ENVIRONMENTAL ASSESSMENT
Cooperative STS Gypsy Moth Project
for Indiana - 2020

By

Indiana Department of Natural Resources
Division of Entomology & Plant Pathology

Indiana Department of Natural Resources
Division of Forestry

United States Department of Agriculture
Forest Service

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Proposed Action

The Indiana Department of Natural Resources (IDNR), Division of Entomology & Plant Pathology (DEPP) and Division of Forestry (DoF), proposes a cooperative project with the United States Department of Agriculture (USDA), Forest Service to treat the gypsy moth populations at four sites in three counties that cover an estimated 8,863 acres (Table 1 below and maps in Appendix B). The preferred alternative for the cooperative project is Alternative 4: Btk and/or mating disruption.

Table 1. Number of Treatment Sites and Acres by County and Treatment Method

COUNTY	TREATMENT SITES		TREATMENT ACRES	
	Mating Disruption	Btk	Mating Disruption	Btk
Huntington	1	1	7,243	734
Marshall	1	0	616	0
Porter	0	1	0	270
Total By Treatment	2	2	7,859	1,004
Total	4		8,863	

1.2 Project Objective

The objective of this cooperative project is to slow the spread of the gypsy moth populations by eliminating or decreasing reproducing populations from the proposed treatment sites. Over the past four years in Indiana, this objective has been successfully met, while implementing the Slow the Spread Program (STS). See the Gypsy Moth STS Foundation website.

1.3 Need for Action

Gypsy moth (*Lymantria dispar*) is not native to the United States, and it lacks effective natural controls. The caterpillars feed on the foliage of many host plants. Oaks are the preferred host species, but the caterpillars defoliate many species of trees and shrubs. When high numbers of gypsy moth caterpillars are present, forests and trees suffer severe defoliation, which can result in reduced tree growth, branch dieback and even tree mortality. The high numbers of caterpillars also create a substantial public nuisance and can affect human health. The State of Indiana, with the IDNR, Division of Entomology and Plant Pathology as the lead agency, is dedicated to preserving urban and rural forested habitats from damage by gypsy moth and to enforcing interstate and intrastate quarantines to further protect areas not currently infested by this pest. If no action is taken, the gypsy moth population will increase and spread throughout the State of Indiana and defoliation will occur sooner. Therefore, the "no action" alternative is not preferred

due to the desire of state officials to eliminate the isolated infestations, prevent human discomfort associated with infestations, delay damage to local plant communities and reduce spread to adjacent non-infested areas. Through public involvement, participating citizens supported the proposed action (Appendix A).

1.4 Decisions to be Made and Responsible Officials

The preferred alternative in this document proposes cooperative participation of the IDNR and the USFS in treatment of gypsy moth populations in Indiana. The decision to be made by the responsible USFS official is to choose which of the alternatives presented in this document best meets the objective of the proposed action, and thus the needs of the people of Indiana. In addition, the decision will have to be made as to whether or not any perceived significant environmental impacts could result from the implementation of this project. If there are none, this will be documented in a Decision Notice and Finding of No Significant Impact (FONSI). If significant environmental impacts are found and the project is to continue, an Environmental Impact Statement (EIS) would be prepared.

The alternatives analyzed for this environmental assessment are:

1) No cooperative project (No action),
2) Btk,
3) Mating disruption,
4) Btk and/or mating disruption (Preferred Alternative)

The responsible USFS official who will make this decision is:

L. Carleen Yocum, Field Representative, USDA, Forest Service, Eastern Region, 1992 Folwell Avenue, St. Paul, MN 55108, (651) 649-5276.

The responsible officials for the implementation of the cooperative project are:

Megan Abraham, State Entomologist, Indiana Department of Natural Resources, Division of Entomology and Plant Pathology, 402 West Washington Street, IGC South, Room W290, Indianapolis, IN 46204, (317) 232-4189.

John Seifert, State Forester, Indiana Department of Natural Resources, Division of Forestry, 402 West Washington Street, IGC South, Room W296, Indianapolis, IN 46204, (317) 232-4105.

1.5 Scope of the Analysis

Since 1996 the USDA has carried out its gypsy moth management responsibilities through the USFS and Animal and Plant Health Inspection Service (APHIS) and pursuant to a programmatic decision based on a 1995 Environmental Impact Statement (EIS) for gypsy moth management. The Record of Decision (ROD) for that EIS was signed in January of 1996; it allowed three management strategies – suppression, eradication, and slow-the-spread. The 1995 EIS was updated with a final Supplemental Environmental Impact Statement (SEIS), titled “Gypsy Moth

Management in the United States: A Cooperative Approach," dated August 2012. The ROD for the SEIS was signed by the USFS in November 2012. It maintains the three strategies of suppression, eradication and slow-the-spread. Strategies depend upon the infestation status of the area: generally infested, non-infested, and transition. The counties involved in this Environmental Assessment (EA) are all within areas considered non-infested or transition.

Implementation requires that a site-specific environmental analysis be conducted and public input gathered to identify and consider local issues before any Federal or cooperative suppression, eradication, or slow-the-spread projects are authorized and implemented. As part of the analyses conducted for the SEIS, human health and ecological risk assessments were prepared (USDA 2012a, Volumes III and IV). These site-specific analyses are tiered to the programmatic EIS and SEIS and documented in accordance with Agency National Environmental Policy Act (NEPA) implementing procedures (USDA 2012b, ROD, p. 2). The purpose of tiering is to eliminate repetitive discussions of the issues addressed in the SEIS (40 CFR, 1502.20 and 1508.28 in Council on Environmental Quality, 1992).

This environmental assessment provides a site-specific analysis of the alternatives and environmental impacts of treating gypsy moth populations in Indiana.

1.6 Summary of Public Involvement and Notification

The National Environmental Policy Act requires public involvement and notification for all projects utilizing federal funds that may have an effect on the human environment (40 CFR, 1506.6 in Council of Environmental Quality 1992). Local issues discussed at the public meetings and in subsequent phone calls, letters and emails are discussed in Appendix A.

On December 18, 2019 approximately 59 letter notifications were mailed to public officials and on January 6, 2020 approximately 1,394 postcard notifications were mailed to residents in the proposed treatment sites informing them of the public meetings. Legal notices were published in local newspapers informing the public about the upcoming meetings on the proposed treatment sites. An IDNR News Release was sent out with information on the scheduled public meetings and the public comment period. Information on the public meetings, proposed treatments and the comment period was also posted on the Indiana DNR, Div. of Entomology and Plant Pathology (DEPP) website gypsy moth page and on the Indiana DNR-DEPP Twitter page.

Three public meetings were held between January 29 and February 5 for citizens, public officials and interested individuals. At each meeting, state officials presented alternatives for gypsy moth management. The discussion included identification and biology of gypsy moth, pest impacts, survey methods, and treatment options. The proposed action and alternatives, including no action, were discussed. There was a total attendance of 16 citizens at the meetings (Appendix A).

After the decision on the proposed treatment is made, and if treatment is conducted, residents will be mailed a notification approximately two weeks prior to treatment. IDNR News Releases will be sent out to local media with a request to communicate the information to the general

public. Phone calls will be made to public officials and other interested individuals. Updates regarding the scheduled day of treatment will continue prior to and through treatments via local media, phone calls, emails and Twitter.

Information gathered from the public and from resource professionals was used to develop issues and concerns related to the project. They are grouped into two categories; 1) issues used to formulate the alternatives, and 2) other issues and concerns.

1.7 Issues Used to Formulate the Alternatives

Each of the major issues is introduced in this section. Discussion pertaining directly to each issue as it relates to the alternatives can be found in Chapter 4, Environmental Consequences.

Issue 1 - Human Health and Safety.

Three types of risk are addressed under this issue: 1) an aircraft accident during applications; 2) treatment materials and potential effects on people; and 3) the future effects of gypsy moth infestations on people.

Issue 2 - Effects on Non-target Organisms and Environmental Quality.

The major concerns under this issue are: 1) the impact of treatment materials to non-target organisms, including threatened and endangered species that may be in the treatment site; and 2) the future impacts of gypsy moth defoliation on the forest resources, water quality, wildlife and other natural resources.

Issue 3 - Economic and Political Impacts of Treatment vs. Non Treatment.

Gypsy moth outbreaks can have significant economic impacts due to effects on the timber resource, nursery and Christmas tree producers, and recreational activities. An additional economic impact is a gypsy moth quarantine imposed to regulate movement of products from the forest, nursery and recreational industries to uninfested areas.

Issue 4 - Likelihood of Success of the Project.

The objective of this cooperative project is to slow the spread of gypsy moth populations by eliminating or decreasing reproducing populations from the proposed treatment sites. Alternatives vary in their likelihood of success for the current situation. Each year, project success is evaluated by treatment types for delaying gypsy moth impacts to Indiana and neighboring states.

1.8 Other Issues and Concerns

Concerns and questions were discussed during the public meetings (see Appendix A). Also, other agencies were consulted (see Appendix C). Information from these sources was used to develop management guidelines, treatment constraints, and mitigating measures.

1.9 Summary of Authorizing Laws and Policies

State

The Division Director (State Entomologist) may cooperate with a person in Indiana to locate, check, or eradicate a pest or pathogen (Indiana Code 14-24-2-1). The Division Director may, on the behalf of the department, enter into a cooperative agreement with the United States government, the government of another state, or an agency of the United States or another state to carry out this article (Indiana Code 14-24-2-2).

Aerial applicators must meet Indiana Pesticide Use and Application Law (Indiana Code 15-3-3.6) to provide safe, efficient and acceptable applications of pesticides. This project will be conducted in accordance with the National Pollutant Discharge Elimination System (NPDES) requirements and is operating under Indiana Pesticide General Permit ING870000.

The Non-Game and Endangered Species Conservation Law (Indiana Code 14-22-34).

Protection of Historic Properties (Indiana Code 14-21-1).

Federal

Authorization to conduct treatments for gypsy moth infestations is given in the Plant Protection Act of 2000 (7 U.S.C. section 7701 et. seq.).

The Cooperative Forestry Assistance Act of 1978 provides the authority for the USDA and state cooperation in management of forest insects and diseases. The law recognizes that the nation's capacity to produce renewable forest resources is significantly dependent on non-federal forestland. The 2018 Farm Bill (P.L. 115-334, Sec 8 [16 U.S.C. 2104], Forest Health Protection) reauthorizes the basic charter of the Cooperative Forestry Assistance Act of 1978.

The National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190), 42 USC 4321 et. seq. requires a detailed environmental analysis of any proposed federal action that may affect the human environment. The courts regard federally funded state actions over which a federal agency conditions the use of the funds as federal actions.

The Federal Insecticide, Fungicide and Rodenticide Act of 1947, (7 USC 136) as amended, known as FIFRA, requires insecticides used within the United States be registered by the United States Environmental Protection Agency (EPA).

Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et. seq.) prohibits federal actions from jeopardizing the continued existence of federally listed threatened or endangered species or adversely affecting critical habitat of such species.

Section 106 of the National Historical Preservation Act and 36 CFR Part 800: Protection of Historic Properties requires the State Historic Preservation Officer be consulted regarding the proposed activities.

USDA Departmental Gypsy Moth Policy (USDA 1990) assigns the USFS and APHIS responsibility to assist states in protecting non-federal lands from gypsy moth damage.

Executive Order #12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Consistent with this Executive Order, the USFS considered the potential for disproportionately high and adverse human health or environmental effects on any minority or low-income populations.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Process Used to Formulate the Alternatives

The ROD for the SEIS (USDA 2012b, ROD), to which this document is tiered, maintains the three strategies for gypsy moth management (eradication, slow-the-spread, and suppression) that were allowed in the EIS (USDA 1995) and the ROD (USDA 1996). Therefore, the USFS and APHIS can assist in funding and carrying out eradication, suppression, and slow-the-spread projects. The ROD for the SEIS adds the insecticide tefubenozide to the previous list of 6 approved treatments from the 1995 EIS. Therefore, seven treatments can be considered for use in developing treatment alternatives under the slow-the-spread and eradication strategies: 1) Btk; 2) diflubenzuron; 3) Gypchek; 4) mass trapping; 5) mating disruption; 6) sterile insect release; and 7) tebufenozide.

Staff entomologists and administration within the IDNR, Division of Entomology and Plant Pathology and the Division of Forestry in cooperation with the USFS, formulated several alternatives to treat the gypsy moth populations in Indiana under eradication and slow-the-spread strategies (See Chapter 6, Persons and Agencies Consulted).

2.2 Alternatives Eliminated from Detailed Study

The following alternatives that are available were eliminated from consideration:

Diflubenzuron (Dimilin)

The label for Dimilin prohibits its use over wetlands and directly to water. This insecticide is a broad spectrum treatment and may increase the impact to nontarget species. Therefore, Dimilin is not considered for this project. In future projects, it may be evaluated for use.

Gypchek

Gypchek has proven effective at reducing gypsy moth at higher population levels. However, Gypchek is a costly alternative with a very limited supply and is only used in environmentally sensitive areas, generally those with threatened or endangered lepidopterans which could be impacted by other treatment options (USDA 2012a, Vol. II, App. A, pp. 3 to 4). Environmental review of the sites did not determine that any threatened or endangered lepidopterans occurred within the treatment sites. Due to the cost and limited availability Gypchek is not considered for this project. In future projects, it may be evaluated for use.

Mass trapping

Mass trapping uses an intensive grid of traps to limit reproduction. Mass trapping is typically used on small gypsy moth infestations of 100 acres or less (USDA 2012a, Vol. II, App. A, p. 5), and generally uses 9 or more traps per acre. This approach is very labor intensive, especially over large areas. Mass trapping has proven capable of eliminating or reducing gypsy moth at very low population levels in small sites. The use of mass trapping can meet the project objective of eradicating gypsy moth at small treatment sites. Due to the level of moth catches

and the size of the areas proposed for treatment, mass trapping is not considered for this project. In future projects, it may be evaluated for use.

Sterile insect release

Sterile insect release can be done for elimination of isolated gypsy moth populations. There are obstacles using this alternative - the limited release period; need to synchronize production of mass quantities of sterile pupae; and the logistical difficulties of repeated release over a 4-week period (USDA 2012a, Vol. II, App. A, p. 7). This treatment alternative is currently not available, and it has not been used since 1992 (USDA 2012a, Vol. II, App. A, p. 8). Given these obstacles, sterile insect release is not considered for this project. In future projects, it may be evaluated for use.

Tebufenozide (Mimic)

This insecticide (an insect growth regulator) is selective against caterpillars (lepidopteran larvae), like Btk, but it has longer persistence in the environment than Btk. Thus, it could have greater impact to nontarget caterpillar populations. Therefore, Mimic is not considered for this project. In future projects, it may be evaluated for use.

2.3 Alternatives Considered in Detail

Alternative 1 - No action

The no action alternative means no federal funding for any treatments. The state of Indiana may still complete some treatments at their discretion. The gypsy moth will reproduce and populations will begin to defoliate trees in the area. Gypsy moth populations will be allowed to develop and spread to surrounding areas.

Alternative 2 – Btk

This treatment option uses one or two applications of Btk at 24 to 38 cabbage looper units (CLU) per acre applied from air or ground. The applications would begin when leaf expansion is near 50% and when first and second instar caterpillars are present and feeding. This usually occurs between late April and late May in northern Indiana. The second application would follow no sooner than four days after the first application. Most commercial formulations of Btk are aqueous flowable suspension containing 48 or 76 CLU per gallon (Appendix D – Product Labels). For aerial application at 24 to 38 CLU, less than 3.0 quarts (3/4 gallon) of the product would be applied per acre.

Btk has been a commonly used treatment option in Cooperative Gypsy Moth Projects in Indiana and other states. Btk is a naturally occurring soil-borne bacterium that is mass-produced and formulated into a commercial insecticide. The Btk strain is effective against caterpillars, including the gypsy moth caterpillar. Caterpillars ingest Btk while eating the foliage. Once in the midgut, Btk becomes active and causes death within a few hours or days (USDA 2012a, Vol. II, App. A, p. 1). Btk may impact nontarget species of spring-feeding caterpillars in the treatment site, but the impact to the local population is usually very minimal as Btk rapidly degrades on the foliage within a few weeks, and the nontarget lepidopterans generally re-

colonize treatment sites in less than 2 years (USDA 2012a, Vol. II, Ch. 4, pp. 13 to 14). Human exposure to Btk provides little cause for concern, though direct exposure to the spray may cause temporary eye and respiratory tract irritation in a few people (USDA 2012a, Vol. II, Ch. 4, pp. 10 to 12).

Btk has proven effective at eliminating or reducing gypsy moth at all levels of population. Thus, Btk applications can meet the project objective of slowing the spread of gypsy moth at the proposed treatment sites.

Alternative 3 - Mating disruption.

This treatment option uses one aerial application of either pheromone flakes or Specialized Pheromone and Lure Application Technology (SPLAT) GM Organic with the active ingredient (disparlure), prior to the emergence of male moths. Application would occur in mid-June to early July. Mating disruption relies on the attractive characteristics of disparlure, the gypsy moth sex pheromone. The objective of mating disruption is to saturate the treatment area with enough pheromone sources to confuse the male moths and prevent them from finding and mating with female moths. Mating disruption is considered specific to gypsy moth and is not known to cause impacts to nontarget organisms (USDA 2012a, Vol. II, Ch. 4, pp. 19 to 20). Like other insect pheromones, disparlure is generally regarded as nontoxic to mammals, and no adverse effects are expected from exposure (USDA 2012a, Vol. II, Ch. 4, pp. 19).

Mating disruption using pheromone flakes involves the aerial application of plastic flake dispensers that are infused with the gypsy moth pheromone. The formulation of Disrupt II (see Appendix D – Product Labels) consists of small plastic flakes, approximately 1/32 inch x 3/32 inch (1 x 3 mm) in size, thus the name "pheromone flakes". A sticker, Micro-Tac, produced by Hercon is applied to the flakes as they are dispersed from the aircraft, which aids in the distribution of the flakes throughout all levels in the forest canopy where mating could potentially occur. The flakes are green in color and applied at a rate of 6 to 30 grams active ingredient (disparlure) per acre. Applications would most commonly be applied at either the 6 or 15 gram rate. At the rate of 15 grams, 85 grams of flakes (2 flakes per square foot) are applied with 2 fluid ounces of sticker per acre. All of the ingredients in the Micro-Tac sticker are considered non-hazardous to public health when used as an additive in the insecticide formulation (40 CFR 180.1001).

Mating disruption using SPLAT GM Organic involves the aerial application of amorphous polymer matrix droplets that are infused with the gypsy moth pheromone. The formulation of SPLAT GM consists of small waxy droplets, approximately 0.3 mm to 2.0 mm in size when released from a conventional aerial application system. The droplets are a grayish white in color and applied at a rate of 3 to 30 grams of active ingredient (disparlure) per acre (see Appendix D – Product Labels). Applications would most commonly be applied at a rate of either 6 or 15 grams (equivalent of approximately 1.2 teaspoons or 3.0 teaspoons) of pheromone per acre. All of the matrix ingredients are cleared as food safe by the FDA and are biodegradable.

Mating disruption has proven effective at eliminating or reducing gypsy moth at very low population levels for sites greater than 40 acres, and can meet the project objective of slowing the spread of gypsy moth at the proposed treatment sites.

Alternative 4 – Btk and/or Mating disruption (Preferred Alternative)

The use of this alternative provides flexibility to select Btk or mating disruption alone or in combination for each site based on the following criteria: 1) gypsy moth population level, 2) habitat type (urban, rural, open water or wetland), 3) nontarget organisms, 4) safety, and 5) cost and project efficiency. The use of this alternative can meet the objective of slowing the spread of gypsy moth at the proposed treatment sites.

2.4 Comparative Summary of Alternatives

Table 2. Summary of Environmental Consequences for Alternatives by Issues from Chapter 4.

	Issue 1 **Human Health & Safety**	**Issue 2** **Effects on Nontarget Organisms & Environmental Quality**	**Issue 3** **Economic and Political Impacts**	**Issue 4** **Likelihood of Success of the Project**
Alternative 1 No action	- No risk of an aircraft accident or pesticide spill. - No risk of Btk contact with humans. - Gypsy moth outbreaks will occur sooner along with the associated nuisance and health impacts to humans.	- No direct effect to nontarget organisms, including threatened and endangered species. - Future gypsy moth impacts will occur sooner, which includes defoliation and reduction in the oak component of forest stands.	- Regulatory action would occur sooner with implementation of quarantines. - Spread of gypsy moth through these counties and into adjacent counties would not be slowed. - Suppression projects and negative financial impacts from defoliation would occur sooner.	- The spread of gypsy moth would not be slowed at the treatment sites and the project objective would not be met.
Alternative 2 Btk	- Slight risk of aircraft accident and pesticide spill. - Contact with Btk may cause mild and temporary irritation (eye, skin & respiratory) to a few susceptible people. - Delay effect of gypsy moth outbreaks on humans.	- Direct impact on spring feeding caterpillars, temporary reduction in local populations. - No effect on Karner blue butterfly and Mitchell's satyr as neither species is known to occur within the proposed Btk sites. - Not likely to adversely affect Indiana bat or monarch butterfly. - Delay the impact of gypsy moth defoliation on environmental quality.	- Regulatory action would not be implemented in these counties during the current year. - Slows the spread of gypsy moth.	- Success is likely in the treatment sites.
Alternative 3 Mating disruption	- Slight risk of aircraft accident. - No effect to human health. - Delay effect of gypsy moth outbreaks on humans.	- No effect to nontarget organisms, including any threatened and endangered species known to occur within the sites. - Delay the impact of gypsy moth defoliation on environmental quality.	- Regulatory action would not be implemented in these counties during the current year. - Slows the spread of gypsy moth.	- Success is likely in treatment sites with very low populations.
Alternative 4 Btk and/or Mating disruption	- Same as alternative 2 or 3 depending on the treatment at each site.	- Same as alternative 2 or 3 depending on the treatment at each site.	- Regulatory action would not be implemented in these counties during the current year. - Slows the spread of gypsy moth.	- Success is likely in the treatment sites.

3.0 AFFECTED ENVIRONMENT

3.1 Description of the Proposed Treatment Sites

Huntington County

Huntington County is approximately 248,141 acres and 7,977 acres are in the proposed treatment sites. Thus a small portion of the county is proposed for treatment. Within the treatment sites, the tree canopy is estimated to be 70% in the Btk core area and 35% in the larger mating disruption area. The tree canopy acreage is the target for treatment.

Huntington MD 20:

The proposed treatment site contains 7,243 acres. The site is composed of trees associated with rural residences, rural suburbs, woodlots and a nature preserve. Oak, hickory, maple, tulip poplar, beech, cherry, pine, spruce and other hardwoods and shrubs are present. There are no schools within the site. Houses and businesses occur within the site. Churches and the Norwood Golf Course are within the site. Ponds and Clear Creek occur within the site. There is Acres Land Trust property (Pehkokia Woods) and also Izaak Walton League property in the southeastern portion of the site. Two locations of beehives registered on Driftwatch occur within a ¼ mile outside of the site boundary. Two water towers and two cell phone towers occur within the site or within a ¼ mile of the site boundary. This site was detected in 2009. The site was part of the 2010 Lagro-1 and Lagro-2 mating disruption treatment. One egg mass was detected in 2019 within this proposed site and a separate core treatment area with Btk is proposed for that smaller area of 734 acres, within this 7,243 acre site. Survey indicates a very low gypsy moth population for this site, and mating disruption is proposed for 2020.

Huntington Btk 20:

The proposed treatment site contains 734 acres. The site is composed of trees associated with rural residences, woodlots and a nature preserve. Oak, hickory, maple, tulip poplar, beech, cherry, pine, spruce and other hardwoods and shrubs are present. There are no schools within the site. Houses, businesses and churches occur within the site. Ponds and Clear Creek occur within the site. There is Acres Land Trust property (Pehkokia Woods) and also Izaak Walton League property in the southeastern portion of the site. Two locations of beehives registered on Driftwatch occur within a ½ mile outside of the site boundary. Two water towers and one cell phone tower occur within the site or within a ¼ mile of the site boundary. This site has had no prior treatment. One egg mass was detected in 2019 within this proposed site. Survey indicates a low gypsy moth population for this site, and Btk is proposed for 2020.

Marshall County

Marshall County is approximately 288,000 acres and 616 acres are in the proposed treatment site. Thus a small portion of the county is proposed for treatment. Within the treatment site, the tree canopy is estimated to be 48% of the individual site and is the target for treatment.

Green Twp MD 20:

The proposed treatment site contains 616 acres. The site is composed of trees associated with rural residences, woodlots and classified forests. Oak, white pine, white cedar, maple, sassafras and other hardwoods and shrubs are present. No schools are within the site. Houses occur within the site. Several ponds and associated wetlands occur within the site. A private airstrip occurs 1.2 miles west/northwest of the site. This site was detected in 2016. A Btk treatment was conducted to the northwest of this site in 2017. This site was also part of the 2018 Green Twp mating disruption site. No egg masses were detected in the site in 2019. Survey indicates a very low gypsy moth population, and mating disruption is proposed for this site in 2020.

Porter County

This county is approximately 334,080 acres and 270 acres are in the proposed treatment site. Thus a small portion of the county is proposed for treatment. Within the treatment site, the tree canopy is estimated to be 25% of the individual site and is the target for treatment.

Westville Btk 20:

The proposed treatment site contains 270 acres. The site is composed of trees associated with rural residences and woodlots. White oak, red oak, maple, black cherry, walnut and other hardwoods and shrubs are present. Houses and businesses are within the site. No schools occur within the site. Ponds occur within the site. Morraine Nature Preserve is just outside the site boundary to the southeast. There is a high power line that runs along the southeast corner of the site. The site was detected in 2010 and was part of the 350 East-1 mating disruption site and 350 East Btk site in 2011. The site was also part of the 2014 Westville mating disruption site. Three egg masses were detected in the site in 2019. Survey indicates a low gypsy moth population, and Btk is proposed for this site in 2020.

3.2 Threatened and Endangered Species

Consultation with the staff of the U.S. Fish and Wildlife Service (USFWS) determined that, spraying with *Bacillus thuringiensis* (Btk) is of concern for 2 federally endangered species of Lepidoptera in Indiana, the Karner blue butterfly (*Lycaeides melissa samueulis*) and Mitchell's satyr butterfly (*Neonympha mitchelii*). USFWS has determined that, "Neither of these species occur within the 2 locations where Btk treatments are proposed." (Appendix C – Letter from U. S. Fish & Wildlife Service).

USFWS has initiated a status review of the monarch butterfly (*Danaus plexippus plexippus*) for possible listing under the Endangered Species Act. USFWS has determined that, "it appears unlikely that monarch butterfly larvae would be present during the spray (Btk) periods." (Appendix C – Letter from U. S. Fish & Wildlife Service).

In review of the endangered Indiana bat (*Myotis sodalist*) the USFWS determined that "it is possible that under some circumstances extensive elimination of lepidopterans over a large habitat area has the potential to adversely affect the food base of an Indiana bat nursery colony." This species has been found within all of the treatment counties, including within the specific treatment sites in Marshall and Porter counties (Appendix C – Letter from USFWS).

The northern long-eared bat (NLEB) (*Myotis septentrionalis*) is listed as threatened. The USFWS states NLEB is found in all the treatment counties; a portion of the Marshall County mating disruption site is within a 3-mile radius of an NLEB capture site (the USFWS assumes that a colony site may be anywhere within a 3-mile radius of an NLEB capture location) (Appendix C – Letter from U. S. Fish & Wildlife Service).

Other federally threatened and endangered species of concern were reviewed, but USFWS determined that "the federally assisted 2020 gypsy moth program is not likely to adversely affect any of these federally listed species" (Appendix C – Letter from U. S. Fish & Wildlife Service).

The USFWS noted that Pehkokia Woods, a nature preserve owned and managed by ACRES Land Trust, Inc., is entirely within the Btk treatment area in Huntington County. It was requested that ACRES be contacted and informed of the proposed treatments.

The IDNR, Division of Nature Preserves does not anticipate any impacts to the nature preserve, communities, or plant species as a result of this project (Appendix C – Letter from IDNR, Division of Fish and Wildlife).

The IDNR, Division of Fish & Wildlife determined that "Impacts to the American badger or its preferred habitat are unlikely as a result of this project" (Appendix C – Letter from IDNR, Division of Fish and Wildlife).

The letters of request for consultation to these agencies are on file in the IDNR administrative record.

3.3 Protection of Historic Properties

The State Historic Preservation Officer did not identify any historic properties that will be altered, demolished, or removed by the proposed project pursuant to Indiana Code 14-21-1. (Appendix C –Letter from IDNR, Division of Historic Preservation and Archaeology).

4.0 ENVIRONMENTAL CONSEQUENCES

This section is the scientific and analytic basis for the comparison of alternatives. It describes the probable consequences (effects) of each alternative for each issue. Environmental consequences are summarized in Table 2 for each combination of the alternatives and issues.

4.1 Human Health and Safety (Issue 1).

Alternative 1 – No action.

For this alternative, there would be no cooperative project, therefore risk of human contact with mating disruption or Btk and an aircraft accident during application would not exist. However, future impacts by gypsy moth to human health will occur sooner under Alternative 1 if treatments are not used to slow the spread of these gypsy moth populations. Gypsy moth outbreaks have been associated with adverse human health effects, including skin lesions, eye irritation, and respiratory reactions (USDA 2012a, Vol. IV, App. L, pp. 3-1 to 3-4). Gypsy moth caterpillars can become a serious nuisance that can cause psychological stress or anxiety in some individuals (USDA 2012a, Vol. IV, App. L, pp. 3-4 to 3-5).

Alternative 2 - Btk.

A detailed analysis of the risks posed to humans by Btk, called Human Health Risk Assessment, was conducted for the Final SEIS (USDA 2012a, Vol. III, App. F., pp. 3-1 to 3-32). Human exposure to Btk provides little cause for concern about health effects. "There is no information from epidemiology studies or studies in experimental mammals to indicate Btk will cause severe adverse health effects in humans under any set of plausible exposure conditions" (USDA 2012a, Vol. III, App. F, p. 3-19). The only human health effects likely to be observed after exposure to Btk involve irritation of the skin, eyes, or respiratory tract (USDA 2012a, Vol. III, App. F, p. 3-19 to 3-32). "Given the reversible nature of the irritant effects of Btk and the low risks for serious health effects, cumulative effects from spray programs conducted over several years are not expected" (USDA 2012a, Vol. III, App. F, p. 3-32). Glare and O'Callaghan (2000) provide a comprehensive review of *Bacillus thuringiensis*, including Btk, and they conclude with this statement, "After covering this vast amount of literature, our view is a qualified verdict of safe to use."

A slight risk of an accident always exists when conducting aerial applications. Btk uses one or two applications for slow the spread. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, Btk loading, and conditions for safe applications.

The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

Alternative 3 – Mating disruption.

A detailed analysis of the risks posed to humans by mating disruption, called Human Health Risk Assessment, was conducted (USDA 2012a, Vol. III, App. H, pp. 3-1 to 3-10). The toxicity of insect pheromones to mammals is relatively low, and their activity is target-specific. Therefore,

the EPA does not foresee negative effects on humans and requires less rigorous testing of these products than of conventional insecticides. Once absorbed through direct contact, disparlure is very persistent in humans, and individuals exposed to disparlure may attract adult male moths for prolonged periods of time. This persistence is viewed as a nuisance and not a health risk (USDA 2012a, Vol. III, App. H, pp. 3-9). In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 2012a, Vol. III, App. H, pp. 4-1 to 4-8) therefore no effects to human health are anticipated.

A slight risk of an accident always exists when conducting aerial applications. Mating disruption uses one application. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, product loading, and conditions for safe applications.

The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

Alternative 4 – Btk and/or Mating disruption.

The human health and safety consequences stated above for Alternatives 2 and 3 apply to this alternative.

4.2 Effects on Nontarget Organisms and Environmental Quality (Issue 2).

Alternative 1 – No action

The "no action alternative" would likely result in a more rapid build-up of gypsy moth populations and defoliation of susceptible forested areas, especially oak and aspen dominated forests. In other parts of the northeastern U.S., gypsy moth outbreaks have changed the structure of some forest ecosystems by killing a portion of the oak component and encouraging tree species that gypsy moth caterpillars avoid, such as red maple (USDA 2012a, Vol. II, Ch.4, pp. 4 to 5). Gypsy moth outbreaks in North America have not resulted in widespread loss of oak, rather a subtle change in many locations towards a more mixed forest (USDA 2012a, Vol. II, Ch.4, p. 5). In Indiana forests, maples and beech should become more prevalent as gypsy moth caterpillars focus their feeding on oaks. The effects of defoliation depend on many factors, including defoliation severity, frequency, timing, tree health and vigor, and the role of secondary organisms, including insects and pathogens (USDA 2012a, Vol. IV, App. L, p. 4-5). Gypsy moth infestations generally result in tree mortality losses of less than 15% of total basal area, but in some cases can exceed 50% (USDA 2012a, Vol. IV, App. L, p. 4-6).

Gypsy moth defoliation and subsequent tree mortality (especially oak trees) caused by the feeding of millions of caterpillars has a variety of impacts on the environment. Some of these changes are detrimental to certain species and favorable to others during and after gypsy moth outbreaks. Defoliation can result in changes to soil condition, microclimate, water quality, water yield, acorn production, and other environmental factors due to the loss of leaf tissue, the waste material produced by large number of feeding caterpillars, and the tree mortality that can follow outbreaks (USDA 2012a, Vol. II, Ch. 4, pp. 4 to 7). Some species of mammals, birds, terrestrial invertebrates, fish and aquatic invertebrates are negatively impacted by gypsy moth related

feeding (USDA 2012a, Vol. II, Ch. 4, pp. 7 to 9). As an example, acorn production can drop during and immediately following an outbreak and this can reduce populations of white-footed mice (USDA 2012a, Vol. II, Ch. 4, p. 8). On the other hand, dead trees favor some species of birds that use dead wood as nesting sites or that feed on wood or bark infesting insects that thrive in dead and dying trees (USDA 2012a, Vol. II, Ch. 4, p. 8).

With Alternative 1 (No action), localized defoliating populations are expected on oak trees at the proposed treatment sites.

Alternative 2 - Btk

Using Btk is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites thus keeping populations from expanding and causing defoliation. However, in the long-term, gypsy moth will likely become more widely distributed in Indiana even if this alternative is followed.

Btk may indirectly help in maintaining existing forest conditions, water quality, microclimate, and soil condition by delaying gypsy moth population increases (USDA 2012a, Vol. II, Ch. 4, p. 10). The ecological risk assessment of the effects of Btk on nontarget organisms states that adverse effects due to Btk are unlikely in mammals and birds (USDA 2012a, Vol. III, App. F, pp. 4-2 to 4-3). The effects of Btk on birds, plants, soil microorganisms, or soil invertebrates other than insects are not of plausible concern (USDA 2012a, Vol. III, App. F, pp. 4-3 to 4-8). The Environmental Protection Agency classifies Btk as virtually nontoxic to fish (USDA 2012a, Vol. III, App. F, p. 4-8). No toxicity data are available on amphibians, though other strains of Btk appear to have low toxicity to this group (USDA 2012a, Vol. III, App. F, p. 4-9). Btk does not harm garden plants. In fact, it is a common garden insecticide against caterpillars such as the cabbage looper.

Btk has been shown to be toxic to several species of target and nontarget Lepidoptera (USDA 2012a, Vol. III, App. F, pp. 4-3 to 4-6). Btk selectively kills members of the insect order Lepidoptera that are actively feeding as caterpillars at or soon after the period of application, though not all non-target Lepidoptera are as sensitive to Btk as is gypsy moth (USDA 2012a, Vol. III, App. F, pp. 4-4 to 4-6). Outside of the Lepidoptera, the negative impact of Btk on other insect orders is minor (USDA 2012a, Vol. III, App. F, pp. 4-6 to 4-7). It is, therefore, more "selective" than many insecticides that kill a wider array of insects. However, concerns still exist over its possible negative impact on native caterpillars, which may occur in the proposed treatment areas.

The use of Btk is likely to maintain the forest condition in the short term by eliminating or reducing gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long term, gypsy moth will become established in these counties even if this alternative is implemented.

Alternative 3 – Mating disruption

Mating disruption using disparlure is likely to maintain the forest condition in the short-term (5 to 10 years) by eliminating gypsy moth populations in the treatment site thus keeping

populations from expanding and causing defoliation. However, in the long-term (10 to 15 years), gypsy moth will likely become more widely distributed in Indiana even if this alternative is followed.

Disparlure may indirectly help in maintaining existing forest conditions, water quality, microclimate, and soil condition (USDA 2012a, Vol. II, Ch. 4, p. 19) by delaying gypsy moth population increases. The ecological risk assessment states that disparlure has a very low toxicity to mammals and birds (USDA 2012a, Vol. III, App. H, pp. 4-1 to 4-2). In addition, it is not likely to cause toxic effects in aquatic species (USDA 2012a, Vol. III, App. H, pp. 4-3 to 4-5). One study found that disparlure caused unusually high mortality in water fleas (*Daphnia*). Later it was determined that the mortality was due to physical trapping in undissolved disparlure of the organisms at the water surface, not due to toxicity (USDA 2012a, Vol. III, App. H, pp. 4-4 to 4-8). This is an experimental artifact and is not likely to be encountered under operational use.

Disparlure is a pheromone component for some other species (USDA 2012a, Vol. III, App. H, pp. 2-1 to 2.2), and could disrupt mating in some other species of moths (nun moth, pink gypsy moth) in the genus *Lymantria* (USDA 2012a, Vol. III, App. H, p. 4-2). All of these species are Asian or Eurasian, and are not known to occur in North America. There is no basis for asserting that mating disruption would occur in other nontarget species in North America, including nontarget insects, specifically native Lepidoptera.

Treatments with mating disruption are likely to maintain the forest condition in the short term by eliminating or reducing gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long term, gypsy moth will become established in these counties even if this alternative is implemented.

Alternative 4 – Btk and /or mating disruption

The nontarget and environmental consequences stated above for Alternatives 2 and 3 apply to this alternative.

4.3 Economic and Political Impacts of Treatment vs. Non-Treatment (Issue 3)

Alternative 1 – No action

If no treatments were applied, the likely action would be to implement quarantine in these counties during the next year. Quarantine would regulate movement of firewood, logs, other timber products, mobile homes, recreational vehicles, trees, shrubs, Christmas trees, and outdoor household articles. This would create a financial impact to industries that deal with these products.

If current populations are not treated, they will continue to reproduce and grow in size. Defoliation would become noticeable in the future, but it would be difficult to predict exactly when noticeable defoliation would occur. Requests for federal assistance to suppress gypsy moth would be likely when defoliation occurs. Suppression projects are generally more expensive in total dollars than slow the spread projects because much larger areas are treated.

The economic impact to state budgets and affected property owners would increase, as responsible agencies would need to administer and fund these suppression projects, and these type of projects are often cost shared with the property owners.

Following defoliation, negative financial impacts are likely to occur for recreational industries such as resorts and campgrounds. Homeowners, private woodland owners, and forest based industries could be impacted by gypsy moth treatment costs, tree mortality, and adverse human health effects. The economic impact of no action would allow gypsy moth infestations to greatly advance ahead of the Transition Area (the area between infested areas and noninfested areas), thus devaluing the Slow The Spread Program accomplishments, and shift the STS line and infestations much further south.

Alternatives 2 (Btk), 3 (Mating disruption), and 4 (Btk and/or Mating disruption)

If treatments are applied, regulatory action is not likely for Marshall and Huntington counties during the next year and the impacts listed under Alternative 1 would be delayed for all three counties. Gypsy moths have not yet infested the areas proposed for treatment and this alternative corresponds with the national strategy for managing gypsy moth in these areas.

Economic analysis for this site-specific assessment show the Benefit-Cost Ratio is 25:1 (Economic Analysis document is in the IDNR Administrative File).

The proposed treatment sites have been determined based on results from gypsy moth surveys using STS protocols. The proposed treatment itself will have minimal effects, and it will not have disproportionate effects to any minority or low-income population. Aerial application of a pesticide may be controversial in the public arena. Through public outreach and scoping, the project provides information on the treatments concerning human health and environmental quality to residents within and near the proposed treatment sites. Also political leaders are consulted about the project and kept informed throughout the planning and application.

4.4 Likelihood of Success of the Project (Issue 4)

Alternative 1 – No action

The project objective would not be met with this alternative. Gypsy moth would not be eliminated from the treatment sites, and its population would serve as a source for increased spread within the counties and into surrounding counties. If these populations were allowed to increase and expand, gypsy moth could spread through the state in 10 years (Sharov et al. 2002).

Alternative 2 – Btk

Project success is likely with this alternative. Btk has proven effective at eliminating or reducing gypsy moth at all population levels.

Alternative 3 – Mating disruption.

Project success is likely with this alternative in two treatment sites with very low gypsy moth populations. However, two sites have gypsy moth populations above the recommended level for treatment with mating disruption.

Alternative 4 – Btk and/or mating disruption

Project success is optimized with this alternative when treatment selection criteria are used to determine the use of Btk or mating disruption alone or in combination for the site. From the data analysis by the STS program, the average rate of spread in Indiana during 2016-2019 was calculated to be -1.15 miles per year (Economic Analysis, Cooperative STS Gypsy Moth Project for Indiana – 2020). Thus the STS treatments have been very successful in reducing the rate of spread compared to the program target of less than 4.8 miles/year. Treatment selection criteria used to evaluate each site are: 1) gypsy moth population level, 2) habitat type (urban, rural, open water or wetland), 3) nontarget organisms, 4) safety, and 5) cost and project efficiency.

4.5 Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources results in the permanent loss of: 1) nonrenewable resources, such as minerals or cultural resources; 2) resources that are renewable only over long periods of time, such as soil productivity; or 3) a species (extinction) (USDA 1995, Vol. II, p. 4-93). For Alternatives 2, 3 and 4 there is an irreversible commitment of labor, fossil fuel, and money spent on the project.

An irretrievable commitment of resources is one in which a resource product or use is lost for a period of time while managing for another (USDA 1995, Vol. II, p. 4-93). No irretrievable commitments were identified for any alternative.

4.6 Cumulative Effects

Cumulative impacts are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The total cumulative impacts are determined by analyzing the direct and indirect effects of the proposed action.

(a) Direct effects, which are caused by the action and occur at the same time and place.

(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Effects and impacts as used in these regulations are synonymous (40 CFR 1508.8).

The site specific analysis of this environmental assessment is tiered to the programmatic EIS and SEIS and documented in accordance with the National Environmental Policy Act (NEPA) implementing procedures (USDA 2012b, ROD, p. 2). The purpose of tiering is to eliminate repetitive discussions of the issues addressed in the SEIS (40 CFR, 1502.20 and 1508.28 in Council on Environmental Quality, 1992).

One of the four proposed treatment sites have had no prior treatment.

Three of the four proposed treatment sites have had partial treatment in prior years. The Huntington MD 20 site was part of the 2010 Lagro-1 and Lagro-2 mating disruption sites. The Green Twp 20 site was part of the 2018 Green Twp mating disruption site. The Westville Btk 20 site was part of the 350 East-1 mating disruption and 350 East Btk site in 2011. The site was also part of the 2014 Westville mating disruption site.

Btk treatments applied to a large area for 3 consecutive years may cause delays in Lepidoptera populations recolonizing the area and may have greater impacts on some species with very small habitats (USDA 2012a. Vol. II Ch. 4 p. 13). Thus, if this project is implemented, Btk treatments will not be occurring in 3 consecutive years or have much overlap of Btk treated area from year to year. Therefore, a conclusion of "no cumulative effects" is made for this proposed project.

4.7 Other Information

Mitigation

The Cooperative Gypsy Moth Project will implement the following safeguards and mitigations:

- News releases of treatments and dates will be given to local newspapers and radio/TV stations.
- Implementation of a Work and Safety Plan.
- Local safety authority will be notified by direct contact or phone calls.
- Prior to treatments, IDNR staff will communicate with private helipads and airports when application aircraft will be flying over the treatment sites.
- Prior to treatments, IDNR staff will communicate to and consult with aerial applicator any aerial hazards (cell towers, etc.) and environmental concerns (T&E species locations, water, etc.) in and outside each treatment site to avoid.
- Employees of state and federal agencies monitoring the treatment will receive training on treatment methods to be able to answer questions from the public.
- Application of Btk will be suspended when school buses are in a treatment site or when children are outside on school grounds.
- Aircraft will be calibrated for accurate application of treatment material.
- Applications will be timed so the most susceptible gypsy moth stage is targeted.
- Weather will be monitored during treatment to ensure accurate deposition of the treatment material.
- The wind speeds during the application will be monitored by IDNR personnel and the aerial applicator will maintain the application within the boundaries of the proposed treatment sites.
- Treatment will be avoided or stopped if winds are above the guidelines stated in the Work and Safety Plan.

- Treatments will be stopped if drones are identified in a treatment site until the flight area is clear.

Monitoring

During the treatments, ground observers and/or aerial observers will monitor the application for accuracy within the site boundaries, swath width, and drift. Application information (e.g. swath widths, spray-on and spray-off, acres treated, and altitude) will be downloaded to an operations-base computer.

The treatment sites will be monitored and reviewed, post-treatment, to determine the effectiveness of the treatments.

5.0 LIST OF PREPARERS & REVIEWERS

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Scott Pruitt, Field Supervisor, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, IN 47403. Consultation on threatened and endangered species.

Christie Stanifer, Environmental Coordinator, Environmental Unit, IDNR Division of Fish and Wildlife, 402 West Washington Street, Room W273, Indianapolis, IN 46204. Consultation with Christie Stanifer and other staff on Natural Heritage Program data and IDNR, Division of Fish and Wildlife concerns within the proposed project.

Kristy Stultz, Nursery Inspector and Compliance Officer, IDNR Entomology and Plant Pathology, 402 West Washington Street, Room W290, Indianapolis, IN 46204. Consultation on treatment sites and the proposed project.

Beth K. McCord, Director, IDNR Division of Historic Preservation and Archaeology, 402 West Washington Street, Room W274, Indianapolis, IN 46204. Consultation on historical properties of concern.

7.0 REFERENCES CITED

Council on Environmental Quality. 40 CFR Part 1500-1508.

Glare, T.R. and M. O'Callaghan. 2000. Bacillus thuringiensis: Biology, Ecology and Safety. John Wiley & Sons, Ltd. New York, 350 pp.

Gypsy Moth Slow the Spread Foundation, Inc. www.gmsts.org

National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190), USC 4321 et.seq.

Sharov, Alexi. A., et. al. 2002. "Slow the Spread", A National Program to Contain the Gypsy Moth. Journal of Forestry, 100(5):30-35.

Sills E.O. 2007. Assessment of the economic feasibility of the gypsy moth Slow the Spread project. Final Report to USDA Forest Service State and Private Forestry, Grant No. NC-06-DG-11244225-337, Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, North Carolina, 30 pp.

Thorpe, Kevin, et al. 2006. A Review of the Use of Mating Disruption to Manage Gypsy Moth, *Lymantria dispar* (L.) USDA, Forest Service, FHTET-2006-13, 76 pp.

Tobin, P.C. and L. M. Blackburn (eds.) 2007. Slow the Spread: A national program to manage the gypsy moth. USDA Forest Service Gen. Tech. Rpt. NRS-6, 109 pp.

USDA. 1990. USDA Departmental Gypsy Moth Policy.

USDA Forest Service Handbook (FSH 2109.14, section 71.3)

USDA. 1995. Gypsy Moth Management in the United States: A Cooperative Approach. Final Environmental Impact Statement, Vols. I-V. USDA-Forest Service and USDA-APHIS.

USDA. 1996. Gypsy Moth Management in the United States: A Cooperative Approach. Record of Decision. USDA-Forest Service and USDA-APHIS.

USDA. 2012a. Gypsy Moth Management in the United States: A Cooperative Approach. Final Supplemental Environmental Impact Statement, Vols. I – V. USDA-Forest Service and USDA-APHIS. NA-MB-01-12.

USDA. 2012b. Gypsy Moth Management in the United States: A Cooperative Approach. Record of Decision. USDA-Forest Service and USDA-APHIS.