

N50/1801

March 22, 1996

The Honorable Bob Goodlatte
U.S. House of Representatives
123 Cannon House Office Building
Washington, DC 20515-4606

Dear Congressman Goodlatte:

Thank you for your interest in the Shenandoah National Park policy on gypsy moth management. Gypsy moths have indeed caused big changes in the complexion of the Park's forest resource as well as other ownerships within the State of Virginia. Since their detection on the Park near Mathews Arm Campground in 1983, gypsy moths have made a steady march south. This is reflective of their activity in the rest of the state.

The question of what resources to protect and how aggressively to respond are reflective of National Park Service policy, our management objectives, and the overall approach to protect the composite environment and not merely focus on one resource component. Unlike ownerships whose management is driven by the desire for timber revenues, we must take the broad view to protect the many trees, herbs, grasses, lichens & mosses, insects, amphibians, reptiles, and small and large mammals which are found in the Shenandoah National Park. You will find attached our policy on gypsy moth management. Also attached is background information that speaks to the history of gypsy moths in America as well as the management activities in the Park. The policy statement speaks of our annual environmental assessment for gypsy moth management. That document is in process for 1996. Due to the gypsy moth population crash in effect within the Park and the state, we believe that our field surveys will indicate the need for continued monitoring and minimal, localized control efforts. A portion of the background document speaks to this issue.

Please contact us if you have further questions.

Sincerely,

(SGD.) VAUGHN L. BAKER for
J.W. Wade
Superintendent

Attachments

bcc: Superintendent
Center for Resources

AKERSON:SHEN-CfR:JAMES:WP51:GOODLATT.396:SLE

Shenandoah National Park Gypsy Moth Policy

Operating within the goals of the National Park Service (NPS) to preserve and conserve the natural diversity, character, and processes of the ecosystem, the major objectives of gypsy moth (GM) suppression in the Park are to:

- (1) Protect sensitive historic and developed special value areas from excessive defoliation and tree mortality that would permanently change the character of the scene or detract significantly from visitor use and/or enjoyment of the area;
- (2) Reduce risks to visitor safety;
- (3) Reduce risks of the artificial spread of gypsy moths to uninfested areas.

Review of NPS Management Policies reveals general guidelines when managing exotic insects such as the gypsy moth. Currently, population management of exotic animals "will be undertaken wherever such species threaten park resources or public health and when control is prudent and feasible." Furthermore, "high priority will be given to the management of exotic species that have a substantial impact on park resources and that can reasonably be expected to be successfully controlled; lower priority will be given to exotic species that have almost no impact on park resources or that probably cannot be successfully controlled." Information obtained from suppression activities and research have demonstrated that widespread suppression efforts are not economically and environmentally feasible to stop the spread of the gypsy moth in its preferred habitat using traditional pest management practices. However, integrated pest management (IPM) procedures will be used to determine when to control pests and what methods to be used to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to people, property, and the environment (NPS Management Policies 1988).

Additionally, the national Environmental Impact Statement Decision on GM management on Federal lands, dated January 1996¹ describes appropriate activities for the area encompassed within the Park. Pre-treatment survey, suppression activity, and post-treatment monitoring are outlined. Three types of suppression tools are authorized. They include:

Bacillus thuringiensis (B.t.) -- a bacterial agent;
Gypcheck -- a viral agent; and
Diflubenzuron -- a chemical agent.

Proposed annual suppression activities are outline in detail in an Annual Gypsy Moth Management Program statement developed by personnel at SNP. Suppression zones within the Park generally include:

- (1) Special value developed and historical zones;
- (2) Special unique, scenic and recreational "natural" areas; and
- (3) Habitat of the federally endangered Shenandoah Salamander.

All proposed suppression activities in the Park must be presented to the public for their comment prior to action. Final suppression activity plans are then determined and implemented. Copies of the Shenandoah Environmental Assessment for the Annual Gypsy Moth Activity Program, and other related documents are made available to the public from the Superintendent upon request.

¹ USDA. 1996. Final environmental impact statement; gypsy moth management in the United States: a cooperative approach. USDA Forest Service, Northeastern Area State and Private Forestry; Radnor, PA.

successful thus far in Washington, Oregon, and North Carolina. Approved methods are the same as with slow-the-spread.

GM in the Shenandoah National Park

Male moths were first found in the Park in 1982. Gypsy moth egg masses (indicating female presence) were first discovered in the Park during the winter of 1983/84. At that time, light infestations were found in the Mathews Arm/Piney River developed area, near Gravel Springs, and in the Compton Gap area. It was believed that these low populations represented the advancing front of the general gypsy moth infestation.

The first large-scale gypsy moth suppression project was conducted in the spring of 1986 at Mathews Arm Campground. One hundred acres surrounding the campground were treated with diflubenzuron in order to prevent the complete defoliation of that public use area. That began the first of ten consecutive years of suppression activities within strategic high-use areas. The objective of those projects was to minimize mortality and eventual creation of hazard trees in high-use areas which might injure the public, cultural resources, and high value improvements. Those projects ranged from 100 to 2,642 acres. The peak of defoliation impacts by the GM caterpillar came in 1992; aerial survey detected 166,668 acres of defoliation area. (Note the charts of defoliation and suppression.)

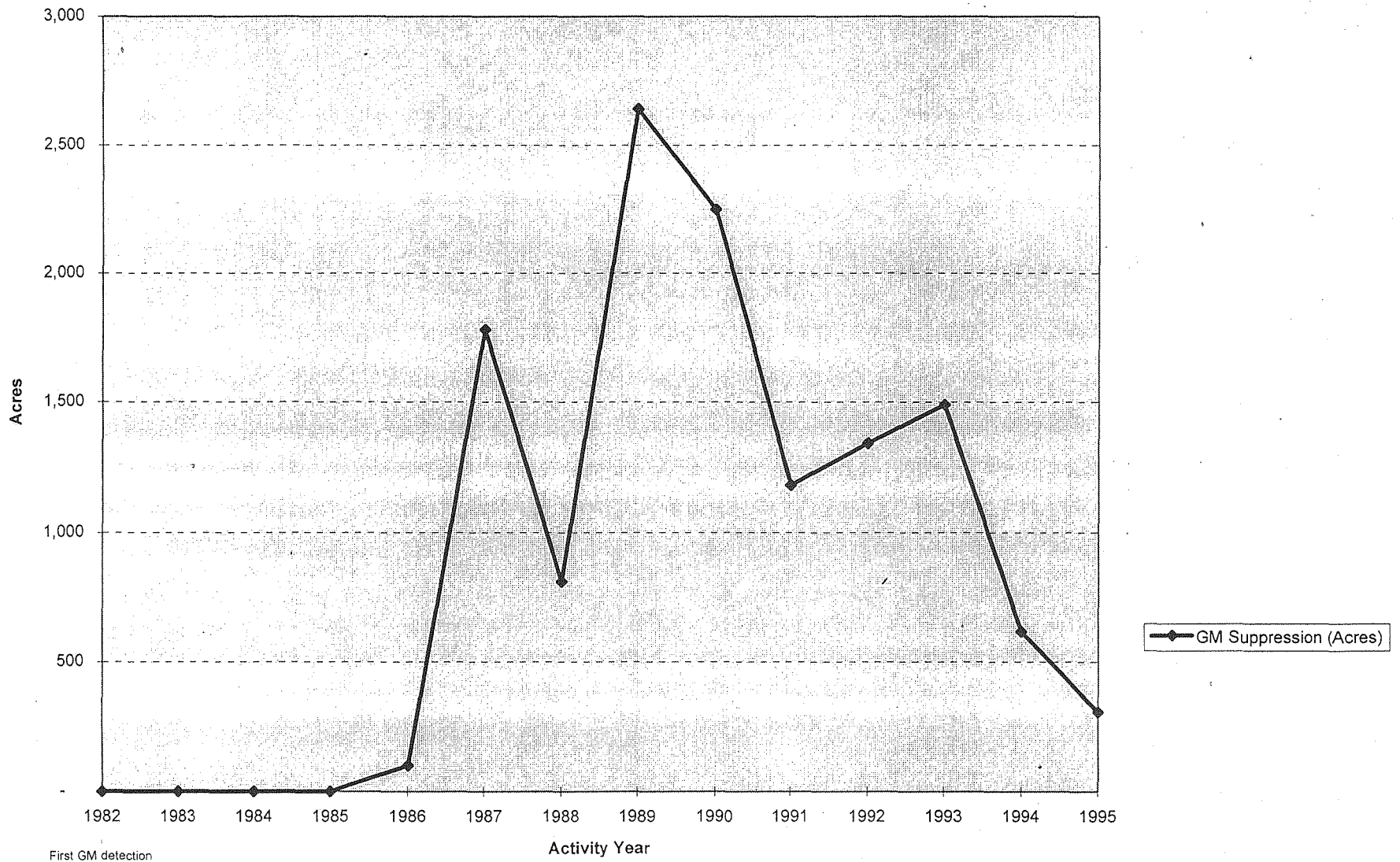
Shenandoah National Park is 95 percent forested. The predominant forest type is oak/hickory. Over 85 percent of the total forest cover of the Park contains trees listed as being preferred as food by gypsy moth caterpillars. The abundance of preferred tree species in the Park and surrounding forested lands enhanced the establishment and spread of this insect. In addition to an abundant food supply, the young larvae may be easily spread from ridge to ridge on the strong spring winds frequently occurring at the higher elevations in the Park.

As naturalization within the Park continues, changes are occurring in the forest ecosystem. One of the major changes is in vegetation composition. Tree mortality resulting from defoliation will be greatest on the highly preferred host species such as the oaks. In some areas, the relative composition of oaks has decreased dramatically. In the long run, this may result in lower gypsy moth population levels and less extensive defoliation because of reduced availability of highly preferred tree species. We do not believe that this foretells the end of oaks and other preferred species, but it certainly indicates lowered percent composition of those species in Shenandoah stands.

Natural Biological Controls of GM

Another change has been the effects that various species of predatory and parasitic insects and diseases have had on the gypsy moth population cycle. In the 1980s it was believed that as the numbers of GM moths increased so would the populations of natural and introduced insect species. Thus, they would play a more important role in the moderation of gypsy moth population fluctuations. However, until the Park's ecosystems could adjust to those changes, widespread, severe defoliation would occur. That prediction appears to have been on target. Populations of GM throughout the Park were greatly reduced in 1992 from diseases caused by the naturally occurring GM virus (nucleopolyhedrosis, aka NPV) and the introduced fungus, *Entomophaga maimaiga* (EM). Our monitoring indicated that defoliation fell from 166,668 acres in 1992 to 87,900 acres the following year. Then again, after two years of defoliation at lower than peak levels, those diseases caused a second "epizootic" killing of GM caterpillars in late 1995 in what now appears to be a statewide GM crash. We will not have our 1996 defoliation figures until this summer, but every indication is that the area will be the smallest in ten

Shenandoah National Park Gypsy Moth Suppression Activities



The major objectives of the Shenandoah GM policy are to:

A. Protect sensitive historic and developed areas, endangered species habitat, and Special Natural Features from excessive defoliation and tree mortality that would permanently change the character of the scene or detract significantly from visitor use and/or enjoyment of the area;

B. Reduce risks to visitor safety; and

C. Reduce risks of the artificial spread of gypsy moths to uninfested areas.

GM Biology

Life Cycle

Eggs: Egg masses measure 1 to 1-1/2 inches long and 1/2 or more inches wide, holding 500 or more eggs. Once laid, the egg masses are covered with buff colored hairs from the females body. They can be found anywhere, although commonly on tree trunks. Usually in sparse or growing populations, these egg masses are well concealed -- under loose bark, in fissures or bark, under rocks, or numerous other concealed places. The egg stage is the longest of the moth's life span and lasts for about eight to ten months of the year, from late June to mid-April. Eggs begin to hatch around mid- to late April.

Larvae: Larvae molt five to six times prior to pupating. Caterpillars in the newly-hatched stage are hairy and blackish and measure about 1/16 of an inch long. This is their dispersal stage, as the caterpillars climb to the tops of trees or objects, drop on silken threads, and are wind blown from tens of yards to miles. Following dispersal, the larvae molt and begin feeding. This stage is usually referred to as the shot-hole stage since leaves are riddled with tiny holes. Most feeding at this stage occurs during the daytime, early morning, and late afternoon. Second and third stage caterpillars measure about 1/2 to 1 inch long and are predominantly black with orange markings down their back. About halfway through this stage, or when they are about 3/4 to 1 inch long, the larvae become nighttime feeders. During the day they come down from the crown of the tree seeking shelter. Late stage caterpillars range from 1-1/2 to 3 inches in length. They are hairy, brownish or black, and have five pairs of blue dots beginning at the head followed by six pairs of red dots continuing down their back. The last of these late stages is responsible for approximately 70 percent of all the foliage destroyed. Much of this defoliation is a result of wasteful feeding when leaves are chewed off at the petiole. Caterpillars may be active from mid-April to mid-July.

Pupae: The pupae are reddish-brown are from 5/8 to 1 inch long. This is also a dispersal stage, as pupal cases are attached to all types of objects and are easily transported. This stage may last from 10-17 days and is found from mid-June to late July.

Adult: Male moths vary in color from light tan to dark brown and are excellent flyers with a wingspan of about 1-1/2 inches. Another characteristic is the feather-like antenna which are held erect while flying. The male lives for a week or so and is capable of inseminating numerous females if the opportunity arises. The female moth is larger and predominantly white, with a few faint wavy brown or black bands and V-markings on the front wings. The wingspread is about 2 to 2-1/2 inches but they cannot fly. After the female emerges from the pupa, she begins to emit a pheromone to attract a male for mating. Once copulation and fertilization have taken place, eggs are deposited within hours. Death occurs within a day after egg-laying. Adult moths are found from late June to early September. One generation of gypsy moth occurs each year.

with non-preferred tree species. In areas with a lot of trees, this can be done a few trees at a time on an annual basis. In other areas, those trees killed by defoliation should be immediately replaced with low preference species. The long-term goal is to reduce the total volume of preferred food available to the caterpillars.

5. Male Moth Trapout. This technique can also be termed a mechanical control because it does kill male moths. However, because large numbers of pheromone traps are used to not only catch male moths but disrupt their mating, it is also a biological control. This method may be effective in reducing small populations where access is good, such as in campgrounds and other developed areas.

6. Mating Disruption. Adult moths rely on odor to find each other to mate. The female produces a strong pheromone attractant to lure the male moth to her. This same pheromone is produced commercially and can be applied to traps, tape strips, or chips of absorbent material. When a large number of pheromone treated objects are scattered in an area it confuses the male moths and often prevents them from finding a female in time to mate successfully. This technique is useful in small to moderate sized areas. The actual effectiveness may vary and is still being studied.

7. Sterile Moth Introduction. Irradiated egg masses are broadcast throughout the infested area. The eggs hatch and the larvae feed along with the resident population; however, these caterpillars pupate into sterile adults. When these adults mate with fertile adults, only sterile eggs are produced. This technique is still in the experimental stage and most likely will only be practical for small, low-level populations.

C. Chemical Controls -

Chemical insecticides have been used for over fifty years in an attempt to eradicate, control, or suppress gypsy moth populations. They produce good reductions in larvae populations and, under ideal conditions achieve 98 percent mortality. However, chemical applications are expensive, and can cause disruptions to natural ecosystems, especially in an otherwise protected Park area. The three most commonly used insecticides used on gypsy moth larvae are trichlorfon (Dylox^R), carbaryl (Sevin^R), and diflubenzuron (Dimilin^R). None of these chemicals are species-specific, although all three are selective to a degree, and non-toxic to humans when used properly. They can be sprayed aerially or by truck-mounted and hand-held sprayers. The EIS-Decision now in effect (1996) authorizes only the use of diflubenzuron.

The management activities which make up the Park's overall gypsy moth control strategy include monitoring, management actions, and research. All three elements are necessary to develop, implement, and evaluate the overall program.

Monitoring

Purpose: Monitoring systems will be used to detect and quantify gypsy moth population levels. The type and degree of management actions selected will be partially based on population data derived from these monitoring systems.

Systems: Life stages to be monitored include male moths, larvae, and egg masses. Detailed information on how to conduct these monitoring systems can be found in Appendix C.

1. Male Moths: Male moths are indicative of approaching gypsy moth populations. Their presence in high numbers is an early warning that other life stages are either present or are nearby. Male moth populations are monitored in special value areas where other life stages have not yet been found. USDA Forest Service male moth pheromone traps are used in this system.

Gypsy Moth Management Alternatives
Based on Predicted Population

<u>Threshold Level</u>	<u>Management Action Alternatives</u>
1) 0-100 egg masses/ acre	A. Scraping egg masses B. Pheromone mating disruption C. Release of parasitic or predatory insects D. Vegetation manipulation E. No action
2) 100-1000 egg masses/ acre	A. Release of parasitic or predatory insects B. Vegetation manipulation C. B.t. application D. Diflubenzuron application ⁴ E. No action
3) Greater than 1000 egg masses/acre	A. Vegetation manipulation B. Diflubenzuron application ⁴ C. No action

Research

Both short- and long-term research projects and programs are being conducted to determine actual and predicted gypsy moth impacts on developed areas and natural forest ecosystems. The Park will also cooperate with state and other federal agencies or organizations in the development of more ecologically sound methods of gypsy moth population control. Some of these studies have included the effects of gypsy moth populations on: (1) tree mortality; (2) wildlife populations; (3) aquatic ecology; and (4) the relationship to other stresses such as drought, fire, air pollution, and acid deposition.

⁴ Chemical Insecticides: The use of chemical insecticides in areas administered by the National Park Service is directed by the following policy statement taken from the Directors Memorandum of February 6, 1981 on this subject: "chemical pesticides of any type will be used only where feasible alternatives are not available or acceptable. The Service's use of all pesticides shall be approved by the Director. Application shall be in accordance with applicable laws, Departmental and Service guidelines, and Environmental Protection Agency and Occupational Health and Safety Administration regulations."

"Service policy does not prohibit, as such, the use of chemical pesticides. However, chemical controls are to be allowed only if (a) there is a clear and present danger to the health and safety of man; and/or (b) there is danger of destruction of significant property or resources and a determination has been made that the control methods of no action, mechanical, cultural and/or biological control are non-existent, unavailable, or unacceptable."

BOB GOODLATTE
6TH DISTRICT, VIRGINIA

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COMMITTEE ON THE JUDICIARY
COMMITTEE ON AGRICULTURE
ASSISTANT MAJORITY WHIP

Congress of the United States House of Representatives

February 26, 1996

Mr. Bill Wade, Superintendent
Shenandoah National Park
Route 4, Box 348
Luray, VA 22835

Dear Bill:

Enclosed herewith, please find a memorandum prepared by my Harrisonburg staff regarding Shenandoah National Park policy for fighting gypsy moths.

I would appreciate your looking into this matter and providing me with a response. Please mail your response to my Harrisonburg office at the address marked below.

Thank you for your assistance.

Very truly yours,

Bob Goodlatte
Member of Congress

RWG/po
Enclosure

RECEIVED Shenandoah National Park	
FEB 28 '96	
	File
Superintendent	VB 2/28
Asst Supt	
Pub Affs Spec	
Info Mgt	
Cons Mgmt	
Admin Servs Ldr	
IEE Ldr	
REWS Ldr	2/25
CPR Ldr	
ND Ldr	
CD Ldr	
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540

916 MAIN STREET
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114 NORTH CENTRAL AVENUE
STAUNTON, VA 24401-3307
(703) 885-3861
FAX (703) 885-3930

Memorandum

To: File

From: Phoebe Orebaugh, District Representative

Date: February 26, 1996

Re: Policy for fighting gypsy moths in the Shenandoah National
Park

We are seeking information about what the Park does in regard to fighting gypsy moths. We also would like to know if there are proposals for other measures that you are considering.