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Gypsy Moth Cooperative Eradication Program in Cowlitz County, Washington

Final Environmental Assessment, April 2021

Agency Contact:

Anthony Man-Son-Hing
National Gypsy Moth Program Manager
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
920 Main Campus Drive
Raleigh, NC 27606

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Asian Gypsy Moth Cooperative Eradication Program in Cowlitz County, Washington—April 2021

I. Introduction

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), in cooperation with the Washington Department of Agriculture (WSDA), is proposing an Asian gypsy moth (AGM) eradication program in Cowlitz County, Washington (WA).

The gypsy moth is one of the most destructive pests of trees and shrubs in the United States. There are two types of gypsy moths—the European (also known as North American) (EGM) and the Asian. The European gypsy moth (*Lymantria dispar*) 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 target of the 2021 gypsy moth program in Washington is the Asian gypsy moth (AGM). The 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. Like the European gypsy moth, AGM prefers forest habitats and can cause serious defoliation and deterioration of trees and shrubs. The EGM has more than 250 known host plants but prefers oak, while the AGM has a much broader host range, including larch, oak, poplar, alder, willow, and some evergreens. Another difference between Asian and European gypsy moths is that AGM females can fly while EGM females cannot fly.

This broad range of possible host plants, combined with the female's ability to fly long distances, could allow AGM to spread rapidly. In contrast, the European gypsy moth has taken more than 140 years (since 1869) to spread throughout the United States from the Northeast to the Southeast and the Midwest (APHIS, 2015). Large infestations of gypsy moths can completely defoliate trees, leaving them weak and more susceptible to disease or attack by other insects. If defoliation is repeated for two or more years, it can lead to the death of large sections of forests, orchards, and landscaping. Any introduction and establishment of AGM in the United States would pose a major threat to the environment and urban, suburban, and rural landscapes. (From: APHIS, 2015)

Asian 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. While the velvety egg masses average 1½ inches long and three-fourths of an inch wide; they are often as small as a dime. Eggs begin hatching in the spring. All the damage caused by the gypsy moth 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. Adult males have grayish-brown wings and a wingspan of 1 ½ inches. Adult female moths are white and larger, with wingspans of 3 ½ inches or more. Gypsy moths do not feed in the moth (adult) 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.

AGM infestations spread in several ways. Adult female moths may fly to other areas to lay eggs. Or, newly hatched AGM caterpillars may climb to tree crowns, where the wind picks up their silken threads and carries them to other areas.

In addition, people can inadvertently transport egg masses or pupae. AGM egg masses tolerate extremes in temperature and moisture and travel well on logs, lawn furniture, nursery stock, pallets, shipping containers, and the hulls and rigging of ships.

A. Purpose and Need

The purpose of the proposed action is for USDA-APHIS, in cooperation with WSDA, to eradicate AGM in Cowlitz County, Washington. There is a need for this proposed action because if AGM were to become established in the United States the damage would likely be more extensive than damage from the European gypsy moth that is established in the eastern United States. Female AGM can fly long distances making it probable that AGM could spread more quickly in the United States compared to the EGM. AGM can completely defoliate trees, leaving them weak and more susceptible to disease or attack by other insects. If defoliation is repeated for two or more years it can lead to the death of large sections of forests, orchards, and landscaping. (APHIS, 2015).

Two agencies within the USDA support AGM eradication work. Each agency has different roles and responsibilities in AGM management. Per the revised memorandum of understanding between USDA-APHIS and the USDA-Forest Service (FS), signed in 2009, USDA-APHIS is responsible for eradication treatments of 640 acres or less, while the USDA-FS' State and Private Forestry is the lead agency for treatment areas larger than 640 acres. Proposed treatments would occur wherever there is an AGM outbreak in the Program area covered under this environmental assessment (EA). The preferred alternative (proposed action) proposes a cooperative approach between USDA-APHIS and WSDA.

The USDA-APHIS prepared this EA to comply with the provisions of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. §§ 4321 et seq.) as prescribed in implementing regulations adopted by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations (CFR) parts 1500-1508), USDA's NEPA regulations at 7 CFR part 1b, and USDA-APHIS NEPA implementing procedures (7 CFR part 372) for the purpose of evaluating the potential effects of the proposed action on the human environment (40 CFR § 1508.1(m)).

The alternatives being considered have been analyzed in detail in the 1995 final environmental impact statement (EIS) for GM management in the United States and the 2012 supplemental EIS (USDA 1995, 2012). The findings of that EIS regarding the alternatives being considered are summarized and incorporated by reference into this EA. USDA-APHIS proposes eradication because of the isolated nature of the AGM detection in Washington and the potential adverse ecological and economic impacts of AGM on the infested and surrounding areas.

B. Public Outreach

The WSDA and USDA-APHIS have conducted multiple outreach activities to stakeholders associated with the proposed eradication. Below is a list of outreach efforts to date.

- Notification to the Cowlitz Tribe (November 30, 2020)
- Press release issued about the proposed Asian gypsy moth eradication (December 1, 2020)
- Email sent to stakeholders in the proposed eradication area (December 1, 2020)
- Postcard with information about the proposed eradication sent to all residences in the proposed treatment area (December 10, 2020)
- Residents in the affected areas are mailed an invitation to the upcoming open houses (January 17, 2021)
- Second announcement sent to stakeholders about the open house (January 27, 2021)
- WSDA held an open house providing information about gypsy moth history, trapping, eradication activities and potential health effects related to the eradication (February 17, 2021)

WSDA will continue to conduct outreach prior to and during the proposed eradication.

The USDA-APHIS provides information on AGM and EGM, including final EAs, on its website at: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/gypsy-moth/ct_gypsy_moth.

The draft EA for the proposed AGM cooperative eradication program was made available to the public for a 30-day comment period beginning on March 17, 2021 at www.regulations.gov (Docket ID: APHIS-2021-0013). The notice of availability was published in The Daily News newspaper in Longview, WA on March 17, 2021. USDA-APHIS and the WSDA received no comments on the EA.

C. Authorizing Laws and Regulations

1. Federal Laws and Regulations

Authorization to conduct treatments for AGM infestations is given in the Plant Protection Act of 2000 (7 U.S.C. section 7701), and the cooperation with State agencies in Administration and Enforcement of Certain Federal Laws (7 U.S.C. section 450). The Cooperative Forestry Assistance Act of 1978 (Public Law (P.L.) 95–313) provides the authority for Federal and State cooperation in managing forest insects and diseases. The 1990 Farm Bill (P.L. 101–624) reauthorizes the basic charter of the Cooperative Forestry Assistance Act. The NEPA of 1969 requires detailed environmental analysis of any proposed Federal action that may affect the human environment. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1947, as amended, requires pesticides used within the United States to be registered by the U.S. Environmental Protection Agency (EPA). Section 7 of the Endangered Species Act prohibits Federal actions from jeopardizing the continued existence of federally listed threatened, endangered, or candidate 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 consultation with the State Historic Preservation Officer regarding the proposed activities.

2. State Laws and Regulations

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

II. Alternatives

This EA is tiered to the USDA's 1995 Final EIS and 2012 supplemental EIS for GM Management in the United States. The preferred alternative in the 1995 EIS is alternative 6: Suppression, Eradication, and Slow the Spread. Under alternative 6 of the EIS, six treatment options were analyzed with an additional treatment option analyzed in the 2012 supplemental EIS:

- Btk—a biological insecticide containing the bacterium *Bacillus thuringiensis* var *kurstaki* (Btk). The insecticide is specifically effective against caterpillars of many species of moths and butterflies, including GM.
- Diflubenzuron (Dimilin®)—an insect growth regulator that interferes with the growth of some immature insects.
- GM Virus (Gypcheck®)—a nucleopolyhedrosis virus which occurs naturally and is specific to GM. Gypcheck is an insecticide product made from the GM nucleopolyhedrosis virus.

- Mass Trapping—a treatment that consists of large numbers of pheromone traps used to attract the male GM thus preventing them from mating with females and, thereby, causing a population reduction.
- Mating Disruption—a treatment that consists of a carrier (i.e., tiny plastic flakes, beads, etc.) that release disparlure, a synthetic GM sex pheromone. The pheromone confuses male moths and prevents them from locating and mating with females.
- Sterile Insect Technology—a treatment that consists of an aerial release of many sterile male GM. This reduces the chance that female moths will mate with fertile males, which results in progressively fewer and fewer fertile egg masses being produced, and eventual elimination of the population.
- Tebufenozide—an insecticide that controls molting in various insects and other invertebrates.

Of the treatment options listed above, USDA-APHIS and WSDA propose the use of Btk to treat AGM the AGM detection in the proposed Program area. Btk is proven to be an effective eradication tool for use with small populations of AGM.

Diflubenzuron is also an effective eradication tool for use with small populations of AGM. Diflubenzuron is an insect growth regulator that has a broader efficacy than Btk and may adversely affect other invertebrates in addition to moth and butterfly caterpillars. USDA-APHIS is not selecting this treatment as an option under this EA's preferred alternative due to the potential for impacts to other nontarget invertebrates.

The remaining treatment options were not selected due to availability, or environmental or efficacy concerns. Similar types of impacts as diflubenzuron would be expected with the use of tebufenozide. GM virus (Gypcheck®) is very host-specific but is not widely available; therefore, it was not selected. Mating disruption was not selected since it may not result in eradication. Sterile insect release experiments show variable results for eradication programs and, consequently, sterile insect technology was not selected. In addition, no sterile AGM are available for use.

This EA analyzes the potential environmental consequences associated with two alternatives: A) no action and B) the preferred alternative (proposed action) to implement an eradication program using Btk treatments in Cowlitz County, Washington (Figure 1).

A. No Action Alternative

NEPA regulations (40 CFR parts 1500-1508) require the scope of analysis to include a no action alternative in comparison to other reasonable courses of action. Under the no action alternative, USDA-APHIS would not participate in the AGM eradication program. Other Federal and non-federal entities, including the State of Washington, could take control measures; however, USDA-APHIS would not assist in either the control or funding of these measures.

B. Preferred Alternative

Under the preferred alternative, USDA-APHIS would provide funding for the AGM eradication program in Cowlitz County, Washington (Figure 1).

The cooperative APHIS/WSDA Program proposes to use *Bacillus thuringiensis* var. *kurstaki* (Btk) (Foray® XG and/or Foray® 48B) to treat an AGM detection. For three years following treatments, the Program would conduct delimiting trapping using pheromone-baited traps and inspect for and remove egg masses (especially at any multiple-catch sites) where found. This strategy gives the Program the best chance for achieving AGM eradication while minimizing risks to human health and impacts to the environment.

The proposed program would involve three to five aerial applications of Btk to all foliage within the designated treatment area. The first treatment date is determined by biological monitoring and modeling but is likely to occur in late April to early May and would be followed by two to four subsequent treatments at approximately 7- to 10-day intervals thereafter, weather permitting. Exact timing of the applications will be dependent on development of gypsy moth larvae and/or foliage as determined by WSDA.

To reduce the potential for drift, Btk will only be applied when winds are 10 miles per hour or less, temperatures are below 80^{o} F, and relative humidity is above 50 percent. Btk applications will be suspended if any of the above conditions are not met or rain is imminent. If rain occurs, Btk applications will only begin when the target foliage has dried sufficiently and according to EPA label instructions. Btk is not directly applied to surface water.

Baited gypsy moth traps will be used to monitor success of the treatments. The traps are baited with a gypsy moth-specific pheromone used to attract males. Non-target insects are not attracted to the gypsy moth-specific pheromone. Trapping density will be as high as 49 traps per square mile in the treatment area to determine if the treatments are successful.

III. Potential Environmental Consequences

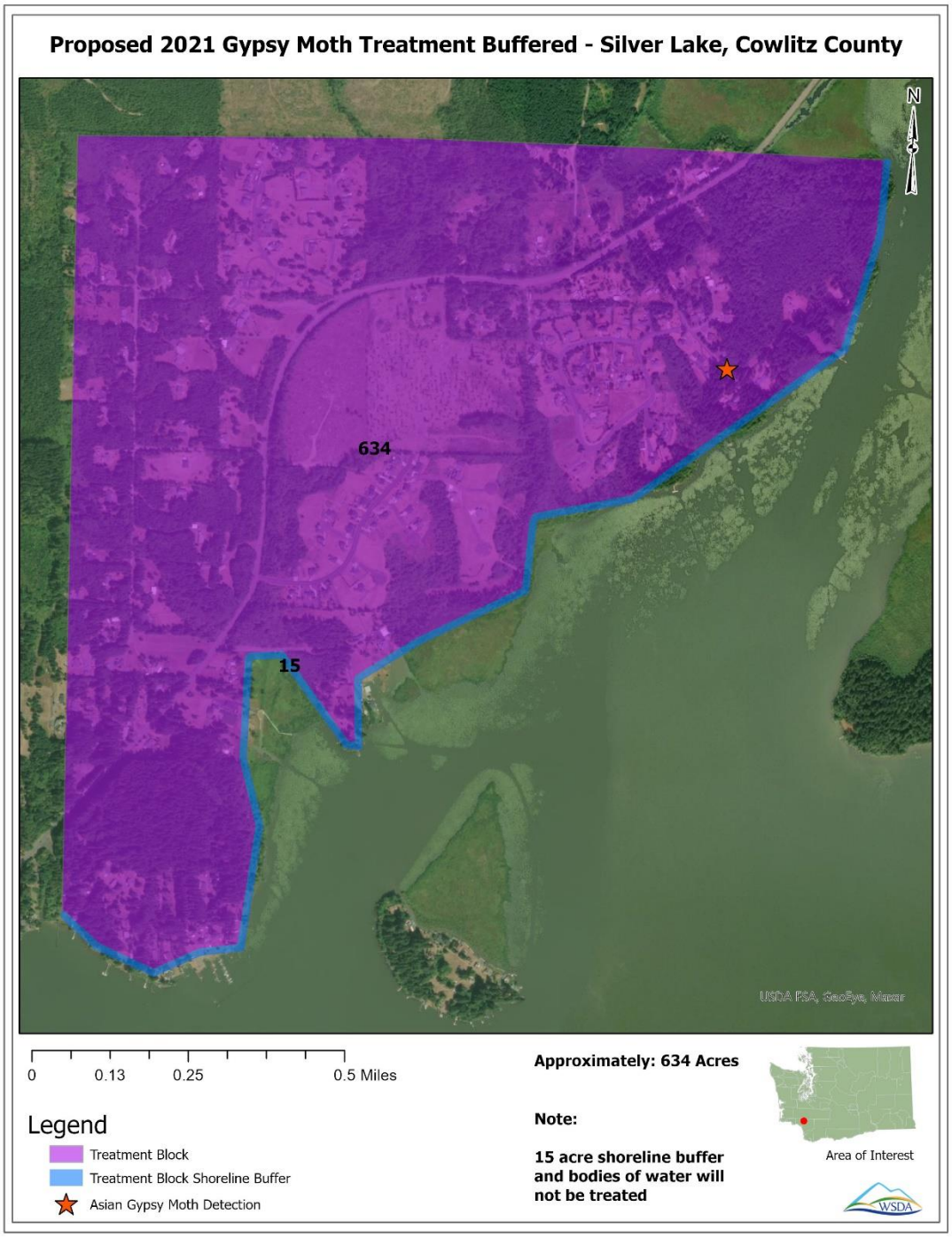
This section evaluates the potential environmental impacts associated with each of the alternatives. The no action alternative is compared to the potential of the preferred alternative to affect human health and ecological resources. This section presents a short description of the environmental baseline for each environmental resource analyzed, followed by an analysis of the potential environmental impact to that resource. The potential impacts may be direct or indirect, of short or long duration, and either beneficial or adverse.

The proposed treatment area is in the unincorporated community of Silver Lake in Cowlitz County, Washington, in the southwestern portion of the state (figure 1). There are no schools, parks, historic structures, or other unique landmarks in the proposed treatment area.

Approximately two dozen residential homes are in the treatment area (USEPA, 2021). Silver Lake is located 6 miles (9.7 km) east of Castle Rock along Washington State Route 504, which is also known as the Spirit Lake Memorial Highway. The area considered Silver Lake is about 6 miles (10 km) east of Interstate 5 (I-5) and is approximately 50 miles (80 km) from Portland, Oregon, to the south and Seattle about 110 miles (180 km) to the north. The closest cities to the subject property are Castle Rock, six miles (10 km) to the west, and Toutle, four miles (6 km) east.

The Silver Lake community takes its name from the lake of the same name and lies on the northwest shore. Silver Lake (waterbody) has an area of 3000 acres and is in the Silver Lake Watershed (USEPA, 2021). The Silver Lake community is part of the Toutle Lake School District, a K-12 school district of about 600 students. Toutle Lake High School is located 3.5 miles from the proposed treatment area (USEPA, 2021).

Figure 1. The proposed Program area in Cowlitz County, Washington.



A. No Action Alternative

Selection of the no action alternative would likely result in the establishment of AGM in Cowlitz County, which could lead to commensurate damage to trees relative to the level of infestation. The no action alternative would allow AGM to flourish in the existing area and continue to spread into surrounding areas. The ecological and human health effects associated with no action were examined in the 1995 final EIS and the 2012 supplemental EIS for GM management in the United States (USDA 1995, 2012). This EA incorporates by reference the no action evaluation in both EIS documents. A summary of ecological and human health impacts is provided below.

1. Ecological Impacts

Most of the environmental impacts associated with AGM are caused by the larval stage. In areas where AGM populations are high, trees can be defoliated, leading to stress (USDA 1995). Trees that are stressed are more susceptible to diseases and other plant pests (USDA 1995). In circumstances where high populations are sustained over several years, AGM feeding damage can cause tree mortality (USDA 1995).

If left untreated, AGM populations would increase and expand into surrounding areas. AGM larval feeding can lead to changes in forest stand composition (USDA 1995). Nesting sites and cover for birds and other animals would also be reduced (USDA 1995). The loss of vegetation in the affected areas could lead to increased erosion of soil and loss of soil moisture retention (USDA 1995). GM infestations can lead to changes in water quality and effects to aquatic organisms (USDA 1995). In the Pacific Northwest defoliation in riparian habitats could lead to increased water temperatures, affecting aquatic life. AGM populations would increase without any treatments and compete with native Lepidoptera for resources (Manderino et al. 2014), alter native flora, and increase the resident predator and parasitoid populations that could impact native Lepidoptera populations (Scriber 2004).

(1) Migratory Bird Treaty Act

Federal law prohibits an individual to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird (16 U.S.C. §§ 703-712; 50 CFR § 21).

Under the no action alternative, USDA-APHIS will not improve habitat conditions for migratory birds, nor will it inadvertently disturb migratory birds.

(2) Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. § 668) prohibits the take of bald or golden eagles unless permitted by the US Fish and Wildlife Service (USFWS). The term “take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or

disturb" (50 CFR § 22.3). Disturb means to agitate or bother to a degree that causes . . . injury . . . a decrease in its productivity . . . or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (§ 22.3).

Cowlitz County is not within the golden eagle's nesting and habitat range (WDFW, 2021a). Bald eagle's may be present in the county, as they are found along marine shorelines and major rivers of western and northeastern Washington (WDFW, 2021b). USDA-APHIS conducted a literature review and did not find evidence of the AGM directly impacting bald eagles. The potential loss of trees may reduce the availability of nesting sites. However, the Program expects bald eagles to utilize nearby trees that are not hosts to the AGM. Also, over time, trees that succumb to AGM and secondary pests and diseases may be replaced with trees that are not hosts to the AGM. Therefore, the no action alternative is unlikely to have any negative impacts on nesting bald eagles.

(3) Endangered Species Act

Section 7 of the ESA and ESA's implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered (T&E) species or result in the destruction or adverse modification of critical habitat. USDA-APHIS does not expect the no action alternative to affect T&E species in the short term because of the current AGM detection. The no action alternative would also not impact critical habitat for species where critical habitat has been designated. However, under the no action alternative AGM would be expected to become established and expand over time resulting in potential future environmental impacts, including T&E species.

2. Human Health

Some people have been shown to be allergic to the tiny hairs on AGM caterpillars. These people could suffer minor allergic reactions (primarily rashes) if AGM became established. Also, irritation to eyes and throat are common reactions with increased AGM infestations (USDA 1995). In heavily infested areas, large numbers of caterpillars limit enjoyment of the outdoors for some people due to AGM larval droppings and defoliation (USDA 1995).

B. Preferred Alternative

The preferred alternative is the aerial application of Btk and placement of pheromone-baited traps.

Btk is a naturally occurring bacterium that has selective insecticidal activity against certain butterflies and moths. *Bacillus* is a large group of bacteria that occurs naturally in soil, water, air, plants, and wildlife. The subspecies, *kurstaki*, is part of the *Bacillus thuringiensis* biopesticide group that has been registered for more than 45 years for a variety of agricultural and nonagricultural uses. Btk is widely used in agriculture, both conventional and organic, and as a transgene in genetically engineered crops to control pests on a variety of crops. Btk also has multiple nonagricultural uses and has been the preferred insecticide for AGM and EGM eradication programs in the United States for several years. The specificity of Btk to certain insects is based on its mode of action which requires ingestion by lepidopteran larvae where, once in the midgut, the alkaline pH breaks down the crystalline proteins that produce the toxins which bind to the midgut cells in the larvae (Cooper 1994). The alkaline conditions and binding sites present in the midgut of lepidopteran larvae are not present in mammals and most other nontarget organisms. The ecological and human health effects associated with the preferred alternative were examined in the 1995 final EIS and the 2012 supplemental EIS for GM management in the United States (USDA 1995, 2012) as well as previous EAs for EGM and AGM that are located at the APHIS website. This EA incorporates by reference the preferred alternative evaluation in both EIS documents. A summary of ecological and human health impacts is provided below.

1. Ecological Impacts

The impacts to ecological resources from applications of Btk under the proposed alternative do not differ from those described in previous NEPA documents prepared for EGM and AGM by APHIS and WSDA and information provided in the EIS (USDA 1995, 2012). There will be minimal risk to most non-target terrestrial and aquatic organisms due to limited exposure and low toxicity (USEPA 1998; WHO 1999; USDA 2004).

Nontarget species (i.e., birds, mammals, amphibians, and reptiles) should not be affected by the proposed Btk treatments for this program. Available toxicity data for all terrestrial vertebrates indicate low toxicity (USEPA 1998; WHO 1999; USDA 2004). Although no direct effects to birds and wild mammals are expected, there is the possibility of indirect effects through the loss of invertebrate prey items which may serve as a temporal input into their diet. Based on the available data, indirect effects have not been noted in studies with wild mammals (Innes and Bendell 1989; Belloco et al. 1992); however, one study reports indirect reproductive effects to birds that rely on caterpillars as a primary food source (USDA 2004). Slight effects on reproduction in spruce grouse (such as nestling growth rates) were seen when applications occurred over large forested areas (Norton et al. 2001); nevertheless, in several other studies assessing impacts to a wide diversity of songbirds, no indirect effects on reproduction or other

endpoints were noted (USDA 2004). Bird populations that may occur in Cowlitz County are not expected to be impacted by the loss of prey items. In addition, the proposed treatment area is small compared to the foraging areas that birds may use. Finally, only some lepidopteran larvae will be impacted in the potential treatment area, while other terrestrial insects will be available as prey items for birds.

Effects to most nontarget terrestrial invertebrates are not expected except for lepidopteran larvae, with early instars more sensitive than later instars. Impacts to some native lepidopteran larvae within the treatment block may occur; however, the effects are minimized due to the expected small size of the blocks and specificity of Btk to the larval stage of the insect. The proposed Btk applications are timed to coincide with the early larval stages of AGM, increasing the efficacy of treatments to AGM. Timing applications to coincide with the most sensitive life stage of AGM reduces the need for applications beyond the number proposed further reducing the risks to non-target Lepidoptera. Non-target lepidoptera present in the spray block as early larval stages may be impacted however there is variability in the sensitivity of moth and butterfly species to Btk (Peacock et al. 1998) so not all non-target lepidopteran species would be impacted. Btk is not effective against adult Lepidoptera and is less effective against later instar larvae therefore further reducing the risk to non-target Lepidoptera that may be present during treatment. Native lepidoptera sensitive to Btk and present in spray blocks during treatment as early larval stages could be impacted, however these impacts would be restricted to areas within and adjacent to each treatment block. No federally listed threatened or endangered lepidopteran species are expected to be present in the proposed treatment area. The short half-life of Btk and relatively small treatment blocks suggest that risk to native lepidoptera would be short term and these areas would be recolonized quickly. Label requirements and other restrictions, where appropriate, will further reduce exposure risk to sensitive organisms.

In general, due to Btk's unique mode of action, toxicity to pollinators and beneficial insects are considered low based on laboratory and field studies testing honey bees, as well as other beneficial insects (USEPA 1998; Sterk et al. 2002; USDA 2004; Bailey et al. 2005; Duan et al. 2008). Effects to honey bees, in particular, are not expected based on the available published studies designed to evaluate short- and long-term effects from exposure to Btk or *Bt*-related proteins (USEPA 1998; Sterk et al. 2002; Bailey et al. 2005; Duan et al. 2008). These studies evaluated impacts to larval and adult honey bees from oral or contact exposures with no lethal or sublethal impacts noted at concentrations above those expected from the proposed use pattern for Btk in this program.

Btk is not expected to be of significant risk to aquatic resources in this program due to the low toxicity of Btk to aquatic organisms and the lack of significant exposure. Multiple freshwater and saltwater fish species were tested in the laboratory to determine what level of Btk exposure would result in any effect (USDA 2004). The levels required to produce an effect were much higher than any potential off-site residues that would occur because of this program (USDA 2004). There have been laboratory studies supported by field data which suggest that exposure

could result in some effects to aquatic invertebrates at environmental concentrations above expected values in this program (Kreutzweiser et al. 1992; Richardson and Perrin 1994; USDA 2004). However, studies showed that *Daphnia magna*, mayflies, stoneflies, copepods, and mysid shrimp were not affected when exposed to concentrations well above those expected in the environment after application of Btk (USDA 2004). Therefore, it is unlikely that fish and other aquatic organisms will be negatively impacted using Btk in the proposed AGM eradication program. In addition to the lack of effects to aquatic organisms from Btk exposure, the label does not allow application to water or where surface water is present which will reduce the potential for exposure to aquatic resources.

After application, exposure to light, higher temperatures, and moisture decrease the amount of Btk remaining in the environment. In a summary of studies regarding the environmental fate of Btk, the majority of studies indicated that insects were only affected for approximately one week; however, other studies have shown that while persistence of Btk in the environment may decrease rapidly, the insecticidal activity can persist up to three months under certain environmental conditions (USDA 1995). Btk's persistence in water depends on organic matter content and salinity (USDA 1995). Btk has been found in aquatic field studies for up to 13 days, and in some studies up to four weeks, after application (USDA 1995). Variations in environmental fate are attributable to various factors, including environmental conditions, formulation chemistry, study protocols, and sampling substrates.

Repeated use over years in an area could result in the accumulation of Btk spores in the soil, potentially above natural background levels in the soil (EFSA, 2020). The Program does not expect an accumulation of Btk in soil because repeated use in one location over multiple years is not anticipated based on historical treatments. Rather, the Program makes three to five treatments 7-10 days apart, followed by monitoring for 3 years to ensure the treatment was effective.

Disparlure, or cis-7,8-epoxy-2- methyloctadecane, is a synthetically produced sex pheromone of the natural pheromone that is used by the female AGM to attract the male AGM. It is the lure used in baited traps. In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 2006). Disparlure does exhibit some toxicity to aquatic invertebrates; however, the effects are related to study design and the limited solubility of the pheromone (USDA 2006). Studies using the freshwater flea, *Daphnia magna*, revealed toxicity was related to the organisms becoming physically trapped at the water surface where undissolved pheromone was present (USDA 2006). Risks to aquatic organisms are not expected in this program because all pheromone will be placed in sticky traps, thus eliminating any potential offsite run-off or drift. Pheromone traps do catch small numbers of nontarget organisms that accidently fly or crawl into the traps. However, because the pheromone in the trap is specific to AGM, nontarget insects will not be attracted to traps. The number of nontarget organisms affected will be very low and the pheromone will have minimal impacts to the environment. The traps used to monitor for AGM after Btk treatment will pose minimal risk to most non-target terrestrial and aquatic organisms due to limited exposure and low toxicity.

(1) Migratory Bird Treaty Act

AGM Program activities may temporarily disturb migratory birds. Some examples of anticipated disturbance associated with program activities includes the use of off-road vehicles and noise.

To minimize impacts to migratory birds, The Program will conduct as many activities as possible outside of the nesting season. However, USDA-APHIS expects that some activities will take place during migratory bird breeding. For example, treatments would take place between late April and May. In some instances, it may be possible to establish a buffer zone around ground-nesting breeding birds until nestlings have fledged or breeding behaviors are no longer observed. The Program also may establish site-specific migratory bird conservation measures, as needed, prior to beginning any program activities.

(2) Bald and Golden Eagle Protection Act

As discussed under the no action alternative, bald eagles may occur within Cowlitz County. If bald eagles are discovered in or near an area to be treated, the State agency responsible for the area would contact the USFWS and implement recommendations for avoiding disturbance at nest sites. For bald eagles, USDA-APHIS would follow guidance as provided in the National Bald Eagle Management Guidelines (USFWS 2007). These guidelines include a 330−660-foot buffer from an active nest, depending on the visibility and level of activity near the nest. In cases where aerial applications are proposed over known eagle nests USDA-APHIS or WSDA will work with the USFWS regarding potential requirements for any permits that could result in disturbance of bald eagles. To date no active eagle nests have been observed in or adjacent to the proposed spray block. USDA-APHIS expects Btk exposure to terrestrial and aquatic nontarget organisms to be very low, and subsequently, the potential for exposure and risk of eagles to Btk is very low. USDA-APHIS expects disturbance from other activities such as survey to be negligible.

(3) Endangered Species Act

Section 7 of the Endangered Species Act (ESA) and ESA's implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. USDA-APHIS has considered the impacts of the proposed program regarding listed species in the proposed Program area.

Although removal of GM from the habitat of some federally listed species would be beneficial, program activities potentially could adversely affect listed species and their habitats. Possible adverse effects include toxicity of program insecticides to listed animal and plant species, decreased water quality from erosion and direct impacts caused by trampling of listed plants during survey and treatment activities.

USDA-APHIS has determined that the proposed Asian Gypsy Moth Eradication Program may affect but is not likely to adversely affect the Lower Columbia River steelhead (*Oncorhynchus*

mykiss), Lower Columbia River coho salmon (*Oncorhynchus kisutch*), and the Lower Columbia River chinook salmon (*Oncorhynchus tshawytscha*) or their designated critical habitat and requested National Marine Fisheries Service (NMFS) concurrence with these determinations.

USDA-APHIS has determined that the proposed Asian Gypsy Moth Eradication Program may affect but is not likely to adversely affect the marbled murrelet (*Brachyramphus marmoratus*), streaked horned lark (*Eremophila alpestris strigata*), yellow-billed cuckoo (*Coccyzus americanus*), and bull trout (*Salvelinus confluentus)*. The proposed program will have no effect on the golden paintbrush (*Castilleja levisecta*). The proposed program will also have no effect on critical habitat because none occurs in the proposed treatment area. USDA-APHIS requested USFWS concurrence with these determinations.

USDA-APHIS prepared biological assessments and submitted them to each agency on December 14, 2020. USDA-APHIS received concurrence from NMFS and FWS on March 9, 2021.

2. Human Health

The impacts to human health from applications of Btk under this proposed alternative do not differ from those described in previous NEPA documents prepared for EGM and AGM by USDA-APHIS and information provided in the EIS (USDA 1995, 2012). USDA-APHIS expects the human health risks to be minimal from both Btk applications based on its long-term safety demonstrated through laboratory and monitoring studies (Noble et al. 1992; Aer'Aqua Medicine Ltd. 2001; Siegel 2001; Pearce et al. 2002; Parks Canada 2003; USDA 2004; Otvos et al. 2005). Btk has low acute mammalian oral, dermal, and inhalation toxicity and pathogenicity (McClintock et al. 1995; USEPA 1998; WHO 1999; Siegel 2001; USDA 2004). The European Food Safety Authority (EFSA 2020) reports observations of allergenicity, indicated through increased immunoglobulin E (IgE) levels, in greenhouse workers exposed to products containing Btk; however, there were no effects on occurrence of respiratory symptoms or lung functions.

Concerns have been raised regarding the pathogenicity of Btk and the production of enterotoxins (which are summarized in a publication from an anti-spray advocacy group) (Ginsberg 2006). Btk belongs to a group of bacteria within the *Bacillus* genus, including *Bacillus cereus*, which has been linked to foodborne illness incidents via the production of enterotoxins which can cause gastrointestinal symptoms, such as diarrhea. The Centers for Disease Control report that *B. cereus* is responsible for approximately 0.6 percent of the total number of foodborne illness cases reported between 1988 and 1992, as well as between 1998 and 2002 (USEPA 1998; Center for Disease Control 2006).

Btk has been shown to produce low levels of enterotoxin in cultures; however, no reported foodborne illness cases have been affirmatively linked to Btk biopesticides in more than 45 years of extensive use.

Several biopesticide strains, including the strain found in Foray 48B (ABTS-351), exhibit mid-level enterotoxicity (Johler et al. 2018). Despite the presence of enterotoxins, the hazard potential

for Btk strain ABTS-351 is likely limited by the lack of sphingomyelinase (SMase), an enzyme that acts synergistically with certain enterotoxins. Other biopesticide strains, including *Bt* subspecies *aizawai* strain ABTS-1857 which was implicated in a salad-related food poisoning outbreak in Germany (EFSA 2016), produce SMase. The lack of pathogenicity may be related to the relatively low levels of enterotoxin produced in Btk compared to *B. cereus* (Damgaard 1995), or the enterotoxins are not typically present in commercial formulations that are produced in North America. Siegel (2001) reported that enterotoxins may be degraded during the fermentation process, or that the isolates used may not produce enterotoxins under the conditions of the fermentation process. In addition, impacts of *B. cereus* enterotoxin are only realized in cases where the enterotoxin can multiply under appropriate conditions; this does not appear to occur for Btk in the environment. This is supported by a lack of gastrointestinal symptoms linked to Btk applications by workers or the public, and laboratory studies that report no enterotoxin production in rats orally dosed with Btk or associated symptoms (USEPA 1998; USDA 2004; Wilcks et al. 2006). The lack of reported gastrointestinal symptoms associated with Btk use in workers and the general public, as well as a lack of effects observed in laboratory studies, indicate factors other than the presence of enterotoxin are required to cause symptoms similar to those in *B. cereus* (Federici and Siegel 2008). Immune response and infectivity data for Btk, as well as results from surveillance studies, suggest that immune-related adverse effects in the general public are unlikely (USDA 2004; Federici and Siegel 2008).

Several epidemiology studies have been published based on surveillance data from applications like those proposed in this program in the United States, Canada, and New Zealand. These studies are summarized in several publications and indicate that no significant adverse effects were reported in the general population, including sensitive subgroups, such as children or people with asthma (Noble et al. 1992; Aer'Aqua Medicine Ltd. 2001; Siegel 2001; Pearce et al. 2002; Parks Canada 2003; USDA 2004; Otvos et al. 2005).

One of the larger monitoring studies conducted in association with forestry Btk applications was in New Zealand (Aer'Aqua Medicine Ltd. 2001). Applications to an area containing approximately 88,000 residents were monitored using self-reporting of adverse effects, as well as information from participating physicians. Results from the study demonstrated no Btk-related cases of anaphylaxis, incidences of birth defects, or changes in birth weight, meningococcal disease, or infections. Adverse effects that were self-reported during the study were related to dermal, respiratory, and eye irritation.

Petrie et al. (2003) conducted a study to investigate the impacts of an aerial application of Foray 48B on self-reported symptom complaints and visits to health care providers after applications in West Auckland, in 1999, to control the painted apple moth. A group of 292 residents within the spray area were questioned prior to treatment, with only 192 residents (or 62 percent) responding after treatment. The authors of the paper assessed the frequency of 25 potential health problems before and after treatment. Of these 25 symptoms, including sleep problems, dizziness, difficulty concentrating, irritated throat, itchy nose, diarrhea, stomach discomfort, and gas discomfort, 8

were found to have increased after application. These results are similar to those reported from the same area by an advocacy group opposed to the spray (Blackmore 2003; Goven et al. 2007). Petrie et al. (2003) states that sleep problems, dizziness, and difficulty concentrating may be related to anxiety regarding perceptions about the risk of the program. A significant increase in participants with hay fever symptoms was noted; however, this may be incidental, as the authors point out, because the onset of the pollen season could have influenced reporting. The authors attribute the gastrointestinal symptoms to possible enterotoxin production from the microbial insecticide; however, this possibility is not supported by any available literature, and no other additional information is offered. The authors do not discuss the possibility that the gastrointestinal symptoms may be related to the reported anxiety from the perceived risks of the application. In addition, the statistical comparisons that were utilized in the study are not considered appropriate for the multiple comparisons that were made (USDA 2004; Federici and Siegel 2008). A review of the study and the application of conservative statistical analysis more appropriate for multiple comparisons revealed that none of the endpoints were found to be statistically significant (USDA 2004). The authors point out that the results should be interpreted with caution as only slightly more than half of the original residents responded post-application through self-reporting which could bias the results. It is important to note that there was no increase in the frequency of visits to general practitioners or other health care providers after treatment which is consistent with results from other surveillance studies of Btk applications.

USDA-APHIS acknowledges aerial treatments can cause people stress. WSDA conducts additional public outreach and education, such as distributing information bulletins and sending postcards to remind residents for the treatment dates) (see the public outreach section). A continuation of local outreach and education will minimize anxiety and health concerns associated with these treatments.

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. Glare and O'Callaghan (Glare and O'Callaghan 2000) provide 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 (WHO 1999) states "*Bt* products can be used safely for the control of insect pests of agricultural and horticultural crops as well as forests."

Applicators who handle concentrated material may experience mild irritation of the eyes, skin, and respiratory tract. However, risks to applicators will be minimized if Foray 48B is handled according to label requirements.

Btk has other uses including organic and inorganic crop, and home and garden uses. The amount of Btk the Program may use in a treatment block, and the size of future treatment blocks, is unknown; however, there would be an expected increase in environmental loading of Btk with

the proposed treatments. However, the impacts from additional Btk use, relative to other stressors are expected to be incrementally negligible to human health and the environment due to the very low risk of Btk to non-target species and human health and its favorable environmental fate characteristics.

Disparlure belongs to a group of compounds known as straight-chain lepidopteran pheromones. Acute toxicity studies with this group of compounds have shown very low mammalian toxicity through multiple exposure routes. The lack of toxicity with these types of compounds has resulted in reduced data requirements for their registration by the EPA (USEPA 2004). Subchronic and chronic studies are limited for these types of chemicals; however, given the low acute toxicity and the fact that pheromones occur naturally in the environment, human health risks are expected to be minimal. The reduced data requirements introduce uncertainty into potential long-term risks; however, the lack of significant exposure to the public (given its use in sticky traps and the limited amount used in the proposed program) substantially reduces the potential for exposure and risk. Human health risks are expected to be minimal from using pheromone-baited traps in this program based on disparlure's long-term safety and the fact that it would be unlikely that humans would be exposed to the pheromone in the traps. The potential for exposure is greatest to workers who handle the concentrated product; however, following label requirements will minimize exposure.

C. Other Considerations

1. Environmental Justice

Federal agencies identify and address disproportionately high and adverse human health or environmental impacts of proposed actions on minority and low-income populations, as described in Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The no action alternative does not pose any highly disproportionate adverse effects to minority or low-income populations. Treatments made under the preferred (proposed) alternative is based on AGM finds in the area. The proposed treatment itself will have minimal effects to those that live in this area and will not have disproportionate effects to any minority or low-income population.

2. Executive Order 13045 "Protection of Children from Environmental Health Risks and Safety Risks"

Consistent with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, USDA-APHIS considered the potential for disproportionately high or adverse environmental health and safety risks to children. The no action alternative does not pose any highly disproportionate health or safety risks to children. Under the preferred alternative, children within proposed treatment blocks are not expected to be adversely affected disproportionately more than adults from the proposed program actions. No schools or parks are in the proposed treatment area so exposure to children from the proposed Btk treatments are not likely. Btk applications are not proposed to any crops where dietary exposure would occur and

there are no anticipated impacts to drinking water resources. Btk has low toxicity and risk to the human population, including children.

3. Historic and Cultural Resources

The National Historic Preservation Act of 1966, as amended (16 United States Code (U.S.C.) §§ 470 et seq.), requires Federal agencies to consider the potential for impact to properties included in, or eligible for inclusion in the National Register of Historic Places (36 C.F.R. §§ 63 and 800) through consultation with interested parties where a proposed action may occur. This includes districts, buildings, structures, sites, and landscapes.

USDA-APHIS has examined the proposed action considering its impacts to national historical properties. USDA-APHIS queried the National Register of Historic Places (USDOI 2021) for properties that are in the proposed Program area. There are no historic properties within the proposed treatment boundary.

Executive Order 13175 *Consultation and Coordination with Indian Tribal Governments* calls for agency communication and collaboration with Tribal officials for proposed Federal actions with potential Tribal implications. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and Tribal lands.

USDA-APHIS contacted the Cowlitz Tribe on November 30, 2020 regarding the proposed AGM eradication program. USDA-APHIS will work with the Tribe to answer any questions or address concerns regarding the proposed AGM eradication program.

IV. Listing of Agencies Consulted

NOAA Fisheries
West Coast Region
510 Desmond Drive SE, Suite 103
Lacey, WA 98503

U.S. Fish and Wildlife Service
Ecological Services Field Office
510 Desmond Drive SE, Suite 102
Lacey, WA 98503

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Plant Health Programs
4700 River Road, Unit 134
Riverdale, MD 20737

Washington State Department of Agriculture
Natural Resources Building
P.O. Box 42560
1111 Washington St. SE
Olympia, WA 98504-2560

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
33400 9th Ave. S., Suite 200
Federal Way, WA 98003

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
Environmental and Risk Analysis Services
4700 River Road, Unit 149
Riverdale, MD 20737

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