

Cooperative Gypsy Moth Eradication Program Snohomish County, Washington State

ENVIRONMENTAL ASSESSMENT

April 7, 2020

Prepared by

Washington State Department of Agriculture- Plant Protection Division-
Pest Program

In cooperation with

United States Department of Agriculture- Animal and Plant Health Inspection Service-
Plant Protection and Quarantine



Washington
State Department of
Agriculture



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1.0 INTRODUCTION

The Washington State Department of Agriculture (WSDA), in cooperation with the United States Department of Agriculture-Animal and Plant Health Inspection Service (USDA-APHIS) proposes to take action to eradicate isolated infestations of gypsy moth in two areas of Snohomish County, Washington State.

There are two types of gypsy moth—the European (also known as North American) and the Asian. The European gypsy moth (*Lymantria dispar*) (EGM) is established in the eastern half of the United States, and defoliates an average of 700,000 acres each year, causing millions of dollars in damage. The Asian gypsy moth (AGM) (including *Lymantria dispar asiatica*, *Lymantria dispar japonica*, *Lymantria albescens*, *Lymantria umbrosa*, and *Lymantria postalba*) is an exotic pest not known to occur in the United States. It is similar to the EGM, but AGM larvae feed on a much broader range of plant species. The EGM has more than 250 known host plants and prefers oak, while the AGM has a host range of 500 host plants covering more than 100 plant families, and feeds on plant species such as larch, oak, poplar, alder, willow, and some evergreens. Another difference between the two gypsy moths is that female AGM can fly 20-25 miles, while EGM females cannot. The broad range of possible host plants, combined with the female's ability to fly long distances, could allow AGM to spread rapidly (APHIS, 2015).

Gypsy moth egg masses may be found on tree trunks, limbs, or leaves, as well as on stones, walls, logs, lawn furniture, and other outdoor objects. Each egg mass can contain hundreds to more than 1,000 eggs. The mass is covered with buff or yellowish fuzz made from the female's body hair. The egg masses average 1½ inches long and 0.75 of an inch wide. Eggs begin hatching in the spring. All of the damage caused by gypsy moths happens during the caterpillar stage, as the insects feed on leaves during this active period of growth. Once caterpillars stop feeding, they enter the pupal stage. This stage typically begins in June or July. Because egg hatch and pupation depend on weather and temperature, they may occur earlier or later in different areas. Adult moths emerge from their dark brown pupal cases in 10 to 14 days. Gypsy moths do not feed in the moth stage (which lasts 1 to 3 weeks); they only mate and lay eggs. Eggs are laid between June and September, depending on weather and location. The eggs remain dormant during the winter and develop and hatch the following spring (APHIS, 2015).

The European strain of gypsy moth was accidentally released in Medford, Massachusetts in 1869. Since that time, the EGM has spread throughout New England, and is now established throughout 20 states, the District of Columbia, and parts of Canada. Those areas now face costly suppression programs, habitat loss, and a decreased quality of life. The Asian strain of gypsy moth is not established in North America. However, a recent global analysis of AGM and international shipping found that in the United States, more than half of international ships (approximately 18,000 ships) arrive to climatically suitable ports (Paini, Mwebaze, Kuhnert *et al.*, 2018). Establishment of AGM would have similar effects to EGM establishment; however, those effects would be at a substantially higher degree.

Since the inception of WSDA's gypsy moth trapping program in 1974, EGM has been detected every year with the exceptions of 1975 and 1976. Asian gypsy moth has been detected in 1991,

1993-1997, 1999, 2015, 2018, and 2019. Gypsy moth is introduced to Washington State through a number of pathways including: visitors (automobiles, RVs), relocation (outdoor furniture etc.), international trade (shipping activities), firewood, and rail cars from infested areas of the United States. For over 40 years, WSDA has successfully detected new introductions of the European and Asian gypsy moth, and successfully eradicated all reproducing populations.

2.0 PURPOSE AND NEED FOR ACTION

The purpose of the proposed action will be to prevent the establishment and spread of the gypsy moth. The target of the proposed eradication is the Asian gypsy moth, more specifically, the Hokkaido gypsy moth (*Lymantria umbrosa*), which was detected for the first time in the United States during WSDA's 2019 summer trapping program. European gypsy moths, which tested positive for Asian gypsy moth genetic traits, will also be targeted as part of this eradication program. The proposed action will be designed to give the project the best chance for achieving the goal of eradicating the gypsy moth introductions, while minimizing risks to human health and detrimental environmental consequences. Action needs to be taken in order to avoid the adverse economic, social, and ecological effects associated with large-scale gypsy moth infestations. Purposed action would be taken after evaluating treatment options available in the USDA Forest Service and APHIS 1995 Final Environmental Impact Statement (FEIS) for "Gypsy Moth Management in the United States: A Cooperative Approach" and 2012 Final Supplemental Environmental Impact Statement (FSEIS).

The proposed treatment sites are located in Woodway and the Boulevard Bluffs areas of Snohomish County (see **Appendix B** for maps). During the WSDA's 2019 summer trapping program, one adult male from a species of AGM (Hokkaido gypsy moth) was detected in a trap in Woodway. This was the first recorded detection of the Hokkaido gypsy moth in the United States. Three European gypsy moths, which after DNA analysis were found to display Asian gypsy moth genetic traits, were detected in the Boulevard Bluffs area. See **Appendix C** for further information on 2019 summer trapping and DNA analysis (Pahs, 2020).

Treatments available for eradication projects include: biological insecticides *Bacillus thuringiensis* var. *kurstaki* (Btk) and the gypsy moth nucleopolyhedrosis virus (Gypchek®); chemical insecticides diflubenzuron (Dimilin®) and tebufenozide (Mimic®); and treatments employing mass trapping, mating disruption, and sterile insect release techniques. A detailed description of these treatment options and the decision making process can be found in Section 3 of this Environmental Assessment (EA).

2.1 Related Documents

This EA is tiered to the FEIS and FSEIS in accordance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code (U.S.C.) § 4231 et seq.), the Council on Environmental Quality NEPA (40 Code of Federal Regulations (CFR) part 1500 et seq.) and APHIS' NEPA implementing regulations (7 CFR part 372). This EA provides the basic background information necessary for the site-specific analysis of the potential environmental effects of WSDA's proposed 2020 Cooperative Gypsy Moth Eradication Program. The FEIS,

FSEIS, and this site-specific EA jointly constitute the environmental analysis and documentation required under NEPA.

Additional environmental analysis and documentation has been prepared to satisfy Washington State requirements under Chapter 43.21c of the Revised Code of Washington (RCW) (State Environmental Policy Act or SEPA), and Chapter 197-11 of the Washington Administrative Code (WAC) (SEPA rules).

Copies of the FEIS, FSEIS, EA, and SEPA checklists are available for review at:

- Washington State Department of Agriculture <https://agr.wa.gov/departments/insects-pests-and-weeds/gypsy-moth/control-efforts>
- Washington State Library
6880 Capitol Blvd. S., Tumwater, WA 98501
- Lynnwood Library-Sno-Isle Libraries
19200 44th Ave. W., Lynnwood, WA 98036

2.2 Decisions Made

There were three decisions made during the evaluation of this cooperative gypsy moth control project. The first decision made was to propose a gypsy moth control project (the absence of a control project is a **no-action alternative**). The second decision made was to tier this EA to the USDA 1995 FEIS and 2012 FSEIS. The third decision made was which tools would be used for the program areas.

2.3 Authorizing Laws and/or Policies

2.3.1 State Authorizing Laws

WSDA has authority under Chapter 17.24 of the Revised Code of Washington (RCW), Insect Pests and Plant Diseases, to eradicate or control insect pests that may endanger the agricultural and horticultural industries in the state of Washington.

2.3.2 Federal Authorizing Laws

The USDA is authorized to manage activities related to the gypsy moth for the Federal government. Two USDA agencies, the Forest Service and APHIS share this responsibility. Agency authorities are found in 7 CFR 2.8(a)(36) and 7 CFR 2.6(a)(38).

2.3.3 Environmental Laws and Other Regulations

Many environmental laws, authorities and Executive Orders (EO) of the President influence how actions to manage pests, including the gypsy moth, are implemented at the site-specific level. Such laws include the National Environmental Policy Act (NEPA); the Washington State Environmental Policy Act (SEPA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); the Clean Water Act (CWA); the Endangered Species Act (ESA); the Magnuson-Stevens Fishery Conservation and Management Act (MSA); the National Historical Preservation Act (NHPA); EO 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”; EO 13045, “Protection of Children from Environmental Health Risks and Safety Risks”; and EO 13175, “Consultation and Coordination with Indian Tribal Governments”.

3.0 TREATMENT ALTERNATIVES

3.1 Treatment Alternatives Considered

This EA is tiered to the USDA’s 1995 FEIS and 2012 FSEIS. Strategies described in those documents depend upon the infestation status of the area: generally infested, transition, or uninfested. The three strategies of suppression, eradication, and slow the spread-or their absence--are included in the six alternatives described in the FEIS. The sixth alternative is the preferred alternative presented in the FEIS. The sixth alternative is comprised of all three strategies. Based on the infestation status of “no established population” Washington State’s strategy in 2020 will be eradication.

WSDA, in cooperation with USDA-APHIS, is proposing to implement an Integrated Pest Management (IPM) program to eradicate gypsy moth in Washington State. WSDA evaluates eradication options upon detection of an Asian gypsy moth(s), European gypsy moth(s) testing positive for Asian gypsy moth genetic traits, or evidence of an isolated reproducing gypsy moth population. IPM includes selecting those options and techniques that give the best chance of meeting the project goal of eradication. The FEIS and FSEIS contain a range of alternatives from which WSDA has selected an IPM strategy. Treatment alternatives detailed in the FEIS and FSEIS include:

3.1.1 *Bacillus thuringiensis var. kurstaki* (Btk). This is a biological insecticide containing the bacterium Bt. The insecticide is effective primarily against caterpillars of many species of Lepidoptera (moths and butterflies).

3.1.2 Diflubenzuron (Dimilin®). This is an insect growth regulator that interferes with the growth of some immature insects.

3.1.3 Tebufenozide (Mimic®). This is an insect growth regulator that controls molting in various insects.

3.1.4 Gypsy moth virus (Gypcheck®). This is a nucleopolyhedrosis virus which occurs naturally and is specific to gypsy moth. Gypcheck® is an insecticide product made from the gypsy moth nucleopolyhedrosis virus.

3.1.5 Mass trapping. This treatment technique consists of deploying large numbers of pheromone traps used to attract the male gypsy moth and prevent them from mating with females, thereby causing a population reduction.

3.1.6 Mating disruption. This treatment technique consists of applying tiny plastic flakes or beads containing disparlure, a synthetic gypsy moth sex pheromone. The pheromone confuses male gypsy moths and prevents them from locating and mating with females.

3.1.7 Sterile insect technology. This treatment technique consists of an aerial release of a large number of sterile male gypsy moths; reducing the chance that female moths will mate with fertile males. The result is progressively fewer and fewer fertile egg masses being produced, and eventual elimination of the population.

After evaluating treatment options available in the FEIS and FSEIS, WSDA proposes three aerial applications of the insecticide *Bacillus thuringiensis* var. *kurstaki* (Btk) to 1,311 acres of vegetation at the core of the 2019 detections (672 acres in Woodway and 639 acres in the Boulevard Bluffs area). The Btk applications will target young gypsy moth caterpillars (2nd instar) shortly after egg hatch in mid-late April and early May, 2020.

3.2 Alternatives Considered and Eliminated

The following treatment options were considered and not selected due to environmental or efficacy concerns.

1. The no action alternative was dismissed at the Woodway site due to the detection of an AGM species which previously had never been detected in the United States. At the Boulevard Bluffs site, the no action alternative was dismissed due to multiple detections of EGM which displayed AGM genetic traits per DNA analysis.

2. Diflubenzuron (Dimilin®) is an insect growth regulator that has adverse impacts on a broader range of non-target species. While Btk primarily impacts moth and butterfly caterpillars, diflubenzuron may kill many other insects in addition to moth and butterfly caterpillars. Its use may adversely affect other insect populations, and therefore was not selected.

3. Tebufenozide (Mimic®) would have similar impacts as diflubenzuron, therefore it was also not selected.

4. Gypsy moth virus (Gypcheck®) is very host-specific but is not widely available on the market; it is generally used in combination with other treatments in suppression projects, but is still experimental for eradication programs, and therefore was not selected.

5. Mass trapping has been used with some success to eradicate isolated populations, but at other times has failed. It is best employed following larval pesticide treatments in small, isolated low-level populations.

6. Mating disruption is similar to mass trapping. It is best used in densely forested areas with isolated, low-level populations.

7. Sterile insect releases have been approved but have rarely, if ever, been used in gypsy moth eradication efforts.

3.3 Preferred Treatment Alternative

The WSDA and USDA-APHIS gypsy moth eradication IPM strategy proposed for 2020 is aerial application of the biological insecticide Btk (Foray® 48B, EPA Reg. No. 73049-427) (treatment alternative 3.1.1). Foray® 48B is approved for organic agriculture. Treatments will begin at Woodway and Boulevard Bluffs in mid-late April or early May, 2020. Three treatments will be conducted by fixed-winged aircraft, three to ten days apart. Each treatment of Btk will be made at the most effective label rate (64 fl. oz. / acre), and no treatments will be applied directly to aquatic areas. Exact timing of treatments will be dependent on foliage, early larval emergence, and larval emergence models, along with weather condition at the time. Treatments will be followed up by visual inspection and removal of egg masses, if found. High-density delimiting trapping will take place around the Woodway and Boulevard Bluffs sites during the summers 2020, 2021 and 2022.

This strategy will give the program the best chance of achieving the goal of eradication, while minimizing risks to human health and detrimental environmental consequences.

4.0 AFFECTED ENVIRONMENT

4.1 Site Descriptions (see Appendix B for maps of each site)

Woodway, Snohomish County

- Township/Range/Section: T27-0N R3-0E S25, S26, S35
- Size: 672 acres
- Zoning:
 - Suburban Residential (R-14.5)
 - Conservation (C)
 - Urban Restricted (UR)
 - Forest Residential Park (R-87)
 - Forest Residential Park (R-43)
- Proposed Site: Residential housing, community/city buildings, open space

- Vegetation: Mix of coniferous, deciduous, and ornamental trees
- Critical/Sensitive Areas: Deer Creek in the south and Willow Creek in the north discharge into Puget Sound. Several smaller, unnamed creeks also discharge into Puget Sound. A 2.4-acre, city owned, palustrine forested, seasonally flooded/saturated wetland is located in the southwest corner of the proposed site. There are also other small wetlands throughout the proposed site. In addition, the Olympic View Watershed around Deer Creek is a documented groundwater recharge area. There are also biodiversity areas and corridors in and around Deer Creek.

The proposed Woodway site will be treated under NPDES permit number WA0039047 issued to the WSDA by the Washington State Department of Ecology (ECY) for the purpose of invasive moth control.

- Historic Properties: There are no historic properties or tribal landmarks/historic properties within the proposed Woodway treatment block.
- Tribal Notification: A representative from the USDA-APHIS notified Tulalip, Stillaguamish and Sauk-Suitattle Tribes of Indians.
- Catch History: One AGM, the Hokkaido gypsy moth (*Lymantria umbrosa*) was detected in the summer of 2019. This was the first recorded detection of the Hokkaido gypsy moth in the United States.

Boulevard Bluffs, Snohomish County

- Township/Range/Section: T28-0N R4-0E S1, S2, S10, S11 and T29-0N R4-0E S35, S36
- Size: 639 acres
- Zoning:
 - Office and Industrial Park (M-1)
 - Suburban Residential (R-S)
 - Single Family Detached, Low Density Single Family Attached (R-1)
 - Single Family Detached, Medium Density Single Family Attached (R-2)
 - Multiple Family Low Density, Multiple Family Medium Density (R-3, R-3L)
- Proposed Site: Industrial, Single, and Multi-Family
- Vegetation: Mix of coniferous, deciduous, and ornamental trees
- Critical/Sensitive Areas: Four separate creeks and tributaries to those creeks flow through the proposed treatment block into Puget Sound. Narbeck Creek flows near the western treatment boundary. Merrill and Ring Creek, as well as Phillips Creek flow through the middle of the

treatment block, and Glenwood Creek flows along the eastern boundary. There are freshwater forested/shrub wetlands associated with these creeks and tributaries. These areas are also part of a biodiversity corridor.

The proposed Boulevard Bluffs site will be treated under NPDES permit number WA0039047 issued to the WSDA by the Washington State Department of Ecology (ECY) for the purpose of invasive moth control.

- **Historic and Cultural Preservation:** There are no historic properties or tribal landmarks/historic properties within the proposed Boulevard Bluffs treatment block.
- **Tribal Notification:** A representative from the USDA-APHIS notified Tulalip, Stillaguamish and Sauk-Suitattle Tribes of Indians.
- **Catch History:** Three EGM which displayed AGM genetic traits per DNA analysis, were detected in the summer of 2019.

4.2 Threatened, Endangered, and Sensitive Species

As required by Section 7 of the Endangered Species Act (1973), the USDA-APHIS consulted with the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Biological assessments (BA) by the USDA-APHIS determined that the proposed Gypsy Moth Eradication Program is not likely to adversely affect any threatened or endangered species, or their critical habitat. After review, NMFS concurred with the determinations of the USDA-APHIS. The USFWS has not responded to the determinations of the USDA-APHIS.

In addition, the WSDA consulted with the Washington State Department of Fish and Wildlife (WDFW) and the Washington State Department of Natural Resources (DNR). These agencies provided maps or other data intended to aid in the identification of habitats of concern and the presence of listed, proposed, candidate, threatened, or endangered species. Further information was gathered from the WDFW Priority and Habitats (PHS) Program, species experts, review of available literature, and site visits.

Information provided by WDFW from their Species of Greatest Conservation Need (SGCN) database found no moth or butterfly species of concern in the vicinity of the proposed gypsy moth treatment sites.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 No Action Alternative

Several USDA pest risk assessments have concluded that because of similarities between Asian and North American ecosystems, left unaddressed, the AGM has great potential for colonization in North American forests (APHIS, 2020). The gypsy moth is able to survive and reproduce in Washington State, as evidenced by numerous past isolated infestations. Many of the coniferous,

deciduous, orchard, and ornamental trees throughout the state are host to the gypsy moth and therefore, the vegetation could support a widespread gypsy moth infestation. The ecological and human health risk assessment for gypsy moth, should it become established, is detailed in the 2012 USDA FSEIS, vol. IV, appendix L (USDA Forest Service, 2004).

If the gypsy moth were to become established, trees in forests and orchards, residential and municipal shade trees, and landscape plantings would be defoliated and eventually killed. Recreational and aesthetic values associated with trees and forested land would also be diminished. Species composition of the vegetation on forested land could change, affecting the quantity and variety of food available for wildlife.

Water quality could be adversely affected in a number of ways including: 1) increased siltation from rapid runoff of rainfall from defoliated areas; 2) increases in water temperature as it flows through areas made shadeless; and 3) nutrient overloading from the deposition of large quantities of caterpillar droppings.

The pesticide load in the environment would likely increase in quantity, variety, and net detrimental environmental impact as home and business owners respond to ever-increasing numbers of gypsy moth caterpillars, the damage they cause, and the nuisance they represent.

Human health impacts associated with the presence of large numbers of gypsy moth caterpillars have been reported. Health effects include itchy skin rashes, welts, and respiratory complaints. These allergic reactions have been attributed to the irritating nature of tiny hairs found on gypsy moth caterpillars (USDA, 2016).

Agricultural, horticultural, and forestry enterprises are dependent upon markets beyond the borders of Washington State. These enterprises must be able to comply with the plant pest and disease regulations of the Federal government, other states, and international markets. The establishment and spread of the gypsy moth in Washington State would result in the imposition of quarantines. The levels of production and value of plant products would also be adversely affected.

5.2 Preferred Treatment Alternative

5.2.1 Human Health and Safety

The use of Btk for the eradication of isolated gypsy moth infestations is expected to have no adverse impact on human health or the environment. Various strains of *Bacillus thuringiensis* (Bt) are a naturally occurring bacterial component of soils worldwide. Modern aqueous formulations of Btk used in gypsy moth control programs contain no organic solvents and have an excellent safety record associated with their use in gypsy moth suppression and eradication programs. An exemption from the requirement of a tolerance has been established for residues of Btk in, or on, all raw agricultural commodities. This exemption stipulates that manufacturers of Btk test each lot for pathogenicity and vertebrate toxicity. See **Appendix F** for product label and Organic Materials Research Institute (OMRI) certificate.

A detailed risk assessment of the human health effects of Btk is detailed in the 2012 FSEIS vol. III, chapter 3 (USDA Forest Service, 2004).

Due to advances in scientific knowledge, the law requires that pesticides which were first registered before November 1, 1984 be reregistered to ensure that they meet today's more stringent standards. In March, 1998 the United States Environmental Protection Agency came out with a Reregistration Eligibility Decision (EPA, 1998) in which they concluded:

“Based on the reviews of the generic data for the active ingredient *Bacillus thuringiensis*, the Agency has sufficient information on the health effects of *Bacillus thuringiensis* and on its potential for causing adverse effects in fish and wildlife and the environment. The Agency has determined that *Bacillus thuringiensis* products, manufactured, labeled and used as specified in this Reregistration Eligibility Decision, will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, the Agency concludes that products containing *Bacillus thuringiensis* for all uses are eligible for reregistration” (EPA, 1998).

In the spring of 1999, Foray® 48B (Btk –based pesticide) was applied by aircraft to 52 square miles of Southern Vancouver Island to combat an infestation of gypsy moth. Approximately 80,000 residents lived in the spray zones. The Capital Health Region coordinated a human health study of possible short-term health effects. The resulting report (Capital Health Region, 1999) concluded:

“The results of this project did not show a relationship between aerial spraying of Foray® 48B and short-term human health effects. Although some people self-reported health problems that they attributed to the spray program, the research and surveillance methods used in this project did not detect any change in health status that could be linked to the spray program. Our results showed that many of the health complaints people reported during the spray were as common in people before the spray as they were shortly after the spray. This conclusion is consistent with those of previous studies of the possible health effects of Btk- based pesticide spray programs.”

Proposed applications of Btk in this program pose minimal risk to the general population, based on the large amount of available toxicity data, surveillance data, and long-term use without significant reports of adverse effects (USDA, 2016). Glare and O’Callaghan (2000) provided a comprehensive review of *Bacillus thuringiensis*, including Btk. They conclude with this statement, “After covering this vast amount of literature, our view is a qualified verdict of safe to use” (Glare and O’Callaghan, 2000). The World Health Organization’s Environmental Health Report (1999) states “Bt products can be used safely for the control of insect pests of agricultural and horticultural crops as well as forests.”

5.2.2 Non-Target Organisms

a. Animals

A detailed discussion of the ecological effects of Btk on non-target organisms may be found in the 1995 FEIS vol. II, chapter 4, pp. 52-55, and vol. IV, chapter 5, pp. 5-10.

As used in gypsy moth eradication projects, Btk has not been shown to adversely affect fish, birds, mammals, or most non-target insects, including honey bees (USDA, 1995, vol. II, chapter 4, pp. 54-55). It is expected that Btk may kill other lepidopteran larvae (leaf-eating caterpillars) if they are present in project areas when treatments occur. In turn, animals dependent on caterpillars as food may theoretically be affected. However, reductions in native caterpillar populations are expected to be temporary due to the brief residual effectiveness of Btk deposits on foliage (4 to 10 days), the high reproductive capacity of most lepidoptera, and recolonization from adjacent untreated areas (USDA, 1995, vol. II, chapter 4, pp. 54-55). The small size of the proposed treatment sites should aid in the recolonization process.

A study conducted in Oregon in connection with gypsy moth control programs in 1986 and 1987 found reduced numbers of caterpillars immediately following Btk treatments and reduced species diversity. This study also found that recovery in numbers of non-target caterpillars began the same season, but that recovery of species diversity lagged behind (Miller, 1990).

Vertebrates that feed on caterpillars in spring will have a reduced number of prey on which to feed for a short time. Reductions in caterpillar numbers from Btk applications forces a switch in diet for birds and mammals. In birds the number of nesting attempts per year may be reduced but not necessarily the overall production of fledglings per breeding territory in the year of application or subsequent years (Rodenhouse and Holmes, 1992).

There is no evidence of significant adverse impacts of Btk on aquatic organisms. In a study conducted on a benthic stream community there was no evidence that addition of Btk to stream mesocosms created adverse effects for these communities even at greater than 100 times expected exposure rates (Richardson and Perrin, 1994).

b. Plants

Btk is non-toxic to plants. Btk is sensitive to meteorological effects once it has been applied to plant surfaces. Btk is readily removed from plant surfaces by rain and is rapidly degraded by sunlight (USDA, 1995, vol. IV, chapter 7, p. 15).

Changes in soil productivity and fertility due to Btk are not likely. Btk persists for a relatively short time, Bt occurs naturally in soils worldwide, and applications of insecticides containing Bt do not appear to increase levels of Bt in soil (USDA, 1995, vol. I, p. 19). For more information about the fate of Btk in the soil refer to 1995 FEIS, vol. IV, chapter 7, pp. 15-16.

c. Threatened, Endangered, and Sensitive Species

Refer to section 4.2 of this Final Environmental Assessment.

6.0 GENERAL PRECAUTIONS

Steps will be taken to educate the public about gypsy moth; as well as assist the public in avoiding or reducing exposure during treatments:

- The Pesticide Sensitive Individuals database, maintained by the Pesticide Management Division of the WSDA, will be checked for people living in or near the proposed treatment areas who require advance notification.
- News media (news releases, social media promotions, radio notices)
- Stakeholder updates
- Updates sent out via email listserv
- An open house was held for both sites on Saturday, February 1st
- The WSDA will provide notification, the day before scheduled applications, to any resident in the proposed treatment area requesting them (text messaging, robocall, email distribution list and email listserv).
- Information will be provided to residents of the treatment areas on ways to avoid or reduce exposure during treatments (social media posts and engagement, social media monitoring, direct mailings, posters/signage/brochures, video).
- During treatments, on-site spray monitors will notify bicyclists, joggers, and other pedestrians that they are approaching or in the treatment area.
- Electronic road signs will be deployed in high-traffic areas before and during treatments. Example message: GYPSY MOTH SPRAYING, LOW FLYING AIRCRAFT
- Yard signs with information about treatments will be deployed throughout each treatment site. All yard signs will be posted on public property.

7.0 PREPARER

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8.0 AGENCIES AND PERSONS CONSULTED/NOTIFIED

- USDA-Animal and Plant Health Inspection Service (USDA-APHIS)
- USDA-Forest Service (USFS)
- National Marine Fisheries Service (NMFS), for review of the proposed treatment areas for the presence of sensitive species or critical habitats
- US Fish and Wildlife Service (USFWS), for review of the proposed treatment areas for the presence of sensitive species or critical habitats
- Federal Aviation Administration (FAA)
- Environmental Protection Agency (EPA)
- Washington State Department of Health
- Snohomish County Public Health Department
- Washington State Department of Natural Resources, for Forest Practices information
- Washington State Department of Natural Resources, Natural Heritage Program, for review of the proposed treatment areas for the presence of sensitive species or habitats
- Washington State Department of Fish and Wildlife, Priority Habitats and Species (PHS) database, for review of the proposed treatment areas for the presence of sensitive species or habitats
- Washington State Department of Fish and Wildlife, Ms. Ann Potter, for review of the proposed treatment areas for the presence of Species of Greatest Conservation Need (SGCN)
- Washington State Department of Archeology and Historic Preservation, Washington Information System for Architectural and Archeological Records Data (WISSARD) database, for review of the presence of historic properties
- Washington State Department of Ecology, for NPDES permit and SEPA review
- Elected Officials in King County
- Elected Officials in Snohomish County
- Tulalip Tribe
- Stillaguamish Tribe
- Sauk-Suiattle Tribe
- Snohomish County School District
- Homeless shelters in Snohomish
- Washington Invasive Species Council (WISC)

9.0 APPENDIX

- A. References
- B. Treatment Site Maps
- C. Gypsy Moth Survey Results and DNA analysis
- D. Information and Outreach
- E. Monitoring
- F. Product label and OMRI certificate

APPENDIX A

References

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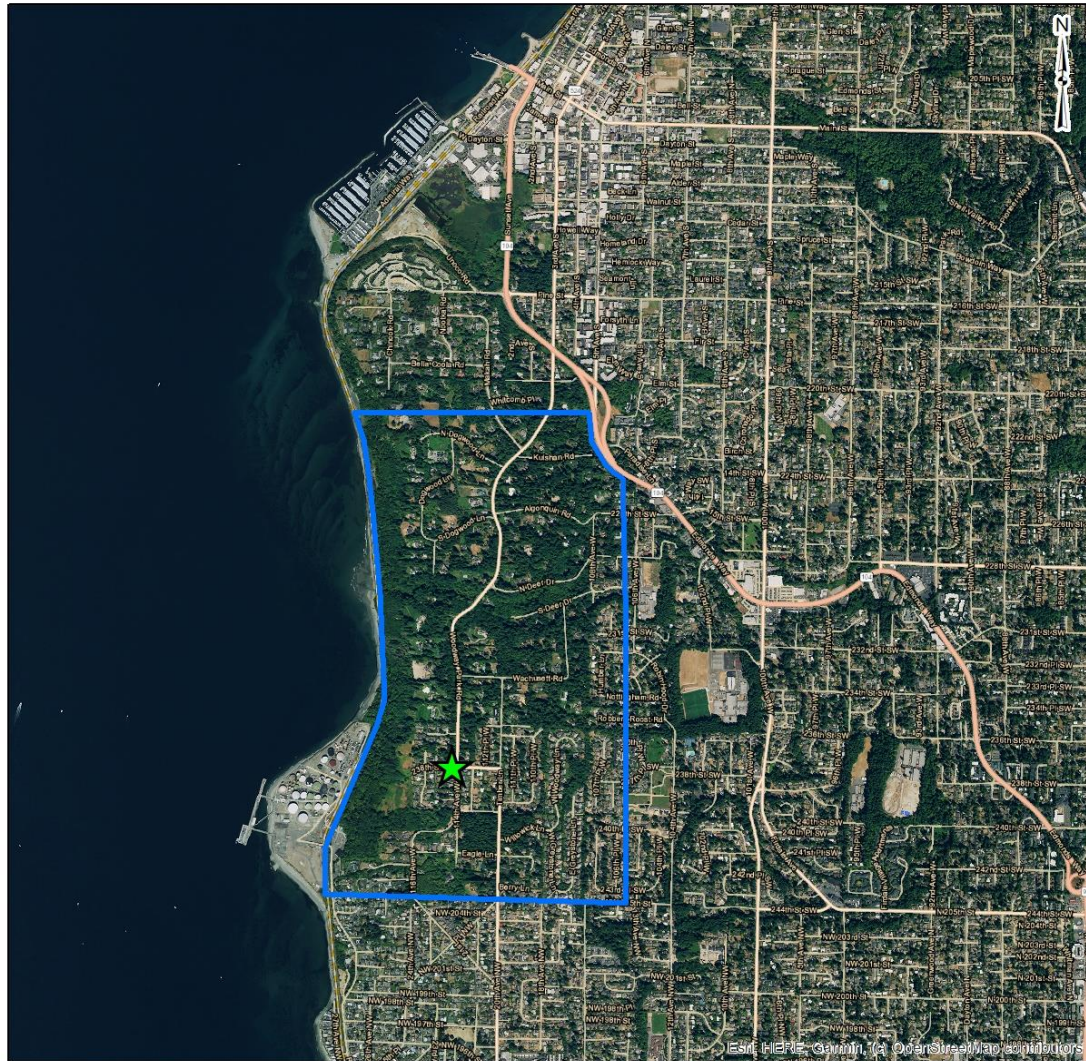
World Health Organization. (1999). Environmental health criteria: microbial pest control agent-*Bacillus thuringiensis*. 125 pp.

APPENDIX B

Treatment Site Maps

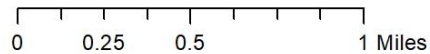
Woodway

Proposed 2020 Gypsy Moth Treatment - Woodway, Snohomish County



Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 FT US
 Projection: Lambert Conformal Conic
 Datum: NAD 1983 2011

Approximately 672 Acres



Legend

Proposed Eradication Boundary

Gypsy Moth Detection

Status: Proposed



Area of Interest

Note:

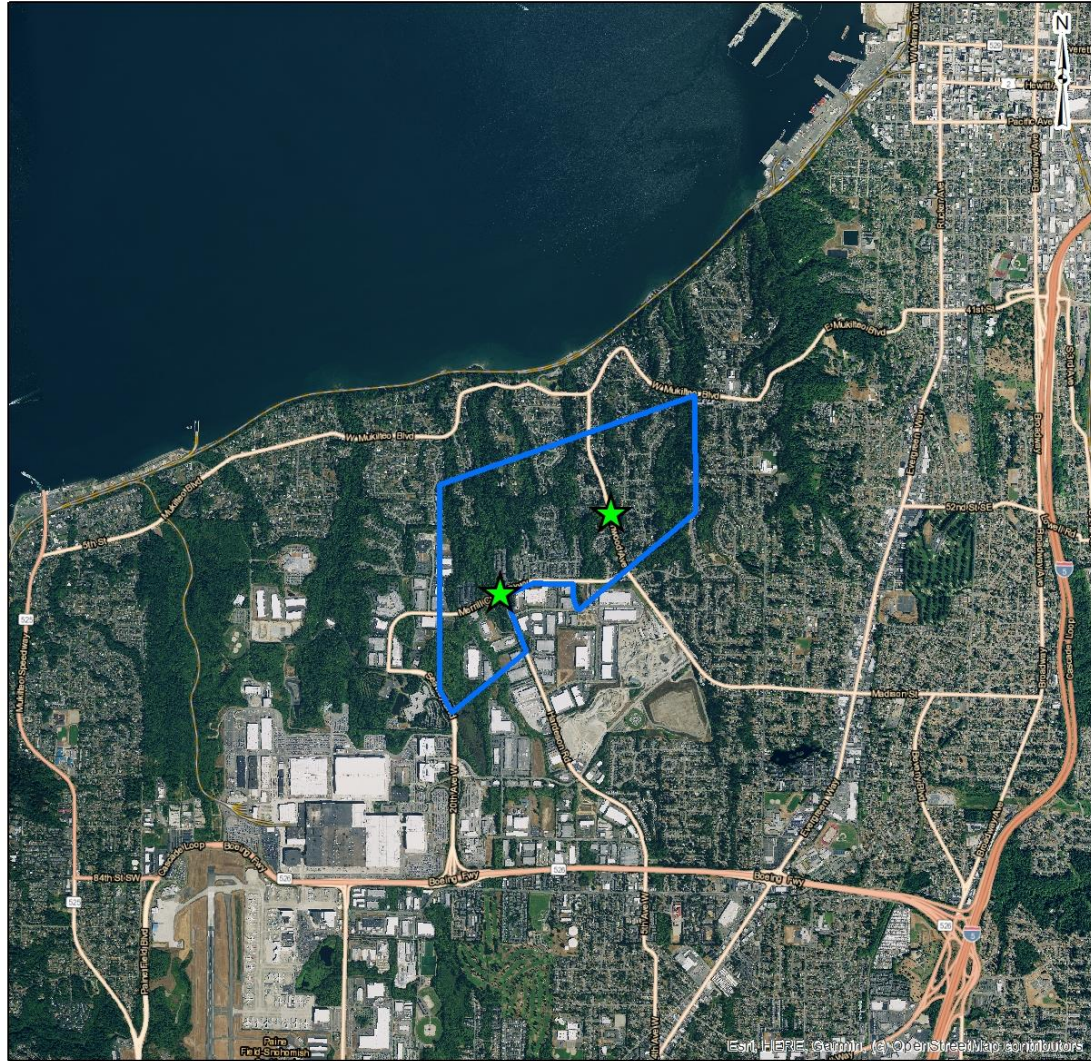
Bodies of water will not be treated



Updated: 11/22/2019

Boulevard Bluffs

Proposed 2020 Gypsy Moth Treatment - Boulevard Bluffs, Snohomish County



Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 FT US
 Projection: Lambert Conformal Conic
 Datum: NAD 1983 2011

Approximately 639 Acres

0 0.25 0.5 1 Miles

Legend

- Proposed Eradication Boundary
- ★ Gypsy Moth Detection

Status: Proposed



Area of Interest

Note:

Bodies of water will not be treated



Updated: 11/22/2019

APPENDIX C

Gypsy Moth Survey Results

Total gypsy moths collected in 2019: 14

Collection Date	County	Location	Molecular Diagnostics*		Type of Moth	
			FS1 Genotype	Mitochondrial Haplotype	Scientific Name	Common Name
7/25/2019	Snohomish	Woodway	Asian	A1	<i>Lymantria umbrosa</i>	Hokkaido gypsy moth
7/25/2019	Klickitat	Goldendale	Heterozygous	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
7/25/2019	Klickitat	Goldendale	Heterozygous	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
8/5/2019	Clark	La Center	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
8/7/2019	Whatcom	Lynden	Heterozygous	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
8/19/2019	Pierce	Tacoma	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
8/19/2019	Clark	Ridgefield	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
8/26/2019	King	Shoreline	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
9/11/2019	Snohomish	Boulevard Bluffs	North American	A1	<i>Lymantria dispar dispar</i>	European gypsy moth
9/11/2019	Snohomish	Boulevard Bluffs	Heterozygous	A1	<i>Lymantria dispar dispar</i>	European gypsy moth
9/16/2019	Snohomish	Boulevard Bluffs	Heterozygous	A1	<i>Lymantria dispar dispar</i>	European gypsy moth
9/24/2019	Pierce	Anderson Island	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
9/30/2019	Pacific	Illwaco	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth
9/30/2019	Pacific	Illwaco	North American	North American	<i>Lymantria dispar dispar</i>	European gypsy moth

Discussion of Gypsy Moth Survey Results

In 2019, the Washington State Department of Agriculture (WSDA) deployed nearly 23,000 gypsy moth detection traps in Washington State for European gypsy moth (EGM) and Asian gypsy moth (AGM). Both European and Asian gypsy moths are a great threat to Washington State's forests and urban landscapes; however, the risk of rapid spread and severity of damage is higher with AGM species due to female flight capability and a wider range of host trees which includes conifers. EGM species have a smaller host range and the females are unable to fly which minimizes the potential for natural spread.

Fourteen (14) adult male gypsy moths were collected and have undergone DNA analysis for determination of either Asian or European genotypes. Molecular diagnostics has identified one moth collected in a trap in Snohomish County as *Lymantria umbrosa*, Hokkaido gypsy moth (HGM); this is the first detection of this species in the United States. HGM is considered an Asian gypsy moth and has the same feeding and female flight behavior as AGM.

DNA analysis found 2 moths that were collected in Snohomish County to be heterozygous; this means they have both North American and Asian DNA. Heterozygous species are of greater concern because female moths produced from this population may exhibit Asian traits and may be flight capable. The presence of flight capable females might increase the potential rate of spread and complicate our ability to detect and eradicate isolated populations.

Molecular Diagnostics of Gypsy Moth*

Gypsy moth specimens collected from the trapping survey undergo molecular diagnostics to determine European or Asian ancestry. *Lymantria dispar asiatica/japonica* (AGM) and *Lymantria umbrosa* (HGM) cannot reliably be distinguished morphologically from *Lymantria dispar dispar* (EGM). The Standard Gypsy Moth Diagnostic Assay is used to distinguish AGM from EGM on a genetic level. DNA is extracted from each specimen and amplified using PCR (polymerase chain reaction). Two genetic markers are used in the assay - the nuclear FS1 and a mitochondrial marker - to determine the type of moth.

FS1 Marker – Inherited from both maternal and paternal lineage. The FS1 marker is present in two copies of DNA within the gypsy moth genome and can occur in two variations: North American (NA) or Asian (A).

The two FS1 copies can be identical (homozygous) or different (heterozygous) in a specimen. Three genotypes are possible: a moth can be homozygous North American (possessing two North American copies), homozygous Asian, or heterozygous (containing one copy each of the North American and Asian FS1 markers).

FS1 Marker Outcomes		
FS1 Copy 1	FS1 Copy 2	Genotype
North American	North American	North American
North American	Asian	Heterozygous
Asian	Asian	Asian

Mitochondrial Marker – inherited from the maternal lineage. The mitochondrial marker is composed of a single section of DNA. The amplified DNA is exposed to two restriction enzymes (Nla III and Bam HI-HF) that have the ability to cut DNA at specific sites.

Mitochondrial Marker Outcomes		
Nla III	Bam HI-HF	Haplotype
Nla-	Bam-	North American
Nla+	Bam-	A1
Nla+	Bam+	A2
Nla-	Bam+	A3

Final Diagnostic Outcome - The final determination for each specimen is made by interpreting the combined outcomes of the Standard Gypsy Moth Diagnostic Assay for each marker. The table below details all possible outcomes.

Final Molecular Diagnostic Outcomes		
FS1 Genotype	+	Mitochondrial Marker = Final Diagnostic Outcome
North American		North American
North American		A1
North American		A2
North American		A3
Heterozygous		North American
Heterozygous		A1
Heterozygous		A2
Heterozygous		A3
Asian		North American
Asian		A1
Asian		A2
Asian		A3

**Diagnostics that result in Heterozygous, A2 or Asian, A1 requires DNA barcoding to make a final determination. DNA barcoding is a molecular tool that uses PCR and DNA sequencing to identify a specimen. The tool is based on the COI marker, a section of mitochondrial DNA that is effective in distinguishing animals of different species. The technique relies on obtaining the unknown specimen's COI DNA sequence and comparing it to sequences of known species that are available in public databases, GenBank and BOLD Systems.

APPENDIX D

Information and Outreach

- Native American tribes in the areas of the proposed 2020 gypsy moth eradication program are contacted (November 26, 2019)
- WSDA issues a press release about the proposed gypsy moth eradication in the spring of 2020 (November 26, 2019)
- WSDA sends out stakeholder update (December 5, 2019)
- WSDA sends an informational postcard to residents around the proposed gypsy moth eradication sites. Nearly 20,000 postcards are mailed out (December 16, 2019)
- WSDA issues a press release about the upcoming open houses and proposed gypsy moth eradication (January 15, 2020)
- WSDA sends out invitation postcards for the upcoming open houses. Nearly 20,000 postcards are mailed out (January 17, 2020)
- Information about the upcoming open houses is emailed to stakeholders (January 21, 2020)
- WSDA holds open house meeting for both proposed sites. Information was provided about gypsy moth trapping, proposed eradication activities, and health effects (February 1, 2020)

Additional information and outreach is planned for the proposed gypsy moth treatments.

APPENDIX E

Monitoring

WSDA and/or USDA-APHIS representatives will be present to monitor loading of the insecticide (Btk). WSDA and/or USDA-APHIS representatives will also be present in the treatment areas.

The proposed treatment areas will be intensively monitored in the summers of 2020, 2021, and 2022. Pheromone-baited traps will be used to determine the effectiveness of the treatments, assist in the eradication, and delimit any residual populations of gypsy moth. Visual inspections for alternate life stages of the gypsy moth will also take place. Egg masses will be removed if found. The results of this monitoring will dictate the need for any future action.

APPENDIX F

Product Label



For Commercial Forestry and Wide-Area
Pest Treatment – Aerial Application Only



Active Ingredient:

Bacillus thuringiensis, subsp. kurstaki, strain ABTS-351,
fermentation solids, spores, and insecticidal toxins12.65%
Other Ingredients87.35%
Total100.00%

Potency: 10,600 Cabbage Looper Units (CLU) per mg of product
(equivalent to 48 billion CLU per gallon).

The percent active ingredient does not indicate product
performance and potency measurements are not federally
standardized.

KEEP OUT OF REACH OF CHILDREN

CAUTION



Valent BioSciences LLC
870 Technology Way
Libertyville, IL 60048 U.S.A.

List No. 60181-04-##

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage: Store in a cool dry place. Keep container tightly closed when not in use. Store in temperatures above freezing and below 32° C (90° F).

Pesticide Disposal: To avoid wastes, use all material in this container by application according to label directions. If wastes cannot be avoided, offer remaining product to a waste disposal facility or pesticide disposal program (often such programs are run by state or local governments or by industry).

Container Disposal: Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Offer for recycling if available. Offer for reconditioning, if appropriate.

Refillable Container: Refill this container with pesticide only. Do not use this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Offer for recycling if available. Offer for reconditioning, if appropriate.

See enclosure label for First Aid, Precautionary Statements, Storage/Disposal Statements and Directions for Use.

EPA Reg. No. 73049-427
EPA Est. No. 33762-IA-001

Lot No.: ##-###-##

Date of Mfg.: ### ##

Net Contents: #####

04-9116/R6

Foray® 48B

BIOLOGICAL INSECTICIDE

FLOWABLE CONCENTRATE

**For Commercial Forestry and Wide-Area
Pest Treatment – Aerial Application Only**



FOR ORGANIC PRODUCTION

Active Ingredient:

<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i> , Strain ABTS-351, fermentation solids, spores and insecticidal toxins	12.65%
Other Ingredients	87.35%
Total	100.00%
Potency: 10,600 Cabbage Looper Units (CLU) per mg of product (equivalent to 48 billion CLU per gallon).	1Use

The percent active ingredient does not indicate product performance and potency measurements are not federally standardized.

EPA Registration No. 73049-427

EPA Est. No. 33762-IA-001

KEEP OUT OF REACH OF CHILDREN CAUTION

FIRST AID	
If in eyes	- Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. - Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. - Call a poison control center or doctor for treatment advice.
HOT LINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-877-315-9819 (24 hours) for emergency medical treatment and/or transport emergency information. For all other information, call 1-800-323-9597.	

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS CAUTION

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Waterproof gloves
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Agricultural Use Requirements:

Mixers/loaders and applicators must wear a NIOSH-approved particulate respirator with any R or P filter with NIOSH approval number prefix TC-84A; or a NIOSH-approved powered air purifying respirator with a HE filter with NIOSH approval number prefix TC-21C. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

Engineering Control

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

IMPORTANT: When reduced PPE is worn because a closed system is being used, handlers must provide all PPE specified above for "applicators and other handlers" and have such PPE immediately available for use in an emergency, such as spill or equipment breakdown.

Non-agricultural Use Requirements:

Mixers/loaders and applicators must wear a NIOSH-approved particulate respirator with any R or P filter with NIOSH approval number prefix TC-84A; or a NIOSH-approved powered air purifying respirator with a HE filter with NIOSH approval number prefix TC-21C. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

USER SAFETY RECOMMENDATIONS

Users should:

- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Environmental Hazards

Except under the forest canopy, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

This product must not be applied aerially within 1/4 mile of any habitats of threatened or endangered Lepidoptera.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. For any requirements specific to your State or Tribe, consult the State or Tribal agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to supplemental labeling under "Agricultural Use Requirements" in the Directions For Use section for information about this standard.

Refer to the Directions For Use (below) for further directions.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage: Store in a cool, dry place. Keep containers tightly closed when not in use. Store in temperatures above freezing and below 32 degrees C (90 degrees F).

Pesticide Disposal: To avoid wastes, use all material in this container by application according to label directions. If wastes can not be avoided, offer remaining product to a waste disposal facility or pesticide disposal program (often such programs are run by state or local governments or by industry).

Container Disposal: Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Offer for recycling if available. Offer for reconditioning, if appropriate.

Refillable Container: Refill this container with pesticide only. Do not use this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Offer for recycling if available. Offer for reconditioning, if appropriate.

Warranty and Disclaimer

To the extent permitted by applicable law, seller makes no warranty, express or implied, of merchantability, fitness or otherwise concerning the use of this product other than as indicated on the label. User assumes all risks of use, storage or handling not in strict accordance with accompanying directions.

DIRECTIONS FOR USE BOOKLET

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. For any requirements specific to your State or Tribe, consult the State or Tribal agency responsible for pesticide regulation.

Apply this product only through aerial application.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard (that involves contact with anything that has been treated, such as plants, soil, or water) is:

- Coveralls
- Waterproof gloves
- Shoes plus socks

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

APPLICATION

Apply Foray 48B Biological Insecticide Flowable Concentrate (hereafter referred to as Foray 48B), undiluted or with quantities of water sufficient to provide thorough coverage of plant parts to be protected, only by aerial equipment. The amount of water needed per acre will depend upon crop size, weather, spray equipment, and local experience.

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator and the grower/treatment coordinator are responsible for considering all of these factors when making decisions.

HANDLING & MIXING

If Foray 48B is applied undiluted, the operator must ensure that the bulk quantity is well agitated and homogenous.

When Foray 48B is shipped by bulk tankers and transferred via a closed-loop mixing/loading system, the material is measured by passing through in-line flow meters directly into the aircraft, minimizing exposure to ground handling personnel.

In a similar manner, smaller containers of Foray 48B are also to be used with a closed-loop mixing/loading system to minimize the potential for accidental spills and exposure of ground handling personnel.

If dilution with water is needed for full coverage, fill tank with approximately 3/4 of the water required for dilution. Begin agitation and pump Foray 48B into the water while maintaining continuous agitation. Agitate as necessary to maintain suspension. Do not allow diluted mixture to remain in the tank for more than 72 hours.

When applying a diluted spray mixture, the use of a spreader-sticker will improve the weather-fastness of the spray deposits. Add the spray adjuvant to the tank after the Foray 48B is added, and before the final volume of water is added to complete the mixture. Reduce or momentarily halt tank agitation and then add the required amount of adjuvant to the diluted mix. Use a closed-loop system to siphon the required quantity of adjuvant or pour the adjuvant into the top hatch of the tank. Once added, close tank opening, and resume agitation; add the rest of the water to complete the spray mix.

Combinations with commonly used spray tank adjuvants are generally not deleterious to Foray 48B, if the mix is used promptly. Before mixing in the spray tank, identify possible problems with physical compatibility by mixing all components in a small container in proportionate quantities. Check with an adjuvant supplier for advice on spray adjuvants that are compatible with biological pesticides such as Foray 48B to avoid incompatibilities.

SPRAY VOLUMES

Aerial Application: Use appropriate amount of Foray 48B, as indicated in the tables that follow, in aerial equipment undiluted or with quantities of water sufficient to provide thorough coverage of plant parts to be protected. In the western U.S., use a normal minimum of 5-10 gallons per acre; in the eastern regions, use a normal minimum of 2-3 gallons. The minimum amount of water needed per acre will depend upon size, weather conditions, spray equipment used and local experience.

GENERAL AGRICULTURAL USE INSTRUCTIONS

Foray 48B is a biological insecticide for the control of lepidopterous larvae. It contains the spores and endotoxin crystals of *Bacillus thuringiensis kurstaki*. Foray 48B must be ingested by the larvae to be effective. For consistent control, apply at first sign of newly hatched larvae (1st and 2nd instar larvae). Susceptible larvae that ingest Foray 48B cease feeding within a few hours and die within 2-5 days.

Foray 48B may be applied up to and on the day of harvest.

For maximum effectiveness, follow the instructions listed below:

Monitor fields to detect early infestations.

Apply Foray 48B when eggs start hatching and larvae are small (early instars) and before significant damage occurs. Larvae must be actively feeding to be affected.

Repeat applications every 3 to 14 days to maintain control and protect new plant growth. Factors affecting spray interval include rate of plant growth, weather conditions, and reinfestation. Monitor populations of pests and beneficials to determine proper timing of applications.

Under conditions of heavy pest pressures or when large worms are present use the higher rate, shorten the application interval, and/or improve spray coverage to enhance control. When these conditions are present, consider use of contact insecticide to enhance control.

Thorough coverage is essential for optimum performance.

Crop	Pests	Rate ¹ (fl. oz./acre)
Forests, Shade Trees, Ornamentals, Shrubs, Sugar Maple Trees, Seed Orchards, Non-Bearing Ornamental Fruit, Nut and Citrus Trees	Gypsy Moth & Asian Gypsy Moth	21 - 107
	Elm Spanworm	
	Spruce Budworm	21 - 80
	Browntail Moth	
	Douglas Fir Tussock Moth	
	Coneworm	
	Buck Moth	
	Tussock Moths	16 - 43
	Pine Butterfly	
	Bagworm	
	Leafrollers	
	Tortrix	
	Mimosa Webworm	
	Tent Caterpillar	
	Jackpine Budworm	
	Blackheaded Budworm	
	Saddled Prominent	
	Saddleback Caterpillar	
	Eastern & Western Hemlock Looper	
	Orangestriped Oakworm	
	Satin Moth	
	Redhumped Caterpillars	11 - 31
	Spring & Fall Cankerworm	
	California Oakworm	
	Fall Webworm	

Special Instructions:

¹Use the higher rates on advanced larval stages or under high density larval populations.

Use and mix this product with other pesticides only in accordance with the most restrictive of label limitations and precautions. Do not mix this product with any product containing a label prohibition against such mixing. Do not exceed label dosage rates.

GENERAL NON-AGRICULTURAL USE INSTRUCTIONS

Not for use on plants being grown for sale or other commercial use, or for commercial seed production, or for research purposes. For use on plants intended for aesthetic purposes or climatic modification and being grown in ornamental gardens or parks, or on golf courses or lawns and grounds.

Not for use on trees being grown for sale or other commercial use, or for commercial seed production, or for the production of timber or wood products, or for research purposes except wide-area public pest control programs sponsored by government entities, such as mosquito abatement, Gypsy Moth control, and Mediterranean Fruit Fly eradication.

Foray 48B contains the spores and endotoxin crystals of *Bacillus thuringiensis kurstaki*. Foray 48B is a stomach poison and is effective against lepidopterous larvae. After ingestion, larvae stop feeding within hours and die 2-5 days later. Maximum activity is exhibited against early instar larvae. Apply Foray 48B only by aerial application.

Use Foray 48B with a closed-loop mixing/loading system that will minimize the potential for accidental spills and exposure of ground handling personnel.

If dilution with water is needed for full coverage, fill tank with approximately 3/4 of the water required for dilution. Begin agitation and pump Foray 48B into the water while maintaining continuous agitation. Agitate as necessary to maintain suspension. Do not allow diluted mixture to remain in the tank for more than 72 hours.

Monitor to detect early infestations.

Crop	Pests	Rate ¹ (fl. oz./acre)
Forests, Shade Trees, Ornamentals, Shrubs, Sugar Maple Trees, Seed Orchards, Non-Bearing Ornamental Fruit, Nut and Citrus Trees	Gypsy Moth & Asian Gypsy Moth	21 - 107
	Elm Spanworm	
	Spruce Budworm	21 - 80
	Browntail Moth	
	Douglas Fir Tussock Moth	
	Coneworm	
	Buck Moth	
	Tussock Moths	16 - 43
	Pine Butterfly	
	Bagworm	
	Leafrollers	
	Tortrix	
	Mimosa Webworm	
	Tent Caterpillar	
	Jackpine Budworm	
	Blackheaded Budworm	
	Saddled Prominent	
	Saddleback Caterpillar	
	Eastern & Western Hemlock Looper	
	Orangestriped Oakworm	
	Satin Moth	
	Redhumped Caterpillars	11 - 31
	Spring & Fall Cankerworm	
	California Oakworm	
	Fall Webworm	

Special Instructions:

¹Use the higher rates on advanced larval stages or under high density larval populations.

Use and mix this product with other pesticides only in accordance with the most restrictive of label limitations and precautions. Do not mix this product with any product containing a label prohibition against such mixing. Do not exceed label dosage rates.

Aerial Application

Apply Foray 48B, either alone or diluted with water, aerially at the rates per acre shown in the application rates table. Spray volumes of 32-107 fluid ounces of product per acre give optimum coverage. Best results are expected when Foray 48B is applied to dry foliage.

For smaller spray volumes, mix the proper number of teaspoons of Foray 48B from the following chart to attain the desired rates:

If the rate is:	Add this amount per gallon of mix:
8 fl. oz. (0.5 pt.)/acre	1/2 teaspoon
16 fl. oz. (1.0 pt.)/acre	1 teaspoon
24 fl. oz. (1.5 pts.)/acre	1-1/2 teaspoons
32 fl. oz. (2.0 pts.)/acre	2 teaspoons
48 fl. oz. (3.0 pts.)/acre	3 teaspoons
64 fl. oz. (4.0 pts.)/acre	4 teaspoons

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OMRI Listed®

The following product is OMRI Listed. It may be used in certified organic production or food processing and handling according to the USDA National Organic Program regulations.

Product

Foray® 48B Biological Insecticide Flowable Concentrate

Company

Valent BioSciences® LLC
Maria Pilar Herrero
870 Technology Way
Libertyville IL 60048 United States

Status

Allowed with Restrictions

Category

NOP: Bacillus thuringiensis

Issue date

07-Dec-2006

Product number

abb-0522

Class

Crop Pest, Weed, and
Disease Control

Expiration date

01-Mar-2021

Restrictions

May only be used if the requirements of 205.206(e) are met, which requires the use of preventive, mechanical, physical, and other pest, weed, and disease management practices.

Executive Director/CEO

Product review is conducted according to the policies in the current *OMRI Policy Manual*® and based on the standards in the current *OMRI Standards Manual*®. To verify the current status of this or any OMRI Listed product, view the most current version of the *OMRI Products List*® at OMRI.org. OMRI listing is not equivalent to organic certification and is not a product endorsement. It cannot be construed as such. Final decisions on the acceptability of a product for use in a certified organic system are the responsibility of a USDA accredited certification agent. It is the operator's responsibility to properly use the product, including following any restrictions.



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