



# MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"...except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

-- The Wilderness Act of 1964

**Project Title:** Suppression of Hemlock Woolly Adelgid Infestations

## MRDG Step 1: Determination

*Determine if Administrative Action is Necessary*

### Description of the Situation

*What is the situation that may prompt administrative action?*

Eastern hemlock is an important native component of eastern forests and many wilderness areas. It is typically long-lived (up to 800 years) and is the most shade tolerant tree species of eastern forests. Hemlock provides habitat for a number of avian and aquatic species, providing critical thermal cover in riparian areas. The hemlock woolly adelgid (*Adelges tsugae* Annand), a non-native insect pest originally from Asia, was first reported in eastern Virginia in the early 1950's. Since then the hemlock woolly adelgid (HWA) has spread through much of the Appalachian region of the United States, occurring in 16 states from Maine to Georgia. The HWA feeds on all stages of eastern hemlock (*Tsuga canadensis*) and Carolina Hemlock (*Tsuga caroliniana*).

Using concepts of metapopulation and Minimum Viable Population (MVP), conservation reserve areas have been identified on national forest lands in the southern Appalachian region as the best places in which to maintain genetic reserves of both hemlock species and their associated plant communities. The Big South Wilderness has been identified as one of only four conservation reserve areas.

The conservation reserve area in the wilderness is important for several reasons. The reserve area in the wilderness contains a high quality hemlock population with a wide distribution of tree ages ranging up to 500 years old. This reserve area is key to the genetic distribution of hemlock and is one of only two known areas with a high concentration of nonvascular species diversity related to hemlock plant communities. The hemlock within the wilderness and in the surrounding national forest and other adjacent lands primarily occurs in mixed stands with mixed hardwoods rather than in pure stands. It occurs primarily in riparian areas, coves, canyon corridors and bluffs.

In January 2012 an infestation of HWA was identified within 60 miles of the Big South Wilderness area which lies in the south western portion of the range of eastern hemlock.

**Note - See the file: *MRDG\_Insect and Disease-additional information.docx* for more.**

## Options Outside of Wilderness

Can action be taken outside of wilderness that adequately addresses the situation?

YES

NO

**EXPLAIN & COMPLETE STEP 1 OF THE MRDG**

Explain:

The physiographic location of the wilderness creates ideal conditions for endemic hemlocks and other shade tolerant tree species along the streams, seepages and waterfalls for which the wilderness is well known. Twenty-two percent of the wilderness area is typed as mixed stands containing hemlock as a component.

Reports from Forest Service ecologists and others who have studied HWA infestations in other areas indicate that, in order to be effective, treatment for HWA must occur on all lands which support hemlock. Pro-active treatment conducted only on non-wilderness lands would not be a successful approach for addressing an HWA infestation that could likely spread to other adjacent lands.

## Criteria for Determining Necessity

Is action necessary to meet any of the criteria below?

### A. Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.

YES

NO

Explain:

There is no requirement to take any type of administrative action in order to satisfy a special provision of wilderness legislation that allows for insect and disease control within wilderness areas.

The Wilderness Act of 1964 - Section 4(d)(1):

"... In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable."

The language of the law indicates that "such measures **may** be taken" (emphasis added) and no specific actions (such as inventory, monitoring, treatment, etc.) are identified. If action is necessary in wilderness the specific possible actions and their potential impacts will be addressed in Step 2.

## B. Requirements of Other Legislation

*Is action necessary to meet the requirements of other federal laws? Cite law and section.*

 YES NO

Explain:

There are no other federal laws that are directly applicable to control of the HWA infestations in wilderness. However, Executive Orders have the effects of law in providing direction to federal agencies.

Executive Order 13112, February 3, 1999, directs all agencies in the Executive Branch to: prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species, provide for restoration of native species and habitat, conduct research and develop technologies, promote public education, and directs agencies not to authorize, fund, carry out actions that are likely to cause or promote the introduction or spread of invasive species. It also directs the creation of a federal invasive species council, directs the development of a national Invasive Species Management Plan and Invasive Species information clearinghouse, and directs federal agencies to participate in the council and to implement the Invasive Species Management Plan.

## C. Wilderness Character

*Is action necessary to preserve one or more of the qualities of wilderness character including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Other Features of Value?*

UNTRAMMELED

 YES NO

Explain:

It is not necessary to take action to preserve this quality. The definition of the Untrammeled quality is the lack of manipulation or control of natural processes by humans, which if allowed to occur, would eventually affect wilderness character. This quality is typically preserved when no action is taken to control, hinder, or manipulate the natural functioning of the ecosystem.

Any treatment to prevent or address a HWA infestation would be a manipulation of the natural processes of wilderness, and a trammeling, even though the HWA is non-native and treatment may ultimately help restore natural conditions.

The potential impacts of any proposed treatment methods will be addressed in the Step 2 alternatives.



## UNDEVELOPED

 YES NO

Explain:

It is not necessary to take action to preserve this quality. Preserving this quality keeps areas free from “expanding settlement and growing mechanization” and “with the imprint of man’s work substantially unnoticeable” and without structures, installations, temporary or permanent roads, or use of motorized equipment, mechanical transport, or landing or aircraft, as required by the Wilderness Act. The Undeveloped quality is preserved when wilderness retains its "primeval character and influence," and is essentially "without permanent improvements" or modern human occupation.

There is no need to take action to prevent adverse impacts to the Undeveloped quality from installations, structures, motorized equipment, or the use mechanical transport devices.

The potential impacts of any proposed treatment methods will be addressed in the Step 2 alternatives.

## NATURAL

 YES NO

Explain:

It is necessary to take action to preserve this quality. A wilderness area is to be "protected and managed so as to preserve its natural conditions" meaning that wilderness ecological systems are substantially free from the effects of modern civilization. To preserve this quality, and address the Scenic and Conservation public purposes of wilderness, it may be necessary to take action to correct unnatural conditions even if they were present at the time of designation.

Hemlock is an important part of the native plant community in the wilderness and therefore any impacts resulting from the influence of modern civilization (such as a non-native HWA infestation) affect both the Natural quality of wilderness character and the Scenic and Conservation public purposes.

The purpose of Step 1 of this analysis is to determine if any action should be taken in the Big South Wilderness to address the threat of the non-native HWA to the native hemlock trees. Specific proposals for actions and their impacts, if necessary, will be addressed in Step 2.

## SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

 YES NO

Explain:

It is not necessary to take action to preserve this quality. The Wilderness Act defines wilderness as having “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” This quality is preserved when the *opportunity* for people to experience wilderness in terms of the visitor's sense of solitude, and their expectation for an undeveloped environment with minimal restrictions is available.

Taking action would make only a slight contribution to preservation of this quality when compared to the need for action to preserve the Natural quality. Any enhancement of opportunities for primitive recreation that result from treatment prior to a HWA infestation is because of the long term contribution to protecting or restoring the Natural quality.

The potential impacts of any proposed treatment methods will be addressed in the Step 2 alternatives.

## OTHER FEATURES OF VALUE

 YES NO

Explain:

It is not necessary to take action to preserve this quality. Hemlock is a widespread species in the east and, although threatened by the HWA, it is not a unique feature of value to the Big South Wilderness.

No Other Features of Value would be affected by actions taken to address an HWA infestation within the wilderness.

The potential impacts of any proposed treatment methods will be addressed in the Step 2 alternatives.

## Step 1 Determination

Is administrative action necessary in wilderness?

### Decision Criteria

- A. Existing Rights or Special Provisions
- B. Requirements of Other Legislation
- C. Wilderness Character
  - Untrammeled
  - Undeveloped
  - Natural
  - Outstanding Opportunities
  - Other Features of Value

### Summary Responses

Action IS NOT necessary to meet this criterion.

Action IS necessary to meet this criterion.

Action IS NOT necessary to meet this criterion.

Action IS NOT necessary to meet this criterion.

Action IS necessary to meet this criterion.

Action IS NOT necessary to meet this criterion.

Action IS NOT necessary to meet this criterion.

Is administrative action necessary in wilderness?

YES

**EXPLAIN & PROCEED TO STEP 2 OF THE MRDG**

NO

Explain:

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Some type of action is necessary in wilderness to address the threat of the hemlock woolly adelgid (HWA) to hemlock within and outside the wilderness. The HWA is a non-native pest that has the potential to eliminate the native hemlock in the southern Appalachian region, based on documentation of the effects of the infestations in other areas. Because there is a substantial population of hemlock in a conservation reserve area within the Big South Wilderness, taking actions outside wilderness to address a HWA infestation would not be effective in minimizing the spread and reducing the chances for elimination of the hemlock population and associated native plant communities in the southern Appalachian region. In addition, Executive Order 13112, February 3, 1999, directs all agencies in the Executive Branch to prevent the introduction of invasive species and to detect and respond rapidly to and control populations of such species.

Based on the analysis described above, some type of action to address the threat of the HWA offers the best chance of the hemlock plant communities being maintained in order to preserve the Natural quality of the wilderness without an overwhelming influence of an exotic pest. The need for action is also based on the threat to adjacent lands since treatment of non-wilderness areas would be ineffective for the HWA if no treatment is done in wilderness.

However, the benefit of treatment for HWA for protecting the natural conditions of the wildernesses must be weighed against the loss of wildness, a negative impact to the Untrammeled quality of wilderness character. If the native hemlock plant communities in the southern Appalachian region could survive an HWA infestation without any treatment action in wilderness, than no action would be necessary. In this situation, based on the analysis described above, the conclusion is that some type of action in the wilderness is needed. The threat from the HWA is a long-term and likely irreversible threat to natural conditions while taking necessary action is a short-term adverse impact to the Untrammeled quality. The specific type of action (including treatment options) will be discussed in Step 2.

**Project Title:** Suppression of Hemlock Woolly Adelgid Infestations

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**MRDG Step 2**

Determine the Minimum Activity

**Other Direction**

Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?

**AND/OR**

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

YES

**DESCRIBE OTHER DIRECTION BELOW**

NO

Describe Other Direction:

There is no special provision language in legislation or other Congressional direction that explicitly allows consideration of a prohibited use. However, The Wilderness Act of 1964 - Section 4(d)(1):  
"... In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable." This language of the law indicates that "such measures **may** be taken" (emphasis added) but no specific actions (such as inventory, monitoring, treatment, etc.) are identified.

Forest Service policy provides direction for management of insect and disease infestations in wilderness.

Environmental Management – FSM 2150

2150.3 (3) – Use pesticides in wilderness only when necessary to protect or restore significant resource values within wilderness or on public or private lands bordering wilderness after receipt of the public or private landowner’s permission.

2151.04a (1) – Regional Foresters. Regional Foresters are responsible for reviewing and approving or disapproving all proposed pesticide uses on National Forest System lands. The Regional Forester may delegate this authority to other line officers on a case-by-case basis or by supplement to this code, except for the following:

1. Any pesticide use in Wilderness, which includes Wilderness study areas.

Wilderness Management - FSM 2320

2320.2 - Objectives

2. Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.

**Note - See the file: MRDG\_Insect and Disease\_additional information.docx for more.**



## Time Constraints

What, if any, are the time constraints that may affect the action?

Any treatment to minimize the impacts of a HWA infestation must be applied when the infestation is first detected to be effective.

## Components of the Action

What are the discrete components or phases of the action?

Component X	<i>Example: Transportation of personnel to the project site</i>
Component 1	Equipment used for treatment.
Component 2	Transportation of personnel and materials to the project site.
Component 3	Treatment method (i.e. pesticide or other substance).
Component 4	Conditions of hemlock after treatment.
Component 5	
Component 6	
Component 7	
Component 8	
Component 9	

### Proceed to the alternatives.

Refer to the [MRDG Instructions](#) regarding alternatives and the effects to each of the comparison criteria.

**Project Title:** Suppression of Hemlock Woolly Adelgid Infestations

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**MRDG Step 2: Alternatives**

**Alternative 1:** No Action

**Description of the Alternative**

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

No actions will occur within wilderness. The existing monitoring program will be suspended and the Eastern Hemlock within the wilderness would not be treated for HWA infestation.

Both chemical and biological controls would be used on private lands adjacent to wilderness. Only chemical controls would be used on national forest lands adjacent to the wilderness to minimize the spread of non-native beetles inside the wilderness.

An information and education program will be implemented outside wilderness (i.e. trailhead information boards, forest offices, forest website, etc.) to inform wilderness visitors and others about the HWA, the effects to hemlock, and the changes that are likely to occur to the natural conditions of the wilderness as the result of the HWA infestation, should it occur.



**Component Activities**

*How will each of the components of the action be performed under this alternative?*

	Component of the Action	Activity for this Alternative
X	<i>Example: Transportation of personnel to the project site</i>	<i>Example: Personnel will travel by horseback</i>
1	Equipment used for treatment.	No equipment would be used.
2	Transportation of personnel and materials to the project site.	No transportation of personnel or materials to the project site would occur.
3	Treatment method (i.e. pesticide or other substance).	No treatments would be done.
4	Conditions of hemlock after treatment.	High hemlock mortality from the HWA.
5		
6		
7		
8		
9		

## Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

### UNTRAMMELED

Component Activity for this Alternative	Positive	Negative	No Effect
X <i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1 No equipment would be used.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2 No transportation of personnel or materials to the project site would occur.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 No treatments would be done.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4 High hemlock mortality from the HWA.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals	0	0	NE
<b>Untrammeled Total Rating</b>	<b>0</b>		

Explain:

No action would be taken in wilderness and there are no impacts to this quality.



UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No equipment would be used.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	No transportation of personnel or materials to the project site would occur.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	No treatments would be done.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	High hemlock mortality from the HWA.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	0	NE
<b>Undeveloped Total Rating</b>		<b>0</b>		

Explain:

No action would be taken in wilderness and there are no impacts to this quality.

NATURAL

Component Activity for this Alternative		<input type="checkbox"/> Positive	<input type="checkbox"/> Negative	<input checked="" type="checkbox"/> No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No equipment would be used.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	No transportation of personnel or materials to the project site would occur.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	No treatments would be done.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	High hemlock mortality from the HWA.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	1	NE
<b>Natural Total Rating</b>		<b>-1</b>		

Explain:

No action would be taken in wilderness which means that there would be no effects from actions to address the impacts of a HWA infestation on hemlock .

Based on the effects of HWA on hemlock in other areas, the lack of treatment would eventually cause nearly 100% mortality of the existing hemlock trees and very likely the loss of the entire species in this area as well as changes in the associated native plant communities. The results of not taking action are negative impacts to the Natural quality of wilderness character and the Conservation and Scenic public purposes of wilderness.

**SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION**

Component Activity for this Alternative		<input type="checkbox"/> Positive	<input type="checkbox"/> Negative	<input checked="" type="checkbox"/> No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No equipment would be used.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	No transportation of personnel or materials to the project site would occur.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	No treatments would be done.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	High hemlock mortality from the HWA.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	0	NE
<b>Solitude or Primitive &amp; Unconfined Recreation Total Rating</b>		<b>0</b>		

Explain:

Not taking any action would cause only a slight degradation of this quality when compared to the impacts to the Natural quality. There may some negative impact to both the Opportunities quality and the Scenic and Recreation public purposes when dead hemlock trees fall and temporarily block trails. But, these effects that occur from the HWA infestation are because of the lack of action to protect the Natural quality.

OTHER FEATURES OF VALUE

OTHER FEATURES OF VALUE		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No equipment would be used.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	No transportation of personnel or materials to the project site would occur.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	No treatments would be done.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	High hemlock mortality from the HWA.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8				
9				
Totals		0	0	NE
<b>Other Features of Value Total Rating</b>		<b>0</b>		

Explain:

There are no impacts to this quality from this alternative. Hemlock is a widespread species in the east and, although threatened by the HWA, it is not a unique feature of value to the Big South Wilderness.

No Other Features of Value would be affected within the wilderness.

**Summary Ratings for Alternative 1**

<b>Wilderness Character</b>	
Untrammeled	0
Undeveloped	0
Natural	-1
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
<b>Wilderness Character Summary Rating</b>	<b>-1</b>

## Project Title: Suppression of Hemlock Woolly Adelgid Infestations

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### MRDG Step 2: Alternatives

**Alternative 2:** Chemical treatment to address a HWA infestation.

#### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

This alternative would utilize chemical treatment to slow the advancement of the HWA once an infestation is detected by the existing monitoring program. Chemical application in wilderness would be accomplished by direct application, using two different methods, depending on the location of the trees to be treated. Both chemical and biological controls would be used on private lands adjacent to wilderness. Only chemical controls would be used on national forest lands adjacent to the wilderness to minimize the spread of non-native beetles inside the wilderness.

Two general types of chemical treatments using imidacloprid have been shown to be effective for HWA control in other areas. Environmental risk can be mitigated by applying the minimum effective dosage in forests. Imidacloprid ( CoreTect tablets ) is placed 3" - 5" deep in the soil surrounding the tree, or the liquid insecticide can be injected into the soil using a non-motorized applicator, to provide protection from HWA up to 5 years. The tablets are slow-acting, requiring 3 months to observe any adelgid mortality and at least 2 years following application to see the full treatment effects. However, the long duration of control (typically about 5 years following one soil treatment) and the extraordinary degree of control observed at the labeled application rate suggest that far less than labeled dosages of imidacloprid could be used to manage adelgid populations and to preserve tree health. A combination of optimum dosing of trees and adoption of the tablet formulation when treating trees in sensitive habitats should minimize the risk of contaminating aquatic resources , bees, and foraging animals with imidacloprid and provide satisfactory multiple-year suppression of adelgids where an immediate reduction in adelgid populations is not needed.

A relatively new insecticide active ingredient, dinotefuran (Safari), has greater mobility in trees than imidacloprid and is valuable where a more immediate reduction of adelgid populations is needed for preserving tree health. The insecticide is applied using direct injection through the bark to permit rapid treatment of trees and minimize soil contact of the insecticide This method is recommended for trees on stream banks to prevent any possible leaching of chemical into the soil and being transmitted in detrimental concentrations to the stream. The complementary nature over time of these two insecticides for protecting trees from adelgids has led to Section 24C registrations (Special Local Need) that permit both the Imidacloprid (CoreTect tablets) dinotefuran (Safari) to be used in southern Appalachian forests. See: [http://www.nrs.fs.fed.us/disturbance/invasive\\_species/hwa/control\\_management/chemical\\_control/](http://www.nrs.fs.fed.us/disturbance/invasive_species/hwa/control_management/chemical_control/).

**See the file: MRDG Insect and Disease - additional information.docx for more.**



**Component Activities**

*How will each of the components of the action be performed under this alternative?*

	Component of the Action	Activity for this Alternative
X	<i>Example: Transportation of personnel to the project site</i>	<i>Example: Personnel will travel by horseback</i>
1	Equipment used for treatment.	Non-motorized injector/applicators.
2	Transportation of personnel and materials to the project site.	Personnel will walk and transport materials via pack stock.
3	Treatment method (i.e. pesticide or other substance).	Chemical insecticides - imidacloprid, dinotefuran.
4	Conditions of hemlock after treatment.	Minimal mortality.
5		
6		
7		
8		
9		

## Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

### UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Non-motorized injector/applicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid, dinotefuran.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	1	NE
<b>Untrammed Total Rating</b>		<b>-1</b>		

Explain:

The method of application, transport of personnel and materials, and the specific chemical to be used do not impact the Untrammed quality.

The Untrammed quality is impacted when there is manipulation or control of the natural processes in wilderness. Even though the HWA is a non-native pest, actions to mitigate its effects are a trammeling even if the actions ultimately help preserve natural conditions.



UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid, dinotefuran.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> NE
<b>Undeveloped Total Rating</b>		<b>0</b>		

Explain:

There is no use of motorized equipment or development in the wilderness so there are no impacts to this quality.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid, dinotefuran.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> NE
<b>Natural Total Rating</b>		<b>0</b>		

Explain:

There are no impacts to this quality from the non-motorized equipment or the transportation of personnel and materials via pack stock.

The use of a chemical pesticide in the wilderness is a negative impact to the natural conditions and this quality.

The effect of the treatment which will allow for minimal hemlock mortality due to the HWA is a positive impact to natural conditions and this quality. While the table only indicates a positive impact, if the impacts were rated, the long term benefits or protecting the natural conditions represented by the native hemlock plant communities in the wilderness outweighs the short term negative impacts from the use of the pesticide.

**SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION**

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid, dinotefuran.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> NE
<b>Solitude or Primitive &amp; Unconfined Recreation Total Rating</b>		<b>-1</b>		

**Explain:**

There are no impacts to this quality from the non-motorized equipment or the transportation of personnel and materials via pack stock.

The necessary area closures during treatment applications will temporarily impact the opportunity for visitors to experience primitive recreation in those areas.

The effect of the treatment which will allow for minimal hemlock mortality due to the HWA is a positive impact to the Natural quality and any resulting impact on the wilderness visitors experience is because of the natural conditions.

**OTHER FEATURES OF VALUE**

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid, dinotefuran.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> NE
<b>Other Features of Value Total Rating</b>		<b>0</b>		

**Explain:**

There are no impacts to this quality from this alternative. Hemlock is a widespread species in the east and, although threatened by the HWA, it is not a unique feature of value to the Big South Wilderness.

No Other Features of Value would be affected within the wilderness.

**Summary Ratings for Alternative 2**

<b>Wilderness Character</b>	
Untrammeled	-1
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	-1
Other Features of Value	0
<b>Wilderness Character Summary Rating</b>	<b>-2</b>

## Project Title: Suppression of Hemlock Woolly Adelgid Infestations

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### MRDG Step 2: Alternatives

#### Alternative 3: Biological control of HWA infestation

##### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

This alternative would utilize biological treatment to slow the advancement of the HWA. One or more species of non-native beetles would be released inside wilderness once an infestation is detected by the existing monitoring program. Both chemical and biological controls would be used on private and national forest lands adjacent to wilderness.

Several types of non-native beetles have been found to be predators of HWA. Research is on-going but the types of beetles being produced have been found to eat only HWA or other types of adelgid. If no HWA or other adelgid is present, these types of beetles will cease to exist in that location. Beetles are being produced by several universities for HWA control, but the availability of beetles is currently limited. The production level is expected to increase in the next few years. Research is on-going but findings are currently inconclusive as to the effectiveness of the beetles for controlling HWA infestations in large remote areas.

*Pseudoscymnus tsugae* (PT) is a pinhead-sized, specialized, black lady beetle discovered feeding on hemlock woolly adelgid in Japan in 1992. *Laricobius nigrinus* (LN): is a beetle that is native to the western North America where it preys on hemlock woolly adelgid on western hemlock. Other lady beetles are also being tested for effectiveness against hemlock woolly adelgid in Connecticut and New Jersey. A leading candidate is the *Scymnus sinuanodulus* (SS) lady beetle from China. SS is yet another predator that feeds on woolly adelgid eggs. In addition to these, Connecticut is currently working with yet another type of Chinese lady beetle, *S. ningshangiensis*. *Laricobius*. The beetles only feed on woolly adelgids. An ironic problem with the lady beetles, unfortunately, is their voracious appetite for the hemlock woolly adelgid eggs. If they are not fed enough, they tend to not multiply as quickly and can fly off in search of better feeding grounds. However, the lady beetles have proven to be quite effective in the test sites at devouring the woolly adelgid, perhaps improving the outlook for threatened hemlocks and reducing long-term pesticide use.

Because of a lack of supply of beetles needed for treatment over a large area biological control is currently restricted to large, high-value (ecological, historical, or aesthetic) trees.

***See the file: MRDG Insect and Disease - additional information.docx for more.***



**Component Activities**

*How will each of the components of the action be performed under this alternative?*

	Component of the Action	Activity for this Alternative
X	<i>Example: Transportation of personnel to the project site</i>	<i>Example: Personnel will travel by horseback</i>
1	Equipment used for treatment.	Beetle containers.
2	Transportation of personnel and materials to the project site.	Personnel will walk and transport materials via pack stock.
3	Treatment method (i.e. pesticide or other substance).	Beetles that are predators of the HWA
4	Conditions of hemlock after treatment.	Minimal mortality.
5		
6		
7		
8		
9		

## Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

### UNTRAMMELED

Component Activity for this Alternative	Positive	Negative	No Effect
X <i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1 Beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2 Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 Beetles that are predators of the HWA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4 Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals	0	1	NE
<b>Untrammeled Total Rating</b>	<b>-1</b>		

Explain:

The method of application, transport of personnel and materials, and the specific chemical to be used do not impact the Untrammeled quality.

The Untrammeled quality is impacted when there is manipulation or control of the natural processes in wilderness. Even though the HWA is a non-native pest, actions to mitigate its effects are a trammeling even if the actions ultimately help preserve natural conditions.



UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Beetles that are predators of the HWA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	0	NE
<b>Undeveloped Total Rating</b>		<b>0</b>		

Explain:

There is no use of motorized equipment or development in the wilderness so there are no impacts to this quality.

NATURAL

Component Activity for this Alternative	<input type="checkbox"/> Positive	<input type="checkbox"/> Negative	<input checked="" type="checkbox"/> No Effect
X <i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1 Beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2 Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3 Beetles that are predators of the HWA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9			
Totals	1	1	NE
<b>Natural Total Rating</b>	<b>0</b>		

Explain:

There are no impacts to this quality from the non-motorized equipment or the transportation of personnel and materials via pack stock.

The introduction of non-native beetles in the wilderness is a negative impact to the natural conditions and this quality.

The effect of the treatment, which will allow for minimal hemlock mortality due to the HWA, is a positive impact to natural conditions and this quality. While the table only indicates a positive impact, if the impacts were rated, the benefits or protecting the natural conditions represented by the native hemlock plant communities in the wilderness likely outweighs the negative impacts from the use of the beetles, which will leave the area once HWA eggs are no longer present.

**SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION**

Component Activity for this Alternative		<input type="checkbox"/> Positive	<input type="checkbox"/> Negative	<input checked="" type="checkbox"/> No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Beetles that are predators of the HWA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	0	NE
<b>Solitude or Primitive &amp; Unconfined Recreation Total Rating</b>		<b>0</b>		

**Explain:**

There are no impacts to this quality from the non-motorized equipment or the transportation of personnel and materials via pack stock.

No area closures will be necessary during beetle release operations and the opportunity for visitors to experience primitive recreation in those areas should not be impacted.

The effect of the treatment which will allow for minimal hemlock mortality due to the HWA is a positive impact to the Natural quality and any resulting impact on the wilderness visitors experience is because of the natural conditions.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	Beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Beetles that are predators of the HWA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		0	0	NE
<b>Other Features of Value Total Rating</b>		<b>0</b>		

Explain:

There are no impacts to this quality from this alternative. Hemlock is a widespread species in the east and, although threatened by the HWA, it is not a unique feature of value to the Big South Wilderness.

No Other Features of Value would be affected within the wilderness.

**Summary Ratings for Alternative 3**

<b>Wilderness Character</b>	
Untrammeled	-1
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
<b>Wilderness Character Summary Rating</b>	<b>-1</b>

## Project Title: Suppression of Hemlock Woolly Adelgid Infestations

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### MRDG Step 2: Alternatives

#### Alternative 4: Chemical treatment and biological control

##### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

This alternative combines use of the chemical treatment methods described in Alternative 2 with the biological control actions described in Alternative 3 for treatment of detected HWA infestations in the wilderness. Both chemical and biological controls would also be used on private and national forest lands adjacent to wilderness.

Chemical control (insecticide applications) would be used to treat infestations that occur within the conservation reserve areas in trees determined to be essential for survival of a high quality hemlock population with a wide distribution of tree ages ranging up to 500 years old and representative of a high concentration of nonvascular species diversity related to hemlock plant communities.

Biological control (beetles) will be used to address all other HWA infestations in the wilderness except that chemical control methods may be used when sufficient beetles are not available within the critical treatment period, as determined by the forest ecologist.

The expected results of treatments and specific effects will be documented in the EA management of the HWA. Both types of treatments can be applied using non-motorized equipment.

An information and education program will be implemented for wilderness visitors to inform them about the HWA, the treatment schedule and locations, and the expected results for hemlock should an infestation occur in the wilderness.

The existing monitoring program to detect new infestations will continue. Once an infestation is detected the program will map the spread and monitor effectiveness of the treatment will be continued.

Insecticide applications will follow the required procedures described in the product Material Safety Data Sheet (MSDS) and Section 24C registration information. Prevention measures will be implemented to ensure that treatment activities will not adversely impact native vegetation or water.

***See the file: MRDG Insect and Disease - additional information.docx for more.***



**Component Activities**

*How will each of the components of the action be performed under this alternative?*

	Component of the Action	Activity for this Alternative
X	<i>Example: Transportation of personnel to the project site</i>	<i>Example: Personnel will travel by horseback</i>
1	Equipment used for treatment.	Non-motorized injector/applicators, beetle containers.
2	Transportation of personnel and materials to the project site.	Personnel will walk and transport materials via pack stock.
3	Treatment method (i.e. pesticide or other substance).	Chemical insecticides - imidacloprid and dinotefuran and beetles
4	Conditions of hemlock after treatment.	Minimal mortality.
5		
6		
7		
8		
9		

## Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

### UNTRAMMELED

Component Activity for this Alternative	Positive	Negative	No Effect
X <i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1 Non-motorized injector/applicators, beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2 Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 Chemical insecticides - imidacloprid and dinotefuran and beetles	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4 Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals	0	1	NE
<b>Untrammeled Total Rating</b>	<b>-1</b>		

Explain:

The method of application, transport of personnel and materials, and the specific chemical to be used do not impact the Untrammeled quality.

The Untrammeled quality is impacted when there is manipulation or control of the natural processes in wilderness. Even though the HWA is a non-native pest, actions (chemical and biological treatment) to mitigate its effects are a trammeling even if the actions ultimately help preserve natural conditions.



UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators, beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid and dinotefuran and beetles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> NE
<b>Undeveloped Total Rating</b>		<b>0</b>		

Explain:

There is no use of motorized equipment or development in the wilderness so there are no impacts to this quality.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators, beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid and dinotefuran and beetles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> NE
<b>Natural Total Rating</b>		<b>0</b>		

Explain:

There are no impacts to this quality from the non-motorized equipment or the transportation of personnel and materials via pack stock.

The introduction of both insecticides and non-native beetles in the wilderness are negative impacts to the natural conditions and this quality.

The effect of the treatments, which will allow for minimal hemlock mortality due to the HWA, is a positive impact to natural conditions and this quality. While the table only indicates a positive impact, if the impacts were rated, the long term benefits or protecting the natural conditions represented by the native hemlock plant communities in the wilderness likely outweighs the short term negative impacts from the use of insecticides and beetles, which will leave the area once HWA eggs are no longer present.

**SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION**

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators, beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid and dinotefuran and beetles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> NE
<b>Solitude or Primitive &amp; Unconfined Recreation Total Rating</b>		<b>-1</b>		

**Explain:**

There are no impacts to this quality from the non-motorized equipment or the transportation of personnel and materials via pack stock.

The necessary area closures during insecticide treatment applications will temporarily impact the opportunity for visitors to experience primitive recreation in those areas. No area closures will be necessary during beetle release operations and the opportunity for visitors to experience primitive recreation in those areas should not be impacted.

The effect of the treatment which will allow for minimal hemlock mortality due to the HWA is a positive impact to the Natural quality and any resulting impact on the wilderness visitors experience is because of the natural conditions.

**OTHER FEATURES OF VALUE**

Component Activity for this Alternative		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>			
1	Non-motorized injector/applicators, beetle containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Personnel will walk and transport materials via pack stock.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Chemical insecticides - imidacloprid and dinotefuran and beetles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Minimal mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals		<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> NE
<b>Other Features of Value Total Rating</b>		<b>0</b>		

**Explain:**

There are no impacts to this quality from this alternative. Hemlock is a widespread species in the east and, although threatened by the HWA, it is not a unique feature of value to the Big South Wilderness.

No Other Features of Value would be affected within the wilderness.

<b>Summary Ratings for Alternative 4</b>	
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<b>Wilderness Character</b>	
Untrammeled	-1
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	-1
Other Features of Value	0
<b>Wilderness Character Summary Rating</b>	<b>-2</b>

## **MRDG Step 2: Alternatives Not Analyzed**

### **Alternatives Not Analyzed**

*What alternatives were considered but not analyzed? Why were they not analyzed?*

#### **Soap Applications**

Soap spraying is the application of insecticidal soap to the entire tree. It requires mechanical equipment and motorized transport of large and specialized spraying equipment. The soap is then sprayed, soaking trees up to 150-feet tall. This is not a realistic option for wilderness due to the necessity for motorized equipment and motor vehicles and the rugged wilderness terrain. In addition, the soap mixture is only effective in killing the HWA on the tree at that moment.



**Project Title:** Suppression of Hemlock Woolly Adelgid Infestations

**MRDG Step 2: Alternative Comparison**

**Alternative 1:** No Action

**Alternative 2:** Chemical treatment to address a HWA infestation.

**Alternative 3:** Biological control of HWA infestation

**Alternative 4:** Chemical treatment and biological control

Wilderness Character	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Untrammeled	0	0	0	1	0	1	0	1
Undeveloped	0	0	0	0	0	0	0	0
Natural	0	1	1	1	1	1	1	1
Solitude/Primitive/Unconfined	0	0	0	1	0	0	0	1
Other Features of Value	0	0	0	0	0	0	0	0
Totals	0	1	1	3	1	2	1	3
<b>Wilderness Character Rating</b>	<b>-1</b>		<b>-2</b>		<b>-1</b>		<b>-2</b>	

Alternative 5: \_\_\_\_\_

Alternative 6: \_\_\_\_\_

Alternative 7: \_\_\_\_\_

Alternative 8: \_\_\_\_\_

Wilderness Character	Alternative 5		Alternative 6		Alternative 7		Alternative 8	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Untrammeled	0	0	0	0	0	0	0	0
Undeveloped	0	0	0	0	0	0	0	0
Natural	0	0	0	0	0	0	0	0
Solitude or Primitive & Unconfined Rec.	0	0	0	0	0	0	0	0
Other Features of Value	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0
<b>Wilderness Character Rating</b>	<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>	

**Project Title:** Suppression of Hemlock Woolly Adelgid Infestations

**MRDG Step 2: Determination**

Refer to the [MRDG Instructions](#) before identifying the selected alternative and explaining the rationale for the selection.

**Selected Alternative**

- Alternative 1: No Action
- Alternative 2: Chemical treatment to address a HWA infestation.
- Alternative 3: Biological control of HWA infestation
- Alternative 4: Chemical treatment and biological control
- Alternative 5:
- Alternative 6:
- Alternative 7:
- Alternative 8:

**Explain Rationale for Selection:**

Eastern and Carolina Hemlock and associated plant communities are significant components of the Natural quality of wilderness character of the Big South Wilderness. Ecosystems in the southern Appalachian area threatened with up to 100 percent mortality from HWA, a non-native pest, originating in Asia. Both survival of the hemlock in this region and a quicker recovery of a significant population of both hemlock species and their associated plant communities in the future would be much more likely if components of these plant communities were maintained in both the short and long term. The objective for any treatment actions for national forest and adjacent lands are to mitigate the long-term effects of the HWA infestation.

The purpose of this analysis is to determine whether treatments are necessary in wilderness (Step 1) and if so, what type of treatment represents the minimum required action (Step 2). Treatments in wilderness are possible (but not required) because of The Wilderness Act of 1964 - Section 4(d)(1): "... In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable." FS policy (see Other Direction, FSM 2150 and 2320) provides direction that both recognizes the objective to allow natural forces (such as fire, insects, and disease) to proceed while also allowing action to be taken for non-indigenous pests (such as HWA) and consideration of the potential unnatural loss to the wilderness resource and impacts on adjacent lands.

Based on the analysis described in Step 1, some treatment of the HWA in wilderness, along with treatments on adjacent lands, offers the best chance of the native hemlock plant communities being maintained in order to preserve the Natural quality of the wilderness. The need for treatment is also based on the threat to adjacent lands since treatment of non-wilderness areas would be ineffective for the HWA

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#### Explain Rationale for Selection, Continued:

if no treatment is done in wilderness.

The selected alternative is #4, Chemical Treatment and Biological Control in the wilderness using the actions and mitigations described. This alternative offers the best combination of effective short and long term methods and is the minimum necessary action that helps preserve the Natural quality of wilderness character while minimizing adverse impacts to other qualities and using feasible and available resources. In the comparison of alternatives, the need and benefits of treatment to help protect the native hemlock from the non-native HWA helps preserve an essential and long-term natural condition of the wilderness more than the temporary treatment actions cause adverse impacts to the Untrammeled quality. The selection of Alternative #4 also considered overall effectiveness of the treatments and the annual costs vs. long-term reapplication costs.

Upon approval of the Regional Forester, insecticides will be used only as needed based on a criteria to select the trees that occur within the conservation reserve areas and are essential for survival of a high quality hemlock population. The goal is a wide distribution of tree ages ranging up to 500 years old and representative of a high concentration of nonvascular species diversity related to hemlock plant communities, which represents natural conditions. Chemical treatments using imidacloprid and dinotefuran offer the surest method of treatment for a smaller scale. It is impractical to treat more than certain selected hemlock stands in this manner because of time and expense. Drawbacks of chemical control include high cost of treatment, temporary control, and secondary outbreaks of spider mites. The intent is to use chemical control as a "stop gap" measure until biological control measures are fully available.

Biological control (beetles) will be used to address all other HWA infestations in the wilderness except that chemical control methods may be used when the supply of beetles is insufficient within the critical treatment period, as determined by the forest ecologist. Biological controls are the most promising on a large scale although the availability of beetles will need to increase and the overall effectiveness is being monitored. Because the beetles leave the area once their food supply (HWA eggs) is no longer present, biological control appears to be the most subtle and potentially effective means of treatment of HWA at a large scale.

Alternative 1, No Action, was not selected because no treatment within wilderness does not preserve the Natural quality of wilderness character nor is it adequate to address the threat to adjacent lands as required by FS policy (FSM 2324).

**Note - See the file: MRDG Insect and Disease - additional information.docx for more.**

#### Describe Monitoring & Reporting Requirements:

The existing HWA monitoring program to detect new infestations will continue. Once an infestation is detected the program will map the spread and monitor the effectiveness of the treatment.



## Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

<u>Prohibited Use</u>	<u>Quantity</u>
<input type="checkbox"/> Mechanical Transport:	
<input type="checkbox"/> Motorized Equipment:	
<input type="checkbox"/> Motor Vehicles:	
<input type="checkbox"/> Motorboats:	
<input type="checkbox"/> Landing of Aircraft:	
<input type="checkbox"/> Temporary Roads:	
<input type="checkbox"/> Structures:	
<input type="checkbox"/> Installations:	

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following review and decision authorities:

Prepared	Name		Position		
	Signature			Date	
Recommended	Name		Position		
	Signature			Date	
Recommended	Name		Position		
	Signature			Date	
Approved	Name		Position		
	Signature			Date	

App		
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