), as amended.

1.7 ORGANIZATION OF THE EA

A summary of the organization of this EA and the contents of the relative chapters is provided in **Table 1.7-1** below. The **Table of Contents** provides a more detailed outline of these chapters.

Table 1.7-1. Summary of the Organization of the EA	
Chapter	Contents
2 Alternatives Including the Preferred Alternative	<ul style="list-style-type: none"> • Description of the Preferred Alternative • Description of the No Action alternative • Mitigation measures • Comparison of the impacts of the alternatives assessed
3 Affected Environment	<ul style="list-style-type: none"> • Description of the existing aspects of the natural and human environment, by resource area, that may be impacted by each alternative
4 Environmental Consequences	<ul style="list-style-type: none"> • Description of the methodology used to analyze environmental impacts resulting from each alternative, including definitions of impact terms • Analysis of potential direct, indirect, and cumulative impacts on the natural and human environment, by resource area, that would result from each alternative
5 Consultation and Coordination	<ul style="list-style-type: none"> • Discusses relevant agency consultation during the EA development • Provides a list of persons and agencies contacted for information during the EA development • Describes public involvement activities implemented as part of the EA process
6 Compliance With Federal and State Regulations	<ul style="list-style-type: none"> • Identifies regulatory compliance, including permits, necessary for implementation of the project
7 References Cited	<ul style="list-style-type: none"> • List of references cited within the EA
8 List of Preparers	<ul style="list-style-type: none"> • Identifies the members of the interdisciplinary team that contributed to the preparation of the EA
Appendices: <ul style="list-style-type: none"> • A: Acronyms and Abbreviations • B: Glossary • C: Environmental Laws and Regulations • D: Agency Consultation and Coordination • E: Comments on the EA 	<ul style="list-style-type: none"> • List of abbreviations (and their definitions) used within the EA • Definitions of terms used within the EA • Relevant environmental laws and regulations for each resource area • Provides supporting agency consultation documents • Provides a description of the public comment period on the EA; would contain comments received from the public and agencies on the EA

2.0 ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

This section describes the alternatives that are analyzed in this environmental assessment. Areas where the treatment of invasive exotic plants would occur generally follow the previously outlined strategy of work. However, due to logistics and simple opportunistic situations other areas may receive invasive treatments. This document is intended to cover the entire Park.

2.1 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, exotic species would be managed on a case-by-case basis without regard to Parkway-wide priorities. Species and areas where control of exotics would be undertaken would be managed according to NPS policy, IPM processes, and regulations concerning use of herbicides. Follow-up and post-control evaluations would be made and retreatment recommended when evaluations warrant.

Since a comprehensive survey of the park would not be conducted, lesser priority areas could be controlled and higher priority areas that are unknown to managers could be ignored. In many areas of the park, invasive exotic plants would be allowed to spread and grow unchecked by any human intervention without understanding its impact on surrounding ecosystems. Native systems could be placed at risk as non-native species out-compete native species.

CEQ regulations (40 CFR 1502.14) require the assessment of the No Action alternative in NEPA documents. The No Action alternative provides a baseline against which to measure the impacts of the other proposed alternatives.

2.2 ALTERNATIVE B: PREFERRED ALTERNATIVE - IMPLEMENT THE PARK'S EXOTIC VEGETATION MANAGEMENT PLAN USING IPM TECHNIQUES OF MECHANICAL AND HERBICIDAL CONTROL

Under this alternative the Blue Ridge Parkway would implement the Park's Exotic Vegetation Management Plan. The stated resource and protection objectives of the plan:

- to establish management methods that effectively control exotic plant species while meeting all regulatory requirements;
- to develop a monitoring program that would detect and set priorities for problem areas;
- to provide a mechanism to identify and justify appropriate and needed programs that should be incorporated into the budget process;
- to develop a record-keeping procedure that minimizes paperwork while providing data on which to base future management decisions, and
- to assign planning, inspection, control and evaluation responsibility.

Under this alternative a combination of mechanical and chemical methods is proposed to treat and control invasive exotic plants. This alternative provides flexibility to match the appropriate control method to the site conditions. At sites where the exotic plant population is small and rare species occur, mechanical methods are preferred over chemical methods and would be employed.

The use of **mechanical methods** involves using hand and/or power tools to dig, pull, and cut plants. Some methods may occur once, such as pulling garlic mustard, or repeatedly, such as continuously cutting multiflora rose until the plants energy reserves have been exhausted. When exotic populations are relatively small or the site contains sensitive resources then mechanical methods are viable treatment options.

The use of **herbicide chemicals** to treat and control invasive exotic plants is a viable treatment options when the target population is large. Herbicide could be applied using three methods: foliar application, cut surface application, and basal bark application.

Foliar Spray applications involve spraying green foliage with herbicide. Herbicides used for foliar application are mixed at low concentrations (typically 2% active ingredient) and are always mixed with water, though a surfactant may be added to increase absorption on species with waxy leaves. Foliar applications are made with a low pressure (20-50 psi) backpack sprayer at rates of one gallon or less per minute. All foliar treatments are made after full leaf expansion in the spring and before fall colors are visible. Allow herbicide treatments to dry for at least three hours at an air temperature above 60°F to ensure adequate absorption and translocation. In areas that receive significant public use, it may be necessary to close off the treatment area until the herbicide has completely dried. Herbicide is applied with a backpack or similar hand-operated

pump sprayer equipped with a flat spray tip or adjustable cone nozzle. Herbicide is applied to the leaves and stems of target plants using a consistent back and forth motion. Herbicide should thoroughly cover foliage, but not to the point of run-off. All recommended herbicides require complete foliar coverage to be effective. Applications made while walking backward reduce the risk of the herbicide wicking onto the applicator's clothing.

Cut Surface applications include hack and squirt, girdle, and cut stump methods. Cut stump are usually mixed at higher concentrations (10-50% active ingredient) and mixed with either water or vegetable oil. The main advantages to these methods are: 1) they are very economical, 2) there is minimal probability of non-target damage, 3) minimal application time, and 4) they could be used in the winter as long as the ground is not frozen. Backpack sprayers or spray bottles are very effective for all of these methods.

Hack and Squirt Method: Using an axe or similar cutting tool, make uniformly spaced cuts around the base of the stem. The cuts should angle downward, be less than 2.5 cm (1 in) apart, and extend into the sapwood. Apply herbicide to each cut to the point of over flow.

Frill Method: Using an axe or similar cutting tool, make continuous cuts around the base of the stem. The cuts should angle downward, be less than 2.5 cm (1 in) apart, and extend into the sapwood. Apply the recommended herbicide to the entire cut area to the point of over flow.

Cut Stump Method: Horizontally cut stems at or near ground level; all cuts should be level, smooth, and free of debris. Immediately apply the herbicide to the outer 20% (cambial area) of the stump; delayed treatment may reduce the effectiveness of treatment.

Basal bark applications involve applying herbicide to the bark of uncut stems at ground level. Basal bark applications are usually mixed at higher concentrations (10-50% active ingredient) and mixed with either water or vegetable oil. This method is used on species that sprout prolifically if the stem is cut (such as Tree of Heaven or Princess Tree). A variant of this method is injecting stems/trunks with a small dose of herbicide. A device called EZ-Ject Lance™ is used to implement this method. Basal bark treatments are effective for controlling woody vines, shrubs, and trees. Treatments could be made any time of year, including the winter months, except when snow or water prevents spraying the basal parts of the stem. Proper plant identification is crucial during the dormant season due to the absence of foliage. Herbicide is applied with a backpack sprayer using low pressure (20-40 psi) with a straight stream or flat fan tip. To control vegetation with a basal stem diameter of less than 7.6 cm (3.0 in) apply specified herbicide-oil mixture on one side of the basal stem to a height of 15.25 cm (6 in) from the base. Herbicide is applied to the point of run-off; within an hour mixture should almost encircle the stem. For stems greater than 7.6 cm (3.0 in) basal diameter or with thick bark, treat both sides of the stem to a basal height of 30.5 cm (12 in) to 61 cm (24 in).

A non-toxic marking dye, which aids in detecting areas already treated, is typically mixed with the chemical in all three methods. The primary herbicides that would be used to treat exotic plants are: *glyphosate* (Roundup™, Accord™, Rodeo™), *triclopyr* (Garlon 3A™, Garlon 4™, Ortho Brush B-Gon Brush Killer™), *clopyralid* (Transline™), *metsulfuron methyl* (Escort™), 2,4-D (xx™).

Glyphosate is used to control grasses, herbaceous plants including deep rooted perennial weeds, brush, some broadleaf trees and shrubs, and some conifers. *Glyphosate* does not control all broadleaf woody plants. Timing is critical for effectiveness on some broadleaf woody plants and conifers. *Glyphosate* applied to foliage is absorbed by leaves and rapidly moves through the plant. It acts by preventing the plant from producing an essential amino acid. This reduces the production of protein in the plant, and inhibits plant growth.

Triclopyr is used to control woody plants and broadleaf weeds. *Triclopyr* acts by disturbing plant growth. It is absorbed by green bark, leaves and roots and moves throughout the plant. *Triclopyr* accumulates in the meristem (growth region) of the plant.

Clopyralid is used to control brush and weed species including mesquite, acacias, other broadleaf plants, thistle, perennial sow-thistle, coltsfoot, and many weeds. *Clopyralid* is absorbed by the leaves and roots of the weed and moves rapidly through the plant. It affects plant cell respiration and growth.

Metsulfuron methyl is used to control brush and certain unwanted woody plants, annual and perennial broadleaf weeds, and annual grassy weeds. *Metsulfuron methyl* is absorbed through the roots and foliage and moves rapidly through the plants. It inhibits cell division in the roots and shoots, which stops growth.

2,4-D is used to control broadleaf weeds, grasses and other monocots, woody plants, aquatic weeds, and non-flowering plants. 2,4-D is a plant-growth regulator that stimulates nucleic acid and protein synthesis and affects enzyme activity, respiration, and cell division. It is absorbed by plant leaves, stems, and roots and moves throughout the plant. It accumulates in growing tips.

To avoid impacting non-target vegetation, herbicides could be applied when the native flora is dormant or in the case of cut stump or basal bark, herbicide could be applied with sufficient precision. All herbicides would be applied in accordance with specific label instructions, which include personal protective equipment and storage requirements. Surveys and existing Park records would be used to identify the presence of rare species prior to any treatment method.

2.3 ENVIRONMENTALLY PREFERRED ALTERNATIVE

As stated in Section 2.7 (D) of the NPS DO-12 Handbook, “The environmentally preferred alternative is the alternative that would best promote the national environmental policy expressed in NEPA (Section 101(b)).”

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) SEC 101 GOAL STATEMENTS

- (1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- (3) Attain the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other undesirable and unintended consequences;
- (4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain wherever possible, an environment which supports diversity and variety of individual choice;
- (5) Achieve a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and
- (6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(NEPA, 42 U.S.C. 4321-4347)

In sum, the environmentally-preferred alternative is the alternative that, not only results in the least damage to the biological and physical environment, but also that best protects, preserves, and enhances historic, cultural, and natural resources.

The approach for incorporating these national goal statements into the determination of the environmentally preferable alternative used a qualitative comparison rating of the alternatives under consideration. Each alternative assessed in this EA was rated as to how well it contributes to meeting each of the six NEPA goals. Given the very general nature of the goal statements, with no specific measurable parameters identified, precise, quantitative ratings are not feasible. Therefore, three general qualitative levels were established to rate alternatives as to how well they contribute to meeting each goal: 1) the alternative contributes substantially to meeting that goal (denoted by a check mark); 2) the alternative neither much contributes nor much detracts to meeting that goal (denoted by a circle); and 3) the alternative interferes with that goal achievement (denoted by an “X”). Each rating was judgmentally based on an alternative's predicted impacts on the relevant environmental resources. For example, an alternative that adversely affects historic, cultural, and natural resources would get a low rating in regard to NEPA goal #4. Although more than one alternative may contribute substantially towards meeting a goal, one may contribute to a greater level than another. In these cases, the use of multiple check marks denotes the difference between alternatives, with the larger number of check marks indicating the greater level of goal achievement.

A summary of this process for each alternative is presented in **Table 2.3-1**. Below the table, a discussion is provided for each alternative explaining the basis for each of the ratings given to that alternative. Identification of the environmentally preferred alternative involved comparing the entire set of ratings for each alternative. In the absence of any indication of Congressional intent otherwise, each of the six NEPA goal statements was considered equally important.

Table 2.3-1. Selection of the Environmentally-Preferred Alternative		
National Environmental Policy Act Goals	Alternative A (No Action)	Alternative B (Preferred Alternative)
Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	X	√
Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.	X	√
Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.	X	√
Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, whenever possible, an environment that supports diversity, and variety of individual choice.	X	√
Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.	X	√
Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	0	0
Legend: Contributes substantially to meeting the goal = √ Neither much contributes nor much detracts to meeting the goal = 0 Interferes with that goal achievement = X		

Although Alternative A would not introduce herbicides into the environment, it would not contribute to meeting any of the six NEPA goals. Conversely, Alternative B would contribute to meeting five of the six NEPA goals in the project area. Alternative B provides flexibility in matching the best treatment strategy to the site, target species, conditions, and sensitivity of area. It is based on a sound understanding of the ecology and biology of the exotic pest and its environment. As an adaptive management tool, information about those resources that are managed is continuously updated and used to make adjustments to management approaches. Therefore, Alternative B would be the environmentally preferred alternative.

2.4 ALTERNATIVES CONSIDERED AND DISMISSED

CEQ regulations for implementing NEPA require that Federal agencies explore and objectively evaluate all reasonable alternatives to the Preferred Alternative, and to briefly discuss the rationale for eliminating any alternatives that were not considered in detail. This section describes alternatives to the Preferred Alternative that were considered and eliminated from further study, and the rationale for their elimination.

Biological Control

Biological control is the next frontier in the battle against invasive exotic plants. However, there are concerns about introducing one exotic to control another. As new developments occur in this arena, the NPS would consider and evaluate each new bio-control separately. NEPA compliance would be determined by the anticipated and known impacts of the proposal.

Fire Control

Use of fire to manage exotic species is addressed in the Blue Ridge Parkway Fire Management Plan and Environmental Assessment. Prescribed fires would be applied at a frequency to simulate natural fire frequencies and would be planned and implemented in accordance with the Park's Fire Management Plan. It was, therefore, recommended that this alternative not be considered in detail in the EA.

2.5 MITIGATION MEASURES

The following precautionary or mitigation measures would be implemented to minimize or avoid adverse impacts on environmental resources as a result of implementation of the Preferred Alternative. The NPS would implement these measures as part of the Preferred Alternative.

Herbicide Use

1. Application of herbicides would comply with applicable Environmental Protection Agency label restrictions and State and Federal laws. All label warnings and restrictions would be strictly adhered to by the applicator, including suggested personal protective equipment.
2. Application of herbicides would comply with the NPS IPM protocols, including approval and reporting processes.
3. Herbicides would be applied by Parkway biologists, biological technicians, or personnel trained and certified in chemical application or under direct, on-site supervision of state-certified personnel.
4. Herbicide application would not be permitted when any of the following conditions exists: (1) the temperature exceeds 90 degrees F, (2) the relative humidity is less than 50%, (3) the wind speed exceeds 5 mph, or (4) fog, inversion, or precipitation is present. A daily record of weather conditions would be taken at each project site.

5. Herbicides known to have adverse impacts on aquatic ecosystems would not be applied within 200 feet of streams or open bodies of water, including ephemeral channels, intermittent, channels, wetlands, etc., to minimize human exposure.
 6. Herbicides would be applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human health.
 7. Herbicides would not be mixed or stored within 100 feet of any perennial stream. Herbicides would be mixed off-site and by certified herbicide applicators. Applicators would not carry concentrated amounts of herbicides in the field.
- Only herbicides approved for use near waterways could be considered under chemical treatment methods in wetland and water bodies.

Human Health and Safety

1. Personal Protective Equipment (PPE) would be required by all personnel applying herbicides.
2. Personnel would receive training in use of mechanical tools (power tools and hand tools).
3. Personnel would read human safety concerns associated with each herbicide prior to use.
4. Treatments of exotics at developed recreation areas such as picnic areas and campgrounds or dispersed areas of high concentrated use would be scheduled during low-use periods and when the areas are temporarily closed.

Threatened and Endangered Species

1. Prior to treating an area using any control method, all occurrences of rare species would be determined using existing information and on-site surveys conducted by Park biologists.
2. If required, spot application of herbicides may be used by NPS biologists to mitigate impacts of drift.
3. Chemicals would not be mixed in the immediate proximity of any state- or federally-listed species to reduce and prevent accidental spills.
4. Exotics in wetlands known to contain bog turtle would not be removed during nesting season, generally May through July.

General

1. Personnel would clean their boots, tools, and machinery before departing an infested worksite to reduce seed dispersal.
2. On slopes exceeding 20%, hand pulling or any other treatment option that disturbs surface soils would not be utilized to minimize soil erosion and sedimentation. If a treatment is selected that does disturb soils, then erosion control and reseedling is required to stabilize soils.
3. Any activities that result in large areas of bare soil would be seeded and mulched if native vegetation does not re-colonize the area.
4. At sites where the exotic seed bank is large, treatment methods that disturb and expose open soil (such as hand pulling) would not be used.
5. To minimize impacts to non-target species when using mechanical or chemical treatments the following options would be considered:
 - a. Employ the use of selective herbicides (such as Transline™),

- b. Apply herbicide with high accuracy using cut stump or basal bark techniques,
- c. Apply herbicide when non-target species are dormant and below ground (herbaceous perennials),
- d. Minimize the use of walk-behind mowers.
- 6. Fuel spills would be reported immediately.
- 7. Searches of the immediate area would be made to ensure that nests are not in the effected area. Searches would also be made for animals that may remain in the area, such as snakes, that may rely on camouflage to avoid danger rather than fleeing the area.
- 8. No heavy equipment would be used along stream banks or shorelines to prevent sedimentation of the waters.

2.6 COMPARISON OF ALTERNATIVES

Table 2.6-1 compares the potential environmental impacts resulting from the No Action and Preferred Alternatives (Alternatives A and B, respectively). Potential impacts are grouped according to environmental resource area. Section 4.0, *Environmental Consequences*, of this EA contains a detailed discussion of these potential impacts by resource topic.

Table 2.6-1 Comparison of Potential Impacts of the Alternatives		
Environmental Resource Area	Alternative A (No Action)	Alternative B (Preferred Alternative)
<i>Natural Resources</i>		
Soils	Changes to soil chemistry moderate intensity and long-term impacts	Positive due to removal of exotic. Preserve soil characteristics.
Vegetation	Exotics out-compete native plants causing local extirpation. Moderate to major impacts that are long-term.	Reduction and/or elimination of exotic plants benefit native flora. Negligible and temporary impacts.
Rare Species	Changes to habitat and ecosystem processes would have major long-term impacts to rare species.	Exotic plant control would reduce threat to rare species.
T&E Animals	Impacts would be long-term and could range from negligible to major depending on the species.	T&E animals should benefit from the elimination and control of non-native plants. Some species may benefit significantly.
Wildlife	Impacts would be long-term and could range from negligible to major depending on the species.	While most animals would not be impacted much by the control of non-native plants, others would benefit greatly.
Neo-tropical Migratory Birds	As with impacts to wildlife the impacts would range from negligible to major depending on the species being considered. Impacts would be long-term.	Native birds should not be impacted by this alternative and the large majority would benefit from this alternative.

Environmental Resource Area	Alternative A (No Action)	Alternative B (Preferred Alternative)
<i>Natural Resources</i>		
Wetlands	Changes to plant community structure and composition would have major, long-term impacts to wetland hydrology.	Removal of exotic plants would ensure that wetlands are preserved.
Invertebrate Fauna	Some invertebrates would suffer major impacts from this alternative while the majority would have minor or negligible impacts. All impacts would be long-term.	Invertebrates would have fewer impacts under this alternative and the impacts should be less significant.
Water Quality	The replacement of a native, mixed species forest with a monoculture of a non-native species, or conversion to a non-native pasture would lead to major long-term changes in biotic flora, fauna and water quality.	Water quality should benefit or at least not be harmed by the removal of non-native vegetation.
Environmental Resource Area	Alternative A (No Action)	Alternative B (Preferred Alternative)
<i>Cultural Resources</i>	Non-historical vegetation patterns would be established in all twelve cultural landscapes, each to a differing degree and impact.	Non-historical vegetation patterns could be ameliorated, where desired, and cultural landscape integrity restored.
Environmental Resource Area	Alternative A (No Action)	Alternative B (Preferred Alternative)
<i>Recreational/Visual Resources</i>	The most valued recreational opportunity on the Parkway, scenic viewing, could be lost and changed without a planned control of exotic vegetation.	The native landscape highly planned in the original design intent of the Parkway would be preserved to a greater extent and there would be a positive action toward preservation of campground spaces, maintaining usable trails, keeping Parkway vistas open by preserving them from aggressive exotic vegetation growth.
<i>Human Health and Safety</i>	There are no threats to human health and safety under this alternative.	As long as the herbicides are approved through the NPS process, applied and disposed of in accordance with label instructions, and stored according to NPS standards, there should be no long-term adverse impact to human safety or health.

3.0 AFFECTED ENVIRONMENT

In accordance with CEQ regulations (40 CFR 1502.15), this section describes the existing conditions of the area(s) to be affected by the alternatives under consideration in this EA. As stated in DO-12, the NPS NEPA compliance guidance handbook, only those resources that may experience impact or be affected by alternatives under consideration are described in this section.

3.1 NATURAL RESOURCES

The Parkway intersects three mountain provinces (ridge, plateau, and highlands), fourteen watershed basins, and a dozen municipal watersheds, providing a mosaic of interesting landforms and natural resource features. The natural resources include 1250 vascular plants species, more than 50 rare or endangered plant species, at least 100 exotic plants, six rare or endangered animals, a variety of slopes (mostly steep) and exposures, possibly 100 different soil types, and an elevation change of 5,700 vertical feet. The Parkway also bisects 47 natural heritage areas that include more than half of the high-elevation wetlands known in North Carolina.

3.1.1 Soils

Soils in this area are located on steep slopes. Elevation ranges from 600 feet at the James River in Virginia to over 6,000 feet in North Carolina. The dominant soils are Ochrepts and Udupts. They are moderately deep and deep and medium textured. These soils have a mesic temperature regime, an udic moisture regime, and mixed mineralogy. Dystrochrepts (Ashe, Ditney, Sylico, Brookshire, Ranger, and Ramsey series) and Hapludults (Edneyville and Saluda series) are the principal soils on steep slopes of lower mountains. Hapludults (Fannin, Evard, and Porters series) are on the rolling foothills. Hapludults (Tusquittee series) and Haplumbrepts (Spivey series) formed from colluvium on foot slopes and coves. Boulders and outcrops of bedrock are conspicuous but inextensive on mountain slopes. Haplumbrepts (Burton series) are dominant at higher elevations. In the broad valleys sections of the Park, extensive Hapludults (Brevard, Fannin, Hayesville, Clifton, and Saluda series) are associated with Rhodudults (Rabun and Dyke series) over mafic rocks on rolling hills. Dystrochrepts (Comus and Codorus series) along the many narrow streams are frequently flooded unless protected.

3.1.2 Vegetation

Forest types in the Park are generally classified as Appalachian oak forest, southeastern spruce-fir forest, and northern hardwoods. The predominant vegetation form is montane cold-deciduous broad-leaved forest dominated by the genus *Quercus* (Oak). The oak forest type consists of black, white, and chestnut oaks that dominate dry mountain slopes; pitch pine is often a component along ridge tops. Mesophytic species such as yellow-poplar, red maple, northern red

oak, and sweet birch dominate the valleys and moist slopes. Smaller areas of cold-deciduous broad-leaved forest with evergreen needle-leaved trees are present in the intermontane basins, with the hardwood-pine cover type of scarlet, white, blackjack, and post oaks and Virginia pine. Table Mountain pine, a fire-dependent species with serotinous cones, occurs on xeric ridge tops where fire was historically more common. Eastern white pine dominates small areas of coarse-textured soils and parts of the Blue Ridge escarpment joining the Southern Appalachian Piedmont Section. Mesic sites at higher elevations (4,500 ft, 1,360 m) are occupied by northern hardwoods (e.g., sugar maple, basswood, and buckeye); drier sites are dominated by northern red oak. The broad-leaved forest changes to evergreen needle-leaved forest with conical crowns (e.g., red spruce, Fraser fir) above altitudes of about 5,000 to 6,000 ft (1,800 m). While plant inventories are currently underway, there is currently 1,400 species of vascular plants that are known to occur in the Park.

The rare plant communities included in **Table 3.1.6-1** below occur throughout the Park and across environmental conditions. All of these communities are potentially threatened by aggressive exotic plants. Protection of these communities involves protecting all of the components of the community.

3.1.3 Threatened and Endangered Species

Plants

There are currently 85 known rare plants that occur on Blue Ridge Parkway lands. Five species are federally listed, they are: *Gymnoderma lineare* (rock gnome lichen), *Geum radiatum* (mountain avens), *Liatris helleri* (Heller's blazingstar), *Helonias bullata* (swamp pink), and *Isotria medeoloides* (small whorled pogonia). In addition, 8 species are listed as Federal Species of Concern: *Calamagrostis cainii* (Cain's reed grass), *Cardamine clematitis* (mountain bittercress), *Chelone cuthbertii* (Cuthbert's turtlehead), *Delphinium exaltatum* (tall larkspur), *Geum geniculatum* (bent avens), *Lilium grayi* (Gray's lily), *Silene ovata* (mountain catchfly), and *Euphorbia purpurea* (glade spurge).

Gymnoderma lineare (rock gnome lichen) was federally listed as endangered on January 18, 1995. This rare lichen is primarily found above 5,000 feet on northern exposed vertical rock faces where water flows periodically---only at very wet times. It prefers sites that are generally open with a moderate amount of light. It can occur on southern and western exposures when there is partial canopy coverage. *G. lineare* is known at several locations on the Parkway, one of which is in the vicinity of a high priority exotic removal area, although several thousand feet away.

Isotria medeoloides (small whorled pogonia) was listed as endangered on October 12, 1982. The small whorled pogonia life cycle and habitat requirements are widely varied, but in the southern Appalachians, it typically emerges in April and flowers in late April to mid-May. It occurs on upland sites generally within second- or third-growth mixed-deciduous or mixed deciduous/coniferous forests. Soils are moderately high in soil moisture, highly acidic, and

generally nutrient poor. Small whorled pogonia occurs in both young and old forests with relatively open understory, moderate ground cover, and near features that "create long-persisting breaks in the forest canopy" (Recovery Plan, 1992). Multiflora rose and garlic mustard are exotic species that can be found very near populations of small whorled pogonia in the Park.

Helonias bullata (swamp pink) is a wetland species, preferring hydric soil conditions and moderate shade. Although the species can reproduce sexually, most of its reproduction is asexual by clonal root growth. This means plants tend to grow in clumps, close to the parent plants, and that plant populations can be extremely dense. Densities of up to 56 plants per square meter have been found in southern Appalachia (Sutter 1982). Dense clusters of plants can also occur when plants reproduce sexually because of limited seed dispersal. Sometimes the seeds would fall out of the capsule and land beneath the mother plant. Swamp pink seeds have appendages, and animals may sometimes help disperse the seeds. The species appears to be somewhat shade tolerant and need enough canopy to minimize competition with other more aggressive species. In areas with thin canopies, deer are more likely to eat the plant's flowers, leaves, or shoots. The species is highly vulnerable to siltation of its habitat by run-off associated with adjacent development. Multiflora rose threatens swamp pink at some sites.

Lilium grayi (gray's lily) is known to occur along trails and along roadside habitats in the Park. This herbaceous perennial prefers moist habitats at mid to upper elevations (4,000' to 6,000'). Light conditions are variable for this species, ranging from full sunlight in open meadows, to filtered shade in forested settings. Recent concerns about decline in this species due to a suite of native fungi has spurred interest in experimenting with increasing light levels and improving air movement at sites where this species occurs. At some populations, there are a number of exotic plants present.

Silene ovata (mountain catchfly) grows mainly in upland forests on slopes in humus-rich, rocky, often thin soils. The plants are normally in partial shade. *Silene ovata* is known to be a perennial, but its longevity is unknown. Colonies of the species may be locally extensive because of the potential ability of the plant to produce individual clumps from a system of creeping underground rhizomes. The Mountain Catchfly is not an aggressive or competitive herb. Competition from exotic plant species can be a threat to populations. These species, as well as the uncontrolled growth of native woody plants and saplings, can form dense stands and eliminate ground layer herbaceous species (including this herb) due to excessive shade. Japanese spiraea occurs nearby several populations for this rare plant.

Euphorbia purpurea (glade spurge) is a tall (1 m) herbaceous perennial that occurs in generally moist nutrient rich soils. This species does not compete well with invasive exotic plants. Glade spurge can tolerate a wide range of light conditions, from full sunlight to deep shade. Multiflora rose is present at some of the sites where *Euphorbia purpurea* occurs.

Delphinium exaltatum (tall larkspur) is a tall (1-2 m) herbaceous perennial that occurs on deep humus nutrient rich soils. This species requires moderate sun, typical of conditions found along the forest edge. Competition with invasive exotic plants is a concern with this species. This rare plant is threatened by multiflora rose at some sites.

The remaining list of rare plants all have the potential of being impacted by exotic plants throughout the Park. These species occur over a range of habitats and environmental conditions. Often the same species occurs along the edge of the Parkway motor road and in adjacent forest. Many species occur along hiking trails, and some occur near Parkway developed areas. In general most populations contain between 10–100 or more individual plants. Some populations are tightly clustered while others are widely dispersed. Nearly all the species in Appendix C are herbaceous, and are therefore dormant and below ground between November and March. Some species are evergreen herbs or woody species with biomass located above ground year-round. Approximately one-third of the species in Appendix C are potentially threatened by exotic plants.

Three federally-listed animal species are known to occur within the Park and all three may occur near proposed treatment areas. These are: Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*) (US, NC, VA Endangered); bog turtle (*Clemmys muhlenbergii*) (US, NC Threatened, VA Endangered); and Virginia big-eared bat (US, NC, VA Endangered). Five other species, Indiana bat (*Myotis sodalis*) (US, NC, VA Endangered), Gray bat (*Myotis grisescens*) (US, NC Endangered), eastern cougar (*Felis concolor cougar*) (US, NC, VA Endangered), Spruce-fir Moss Spider (*Microhexura montivaga*) (US Endangered) and Saint Francis' Satyr (*Neonympha mitchellii francisci*) (US Endangered, VA Proposed T), are not known to, but may, occur within the Park. Each of these species would be discussed separately below.

Bald Eagles (*Haliaeetus leucocephalus*) (US, VA Threatened, NC Endangered) and Kirtland's Warblers (*Dendroica kirtlandii*) (US, VA Endangered) migrate across the Parkway and do not use Parkway lands enough to be impacted.

Species on the North Carolina or Virginia threatened and endangered lists that would not be impacted include Engraved Covert (*Fumonelix orestes*) (NC Threatened), Peregrine Falcon (*Falco peregrinus*) (NC Endangered, VA Threatened), Appalachian Bewick's Wren (*Thryomanes bewickii altus*) (NC, VA Endangered), Henslow's Sparrow (*Ammodramus henslowii*) (VA Threatened) and Wehrle's Salamander (*Plethodon wehrlei*) (NC Threatened).

Carolina Northern Flying Squirrel (*Glaucomys sabrinus coloratus*): The Carolina northern flying squirrel was federally listed as endangered in 1985. They are nocturnal and are primarily found in moist boreal habitats, especially northern hardwood and spruce-fir forests with down and standing snags. Radio-tracked animals have demonstrated a biphasic activity pattern with peaks between sundown and midnight and 1-3 hours before sunrise (Recovery Plan, 1992). Telemetry in North Carolina suggests that their home range is 2-3 hectares in summer and during the winter they can cover large areas (more than 30 ha) and move almost a kilometer in a direct line in a few minutes (Recovery Plan, 1992).

These squirrels feed primarily on hypogeous fungi, which are found more often in areas with spruce trees (Loeb *et al.*, 2000). Flying squirrels also eat other plants parts including lichens, fruits, seeds and conifer seedlings (Thysell *et al.*, 1997). While gaining nutrients from fungi flying squirrels also contribute to the dispersal and diversity of fungi and microbial species in

spruce-fir forests (Thysell *et al.*, 1997), playing an important role in the maintenance of these systems. The establishment of non-native plant species in spruce-fir forests may affect the availability of the squirrel's food sources, the viability of flying squirrel and the continuation of the forests.

Bog Turtle (*Clemmys muhlenbergii*): The bog turtle is considered to be the rarest freshwater turtle in North America and is currently listed as endangered in nearly every state within its range, including Virginia and North Carolina. Northern bog turtle populations (i.e., from Maryland north) are currently classified as Threatened under the Endangered Species Act (ESA). For the purpose of regulating illegal commercial collection, southern bog turtle populations (from Virginia south) are also classified as Threatened under the ESA due to similarity of appearance to the northern populations (USFWS, 1997).

Bog turtles are closely associated with sphagnaceous bogs, marshy meadows and pastures characterized by small, shallow streams or trickles with soft bottoms and by various sedges and other aquatic and semi-aquatic plants (Palmer and Braswell, 1995). Most of the known localities are disjunct with small, isolated populations. Because of their local occurrence and highly specific habitat requirements, in places often drained or otherwise altered adversely by humans, many populations of bog turtles are threatened with extinction. Much of the bog turtles range in Virginia and North Carolina is scattered along a narrow belt located in and along the Blue Ridge Parkway. Within the Parkway, the bog turtle is found in only four Virginia counties, and in North Carolina, only three.

Bog turtle populations are believed to be declining throughout their range (Carter, 1997; USFWS, 1997). This population decline is believed to be the result of illegal collection for the pet trade, and loss of habitat through ditching, draining and filling in of wetlands for development and agriculture (Mitchell, 1994). However, other factors including the species' low reproductive rates, isolation of individual populations, predation, flooding of habitat by beaver, mortality due to vehicles, livestock grazing, and pollution may also be contributing to the bog turtle's decline (USFWS, 1997).

Consequently, wetlands along the Blue Ridge Parkway are important to protection of bog turtles, offering one of the last refuges where both the bog turtle and its habitat are protected. Wetlands along the Blue Ridge Parkway, however, are not pristine and many have been impacted by past agricultural activities and development. Encroaching non-native plant species would further impact these sites and may make them unsuitable for bog turtles.

Virginia Big-Eared Bat (*Corynorhinus townsendii*): Virginia big-eared bats are a federally-listed endangered species found in several counties adjoining the Blue Ridge Parkway. In 2003 a Virginia Big-Eared bat was found for the first time on Parkway lands. These bats live year round in caves or abandoned mines, though their winter and summer roosts may differ. Usually found in mountainous regions above 1500 feet, the caves are in oak/hickory forests or where beech, maple or hemlock dominate. Unless non-native vegetation limits access to caves these bats should not be affected by the introduction of exotic plant species.

Indiana Bat (*Myotis sodalis*): Indiana bat is an endangered species that occurs throughout much of the eastern United States. During the winter they hibernate in large groups in caves and mines. With only seven locations identified Indiana bats are highly vulnerable to disturbances, habitat change or environmental contaminants at this time. In the spring the bats migrate north and form nesting colonies, roosting under the loose bark of dead, large-diameter trees between mid-April through mid-August. The diet of Indiana bats is largely nocturnal insects. Except for exotic plants that may cover entire trees, such as kudzu, non-native plants should have no impact on Indiana bats.

Gray Bat (*Myotis grisescens*): Gray bats use caves in both summer and winter. They forage for insects over lakes and streams. This endangered species should not be affected by exotic vegetation encroachment or control.

Eastern cougar (*Felis concolor cougar*): Parkway employees and other land management agencies continue to receive occasional reports of cougar sightings. While many of these reports likely involve bobcats, dogs or other large animals, some come from people who are familiar enough with large mammals to be considered credible sources. Many biologists have assumed that even if these were valid reports of cougars that they were of cats that were raised as pets and were released into the wild as the owner realized the work and difficulty in keeping an animal of this size. The assumption being that even if there were cougars living in the Southern Appalachians, that they were not a reproducing population. Recently, however, there have been reported sightings of cougar kittens, suggesting that a wild population is being established.

Federally listed as endangered, mountain lions are a secretive animal, occupying large forested areas and seemingly at home in coastal swamps as well as on mountain slopes. They occur primarily in undisturbed habitats that support healthy populations of their primary prey species, the white-tailed deer (Biggs, 1985). Abundant prey allows cougars to survive on smaller areas at higher densities and stable prey populations permit a more stable cat population (Macdonald, 1993). Seen as a threat to domesticated animals and as a competitor to deer hunters, cougars have been hunted throughout their range (Macdonald, 1993). Because of their wide-ranging habits and their status as a top-level carnivore, cougars should not be affected by the establishment of non-native plants.

Spruce-fir Moss Spider (*Microhexura montivaga*) (US Endangered) is found in damp moss mats on rock outcrops and boulders in well shaded situations within spruce-fir forests. While several surveys have been conducted they have not been located on Blue Ridge Parkway lands. These animals are dependent to spruce-fir forests. While these high-elevation forests are not as affected by non-plants as are lower level, more degraded ecosystems, the spruce-fir moss spider would be imperiled by any exotic vegetation that would impact spruce-fir forests.

Saint Francis' Satyr (*Neonympha mitchellii francisci*) (US Endangered, VA Proposed T) has been found in wetlands nearby. It has not yet been located on Blue Ridge Parkway lands. Additional Saint Francis' Satyr surveys would be conducted on Parkway lands since few surveys have been conducted and suitable habitat is available. These habitats are vulnerable to exotic vegetation intrusion and are currently being impacted.

Peaks of Otter Salamander (*Plethodon hubrichti*) are known to occur in the project area. It is a G1/S2 species. This salamander inhabits mature Appalachian hardwood forests at elevations above 550 m above sea level. Loose rocks or logs are usually present and serve as ground cover. During wet, rainy periods, the salamanders are usually active and forage at night. The Peaks of Otter salamander is known globally only from a small section of the northern Blue Ridge Mountains in Virginia and adults seldom disperse more than several yards during their entire lifetimes. Colonization of newly created habitats; therefore, is very slow for this salamander. Because this species does not disperse widely, the greatest threat to this salamander is from forest fragmentation within its range through logging activities and the creation of roads, trails, and utility corridors (Virginia Department of Conservation and Recreation). Exotic plants would only affect Peaks of Otter salamanders if there was a dense, large scale intrusion onto their habitat. Even this impact would be less intrusive than removal of the vegetation or fragmentation of habitat as would occur with logging or development of a site.

3.1.4 Wildlife

The Parkway supports a variety of wildlife species. Most commonly observed are whitetail deer, squirrels, rabbits, groundhogs and songbirds. Dozens of less visible species are found throughout Parkway lands including approximately 70 species of mammals, 49 of amphibians, 34 reptile species, 50 species of fish and more than 300 types of birds. Many of these native species have developed a dependence on native plants for food, nesting and refuge. In many cases the animal would be able to switch over to using non-native plants, in some cases this may not be an easy matter. Native plants generally would provide better habitat and food resources to animals and these animals would benefit from the removal of non-native plants and the restoration of native vegetation communities.

3.1.5 Migratory Birds

Executive Order 13186 directs each Federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the U.S. Fish and Wildlife Service to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts or other agreements; and the creation of or revisions to land management plans. In addition to avoiding or minimizing impacts to migratory bird populations, agencies are expected to take reasonable steps that include restoring and enhancing habitat, preventing or abating pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible.

Waves of migratory songbirds travel along the Blue Ridge Parkway during the spring and fall migrations and over 150 species have been identified as breeding here during the summer months. Nesting birds take advantage of the various vegetation communities and breeding birds can be found the length of the Parkway in virtually all habitats, including those areas dominated by exotic plants. Just about any native fruit or seed, and even most non-native foods, found

along the Parkway are fed upon by birds. However, species that take advantage of native plants may not be the same as those that use exotic plants. There is growing evidence that non-native plants do not provide the same nesting and foraging opportunities as native plants.

While exotic plants may provide nesting and feeding resources for migratory birds, these plants are not a substitute for native plants. Overall the removal of exotic plants and restoration of native communities would be beneficial to birds

3.1.6 Wetlands

There are currently 84 known wetlands that occur on Blue Ridge Parkway lands. All wetlands in the southern Appalachians have a G1, G2, or G3 global rarity ranking making them significantly rare resources. A list of globally rare plant communities are contained in **Table 3.1.6-1**. Of these communities the High Elevation Seep, Montane Alluvial Forest, Southern Appalachian Bog (Northern Subtype), Southern Appalachian Bog (Southern Subtype), and Swamp Forest-Bog Complex (Typic Subtype) are wetlands.

Table 3.1.6-1 List of rare communities that occur within Blue Ridge Parkway lands	
COMMUNITY NAME	G RANK
Boulderfield Forest	G3
Carolina Hemlock Bluff	G2G3
Fraser Fir Forest	G1
Grassy Bald	G2
High Elevation Granitic Dome	G2
High Elevation Rocky Summit	G2
High Elevation Seep	G3
Montane Alluvial Forest	G2
Montane Mafic Cliff	G2
Northern Hardwood Forest (Beech Gap Subtype)	G2
Red Spruce--Fraser Fir Forest	G2
Southern Appalachian Bog (Northern Subtype)	G1
Southern Appalachian Bog (Southern Subtype)	G1
Spray Cliff	G2
Swamp Forest-bog Complex (Typic Subtype)	G2G3

Survey and inventory work for exotics in the Parks wetlands is partially complete. Findings indicated that approximately one-fourth of the wetland sites have some level of exotic infestation; the principal exotic plant is multiflora rose.

3.1.7 Invertebrate Fauna

Some invertebrates are dependent on native plant species at certain stages of their lives. While adult butterflies may take advantage of the nectar from the flowers of both native and exotic plants, the caterpillar stage often depends on a specific species of native plant as a food source (Chong, *et al.*, 1999). If this native plant is lost due to competition from non-native species then the butterfly may be lost as well. As an example, Appalachian Azure (*Celastrina neglectamoja*) uses black cohosh (*Cimicifuga racemosa*) as its host plant and the loss of this plant would also threaten the Azure.

Many aquatic invertebrates depend on streamside vegetation and other allochthonous materials as their primary food source. A diverse, mixed species forest provides better food resources than the monocultures, or communities that are dominated by single species, which often occur in areas taken over by non-native plants (Sweeney 1993). In feeding studies a leaf eating mayfly had significantly lower larval survivorship when eating three different non-native types of leaves rather than native leaves. All of the mayfly eating multiflora rose died (Sweeney *et al.* 1992). (Dr. John Jackson, pers. comm.)

3.1.8 Water Quality

The Blue Ridge Parkway contains numerous headwaters and tributaries, many of which contain pristine wild brook trout fishery. Six hundred miles of streams occur within fourteen watersheds, including three municipal watersheds. There are more than 250 acres of wetlands and miles of floodplains along creeks and rivers.

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, establishes a national policy to restore and maintain the physical, chemical, and biological integrity of the Nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. In general, the maintenance of forested riparian areas comprised of a diversity of species would help maintain the desired characteristics of a high quality stream (Sweeney 1993). Most actions that reduce the diversity of plant species in the riparian zone would lead to a reduction in some aspect of the desired aquatic system.

The establishment of non-native plants similar to the type of native plants they replace (exotic trees vs. native trees) would generally have little impact on water quality. However, the replacement of a native, mixed species forest with a monoculture of a non-native species, or conversion to a non-native pasture would (Sweeney 1992).

Removal of a small area of exotic trees or other plants near or upslope of water resources could locally affect water quality due to impacts to stream banks, increased erosion and sedimentation, reduced stream shading and reduced nutrient input. This impact however would be of such a small degree, and to such a restricted area, that it should not affect stream or lake quality overall. A stream that is well-shaded would not be impacted by the loss of the small number of plants

that would be removed under this Plan. Streams that are already lacking in woody vegetation, such as those in some Parkway developed areas or agricultural fields, would likewise see no change to water quality. Water quality would not be addressed as an impact topic in this document.

3.2 CULTURAL RESOURCES

3.2.1 Historic and Pre-Historic Structures

The Blue Ridge Parkway presents an extremely broad spectrum of historic structures and related socio-cultural themes that are intrinsically tied to management of these valuable cultural resources. According to the List of Classified Structures (LCS), there are more than 100 historic buildings/structures on the Blue Ridge Parkway. Most of these are 19th- and early 20th-century log and/or frame vernacular dwellings and associated outbuildings. Almost all of these serve some role in interpreting various aspects of the lifestyles and folkways that would have been typical of the southern Appalachians prior to the beginning of construction on the Parkway in the late 1930s. There are other historic resources on the Blue Ridge Parkway, including the remains of early 19th-century canals, the estates of wealthy individuals who built summer retreats in the late 19th century, and buildings/structures associated with the earliest period of construction of the Parkway (1936-41).

3.2.2 Cultural Landscapes

More than twelve sites within the park have been identified as potential historic districts, with significant assemblages of buildings and landscapes. Each of these is being reviewed as time and funds allow for importance to the park and to the region as cultural landscapes. Cultural Landscape Reports have been prepared for Moses H. Cone Memorial Park, Doughton Park, and Otter Creek.

3.2.3 Ethnographic Resources

The Parkway is undertaking an ethnographic assessment and overview that would provide evidence of relationships or affiliations for stakeholders that have traditionally valued park resources. This may include American Indian groups or individuals who have prehistoric, historic and contemporary affiliations with natural or cultural resources in the park. This study was begun in 2005 and would conclude in 2008.

3.2.4 Archeological Resources

The Blue Ridge Parkway has archeological remnants from more than 58 sites representing four broad archeological periods: Paleo-Indian, Archaic, Woodland, and Mississippian. Most sites known in the park are from the archaic period. The Paleo-Indian and late Mississippian periods are known in the park but are not well represented.

3.2.5 Archival and Museum Collection

Completed in September 1990, the park archives has more than 400 linear feet of records, audio transcripts, maps, drawings and plans. The park's total collection exceeds 622,000 archival objects with an estimated 43,000 objects that need to be catalogued. The number of researchers wanting to use the archives is increasing, with an estimated 70 people currently using the facility each year.

The park maintains more 1350 museum objects representing a cross-section of historical, biological and geological resources. More than 300 of these objects are being used in park exhibits, another 15,000 are on loan to other institutions, and 9,000 archeological resources are maintained by the NPS Southeast Archeological Resource Center (SEAC) in Tallahassee, Florida. Because of its favorable climate and staff expertise, the Parkway is being considered as a regional repository for NPS collections.

3.2.6 National Register of Historic Places

The Blue Ridge Parkway has a national level of significance and is being proposed for nomination to the National Register of Historic Places as a historic district. It relates to the following National Historic Landmark themes:

- *Transportation (XIV) (subtheme G, automobiles, buses, wagons and highways):* The Blue Ridge Parkway was the first rural national parkway. It is the prime example of a long distance road designed for recreational motoring – a function that it continues to serve today.
- *Landscape Architecture (XVII):* The Parkway occupies a special position within the National Park System. Unlike most other parks, the Parkway is an artifact. In its entirety it is a work of art, a serpentine road set within a carefully manipulated landscape. It is a work of extraordinary scale and complexity.
- *Conservation of Natural Resources (XXXII) (subtheme C, the conservation movement matures, 10 the Great Depression and Conservation):* The Blue Ridge Parkway pioneered a new type of conservation, remarkable for its synthesis of diverse land management programs creating, in Abbott's words, "a museum of managed American countryside."

Though the period of significance is 1935 to 1942, the historic district would include log cabins dating from the first half of the 19th century, such as the Sheet's Cabin that dates to around 1815.

The following categories of resources are proposed to contribute to the historical significance of the Blue Ridge Parkway:

- Road: roadway, bridges, tunnels, walls, drainage structures, parking overlooks, signs

- Landscape: cuts and fills, reforested woodlands, woodland edges, cleared views shown on the Park Land Use Maps (PLUMs), farmlands, split rail fences, restored lands
- Recreation Areas: Landscapes, recreational developments (food, lodging, trails, picnic areas, campgrounds with associated shelters, comfort stations), maintenance areas
- Exhibits: Exhibits of pioneer buildings and structures

3.3 RECREATIONAL/VISUAL RESOURCES

The Blue Ridge Parkway was created and legislatively intended to be a scenic parkway. In visitor surveys scenic viewing is considered the most valued recreational opportunity, with hiking also showing high participation. There are over 960 vista cut areas on the Parkway. Original Planning Land Use Maps (PLUM) of the Parkway depict exacting locations where vista views were planned as part of the alignment engineering of the Parkway. Panoramic, canopy, open, vista, and other types of designed scenic experiences were an intended historic design element shown on the PLUM's of the Parkway, and these areas require extensive vista clear cutting and landscape maintenance. The fall leaf color display is historically our most visited scenic recreational opportunity on the Parkway, with the month of October at its peak. The Parkway is a highly designed landscape with PLUM's indicating planted grass, shrub, and tree bays aesthetically displayed along the Parkway with the design intent to provide foreground interest to the panoramic background of the Appalachian Mountains. The original landscape of the Parkway included almost exclusive use of native species that were often transplanted from the alignment footprint of the Parkway. Some exotic plants quickly crowd out space for open sun, and on the Parkway that would include grassed Parkway cut and fill slopes, trails, agriculture fields, and other open areas presently maintained to keep views open or to stabilize areas from sliding or eroding. Trees such as ailanthus have been known to grow in rocky slopes, which may be the cause of some rock slides, which is a very serious traffic safety issue on the Parkway.

Many of the exotics listed such as ailanthus, mimosa, paulownia, are known to proliferate in the vista cut areas that must be clear cut on the Parkway to maintain open views. Some of these plants have been documented to grow 3 to 4 feet per year, which quickly obscures the open view before they can again be clear cut. The Parkway is presently on a three-year cycle to recut each of the 960 total vista cut areas due to limited man-power and funding. It has been documented that growth of exotic vegetation can reach heights of 12 to 15 feet before they can be recut to preserve the vista. Such rapid prolific and dense vegetation growth can therefore quickly change and alter the scenic viewing opportunities to the Parkway visitors. Exotics can change the nature of the fall color display, and change the nature of the forest types. They can lessen the native flower display that visitors travel many miles to see.

3.4 HUMAN HEALTH AND SAFETY

Herbicides are currently applied by Parkway biologists, biological technicians, or personnel trained and certified in chemical application or under direct, on-site supervision of state-certified personnel. Treatments of exotics at developed areas such as campgrounds and picnic areas and/or areas of high use, poses a direct threat to the health and safety of staff who are applying the herbicide and those people who are in the project area.

Public health and safety and the welfare of visitors are the greatest concerns of the NPS. The NPS encourages visitors to be aware of park staff operations when coming into the area, and advises them when situations are, or have the potential to be, life-threatening. Precautions are taken to notify park staff and visitors when applications of herbicides are in progress.

4.0 ENVIRONMENTAL CONSEQUENCES

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented. This section analyzes the environmental impacts of the two alternatives for the management of invasive exotic plant species that occur on Parkway lands on natural resources, cultural resources, recreational/visual resources, and human health/safety. This analysis provides the basis for comparing the effects of the two alternatives. The intensity and duration of the impacts, mitigation measures and cumulative impacts were assessed in considering the impacts.

4.1 METHODOLOGY

The interdisciplinary study team (see Section 8.0, List of Preparers) followed a structured process to analyze the potential environmental impacts, or effects, resulting from the Preferred and No Action Alternatives. This process, called the cause-effects-questions process, is described below.

**Causes-Effects-Questions:
A Structured Analytic Process**

- Step 1:** Identify the specific activities, tasks, and subtasks involved in the proposed action(s) and alternative(s).
- Step 2:** For each specific activity, task, and subtask, determine the full range of direct effects that each could have on any environmental resource. For example, removing vegetation could cause soil erosion.
- Step 3:** For each conceivable direct effect, identify which further effects could be caused by the direct effects. For example, soil erosion could cause stream sedimentation, which could kill stream species, which could diminish the food supply for fish, leading to decreased fish populations. This inquiry can identify multi-stepped chains of potential causes-and-effects.
- Step 4:** Starting at the beginning of each chain of causes-and-effects, work through a series of questions for each potential effect:
- Would this effect actually occur from this project?
If not, why not? What would preclude it from happening?
 - If the effect cannot be ruled out, characterize which types of data, other information, and analyses are needed to determine the parameters of the effect, including its extent, duration, and intensity. Identify the sources from which the data is to be obtained.
- Step 5:** Gather the data and conduct the analyses identified by the above steps. Gather and use only relevant information. Focus on getting sound answers to the impact questions.
- Step 6:** Document the results of this study process. Provide all relevant analytic information, but no extraneous encyclopedia bulk.

Using this process, both direct and indirect effects that could potentially occur as a result of the Preferred Alternative and its alternatives were identified. Direct effects are impacts caused by the alternative(s) at the same time and in the same location as the action. Indirect effects are impacts caused by the alternative(s) that occur later in time or farther in distance than the action.

In this document, the study team based its analysis of impacts and conclusions on discussions with the scientific community, a review of scientific literature and park studies, and on professional judgments of Park technical experts. Using these data, the team determined which impacts would occur and assessed them according to their duration, extent, intensity, and whether or not the impact would cause impairment to Park resources. These parameters are defined below. Potential mitigation measures were also identified and analyzed to reduce or avoid potential adverse impacts resulting from the Preferred Alternative (see Section 2.5 of this EA).

4.1.1 Definitions

Thresholds of Change:

Threshold events are marked by a distinct change in conditions or level. Although environmental thresholds are not events in themselves, data from extensive monitoring programs and more general sources of information indicates that thresholds of change may be identifiable

for this project and that a practical means of monitoring proximity to thresholds is available. The thresholds of change of a biological or ecological impact are designated as *intensity* and *duration*.

Intensity:

For the purpose of this analysis, intensity or severity of the impact to the resource or discipline is defined as:

- *Negligible* is barely perceptible, not measurable, and confined to a small area
- *Minor* is perceptible, measurable, and localized
- *Moderate* is clearly detectable and could have appreciable effect
- *Major* is substantial and highly noticeable

Duration:

For the purpose of this analysis, duration of the impacts to the resource or discipline is defined as:

- *Short-term* are those that occur during implementation of the alternative
- *Long-term* are those that extend beyond implementation of the alternative and would likely have permanent effects

4.1.2 Impairment of Park Resources

The purpose for which the Blue Ridge Parkway is managed is articulated in the 1916 Organic Act establishing the National Park Service. The Organic Act tells us that the purpose is:

“to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for the enjoyment of future generations.”

The National Park Service may not allow the impairment of park resources and values unless directly and specifically provided for by legislation or by the proclamation establishing the park. Impairment that is prohibited by the *Interim Technical Guidance on Assessing Impacts and Impairment to Natural Resources (July 2003)*, National Park Service Organic Act, the General Authorities Act, and National Park Service Management Policies is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values had the impact not occurred.

NPS Management Policies outline the conditions under which an impact would be likely to result in an impairment of Park resources. According to the Policies, an impact would likely create an impairment to the extent that the conservation of the affected resource or value is: 1) essential to fulfill a purpose established in the enabling legislation or proclamation of the Park; 2) key to the integrity (natural or cultural) of the Park or its opportunities, 3) identified as a goal in the general management plan for the Park. If an impact is an unavoidable result of an action required to maintain or restore the integrity of Park resources or values, and cannot be reasonably mitigated, the impact would be less likely to constitute an impairment of Park resources (NPS, 2001a).

4.1.3 Cumulative Impacts

A cumulative impact is an impact on the natural or human environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency, organization, or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor and insignificant, but collectively significant actions, taking place over a period of time.

Cumulative impacts were assessed by combining the potential environmental impacts of the alternatives with the potential impacts of known projects that have occurred in the past, are currently occurring, or are projected to occur in the future.

4.2 ALTERNATIVE A: NO ACTION

4.2.1 Natural Resources

Soils

Under this alternative, invasive exotic plants would continue to increase in abundance. Non-native plants may reduce or deplete water levels. Soil erosion increases drastically when exotic weeds replace native grasses (NPS, 2003) by altering runoff patterns, thus diminishing both the land and water quality. Some non-native plants release toxic chemicals into the soil or harbor diseases, increasing stress on native plants. Some nitrogen-fixing non-natives increase soil fertility, allowing other non-natives to out-compete plants that have evolved in the nutrient-poor native soils. Allowing exotic plants to proliferate natural ecosystems may result in repeated and long-term changes to soil chemistry and soil microbial community as non-native species utilize resources differently than the native flora.

Under this alternative, changes to soil chemistry and soil erosion are minor to moderate, depending on the level of infestation. The changes to soil resources would be long-term. The impact to soil resources would increase over time as exotic species infestations grow in size and distribution across the landscape. Efforts to control exotics in the past have received limited attention by both NPS and adjacent agencies, such as the U.S. Forest Service.

Compared to other threats, exotic plants pose the biggest threat to soil resources. Threats such as landslides occur sporadically and in small pockets within Park; their occurrence is related to factors involving construction of the Park motor road across steep slopes. Other threats include trampling by visitors at fragile sites where vegetation is quickly destroyed leaving bare exposed soil that is susceptible to compaction and erosion; this threat occurs over a variety of areas (social trails) and scattered locations in the Park. Other minor threats to soil resources include vista management and hazard tree management; these threats while pervasive in the Park, only rarely result in degradation of soil resources.

Under this alternative, overall impacts to soil resources would be of moderate intensity and have long-term impacts. Occurrences are small and in isolated pockets that are manageable. Exotic plant incursion, by far, is the biggest threat to this resource. Implementation of Alternative A would not result in an impairment of the Blue Ridge Parkway's soil resources.

Vegetation

Under this alternative, approximately 4,000 acres of globally critically imperiled habitat and 5,000 acres of globally imperiled habitat are threatened by exotic plant incursion (10% of NPS land base). These habitats include, spruce fir forests, high elevation rock outcrops, grassy balds, and wetlands.

Aggressive exotic plants would invade natural areas and crowd out, smother, and out-compete native species. Large extensive patches of exotic plants may hinder seed dispersal of native species. In addition, pollination and seed dispersal vectors could be negatively impacted by exotic plants that would result in wide ranging negative impacts for native ecosystems. There are no natural mechanisms in place that would help control or limit the spread of these non-native invading species. The growth and spread of exotics could also change natural fire patterns and intensities, resulting in altered ecosystems. Exotic species could interbreed with native species which as a negative effect on native gene pools.

Since each exotic species has slightly different environmental impacts to vegetation resources, the following sections divide the most invasive exotic plants into growth form categories. Additional information about each exotic species is presented in the Park's *Exotic Plant Management Plan*.

Herbaceous Plants: Garlic mustard (*Alliaria petiolata*), a shade tolerant annual plant, out-competes native plants by aggressively monopolizing resources such as light, nutrients, moisture, and space. Japanese stiltgrass (*Microstegium vimineum*), an annual plant, threatens understory vegetation in open to shady location; it is adapted to low-light conditions. It can also invade wetland areas. One of the most opportunistic exotics is spotted knapweed (*Centaurea biebersteinii*). It colonizes a variety of natural and human-made habits, including fields, pastures, meadows, and forests. It reduces forage production for livestock and wildlife. Purple loosestrife (*Lythrum salicaria*) invades natural and disturbed wetlands by forming a dense homogenous stand and replacing plants that provide a higher quality source of nutrition for wildlife.

Trees: Tree of heaven (*Ailanthus altissima*) produces toxins that prevent establishment of other plants, resulting in impenetrable thickets. In addition, the aggressive root system can cause damage to foundations and sewers. Princess tree (*Paulownia tomentosa*) is an aggressive invader of newly disturbed sites, produces prolific seed crops, and is relatively long lived.

Vines: Oriental bittersweet (*Celastrus orbiculata*) and kudzu (*Pueraria montana*) completely cover all levels of vegetation in open and forested areas. These species reduce or eliminate photosynthesis, girdles woody stems and tree trunks, and sometimes uproots trees and shrubs with its massive weight, thus killing its host plant. Recently discovered on the Parkway, porcelainberry (*Ampelopsis brevipedunculata*) invades recently disturbed urban and open landscapes. It shades smaller plants and out-competes native plants for water and nutrients. Areas of the Parkway that adjoin neighboring residential areas are particularly vulnerable.

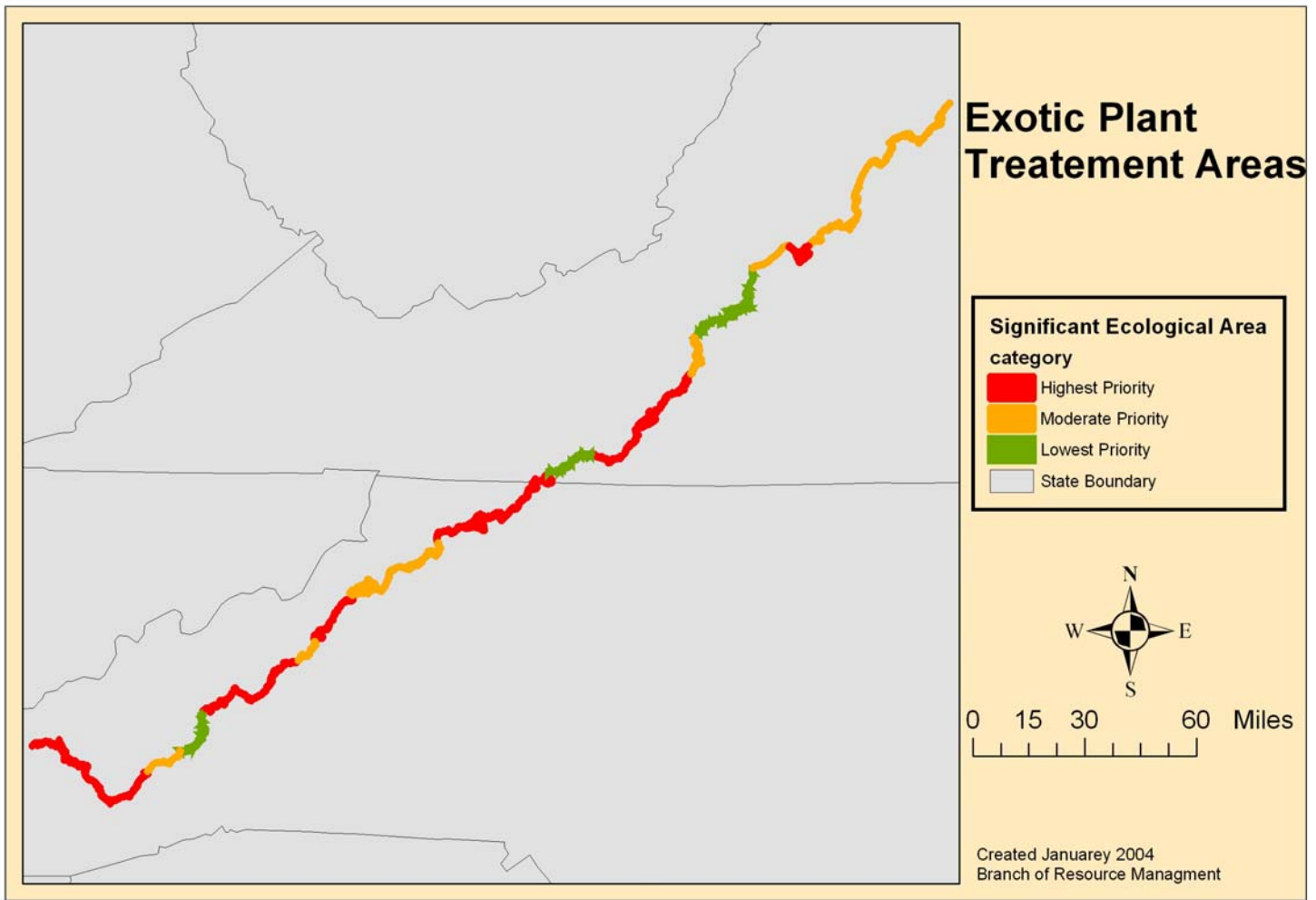
Shrubs: Multi-flora rose (*Rosa multiflora*), Japanese spiraea (*Spiraea japonica*), and wineberry (*Rubus phoenicolasius*), form dense, impenetrable stands that kill and exclude native herbaceous plants and shrubs. Russian/autumn olive (*Eleagnus sp*), widely planted as a food source for wildlife, has begun to form new forests, displacing many native trees. These species are distributed by birds and mammals.

The Parkway has a very high exterior/interior ratio as compared to most parks in the National Park System. Consequently, impacts from outside influences are high. The impacts of exotic plant incursion combined with air pollution, trampling, habitat destruction/fragmentation, and lack of natural fire regimes, threaten continued existence of many globally critically imperiled and globally imperiled communities, as well as old-growth forests, and high elevation wetlands. Exotic species invasions, considered the second greatest threat to biological diversity (Simberloff, 1996), would continue to invade Parkway landscapes, eventually fragmenting natural areas or extirpating them altogether, causing tremendous loss of biological diversity.

The Park also manages more than 5,000 acres as agriculture to provide an experience of viewing rural farms, their landscapes, and adjacent landscapes ranging from one-tenth mile to more than 50 miles. This program has become an intrinsic experience to visitors of the Park. However, Simberloff contends that landscapes of forested patches interspersed with farms and residential areas are much more easily invaded by exotic plants (1996). While this activity provides biological and viewing diversity and is integral to the visitor experience, it contributes directly to the incursion of exotic plant species. It also fragments forested habitat along the Park corridor.

Currently, exotic plants have begun to invade the Park's most important natural areas within high priority areas zoned by the *Exotic Vegetation Management Plan* for the Park. (see Figure F-2) Adverse impacts are already beginning to approach the moderate range of adverse impacts at these sites. In lower priority areas, moderate to major disruption is already occurring. As invasive exotic plants increase in abundance, there would be moderate to major disruption of native vegetation, and this change would remain for the long-term. Local species extirpation could result; however, implementation of Alternative A would not lead to an impairment of the Blue Ridge Parkway's vegetation resources.

Figure F-2 Graphic of Exotic Priority Zones



Threatened and Endangered (T&E) Species

Section 7 of the Endangered Species Act requires that a Federal agency consult with the USFWS or the National Marine Fisheries Service on any action that may affect endangered, threatened, or candidate species, or that may result in adverse modifications of critical habitat. Implementing regulations that describe procedures for interagency cooperation and consultation with regards to effects on threatened, endangered, or proposed species are contained in 50 CFR 402.

The USFWS, the VDCR, and the NC Natural Heritage Database were contacted in May 2006 regarding potential impacts of the project on natural heritage resources, including rare, threatened, or endangered plant and animal species. Under this alternative, threatened and endangered species would be at risk due to changes in habitat and ecosystem processes.

According to Simberloff (1996), 424 of the 632 Federally-listed species at the time of his survey were threatened by habitat destruction. For those that were plants, the primary threat was domination of their new habitat by introduced species. A rare native insect in West Virginia is threatened by an exotic plant (garlic mustard) because the exotic is extirpating the food source (toothwort family) of the insect's caterpillar stage. While local extirpation of specific species is not known for the Park, it is conceivable that it may be occurring.

Habitat conditions would change due to altered plant composition from competition by aggressive exotic plants. The modified plant community in turn alters the light, moisture, and temperature environment. Plant pollination and dispersal mechanisms and animal migration and mating behavior could be impacted by the abundance of exotic plants by presenting physical and chemical barriers. As native plants are displaced, animal populations that rely on the plants for food and shelter also decline.

All of the federally-listed and state-listed plants would be impacted by aggressive exotic plants under this alternative. By definitions, the health of these rare plant species is precarious primarily due to habitat destruction. Exotic plants would modify the last remaining suitable habitats for these rare species, but in addition, exotics may compete directly with rare species for resources, thereby causing local extirpations. As exotic species increase in abundance and distribution the demise of rare plants is inevitable because a natural mechanism does not exist to control or limit the spread of exotics.

Carolina northern flying squirrel: Populations of Carolina northern flying squirrels have been threatened by habitat loss, habitat fragmentation and competition from southern flying squirrels (*Glaucomys volans*). Exotic plant invasion has not been a concern for this species, although vines could potentially cause problems if they envelop entire trees and herbaceous plants if they create a thick forest floor mat that restrict animal movements and foraging.

Bog turtles: The encroachment of non-native plants into bog turtle habitat (wetlands) has not been considered a specific threat to their well-being. A more immediate threat is encroachment of open wetlands by woody vegetation of any type, resulting in increased water uptake and increased shading. There is no evidence that non-native woody vegetation has any different impact than native woody vegetation on these sites (Dennis Herman, pers. comm.). The greatest exotic plant threat to bog turtles is probably presented by purple loosestrife (*Lythrum salicaria*), which has been known to virtually take over entire wetlands. Establishment of this plant in a bog turtle wetland could have a major negative impact on this species. Removal of non-native plants in bog turtle habitat should not be done during nesting season (May – July) and the use of heavy equipment in wetlands should be avoided completely.

Indiana bat: Encroachment by non-native plants generally does not impact habitat used by Indiana bats. Some vines may climb and cover roost trees, making them unavailable as maternity sites, but the non-native herbaceous plants should not have this effect on Indiana bats and their habitat needs. Treatment of vines or woody vegetation should not occur in identified bat habitat during their maternity season.

Natural areas where T&E plants occur are already threatened by visitor over-use and social trails. Trails provide the disturbance opening upon which exotics become established, bringing them in closer proximity to T&E habitat. Visitor use impacts habitat and individual plants by direct trampling. These cumulative impacts are contributing to fragmentation and are having a minor, long-term influence on T&E populations.

Threatened and endangered species by definition are already nearing extirpation and could be easily stressed by invasive exotic plants. Changes to habitat and ecosystem processes, especially loss of habitat and fragmentation, would prove devastating for these rare species if allowed to continue unabated. The impact that exotics would have on rare plants is major and long-term, under this alternative. Impacts to T&E animals would be long-term but should be negligible to major. Implementation of this alternative would not lead to an impairment of these park resources on the Blue Ridge Parkway.

Wildlife

In accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the National Environmental Policy Act (42 U.S.C. 4332 (2)(c)), the North Carolina Wildlife Resources Commission (NCWRC) was consulted in April 2006 with regards to effects on wildlife. Impacts to wildlife under this alternative would be negligible to major, depending on the species considered. The impacts that occur would be long-term since the non-native plants would persist in the absence of human intervention.

Negative impacts would primarily be in areas where exotic vegetation occurs in dense mats, excluding native plants from the area. Purple loosestrife (*Lythrum salicaria*) can take over entire wetlands, displacing the native plants that wildlife depends on for food and nesting sites. The thick stands of loosestrife not only prevent native plants from growing but they may also impede the movement of animals through these areas. The seeds are not used by most native animals and the plants are not suitable as nesting structure. These impacts would be permanent with major impacts on many types of local wildlife.

Other non-native plants may have beneficial impacts to local animals. Multiflora rose (*Rosa multiflora*) provides food, cover and nesting sites for birds and small mammals. The dense thickets allow animals to hide from predators and the seeds provide a food source when many other fruits are no longer available.

In the Southern Appalachians about 74% of the acreage is forested or in grasslands while about 24% is either in agriculture or developed (SAMAB 1996). Despite this large percentage of “natural” systems remaining much of this land has also been altered and has lost its value as wildlife habitat. Forested lands declined by 450,000 acres from the mid 1970’s through 1995 while both large and small urban areas increased 35% and 53% respectively (SAMAB 1996).

Many public land agencies and private conservation groups have recognized the impact that exotic vegetation can have on native wildlife and are making efforts to control their spread. At the same time private landowners and commercial landscapers are introducing exotic vegetation

to areas where they did not previously exist and are planting even more new species of exotics without regard to their potential to spread into the wild. Few individuals are doing anything to keep their land from being invaded by non-native plants, and it is likely that additional areas would be affected in years to come.

In many sections the Blue Ridge Parkway is quickly becoming an oasis of natural ecosystems within human development and altered environments. Increasing invasions of non-native plants would degrade the valuable natural areas that the Parkway protects. The Parkway protects many rare ecosystems, including high-elevation rock outcrops, mountain bogs and spruce-fir forests. Losing or degrading these areas along the Parkway would be a significant loss to the region and the wildlife that depend on them.

Allowing natural areas on the Blue Ridge Parkway to be overwhelmed by non-native plants would have a devastating impact on some wildlife species. The Parkway protects many rare ecosystems and large tracts of natural area that would be threatened by the spread of exotics.

Loss of these rare systems, such as mountain wetlands, could have a significant, negative impact from which these areas would never recover. However, implementation of this alternative would not lead to an impairment of wildlife resources on the Blue Ridge Parkway.

Neo-tropical migratory birds

This alternative could adversely impact neo-tropical migratory birds. Changes in vegetation structure may alter habitat previously used by breeding birds. Food resources may also change as a result of changes in plant species composition and forest structure. Birds that depend on native species for foliage, pollen, nectar, fruits, seeds and roots are deprived of these essential food sources. Nesting opportunities and nest predation rates may differ in non-native vegetation. The habitat created by invading exotic plants may prove beneficial to some native birds. Invasive exotic plants may convert some closed forest settings into patchy forests which would negatively impact species that depend on forest interior habitats. As invasive exotic plant populations increase in abundance, forest habitats would increasingly become fragmented and more open. In addition, plant diversity could decline resulting in decreased food sources. Habitat diversity may decrease as exotics homogenize areas into monocultures.

Approximately 30% of the breeding birds in the Southern Blue Ridge physiographic area have declined sharply in the last 30 years with another 18% showing possible declining trends (Hunter *et al.* 1999). Neo-tropical migratory birds are declining the most of all birds studied, though the reasons for this decline are not clear, though habitat loss in both winter and summer ranges is suspected as the major cause. Lands in the southern Appalachians have changed routinely and significantly from the glacial period, to Native American use, to settlement by early Europeans to the present times. Land use now is different than just a few decades ago and this change has had significant effects on bird populations and composition (Hunter *et al.* 1999). As human development increases and agricultural activity declines bird populations would continue to be affected, with some species declining in number and others coping with the changes.

Blue Ridge Parkway lands offer some stability within a surrounding world that is rapidly changing. This stability could be threatened by the large-scale establishment of non-native plants. While natural systems are generally quite dynamic, moving from one seral stage to the next, the protected lands along the Parkway provide an increasingly important refuge.

The encroachment of invasive exotic plants into natural areas could result in additional habitat diversity at least initially, but in the long run the result may be lowered habitat diversity as sites are dominated by exotics. Allowing exotics to persist in natural areas would very likely alter forest structure, species composition, and environmental conditions that neo-tropical migratory birds are dependent upon. This may result in beneficial conditions for some species while others would be harmed. Implementation of Alternative A would not lead to an impairment of the Blue Ridge Parkway's neo-tropical migratory bird species or habitat.

Wetlands

Wetland resources would be threatened by the proliferation of invasive exotics plants. Native wetland plants face strong competition by invading non-native plants for available resources such as nutrients, light, and water. Wetland animals may be impacted by changes in vegetation composition and structure. Invasion of non-native woody species, such as multiflora rose, have been documented to alter the hydrologic regime in wetland systems by increasing evapotranspiration rates. As water levels are reduced in wetlands, the change in environmental conditions favors upland plants while discouraging plants adapted to saturated conditions. Therefore, unique and rare wetland plant and animal communities would be transformed to more common upland dry communities. The direct and indirect impacts would become magnified over time as more exotic plants invade sites and increase in abundance.

Of the 84 known wetlands that occur on NPS lands, exotic species are present in approximately one third of these sites (NPS exotic plant survey 2001). It is likely that an additional third of the wetlands would be invaded by exotic species over the next 5-10 years. Multiflora rose has been observed as the most common exotic to invade wetlands. Adjacent landowners to NPS lands have not managed exotic species on wetland or non-wetlands sites in the past or present. The U.S. Forest Service is currently conducting inventories of exotic plants, but there is no current plan to begin controlling exotics.

Relative to other factors that threaten wetland resources on NPS lands, invasion by exotic plants is one of the most significant and pervasive. Other threats include development (road construction) near wetlands which has the potential to modify the hydrology and/or accidentally introduce exotic species through fill dirt. In addition, land use activities within a wetlands watershed may impact wetland resources. According to Weakley and Schafale (1994) "a one-hectare wetland may be affected by pasturing, fertilizing, logging, or ground-disturbing activities anywhere in a watershed of tens or hundreds of hectares." While wetlands that occur on NPS lands are protected, those that occur outside the Park boundary are subject to land conversion for agricultural use or home development. Therefore, across the landscape the occurrences of

wetlands have diminished greatly and the interconnectedness of remaining wetlands has been disrupted. Weakley and Schafale (1994) estimated that 15% of the wetland acreage remains in the southern Appalachian region.

Important wetlands within the Park are threatened by invading exotic plants. Wetland plants may be out competed by exotic plants; wetland animals would face habitat changes as a result of altered plant community structure and composition; and current hydrology could change resulting in either drier or wetter conditions. The impacts to wetland resources under this alternative are major and long-term; however, there would be no impairment to the park's wetland resources under Alternative A.

Invertebrate Fauna

Establishment of non-native vegetation on a long-term and extensive scale would affect invertebrate fauna habitat and food resources. Many species are host or food specific and would not be able to change from a native resource to a non-native one.

Few land owners adjoining Parkway lands are concerned about the establishment of exotic plants. In fact many land owners are intentionally introducing plants that the Parkway is trying to eliminate. This lack of action and the introduction of these species would result in the increase in these non-native plants on lands surrounding the Parkway and a reduction in habitat for some invertebrate species. There would also be an increased seed source entering Park lands. Under this alternative these non-native plants would become established on Parkway lands and could displace native species over large areas.

Some invertebrate fauna could be considerably affected by this alternative. Species that are dependent on a single host species for food have the greatest potential to be impacted. For those few species the impact could be major and long-term. There should be negligible impact to species that are generalists. Alternative A would not result in an impairment of the Park's invertebrate fauna resources.

Water quality

Large portions of the Parkway's riparian zones are presently occupied by non-native vegetation, primarily grasses used in agricultural and developed areas. The major impact to water quality would likely result more from the replacement of woody vegetation with grasses and forbs than with the replacement of native with non-native plants.

Solar input and water temperature could change on streams where the riparian vegetation canopy changes in response to infestations of exotic plants. Trees provide shading to streams, keeping them cooler in the summer and reducing the daily fluctuation of minimum and maximum temperatures. Leaf detritus input would increasingly become non-native and may be less desirable or less palatable than detritus from native plants making them less available to aquatic invertebrates. Changes from native woody vegetation with deep root systems to shallow-rooted

non-native grasses would likely lead to an increase in sedimentation in creeks and increased sloughing of banks. All of these impacts would be expected to be small overall; therefore, a negligible to minor impact to water quality is expected.

Lythrum salicaria, listed as a noxious weed in both Virginia and North Carolina, occupies less than 0.5 acres within the Park. It is known to occur on Park lands at the James River and in shallow sections of Bass Lake on the Moses Cone Estate. While no other aquatic exotic plants are known to occur in the Park they have been introduced to many streams and lakes in or near the Southern Appalachians and the potential for invasion into Parkway waters is great. Species that could invade Parkway lakes and streams are included in **Table 4.2.1-1** below (TVA, Undated):

Table 4.2.1-1 Species That Could Invade Parkway Lakes and Streams		
<i>Alternanthera philoxeroides</i>	Alligator weed	Lakes, slow streams
<i>Hydrilla verticillata</i>	Hydrilla	Still or flowing waters
<i>Ludwigia uruguayensis</i>	Uruguayan water primrose	Reservoirs, swamps
<i>Myriophyllum aquaticum</i>	Parrot's-feather	Ponds, lakes, springs
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	Reservoirs
<i>Najas minor</i>	Spinyleaf naiad	Ponds, lakes, slow streams
<i>Nasturtium officinale</i>	Watercress	Streams, springs
<i>Phragmites australis</i>	Common reed	Marshes, streams, ditches
<i>Potamogeton crispus</i>	Curlyleaf pondweed	Ponds, lakes, reservoirs
<i>Trapa natans</i>	Water chestnut	Ponds

Introduction of these plants, as may occur under this alternative, could have significant impacts on Parkway waters. Some of these species can take over entire ponds or wetlands resulting in major changes to flora, fauna and biotic conditions. Water quality may degrade as normal water flows and temperature, organic input and processing, and aquatic fauna all change with the establishment of these plants.

More than 5000 acres of Park land, mainly in northern North Carolina and southern Virginia, are in agriculture. The vegetation in these areas has been changed to non-native forbs and grasses that are either cut for hay or used as livestock pasture. Typically the riparian zones are mowed right down to the water edge, eliminating the natural wooded riparian areas that previously existed there.

Lands adjoining the Parkway have experienced the same changes where the topography is relatively level and the soils are suitable. In the Southern Appalachians over 20% of the lands are used for crops or pasture (SAMAB 1996), with many of these parcels located near the Blue Ridge Parkway. While the Natural Resources Conservation Service has had increasing success with fencing livestock out of riparian zones, it is still common in many areas for cattle to have unrestricted access to the water.

Housing and commercial development along lakes and streams is another problem on private lands. As with agricultural lands the vegetation is commonly converted to non-native grasses and the wooded riparian zone is removed. In many areas the agricultural fields are being replaced by subdivisions and there is a continued problem with solar heating and reduced organic input.

Landscaping around these developments is often done with non-native plants, resulting in more of the plants that are already causing problems or introducing new species of plants to new areas. Aquarium water is often poured into natural water sources which may allow the non-native plants in the tank to get established in the stream or pond.

Except for plants listed by Virginia and North Carolina, there is often no action being taken to control their spread. In North Carolina the Department of Agriculture is working with landowners and nurseries to control the dispersal of purple loosestrife and other plants on its noxious plant list. Otherwise non-native plants are generally not being fought aggressively on private lands along the Blue Ridge Parkway and would likely become an increasing problem in the future as new species are introduced.

Increases in non-native terrestrial plants should have little impact on water quality. The impacts that may occur are indirect (reduced shading and increased solar input) and except in extreme cases probably would not cause significant effects. Water chemistry should not be affected by increased amounts of non-native vegetation.

Introduction of non-native aquatic plants is a problem that would likely get worse in the future as new species are brought to the US. These plants may significantly affect ponds, streams and wetlands and could lead to major long-term changes in biotic flora, fauna and water quality. This alternative would not result in the impairment of water quality on the Blue Ridge Parkway.

4.2.1.1 Cumulative Impacts

There would be both direct and indirect impacts to natural resources under Alternative A. Rare plant species and their habitat in the park are impacted by a number of threats, including visitor trampling, loss of habitat, and exotic species incursion. Implementation of this alternative would not prioritize the control of invasive exotic plants in natural areas where rare plants grow. Invasion by exotic plants is one of the most significant and pervasive impacts to the park's wetlands, and would continue under this alternative. Cumulative impacts of additional invasion sites due to the spread of the species without the park, coupled with existing vectors of utility corridors, road crossings, adjacent land development, cleared vistas, and bushwhack trails would continue to contribute to fragmentation and have a minor, long-term influence on T&E populations and their habitat.

Exotic species invasions would continue to invade Parkway landscapes without park staff knowledge, eventually fragmenting natural areas or extirpating them altogether, causing tremendous loss of biological diversity.

There would be long-term major adverse impacts on many types of local wildlife. Under this alternative, there would be negligible impact to neo-tropical migratory birds on the Blue Ridge Parkway. There should be negligible impacts to invertebrate fauna species, soils, and water quality along the Blue Ridge Parkway.

Under Alternative A, natural processes, such as nutrient cycling, herbivory, and pollination would be further disrupted. The ecological balance of plants, animals, soil, and water achieved over many thousands of years would be destroyed.

4.2.1.2 Conclusion

Alternative A would allow invasive exotic plants to continue occupying natural areas and further invade new sites. The negative impacts that exotics pose to natural resources are substantial. Soil chemical properties and microbial activity would likely be altered permanently. Vegetation composition would be modified due to competition of exotics plants with the native flora for available resources. This modification of resource availability would in turn negatively impact rare species and neo-tropical migratory birds. Wetland ecosystems would likely experience lasting modification due to changes in plant composition and diversity, alteration of necessary habitat for wildlife, and modification of current hydrologic conditions. However, implementation of this alternative would not lead to an impairment of these park resources.

4.2.2 Cultural Resources

Cultural Landscapes

In coordination with Section 106 of the NHPA, the NPS initiated consultation with the North Carolina and Virginia SHPO regarding effects to cultural and historic resources from the proposed alternatives.

Under this alternative, known and potential cultural landscape properties lie within the **highest priority** significant ecological areas (SEA). These are:

Virginia

- Peaks of Otter
- Smart View Picnic Area
- Rocky Knob
- Rocky Knob Cabins complex
- Mabry Mill complex

North Carolina

- Doughton Park
- Gillespie Gap Maintenance Area complex
- Craggy Gardens
- Davey Farm complex

The following cultural properties occur within the **moderate priority** SEA:

Virginia:

- Humpback Rock complex
- James River complex

North Carolina:

- Moses Cone Estate

No cultural landscapes occur within the **lowest priority** SEA.

With the exception of the hydrangea plantings and rose garden at the Moses Cone Estate and apple orchards at Johnson Farm and the Moses Cone Estate, vegetation is a relatively minor component in the historicity and landscape architecture of these areas. In two draft reports for Doughton Park and Otter Creek, exotics have been identified as diminishing the cultural integrity of these historic districts and thus should be managed to protect the scene and historic landscape.

Exotics are known to occur at some level at all twelve cultural landscape sites. Under the No Action Alternative, then, exotics that have invaded cultural landscapes would be left untreated and could adversely impact the landscape. The impact would vary from location to location, and thus could range from minor to major. All sites are currently as minor impacts except Peaks of Otter which is moderately impacted.

4.2.2.1 Cumulative Impacts

Natural succession of plants and plant communities and incursion of exotic plants all work to change the species composition of cultural landscape. The level of impact would depend on the location of the cultural resource, the period of exposure to exotic plants incursion, and the amount and extent of natural succession. Parkwide, no site is free from incursion of exotic plant species and succession, and visitors to these areas are not afforded the most historical presentation possible. However, landscape edges are generally maintained to near-historical patterns.

Forest pathogens and pests, and storm-related events, such as ice storms, hurricanes, and rock slides, also contribute to vegetation loss and change, and management of affected vegetation focuses on reducing hazard tree formation. When possible, dead and dying trees are left on the ground when cut, unless the remediation adversely affects the cultural resource. If deemed a fire hazard, trees would be removed from the site. In some instances, trees can be replanted to restore the cultural scene, recognizing that trees take time to reach maturity. For the most part, natural regeneration is allowed to proceed unencumbered in areas of severe devastation. While the mosaic of the landscape may be temporarily compromised by species not prevalent in the mature canopy, the site would eventually return to near-historical conditions with similar tree species and landscape edges would still be maintained. Debris flow materials (rocks, soil, etc.) would be removed from a cultural landscape and slopes recontoured to near-natural conditions, thus minimizing aesthetic and substantive damage to the landscape.

4.2.2.2 Conclusion

Impacts to cultural landscapes under this alternative would be long-term and would rank as minor to moderate, depending on the site. Landscape edges would be maintained though vegetation composition might vary. There would be no impairment to the park's cultural resources under this alternative.

4.2.3 Recreational/Visual Resources

As discussed in Section 3.4, rapid prolific and dense vegetation growth can quickly change and alter the scenic viewing opportunities for Parkway visitors. Exotics could change the nature of the fall color display, and change the nature of the forest types. They could also lessen the native flower display that visitors travel many miles to see.

4.2.3.1 Cumulative Impacts

Exotics plants are known to crowd-out, smother, and out-compete natives in some habitat and impact their growth, or ability to persevere. Exotic vegetation could change to some degree the integrity of the historic cultural landscape of the Blue Ridge Parkway, which is eligible for national landmark status. Exotic plant growth could alter or screen vistas from view, obscure trails from use, and thus have a detrimental impact on recreational resources.

4.2.3.2 Conclusion

The most valued recreational opportunity on the Parkway, scenic viewing, could be lost and changed without a planned control of exotic vegetation. Rapid, prolific and dense exotic vegetation growth could quickly change and alter the scenic viewing opportunities to the Parkway visitors. However, since there are many other recreational opportunities along the Blue Ridge Parkway, Alternative A would not lead to an impairment of visitor use and experience and recreation at the Park. Exotics may harbor plant diseases such as the sudden oak death syndrome that may lead to a huge loss of very highly valued native trees such as oaks, and flowering rhododendrons that were so highly valued in the historic landscape planning of the Parkway.

4.2.4 Human Health and Safety

There are no threats to human health and safety under Alternative A.

4.3 ALTERNATIVE B: PREFERRED ALTERNATIVE - IMPLEMENT THE PARK'S EXOTIC VEGETATION MANAGEMENT PLAN USING IPM TECHNIQUES OF MECHANICAL AND HERBICIDAL CONTROL

Under this alternative a combination of mechanical and chemical methods is proposed to treat and control invasive exotic plants (see Section 2.2 above). This alternative provides flexibility to match the appropriate control method to the site conditions. At sites where the exotic plant population is small and rare species occur, mechanical methods are preferred over chemical methods and would be employed.

To avoid impacting non-target vegetation, herbicides could be applied when the native flora is dormant or in the case of cut stump or basal bark, herbicide could be applied with sufficient precision. All herbicides would be applied in accordance with specific label instructions, which include personal protective equipment and storage requirements. Surveys and existing Park records would be used to identify the presence of rare species prior to any treatment method.

4.3.1 Natural Resources

Soils

Soil chemical and physical properties would be preserved in a natural state under this alternative and would not be altered by the presence of exotic plants. Mechanical methods have the potential to impact soils on steep slopes (greater than 20%) due to erosion if resource protection measures are not followed. The potential for fuel spills could occur when using motorized equipment, such as chainsaws, and impact soil resources if resource protection measures are not followed. Under this alternative the use of heavy equipment (tractors, backhoes, etc.) is not proposed. Instead, small motorized equipment such as chainsaws, weed-eaters, and walk-behind brush mowers are proposed.

At some sites where exotic plants have very high abundance, treatment and removal of the exotic may result in several hundred square feet of soil to be exposed without plant cover. At these sites soil erosion could become a concern if the site is not revegetated quickly. To protect the soil resource, mulching or reseedling may be needed stabilize soils until native species could resume occupation.

Specific impacts to soil resources for each herbicide are presented below.

Glyphosate is not generally active in the soil. It is not usually absorbed from the soil by plants. *Glyphosate* and the surfactant used in Roundup™ are both strongly adsorbed by the soil. *Glyphosate* remains unchanged in the soil for varying lengths of time, depending on soil texture and organic matter content. The half-life of *glyphosate* could range from 3 to 130 days. Soil

microorganisms break down *glyphosate*. In tests, the surfactant in Roundup™ has a soil half-life of less than one week. Soil microorganisms break down the surfactant. The main break-down product of *glyphosate* in the soil is *aminomethylphosphonic acid*, which is broken down further by soil microorganisms. The main break-down product of the surfactant used in Roundup™ is carbon dioxide.

Triclopyr is active in the soil, and is absorbed by plant roots. *Triclopyr* is adsorbed by clay particles and organic matter particles in soil. Microorganisms degrade *triclopyr* rapidly; the average half-life in soil is 46 days. *Triclopyr* degrades more rapidly under warm, moist conditions. 3,5,6-Trichloro-2-pyridinol is the major initial product of degradation. It has a half-life of 30 to 90 days, and degrades to carbon dioxide and organic matter.

Clopyralid is generally active in the soil. It is usually absorbed from the soil by plants. *Clopyralid* is not strongly adsorbed by the soil. *Clopyralid* may be persistent in soils under anaerobic (no oxygen) conditions and in soils with a low microorganism content. The half-life in soil could range from 15 to 287 days. Soil microorganisms break down *clopyralid*. The only degradation product that has been identified is carbon dioxide. Other degradation products have not been identified.

Metsulfuron methyl is generally active in the soil. It is usually absorbed from the soil by plants. The adsorption of *metsulfuron methyl* to soil varies with the amount of organic matter present in the soil, and with soil texture and pH. Adsorption to clay is low. *Metsulfuron methyl* remains unchanged in the soil for varying lengths of time, depending on soil texture, pH and organic matter content. The half-life of *metsulfuron methyl* could range from 120 to 180 days (in silt loam soil). Soil microorganisms break down *metsulfuron methyl* to lower molecular weight compounds under anaerobic (no oxygen) conditions. *Metsulfuron methyl* in the soil is broken down to nontoxic and non-herbicidal products by soil microorganisms and chemical hydrolysis.

2,4-D may remain active for one to six weeks in the soil. Over time, 2,4-D would bind to organic matter in soil. Soil high in organic matter would bind 2,4-D the most readily. 2,4-D is not persistent in soil. At its highest application rate it persists for 30 days in soil. 2,4-D is rapidly degraded in soil, especially by soil microorganisms. It degrades more rapidly under warm, moist conditions. It is also taken up from the soil by target plants. Some forms of 2,4-D would evaporate from the soil. 2,4-D would degrade to half of its original concentration in several days. In soil, 2,4-D may be metabolized by microbes in steps to 2,4-dichlorophenol and 4-chlorophenol and then ultimately to harmless forms.

Since exotic plants have not been managed on NPS lands in the past there is no historical legacy of impacts to soils that correspond to this alternative. Present and future impacts to soil resources would be negligible under this alternative if resource protection measures are followed. It is possible that at heavily infested sites requiring several years of treatment, that soil compaction could impact soils. However, this impact is limited to very small, localized areas in the form of trails leading access to the infested site.

Management and treatment of exotic plants outside the Park boundary is very limited. Therefore, the potential for actions related to the treatment of exotics occurring outside the Park boundary to impact soil resources within the Park boundary are very slight.

Under this alternative there would be negligible, short-term impacts to soil resources if resource protection measures are followed. Native soil chemistry and structure would be preserved. Implementation of erosion protection measures would adequately reduce or prevent accelerated erosion that could be produced with sudden removal of vegetation on steep slopes. Above ground cutting with hand tools is a viable option at sensitive sites where soil disturbance is problematic. Implementation of Alternative B would not result in an impairment of the Blue Ridge Parkway's soil resources.

Vegetation

This alternative would benefit native vegetation because successful treatment of exotic plants would remove the negative impacts of competition, displacement, nitrification, inbreeding, habitat modification, and pollination disruption that threaten native species. This alternative provides the flexibility to use a variety of treatment options to maximize removal of exotic plants and reduce negative impacts on vegetation.

This alternative may disturb the root systems of native plants, particularly herbaceous plants when exotics are either dug or pulled using mechanical treatments; however, this impact would be negligible because hand pulling exotics would only be used when the population is small. Disturbance of the surface soil from pulling or digging exotic vegetation may either provide a suitable substrate for new exotics to become established or reveal a seed bank containing copious quantities of exotic plant seed; to alleviate this impact, at sites where large seed banks exist, the use of mechanical methods that result in disruption of surface soils would not be used. When exotic plants are mowed, non-target native species may be impacted by these activities; this action is expected to have negligible impacts because there are a limited number of sites where mowing is a feasible option. Extensive amounts of exotic plant debris that remain from mechanical treatment options may shade and suffocate native species, but the duration of this impact is expected to last 1 to 3 years, as the plant debris decomposes.

Broad spectrum herbicides have the potential to impact non-target species because these chemicals are not selective for exotic plants only. The impact to non-target species could be minimized by using high accuracy application methods (cut stump or basal bark); schedule treatment during the dormant season; or use selective herbicides such as Transline™ that affects primarily species in the legume family. The impact to non-target species is expected to be negligible and temporary as native seed from adjacent untreated areas would allow native species to re-establish in treated areas formerly occupied by exotic plants.

Vegetation may be impacted in situations where sites are repeatedly visited over several years for treatment, resulting in vegetation trampling. However, vegetation trampling is limited to very small, localized areas in the form of trails providing access to the infested site. Among the

threats to vegetation resources, this alternative presents a minor threat. Threats to vegetation resources include: air pollution, global warming, visitor trampling, illegal poaching, and forest pests and diseases.

Under this alternative native vegetation would benefit from the treatment and decline of invasive exotic plants which present multiple threats to the native flora. Mechanical methods such as pulling or digging may impact the root systems of native species. Disruption of the surface soil as a result of using mechanical methods may reveal an exotic plant seed bank and/or provide suitable substrate for the establishment of exotic species. Cutting and mowing may also impact native species if applied indiscriminately. Broad spectrum herbicides have the potential to impact non-target native species. Overall, this alternative presents negligible and temporary impacts to vegetation resources, if the resource protection measures are followed, and would not be an impairment to the park's vegetation resources.

Threatened and Endangered (T&E) Species

In accordance with Section 7 of the Endangered Species Act, the park consulted with the USFWS, the VDCR, and the NC Natural Heritage Database in May 2006 with regards to effects on threatened, endangered, or proposed species. Federal or State-listed threatened or endangered plants or animals would benefit under the Preferred Alternative by removing invasive exotic plants which threaten them. These findings were confirmed in a response letter from the USFWS dated May 12, 2006 (see Figure F-3).

The purpose of this program is to protect rare plants and their habitat from destruction and alteration by exotics. Successful treatment of invasive exotic plants would alleviate adverse impacts (such as competition for resources, inbreeding, pollination disruption, habitat modification, out competing food resources) posed to rare species. The flexibility offered by this alternative allows for sensitive treatment options to be considered when a rare species is present.

Although no exotics are known to occur in the immediate vicinity of rare plant populations, they are known to exist within 1,000 feet of state and federally-listed species. Rare plants may be inadvertently cut or have their root systems disturbed if mechanical methods are used to treat exotics; this impact could be minimized by surveying for rare plants prior to using mechanical methods of control. Chemical treatments have the potential to impact rare plants if the species of concern is exposed to an herbicide; however, mechanical treatments could be used instead of chemical treatments to minimize impacts. If chemical treatments are used around rare plants, then selective herbicides would be used, and/or, high application control methods such as cut stump or basal bark would be used, and/or, timing of application would occur when the rare plant is dormant or below ground level. Application would be made by NPS employees who are specifically trained in application of herbicides under proper conditions. All work would be conducted in consultation with Fish and Wildlife Service biologists.

There is always a small risk that populations of rare species have escaped detection. However, because of the extensive search performed for these species, it is unlikely that any other threatened, endangered, or rare plant species are located within the project boundaries.

Rare animals may experience temporary, short-term disturbance while treatment is taking place and possible loss of habitat if an exotic plant is being utilized by the rare animal. Specific impacts follow.

Carolina northern flying squirrels occur along the Blue Ridge Parkway at high elevations south of Grandfather Mountain. They are omnivorous, eating lichens, hypogeous fungi, seeds, buds, cones, catkins, tree sap and insects, with their dependence on fungi possibly restricting their range to cold, moist, high elevations. These areas are generally not heavily impacted by non-native plants and therefore northern flying squirrels should not be affected by the actions taken under this management plan (McGrath personal communication 2003). Unless a spill occurred, application of herbicides to control non-native plants should not affect the fungi consumed by flying squirrels on these sites (McCleneghan personal communication 2003).

Virginia big-eared bats are insectivores, generally waiting until after dark to catch moths, flying ants, beetles, wasps and flies. The removal or spraying of non-native plants should have no effect on these bats or their food sources if done carefully. If treatment of non-natives is needed near caves or mines containing Virginia big-eared bats, the work would be done in such a way as to minimize impacting the colony. This may preclude the use of loud equipment or other methods that would create a disturbance. These food sources are opportunistic pollinators and would move to native species if they currently visit flowering exotic vegetation. There are no known exotic plants in or near caves known to be occupied by Virginia big-eared bats.

Indiana bats are only near Parkway lands during summer months when they establish maternity colonies. Exotic plant controls in the limited areas where these bats may occur would need to be done with a consideration of impacts on the bats. Indiana bats roost under tree bark during the day when this activity would occur. Surveys would be needed to ensure that trees with bats would not be affected.

Bog turtles: The biggest threat to bog turtle populations is loss of habitat, including the encroachment of woody vegetation. This alternative would keep non-native woody vegetation out of bog turtle sites but would not prevent other woody plants from invading. If invasive exotics are kept out of wetlands, this plan would better preserve their habitat and result in a benefit to turtles.

Cougars: Management of non-native plants should have little, if any, direct impact on cougars. Their large home range and use of diverse habitats would minimize any impact the non-native plants would have, or the removal of these plants would cause. There may be an indirect impact if native/non-native plant composition results in changes to prey species used by cougar, but this should be very minor to the animal's total diet.

State-listed Species **Appendix D** shows the 18 listed Federal Threatened and Endangered species, the 92 listed North Carolina Threatened, Endangered or Special Concern species and the 11 listed Virginia Threatened and Endangered species found in counties along the Blue Ridge Parkway. This information was retrieved June 2006 from the U.S. Fish and Wildlife *Federal*

List of Endangered and Threatened Wildlife and Plants, the North Carolina Natural Heritage database [<http://www.ils.unc.edu/parkproject/nhp/>], and the Virginia Fish and Wildlife Information System [<http://vafwis.org>].

Research on the affects of non-native plants on animal species, including those listed in Appendix D, is scarce. Generally research shows that non-native plants are detrimental to native animal species by replacing available native food sources, reducing nesting habitat, hindering foraging opportunities, and impeding movement.

Restoration of native plant species would have either neutral or beneficial impacts on animal species (Herman, McGrath, Mickey, Petranka, Van Devender, personal communication 2003). None of the experts consulted thought that any animal T&E species would be significantly impacted by the proposed work. The habitat where most T&E species are found on the Parkway are generally not heavily infested with non-native plants and so the work required in these areas would not have major impacts on the sites.

There may be a period between the removal of the non-native plants and the time when natives become re-established when some animals would be negatively impacted due to loss of food resources or hiding places. The relatively short duration and the limited areas impacted should not have a population level impact and the species affected should re-colonize the site quickly or be able to find alternate resources.

Removal of non-native plants could be harmful to animals if done incorrectly or at the wrong time of year. Mechanical removal of non-native plants often results in soil disturbance, which could result in erosion and increased sedimentation to streams or wetlands. Prompt site restoration by mulching, reseeding, or plantings would help minimize or eliminate this problem (Mickey personal communication 2003). Larger scale mechanical removal using heavy equipment or power tools should be timed to avoid nesting periods when animals may be chased from the nest or when nests may be damaged by the work. If nesting seasons cannot be avoided the area would be surveyed for nests before any work is begun (Herman personal communication).

The application of herbicides at proper rates and using approved methods should not significantly impact wildlife. There is some evidence that *glyphosate* may cause malformations in amphibians. Herbicides containing this chemical should not be used near ponds or wetlands or broadcast over large areas (Petranka, personal communication 2003). Herbicide use in northern flying squirrel habitat should not affect fungi, their primary food source (McCleneghan, personal communication 2003).

Rare plants are more likely to be trampled with repeated visits to the same site. Any access trails that develop and which are prone to erosion have the potential to impact rare plant species. Soil compaction as a result of repeated site treatments would negatively impact rare plant species.

Compared to the myriad of threats that rare species face, such as global warming, visitor trampling, air quality, and habitat fragmentation, this alternative would actually benefit rare species, if the resource protection measures are followed.

Of the federally-listed species that occur in the Park, only bog turtle exist in the immediate vicinity of proposed control zones. Since canopy removal would enhance bog turtle habitat, felling of trees and shrubs either by hand-pulling, handsaws, and chain-saws would not adversely impact this species. Application of a small amount of herbicide to basal sprouts would be done in such a way as to cause no drift or runoff into water resources. Only herbicides appropriate to use near water and wetlands would be used.

Consequently there should be no short-term or long term impacts to federally listed species. If exotics are stopped before they invade T&E species habitat, there should be long-term protection of the species. If exotics become established in or near T&E species, then NPS biologists, in consultation with Fish and Wildlife Service, would develop a mutual course of action. Where needed, monitoring would be established to determine short- and long-term impacts.

None of the Parkway's T&E species should be harmed by the removal of non-native plants by either mechanical methods or by the proper use of herbicides. Ensuring that herbicides are used correctly and that disturbed areas are restored quickly should protect aquatic species. Many of the rare animals, especially the birds and amphibians, feed primarily on invertebrates and should not be affected by the removal of non-native plants. The few species whose diets consist mainly of berries or seeds use a variety of native foods and should not be harmed by the removal of non-native food sources.

This alternative would benefit rare species by removing invasive exotic plants which threaten rare plants and animals. The flexibility offered by this alternative allows for sensitive treatment options to be considered when a rare species is present. While there are some risks of accidental exposure to herbicides, these unintended side effects would be minimized with NPS biologists conducting the work. Basal bark or cut stump chemical treatments would minimize affecting non-target species. Rare animals may be disturbed temporarily during treatments and more permanently if utilizing exotic plants that are treated. Continued visits to the same site would increase the likelihood of trampling rare plants and increase soil compaction. All existing Park records would identify the presence of rare species and a site survey for rare species would be done before treatments are implemented. Implementation of Alternative B would not impair T&E species on the Blue Ridge Parkway.

Wildlife

In accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the National Environmental Policy Act (42 U.S.C. 4332 (2)(c), the North Carolina Wildlife Resources Commission (NCWRC) was consulted in April 2006 with regards to effects on wildlife. In a response letter dated June 5, 2006, the NCWRC recommended that native plants that are valuable to wildlife for food and cover be planted where exotic plants that are similarly important are eliminated (see Figure F-4).

While wildlife are not intended targets under this plan, there would be some impacts to animals from activities taken to control non-native vegetation. These impacts would result from both chemical use and mechanical methods.

In small-scale activities most of the wildlife, such as birds and mammals, would leave the area as Park employees begin their work and would not be affected. Smaller animals and animals that do not move as quickly may not be able to leave the area quickly and could be impacted. Chemical effects may come from exposure to direct spray, ingestion of treated vegetation or prey, exposure to contaminated water sources, inhalation of chemicals or indirect contact with contaminated vegetation. Studies of herbicide effects on wildlife have shown mixed impacts. In a laboratory study Larson *et al.* (1998) found elevated levels of Atrazine affected the larval development of tiger salamanders (*Ambystoma tigrinum*). Henry (1992) found no significant difference in treated and untreated wetlands in the mortality of invertebrates and a minnow after the application of Rodeo™ herbicide (*glyphosate*). All herbicides applied under this plan would be used as permitted under the product labeling. Use of these products at these levels is generally considered to be safe for wildlife.

Mechanical impacts should be minor and limited to species with reduced mobility. Mechanical work typically is a noisy, intrusive activity and animals that are able to leave the area would do so. Small and young animals that cannot move quickly or slow moving adults may not be able to flee and could be injured or killed during the vegetation removal and cutting. Searches of the immediate area would be made to ensure that nests are not in the effected area. Searches would also be made for animals that may remain in the area, such as snakes, that may rely on camouflage to avoid danger rather than fleeing the area.

Large-scale control may occur over a large enough area or occur so quickly that even larger or more mobile animals cannot get away. These areas would be surveyed for the presence of animal species that may be harmed by exotic vegetation control activities.

Control of non-native vegetation on lands adjoining the Parkway is limited primarily to other public lands and to lands protected by some private conservation organizations. Little to no activity is occurring on private lands.

Herbicides are used by many landowners along the Parkway but generally this use is a small-scale application around houses and would not impact Parkway wildlife. An exception may be on lands adjoining Christmas tree farms where large amounts of herbicides and pesticides are occasionally used. Most agricultural lands on private property are hay or pasture, which generally do not require large amounts of chemicals. A few areas are used to grow row crops and these areas tend to have increased chemical use. The main concern from this chemical use is primarily the risk to water sources rather than direct contact with wildlife.

Herbicide use should not affect wildlife on Parkway lands. The benefits from the removal of non-native plants and the preservation of native vegetation would be far greater than the minor impacts to wildlife that may result, therefore, there would be no impairment to wildlife resources on Parkway lands under Alternative B.

Neo-tropical migratory birds

Breeding behavior and foraging may be temporarily disrupted while treatment is taking place, particularly if motorized equipment is used. Work would be timed to avoid disturbance to nesting birds. Restoration of native plant communities would generally benefit migratory bird species by preserving nesting and foraging habitat used by these species.

Protection of native plant communities is important to many bird species. Throughout the southern Appalachians habitat is lost to development, changes in land use and conversion of plant communities. Encroachment of exotic plants also has a negative impact on a variety of bird species. Federal and state agencies and private conservation groups are working to control non-native plant species and these activities would help preserve bird habitat. Unfortunately private landowners often plant exotic landscaping and many of these are capable of spreading to neighboring lands.

This alternative has the potential to impact neo-tropical migratory birds if these species are utilizing the exotic plants that are targeted for treatment. Under this alternative neo-tropical migratory birds may experience temporary disruptions while treatments are taking place. Any species using existing exotic vegetation would be impacted, though this should be a minimal impact as these bird species should be able to find native vegetation replacements.

Removal of non-native plants would benefit native species that neo-tropical migrants depend on for nesting and foraging. The overall beneficial impacts on birds should be moderate and long-term. There would be no impairment to neo-tropical migratory birds if Alternative B were implemented.

Wetlands

There would be no adverse impacts to wetland resources under this alternative, if the resource protection measures are followed. The successful treatment of exotic plants would reduce the threat that exotics pose to wetland systems (threats such as alter hydrology, competition with wetland plant species, alteration of structural habitat for animals in wetlands). The flexibility offered by this alternative would allow a range of treatment options to be considered for each sensitive wetland.

Mechanical methods of control have the potential to create soil disturbance which may lead to sedimentation, if the resource protection measures are not followed. Sedimentation could be minimized by reseeding disturbed areas with native species or applying an erosion control fabric to heavily disturbed areas.

Herbicide use has the potential to contaminate waterways and aquatic systems if used inappropriately; herbicides approved for use in wetlands, or using mechanical treatment methods would minimize this risk. Non-target species may be impacted when broad spectrum herbicides are used; however, this risk could be minimized by using selective herbicides (such as

clopyralid) or cut stump/basal bark methods that increase accuracy at which the herbicide could be applied. In addition, impacts to non-target wetland resources could be reduced by applying herbicides during the dormant season.

Over the long-term, removal of exotics would favor the reestablishment of native wetland plants by reducing competition. Tall, dense stands of exotic woody plants would trap suspended sediment, gradually raising the ground level and diminishing wetland function. Removal of these plants would help preserve wetland function. The preservation of wetlands, wetland function, and native wetland species by removal of exotic plants would be considered a positive impact.

Repeat treatments in a given wetland may result in compacted soils, thereby adversely affecting wetland vegetation. Wetland vegetation may be trampled and degraded with repeated treatments.

While the rarity and significance of southern Appalachian wetlands is widely acknowledged by the conservation community, most protection efforts have focused on changing ownership to protected status. The largest threat to wetlands in the region continues to be draining and land conversion to one of agricultural use or urban development. Control of exotics in wetlands is sporadic across the region.

This alternative would benefit wetlands by reducing the threats posed by exotic plants. The flexibility offered by this alternative allows treatments to be tailored to the conditions and concerns that uniquely exist at each wetland. This alternative may negatively impact wetland resources, if the resource protection measures are not followed. Mechanical methods could create erosion and sedimentation concerns if open ground is not revegetated quickly. Chemical methods have the potential to negatively impact non-target plant species and create contamination problems in aquatic systems if mishandled. Basal bark or cut stump chemical treatments would minimize affecting non-target species and reduce the contamination potential. Under this alternative, impacts to wetland resources would be negligible and short-term in duration, however, there would be no impairment to wetland resources on the Blue Ridge Parkway under this alternative.

Invertebrate Fauna

As with other wildlife, native invertebrates evolved along with the native plants and there are often strong dependencies by invertebrates on a single plant species or genus at some stage of their lives. Perhaps the best known example is the use of milkweed by monarch butterflies. Replacement of these native plants with non-native ones could impact a variety of invertebrate species. Depending on the species involved these impacts would range from negligible to major, with most impacts falling between these two extremes, but any impact would likely be long-term and wide ranging. Generally few native invertebrates would feed on non-native plants and so the loss of native plant communities may significantly reduce the quality and abundance of native invertebrates (Blossey 1999).

Exotic plants may have cascading effects in areas where they occur. Non-native earthworms appear to benefit from the introduction of non-native plants, though this may be at the expense of other invertebrates that are native. Earthworm abundance was found to be significantly greater in areas invaded by non-native plants (Kourtev *et al.* 1999). Non-native plants in turn benefit from the presence of earthworms and their enrichment of leaf litter quality and increased availability of nutrients (Hendrix and Bohlen 2002). Abundance of native arthropods in turn decreases due to the change in leaf litter and humus layers (Hendrix and Bohlen 2002) and salamander demographics are altered in response to the change in prey available.

As with other forms of wildlife the Blue Ridge Parkway provides a haven of relatively undisturbed habitats that are being lost on adjoining lands. Loss of any of these habitats on the Parkway due to encroaching non-native plants would probably be detrimental to area invertebrate species. Because of the paucity of data concerning most invertebrate species these impacts are not clear and may not be noticed until it is too late to do anything to address these changes.

Many species of native invertebrates would be negatively impacted by increasing numbers and types of non-native plants. This may lead to local extirpation in extreme cases but should not be significant for most species. Invertebrates are generally able to use a variety of types of plants and the plants that are needed can be found in many locations. Except for those that are dependent on a single species, or species found in very restricted locations, invertebrates should be able to find alternate sources of vegetation and would be able to survive despite increasing numbers of non-native plants along the Blue Ridge Parkway. If Alternative B were implemented, there would be no impairment to invertebrate fauna along the Blue Ridge Parkway.

Water quality

The treatment and management of non-native plants should have little direct impact on water quality. Herbicides would be applied away from water sources when possible and herbicides approved for use near water sources would be used otherwise. No heavy equipment would be used along stream banks or shorelines to prevent sedimentation of the waters. Indirect impacts of decreased amounts of non-native plants are less clear but should generally be positive or negligible.

As larger or additional areas of non-native plants are removed the cumulative impacts should be beneficial or neutral. These impacts may include improved stream shading, increased foraging opportunities for aquatic fauna, and reduced sedimentation. Water quality should benefit or at least not be harmed by the removal of non-native vegetation. All of the identified non-native species, except one, are terrestrial plants and have little impact on aquatic systems. Therefore, there would be no impairment to water quality along the Blue Ridge Parkway.

4.3.1.1 Cumulative Impacts

As a result of Alternative B, present and future impacts to soil resources would be negligible under this alternative. Vegetation may be impacted in situations where sites are repeatedly visited over several years for treatment, resulting in vegetation trampling. However, vegetation trampling is limited to very small, localized areas in the form of trails providing access to the infested site. Soil compaction as a result of repeated site treatments would negatively impact rare plant species, but compared to the myriad of threats that rare species face, such as global warming, visitor trampling, air quality, and habitat fragmentation, this alternative would actually benefit rare species, if the resource protection measures are followed.

Compared to the myriad of threats that threatened and endangered species face, such as global warming, visitor trampling, air quality, and habitat fragmentation, this alternative would actually benefit rare species, if the resource protection measures were followed. The cumulative impacts to wildlife under Alternative B are primarily the risk to water sources rather than direct contact with wildlife. Removal of non-native plants would benefit native species that neo-tropical migrants depend on for nesting and foraging. Repeat treatments in a given wetland may result in compacted soils, thereby adversely affecting wetland vegetation. Wetland vegetation may be trampled and degraded with repeated treatments. As larger or additional areas of non-native plants are removed the cumulative impacts to water quality should be beneficial or neutral.

4.3.1.2 Conclusion

Under this alternative there would be negligible, short-term impacts to soil resources if resource protection measures are followed. Native vegetation would benefit from the treatment and decline of invasive exotic plants which present multiple threats to the native flora. Mechanical methods such as pulling or digging may impact the root systems of native species. Disruption of the surface soil as a result of using mechanical methods may reveal an exotic plant seed bank and/or provide suitable substrate for the establishment of exotic species. Cutting and mowing may also impact native species if applied indiscriminately.

Broad spectrum herbicides have the potential to impact non-target native species. Overall, this alternative presents negligible and temporary impacts to vegetation resources, if the resource protection measures are followed.

None of the Parkway's T&E animal species should be harmed by the removal of non-native plants by either mechanical methods or by the proper use of herbicides. Ensuring that herbicides are used correctly and that disturbed areas are restored quickly should protect aquatic species. Many of the rare animals, especially the birds and amphibians, feed primarily on invertebrates and should not be affected by the removal of non-native plants. The few animals whose diets consist mainly of berries or seeds use a variety of native foods and should not be harmed by the removal of non-native food sources. This alternative would benefit rare plant species by removing invasive exotic plants which threaten rare plants and animals. The flexibility offered by this alternative allows for sensitive treatment options to be considered when a rare species is present.

Herbicide use should not affect wildlife on Parkway lands. This alternative has the potential to impact neo-tropical migratory birds if these species are utilizing the exotic plants that are targeted for treatment. Under this alternative neo-tropical migratory birds may experience temporary disruptions while treatments are taking place. Any species using existing exotic vegetation would be impacted, though this should be a minimal impact as these bird species should be able to find native vegetation replacements.

This alternative would benefit wetlands by reducing the threats posed by exotic plants. Water quality should benefit or at least not be harmed by the removal of non-native vegetation. All of the identified non-native species, except one, are terrestrial plants and have little impact on aquatic systems. Implementation of Alternative B would not lead to an impairment of these resources on the Blue Ridge Parkway.

4.3.2 Cultural Resources

In accordance with Section 106 of the NHPA, the NPS consulted with the North Carolina and Virginia SHPO in July 2006 requesting SHPO input on the proposed project (see Figure F-5). The NPS prepared a *Section 106 Assessment of Actions* with a No Adverse Effect determination which would also result in better management of cultural landscapes. The VA SHPO concurred with this determination on July 25, 2006 (see Figure F-6). However, this consultation resulted in no comments regarding the project from the North Carolina SHPO.

Exotics are known to occur at some level at all twelve cultural landscape sites. Impacts vary from site to site, with the greatest loss of integrity currently existing at Peaks of Otter and Otter Creek. In two draft reports for Doughton Park and Otter Creek, exotics have been identified as diminishing the cultural integrity of these historic districts and thus should be managed to protect the scene and historic landscape. Under this alternative, cultural landscapes could be prioritized and measures taken to restore the vegetative integrity. Known plantings, such as the hydrangea plantings and rose garden at the Moses Cone Estate and apple orchards at Johnson Farm and the Moses Cone Estate could remain intact.

4.3.2.1 Cumulative Impacts

Currently, no cultural landscapes within the park exist in its original purity regarding vegetation and exotics in particular. Under this alternative, minimal work could be conducted in all landscapes that warrant mitigation or intensive work could be conducted in only the highest priority areas. In either case, mitigation would restore cultural landscapes, to the extent most desired by the National Park Service, and would have a positive affect on historicity.

4.3.2.3 Conclusion

This alternative would allow direct mitigation of problems and landscape component changes. Priorities could be established that would best benefit the park as a whole, and individual sites, as needed. This alternative best provides for long-term management of cultural landscapes. There

would no impairment to cultural landscapes under this alternative since landscapes could be managed to best restore historicity.

4.3.3 Recreational/Visual Resources

As discussed in Section 3.4, rapid prolific and dense vegetation growth could quickly change and alter the scenic viewing opportunities for Parkway visitors. Exotics could change the nature of the fall color display, and change the nature of the forest types. They could also lessen the native flower display that visitors travel many miles to see.

4.3.3.1 Cumulative Impacts

Large and small scale removal of exotics would have a favorable impact for preservation of the cultural Parkway landscape, because the majority of these plants were not prevalent on the Parkway historically. The landscaped shrubs and trees were often placed in the landscape for their flowering qualities such as the many varieties of rhododendron, mountain laurel, or azalea, or their fall color display such as the maples or sour wood. Control of exotics would have a favorable impact toward the preservation of native fall color and spring flower display. Exotics plants are known to crowd-out, smother, and out-compete natives in some habitat and impact their growth, or ability to persevere.

Surveys have shown that if the scenic quality of the Parkway is greatly changed, that fewer visitors would make return visits. The most valued recreational opportunity on the Parkway, scenic viewing, could be lost and changed without a planned control of exotic vegetation... Removal or management of exotics would favor the native landscape that visitors understand and value as part of the natural scenery. Rapid, prolific and dense exotic vegetation growth could quickly change and alter the scenic viewing opportunities to the Parkway visitors. Exotics could change the nature of the fall color display, and change the nature of the forest types. They could lessen the native flower display that visitors travel many miles to see. Exotics may harbor plant diseases such as the sudden oak death syndrome that may lead to a huge loss of very highly valued native trees such as oaks, and flowering rhododendrons that were so highly valued in the historic landscape planning of the Parkway. The Park natural scene would be enhanced for public enjoyment, learning and interpretation. Removal of exotic species would enhance the diversity and aesthetic qualities of these areas. Exotic plant control would open and maintain views of the southern Appalachian highlands in some locations.

4.3.3.2 Conclusion

Exotic vegetation could change to some degree the integrity of the historic cultural landscape of the Blue Ridge Parkway, which is eligible for national landmark status. Exotic plant growth could alter or screen vistas from view, obscure trails from use, and thus have a detrimental impact on recreational resources. This alternative would be a positive action toward preservation

of campground spaces, maintaining usable trails, keeping Parkway vistas open, and insuring that the intended recreational spaces such as open grassy bays used for picnicking and sunbathing, are preserved from aggressive exotic vegetation growth.

The Park natural scene would be enhanced for public enjoyment, learning and interpretation. Removal of exotic species would enhance the diversity and aesthetic qualities of these areas. Exotic plant control would open and maintain views of the southern Appalachian highlands in many vista cut locations. The native landscape highly planned in the original design intent of the Parkway would be preserved to a greater extent. Preservation of the historic vistas would help ensure that the historic design intent of the cultural landscape and its unique panoramic Appalachian Mountain vistas are maintained for future generations. There would be no impairment of visitor use and experience and recreation at the Park under Alternative B.

4.3.4 Human Health & Safety

There are no anticipated adverse effects of herbicide use to human safety as long as herbicides are used in accordance with product labels and the mitigation measures described herein. Product labels and MSDS for *glyphosate* and *triclopyr* are in the project record.

The use of herbicide does not involve unique or unknown risks, and their use is not highly controversial due to the limited acres in the project area, the targeted species, and the method of application. Implementation of the resource protection measures listed previously would further reduce adverse impacts of herbicides on humans.

Exposure to *glyphosate* base chemicals could cause eye and skin irritation, and is harmful if swallowed. Signal wording for Roundup 2F™ is WARNING, and for Rodeo 4L™ and Accord 25W™ is CAUTION (see table below). Workers should avoid contact with eyes, skin or clothing. Avoid breathing vapors or spray mist. Wash thoroughly with soap and water after handling. Most incidents reported in humans have involved skin or eye irritation in workers after exposure during mixing, loading or application of *glyphosate* formulations. Nausea and dizziness have also been reported after exposure. Swallowing the Roundup™ formulation caused mouth and throat irritation, pain in the abdomen, vomiting, low blood pressure, reduced urine output, and in some cases, death. These effects have only occurred when the concentrate was accidentally or intentionally swallowed, not as a result of the proper use of Roundup™. The amount swallowed averaged about 100 milliliters (about half a cup). There are no reported cases of long term health effects in humans due to *glyphosate* or its formulations.

Exposure to *triclopyr* based chemicals could cause eye damage and skin irritation, is harmful if swallowed, inhaled or absorbed through the skin. Signal wording for Garlon 4™ is CAUTION, and for Garlon 3A™ is WARNING. Workers should avoid contact with eyes, skin, or clothing. Avoid contamination of food. Wash thoroughly after handling. For Garlon 3A™, wear goggles or face shield and rubber gloves when handling. For Garlon 4™ avoid breathing mists or vapors. Remove and wash contaminated clothing before reuse. There are no reported acute or chronic toxicity poisoning for *triclopyr* herbicides.

Exposure to *clpyralid* based chemicals could cause eye injury, harmful if inhaled or absorbed through the skin. Signal wording for Reclaim™, Stinger™, and Transline™ is CAUTION.

Workers should avoid contact with eyes, skin or clothing. Avoid breathing vapors or spray mist. Wash thoroughly with soap and water after handling. Remove clothing immediately if pesticide gets inside. Then wash body thoroughly and put on clean clothing. Wash contaminated clothing before reuse. There are no reported acute or chronic toxicity poisoning for *clpyralid* herbicides.

Exposure to *metalsfuron* based chemicals could cause eye irritation and is harmful if absorbed through the skin. Signal wording for Escort™ and Ally™ is CAUTION. Workers should avoid contact with eyes, skin or clothing. Avoid breathing dust or spray mist. Wash thoroughly with soap and water after handling. Applicators and other handlers must wear a long-sleeved shirt, long pants, waterproof gloves, socks, and shoes. Remove clothing immediately if pesticide gets inside. Then wash body thoroughly and put on clean clothing. Wash contaminated clothing before reuse. Personal protective equipment should be cleaned/maintained according to the manufacturer's instructions. If no such instructions exist for washables, use detergent and hot water. Keep and wash personal protective equipment separately from other laundry. There are no reported acute or chronic toxicity poisoning for *metasulfuron* herbicides.

Exposure to 2,4-D based chemicals may be fatal if absorbed through the skin and causes permanent eye damage. Signal wording for Weedar 64™ and Hi-Dep™ is DANGER. Workers should wear goggles or a face shield, protective gloves, and protective clothing when handling 2,4-D products. Avoid breathing vapor or spray mist. Use a NIOSH/MSHA approved respirator for protection from pesticide mists. Under emergency conditions, workers should wear a positive-pressure self-contained breathing apparatus. When mixing or loading 2,4-D, workers should wear chemical-resistant gloves. Gloves should be washed with soap and water before removal. Remove contaminated clothing and wash before reuse. Workers should wash thoroughly with soap and water before eating, drinking or using tobacco. Individuals with skin lesions, disease, or sensitivity should avoid contact with 2,4-D. No delay after spray has dried is necessary before workers could reenter the treated area. There is some uncertainty as to 2,4-D's reproductive and developmental effects. Acute toxicity reported includes nervous system damage resulting from absorption of 2,4-D through the skin. This damage to the nerves may be irreversible. Prolonged inhalation may cause dizziness, burning in chest or coughing. Large doses of 2,4-D have caused digestive distress and effects on the neuromuscular system. Ingestion of large quantities of 2,4-D formulations has led to death within one to two days of poisoning. Poisoning by lower doses of 2,4-D has led to symptoms, such as neuromuscular problems, that lasted for several months after ingestion. Existing medical conditions such as asthma or skin lesions may be aggravated. Chronic toxicity reported includes long-term exposure to 2,4-D causes liver, kidney, digestive, muscular, or nervous system damage. Symptoms may include weakness, fatigue, headache, dizziness, loss of appetite, nausea, eye and nasal irritation, skin irritation, hypertension, and slowed heart rate.

Some people have severe allergic reactions to herbicides and some do not. The risks vary greatly from chemical to chemical and person to person.

Table 4.3.4-1 Categories of Toxicity (40 CFR 162.10 (h) (1), July 3, 1975)						
		Route of Administration			Hazard	
Category	Signal word	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (mg/L)	Eye Irritation	Skin Irritation
I	DANGER Poison	0-50	0-200	0-0.2	corrosive: corneal opacity not reversible within 7 days	corrosive
II	WARNING	>50-500	>200-2000	>0.2-20	corneal opacity reversible within 7 days; irritation persisting for 7 days	severe irritation at 72 hours
III	CAUTION	>500-5000	>2000-20,000	>2.0-20	no corneal opacity; irritation reversible within 7 days	moderate irritation at 72 hours
IV	none	>5000	>20,000	>20	no irritation	mild or slight irritation at 72 hours

4.3.4.1 Cumulative Impacts

Repeated usage of herbicides at the same site over time has the potential to impact human safety and health due to a higher probability of exposure. However, all the herbicides considered under this alternative are short-lived in the environment and many photo degrade under sunny conditions. Therefore, herbicides would breakdown between applications and not pose a risk to humans.

4.3.4.2 Conclusion

As long as the herbicides are approved through the NPS process, applied and disposed of in accordance with label instructions, and stored according to NPS standards, there should be no long-term adverse impact to human safety or health and no impairment to park resources. The following conditions would be observed:

- Applicators are also required to have pesticide certifications and/or licenses as required by individual state regulations.
- All pesticides have instructions on how they should be used, such as safety equipment that must be worn, and pesticide application guidelines. These are legally binding instructions.
- No restricted-use pesticides would be used.

- By limiting the amount of pesticides purchased, there should be few, if any, pesticides that need to be disposed. If it is determined that leftover pesticides are unusable, they must be discarded according to label instructions and in compliance with OSHA hazardous material regulations.
- Pesticide storage facilities must be managed in accordance with OSHA regulations (e.g., facilities must be locked, fireproof, ventilated, and have proper warning signs). Pesticides must be stored separately from other substances (e.g., food, cleaning chemicals). Pesticides should be stored in a building separate from other chemicals. This would help avoid the potential reaction of incompatible materials (e.g. flammable dormant oil and reactive organic insecticide) or other adverse reactions (e.g., herbicides should be stored separately away from other pesticides as they could off-gas and chemically alter other pesticides).
- Employees would maintain an annual pesticide use log and submit it to the PUPS database. This information is maintained for legal purposes and in accordance with NPS Management Policies.

5.0 CONSULTATION AND COORDINATION

To ensure that the Park and its programs are coordinated with the programs and objectives of State, Federal, and local governments and private organizations, it is the Park's objective to work with these agencies and organizations during the planning process. Consultation and coordination have occurred with numerous agencies during the preparation of this EA. Consultation undertaken for compliance with specific laws is discussed below and in Section 6.0 of this EA. **Table 5-1** lists the agencies, organizations, and persons contacted for information, which assisted in identifying issues, developing alternatives, and analyzing impacts of the alternatives.

Virginia Department of Environmental Quality (VDEQ)

The VDEQ, Office of Environmental Impact Review is responsible for coordinating the VDEQ's review of environmental documents submitted pursuant to Executive Order 12372, and responding to appropriate government agencies. The VDEQ, Office of Environmental Impact Review was contacted regarding potential impacts of the project and compliance with Virginia's environmental legislation. No response was received from the VDEQ, Office of Environmental Impact regarding programs administered by the VDEQ and other State agencies, which could be applicable to this project.

North Carolina Department of State Clearinghouse, Environmental Review (NCDSC)

The NCDSC, Office of Environmental Impact Review is responsible for coordinating the state review of environmental documents submitted pursuant to Executive Order 12372, and responding to appropriate government agencies. The NCDSC, Office of Environmental Impact Review was contacted regarding potential impacts of the project and compliance with North Carolina's environmental legislation. A response letter was received on June 13, 2006 (see

Figure F-7). The NCDSC, Office of Environmental Impact provided guidance regarding programs administered by the NCDSC and other State agencies, which could be applicable to this project. This guidance was incorporated into this EA.

Table 5-1. Persons and Agencies Contacted	
Person Contacted	Agency/Organization
Coleman McCleneghan, Assistant Professor, Mycology	Appalachian State University
R. Wayne Van Devender, Herpetology and Vertebrate Biology	Appalachian State University
	North Carolina Department of Agriculture, Plant Conservation Program
Chrys Baggett, Environmental Policy Act Coordinator	North Carolina Department of State Clearinghouse, Environmental Review
Renee Gledhill-Earley Environmental Review Coordinator	North Carolina Department of Cultural Resources
	North Carolina Department of Cultural Resources, Division of Archives & History
David Brook, Deputy	North Carolina Department of Historic Resources, State Historic Preservation Office
Melba McGee Environmental Review Coordinator	North Carolina Department of Environment and Natural Resources
	North Carolina Natural Heritage Program, Biological Conservation Database
Dennis Herman, Coordinator of Living Collections	North Carolina Museum of Natural Sciences
Dave McHenry, Mountain Region Coordinator Habitat Conservation Program	North Carolina Wildlife Resource Commission, Habitat Conservation Program
Chris McGrath, Non-game Biologist	North Carolina Wildlife Resource Commission
Joe Mickey	North Carolina Wildlife Resource Commission, Raleigh Office
Steven Chapin	US Army Corps of Engineers, Asheville Field Office
Brian Cole, Supervisor	US Fish and Wildlife Service, Endangered Species Office, Asheville Field Office
Mari Sue Hilliard, Forest Supervisor	US Forest Service, Asheville, North Carolina
	USDA, Soil Conservation Service, Raleigh North Carolina
Keith R. Tignor, Endangered Species Coordinator	Virginia Department of Agriculture and Consumer Services, Office of Plant and Pest Service
S. René Hypes, Project Review Coordinator	Virginia Department of Conservation and Recreation, Natural Heritage Program
John Fisher, EIR Coordinator	Virginia Department of Environmental Quality, Office of Environmental Impact Review
Elleanore Daub, Environmental Program Planner	Virginia Department of Environmental Quality
Brian Moyer	Virginia Department of Game and Inland Fisheries, Environmental Services Section

Person Contacted	Agency/Organization
Bud LaRoche	Virginia Department of Game and Inland Fisheries
Kathleen Kilpatrick, State Historic Preservation Officer	Virginia Department of Historic Resources
Jeff Madden	Virginia Marine Resources Commission, Habitat Management Division
	US Army Corps of Engineers, Norfolk District Office
Patricia Egan, District Ranger	USDA Forest Service, Glenwood and Pedlar Ranger Districts
Andy Moser	US Fish and Wildlife Service, Chesapeake Bay Field Office
	US Fish and Wildlife Service, Ecological Services, Virginia Field Office
	Southeast Archeological Center, National Park Service
Dr. John Jackson, Associate Research Scientist	Stroud Water Research Center
Bob Gale, Ecologist	Western North Carolina Alliance
Dr. Dan Pittillo, former Professor	Western Carolina University, Department of Biology

5.1 PUBLIC INVOLVEMENT

Public involvement during the NEPA process includes public scoping, public review of the EA, and responses to comments submitted by the public. In accordance with CEQ's regulations for implementing NEPA (40 CFR 1506.6), the NPS has involved the interested and affected public during the preparation of this EA.

A copy of this EA was sent to all persons who requested a copy, as well as to other pertinent agencies and individuals potentially affected by the Preferred Alternative. This EA would be available for public review for a minimum of 30 days. During this public review period, comments on the EA are invited from the public and interested agencies. All comments received on the EA would be reviewed by multiple parties, and appropriate responses would be prepared. Appendix F of this EA contains a more detailed discussion of this process.

6.0 COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

The following laws and associated regulations provided guidance for the development of this EA, the decision on the Preferred Alternative and alternatives, the analysis of impacts, and the creation of mitigation measures to be implemented as part of the Preferred Alternative. Summaries of the following laws, as well as a complete list and description of environmental laws and regulations relevant to the project, are provided in Appendix E of this EA.

National Environmental Policy Act of 1969 (NEPA) (42 USC 4321-4370):

This Act requires Federal agencies to evaluate the environmental impacts of their actions and to integrate such evaluations into their decision-making processes. Implementing regulations for NEPA are contained in 40 CFR 1500 through 1508. This EA was prepared in accordance with NEPA and its implementing regulations.

Endangered Species Act of 1973, as amended (ESA) (16 USC 1531-1544):

Section 7 of the ESA requires that a Federal agency consult with the USFWS or the National Marine Fisheries Service on any action that may affect endangered, threatened, or candidate species, or that may result in adverse modifications of critical habitat. Implementing regulations that describe procedures for interagency cooperation and consultation with regards to effects on threatened, endangered, or proposed species are contained in 50 CFR 402.

The United States Fish and Wildlife Service (USFWS), the VDCR, and the NC Natural Heritage Database were contacted regarding potential impacts of the project on natural heritage resources, including rare, threatened, or endangered plant and animal species. Federal or State-listed threatened or endangered plants or animals would benefit under the Preferred Alternative by removing invasive exotic plants which threaten them. These findings were confirmed in a response letter from the USFWS dated May 12, 2006. The VDCR had no comment on the project.

National Historic Preservation Act of 1966, as amended (NHPA) (16 USC 470 et seq.):

Section 106 of the NHPA requires Federal agencies to consider the effects of their proposals on properties listed or eligible for listing in the National Register of Historic Places (NRHP). Section 106 also directs Federal agencies to provide the state historic preservation officer (SHPO), tribal historic preservation officers, and, as appropriate, the Advisory Council on Historic Preservation, a reasonable opportunity to review and comment on these proposals.

The NPS has consulted with the North Carolina and Virginia SHPO, as required by Section 106 of the NHPA, as amended, and its implementing regulations (36 CFR 800). The NPS initiated consultation on July 14, 2006 with a letter requesting SHPO input on the project.

The *Section 106 Assessment of Actions* was determined to be No Adverse Effect, signed by the Park Superintendent on July 6, 2006. The VA SHPO concurred with this determination on July 25, 2006. However, this consultation resulted in no comments regarding the project from the North Carolina SHPO.

Executive Order 13112, *Invasive Species*:

This executive order requires Federal agencies to not contribute to the introduction, continued existence, or spread of non-native invasive species, or actions that may promote the introduction, growth or expansion of the range of non-native invasive species. Adverse effect on park resources, as well as recreational resources would result from the No Action Alternative. Likewise, beneficial impacts on these resources would result from the Preferred Alternative and would be experienced by all visitors.

Executive Order 11990, *Protection of Wetlands*:

This executive order directs the NPS to avoid, to the extent possible, the long- and short-term adverse impacts associated with modifying or occupying wetlands, and requires Federal agencies to follow avoidance, mitigation, and preservation procedures regarding wetlands with public input before proposing new construction projects. The Preferred Alternative would benefit wetlands by reducing the threats posed by exotic plants. The flexibility offered by this alternative allows treatments to be tailored to the conditions and concerns that uniquely exist at each wetland.

7.0 REFERENCES SITED

EXECUTIVE ORDERS

Executive Order 11988 (*Floodplain Management*)
Executive Order 11990 (*Protection of Wetlands*)
Executive Order 12898 (*Environmental Justice*)
Executive Order 13186 (*Migratory Birds*)

NPS DIRECTOR'S ORDERS

DO-2 (*Planning Process Guidelines*)
DO-12 (*Conservation Planning, Environmental Impact Analysis, & Decision-making*)
DO-28 (*Cultural Resource Management*)
DO-77 (*Natural Resources Management*)

US FEDERAL GOVERNMENT

1916 National Park Service Organic Act, as amended
16 U.S.C. National Park Service General Authorities Act
1947 Federal Insecticide, Fungicide and Rodenticide Act, as amended

1958 Fish and Wildlife Coordination Act, as amended
1963 Clean Air Act, as amended
1966 National Historic Preservation Act, as amended
1969 National Environmental Policy Act (NEPA)
1972 Noise Control Act, as amended
1973 Endangered Species Act, as amended
1974 Archeological and Historic Preservation Act (88 Stat. 174)
1976 General Authorities Act (90 Stat 1939)
1977 Clean Water Act, as amended
1979 Archeological Resources Protection Act
1984 Farmland Protection Policy Act
1990 Native American Graves Protection and Repatriation Act
1993 Government Performance and Results Act (GPRA)
1995 Programmatic Agreement among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers
2001 *Blue Ridge Parkway Strategic Plan*
Dept. of the Interior, Departmental Manual, *DM 516-NEPA Policies*
36 Code of Federal Regulations, Chapter 1 – *National Park Service*
36 Code of Federal Regulations, Part 800 - *National Historic Preservation Act*
40 Code of Federal Regulations, Parts 1500-1508 - *NEPA Regulations*
40 Code of Federal Regulations, Part 162 - 40 CFR 162.10 (h) (1), July 3, 1975)
43 Code of Federal Regulations, Part 7 – *Archeological Resources Protection*
43 Code of Federal Regulations, Part 10 – *Native American Graves Protection and Repatriation*
50 Code of Federal Regulations, Part 17 – *Endangered and Threatened Wildlife and Plants*

8.0 LIST OF PREPARERS

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APPENDIX A

ACRONYMS AND ABBREVIATIONS

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ACRONYMS & ABBREVIATIONS

A list of terms relevant to managing the Blue Ridge Parkway is provided below. Although not exhaustive, this glossary highlights some of the key terms and evolving concepts that are important to understanding National Park Service management policies and principles. Statutory definitions can be accessed on-line, e.g., at: [<http://www4.law.cornell.edu/uscode/>].

ACHP	Advisory Council on Historic Preservation
BLRI	Blue Ridge Parkway
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRM	Cultural Resource Management
CWA	Clean Water Act
DOI	Department of the Interior
DM	Department of the Interior Manual
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
GPRA	Government Performance and Results Act
GMP	<i>General Management Plan</i>
IPM	Integrated Pest Management
LPP	<i>Land Protection Plan</i>
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Protection Act
NCWRC	North Carolina Wildlife Resources Commission
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
PL	Public Law
PLUMs	Park Land Use Maps
RCRA	Resource Conservation and Recovery Act
RV	Recreational Vehicle
SDWA	Safe Drinking Water Act
SEA	Significant Ecological Areas
SHPO	State Historic Preservation Officer
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USDI	United States Department of Interior

USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
VDACS	Virginia Department of Agriculture and Consumer Services
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VMRC	Virginia Marine Resources Commission

APPENDIX B

GLOSSARY

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Glossary

Administrative record: The “paper trail” that documents an agency’s decision-making process and the basis for the agency’s decision. It includes all materials directly or indirectly considered by persons involved in the decision-making process. These are the documents that a judge would review to determine whether the process and the resulting agency decision were proper.

Adsorption: The process of attaching to a surface.

Affected environment: The existing biological, physical, cultural, social, and economic conditions of an area that are subjected to both direct and indirect changes, as a result of actions described within alternatives under consideration.

Air quality: A measure of health and visibility-related characteristics of air often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Alternatives: A reasonable range of options that can accomplish an agency’s objectives.

Ambient air: The surrounding air.

Aquatic species: A group of closely related and interbreeding living things, living or growing in, on, or near the water.

Archeological resource: Any material remains or physical evidence of past human life or activities, which are of archeological interest, including the record of the effects of human activities on the environment. An archeological resource is capable of revealing scientific or humanistic information through archeological research.

Backcountry: Refers to primitive, undeveloped portions of parks, some of which may be categorized as “wilderness.”

Canopy: The uppermost layer of a forest where a layer of tree branches spread.

Consultation: A discussion, conference, or forum, in which advice or information is sought or given, or information or ideas are exchanged. Consultation usually takes place on an informal basis; formal consultation requirements for compliance with Section 106 of NHPA are published in 36 CFR Part 800.

Council on Environmental Quality (CEQ): The President’s Council on Environmental Quality was established by the National Environmental Policy Act NEPA and is the agency responsible for the oversight and development of national environmental policy.

Critical habitat: Specific areas within a geographical area occupied by a threatened or endangered species which contain those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time of its listing, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species.

Cultural landscape: A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or esthetic values. There are four non-mutually exclusive types of cultural landscapes- historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.

Cultural resource: An aspect of a cultural system that is valued by or significantly representative of a culture, or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places, and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management purposes. By their nature, cultural resources are nonrenewable.

Cumulative effects (impacts): Effects on the environment that result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Deciduous: Shedding or losing foliage at the end of the growing season.

Degradation (natural resources): Refers to negative impact(s) to natural resources or natural processes. The impact may be singular or cumulative; the extent may be local or ecosystem-wide. The term degradation is used broadly and may refer to: reduction in habitat size, reduction in extent of plant populations, declining species vigor exhibited as reduced population numbers, reduced reproductive success, increased mortality rates, and/or decreased percent of available habitat utilized.

Developed area: An area managed to provide and maintain facilities (e.g., roads, campgrounds, housing) serving park managers and visitors. Includes areas where park development or intensive use may have substantially altered the natural environment or the setting for culturally significant resources.

Ecosystem: A system formed by the interaction of a community of organisms with their physical environment, considered as a unit.

Environmental Assessment: A brief NEPA document that is prepared (a) to help determine whether the impact of an proposed action or its alternatives could be significant; (b) to aid the NPS in compliance with NEPA by evaluating a proposal that would have no significant impacts, but may have measurable adverse impacts; or (c) as an evaluation of a proposal that is either not described on the list of categorically excluded actions, or is on the list, but exceptional circumstances apply.

Environmental Impact Statement: A detailed NEPA analysis document that is prepared when a proposed action or alternatives have the potential for significant impact on the human environment.

Environmental consequences: A section of an environmental assessment that is the scientific and analytic basis for comparing alternatives. This discussion includes the environmental effects of the alternatives, any adverse effects that cannot be avoided, and short-term, long-term and cumulative effects.

Encroachment: An advance beyond proper or legal limits; intruding.

Endangered species: Any species which is in danger of extinction throughout all or a significant portion of its range. These species are listed by the U.S. Fish and Wildlife Service.

Endangered Species Act of 1973 (amended) (ESA): The Endangered Species Act ensures that no federal action would jeopardize the continued existence of federally listed or proposed threatened or endangered species of plant or animal.

Eradication: To control or suppress, in this case, exotic plants.

Escarpment: A steep slope or long cliff that results from erosion or faulting and separates two relatively level areas of differing elevations.

Ethnographic landscape: An area containing a variety of natural and cultural resources that traditionally associated people define as heritage resources. The area may include plant and animal communities, structures, and geographic features, each with their own special local names.

Ethnographic resources: Objects and places, including sites, structures, landscapes and natural resources, with traditional cultural meaning and value to associated peoples. Research and consultation with associated people identifies and explains the places and things they find culturally meaningful. Ethnographic resources eligible for the National Register of Historic Places are called traditional cultural properties.

Exotic: Plant or animal species introduced into an area where they do not occur naturally; non-native species.

Facilities: Refers to buildings, houses, campgrounds, picnic areas, visitor-use areas, operational areas, and associated supporting infrastructure such as roads, trails, and utilities.

Fauna: Refers to animal life.

Floodplain: Land on either side of a stream or river that is submerged during floods; typically discussed in terms of 50, 100, or 500-year events.

100-year floodplain: The land adjacent to a river corridor that would be covered by water during a 100-year flood event. A 100-year flood event has a 1% probability of occurring during any given year.

Foraging: The act of looking or searching for food or provisions.

Finding of No Significant Impact (FONSI): The public document following the preparation of a final environmental assessment that reflects the agency's final decision, rationale behind the decision, and commitments to monitoring and mitigation.

General Management Plan (GMP): A plan which clearly defines direction for resource preservation and visitor use in a park, and serves as the basic foundation for decision making. GMPs are developed with broad public involvement.

Groundwater: All water found below the surface of the ground.

Half-life: The time required for half the amount of substance to be reduced by natural processes

Headwaters: The water from which a river rises; a source.

Historic property: A district, site, building, structure, or object significant in the history of American archeology, architecture, culture, engineering, or politics at the national, state, or local level.

Historic district: A geographically definable area, urban or rural, possessing a significant concentration, linkage or continuity of sites, landscapes, structures, or objects, united by past events or aesthetically by plan or physical developments. A district may also be composed of individual elements separated geographically but linked by association or history.

Hydrology: A science dealing with the properties, distribution and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Impact: The likely effects of an action or proposed action upon specific natural, cultural, or socioeconomic resources. Impacts may be direct, indirect, cumulative, beneficial, or adverse. Direct impacts are those occurring at the same time and place as the action itself. Indirect impacts occur later in time or are farther removed in distance from the action, yet are reasonably foreseeable. Severe impacts that harm the integrity of park resources or values are known as “impairments.”

Impairment: An impact so severe that, in the professional judgment of a responsible NPS manager, it would harm the integrity of park resources or values and violate the 1916 NPS Organic Act.

Integrated pest management: A decision-making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest damage, by cost-effective means, while posing the least possible hazard to people, resources, and the environment.

Invasive native and exotic plants: A species which takes over a new habitat where it was not previously found, often to the detriment of species which were there before.

Invertebrate: Generally, any animal that does not have a spine (vertebrae).

Mitigation: An activity designed to avoid, minimize, rectify, reduce or compensate the severity of, or eliminate impacts from the proposed project. A mitigation measure should be a solution to an identified environmental problem.

Monitoring: To keep track of systematically with a view to collecting information.

National Environmental Policy Act of 1969 (NEPA): A law enacted on January 1, 1970 that established a national policy to maintain conditions under which humans and nature can exist in productive harmony and fulfill the social, economic and other requirements of present and future generations of Americans.

National Historic Landmark: A district, site, building, structure, landscape, or object of national historical significance, designated by the Secretary of the Interior under authority of the Historic Sites Act of 1935 and entered in the National Register of Historic Places.

National Historic Preservation Act of 1966 (NHPA): This act required federal agencies to give consideration to historic properties determined significant (properties listed on or determined to be eligible for the National Register of Historic Places) prior to expending funding for, authorizing, or licensing a federal project or permit.

National Park Service (NPS): An agency in the Department of the Interior responsible for protection and preservation of 384 natural and cultural units throughout the United States.

National Register of Historic Places: The comprehensive list of districts, sites, buildings, structures, and objects of national, regional, state, and local significance in American history, architecture, archeology, engineering, and culture kept by the National Park Service under authority of the National Historic Preservation Act of 1966.

Natural resources: Features and values that include plants and animals, water, air, soils, topographic features, geologic features, paleontological resources, natural quiet and clear night skies.

NEPA process: The objective analysis of a proposed action to determine the degree of its environmental impact on the natural and physical environment; alternatives and mitigation that reduce that impact; and the full and candid presentation of the analysis to, and involvement of, the interested and affected public. Required of federal agencies by the National Environmental Policy Act of 1969.

No action alternative: An alternative in an environmental assessment that continues current management direction. A no action alternative is a benchmark against which action alternatives are compared.

Non-native species: Species of plants or animals that do not naturally occur in a particular area and of often interfere with natural biological systems. Also known as alien, introduced, or exotic species.

Non-target: Animals or plants other than the ones which the pesticide is intended to kill.

Organic Act (NPS): The 1916 law (and subsequent amendments) that created the National Park Service and assigned it responsibility to manage the national parks.

Paleontological/paleoecological resources: Resources such as fossilized plants, animals, or their traces, including both organic and mineralized remains in body or trace form. Paleontological resources are studied and managed in their paleoecological context (that is, the geologic data associated with the fossil that provides information about the ancient environment).

Predation: The capturing of prey as a means of maintaining life.

Preservation (cultural resource): The act or process of applying measures to sustain the existing form, integrity, and material of a historic structure, landscape, or object. Work may include preliminary measures to protect and stabilize the property, but generally focuses on the ongoing preservation maintenance and repair of historic materials and features rather than extensive replacement and new work.

Preservation (natural resource): The act or process of preventing, eliminating, or reducing human-caused impacts to natural resources and natural processes.

Restoration: Work conducted to remove impacts to natural resources and restore natural processes, and to return a site to natural conditions.

Riparian areas: Areas that are on or adjacent to rivers and streams; these areas are typically rich in biological diversity.

Sacred sites: Certain natural and cultural resources treated by American Indian tribes and Alaska natives as sacred places having established religious meaning, and as locales of private ceremonial activities.

Section 7 Consultation: Section 7 of the Endangered Species Act requires consultation with the U.S. Fish and Wildlife Service if the habitat of a threatened or endangered plant or animal may be affected by a federally authorized action.

Snag: A standing dead tree.

Strategic Plan: A Service-wide, 5-year plan required by GPRA (5 USC 306) in which the NPS states (1) how it plans to accomplish its mission during that time, and (2) the value it expects to produce for the tax dollars expended. Similarly, each park, program, or central office has its own strategic plan, which considers the Service-wide mission plus its own particular mission. Strategic plans serve as “performance agreements” with the American people.

Threatened species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. These species are listed by the U.S. Fish and Wildlife Service.

Visitor experience: The perceptions, feelings, and interaction a park visitor has in relationship with the environment.

Watershed: The region draining into a river, river system, or body of water.

Wetland: Areas that are inundated by surface or groundwater with a frequency sufficient to support, under normal circumstances, vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

TYPES OF AUTHORITIES – SOURCES OF NPS GUIDANCE

Constitution: The fundamental law of the United States.

Code of Federal Regulations (CFR): A publication that codifies the general and permanent rules or regulations published in the Federal Register by the Executive branch departments and agencies of the federal government, and which carry the force of law. The citation 36 CFR 1.1 refers to part 1, section 1, of title 36.

Department of the Interior Manual (DM): The compilation of policies, procedures, and guidelines governing operations of the various bureaus of the Department of the Interior.

Director’s Orders: Provide guidance for implementing certain aspects of NPS Management Policies, and are used as a vehicle for updating Management Policies between publishing dates. In many cases, Director’s Orders are further supplemented by handbooks or reference manuals.

Executive Orders, Memoranda, or Proclamations: Regulations having the force of law issued by the President of the United States to the Executive branch of the federal government.

Federal Register: A daily publication of the National Archives and Records Administration that updates the Code of Federal Regulations, in which the public may review the regulations and legal notices issued by federal agencies. Source citations for the regulations are referred to by volume number and page number of the FR and the date of publication (e.g., 65 FR 2984, January 19, 2000).

Public Law: A law or statute of the United States.

Regulations: Rules or orders prescribed by federal agencies to regulate conduct, and published in the CFR.

Unites States Code (USC): The systematic collection of the existing laws of the United States, organized under 50 separate titles. The citation 16 USC 1 refers to section 1 of title 16.

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APPENDIX C

**List of rare plants (vascular and non-vascular) that occur
on Blue Ridge Parkway lands (NC/VA)**

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**List of rare plants (vascular and non-vascular) that occur
on Blue Ridge Parkway lands (NC/VA)**

Scientific Names	Common Names	GRank	SRank
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	G3G5	S2
<i>Anemone canadensis</i>	Canada Anemone	G5	S1
<i>Anomyia cuneifolia</i>	A Liverwort	G4G5	S2
<i>Arabis hirsuta var adpressipilis</i>	Hairy Rockcress	G5T4Q	S1
<i>Arisaema triphyllum ssp stewardsonii</i>	Bog Jack-in-the-pulpit	G5T4	S1
<i>Botrychium simplex var simplex</i>	Least Moonwort	G5T5	S1
<i>Calamagrostis cainii</i>	Cain's Reed Grass	G1	S1
<i>Calopogon tuberosus var. tuberosus</i>	Tuberosus Grass-pink	G3	S2
<i>Campylopus atrovirens var cucullatifolius</i>	Cliff Campylopus	G4?T3?	S1
<i>Cardamine clematidis</i>	Mountain Bittercress	G2G3	S2
<i>Carex biltmoreana</i>	Biltmore Sedge	G3	S3
<i>Carex buxbaumii</i>	Brown Bog Sedge	G5	S2
<i>Carex misera</i>	Wretched Sedge	G3	S3
<i>Carex vesicaria</i>	Inflated Sedge	G5	S1S2
<i>Cephaloziella spinicaulis</i>	A Liverwort	G3G4	S1
<i>Cetraria arenaria</i>	A Foliose Lichen	G4	S2
<i>Cetrelia cetrarioides</i>	A Foliose Lichen	G3	S2
<i>Chelone cuthbertii</i>	Cuthbert Turtlehead	G3	S2
<i>Cirriphyllum piliferum</i>	A Moss	G5	S1
<i>Clematis glaucophylla</i>	White-leaved Leatherflower	G5	SH
<i>Clematis occidentalis</i>	Mountain Clematis	G5	S1
<i>Coeloglossum viride var virescens</i>	Long-bracted Frog Orchid	G5T5	S1
<i>Coreopsis latifolia</i>	Broadleaf Coreopsis	G3	S3
<i>Cornus sericea ssp. sericea</i>	Red-osier Dogwood	G5	S1
<i>Coscinodon cribrosus</i>	Copper Grimmia	G3?	S1
<i>Crataegus mollis</i>	A Hawthorn	G5	S1
<i>Crataegus pruinosa</i>	A Hawthorn	G5	S2
<i>Dalibarda repens</i>	Robin Runaway	G5	S1
<i>Delphinium exaltatum</i>	Tall Larkspur	G3	S1
<i>Dodecatheon meadia var meadia</i>	Eastern Shooting Star	G5T5	S2
<i>Epilobium angustifolium</i>	Purple Woldow-herb	G5	S1
<i>Epilobium ciliatum</i>	Purpleleaf Woldow-herb	G5	S2
<i>Epilobium leptophyllum</i>	Linear-leaved Woldow-herb	G5	S2
<i>Euphorbia purpurea</i>	Glade Spurge	G3	S2
<i>Geum geniculatum</i>	Bent Avens	G2	S2
<i>Geum radiatum</i>	Mountain Avens	G1	S1
<i>Gymnoderma lineare</i>	Rock Gnome Lichen	G2	S2
<i>Helianthemum propinquum</i>	Creeping Sunrose	G4	S1

Scientific Names	Common Names	GRank	SRank
<i>Helonias bullata</i>	Swamp-pink	G3	S2S3
<i>Hexastylis shuttleworthii</i> var. <i>shuttleworthii</i>	Large-flowered Heartleaf	G4T4	S2?
<i>Homalia trichomanoides</i>	Lime Homalia	G5	S1
<i>Houstonia canadensis</i>	Canada Bluets	G4	S2
<i>Huperzia appalachiana</i>	Appalachian Fir-clubmoss	G4G5	S2
<i>Hydrothyria venosa</i>	An Aquatic Lichen	G3	S2
<i>Hypericum ellipticum</i>	Pale St. John's-wort	G5	SH
<i>Iliamna remota</i>	Kankakee Globe-mallow	G1Q	S1
<i>Isotria medeoloides</i>	Small Whorled Pogonia	G2	S1
<i>Juncus trifidus</i>	Highland Rush	G5	S1
<i>Leptodontium excelsum</i>	Grandfather Mountain Leptodontium	G2	S1
<i>Leptodontium flexifolium</i>	Pale-margined Leptodontium	G5	S1
<i>Leucothoe fontanesiana</i>	Highland Dog-hobble	G5	S1S2
<i>Liatris helleri</i>	Heller's Blazing Star	G2	S2
<i>Lilium grayi</i>	Gray's Lily	G3	S2
<i>Liparis loeselii</i>	Fen Orchid	G5	S1
<i>Lonicera canadensis</i>	American Fly-honeysuckle	G5	S2
<i>Melanelia stygia</i>	A Foliose Lichen	G4G5	S1S2
<i>Minuartia groenlandica</i>	Greenland Sandwort	G5	S2
<i>Muhlenbergia glomerata</i>	Marsh Muhly	G5	S2
<i>Nardia scalaris</i> ssp. <i>scalaris</i>	A Liverwort	G5T5	S1
<i>Phlox subulata</i>	Moss Pink	G5	S1
<i>Plagiochila corniculata</i>	A Liverwort	G2G4	S2
<i>Plagiochila sharpii</i>	A Liverwort	G2G3	S2
<i>Plagiochila sullivantii</i> var. <i>sullivantii</i>	A Liverwort	G2T2	S2
<i>Platanthera grandiflora</i>	Large Purple-fringe Orchid	G5	S1
<i>Platanthera peramoena</i>	Purple Fringeless Orchid	G5	S1
<i>Ppolanisia dodecandra</i> ssp. <i>dodecandra</i>	Common Clammy-weed	G5	S2
<i>Prenanthes roanensis</i>	Roan Rattlesnake Root	G3	S3
<i>Rhododendron vaseyi</i>	Pink-shell Azalea	G3	S3
<i>Robinia hispida</i> var. <i>kelseyi</i>	Kelsey's Locust	G4TUQ	S1
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	Red Raspberry	G5T5	S2?
<i>Sanguisorba canadensis</i>	Canada Burnet	G5	S2
<i>Saxifraga caroliniana</i>	Carolina Saxifrage	G2	S2
<i>Silene ovata</i>	Mountain Catchfly	G2G3	S2
<i>Silphium connatum</i>	Virginia Cup-plant	G3?Q	S1
<i>Solidago uliginosa</i> var. <i>uliginosa</i>	Bog Goldenrod	G3	S2
<i>Sparganium chlorocarpum</i>	Greenfruit Bur-reed	G5	S1
<i>Spartina pectinata</i>	Freshwater Cordgrass	G5	S1
<i>Stachys clingmanii</i>	Clingman's Hedge-nettle	G2Q	SH
<i>Streptopus amplexifolius</i>	White Mandarin	G5	S1
<i>Tofieldia glutinosa</i>	Sticky Bog Asphodel	G5	S1

Scientific Names	Common Names	GRank	SRank
<i>Trichophorum cespitosum</i>	Deerhair Bulrush	G5	S2S3
<i>Vaccinium macrocarpon</i>	Cranberry	G4	S2
<i>Vaccinium macrocarpon</i>	Large Cranberry	G4	S2
<i>Vicia americana</i> ssp. <i>americana</i>	American Purple Vetch	G5T5	S1S2
<i>Woodsia appalachiana</i>	Appalachian Cliff Fern	G4	S1
<i>Xanthoparmelia monticola</i>	A Foliose Lichen	G2?	S2?
<i>Zigadenus leimanthoides</i>	Pinebarren Death-camus	G4Q	S1

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APPENDIX D

List of federally listed animal species on Blue Ridge Parkway lands (NC/VA)

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FEDERALLY LISTED ANIMAL SPECIES		
Scientific Names	Common Names	Habitat
<i>Alasmidonta raveneliana</i> (E)	Appalachian elktoe	Tennessee drainages – Little Tennessee and Nolichucky
<i>Antrolana lira</i> (T)	Madison Cave isopod	Subterranean, freshwater, phreatic lakes
<i>Clemmys muhlenbergii</i> (T-S/A)	Bog turtle	Bogs, wet pastures, wet thickets
<i>Corynorhinus townsendii virginianus</i> (E)	Virginia big-eared bat	Roosts in caves (rarely mines) especially in limestone areas
<i>Epioblasma capsaeformis</i> (E)	Oyster mussel	Tennessee and Cumberland River Basins
<i>Erimonax monachus</i> (T)	Spotfin chub (=turquoise shiner)	Moderate to large streams with
<i>Glaucomys sabrinus coloratus</i> (E)	Carolina northern flying squirrel	High elevation forests, mainly Spruce-Fir
<i>Haliaeetus leucocephalus</i> (T)	Bald eagle	Most nest sites are found in the midst of large wooded areas adjacent to marshes or bodies of water
<i>Mesodon clarki nantahala</i> (T)	Noonday snail	Damp oak hickory forest with dense undergrowth; northern exposure
<i>Microhexura montivaga</i> (E)	Spruce-fir moss spider	In moss of spruce-fir forests
<i>Myotis grisescens</i> (E)	Gray bat	Caves near water
<i>Myotis sodalis</i> (E)	Indiana bat	Roosts in hollow trees or under loose bark, in caves
<i>Patera clarki nantahala</i> (T)	Noonday globe	Nantahala Gorge
<i>Pegias fabula</i> (E)	Little-wing pearlymussel	Little Tennessee River
<i>Percina rex</i> (E)	Roanoke logperch	Warm, moderate to large size streams and rivers with a succession of riffle-run-pool habitat
<i>Pleurobema collina</i> (E)	James spinymussel	Endemic to the James River drainage
<i>Puma concolor cougar</i> (E)	Eastern cougar	Extensive forests, remote areas
<i>Stygobromus stegerorum</i> (T)	Madison cave amphipod	Subterranean

NORTH CAROLINA STATE LISTED ANIMAL SPECIES		
Scientific Names	Common Names	Habitat
<i>Aegolius acadicus pop 1</i> (PT)	Northern saw-whet owl – Southern App. Population	Spruce-fir forests or mixed hardwood/spruce forests (for nesting) [breeding season only]
<i>Aegolius acadicus pop 1</i> (PT)	Northern saw-whet owl – Southern App. Population	Spruce-fir forests or mixed hardwood/spruce forests (for nesting) [breeding season only]
<i>Alasmidonta raveneliana</i> (E)	Appalachian elktoe	Tennessee drainages – Little Tennessee and Nolichucky
<i>Alasmidonta viridis</i> (E)	Slippershell mussel	Little Tennessee River
<i>Ambystoma talpoideum</i> (SC)	Mole salamander	Breeds in fish-free semipermanent woodland ponds, forages in adjacent woodlands
<i>Aneides aeneus</i> (E)	Green salamander	Damp shaded crevices of cliffs or rock outcrops in deciduous forests
<i>Apalone spinifera spinifera</i> (SC)	Eastern spiny softshell	Large streams in the French Broad system
<i>Appalachina chilhoweensis</i> (SC)	Queen crater	Southern half of mountains
<i>Cambarus chaugaensis</i> (SC)	Oconee stream crayfish	Streams in Savannah drainage
<i>Cambarus georgiae</i> (SC)	Little Tennessee River crayfish	Streams in Little Tennessee Drainage
<i>Certhia Americana</i> (SR – PSC)	Brown creeper	High elevation forests, favoring spruce-fir mixed with hardwoods
<i>Clemmys muhlenbergii</i> (T)	Bog turtle	Bogs, wet pastures, wet thickets
<i>Clinostomus funduloides</i> ssp 1 (SC)	Little Tennessee River rosyside dace	Little Tennessee drainage
<i>Contopus cooperi</i> (SC)	Olive-sided flycatcher	Montane conifer forests (mainly spruce-fire) with openings or dead trees (breeding season only)
<i>Crotalus horridus</i> (SR – PSC)	Timber rattlesnake	Rocky, upland forests
<i>Cryptobranchus alleganiensis</i> (SC)	Hellbender	Large and clear fast-flowing streams

NORTH CAROLINA STATE LISTED ANIMAL SPECIES (Cont'd)		
Scientific Names	Common Names	Habitat
<i>Cyclomaias tuberculata</i> (E)	Purple wartyback	New River
<i>Cyprinella monacha</i> (T)	Spotfin chub	Little Tennessee River
<i>Elliptio dilatata</i> (SC)	Spike	Little Tennessee, New River drainages
<i>Etheostoma acuticeps</i> (T)	Sharphead darter	Streams in Nolichucky system
<i>Etheostoma inscriptum</i> (SC-PT)	Turquoise darter	Streams in Savannah drainage
<i>Etheostoma jessiae</i> (SC)	Blueside darter	Streams in Mills River system
<i>Etheostoma vulneratum</i> (SC)	Wounded darter	Streams of the Little Tennessee system
<i>Eurycea longicauda longicauda</i> (SC)	Longtail salamander	Moist woods and floodplains; small ponds for breeding
<i>Falco peregrinus</i> (E)	Peregrine falcon	Cliffs (for nesting) [nesting evidence]
<i>Fumonelix jonesiana</i> (T)	Big-tooth covert	Newfound Gap GRSM
<i>Fumonelix orestes</i> (T)	Engraved covert	Plott Balsam
<i>Fumonelix wheatleyi clingmanicus</i> (T)	Clingman covert	Clingman's Dome GRSM
<i>Fusconaia barnesiana</i> (E)	Tennessee pigtoe	Little Tennessee River
<i>Glaucomys sabrinus coloratus</i> (E)	Carolina northern flying squirrel	High elevation forests, mainly spruce-fir
<i>Glyphyalinia junaluskana</i> (SC)	Dark glyph	Southwestern mountains
<i>Glyphyalinia pentadelphia</i> (SC)	Pink glyph	Southwestern mountains
<i>Glyphyalinia vanattai</i> (SC)	Honey glyph	Mountains
<i>Haplotrema kendeighi</i> (SC)	Blue-footed lancetooth	Southwestern Mountains
<i>Helicodiscus bonamicus</i> (SC)	Spiral coil	Nantahala Gorge vicinity
<i>Hemidactylium scutatum</i> (SC)	Four-toed salamander	Pools, bogs and other wetlands in hardwood forests
<i>Hiodon tergisus</i> (SC)	Mooneye	French Broad River
<i>Inflectarius subpalliatu</i> s (SC)	Velvet covert	Central mountains
<i>Inflectarius ferrissi</i> (T)	Smoky Mountain covert	Great Smoky Mountains and Plott Balsams
<i>Lampsilis fasciola</i> (SC)	Wavy-rayed lampmussel	French Broad, Pigeon and Little Tennessee River
<i>Lanius ludovicianus ludovicianus</i> (SC)	Loggerhead shrike	Field and pastures (breeding season only)
<i>Lasmigona holstonia</i> (E)	Tennessee heelsplitter	Mills River
<i>Lasmigona subviridis</i> (E)	Green floater	New and Watauga River drainages

NORTH CAROLINA STATE LISTED ANIMAL SPECIES (Cont'd)		
Scientific Names	Common Names	Habitat
<i>Leptaxis dilatata</i> (T)	Seep mudalia	New River drainage in Ashe, Allegheny and Watauga Counties
<i>Loxia curvirostra pop 1</i> (SR – PSC)	Red crossbill – Southern Appalachian population	Coniferous forests, preferably spruce-fir [breeding season only]
<i>Mesodon orestes</i> (T)	Engraved covert	Rock ledges and during wet weather the forest floor around rocks
<i>Microtus chrotorrhinus carolinensis</i> (SC)	Southern rock vole	Rocky areas at high elevations, forests or fields
<i>Myotis leibii</i> (SC)	Eastern small-footed bat	Roosts in hollow trees (warmer months), in caves and mines (winter)
<i>Myotis sodalis</i> (E)	Indiana bat	Roosts in hollow trees or under loose bark, in caves
<i>Myotis septentrionalis</i> (SC)	Northern long-eared bat	Roosts in hollow trees and buildings (warmer months), in caves and mines (winter)
<i>Necturus maculosus</i> (SC)	Common mudpuppy	Rivers and large streams (French Broad drainage)
<i>Neotoma floridana haematoreia</i> (SC)	Eastern woodrat – Southern Appalachian population	Rocky places in deciduous or mixed forests, in southern mountains adjacent to Piedmont
<i>Neotoma magister</i> (SC)	Allegheny woodrat	Rocky places and abandoned buildings in deciduous or mixed forests in the northern mountains
<i>Notropis lutipinnis</i> (SC)	Yellowfin shiner	Savannah, Little Tennessee and Broad drainages
<i>Noturus flavus</i> (E)	Stonecat	Nolichucky, French Broad and Little River drainages
<i>Pallifera hemphilli</i> (SC)	Black mantleslug	High elevation forests, mainly spruce-fir
<i>Paravitrea andrewsae</i> (SC)	High mountain supercoil	Northern half of mountains
<i>Paravitrea clappi</i> (SC)	Mirey ridge supercoil	High elevations GRSM
<i>Paravitrea placentula</i> (SC)	Glossy supercoil	Mountains
<i>Paravitrea varidens</i> (T)	Roan supercoil	Mountains

NORTH CAROLINA STATE LISTED ANIMAL SPECIES (Cont'd)		
Scientific Names	Common Names	Habitat
<i>Passerculus sandwichensis</i> (SR)	Savannah sparrow	Grassy fields and pastures [breeding season only]
<i>Patera clarki</i> (SC)	Dwarf proud globe	Southwestern mountains
<i>Patera clarki nantahala</i> (T)	Noonday globe	Nantahala Gorge
<i>Pegias fabula</i> (E)	Littlewing pearlymussel	Little Tennessee River
<i>Percina caprodes</i> (T)	Logperch	Tennessee and New River drainages
<i>Percina nigrofasciata</i> (SC-PT)	Blackbanded darter	Savannah drainage
<i>Percina oxyrhynchus</i> (SC)	Olive or Sharpnose darter	New River drainage
<i>Percina squamata</i> (SC)	Olive darter	Tennessee drainage
<i>Phenacobius teretulus</i> (SC)	Kanawha minnow	New drainage
<i>Pituophis melanoleucus melanoleucus</i> (SC)	Northern pinesnake	Dry and sandy woods, mainly in pine/oak sandhills
<i>Plethodon ventralis</i> (SC)	Southern zigzag salamander	Moist areas of talus slopes or rock outcrops in hardwood forests
<i>Plethodon wehrlei</i> (SC)	Wehrle's salamander	Upland forests (low mountains near Virginia border)
<i>Plethodon welleri</i> (SC)	Weller's salamander	High elevation forests in northern mountains, mainly in spruce-fir, and to a lesser degree in northern hardwood forests
<i>Plethodon yonahlossee</i> Pop 1 (SC)	Crevice salamander	Crevices n moist shaded rocks in the Hickory Nut Gorge area
<i>Pleurobema oviforme</i> (E)	Tennessee clubshell	Little Tennessee and Hiawassee drainages
<i>Poecile atricapilla practica</i> (SC)	Black-capped chickadee	High elevation forests, mainly Spruce/Fir (breeding season only)
<i>Pseudacris brachyphona</i> (SC)	Mountain chorus frog	Forests near temporary pools or ponds, in extreme southwestern mountains
<i>Puma concolor cougar</i> (E)	Eastern cougar	Extensive forests, remote areas
<i>Regulus satrapa</i> (SC-PD)	Golden-crowned kinglet	Spruce-fir forests, hardwood forests mixed with spruce or hemlock
<i>Sorex dispar</i> (SC)	Long-tailed shrew	Stream banks in montane forests

NORTH CAROLINA STATE LISTED ANIMAL SPECIES (Cont'd)		
Scientific Names	Common Names	Habitat
<i>Sorex palustris punctulatus</i> (SC)	Southern water shrew	Stream banks in montane forests
<i>Spyhrapicus varius appalachiensis</i> (SR-PSC)	Appalachian yellow-bellied sapsucker	Mature, open hardwoods with scattered dead trees [breeding season only]
<i>Stenotrema depilatum</i> (SC)	Great Smoky slitmouth	GRSM mountains
<i>Strophitus undulatus</i> (T)	Squawfoot	Many river systems
<i>Thryomanes bewickii altus</i> (E)	Appalachian Bewick's wren	Woodland borders or openings, farmlands or brushy fields, at high elevations
<i>Tritogonia verrucosa</i> (E – PEX)	Pistolgrip	New River near the Virginia border
<i>Ventridens coelaxis</i> (SC)	Bidentate dome	Northern mountains
<i>Villosa iris</i> (SC)	Rainbow mollusk	French Broad, Hiawassee and Little Tennessee Rivers
<i>Zonitoides patuloides</i> (SC)	Appalachian gloss	Southwestern mountains

VIRGINIA STATE LISTED ANIMAL SPECIES		
Scientific Names	Common Names	Habitat
<i>Ambystoma tigrinum</i> (E)	Eastern tiger salamander	Woodlands or marshy wetlands.
<i>Ammodramus henslowii</i> (T)	Henslow's sparrow	Breeds in neglected weedy fields. Winter - moist grassy spots under open pine woods
<i>Bartramia longicauda</i> (T)	Upland sandpiper	Breeds open pastures or grassy fields
<i>Falco peregrinus</i> (T)	Peregrine falcon	Nests on rocky cliffs of varying sizes or on manmade structure
<i>Fusconaia masoni</i> (T)	Atlantic pigtoe	Upper parts of rivers. Prefer clean, swift-moving waters and is often found in gravel or gravel-sand substrata
<i>Helicodiscus diadema</i> (E)	Shaggy coil	Leaf litter at the base of limey shale outcrops and on thinly wooded limestone hillsides.
<i>Helicodiscus lirellus</i> (E)	Rubble coil	Limestone rubble
<i>Lanius ludovicianus</i> (T)	Loggerhead shrike	Grazed or mowed grasslands with an abundance of perching sites
<i>Noturus gilberti</i> (T)	Orangefin madtom	Medium to large, cool to warm streams beneath shelter or larger gravel, rubble, and probably, boulders
<i>Sigmoria whiteheadi</i> (T)	Laurel Creek xystodesmid	No habitats listed
<i>Thryomanes bewickii altus</i> (E)	Appalachian Bewick's wren	Woodland borders or openings, farmlands or brushy fields, at high elevations

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APPENDIX E

ENVIRONMENTAL LAWS AND REGULATIONS

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Relevant Laws and Regulations	Summary	Affected Resource(s)
National Environmental Policy Act (NEPA) (42 USC 4321-4370)	Requires Federal agencies to evaluate the environmental impacts of their actions and to integrate such evaluations into their decision-making processes.	All
Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508)	These regulations implement NEPA and establish two different levels of environmental analysis: the environmental assessment (EA) and the environmental impact statement (EIS). An EA determines whether significant impacts may result from a proposed action. If significant impacts are identified, an EIS is required to provide the public with a detailed analysis of alternative actions, their impacts, and mitigation measures, if necessary.	All
Clean Water Act (CWA) (33 USC 1251 et seq.)	Section 401, the state water quality certification process, gives states the authority to grant, deny, or condition the issuance of Federal permits that may result in a discharge to the waters of the United States based on compliance with water quality standards. Section 404 regulates the discharge of pollutants, including dredged or fill material, into navigable waters of the U.S. through a permit system jointly administered by the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE). Nonpoint sources requirements control pesticide runoff, forestry operations, and parking lots/motor pools. Point sources require individual or group permits and must be monitored at the point at which they enter public waters, storm sewers, or natural waterways. Section 311 (j) requires facilities to prepare a Spill Prevention Control and Countermeasure Plan, containing minimum prevention facilities, restraints against drainage, an oil spill contingency plan, etc.	Water Resources, Biological Resources
Clean Air Act (CAA) (42 USC 7401 et seq.)	Among its varied provisions, the CAA establishes standards for air quality in regard to the pollutants generated by internal combustion engines. These standards, known as the National Ambient Air Quality Standards (NAAQS), define the concentrations of these pollutants that are allowable in air to which the general public is exposed (“ambient air”).	Air Quality
Endangered Species Act (ESA) (16 USC 1531-1544)	Prohibits the harming of any species listed by the U. S. Fish and Wildlife Service (USFWS) as being either Threatened or Endangered. Harming such species includes not only directly injuring or killing them, but also disrupting the habitat on which they depend.	Biological Resources
Migratory Bird Treaty Act (16 USC 703 et seq.)	Restricts the taking, possession, transportation, sale, purchase, importation, and exportation of migratory birds through permits issued by the USFWS.	Biological Resources
Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978 (42 USC 4901 et seq.)	Requires compliance with State and local noise laws and ordinances.	Noise, Human Health and Safety
National Park Service Organic Act of 1916 (16 USC et seq.)	Established the National Park Service to manage national parks for the purposes of conserving the scenery, natural resources, historic objects, and wildlife within the parks, and providing for the enjoyment these resources in such manner that would leave them unimpaired for the enjoyment of future generations.	All

Relevant Laws and Regulations	Summary	Affected Resource(s)
Archaeological Resources Protection Act (ARPA) (16 USC 470a et seq.)	Ensures the protection and preservation of archeological resources on Federal lands.	Cultural Resources
National Historic Preservation Act (NHPA) (16 USC 470 et seq.)	Provides the framework for Federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. The implementing regulations for the Section 106 process (36 CFR Part 800) have been developed by the Advisory Council on Historic Preservation (ACHP). The Secretary of the Interior maintains a National Register of Historic Places (NRHP) and sets forth significance criteria for inclusion in the register. Cultural resources included in the NRHP, or determined eligible for inclusion, are considered “historic properties” for the purposes of consideration by Federal undertakings.	Cultural Resources
Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq.)	Protects Native American human remains, burials, and associated burial goods.	Cultural Resources
E.O. 11988: Floodplain Management	Requires all Federal agencies to take action to reduce the risk of flood loss, to restore and preserve the natural and beneficial values served by floodplains, and to minimize the impact of floods on human safety, health, and welfare. Because many wetlands are located in floodplains, E.O. 11988 has the secondary effect of protecting wetlands.	Water Resources, Biological Resources
E.O. 11990: Protection of Wetlands	An overall wetlands policy for all agencies managing Federal lands, sponsoring Federal projects, or providing Federal funds to State or local projects. It requires Federal agencies to follow avoidance/mitigation/preservation procedures with public input before proposing new construction projects.	Water Resources, Biological Resources
E.O. 12372: Intergovernmental Review of Federal Programs	Directs Federal agencies to consult with and solicit comments from state and local government officials whose jurisdictions would be affected by Federal actions.	All
E.O. 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	Requires Federal actions to achieve Environmental Justice by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.	Human Health and Safety
E.O. 13007: Protection and Accommodation of Access To "Indian Sacred Sites"	Directs Federal agencies to consider Indian sacred sites in planning agency activities.	Cultural Resources
E.O. 13112: Invasive Species	Requires federal agencies to not contribute to the introduction, continued existence, or spread of non-native invasive species, or actions that may promote the introduction, growth or expansion of the range of non-native invasive species.	All
E.O. 13186: Responsibilities of Federal Agencies To Protect Migratory Birds	Requires Federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that would promote the conservation of migratory bird populations.	Biological Resources
E.O. 13229: Protection of Children from Environmental Health Risks and Safety Risks	Requires Federal actions and policies to identify and address disproportionately adverse risks to the health and safety of children.	Human Health and Safety

APPENDIX F

AGENCY CONSULTATION AND COORDINATION

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AGENCY CONSULTATION AND COORDINATION

The purpose of the scoping process, as outlined in the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1501.7), is to determine the scope of issues to be addressed in the EA/EIS and to identify significant issues relating to the Preferred Alternative. The lead agency is required to invite input from Federal, State, and local agencies, affected Indian tribes, project proponents, and other interested parties (Section 1501.7 (a)(1)). Scoping is required for all EAs prepared by the NPS.

To ensure that the Park and its programs are coordinated with the programs and objectives of State, Federal, and local governments and private organizations, it is the Park's objective to work with these agencies and organizations during the planning process. Consultation and coordination have occurred with numerous agencies during the preparation of this EA. Consultation undertaken for compliance with specific laws is discussed below and in Section 6.0 of this EA. Letters of consultation and coordination with various agencies are presented in **Figures F-3 through F-7**.

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Figure F-3 U.S. Fish & Wildlife Service Consultation Letter



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

May 12, 2006

2006 MAY 15 PM 12:47

Mr. Philip A. Francis, Jr., Superintendent
National Park Service
Blue Ridge Parkway
199 Hemphill Knob Road
Asheville, North Carolina 28803

Dear Mr. Francis:

Subject: Blue Ridge Parkway Exotic Plant Management Plan and Environmental Assessment - Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Haywood, Henderson, Jackson, McDowell, Mitchell, Surry, Swain, Transylvania, Watauga, Wilkes, and Yancey Counties, North Carolina

In your letter of April 17, 2006, you requested our comments on the subject project. The following comments are provided in accordance with the provisions of the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e); the Migratory Bird Treaty Act, as amended (16 U.S.C. 703); and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

According to your letter, the Blue Ridge Parkway is going to prepare an Exotic Plant Management Plan to combat the increasing threat of invasive species along the Parkway. We strongly support the Park Service's efforts to control invasive exotics, particularly in areas known to harbor federally endangered and threatened species. Enclosed is a list of endangered and threatened species for Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Haywood, Henderson, Jackson, McDowell, Mitchell, Surry, Swain, Transylvania, Watauga, Wilkes, and Yancey Counties that are on the *Federal List of Endangered and Threatened Wildlife and Plants* as well as federal species of concern which may occur in the project impact area. We recommend surveying suitable habitat within the project area for these species prior to any further planning or on-the-ground activities to ensure that no adverse impacts occur to these species. Federal species of concern are not legally protected under the Act and are not subject to any of its provisions, including section 7, unless they are formally proposed or listed as endangered or threatened. We are including these species in our response to give you advance notification.

We appreciate the opportunity to provide these comments and request that you continue to keep us informed as to the status of this project. If we can be of assistance or if you have any questions, please do not hesitate to contact Mr. Allen Ratzlaff of our staff at 828/258-3939, Ext. 229. In any future correspondence concerning this project, please reference our Log Number 4-2-06-263.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brian P. Cole".

Brian P. Cole
Field Supervisor

Enclosure

Figure F-4 NC Wildlife Resources Commission Consultation Letter

06/05/2006 16:39

828-452-7772

NC WILDLIFE

PAGE 03



North Carolina Wildlife Resources Commission

Richard B. Hamilton, Executive Director

MEMORANDUM

TO: Melba McGee, Environmental Coordinator
Office of Legislative and Intergovernmental Affairs

FROM: Dave McHenry, Mountain Region Coordinator
Habitat Conservation Program

DATE: June 5, 2006

SUBJECT: National Park Service, Blue Ridge Parkway
Scoping for Blue Ridge Parkway Exotic Plant Management Plan
OLIA No. 06-0326



Biologists with the North Carolina Wildlife Resources Commission (Commission) reviewed the April 17, 2006 letter regarding the National Park Service's proposal to implement an exotic plant management plan on the Blue Ridge Parkway. An Environmental Assessment (EA) will be prepared. Comments from the Commission are provided under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the National Environmental Policy Act (42 U.S.C. 4332 (2)(c)).

The EA should evaluate effects of the project on aquatic and terrestrial habitats and describe measures that would be used to off-set any adverse effects. Effects on the federally listed Carolina northern flying squirrel should be evaluated if occupied habitat will be treated. For example, potential harm to fungi and other forage should be considered. The USFWS Recovery Plan has information about habitat identification and management for flying squirrels

(http://ecos.fws.gov/docs/recovery_plans/1990/900924c.pdf Appendix A, items 2-I – 2-IV public lands).

The Commission also recommends that native plants that are valuable to wildlife for food and cover be planted where exotic plants that are similarly important are eliminated.

The Commission appreciates the opportunity to provide scoping comments on this project. If you need to discuss these comments please call me at (828) 452-2546 extension 24.

Sincerely,

Dave McHenry
Mountain Region Coordinator
Habitat Conservation Program

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • Fax: (919) 707-0028

Figure F-5 North Carolina State Historic Preservation Officer Consultation Letter

H22
xL7617
(PIN 10198)

July 14, 2006

Mr. David Brook, Deputy
Historic Preservation Office
4617 Mail Service Center
Raleigh, North Carolina 27699-4617

**Re: SCH File #06-E-0000-0326; Blue Ridge Parkway Exotic Plant Management Plan /
Environmental Assessment**

Dear Deputy Brook:

In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, we are writing to you with regards to the proposed Exotic Plant Management Plan for the Blue Ridge Parkway (BLRI), National Park Service (NPS), United States Department of the Interior lands.

We are enclosing a copy of the Environmental Assessment (EA) for the proposed project. As noted in the attached EA, "exotics are known to occur at some level at all twelve cultural landscape sites. Impacts vary from site to site, with the greatest loss of integrity currently existing at Peaks of Otter and Otter Creek. In two draft reports for Doughton Park and Otter Creek, exotics have been identified as diminishing the cultural integrity of these historic districts and thus should be managed to protect the scene and historic landscape." Under the park's preferred alternative, cultural landscapes could be prioritized and measures taken to restore the vegetative integrity of these sites.

Also noted within the attached EA, there would be no impacts to archeological resources due to the fact that there would be no ground disturbance associated with this project. Nor would there be any impacts to structures, historic or prehistoric, since there are none directly involved in this project.

It is, therefore, the determination of the National Park Service that this project would have no adverse effect on cultural resources or sites eligible or potentially eligible for listing in the National Register of Historic Places. We have attached a copy of the *Section 106 Assessment of Effects* form documenting this determination. If you concur with this determination, please sign on the line provided below and return this letter to us. If we have not received this response

within 30 days, as provided by 36 CFR 800.5(b) and (c), then we would consider our responsibilities under Section 106 of the National Historic Preservation Act, as amended, and the implementing regulations as codified in 36 CFR Part 800.5(b) and (c) to be completed.

We want to provide a full and fair opportunity for comment within the context of law and regulations, therefore, if you need additional time to comment, please let us know. If any questions or concerns should need addressing immediately, please contact Park Environmental Protection Specialist Suzette Molling at (828) 271-4779 extension 219, or by email at suzette_molling@nps.gov.

Sincerely,

/signed/

Philip A. Francis, Jr.
Superintendent

Enclosures

I concur:

State Historic Preservation Officer

cc: Bambi Teague, BLRI

Figure F-6 Virginia State Historic Preservation Officer Consultation Letter



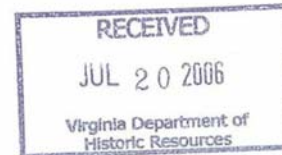
IN REPLY REFER TO:

United States Department of the Interior

National Park Service
Blue Ridge Parkway
199 Hemphill Knob Road
Asheville, North Carolina 28803



H22
xL7617
(PIN 10198)
✓
July 17, 2006



Ms. Kathleen Kilpatrick, Director
State Historic Preservation Officer
VA Department of Historic Resources
Richmond Central Office
2801 Kensington Avenue
Richmond, Virginia 23221

**Re: BLRI PIN 10198; Blue Ridge Parkway Exotic Plant Management Plan /
Environmental Assessment**

Dear Director Kilpatrick:

In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, we are writing to you with regards to the proposed Exotic Plant Management Plan for the Blue Ridge Parkway (BLRI), National Park Service (NPS), United States Department of the Interior lands.

We are enclosing a copy of the Environmental Assessment (EA) for the proposed project. As noted in the attached EA, "exotics are known to occur at some level at all twelve cultural landscape sites. Impacts vary from site to site, with the greatest loss of integrity currently existing at Peaks of Otter and Otter Creek. In two draft reports for Doughton Park and Otter Creek, exotics have been identified as diminishing the cultural integrity of these historic districts and thus should be managed to protect the scene and historic landscape." Under the park's preferred alternative, cultural landscapes could be prioritized and measures taken to restore the vegetative integrity of these sites.

Also noted within the attached EA, there would be no impacts to archeological resources due to the fact that there will be no ground disturbance associated with this project. Nor would there be any impacts to structures, historic or prehistoric, since there are none directly involved in this project.



It is, therefore, the determination of the National Park Service that this project will have no adverse effect on cultural resources or sites eligible or potentially eligible for listing in the National Register of Historic Places. We have attached a copy of the Section 106 Assessment of Effects form documenting this determination. If you concur with this determination, please sign on the line provided below and return this letter to us. If we have not received this response within 30 days, as provided by 36 CFR 800.5(b) and (c), then we will consider our responsibilities under Section 106 of the National Historic Preservation Act, as amended, and the implementing regulations as codified in 36 CFR Part 800.5(b) and (c) to be completed.

We want to provide a full and fair opportunity for comment within the context of law and regulations, therefore, if you need additional time to comment, please let us know. If any questions or concerns should need addressing immediately, please contact Park Environmental Protection Specialist Suzette Molling at (828) 271-4779 extension 219, or by email at suzette_molling@nps.gov.

Sincerely,



Philip A. Francis, Jr.
Superintendent

Enclosures

I concur:

 E. R. Eaton, Ph.D., Manager, Office of Review and Compliance
State Historic Preservation Officer

cc: Bambi Teague, BLRI

July 25, 2006
OHR File No.
2006-1152

Figure F-7 North Carolina Department of Administration Consultation Letter



North Carolina
Department of Administration

Michael F. Easley, Governor

Britt Cobb, Secretary

June 13, 2006

Ms. Suzette Molling
US Dept of Interior-National Pk Service
199 Hemphill Knob Road
Blue Ridge Pkwy
Asheville, NC 28803

Dear Ms. Molling:

Re: SCH File # 06-E-0000-0326; Scoping; Proposal to prepare an Exotic Plant Management Plan (EPMP) that will prevent the introduction of invasive species and provide for their control & minimize the economic, ecological, & human impacts caused by species

The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to G.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act. Attached to this letter for your consideration are the comments made by agencies in the course of this review.

If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review.

Should you have any questions, please do not hesitate to call.

Sincerely,

A handwritten signature in cursive script that reads "Chrys Baggett 1576".

Ms. Chrys Baggett
Environmental Policy Act Coordinator

Attachments

Mailing Address:
1301 Mail Service Center
Raleigh, NC 27699-1301

Telephone: (919)807-2425
Fax (919)733-9571
State Courier #51-01-00
e-mail Chrys.Baggett@ncmail.net

Location Address:
116 West Jones Street
Raleigh, North Carolina

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