

Environmental Assessment

Gypsy Moth Eradication Program

Southeast Eugene, Lane County
January 27, 2009

Lead agency	Oregon Department of Agriculture
Cooperating agency	USDA, Animal and Plant Health Inspection Service
For further information contact	Plant Division Oregon Department of Agriculture 635 Capitol St. NE Salem, OR 97301- 2532 (503) 986-4636 <i>USDA, APHIS</i> Airport Business Center 6135 NE 80th Ave., Suite A-5 Portland, OR 97218-4033 (503) 326-2814

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A. Purpose and need for action

1. Decisions to be made and scope of analysis

Decisions

The Oregon Department of Agriculture (ODA), in cooperation with USDA, Animal and Plant Health Inspection Service (APHIS), proposes to eradicate a gypsy moth infestation in Lane County, Oregon. At this time funding for this program is pending. There is nothing new that we are proposing that has not been analyzed in the 1995 final Environmental Impact Statement (EIS) for Gypsy Moth Management in the United States. A draft supplement to the EIS is now completed. The draft supplemental EIS includes new information on additional treatment options and up-to-date risk assessments for the bacterial insecticide *Bacillus thuringiensis* var. *kurstaki*. Therefore, no new EIS programmatic analysis other than that found in the EIS and its supplements needs to be conducted. The proposed action to eradicate isolated gypsy moth infestations in Oregon conforms to integrated pest management principles required by Oregon law, ORS 635.655. The need for this proposed action is based on the potential ecological and economic impacts of gypsy moth infestations on the surrounding areas, the entire state of Oregon, and indeed, the entire western United States.

Tiering

This Environmental Assessment is tiered to the USDA's 1995 final EIS for Gypsy Moth Management in the United States and its supplement (a draft version is now available). Copies of the EIS are available for inspection at the Oregon Department of Agriculture in Salem. The preferred alternative in the 1995 EIS is Alternative 6: Suppression, Eradication, and Slow the Spread. Under this alternative, we propose eradication because of the isolated nature of gypsy moth infestations in Oregon. This site-specific Environmental Assessment is designed to examine the environmental consequences of a range of treatment options under Alternative 6 that may accomplish the program's goals.

Biology of gypsy moth

Gypsy moth, *Lymantria dispar* L., is one of the most damaging pests of trees in the United States. It was originally imported into Massachusetts from Europe in 1869 for silk production experiments. Some moths were accidentally released and became established. The gypsy moth has spread relentlessly and now covers the entire northeastern part of the United States from Maine south to North Carolina and west to Illinois and Wisconsin. Outbreaks of gypsy moth caterpillars can alter ecosystems. Defoliation of trees and plants as a result of caterpillar feeding can alter wildlife habitat, change water quality, reduce property and esthetic values, and reduce the recreational value of forests. Heavy gypsy moth infestations not only cause defoliation and mortality, but defoliated trees are more susceptible to attack by other insects and diseases that may kill them. When present in large numbers, gypsy moth caterpillars can be a hazard to human health and safety and disrupt people's lives, as well as be a nuisance (USDA 1995, EIS pp. 1-4).

Gypsy moths are notorious hitchhikers. Egg masses and pupae can be transported on nursery stock and Christmas trees, but can also be attached to other substrates such as vehicles, camping equipment, and outdoor household articles that people bring with them when they come to Oregon. The wide host plant range of gypsy moth would allow it to establish throughout western Oregon and where hosts

occur in eastern Oregon. Gypsy moths were first detected in Oregon in 1979 and have been detected every year since then in many different isolated locations. These have been primarily in western Oregon, but recently it was found east of the Cascades mountain range in Bend (Deschutes County), Wasco (Sherman County), and Baker City (Baker County).

Two strains of gypsy moth now threaten Oregon: European gypsy moth and Asian gypsy moth. Gypsy moths introduced into Oregon from Europe or eastern North America are referred to simply as gypsy moths in this document. Asian gypsy moths are a strain of the same species that come from eastern Russia and Asia. The two strains look very similar; they cannot be reliably separated by visual examination. Scientists have developed genetic tests to distinguish one strain from the other (Garner and Slavicek 1996). However, the Asian gene markers in these tests are also present at low frequencies in established gypsy moth populations in eastern North America (Bogdanowicz et al. 1997). These genetic results indicate that hybridization between the two strains is likely and that the hybrids may pose an equal threat to Oregon.

Female Asian gypsy moths differ from European females because they can fly long distances, whereas European females cannot fly. The Asian strain also feeds on a more extensive range of host trees, including some (e.g., larch) that are not favored by the European strain. Asian gypsy moth caterpillars also develop more quickly and are larger than their North American counterparts.

Asian gypsy moth egg masses have been transported to Oregon on ships. As trade with east Asia continues to expand, containers and products from that part of the world will present an ever increasing risk of introduction. Asian gypsy moths may also reach Oregon via Europe. They have become established in Germany and other European countries where they are hybridizing with European gypsy moths.

A sobering example of how easily these pests can be introduced took place in 1993 in North Carolina. A ship carrying military cargo from Germany was infested with large numbers of gypsy moths, including flying female moths typical of the Asian strain. The ship was sent back out to sea and the cargo was fumigated, but not before large numbers of moths were seen headed for shore. Hundreds of male moths were trapped near the port facilities, along the shore, and up to 25 miles inland. Genetic testing indicated that both European and Asian strain moths were present as well as some that were apparently hybrids (North Carolina Department of Agriculture 1994).

The Oregon Department of Agriculture and the U.S. Department of Agriculture cooperate to eradicate gypsy moth infestations whenever they are detected in Oregon. A brief history of the major infestations and eradication programs follows.

History of gypsy moth infestations in Oregon

The first gypsy moth in Oregon was trapped in 1979 in Lake Oswego, Clackamas County. Follow-up trapping indicated that the infestation did not become established. However, in the early 1980's detection programs revealed established gypsy moth infestations in Salem, Corvallis, Portland, and Gresham. Effective eradication programs were implemented using various insecticides [acephate, carbaryl and *Bacillus thuringiensis* (*B.t.k.*)].

The largest infestation ever found in the western United States was discovered in 1984 in Lane County. Traps in Eugene and Lowell caught large numbers of

male moths in the summer of that year. Trapping densities were then increased and over 19,000 male gypsy moths were collected from a 355 square mile area. In the spring of 1985, 226,405 acres of Lane County were sprayed with *B.t.k.* in the first phase of an eradication program. In 1986, 189,011 acres were sprayed, followed by 7,135 acres in 1987, and 2,995 acres in 1988 -- all with *B.t.k.* Aerial treatments consisted of three applications each year. Following the 1988 spring treatment, delimitation trapping caught only 1 moth. The total cost of detection, eradication, and trapping for Lane County from 1984 to 1989 was estimated to be \$18 million.

Two moths were subsequently caught in the Eugene/Springfield area in 1989 and 1990 and one moth was caught in 1991. Follow-up delimitation trapping indicated these were new introductions that did not become established. No gypsy moths were caught in Lane County in 1992 and no eradication programs were required from 1989 through 1994. However, in 1995 an 80-acre aerial spray program using *B.t.k.* was conducted to eradicate a breeding population in Veneta (Lane County). The program was a success. In 1995 three moths were trapped at another site near Dorena Lake and Schwarz Park (in Lane County) and 34 moths were trapped in 1996. This resulted in the smallest gypsy moth aerial spray program ever conducted in Oregon. Seventy acres were aeri ally sprayed with *B.t.k.* in the spring of 1997. In 2004, 183 acres were treated by air with *B.t.k.* in the south hills of Eugene to eradicate an infestation. Subsequent trapping indicated that the eradication effort was a success.

Several eradication programs have been conducted in the Portland metropolitan area. An infestation of gypsy moths was detected in east Portland in 1985. In 1986 a new eradication technique developed by USDA-APHIS (Induced Inherited Sterility Technique) was implemented. The area was inundated with sterile insects in an attempt to disrupt normal mating. Results of post-release monitoring indicated that the program was unsuccessful; a residual gypsy moth population remained. Treatment with *B.t.k.* eliminated the infestation in 1988. Small 4-acre areas were treated with ground applications of *B.t.k.* in Lake Oswego in 1989 and 1991.

Another large eradication program in the state was completed in 1992 on 8,388 acres in North Portland. Ships that had visited Russian ports brought the Asian gypsy moth to Oregon via the Columbia River. *B.t.k.*, applied by helicopter, was used to eradicate the subsequent infestation. A second Asian gypsy moth infestation was successfully eradicated in 2001 in Portland's Forest Park. This treatment consisted of an aerial application of *B.t.k.* over 910 acres. More recently, 640 acres were treated in the spring of 2007 in St. Helens (west of Portland) for a single, large Asian gypsy moth that was caught in the summer of 2006. No Asian gypsy moths were caught there in 2007 or 2008.

Eradication programs for the North American gypsy moth were also carried out at eight sites in 1993, 1994, 1996, 1998, and 1999 in the Portland metropolitan area. The 1996 eradication program was conducted on a 10-acre area in Gresham and SE Portland. In 1998, two eradication programs were conducted in suburbs of Portland, one in Beaverton on a 22-acre area and the other in Lake Oswego on a 13-acre area. The Beaverton site was re-treated in 1999, although the eradication boundary was shifted slightly. Additional trap catches of 19 gypsy moths in the summer of 1998 on both sides of the eastern spray boundary indicated that another treatment was necessary. All of these programs utilized ground applications of *B.t.k.* (because of the small areas and easy access) followed by mass

trapping. In 2004, a gypsy moth infestation was found at a commercial nursery in Eagle Creek, Clackamas County. Infested spruce nursery stocks had been imported from Ontario, Canada. Three aerial applications of *B.t.k.* over 268 acres successfully eradicated this infestation in 2005.

Infestations have also been eradicated in other parts of the state. Gypsy moth was successfully eradicated in Josephine County in 1988 and 1992 at two small sites. Other eradication programs were successfully conducted in Benton County in 1993 (440 acres near Philomath), Clackamas County in 1994 (270 acres near Carver), and Lincoln County in 2003 (706 acres near Fisher). All of the treatments included the use of helicopters to apply *B.t.k.* Three infestations of gypsy moth have been treated in Jackson County. In 1995 a small infestation in Jackson County was ground-sprayed with *B.t.k.* In 2001, 160 acres were aerially treated with *B.t.k.* in Ashland. Last year (2008) 336 acres in Shady Cove were sprayed with *B.t.k.* by helicopter to eradicate a gypsy moth infestation.

The first central Oregon eradication program was carried out in Deschutes County in spring 2007. Three aerial treatments of *B.t.k.* were applied to 533 acres in Bend. The source of this gypsy moth infestation was an eBay purchase of Chevy car parts (vintage 1967) that were shipped from Connecticut to Bend in January 2005. No additional moths were caught in 2007 or 2008; the gypsy moth has been eradicated.

For a review of gypsy moth detection and eradication programs in Oregon from 1979 through 1988, see Oregon Department of Agriculture (1989) and Oregon Department of Agriculture Plant Division Annual Reports (1995-2007). Hitchhiking gypsy moths will continue to be introduced into Oregon and other non-infested western states. With continual introductions via commercial trade and a mobile human population, the probability of gypsy moths becoming permanently established in Oregon and in the West is increasing. However, until that happens eradication of all isolated infestations that result from accidental introductions will continue to be the goal of the U.S. Department of Agriculture and the Oregon Department of Agriculture.

2. Proposed action

Proposed action: Eradication

The proposed action is eradication, which conforms to the EIS recommendation to eradicate isolated infestations found in the western United States. The EIS proposes alternative actions that include eradication, slow the spread, suppression, and no action. These alternatives are based on the known geographical distribution of the gypsy moth in the continental United States.

Gypsy moth distribution and abundance in the continental United States is described as follows: a) the area of the United States where the European strain of the gypsy moth is established is called the generally infested area b) a 50-100 mile band adjacent to this area is called the transition area, where the gypsy moth is spreading from the generally infested area c) the area where the gypsy moth is not established is called the uninfested area. Isolated infestations resulting from accidental spread of the gypsy moth are found in this area. Different management strategies are carried out in each of these three areas: suppression in the generally infested area, slow- the-spread in the transition area, and eradication of isolated infestations in the uninfested area. If the Asian strain is detected, an eradication program may be conducted in all areas, including the generally infested area.

Our proposed action for Lane County in 2009 is based on trapping results from 2007 and 2008. In 2007, single gypsy moths were caught in two traps about 0.6 miles apart in southeast Eugene. Delimitation trapping in 2008 caught six gypsy moths in four traps near one of the 2007 positive sites: three of the moths were caught in a delimitation trap behind a residence where one of the gypsy moths was caught the previous year; three other moths were caught in three delimitation traps in the same area. Another moth (the seventh) was caught approximately 1.5 miles north of this site in a detection trap and is outside of the proposed eradication area. Two moths were also caught in a detection trap about 3.5 miles southwest of the other positive catches. This site is also outside of the proposed eradication area. All moths were submitted to the USDA Otis Pest Survey, Detection and Exclusion Laboratory and were determined by genetic analysis to be the North American strain.

We conducted interviews and egg mass searches in the surrounding neighborhood in late summer and fall 2008 but were not able to trace the source of introduction. There are an abundance of host plants in the area, including white oak, maple, birch, apple, willow, and alder. The information available to date indicates that the southeast Eugene site has a breeding gypsy moth population.

Alternatives considered

Six alternatives were considered in detail in the 1995 EIS:

- 1) No action. The U.S. Department of Agriculture would do nothing to reduce the adverse effects of the gypsy moth in the United States. No suppression, no eradication and no slow the spread would occur. Implementation of alternative 1 would not reduce damage, prevent establishment, or slow the spread of the gypsy moth.
- 2) Suppression. The U.S. Department of Agriculture would reduce the adverse effects of the gypsy moth only in the generally infested area. Implementation of alternative 2 would help reduce damage caused by the gypsy moth in the generally infested area of the continent.
- 3) Eradication. The U.S. Department of Agriculture would reduce the potential adverse effects of the gypsy moth only in the uninfested area, and of the Asian strain anywhere in the United States. It would not slow the spread in the transition area. Implementation of alternative 3 would prevent the establishment of gypsy moth populations in the uninfested area and the Asian strain would be eradicated wherever it is found.
- 4) Suppression and Eradication. This combines alternatives 2 and 3. The U.S. Department of Agriculture would reduce the potential adverse effects of the gypsy moth in both the generally infested and uninfested areas, and of the Asian strain anywhere in the United States. Alternative 4 represents no change from the current program.
- 5) Eradication and Slow the Spread. The U.S. Department of Agriculture would reduce the potential adverse effects of the gypsy moth in both the uninfested and transition areas, and of the Asian strain anywhere in the United States. Implementation of alternative 5 would prevent the establishment of gypsy moth populations in the uninfested area and slow the natural spread of the insect in the transition area. The Asian strain would be eradicated wherever it is found, including the generally infested area when the source of the introduction is known.

- 6) Suppression, Eradication, and Slow the Spread. The U.S. Department of Agriculture would fully pursue its goal of reducing adverse effects of the gypsy moth (including the Asian strain) anywhere in the United States. A full range of strategies would be available nationwide to manage affected ecosystems. This is the preferred alternative. Implementation of alternative 6 would help reduce damage in the generally infested area, prevent the establishment of the gypsy moth in the uninfested area, and slow the natural spread of the insect in the transition area. The Asian strain would be eradicated wherever it is found, including the generally infested area when the source of the introduction is known.

Treatment options

Treatment options available under the 1995 EIS are:

- 1) *B.t.k.* This biological insecticide contains a bacterium, *Bacillus thuringiensis* var. *kurstaki*. The insecticide is specifically effective against caterpillars of many species of moths and butterflies, and is without significant risk to healthy humans, wildlife, and the environment.
- 2) Diflubenzuron (Dimilin). This insect growth regulator interferes with the growth of some immature insects.
- 3) Gypsy moth virus. The nucleopolyhedrosis virus, which occurs naturally, is specific to the gypsy moth. Gypchek is an insecticide product made from the gypsy moth nucleopolyhedrosis virus.
- 4) Mass trapping. Large numbers of pheromone traps are used to attract male gypsy moths and prevent them from mating with females, thereby causing a population reduction. An effective trap density for mating disruption is nine or more traps per acre.
- 5) Mating disruption. Tiny plastic flakes or beads embedded with synthetic gypsy moth sex pheromone are disseminated aurally. The pheromone may confuse male moths and prevent them from locating and mating with females.
- 6) Sterile insect releases. Large numbers of radiation-sterilized gypsy moth eggs or pupae are released in a treatment area and develop into adults. Subsequent mating between sterile and fertile adults prevents the development of viable offspring. If the program is successful, the population will be reduced and eventually eliminated.

The preferred option proposed for this eradication project is option 1) *B.t.k.*; Mass trapping (option 4) at a density of up to 3-9 traps/acre will be employed after the eradication program to determine its success. Mass trapping can also remove any remnant gypsy moths that were not killed by the *B.t.k.* treatment.

3. Need for action

Goals and objectives

Goal

Eradicate the gypsy moth infestation from Eugene, Lane County in order to avoid economic and ecological impacts described under Need for Action.

Objective 1

Apply the biological insecticide *B.t.k.* to 626 acres centered on the Eugene site where three gypsy moths were caught in one trap in 2008 on Dillard Road (see the enclosed Eugene eradication area map). *B.t.k.* will be applied three times by air at a rate of 24 billion international units (i.e., 24 billion cabbage looper units, aka, B.I.U.) per acre about 7-14 days apart starting in late April or May; exact timing depends on weather. Ideally, the *B.t.k.* application should target early instar stages of gypsy moth. It is likely that a small buffer area surrounding the eradication area will receive some *B.t.k.* but in quantities much less than in the eradication area.

Objective 2

Delimit and intensively trap treated and surrounding areas using gypsy moth pheromone traps to determine the effectiveness of the *B.t.k.* treatment and to pinpoint any remnant gypsy moth populations. Trap densities in the core area will be 3 to 9 traps per acre. If more moths are caught, additional egg mass searches and treatments will be considered. If only one or two moths are caught after the treatment, the area will be intensively trapped each year until no moths are caught for two consecutive years. Two years of negative trapping results indicate that the gypsy moth is eradicated.

Need for action

The gypsy moth has been a non-native destructive insect pest of trees and shrubs in the eastern United States and its native Eurasia for many years. Gypsy moth larvae emerge from overwintering egg masses in the spring and can feed and develop on leaves of more than 500 species of trees and shrubs. An average of four million acres is defoliated each year in the eastern United States (EIS 1995). In Oregon, adults typically emerge from mid-July through August. Detection and delimitation trapping is conducted during these peak flight times. After mating, females lay egg masses that contain up to 1000 eggs. Oregon has many species of host plants that would be damaged by gypsy moth, including those in forested and natural areas, agricultural lands, and urban areas. The gypsy moth would negatively affect the economy, natural resources, environmental quality, and potentially human health in Oregon should it become established.

Economic impacts

An established population of any gypsy moth strain in Oregon would have very serious economic impacts for some residents and industries in the state. Although it is expected that the Asian strain would spread more quickly than the North American strain (because of female flight ability and the broader host range), the economic impacts of quarantines resulting from any non-suppressed gypsy moth population are expected to be immediate.

Quarantines

Eradication of gypsy moth infestations in Oregon is essential to the health of agricultural, horticultural, and forestry enterprises of the State. These Oregon industries are economically viable only when their products can be marketed in other states and countries. As an exporter of plant products, Oregon must comply with plant pest and disease regulations of market states and countries.

In 1984 the Lane County gypsy moth infestation led California, the most important market state for Oregon, to place an embargo on all forest products

and live plant material originating from that county. Although this embargo was soon replaced with a more reasonable USDA “high hazard” gypsy moth quarantine, the disruption of normal marketing relationships remained.

Christmas tree growers near the more intense infestation sites were required to fumigate their trees before interstate movement and were subject to loss of export markets. Individual growers claimed losses as high as 80 percent from the cost of the fumigation process, with some claims as high as \$200,000. For the following five years (until 1989), all Christmas tree growers inside the quarantine area were required to apply chemical insecticides to obtain certification for interstate movement; thus, their production costs and pesticide usage in the area increased.

Oregon is the number one producer of Christmas trees in the U.S. and failure to eradicate the gypsy moth would have led to an increasingly negative impact on the industry. Approximately 90 percent of the Christmas trees grown in Oregon are exported and the industry value in 2007 is about \$109 million. Similarly, about 85 percent of the nursery stock grown in Oregon is exported to other states and countries. The value in 2007 of this sector is about \$988 million (Oregon Agripedia 2008). Greenhouse and nursery products have been Oregon’s most economically valuable commodities since 1994. The Christmas tree industry has also increased steadily during the last several years. Oregon’s most lucrative markets are states that are geographically the closest and that are also free from the gypsy moth. There would be serious quarantine restrictions on nursery stock in infested areas should Oregon fail to exclude the gypsy moth.

State and federal quarantines imposed on wood products industries during the Lane County infestation in 1984 did not seriously affect these businesses. Nevertheless, limitations imposed by compliance agreements with the Oregon Department of Agriculture affected product movement and handling procedures. If the new gypsy moth infestation in Lane County is allowed to spread, similar embargoes and quarantines would be implemented and most likely become increasingly restrictive and expensive.

The potential impact of gypsy moth quarantines on Oregon would be similar to those outlined in a risk assessment of European gypsy moth for British Columbia (B.C.) (Carlson et. al. 1994). It concludes: “The commitment by western States to preserve their export markets by excluding gypsy moth compels B.C. to follow suit. If B.C. were to allow gypsy moth to become established, trade and quarantine sanctions would be imposed by all the western states.” Further, “costs [of trade sanctions] would likely exceed the current detection and eradication strategy costs by a factor of at least ten to one. The threat of trade barriers through quarantine restrictions in the western states ... presents a significant incentive for continued detection and eradication. B.C. could conceivably be denied access to its most important markets. The social and economic impacts resulting from these barriers to trade would likely be unacceptable for most British Columbians.” In fact, both the USDA and Canadian Food Inspection Agency enacted a quarantine in response to a large gypsy moth infestation in Vancouver Island in B.C. between 1998 and 1999.

Reforestation

The immediate economic threat of gypsy moth to the forest products industry is quarantine, but the long-term impact on reforestation projects may be just as important. Douglas fir and western hemlock have proven to be viable hosts for gypsy moth caterpillar in laboratory studies (Miller et al. 1991a, 1991b). Some

defoliation of Douglas fir was observed in heavily infested areas of Lane County in 1984. Young conifers that are important timber species may suffer reduced growth or mortality when they are defoliated. Historically, hardwoods have not been considered of economic importance to the timber industry, but now they are receiving greater scrutiny from researchers and foresters. Gypsy moth infestations in Oregon would decrease the economic potential of hardwoods that presently cover 2 to 3 million acres in Oregon. Some companies are working specifically with hardwoods as they become more economically important in the western U.S.

Tourism

Oregon ranks fourth in the nation in the number of visitors to state parks and natural recreation areas. Native hardwood species that are good hosts for gypsy moths contribute significantly to the scenic beauty of Oregon. If gypsy moths become established in Oregon and defoliate areas where these species occur, visitors to the state would lose full use of the parks and campgrounds. Caterpillar feeding can create unwanted droppings on all types of outdoor equipment and caterpillar hairs can be irritating to humans. Areas known for their scenic beauty could be negatively affected and use of facilities by tourists could be decreased. May and June are important tourism months in Oregon. The value of tourism to Oregon in 2007 was about \$8.3 billion. A significant proportion of visitors come from states that are also concerned about the gypsy moth. If gypsy moths become established in Oregon, it is expected that these states would impose serious limitations on recreational vehicles returning from Oregon.

Ecological impacts

Keeping the gypsy moth out of Oregon is also essential to protect the state from adverse ecological effects. One of these effects is that gypsy moth feeding can lead to changes in forest stand composition. Oaks, alder, willow, hazelnut, and other deciduous hosts are preferred by gypsy moths and can suffer mortality from repeated defoliation. Oak trees in the East have been killed by repeated defoliation and have been replaced by other vegetation. The number of acres defoliated by gypsy moth in eastern states has fluctuated over the past five years: 175,000 acres in 2004, 798,000 acres in 2005, 1.3 million acres in 2006, 1.33 million acres in 2007, and 1.59 million acres in 2008 (GM Digest 2008). This level of defoliation can severely impact watershed function.

Ecological consequences of large-scale defoliation include negative impacts on wildlife. Animals feeding on acorns from oak trees would be directly affected. Nesting sites and cover would be reduced. Defoliation of riparian areas would cause short-term increased, but long-term reduced water output and increased air and water temperatures. Salmon, trout, and other aquatic species might leave affected areas or die. A study of stream water quality in gypsy moth-defoliated watersheds in the East found increased nitrate levels and decreased acid neutralizing capacity; thus, gypsy moth defoliation of trees and shrubs in riparian areas could exacerbate the effects of acid rain (Downey 1991). Defoliation of riparian, watershed, and other critical areas and of specific plant species could jeopardize threatened or endangered species or species of concern (plant, insect, or certain wildlife species). Sample et al. (1993) found that gypsy moth defoliation reduced both the abundance and species richness of Lepidoptera (butterflies and moths) in the affected area. In short, the ecological effects of gypsy moth becoming established in the West are expected to be substantial.

Specifically, defoliation of riparian and other critical areas by the gypsy moth in Eugene could expose the Willamette River and its watershed to more direct sunlight and increase the water temperature (through loss of shade), which could negatively impact salmon and other fish species in the area. Other threatened and endangered species or species of concern may also be negatively affected due to gypsy moth defoliation and its resulting habitat modification. For example, streams and riparian areas could become contaminated with excessive excrement from caterpillar feeding and increased nitrate levels.

Environmental quality

While it is difficult to predict the extent of environmental damage that the gypsy moth will cause by defoliation, it is not difficult to predict that pesticide use will increase when it is established. Even at relatively low levels of infestation, pressure is increased to use chemical sprays to certify certain plant products, including Christmas trees, nursery stock, and forest products, for interstate marketing. Storage sites for these products would likely receive more pesticide treatments, as would residential areas within urban and suburban settings. Parks and campgrounds would also require treatments to make forested areas fully usable. Every year, thousands of acres of trees are treated to control gypsy moth in the East; 542,951 acres were treated to suppress populations in the generally infested area and 413,516 acres were treated in the transition (slow the spread) area in 2008 (GMDigest 2008).

Human health

Some people are allergic to the tiny hairs on gypsy moth caterpillars (Tuthill et al. 1984). These people could suffer minor allergic reactions, primarily rashes, if the gypsy moth becomes established in Oregon. During gypsy moth outbreak years, caterpillars crawl over sidewalks, patios, lawn furniture, etc. They may even invade houses. In heavily infested areas, large numbers of caterpillars limit some people's enjoyment of the outdoors.

4. Authorizing laws and policies

The US Department of Agriculture has broad discretionary statutory authority to conduct gypsy moth management activities. The following is a list of authorizing laws and policies.

Federal

The Plant Protection Act of 2000 (7 CFR 401-442) and Cooperative Forestry Assistance Act of 1978 as amended (16 USC 2101-2105). These statutes authorize, among other things, the development of USDA activities for the regulation of the artificial spread of the gypsy moth from the quarantined area, and the eradication of isolated gypsy moth infestations outside this area.

7CFR 301.45. This regulation establishes a federal gypsy moth quarantine covering infested areas of the U.S.

1988 Memorandum of Understanding between the USDA Forest Service and USDA Animal and Plant Health Inspection Service for Management of the Gypsy Moth.

State

ORS 570.305. This statute gives broad enabling authority to eradicate dangerous insect pests and plant diseases. It states that "the director [State Department of

Agriculture], and the chief of the division of plant industry, are authorized and directed to use such methods as may be necessary to prevent the introduction into the state of dangerous insect pests and plant diseases, and to apply methods necessary to prevent the spread, and to establish control and accomplish the eradication of such pests and diseases, which may seriously endanger agricultural and horticultural interests of the state, which may be established or may be introduced, whenever in their opinion such control or eradication is possible and practicable.”

ORS 634.655. This law requires that state agencies with pest control responsibilities follow the principles of integrated pest management (IPM). IPM is defined as “a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency pest management objectives.”

ORS 634, State Pesticide Control Act. This law regulates the formulation, distribution, storage, transportation, application, and use of pesticides in Oregon.

5. Environmental laws and their relationship to this analysis

Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (7 USC 136). This Act requires that all insecticides used in suppression or eradication projects be registered with the Environmental Protection Agency and that application requirements be followed.

National Environmental Policy Act of 1969 (P. L. 91-190 42 USC 4321 et. seq.). This Act requires detailed and documented environmental analysis of proposed federal actions that may affect the quality of the human environment. The courts regard as federal actions any state actions for which federal funds are granted.

Endangered Species Act of 1973 (16 USC 1531 et. seq.). This Act prohibits federal actions from jeopardizing the existence of federally listed threatened or endangered species or adversely affecting designated critical habitat. Federal agencies must consult with the U.S. Fish and Wildlife Service to determine the potential for adverse effects from any federal action. Federal agencies are also responsible for improving the status of listed species.

B. Public involvement and issues

Efforts are made to address issues and concerns among individuals and organizations that will be affected by the proposed gypsy moth eradication project. A public information meeting notice was sent to residents in the proposed eradication area and adjacent properties in Eugene on February 2, 2009 and to Eugene city and Lane County government offices. In addition to sending letters with the date and location of the meeting to residents, concerned parties, and other individuals, such information is also published three times in the local newspaper before the meeting. A copy of the meeting notice appearing in the local newspaper is included in Appendix A. The public information meeting notice also includes information on the gypsy moth situation, ODA's eradication proposal, and the availability of the draft Environmental Assessment. Letters indicating ODA's proposal and a draft copy of the Environmental Assessment were also mailed to interested individuals and parties on February 2, 2009. Copies of the public information meeting letter, draft Environmental Assessment, and other information were also placed on the ODA website.

ODA scheduled the public information meeting for Eugene on February 19, 2009 at the Calvary Fellowship, 4060 W Amazon Dr., Eugene, OR 97405 at 7:00 p.m. The comment period on the draft Environmental Assessment will end on March 6, 2009.

General concerns that have been brought up in previous gypsy moth eradication programs in Oregon include:

- 1) **Human Health.** Concern has been expressed about direct or indirect human exposure to insecticides (especially for children, pregnant women, and people with severe immune disorders). Monitoring of human health during the application process is an additional concern. Concerns have been expressed regarding the aerial application of biological insecticides (*B.t.k.*) to urban and rural areas, especially in relation to direct or indirect contamination of drinking water, watersheds, wells, garden crops, and organic produce certification. Some people have been concerned that inert ingredients are not subject to disclosure. Some of the inert ingredients are approved for use in foods. Opinions were expressed about the need for developing an organic formulation of *B.t.k.* product for gypsy moth eradication projects. This may reduce people's anxiety over undisclosed inert ingredients. Concern has also been expressed about human allergic reactions to caterpillars if gypsy moth infestations are not eradicated.
- 2) **Public Education.** A need for increased public education about the gypsy moth problem and the possible effects of eradication measures has been expressed.
- 3) **Public Involvement and Notification.** Concern has been expressed about adequate public involvement in the decision-making process concerning eradication procedures and methods, and about adequate notification of treatment dates, areas, cancellation, reschedule dates, and plans to ensure public safety.
- 4) **Environmental Effects.** Concern has been expressed about the possible effects of insecticides, including biological insecticides, on non-target organisms, such as natural enemies of the gypsy moth, wildlife, honeybees, locally farmed livestock, pets, fish ponds on private properties, aquatic insects, and other Lepidoptera (moths and butterflies). Concern has also been expressed about the possible adverse effects of gypsy moth defoliation on wildlife, water quality, timber value, and other forest resources in affected areas.
- 5) **Alternatives to Eradication Programs.** Opinions have been expressed about a need for research on the behavior of the gypsy moth in Oregon to determine which natural enemies might maintain populations at low levels. Concern has been expressed about the viability of an eradication approach and the need for long range planning and research for an integrated pest management approach to suppression.
- 6) **Gypsy Moth Quarantine.** During the 1984 Lane County infestation, a need was expressed for a rapid reduction in the population of gypsy moths to reduce or eliminate the gypsy moth quarantines imposed on the infested portions of that county. During the last several years, concerns have been also expressed about how to prevent introduction of the gypsy moth or Asian gypsy moth from infested states or countries through quarantine or other methods, especially when the pathway is known.

- 7) **Economic Effect.** Concern has been expressed about the possible negative impact of the gypsy moth on the forest and nursery industries if infestations are allowed to expand unchecked. Concern has also been expressed by Christmas tree growers, in particular about the negative impact of the gypsy moth on their markets. Concern has been expressed by landowners about the possible negative effects of a continued gypsy moth infestation on property values.
- 8) **Compliance with State Law.** Concern has been expressed about ODA's authority in eradicating the gypsy moth. State laws (ORS 570.305 & ORS 634.655) apply to gypsy moth eradication projects (see previous section A 4).

Similar concerns were documented in the 1995 final EIS Appendix C, page C4-C10, All of these issues and concerns were considered when reviewing the range of treatment options available to accomplish the goal of eradication of the current gypsy moth infestation in Oregon. The 1995 EIS addressed three principal issues in detail:

- 1) How does the presence of gypsy moth affect people and the environment?
- 2) How do insecticidal treatments applied affect people and the environment?
- 3) How do noninsecticidal treatments applied affect people and the environment?

Most of the concerns and issues raised in gypsy moth eradication programs in Oregon fall into one of the three categories addressed in the 1995 EIS and its supplement. Readers are encouraged to consult the 1995 final EIS and the supplemental EIS for details.

Citizens and organizations are urged to write to the Insect Pest Prevention and Management Program Manager of the Plant Division of the Oregon Department of Agriculture with their concerns about the gypsy moth problems and the proposal to employ an eradication IPM program. Postal address, email address, and telephone numbers were provided to the public and concerned parties and individuals in all mailings. Areas of concern expressed will be summarized and presented to the Director of the Oregon Department of Agriculture for evaluation prior to her decision regarding implementation of the Department's proposal or another alternative. Written comments from concerned parties and individuals on the draft EA will be included in the final EA.

C. Affected environment

Location

The eradication area consists of approximately 626 acres in southeast Eugene, Lane County, that will be aerially treated with *B.t.k.* It is likely that a small buffer area surrounding the eradication area will receive some *B.t.k.*, but in quantities much less than inside the eradication area. Movement of *B.t.k.* beyond the eradication area is likely to be affected by conditions such as temperature, humidity, wind direction, wind speed, and terrain. Standard buffer areas used around control areas in gypsy moth suppression programs in the eastern US are typically 200 to 500 feet.

The proposed gypsy moth eradication area encompasses two sites where single gypsy moths were caught in 2007 and four sites where six gypsy moths were caught in 2008, including three moths that were caught in one trap. The eradication area includes four city parks: Kinney Frank Park, Shadow Wood

Park, Skyline Park, and a newly acquired parcel of 40 acres in the Amazon Creek headwaters. Most of the eradication area is within the Eugene city limits, except for another park, Dylard Skyline Park (that borders Skyline Park). The exact location is within T18S R3W S16, 17, 20, and 21. The East Fork Amazon Creek runs from the south to north along the western portion of the eradication area. The northwest corner of the boundary begins at N 44.00753, W -123.07815 (GPS readings of the latitude and longitude), at the end of Y Way, and proceeds due east for approximately 5150 feet, along 43rd Avenue, and 400 feet east of Spring Blvd. at N44.00750, W -123.05853. From this point it turns 90 degrees south and proceeds 5295 feet to a point 370 feet south of Hidden Meadows Dr. and 300 feet west of Allbritain Ln. at N 43.99297, W -123.05858. The boundary continues due west for 5150 feet to a point 1785 feet south of the intersection of Martin St. and Amazon Dr. at N 43.99303, W -123.07816. From this point the boundary turns 90 degrees north and continues for 5,295 feet to the starting point (see map of southeast Eugene, next page).

There are over 1500 residences and one school (Eugene Christian School) within the eradication area. Most residences are single-family homes, but there are some apartment complexes. There is also an assisted living residence. There are no businesses in the 626-acre area. The area is hilly and ranges in elevation from 450 feet along Amazon Creek to 1200 feet on Mt. Baldy peak. Trees are abundant within the area and include a mixture of Douglas fir (up to 200 feet tall), oak, maple, ash, and filbert. There is an understory of blackberry, vine maple, willow, sword fern, rhododendron, holly, and other plant species in the Amazon Creek headwaters. Many residential yards have landscaping and numerous other plant species. In addition, a long power line traverses the southern east-west length of the eradication area.

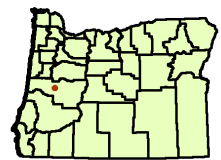
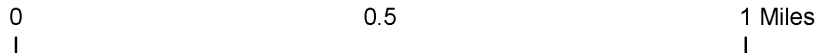
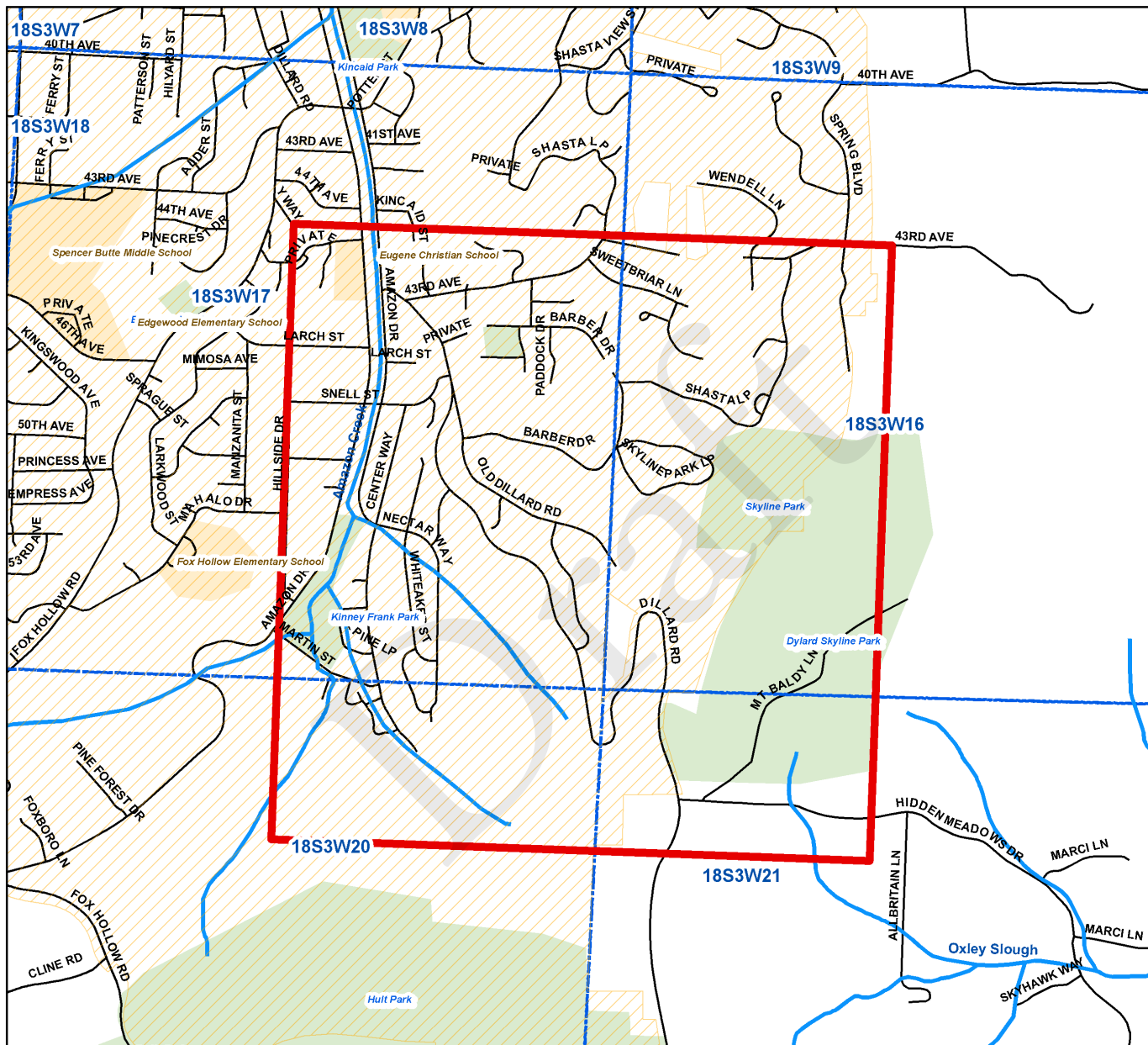
Environmental factors: federal and state listed species

Based on information provided by the U.S. Fish and Wildlife Service (USFWS), the Oregon Natural Heritage Information Center (ORNHIC), and National Marine Fisheries Service (NMFS), there are no federal or state listed endangered, threatened, or candidate vertebrate (birds, fish, mammals, reptiles, amphibians) or invertebrate species (insects, mollusks, arachnids, etc.) or species of concern within two miles of the proposed eradication area. However, there are five listed plant species within a two mile radius of the proposed eradication area (see table on p. 18). Two of the possible pollinators are butterflies, but both species are common and widespread in Oregon (Dornfeld 1980) and therefore could easily re-establish in the eradication area. Although these two species are documented as pollinators (Jackson 1996, Alverson and Kuydendall 1989), in general butterflies are not known to be efficient pollinators (USDA Forest Service). In fact, as a group, butterflies may not be considered pollinators at all (Wiklund 1979). Other insects such as bumblebees and solitary bees are likely more effective pollinators and are not affected by *B.t.k.*

Proposed 2009 Gypsy Moth Eradication Program Eugene, Lane County

Proposed 626 acre eradication area

It is likely that a small buffer area surrounding the eradication area will receive some B.t.k. but in quantities much less than inside the eradication area.



- Legend**
- eradication area
 - city limits
 - rivers, water



Prepared by: dkimberling
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 Datum: North American 1983
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 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Species	Federal Status	State Status	Insect Visitors/Pollinators
Bradshaw's desert-parsley (<i>Lomatium bradshawii</i>)	endangered	endangered	solitary bees, flies, wasps, and beetles (Kaye 1992)
Willamette Daisy (<i>Erigeron decumbens</i> var. <i>decumbens</i>)	endangered	endangered	field crescent (<i>Phyciodes campestris</i>)*, syrphid fly (Jackson 1996)
shaggy horkelia (<i>Horkelia congesta</i> ssp. <i>congesta</i>)	species of concern	sensitive-critical	unknown
wayside aster (<i>Aster vialis</i>)	species of concern	threatened	bumblebees, solitary bees, blister beetle, and the woodland skipper butterfly (<i>Ochlodes sylvanoides</i>) (Alverson and Kuydendall 1989)
tall bugbane (<i>Cimicifuga elata</i>)	none	sensitive-critical	bumblebees, syrphid flies, solitary bees (Kaye 1998)

* The field crescent butterfly and woodland skipper are abundant and found almost everywhere in Oregon (Dornfeld 1980). These species could easily re-establish in the eradication area.

Human factors

No unusual hazards are known in the proposed eradication area. There are about 1500 properties within the proposed 626-acre eradication area; most are single-family residences. No hospitals, or day care centers exist within the proposed eradication area, but there is one assisted living facility, the Emerald Valley Assisted Living Residence. There is a change of staff at 6:00 am every day. One church, the Calvary Fellowship, is within the eradication area near the northwest corner. One school, the Eugene Christian School, lies within the proposed eradication area near the northwestern corner. Parents drop off students at the school when it starts at 8:10 am. Teachers arrive around 7:45 am. Four other schools including Fox Hollow Elementary School, Spencer Butte Middle School, Edgewood Community Elementary School, and Ellis Parker Elementary School, are nearby and to the west or north of the eradication area. Several school bus routes serving these schools travel through the proposed 2009 eradication area. The bus for Spencer Butte Middle School runs between 8:10 am and 8:35 am and is in the vicinity of Dillard Rd. and E. 43rd Ave. Spencer Butte begins at 8:50 am each day. Another bus (RT 22) for Ellis Parker Elementary School enters the eradication area at 7:47 am at W. Amazon Dr. and E. 44th Ave., but leaves the area after that. Bus route 24 for Ellis Parker Elementary School runs within the eradication area between 6:50 am and 7:50 am. Ellis Parker begins at 8:00 am, but students start arriving around 7:15 am. Fox Hollow Elementary School is an alternative school (with no buses) that begins at 8:30. School buses do not run

again until after 1:00 pm. Two city buses (#25 and #28) run along W. Amazon Ave. The earliest of these, each running at half hour intervals in the morning, arrives at W. Amazon and Martin St. at 6:07 am. Both continue to run at one-hour intervals later in the day. Property lots in the area are relatively large with dense vegetation coverage, especially trees. The four city parks are popular with locals and are used by the public for walking, playing or family leisure activities. Skyline Park has popular hiking and jogging trails leading to the Mt. Baldy peak.

Tourism, recreation, education, forestry, and agriculture are probably among the most important industries affecting humans around Eugene. Eugene is located in the south end of the Willamette Valley where the Willamette River runs through the city. This provides good opportunities for recreation and tourism. Eugene, with the University of Oregon, is also a higher education center for the southern Willamette Valley. Some local residents have home orchards, gardens, or small wood lots. In Oregon, Lane County ranked 11th in agriculture production in 2007 with a total value of \$139 million. It is expected that the establishment of the gypsy moth will adversely affect these industries because trees and shrubs in private wood lots, the university campus, city streets and parks, and other recreation areas are suitable plant hosts. Broadleaf trees are important components of the local flora, especially along the rivers and streams, and are preferred hosts of the gypsy moth. Parks and recreation areas with defoliated trees and shrubs would be less attractive to tourists and local citizens.

Effects of the alternative treatment options on the human environment (including minority and low-income populations) are expected to be similar for all human populations regardless of nationality, gender, race, or income. No disproportionately high and adverse human health or environmental effects on minority populations and low-income populations are expected as a result of implementing actions described for the preferred alternative.

D. Alternatives

Pesticide application: ground vs. air

If a chosen alternative includes pesticide sprays, the pesticide can be applied from either ground (i.e., truck or trailer mounted sprayers) or air (i.e., helicopter or airplane mounted sprayers). Ground sprays are preferred for small eradication areas if the road system is adequate to allow access to all parts of the block. If access is restricted or if the area is large, then aerial sprays are usually more practical, less disruptive to residents and wildlife, and more economical.

1. Treatment options under the 1995 EIS

The treatment alternatives for the proposed eradication program in Eugene are analyzed in the 1995 gypsy moth EIS and its later supplement. These alternatives are considered as treatment options for any gypsy moth eradication programs in the U.S. Six alternatives are available to carry out an eradication program:

- 1) *Bacillus thuringiensis* var. *kurstaki*
- 2) Diflubenzuron (Dimilin)
- 3) Gypsy moth virus
- 4) Mass trapping
- 5) Mating disruption
- 6) Sterile insect release.

2. Alternatives not considered in detail

Treatment alternatives 2, 3, 5, and 6 listed above are not considered for use this year for this gypsy moth eradication program. The rationale follows:

Diffubenzuron (Dimilin) is an insect growth regulator that has a broader non-target host range than *B.t.k.* and it can kill many other insects besides moth and butterfly caterpillars. Its use may adversely affect other insect populations, including beneficial ones.

Gypsy moth virus (Gypchek) is very host specific, but it is not widely available in the market and it is still somewhat experimental for eradication programs. The effectiveness of gypcheck has been variable.

Mating disruption is still an experimental method and its effect on gypsy moth infestations is variable. This alternative has been used more frequently in recent years in slow-the-spread programs in eastern states but has not been used for eradication in western states.

Sterile insect releases are also experimental and their effect on gypsy moth suppression is variable.

These alternatives are not considered in detail because the probability that they are able to achieve the program goal of eradication has been judged to be too low or cannot be determined.

3. Alternatives considered in detail

Proposed action

Options considered for use under the proposed action's eradication program are *B.t.k.* and mass/intensive trapping. The two options meet state and federal gypsy moth program goals and adhere to USDA's EIS guidelines. In our opinion, *B.t.k.* is the best option for gypsy moth control because it has proven effective as an eradication treatment. Since 2008, an organic formulation of *B.t.k.* became available after many years of public pressure. This organic formulation will be the one we propose to use. Application of *B.t.k.* poses little risk to human health or the environment. The host range of *B.t.k.* is limited to lepidopteran (moth and butterfly) caterpillars. There are no threatened or endangered species of Lepidoptera in or near the proposed eradication area in Eugene. Mass trapping removes male moths from the environment, thus reducing the probability of males finding females for mating. It can be an effective control tool when a gypsy moth infestation is small, but its effectiveness is variable when gypsy moth populations are large. Mass/intensive trapping can be an excellent monitoring tool to detect the presence of gypsy moth adult males, and is best used to determine the effectiveness of *B.t.k.* applications after an eradication program.

B.t.k. - The biological pesticide, *B.t.k.*, is now commonly the material of choice for gypsy moth eradication programs in the United States. In the past decades, improved formulations and more concentrated applications of *B.t.k.* have increased gypsy moth larval mortality and have provided more consistent foliage protection where it has been used. Aqueous *B.t.k.* formulations do not affect aquatic organisms and can be applied over open water. *B.t.k.* is relatively expensive because three applications (two in ground programs) are usually required to ensure eradication.

Oregon has had over 20 years of experience using *B.t.k.* to eradicate the gypsy moth. Two applications of *B.t.k.* by ground or three applications by air during late April and May have proven effective in eradication programs. Other western states, including California, Idaho, Utah, and Washington, have experienced similar success with the use of *B.t.k.* in their eradication programs (USDA APHIS1994). A review of eradication options for British Columbia also supports the use of *B.t.k.*; it concludes: “multiple applications of *Bacillus thuringiensis* var. *kurstaki* (*B.t.k.*) should be the primary choice for eradication (Surgeoner 1994).

Trapping - Mass/intensive trapping involves the placement of gypsy moth pheromone traps at very high densities (up to 9 traps/acre). These traps attract male gypsy moths and are the same ones used for annual state-wide detection surveys. Mass trapping has been tested as an eradication tool, but results have been unreliable. This method, however, is very useful when used in combination with other methods. Not only does mass trapping remove male moths from the breeding population, but it can also be used to evaluate the success of treatments and delimit any residual populations.

No action

The no-action alternative is required by Council of Environmental Quality regulations (40 CFR 1502.14(d)). The no-action alternative forms the basis for a comparison between meeting the project needs and not meeting the project needs. This alternative provides baseline information for understanding changes associated with the action alternative and expected environmental responses to an introduced species. Selecting this alternative would allow existing environmental conditions, including those associated with an established gypsy moth population, to continue on a natural course.

4. Preferred action alternative

The preferred alternative is to use the biological pesticide *B.t.k.* in conjunction with mass/intensive trapping. Eugene is suitable for aerial applications because of the size of the area (number of acres) and variable terrain. Three aerial applications of *B.t.k.* at a rate of 24 B.I.U.s per acre would be applied to a 626-acre eradication area in Eugene in 2009. The three treatments are planned to begin in late April about 7-14 days apart. Exact timing depends on weather conditions. It is likely that a small buffer area surrounding the eradication area will receive some *B.t.k.* but in quantities much less than in the eradication area.

Following *B.t.k.* treatments, an intensive mass trapping program will be used to monitor the effectiveness of the *B.t.k.* applications and to delimit the location of any remaining populations. Trap densities in the core area will range from 3 to 9 traps per acre.

E. Environmental consequences

This section will address the effects of the preferred action alternative on the affected environment for the proposed eradication site. Two areas of effects, human health and environment, were analyzed in detail in the 1995 gypsy moth programmatic EIS and its later supplement and are hereby incorporated by reference.

Bacillus thuringiensis var. *kurstaki*

B.t.k. is a naturally occurring soil bacterium. It is toxic to most caterpillars (larvae of butterflies and moths) when it is sprayed on foliage and ingested by them. Other insects and vertebrates are not affected by this bacterium. Human health risks from use of *B.t.k.* in a gypsy moth eradication program are believed to be extremely low. Modern aqueous formulations of *B.t.k.* contain no organic solvents. None of the inert ingredients in these formulations are on EPA list 1 (Inerts of Toxicological Concern) or list 2 (Potentially Toxic Inerts). In addition, all of the inert ingredients are FDA approved for use in foods or in food processing. *B.t.k.* products are exempt from residue tolerances by EPA. This means that there are no limitations on the amount of material allowed on food items. *B.t.k.* can be used on food crops up to and including the day these products are harvested, as well as on stored food products. Some genetically modified crops such as corn now have *B.t.k.* genes permanently incorporated in them. The World Health Organization (WHO) reviewed and established environmental health criteria for *Bacillus thuringiensis* and published a book on the topic (WHO 1999). The book concluded “owing to their specific mode of action, Bt products are unlikely to pose any hazard to humans or other vertebrates or to the great majority of non-target invertebrates.” Glare & O’Callaghan (2000) conducted an exhaustive world literature review of *B.t.* They concluded in their book *Bacillus thuringiensis: Biology, Ecology and Safety* that “the wealth of data currently available and experience of many years of broad-scale applications would suggest that Bt is one of the safest pesticides currently available. . . . We view Bt-based products used at recommended field rates as safe to use, in terms of minimal non-target impacts, little residual activity and lack of mammalian toxicity.” A review of the environmental impacts of *Bacillus thuringiensis* by Canadian scientists (Joung & Cote, 2000) produced similar conclusions. Syracuse Environmental Research Associates, Inc. submitted a more recent and extensive review to the USDA Forest Service (2004). This review, “Control/Eradication Agents for the Gypsy Moth – Human Health and Ecological Risk Assessment for *Bacillus thuringiensis* var. *kurstaki* (*B.t.k.*) Final Report,” concluded that “Sensitive terrestrial insects are the only organisms likely to be seriously affected by exposure to *B.t.k.* or its formulations. All sensitive terrestrial insects are Lepidoptera and include some species of butterfly, like the endangered Karner blue and some swallowtail butterflies and promethea moths. At the application rates used to control gypsy moth populations, mortality rates among sensitive terrestrial insects are likely to range from approximately 80 percent to 94 percent or more. The risk characterization for other wildlife species is unambiguous: under foreseeable conditions of exposure, adverse effects are unlikely to be observed.” Further, “In terms of potential human health effects, formulations of *B.t.k.* are likely to cause irritation to the skin, eyes, and respiratory tract; however, serious adverse health effects are implausible. For members of the general public, exposure levels are estimated to be below the functional human NOAEL for serious adverse effects by factors of about 28,000 to 4,000,000 [4 million]. At the extreme upper range of exposure in ground workers, exposure levels are estimated to be below the functional human NOAEL for serious effects by a factor of 25. This assessment is based on reasonably good monitoring data, conservative exposure assumptions, and an aggressive and protective use of the available toxicity data.”

***B.t.k.* and human health**

If directly exposed to *B.t.k.* spray, some individuals (most likely project workers) may develop minor irritation of the skin, eyes, or respiratory tract. These effects are relatively mild and transient. Pathogenic effects are not likely, even in individuals with impaired immune systems. Allergic responses to *B.t.k.* are conceivable, but have not been documented. The most thorough human health studies of *B.t.k.* applications in populated areas have been reported by Green et al. (1990), Noble et al. (1992), USDA (1993), Aer'aqua Medicine Limited (2000), and Capital Health Region (1999). All five studies were carried out during large-scale gypsy moth eradication programs. No significant health effects attributable to the *B.t.k.* treatments were found. Table 9-4 and figure 9-1 from Appendix F of the 1995 EIS (USDA, 1995) clearly and concisely show human risks due to gypsy moth and all treatment alternatives including *B.t.k.*

Green et al. (1990) monitored human health in Lane County, Oregon in 1985 & 86 when *B.t.k.* was sprayed by helicopter over areas with a population of approximately 120,000 people. Three applications of Dipel® 8L were made in 1985. In 1986, three applications of either Dipel® 8L or Dipel® 6AF were used. Their conclusions were:

- 1) Telephone complaints to the Lane County Health Department from members of the public did not reveal any pattern of predominance of any symptom complex or of involvement of any single organ system. Symptoms were those common to any community, e.g., nausea, headache/dysphoria, rash, or angioedema.
- 2) Fifty-five cultures from patients, obtained for routine clinical purposes, were positive for *B.t.k.* Of these, 52 were assessed to be probable contaminants. The other three patients had preexisting medical problems, but *B.t.k.* could neither be ruled in nor out as a pathogen.
- 3) The level of risk for *B.t.k.* and other existing or future microbial pesticides in immunocompromised hosts deserves further study.

Noble et al. (1992) studied the human health effects of a 44,478-acre Asian gypsy moth eradication program using *B.t.k.* in Vancouver, British Columbia. Three applications of Foray® 48B were made with large airplanes, helicopters, and trucks. They found no significant effect of *B.t.k.* on human health.

USDA (1993) reported on health monitoring programs in Washington and Oregon during large *B.t.k.* eradications for Asian gypsy moth in 1992. Combined, these eradications covered approximately 124,000 acres in urban residential neighborhoods in Tacoma, Washington and Portland, Oregon. Between the two states, over 300 complaints of human illness were received primarily via telephone "hotlines." No cases of infection were confirmed although many people did report symptoms including allergic rhinitis (hayfever), viral gastroenteritis (intestinal flu), and skin rashes. The occurrence, frequency, and type of symptoms were indistinguishable from background illnesses that occurred in both *B.t.k.*-treated and non-treated areas.

Aer'aqua Medicine Ltd (2000) reported on methods and results of a health surveillance program during a two-year eradication spray program against the white-spotted tussock moth (*Orgyia thyellina*) in Auckland, New Zealand. The eradication program, carried out in the eastern suburbs of Auckland, used aerial and ground treatments of *B.t.k.*. The report concluded that there was no evidence

of a causal association between *B.t.k.* spray and human health effects or significant health problems during or after the spray treatment.

In 1999, The Capital Health Region of Victoria, British Columbia, coordinated a human health study of possible short-term health effects from aerial spraying of Foray 48B on south Vancouver Island. The study was performed as a necessary condition for the spray program to take place under a provincial order-in-council. The study included a survey of the health of asthmatic children in the region; a survey of the general health of the population; monitoring and analysis of visits to doctors' offices and hospital emergency departments; laboratory surveillance of clinical samples which contained *B.t.k.*; measurement of environmental levels of *B.t.k.*; and a review of self-reported complaints of health symptoms made to telephone information and support hotlines. The study's conclusions were:

“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 *B.t.k.*-based pesticide spray programs.”

Due to advances in scientific knowledge, the law requires that pesticides registered before November 1, 1984 must be reregistered to ensure that they meet current standards. In 1998 the United States Environmental Protection Agency (EPA) published a Reregistration Eligibility Decision *Bacillus thuringiensis* (EPA 1998) in which the agency 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.”

The Oregon Health Services (2003) has developed its recommendations for people affected by the proposed spray program. These recommendations are:

“Even though the spray is considered safe for humans, we recommend that people stay indoors during spraying, unless it is essential to be outdoors. You should be advised in advance by the Department of Agriculture when spraying will occur, so you may plan accordingly. This is general advice for the public. If you or someone in your home has a medical problem that they believe may be made worse by the spraying, talk to your health care provider.

If your drinking water source is from open surface water (e.g., creeks, streams, springs) and you are concerned about potential exposure, you may wish to shut off the intake during the spray and until you are satisfied that any water exposed to the spray has moved downstream of your intake. Alternative water sources in

the interim might include previously stored and covered water on site, bottled water, or water from a neighbor outside the sprayed area.

To avoid exposure, we recommend:

- Staying indoors during and for at least 30 minutes after spraying to allow droplets to settle.
- Waiting until the spray has dried before touching grass or shrubs. Cover playground equipment, sandboxes, benches, and lawn chairs before the spray or hose them off afterward.
- Washing exposed skin with soap and water if direct contact with the spray droplets occurs. If the material should get into your eyes, flush with water for 15 minutes.

Although we don't have evidence that *B.t.k.* will affect any given group of people, individuals with leukemia, AIDS, or any other physician-diagnosed causes of severe immune disorders, may consider leaving the spray area during the actual spraying. If you or someone in your home has one of these conditions, ask your doctor for advice about avoiding exposure before the spray project begins.

The *B.t.k.* product contains residues of grains and other foods used to help the bacteria grow. If you have serious allergies to foods or food preservatives, your health care provider may consult with the manufacturer of Foray® 48B, about the exact ingredients (Valent Biosciences: 847-968-4700, after hours 877-315-9819)."

This information will be sent to residents in the proposed eradication area in spray notices. Included in the spray notices are two Oregon Poison Center phone numbers for residents who are exposed to *B.t.k.* and have health-related questions. A phone number for Oregon Health Services is also provided for physicians with questions about specific patients. Oregon State University's National Pesticide Information Center website address and toll-free phone numbers are also listed. Oregon Health Services will be available to consult with physicians about *B.t.k.*, inert ingredients, and any possible health effects.

***B.t.k.* and environment**

***B.t.k.* and non-target Lepidoptera**

Some non-target lepidopteran larvae (caterpillars) present in the proposed spray area will likely be killed by the application of *B.t.k.* In turn, animals dependent on caterpillars for food may be affected. Drift may affect non-target Lepidoptera near the treatment area (Whaley et. al. 1998). However, depressions in caterpillar populations are expected to be temporary because recolonization from adjacent areas will occur and most insects have a high reproductive capacity. There have been several studies that have examined these effects.

During the 1986-87 gypsy moth program in Oregon, a study assessed the direct impact of *B.t.k.* on non-target Lepidoptera in the canopy of Oregon white oak (Miller 1990). The study found a significant reduction in the number of caterpillars collected in *B.t.k.* treated areas in the spring and early summer following treatment. By mid-August, no significant differences in numbers of caterpillars could be detected, but species richness was reduced in the treated blocks. Sampling conducted in the study areas a year after application (1987) revealed that Lepidoptera populations were continuing to recover. Two years after the spray (1988), there were no significant differences between the number

of caterpillars collected in treated and untreated plots and the number of species collected in treated blocks was not significantly different from pre-treatment levels in those blocks. However, a comparison of treated and untreated plots indicated that the number of species was still significantly less in treated plots (Miller 1990). Recovery of non-target Lepidoptera populations begins the same season after *B.t.k.* application, but some effects may linger for at least three years. Another study of *B.t.k.* effects on non-target butterfly communities in western Oregon showed similar impacts (Severns 2002). Species richness and density were negatively affected for two years following *B.t.k.* sprays in a gypsy moth eradication program. However, in the third year both indexes rebounded to the pre-spray levels.

Results from a study in West Virginia confirm that *B.t.k.*'s immediate effects are limited to immature Lepidoptera. Other insects, including most beneficial types, are not affected by *B.t.k.* applications (Sample et al. 1992). While the effects of *B.t.k.* application are most evident among larval Lepidoptera in the same year as the treatment, some effects on adults may not be observed until the year following treatment. Lepidopteran species with early season larval development experience the greatest impacts (Sample et al. 1993).

***B.t.k.* and aquatic insects**

Some aquatic insects are susceptible to different strains of *B.t.* (e.g., *B.t.* var. *israelensis* is used to control mosquitoes and black flies), but *B.t.* var. *kurstaki*, the strain used for gypsy moth control, is harmless to aquatic insects when it is applied at concentrations used in aerial treatments (Edit 1985, Kreutzweiser et al. 1992). When *B.t.k.* is used for gypsy moth suppression or eradication in blocks with open water, fish and other animals dependent on aquatic insects for food should not be affected by the *B.t.k.* treatments.

***B.t.k.* and birds**

A study in Oregon examined the indirect effects of *B.t.k.* on the reproductive success of insectivorous birds. The hypothesis was that food supply for the nestlings might be reduced. The study reported no significant differences between treated and untreated areas in numbers of eggs hatched and in nestling growth and development. When caterpillars were not available, the birds switched to other available prey (Gaddis and Corkran 1986, Gaddis 1987). Preliminary results from a study in Arkansas are similar: *B.t.k.* treatments did not have a significant effect on the breeding success of the Hooded Warbler (Lih et al. 1994).

***B.t.k.* and bats**

Some bats, including those species of concern listed in the section of Environmental Factors, feed primarily on moths. These bats might be affected by a decrease in available food in *B.t.k.* treated areas. Perkins and Peterson (1994), however, failed to find any significant differences in total bat activity or species diversity in *B.t.k.*-treated sites within a small aerial spray block when compared to non-treated control sites.

***B.t.k.* and natural enemies**

Field studies suggest that *B.t.k.* may indirectly affect gypsy moth parasitoids. At least two parasitoid species, *Cotesia melanoscelus* and *Rogas lymantriae*, had increased rates of parasitism in areas that were sprayed with *B.t.k.* (Wallner et al.

1983, Webb et. al. 1989). Field studies of insects other than Lepidoptera and their natural enemies have found little effect on other species or groups.

***B.t.k.* and water quality, soil condition, and microclimate**

Water quality and soil condition should not be directly affected by *B.t.k.*. *B.t.k.* is not likely to affect most aquatic organisms and is naturally present in soils worldwide. Since *B.t.k.* can reduce the amount of defoliation by leaf-eating caterpillars, it may also help to preserve microclimate conditions.

***B.t.k.* and recreation and agriculture**

The proposed application of *B.t.k.* should have a positive effect on tourism, recreation, forestry, and agriculture. Eradication of the gypsy moth will prevent defoliation of trees and other plants in the area and protect the economic and aesthetic value of these industries.

***B.t.k.* and domestic/farm animals**

Domestic animals (e.g., dogs and cats) and farm animals (e.g., cattle and horses) should not be affected by the *B.t.k.* applications proposed in this program. Although there are no known studies on direct exposure to *B.t.k.* and its effect on these animals, other studies have been conducted. There were no differences between untreated laboratory or wild animals and exposed animals (either through injection or ingestion). Species included mice, rabbits, sheep, rodents, and shrew (WHO 1999).

Intensive/mass trapping using disparlure

Disparlure is a chemical sex attractant that attracts male gypsy moths. Intensive/mass trapping involves use of large numbers of disparlure-baited pheromone traps – up to nine traps per acre. Section 5 from Appendix G of the 1995 EIS thoroughly discusses the ecological effects of disparlure, *B.t.k.*, and other treatment options on the environment.

Disparlure and human health

Data are not sufficient for a quantitative risk assessment. By analogy to other insect pheromones, risks of toxic effects, if any, are likely to be slight for the general public and workers. Disparlure is very persistent on and in the body. Individuals exposed to disparlure may attract adult male moths for prolonged periods of time (for 2 to 3 years). This may be a considerable nuisance in gypsy moth infested areas such as the eastern United States. In uninfested Oregon, however, no impact is expected. The level of exposure required to cause the attractant effect cannot be characterized, although the likelihood of this effect would most likely be greater for workers than for the general public.

Disparlure and environment

In acute toxicity tests, disparlure was not toxic to mammals (IBT 1972), birds (USDI Fish & Wildlife Service 1975), or fish (USDI Fish & Wildlife Service 1972). One field study showed no effect of disparlure on the level of parasitization by the wasp *Ooencyrtus kuvanae*, an egg parasitoid of gypsy moth (Brown & Cameron 1979). No studies were found in the published literature on the effects, if any, of disparlure on aquatic ecosystems. Pheromone traps do catch small numbers of non-target organisms. These incidental catches are unlikely to have significant environmental consequences.

Cumulative impacts

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agencies (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7, p. 28). Cumulative impacts resulting from an eradication program can be caused by 1) multiple treatments of the same area in the same season (e.g., three applications of *B.t.k.* in this program), 2) combining treatment types (e.g., *B.t.k.* and disparlure in this program) within the same project area and 3) retreatment of the same project area in the following season. Cumulative impacts may be additive resulting in a greater effect than the sum of the individual effects. The cumulative impacts in the proposed program in Eugene may be the three *B.t.k.* applications that extend the time of potential exposure and risk to a greater number of non-target Lepidoptera. However, because the proposed eradication area is relatively small, the opportunity for recolonization from the surrounding area is great. Another possible cumulative impact will be if the treatment needs to be conducted again in 2010 if the gypsy moth infestation is larger than expected. For example, if the gypsy moth spreads to areas larger than the proposed 2009 eradication area, i.e., larger than 626 acres in Eugene, then a larger area may be sprayed in 2010. If that happens, the cumulative impacts of the treatments over two consecutive years will extend the time of potential exposure and risk to a greater number of non-target Lepidoptera.

Mass trapping and delimitation using disparlure pose little or no risk to non-target organisms and do not produce cumulative effects. The risk of cumulative impacts from using disparlure after *B.t.k.* treatment is none to minimal. No or minimal effects on water quality, microclimate, or soil productivity are likely from *B.t.k.* or disparlure use and the risk of cumulative effects is none to minimal.

Summary

Alternative	Preferred	Human effect	Environmental effect	Program objectives
<i>B.t.k.</i>	Yes	Short-term minor effects are possible, but no long-term cumulative effects are anticipated.	Short-term effects on nontarget caterpillars are likely. Cumulative effects on nontarget species are not anticipated; recolonization will occur. No effects on water quality or forest and soil health.	Yes
Gypchek®	No	No effects.	No effects.	No
Diflubenzuron	No	No long or short-term effects anticipated at low exposure.	Effects are anticipated on nontarget insects and possibly aquatic arthropods. May affect soil health through impacts on arthropods that alter soil composition and structure	No
Mass trapping	Yes	No effects.	No effects.	Yes

Mating disruption	No	No effects.	No effects.	No
Sterile insect release	No	No effects.	No effects	No

Monitoring

A program using pheromone traps will be used to monitor the infestation and determine the success of the eradication project. Intensive trapping will continue until negative trapping results have been achieved for two years. This type of programmatic monitoring following *B.t.k.* treatment has been conducted in Oregon during the last two decades for all of the eradication programs.

Mitigation

The following standard operating procedures will be observed to safeguard human health and minimize effects on the environment. Procedures pertaining to both ground and aerial treatments are listed. Because we are proposing an aerial eradication project, the procedures for aerial treatments are applicable to this year's project.

Ground and aerial treatments

- The Oregon Department of Agriculture will work with Health Services of the Department of Human Services on measures that may be required to safeguard human health. They will provide the public with accurate information on potential risks from *B.t.k.* applications and any recommended personal protection measures.
- The *B.t.k.* insecticide will be applied according to label instructions.
- The public and other selected groups or organizations will be notified by project officials by letter, radio, television, newspaper, or other means of spray dates and places, as appropriate.
- Special emphasis will be placed on avoiding the spraying of areas outside designated eradication areas.
- Transportation of the *B.t.k.* insecticide will be supervised by project personnel to, within, and from the project areas.
- A safety, spill, and emergency response plan will be prepared.
- Species of concern and areas may be buffered as needed

Aerial treatments

Aerial *B.t.k.* applications (using a rotary atomizer as a spray device) will be made by a helicopter or fixed wing aircraft flying at or in excess of 50 feet above the tree canopy. Spray deposition cards will be utilized to monitor droplet size and coverage. In order to control aerial *B.t.k.* application in large blocks*, application aircraft may be accompanied by observation aircraft staffed with a fully qualified observer. Observers and application pilots will fly each spray block for familiarization before spraying.

The project pilots and their aircraft will adhere to all FAA requirements.

No *B.t.k.* will be applied aerially when:

- Wind velocity is zero or exceeds 10 miles per hour.
- Air temperature exceeds 80° F or is less than 38° F.
- Rain is predicted (>50 percent probability) to occur before adequate drying time has elapsed, i.e., within 6 hours of application.
- Foliage is covered with visible water drops. *B.t.k.* will be applied only when the target foliage has dried sufficiently.
- There is fog or poor visibility on the spray block or helispot.
- Relative humidity is less than 50 percent.
- The air turbulence (thermal updrafts, etc.) is great enough to disrupt the normal application.
- Temperature inversions are present with no air movement and are sufficient to interrupt the proper settling and penetration of material through the canopy.

Precautions taken during the *B.t.k.* application:

- School bus routes will not be directly sprayed when children are present.
- Helispot managers and other contract administrators can exercise shutdown authority when they observe aircraft safety or application violations.
- To prevent accidental release of insecticide due to faulty emergency release mechanisms, spray systems will be inspected to ensure that a positive locking mechanism is in place which will not trip accidentally, but only in response to pilot activation during an emergency. Application equipment will be monitored for leaks and equipment failures.
- Aerial *B.t.k.* application will be suspended whenever the *B.t.k.* does not appear to be settling in the target area.

*Small aerial projects may not require an observation aircraft.

F. Recommendation of the Oregon Department of Agriculture

The Oregon Department of Agriculture, Insect Pest Prevention & Management Section recommends that the gypsy moth infestation in Eugene be eradicated. The recommended strategy is to use the biological pesticide *Bacillus thuringiensis* var. *kurstaki* (*B.t.k.*) in conjunction with mass/intensive trapping. The *B.t.k.* product used would be either Foray® 48B or Dipel® 6AF (Appendix C). Both are aqueous formulations that have been used in previous gypsy moth eradication and control programs in rural and urban areas of Oregon and other states. We propose three aerial applications of *B.t.k.* at a rate of 24 billion international units (i.e., 24 billion cabbage looper units) per acre in a 626-acre eradication area in Eugene. The three treatments will begin in late April in Eugene, about 7-14 days apart. Exact timing depends on weather. Mitigation measures described in the 2009 Environmental Assessment for aerial applications will be followed. It is likely that a small buffer area surrounding the eradication will receive some *B.t.k.* but in quantities much less than inside the eradication area.

Following *B.t.k.* treatments, intensive/mass trapping programs will be used to monitor the effectiveness of the *B.t.k.* applications and to delimit the location of any remaining populations in Eugene. Trap density will be 3 to 9 traps per acre. If more moths are caught, additional egg mass searches and treatments will

be considered for 2010. Two years of negative trapping results following the treatments will indicate the infestation has been eradicated.

G. Conclusion

The environmental analysis conducted by ODA has determined that the proposed gypsy moth eradication program using the bacterial insecticide, *Bacillus thuringiensis* var. *kurstaki* (*B.t.k.*) and mass/intensive trapping, will have no significant impact on humans and the environment. This finding is based on the following facts.

- 1) *B.t.k.* is a naturally occurring soil bacterium. *B.t.k.* has been used extensively for gypsy moth suppression and eradication programs throughout the United States. In Oregon, *B.t.k.* has been used in gypsy moth eradication programs since 1984.
- 2) *B.t.k.* is not harmful to healthy humans, pets, domestic animals, birds, wildlife, or aquatic organisms. Beneficial insects including predators, parasites, and honeybees are not harmed by *B.t.k.* Some non-target butterfly and moth larvae (caterpillars) will be killed by the proposed eradication, but these species should recolonize the eradication block from the surrounding untreated area. No long-term, irreversible effects to non-target butterfly or moth populations are expected.
- 3) Human health studies during five large eradication programs using *B.t.k.* in populated areas have found no significant health problems attributable to the treatments.
- 4) Aqueous formulations of *B.t.k.* contain no organic solvents. None of the inert ingredients of the formulations being considered are on EPA list 1 (Inerts of Toxicological Concern) or list 2 (Potentially Toxic Inerts). The *B.t.k.* product (including the inert ingredients) being considered has been certified by EPA and OMRI (Organic Materials Review Institute) for organic production.
- 5) Two federally listed threatened or endangered plant species may occur within two miles of the proposed gypsy moth eradication area in Eugene: Willamette daisy *Erigeron decumbens* var. *decumbens* and Bradshaw's desert parsley *Lomatium bradshawii*. The proposed action will have no effect on threatened or endangered species or their designated critical habitats within or near the eradication areas.

H. Agencies and persons consulted

National Marine Fisheries Service (Ben Meyer) Willamette Basin Habitat Branch 1201 NE Lloyd Blvd, Suite 1100 Portland, OR 97232 503-231-2202	For information on threatened and endangered fish species.
Oregon Natural Heritage Information Center Oregon State University (Lindsey Koepke) 1322 SE Morrison Street Portland, OR 97214 (503) 731-3070 ext 104	For information on threatened and endangered fish species.
Oregon Dept. of Agriculture (Bob Meinke) 635 Capitol St. NE Salem, OR 97301 (541) 737-2317	For information on plant species of concern.
Oregon Department of Forestry (Rob Flowers) 2600 State St. Salem, OR 97301 (503) 945-7396	For review and comment.
Oregon Department of Human Services, Health Services (Kari Christensen) 800 NE Oregon Street, Suite 640 Portland, OR 97232-2162 (971) 673-1211	For assistance on measures to safeguard human health, and for review and comment.
Oregon Health Sciences University/Oregon Poison Center (Zane Horowitz, M.D.) Mail Code CB550 3181 SW Sam Jackson Park Rd. Portland, OR 97201 (503) 494-8968	For assistance on measures to safeguard human health, and for review and comment.
Oregon State University (Paul Jepson) Integrated Plant Protection Center, Cordley Hall Corvallis, OR 97331	For review and comment.
Oregon State University (Ross Penhallegon) Oregon State University/Lane County Extension 950 West 13th Avenue Eugene, OR 97402 (541) 682-4243	For local information in Eugene and review, comment.
Paul Hammond 2435 E. Applegate Philomath, OR 97370 (541) 929-3894	For information on threatened or endangered Lepidoptera.
USDA Forest Service (Kathy Sheehan) P.O. Box 3623 333 SW First Ave Portland, OR 97208 (503) 808-2666	For review, comment, and application timing issues.
US. Fish & Wildlife Service (Kevin Maurice) 2600 S.E. 98th Ave., Suite 100 Portland, OR 97266 (503) 231-6179	For information on threatened and endangered species, and to ensure compliance with the Endangered Species Act.

I. List of preparers and reviewers

Preparers

Barry Bai, Diana Kimberling, Jim LaBonte, and Kerri Schwarz
Oregon Department of Agriculture, Salem, OR 97301.

Reviewers

Dan Hilburn, Helmuth Rogg, and Richard Worth
Oregon Department of Agriculture, Salem, OR 97301.

Rhonda Solomon and Tracy Horner
USDA, APHIS, 4700 River Road, Riverdale, MD 20737.

J. References

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Appendix A: Public information meeting notice published in the local newspaper

Published in the Eugene Register Guard, Eugene, Oregon, February 5, 15, 17, 2009

Public Information Meeting “The Gypsy Moth Problem”

Thursday, February 19, 2009 • 7:00 - 9:00 pm

Calvary Fellowship
4060 W Amazon Dr • Eugene, OR 97405

The Oregon Department of Agriculture is proposing an eradication program for a gypsy moth infestation detected in southeast Eugene. The department proposes three applications of the biological insecticide *Bacillus thuringiensis* var. *kurstaki*, applied by helicopter from late-April to mid-May 2009, to eradicate gypsy moth from the area. An intensive pheromone trapping program would follow. The proposed eradication area is a rectangular block of about 626 acres, roughly centered around the Old Dillard Road area.

You are invited to attend this public information meeting to learn more about the gypsy moth and the proposed eradication program. For more information contact the **Oregon Department of Agriculture: Helmuth Rogg 1-800-525-0137, Bruce Pokarney 503-986-4559, or by email at gypsymoth@oda.state.or.us**. Please check your local phone book for TTY/TDD telecommunications service.

Individuals with disabilities requiring accommodations at the public information meeting should contact Helmuth Rogg as soon as possible at the number above.

Appendix B: Letters concerning threatened and endangered species

From: Ben Meyer <Ben.Meyer@noaa.gov>
Date: December 11, 2008 1:05:13 PM PST
To: Barry Bai <bbai@oda.state.or.us>
Subject: Re: T&E species consultation

Mr. Bai

Based on the information you provided in your December 1, 2008 letter and available salmon presence/absence data, it is NMFS' opinion that there are currently no salmon under NMFS' jurisdiction occupying the area of the proposed gypsy moth eradication project in Eugene .

If you need any further assistance, please feel free to contact me at 503.230.5425.

Ben Meyer
Chief, Willamette Habitat Branch

Barry Bai wrote:
Dear Mr. Meyer,

Please find attached two files - a letter and a map, requesting the T& E species consultation. We appreciate your help in checking for the T&E species that may be present in our proposed gypsy moth eradication area in Eugene.

Please contact me if you have any questions.

Thank you in advance.

Barry.

PS: The letter was addressed to your director. I was told that it should be sent to you directly because the area is in Lane County.

Barry B. Bai, Ph.D.
Entomologist
Oregon Dept. of Agriculture
Plant Division
635 Capitol Street NE
Salem, Oregon 97301-2532
Tel: 503-986-4645
Fax: 503-986-4786
Email: bbai@oda.state.or.us

From: Kevin_Maurice@fws.gov
Date: December 2, 2008 10:58:13 AM PST
To: Barry Bai <bbai@oda.state.or.us>
Cc: Ted_Buerger@fws.gov, Richard_Szlemp@fws.gov, Mikki_Collins@fws.gov
Subject: Re: T&E species consultation

Hi Barry. Sorry I missed you. I have been out the last 2 days.
Attached is the Lane County species list and the link to our web page where you can find all OR county species lists. I have forwarded this e-mail to our contaminants division and staff with expertise in silver spot and fender blue butterfly ecology. They may have questions or further information to share. Feel free to give a call if you have any questions.
KJM

(See attached file: LANE COUNTY.doc)
<http://www.fws.gov/oregonfwo/Species/Lists/>

Kevin J. Maurice
Wildlife Biologist
USFWS Oregon State Office
2600 SE 98th Ave., Suite 100
Portland, OR 97266
(503) 231-6179
(503) 231-6195 (fax)
Kevin_Maurice@FWS.Gov

From: Barry Bai <bbai@oda.state.or.us>
To: Kevin_Maurice@fws.gov
12/01/2008 03:34 PM
CC: Helmuth W Rogg <hrogg@oda.state.or.us>, Diana N Kimberling <dkimberl@oda.state.or.us>
Subject: T&E species consultation

Dear Mr. Maurice,

Please find attached two files - a letter and a map, requesting the T&E species consultation. We appreciate your help in checking for the T&E species that may be present in our proposed gypsy moth eradication area in Eugene.

Please contact me if you have any questions.

Thank you in advance.

Barry.

Barry B. Bai, Ph.D.
Entomologist
Oregon Dept. of Agriculture
Plant Division
635 Capitol Street NE
Salem, Oregon 97301-2532
Tel: 503-986-4645
Fax: 503-986-4786
Email: bbai@oda.state.or.us

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

LISTED SPECIES

Birds

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Western snowy (coastal) plover	<i>Charadrius alexandrinus nivosus</i>	CH T
Brown pelican	<i>Pelecanus occidentalis</i>	E
Short-tailed albatross	<i>Phoebastria albatrus</i>	E
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

Fish

Inland:

Oregon chub	<i>Oregonichthys crameri</i>	E
Bull trout	<i>Salvelinus confluentus</i>	CH T

Invertebrates

Insects:

Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>	CH E
Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T

Plants

Willamette daisy	<i>Erigeron decumbens var. decumbens</i>	CH E
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus ssp. kincaidii</i>	CH T

PROPOSED SPECIES

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Birds

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

Reptiles and Amphibians

Inland:

Oregon spotted frog	<i>Rana pretiosa</i>
---------------------	----------------------

SPECIES OF CONCERN

Mammals

Pallid bat	<i>Antrozous pallidus pacificus</i>
White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

Townsend's western big-eared bat
California wolverine
Silver-haired bat
Long-eared myotis bat
Fringed myotis bat
Long-legged myotis bat
Yuma myotis bat
Camas pocket gopher

Corynorhinus townsendii townsendii
Gulo gulo luteus
Lasionycteris noctivagans
Myotis evotis
Myotis thysanodes
Myotis volans
Myotis yumanensis
Thomomys bulbivorus

Birds

Northern goshawk
Western burrowing owl
Black tern
Olive-sided flycatcher
Black oystercatcher
Harlequin duck
Yellow-breasted chat
Acorn woodpecker
Lewis' woodpecker
Mountain quail
Band-tailed pigeon
Oregon vesper sparrow
Purple martin

Accipiter gentilis
Athene cunicularia hypugaea
Chlidonias niger
Contopus cooperi
Haematopus bachmani
Histrionicus histrionicus
Icteria virens
Melanerpes formicivorus
Melanerpes lewis
Oreortyx pictus
Patagioenas fasciata
Pooecetes gramineus affinis
Progne subis

Reptiles and Amphibians

Northern Pacific pond turtle
Coastal tailed frog
Oregon slender salamander
Northern red-legged frog
Foothill yellow-legged frog
Cascades frog
Southern torrent (seep) salamander

Actinemys marmorata marmorata
Ascaphus truei
Batrachoseps wrighti
Rana aurora aurora
Rana boylei
Rana cascadae
Rhyacotriton variegatus

Fish

Malheur mottled sculpin
Pacific lamprey
Coastal cutthroat trout

Cottus bairdi ssp.
Lampetra tridentata
Oncorhynchus clarki ssp.

Invertebrates**Insects:**

Tombstone Prairie farulan caddisfly
Tombstone Prairie oligophlebodes caddisfly
Insular blue butterfly
One-spot rhyacophilan caddisfly

Farula reaperi
Oligophlebodes mostbento
Plebejus saepiolus insulanus
Rhyacophila unipunctata

Plants

Pink sand-verbena
Crenulate grape fern
Cliff paintbrush
Cold-water corydalis
Willamette Valley larkspur
Peacock larkspur

Abronia umbellata ssp. breviflora
Botrychium crenulatum
Castilleja rupicola
Corydalis aquae-gelidae
Delphinium oregonum
Delphinium pavonaceum

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

Wayside aster
Shaggy horkelia
Thin leaved peavine
Frye's Limbella
Snake River goldenweed
Whitetop aster
Henderson's checker-mallow
Hitchcock's blue-eyed grass

Eucephalus vialis
Horkelia congesta ssp. congesta
Lathyrus holochlorus
Limbella fryei
Pyrrocoma radiata
Sericocarpus rigidus
Sidalcea hendersonii
Sisyrinchium hitchcockii

DELISTED SPECIES

Birds

American Peregrine falcon
Bald eagle

Falco peregrinus anatum
Haliaeetus leucocephalus

Definitions:

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

Key:

E Endangered
T Threatened
CH Critical Habitat has been designated for this species
PE Proposed Endangered
PT Proposed Threatened
PCH Critical Habitat has been proposed for this species

Notes:

Marine & Anadromous Species: Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

Draft

Oregon Natural Heritage Information Center -December 2008

Sensitive Data - Do Not Distribute

Scientific Name: ***Actinemys marmorata marmorata*** EONUM: 230
 Common Name: **Northern Pacific pond turtle** EOID: 518
 Federal Status: SOC GRANK: G3G4T3Q NHP List: 2 Category: Vertebrate Animal
 State Status: SC SRANK: S2 HP Track: Y ELCODE: ARAAD02031
 Confirmed: First Obs: 1984-09-15 Last Obs: 2003-05-10 EO Rank: BC - Good or fair estimated viability
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV	COUNTY; PRIVATE	1709000101 - MIDDLE FORK WILLAMETTE RIVER, LOWER 1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[REDACTED]	[REDACTED]		[REDACTED]	[REDACTED]	[REDACTED]

<u>Source Feature</u>	<u>[Uncertainty Type (Distance)]</u>	<u>Use Class</u>	<u>Annual Observations</u>
518	Polygon [Areal - Delimited (8 m)]		
2849	Polygon [Areal - Delimited (8 m)]		
10475	Polygon [Areal - Delimited (8 m)]		
18005	Polygon [Areal - Delimited (8 m)]		
41013	Point [Areal - Estimated (50 m)]		
41014	Polygon [Negligible (8 m)]		
41015	Polygon [Negligible (8 m)]		
41016	Polygon [Negligible (8 m)]		
41017	Polygon [Negligible (8 m)]		
41018	Polygon [Negligible (8 m)]		
41019	Polygon [Negligible (8 m)]		
41020	Polygon [Negligible (8 m)]		
41021	Polygon [Negligible (8 m)]		
41188	Point [Areal - Estimated (100 m)]		

Oregon Natural Heritage Information Center -December 2008

Sensitive Data - Do Not Distribute

EO Comments: UNDER PLYWOOD ON WET CONCRETE GARAGE FLOOR.

Protection:

Management:

General: OBSERVER: JOHN APPLGARTH, TOM KEATING.

Scientific Name: ***Boletus pulcherrimus***

EONUM: 15

Common Name: **Fungus**

EOID: 29910

Federal Status:

GRANK: G2G3

NHP List: 1

Category: Fungus

State Status:

SRANK: S2

HP Track: Y

ELCODE: NFSM000016

Confirmed:

First Obs: 1940-10-06

Last Obs: 1940-10-06

EO Rank:

Directions:

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>
Lane	WV	City

Watershed
1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER
1709000301 - LONG TOM RIVER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>

Managed Area Name

Source Feature [Uncertainty Type (Distance)] Use Class

50408 Point [Areal - Estimated (400 m)]

Annual Observations

<u>Feature ID</u>	<u>Date</u>	<u>Source Observation data</u>
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Occurrence Data

EO Type:

Minimum Elev.(m):

EO Data:

EO Comments:

Protection:

Management:

General: Herbarium collection: OSC fungi (no collector information noted).

Scientific Name: ***Chrysemys picta***

EONUM: 66

Common Name: **Painted turtle**

EOID: 15117

Federal Status:

GRANK: G5

NHP List: 2

Category: Vertebrate Animal

State Status: SC

SRANK: S2

HP Track: Y

ELCODE: ARAAD01010

Confirmed:

First Obs: 1991

Last Obs: 1991-07-03

EO Rank: C - Fair estimated viability

Directions:

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>
Lane	WV	PRIVATE

Watershed
1709000301 - LONG TOM RIVER
1709000302 - MUDDY CREEK

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>

Managed Area Name



Source Feature [Uncertainty Type (Distance)] Use Class

15117 Point [Areal - Estimated (4000 m)]

Annual Observations

• 1991 - 1

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 128

EO Data: 1991: 1 INDIVIDUAL OBSERVED

EO Comments:

Protection:

Management:

General:

Scientific Name: ***Cicendia quadrangularis***

EO NUM: 5

Common Name: **Timwort**

EO ID: 19093

Federal Status: GRANK: G4

NHP List: 2

Category: Vascular Plant

State Status: SRANK: S2

HP Track: Y

ELCODE: PDGEN0R010

Confirmed: First Obs: 1982 Last Obs: 1984 EO Rank: B - Good estimated viability

Directions:

County Name

Ecoregion

Owner Name/Type

Watershed

Lane

WV

PRIVATE

1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER

Town-Range

Sec

Note

QuadCode

QuadName

Managed Area Name

Source Feature [Uncertainty Type (Distance)] Use Class

19093 Polygon [Areal - Delimited (8 m)]

28635 Polygon [Areal - Delimited (8 m)]

Annual Observations

• 1984 - LARGE POP.

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 183

EO Data: MOST ABUNDANT OF KNOWN MICROCALA SITES IN OREGON.

EO Comments: APPARENTLY THE NORTHERNMOST OCCURRENCE OF BLACK OAK FOREST. HILLSLOPE ASH SWAMP ALSO IN BASIN. PLANT GROWS IN OPEN MEADOW HABITAT.

Protection:

Management: AREA BEING CONSIDERED BY COUNTY FOR NATURAL AREA STATUS.

General: THREATENED BY POTENTIAL LOGGING/CLEARING OF SURROUNDING AREA AND UNRESTRICTED ORV USE.

Scientific Name: ***Cicendia quadrangularis***

EO NUM: 19

Common Name: **Timwort**

EO ID: 18277

Federal Status: GRANK: G4

NHP List: 2

Category: Vascular Plant

State Status: SRANK: S2

HP Track: Y

ELCODE: PDGEN0R010

Confirmed: First Obs: 1995-05-18 Last Obs: 1995-05-18 EO Rank:

Directions:

Oregon Natural Heritage Information Center - December 2008

Sensitive Data - Do Not Distribute

Source Feature [Uncertainty Type (Distance)] Use Class
 2153 Point [Areal - Estimated (50 m)]

Annual Observations
 * 1999 - 250-300 PLANTS

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 223
 EO Data: 250-300 PLANTS, 75% IN FLOWER (50% IN FLOWER BUD), 25% IN LEAF.10% 1ST YEAR, 90% MATURE. <1 HA AREA.
 EO Comments: PSEMEN-ACEMAC/AEMCER/POLMUN. MANY HERBS VERY VIGOROUS ESP SMILACINA RACEMOSA, ADENCAULON BICOLOR. TREE COVER: GAP BELOW, 80% ABOVE, SHRUB 60%, HERB 100%. ASPECT: 84 DEG AZ, SLOPE: 20-45%. MID SLOPE, OPEN/FILTERED LIGHT, MOIST. ASSOC SPECIES: SHRUBS: SAMBUCUS CALLICARPA, RUBUS DISCOLOR, CORYLUS CORNUTA VAR CAL, ADENOCAULON BICOLOR, SMILACINA RACEMOSA, DRYOPTERIS SP, HEDERA HELIX, OSMORHIZA CHILENSIS, GERANIUM ROBERTIANUM, ACTAEA RUBRA, RUBUS URSINUS, PROSARTES HOOKERII.
 Protection: THREATS BY HEDERA HELIS, RUBUS DISCOLOR, GERANIUM ROBERTIANUM.
 Management:
 General: 1999 PLANT SIGHTING REPORT, BRUCE NEWHOUSE REPORTER.

Scientific Name: ***Corynorhinus townsendii***
 Common Name: **Townsend's big-eared bat**

EONUM: 93
 EO ID: 9833

Federal Status: SOC GRANK: G4 NHP List: 2 Category: Vertebrate Animal
 State Status: SC SRANK: S2 HP Track: Y ELCODE: AMACC08010
 Confirmed: First Obs: 1936-PRE Last Obs: 1936-PRE EO Rank: H - Historical

Directions: [REDACTED]

County Name Ecoregion Owner Name/Type
 Lane WV

Watershed
 1709000301 - LONG TOM RIVER
 1709000302 - MUDDY CREEK

Town-Range Sec Note
 [REDACTED]

Managed Area Name

Source Feature [Uncertainty Type (Distance)] Use Class
 9833 Point [Areal - Estimated (800 m)]

Annual Observations

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 130
 EO Data: Sensitive Data - contact ORNHIC for more information
 EO Comments: CAPTURED INSIDE A CAMPUS BUILDING
 Protection:
 Management:
 General:

Scientific Name: ***Erigeron decumbens var. decumbens***
 Common Name: **Willamette Valley daisy**

EONUM: 18
 EO ID: 6745

Federal Status: LE GRANK: G4T1 NHP List: 1 Category: Vascular Plant
 State Status: LE SRANK: S1 HP Track: Y ELCODE: PDAST3M133
 Confirmed: Y First Obs: 1927 Last Obs: 1934-06-23 EO Rank: U - Unrankable

Directions: [REDACTED]

County Name Ecoregion Owner Name/Type
 Lane WV

Watershed
 1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER
 1709000301 - LONG TOM RIVER

Town-Range Sec Note
 [REDACTED]

QuadCode QuadName
 [REDACTED]

Managed Area Name



Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 6745 Point [Areal - Estimated (1500 m)]

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 610
 EO Data: HERBARIUM COLLECTIONS: HENDERSON, 6-23-34, #16484, ORE; BROWN, 8-6-33, #248, ORE; LEACH, 6-27-27, NO #, WTU; HENDERSON, 6-23-32, #14543, UC.
 EO Comments: DRY OR DRIED GROUND (HENDERSON, 1934); EDGE OF MEADOW (BROWN, 1933).
 Protection:
 Management:
 General:

Scientific Name: *Erigeron decumbens var. decumbens* EONUM: 28
 Common Name: **Willamette Valley daisy** EOID: 8942

Federal Status: LE GRANK: G4T1 NHP List: 1 Category: Vascular Plant
 State Status: LE SRANK: S1 HP Track: Y ELCODE: PDAST3M133
 Confirmed: First Obs: 1986 Last Obs: 1986-06-12 EO Rank: C - Fair estimated viability

Directions: [Redacted]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV	PRIVATE; STATE	1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[Redacted]	[Redacted]		[Redacted]	[Redacted]	[Redacted]

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 8942 Point [Areal - Estimated (50 m)] * 1986 - 15-20 PLANTS

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 152
 EO Data: 15-20 PLANTS IN LARGE CLUMPS
 EO Comments: IN DECA PRAIRIE, WEEDY. W/SIDALCEA CAMPESTRIS (50-100 PLANTS), CAMASSIA LEICHTLINII, ZYGADENUS, BRODIAEA, POTENTILLA, ROSA, WYETHIA, DACA, CHRYSANTHEMUM, ASTER HALLII.
 Protection:
 Management: THREATS: SPRAYING, MOWING, DITCHING, ETC.
 General: ONHDB/TNC SURVEY. Also included here is herbarium collection: Abrams (8719), 7-5-1922, POM. "Goshen"

Scientific Name: *Eucephalus vialis* EONUM: 2
 Common Name: **Wayside aster** EOID: 15136

Federal Status: SOC GRANK: G3 NHP List: 1 Category: Vascular Plant
 State Status: LT SRANK: S3 HP Track: Y ELCODE: PDASTEC0A0
 Confirmed: Y First Obs: 1933 Last Obs: 1989-07-31 EO Rank: C - Fair estimated viability

Directions: [Redacted]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV	COUNTY	1709000301 - LONG TOM RIVER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[Redacted]	[Redacted]		[Redacted]	[Redacted]	[Redacted]

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 15136 Point [Areal - Estimated (50 m)] * 1996 - 63 PLANTS
 * 1983 - 7-8 PLANTS

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 213
 EO Data: 2 LARGE, MATURE, SINGLE STEMMED PLANTS FLOWERING & FRUITING. ON A MID-SLOPE POSITION UNDER FILTERED LIGHT CONDITIONS. SITE IS MOIST
 EO Comments: GROWING IN W-FACING ROADCUT. ASSO. SPP. INCLUDE: QUERCUS GARRYANA, RHUS DIVERSILOBA & PSEUDOTSUGA MENZIESII
 Protection: THREATS: ROADSIDE CLEARING & SPRAYING
 Management:
 General: HO, LEIGHTON, ASVI FIELD SURVEY, 1985

Scientific Name: ***Eucephalus vialis*** EONUM: 18
 Common Name: **Wayside aster** EOID: 10386
 Federal Status: SOC GRANK: G3 NHP List: 1 Category: Vascular Plant
 State Status: LT SRANK: S3 HP Track: Y ELCODE: PDASTEC0A0
 Confirmed: First Obs: 1985-10-29 Last Obs: 2000-05-02 EO Rank: D - Poor estimated viability
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV	PRIVATE; COUNTY	1709000301 - LONG TOM RIVER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

<u>Source Feature</u>	<u>Uncertainty Type</u>	<u>(Distance)</u>	<u>Use Class</u>	<u>Annual Observations</u>
10386	Polygon	[Areal - Delimited (8 m)]		• 2000 - 5 GENETS
30788	Polygon	[Areal - Delimited (8 m)]		• 1989 - 82 CLUMPS
30789	Polygon	[Areal - Delimited (8 m)]		• 1985 - 20 CLUMPS

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 335
 EO Data: 2000: 5 GENETS, 100% IN LEAF, 100% MATURE. 1989: 82 PLANTS (82 GENETS, 78% FLOWERING; 464 RAMETS, 57% FLOWERING). 1985: APPROX 20 MATURE CLUMPS IN CLAY SOIL ON E FACING ROAD-CUT. PLANTS WERE ALL SENESCENT. MOST ARE ON EDGE OF ROAD-CUT OPENING
 EO Comments: GROWING ON EDGE OF ROAD CUT NEXT TO, & SOMEWHAT INTO, WOODS. ASSO. SPP. INCLUDE PSME, QUGA, ARME, SYAL, RHDI, RUUR, LURI, POMU, PTAQ. W ASPECT, UPPER SLOPE POSITION OF SLIGHT SLOPE (0-20%). FILTERED LIGHT, DRY CONDITION.
 Protection:
 Management:
 General: 2000 PLANT SIGHTING REPORT, BRUCE NEWHOUSE, RICHARD BRAINERD REPORTERS. 1989 SIGHTING REPORT, ED ALVERSON AND KELI KUYKENDALL. ASVI FIELD SURVEY, 1985, BY LEIGHTON HO.

Scientific Name: ***Eucephalus vialis*** EONUM: 33
 Common Name: **Wayside aster** EOID: 12305
 Federal Status: SOC GRANK: G3 NHP List: 1 Category: Vascular Plant
 State Status: LT SRANK: S3 HP Track: Y ELCODE: PDASTEC0A0
 Confirmed: First Obs: 1991 Last Obs: 1991-06-16 EO Rank: D - Poor estimated viability
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV	CITY OF EUGENE	1709000301 - LONG TOM RIVER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Oregon Natural Heritage Information Center - December 2008

Sensitive Data - Do Not Distribute

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 12305 Point [Areal - Estimated (50 m)] • 1991 - 18 RAMETS

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 335
 EO Data: PLANTS VEGETATIVE ONLY; 13 RAMETS ON EAST SIDE OF TRAIL #5, RAMETS ON WEST SIDE, ALSO RAMET ON EAST SIDE AT THE LARGE PSME WOLF TREE. <1 ACRE.
 EO Comments: RATHER DRY FOREST ON RIDGE CREST; PSME DOMINANT WITH QUKE, ACMA, SYAL, RUUR, POMU, RHD1, LIGUSTICUM, ADENOCAULON. SOILS MAPPED AS DIXONVILLE-PHILOMATH-HAZELAIR COMPLEX.
 Protection: THREATS: HIKERS FEET, DEER BROWSING.
 Management:
 General:

Scientific Name: ***Eucephalus vialis*** EONUM: 55
 Common Name: **Wayside aster** EO ID: 16838
 Federal Status: SOC GRANK: G3 NHP List: 1 Category: Vascular Plant
 State Status: LT SRANK: S3 HP Track: Y ELCODE: PDASTEC0A0
 Confirmed: First Obs: 1996-04-28 Last Obs: 1996-04-28 EO Rank: C - Fair estimated viability
 Directions: [REDACTED]

County Name Ecoregion Owner Name/Type Watershed
 Lane WV LOCAL 1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER

Town-Range Sec Note QuadCode QuadName Managed Area Name

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 16838 Point [Areal - Estimated (400 m)] • 1996 - 51-100 PLANTS

Feature ID Date Source Observation data

Occurrence Data

EO Type: Minimum Elev.(m): 290
 EO Data: 51-100 PLANTS; IN LEAF; 100% IMMATURE; 10-100 SQ METER AREA.
 EO Comments: MIXED FOREST COMMUNITY AT UPPER END OF STEEP SLOPE NEAR EDGE OF CLEARCUT; MOIST, FILTERED SHADE; DENSE CROWN COVER OF PSEUDOTSUGA MENZIESII; ARBUTUS MENZIESII & ACER MACROPHYLLUM. ASSOC SPECIES: HOLODISCUS DISCOLOR, POLYPODIUM GLYCYRRHIIZA, OSMORHIZA CHILENSIS, TELLIMA GRANDIFLORA, POLYSTICHUM MUNITUM, ARBUTUS MENZIESII, ACER MACROPHYLLUM, PSEUDOTSUGA MENZIESII.
 Protection:
 Management:
 General: 1996 ONHP SIGHTING REPORT; RON HAMILL & BRUCE NEWHOUSE REPORTERS.

Scientific Name: ***Eucephalus vialis*** EONUM: 60
 Common Name: **Wayside aster** EO ID: 16577
 Federal Status: SOC GRANK: G3 NHP List: 1 Category: Vascular Plant
 State Status: LT SRANK: S3 HP Track: Y ELCODE: PDASTEC0A0
 Confirmed: First Obs: 1997-05-04 Last Obs: 1997-05-04 EO Rank: D - Poor estimated viability
 Directions: [REDACTED]

County Name Ecoregion Owner Name/Type Watershed
 Lane WV COUNTY 1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER

Town-Range Sec Note QuadCode QuadName Managed Area Name

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 16577 Point [Areal - Estimated (50 m)] • 1997 - 10 GENETS

Oregon Natural Heritage Information Center -December 2008

Sensitive Data - Do Not Distribute

Occurrence Data

EO Type: Minimum Elev.(m): 229
 EO Data: 3 CLUMPS/12 STEMS. 100% IN LEAF. 100% IMMATURE. ALL BROWSED TO 12" OR LESS. 5 SQ M AREA.
 EO Comments: SMALL OPENING IN DOUG FIR, OAK FOREST AT TOP OF SMALL ROCKY KNOB. FLAT ASPECT, SLIGHT SLOPE. CREST POSITION, FILTERED LIGHT, DRY, ROCKY SOIL. ASSOC SPECIES: PSEUDOTSUGA MENZIESII, QUERCUS KELLOGGII, QUERCUS GARRYANA, ABIES GRANDIS (REGEN), TOXICODENDRON DIVERSILOBA, RUBUS URSINUS, FESTUCA CALIFORNICA, SYNTHYRIS RENIFORMIS, ELYMUS GLAUCUS
 Protection: CONIFER SHADING.
 Management:
 General: 1999 PLANT SIGHTING REPORT, DICK BRAINERD REPORTER.

Scientific Name: ***Horkelia congesta ssp. congesta*** EONUM: 32
 Common Name: **Shaggy horkelia** EOID: 10321
 Federal Status: SOC GRANK: G4T2 NHP List: 1 Category: Vascular Plant
 State Status: C SRANK: S2 HP Track: Y ELCODE: PDROS0W031
 Confirmed: First Obs: Last Obs: EO Rank: U - Unrankable
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV		1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER 1709000301 - LONG TOM RIVER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[REDACTED]	[REDACTED]		[REDACTED]		

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 10321 Point [Areal - Estimated (1500 m)]

<u>Feature ID</u>	<u>Date</u>	<u>Source Observation data</u>

Occurrence Data

EO Type: Minimum Elev.(m):
 EO Data:
 EO Comments:
 Protection:
 Management:
 General: KECK, D. 1938. REVISION OF HORKELIA AND IVESIA. LLOYDIA I(1-4): 75-109. HERBARIUM COLLECTION: ANDREWS 179 (ORE)

Scientific Name: ***Horkelia congesta ssp. congesta*** EONUM: 33
 Common Name: **Shaggy horkelia** EOID: 18729
 Federal Status: SOC GRANK: G4T2 NHP List: 1 Category: Vascular Plant
 State Status: C SRANK: S2 HP Track: Y ELCODE: PDROS0W031
 Confirmed: First Obs: Last Obs: EO Rank: U - Unrankable
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane	WV		1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Managed Area Name</u>
[REDACTED]	[REDACTED]		[REDACTED]		

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations
 18729 Point [Areal - Estimated (1500 m)]

Oregon Natural Heritage Information Center - December 2008

Sensitive Data - Do Not Distribute

Source Feature [Uncertainty Type (Distance)]	Use Class	Annual Observations
2383 Polygon [Areal - Delimited (8 m)]		• 2005 - 31280
27028 Polygon [Areal - Delimited (8 m)]		• 2000 - 24480
27029 Polygon [Areal - Delimited (8 m)]		• 1995 - 10140
27030 Polygon [Areal - Delimited (8 m)]		• 1982 - 50
27031 Polygon [Areal - Delimited (8 m)]		
27032 Polygon [Areal - Delimited (8 m)]		
27033 Polygon [Areal - Delimited (8 m)]		

Feature ID	Date	Source Observation data
27029	2005	Approx. 30 flowering plants.
27029	2000-04	7 flowering plants and 61 seedlings observed.
27029	1995-07-25	5 plants, in leaf and flower, 100% mature. Grassland, historically disturbed with channelization of Amazon Creek and road construction.

Occurrence Data

EO Type: Minimum Elev.(m): 131
 EO Data: 2005 [all sites]: approx. 31280 plants, in flower. 2000 [all sites]: approx. 24480 plants in flower. 1995 [all sites]: approx. 10140 plants in leaf and fruit. 1982: approx. 50 plants scattered in patches along creek.
 EO Comments: WET MEADOW OF MOSTLY INTRODUCED SPECIES. BY JOGGING PATH. AREA CUT FOR HAY ANNUALLY
 Protection:
 Management: AREA IS MOWED YEARLY AFTER PLANT HAS BLOOMED
 General: 2005 USFWS sighting information, Rachel Rounds reporter; this report also contained plant sighting counts for 1995 & 2000. 2000 SIGHTING REPORT; BRUCE NEWHOUSE. 1995 SIGHTING REPORT; BRUCE NEWHOUSE REPORTER (IN SEC 8). SEEN BY KAGAN 3-17-82. GIS POLYGONS FROM CITY OF EUGENE GIS DEPT, JAN 2001.

Scientific Name: ***Oncorhynchus tshawytscha pop. 23*** EONUM: 7
 Common Name: **Chinook salmon (Upper Willamette River ESU, spring run)** EO ID: 6696
 Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal
 State Status: SRANK: S2 HP Track: Y ELCODE: AFCHA02052
 Confirmed: First Obs: 1999-PRE Last Obs: 1999-PRE EO Rank:
 Directions: [REDACTED]

County Name	Ecoregion	Owner Name/Type	Watershed		
Lane			17090002 - Coast Fork Willamette		
Town-Range	Sec	Note	QuadCode	QuadName	Managed Area Name

Source Feature [Uncertainty Type (Distance)]	Use Class	Annual Observations
Data currently not available.		

Feature ID	Date	Source Observation data

Occurrence Data

EO Type: REARING & MIGRATION - fish Minimum Elev.(m):
 EO Data: SPRING RUN; JUVENILES MIGRATE UP FROM MAINSTEM WILLAMETTE RIVER; ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE.
 EO Comments:
 Protection:
 Management:
 General: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 2001. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFWS DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Oregon Natural Heritage Information Center - December 2008

Sensitive Data - Do Not Distribute

Scientific Name: ***Oncorhynchus tshawytscha pop. 23*** EONUM: 65
 Common Name: **Chinook salmon (Upper Willamette River ESU, spring run)** EO ID: 22004
 Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal
 State Status: SRANK: S2 HP Track: Y ELCODE: AFCHA02052
 Confirmed: First Obs: 1999-PRE Last Obs: 1999-PRE EO Rank:
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane			1709000101 - MIDDLE FORK WILLAMETTE RIVER, LOWER
<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>Managed Area Name</u>

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations

Data currently not available.

<u>Feature ID</u>	<u>Date</u>	<u>Source Observation data</u>
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Occurrence Data

EO Type: SPAWNING & REARING - fish Minimum Elev.(m):
 EO Data: SPRING RUN, ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE. ODFW SALMONID DISTRIBUTION DOCUMENTATION 1998: MIDDLE FORK WILLAMETTE RIVER.

EO Comments:

Protection:

Management:

General: DOCUMENTATION INFORMATION USED IN THIS EOR WAS DERIVED FROM THE ODFW SALMONID DISTRIBUTION DOCUMENTATION DIGITAL DATABASE DISTRIBUTED IN 2001. DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 2001. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Scientific Name: ***Oncorhynchus tshawytscha pop. 23*** EONUM: 79
 Common Name: **Chinook salmon (Upper Willamette River ESU, spring run)** EO ID: 8126
 Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal
 State Status: SRANK: S2 HP Track: Y ELCODE: AFCHA02052
 Confirmed: First Obs: 1999-PRE Last Obs: 1999-PRE EO Rank:
 Directions: [REDACTED]

<u>County Name</u>	<u>Ecoregion</u>	<u>Owner Name/Type</u>	<u>Watershed</u>
Lane			17090003 - Upper Willamette
<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>Managed Area Name</u>

Source Feature [Uncertainty Type (Distance)] Use Class Annual Observations

Data currently not available.

<u>Feature ID</u>	<u>Date</u>	<u>Source Observation data</u>
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Occurrence Data

EO Type: REARING & MIGRATION - fish Minimum Elev.(m):
 EO Data: SPRING RUN, ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE.

EO Comments:

Protection:

Management:

General: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 2001. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF CHINOOK IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Oregon Natural Heritage Information Center - December 2008

Sensitive Data - Do Not Distribute

<u>County Name</u> Lane	<u>Ecoregion</u> WV	<u>Owner Name/Type</u> PRIVATE; STATE	<u>Watershed</u> 1709000301 - LONG TOM RIVER
<u>Town-Range</u> [REDACTED]	<u>Sec</u> [REDACTED]	<u>QuadCode</u> [REDACTED]	<u>Managed Area Name</u> [REDACTED]
<u>Source Feature [Uncertainty Type (Distance)] Use Class</u> 16327 Point [Areal - Estimated (800 m)]			<u>Annual Observations</u>
<u>Feature ID</u>	<u>Date</u>	<u>Source Observation data</u>	

Occurrence Data

EO Type: Minimum Elev.(m): -339
 EO Data: HERBARIUM COLLECTION: WHITE, NO #, 5-8-35, ORE
 EO Comments: NEAR TOP OF GRADE
 Protection:
 Management:
 General:

Scientific Name: ***Sericocarpus rigidus*** EONUM: 1
 Common Name: **White-topped aster** EOID: 20092
 Federal Status: SOC GRANK: G3 NHP List: 1 Category: Vascular Plant
 State Status: LT SRANK: S2 HP Track: Y ELCODE: PDASTEF010
 Confirmed: First Obs: 1987 Last Obs: 1987-05-04 EO Rank: C - Fair estimated viability
 Directions: [REDACTED]

<u>County Name</u> Lane	<u>Ecoregion</u> WV	<u>Owner Name/Type</u> PRIVATE; STATE	<u>Watershed</u> 1709000205 - WILLAMETTE RIVER, COAST FORK, LOWER
<u>Town-Range</u> [REDACTED]	<u>Sec</u> [REDACTED]	<u>QuadCode</u> [REDACTED]	<u>Managed Area Name</u> [REDACTED]
<u>Source Feature [Uncertainty Type (Distance)] Use Class</u> 20092 Point [Areal - Estimated (50 m)]			<u>Annual Observations</u> • 1987 - 30 PLANTS
<u>Feature ID</u>	<u>Date</u>	<u>Source Observation data</u>	

Occurrence Data

EO Type: Minimum Elev.(m): 152
 EO Data: ABOUT 30 PLANTS.
 EO Comments: IN DECA PRAIRIE, WEEDY W/SIDALCEA CAMPESTRIS, CAMASSIA LEICHTLINII, ZYGADENUS BRODIAEA,
 POTENTILLA, ROSA, WYETHIA, DACA, ERIGERON DECUMBENS
 Protection: HWY DIVISION, DOT (N OF DILLARD RD) & JACKSON'S (S OF RD)
 Management:
 General: 1987 ONHDB SURVEY

33 records total

Key to Oregon Natural Heritage Information Center Data

Field Name	Description
Scientific Name	The scientific name of the species.
Common Name	The common name of the species.
Category	Value that indicates the broad biological category for each species.
ELCODE	Unique NatureServe code for identifying this element. 1st and 2nd byte (PD=Plant dict, PM=Plant monocot, PG=Plant gymnosperm, PP=Plant pteridophyte, AA=amphibian, AB=bird, AF=fish, AM=mammal, AR=reptile, I=invertebrate. 3rd-5th byte (family abbreviation). 6th-7th (genus code). 8th-9th (species). 10th (tie breaker).
Federal Status	US Fish and Wildlife Service or NOAA Fisheries status. LE =listed endangered, LT =listed threatened, PE or PT =proposed endangered or threatened, C =candidate for listing with enough information available for listing, SOC or SC =species of concern, PS:xx =partial status for species.
State Status	For animals, Oregon Department of Fish and Wildlife status; LE =listed endangered, PE =proposed endangered, PT =proposed threatened, SC or C =sensitive-critical, SV or V =sensitive-vulnerable, SP or P =sensitive-peripheral, SU or U =sensitive-undetermined status. For plants, Oregon Department of Agriculture status; LE =listed endangered, LT =listed threatened, C =candidate.
GRANK/SRANK	ORNHIC participates in an international system for ranking rare, threatened and endangered species throughout the world. The system was developed by The Nature Conservancy and is now maintained by NatureServe in cooperation with Heritage Programs or Conservation Data Centers (CDCs) in all 50 states, in 4 Canadian provinces, and in 13 Latin American countries. The ranking is a 1-5 scale, primarily based on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. In this book, the ranks occupy two lines. The top line is the Global Rank and begins with a "G". If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator. A "Q" at the end of this line indicates the taxon has taxonomic questions. The second line is the State Rank and begins with the letter "S". The ranks are summarized as follows: 1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences; 2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6 -20 occurrences; 3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences; 4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences; 5 = Demonstrably widespread, abundant, and secure; H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered; X = Presumed extirpated or extinct; U = Unknown rank; ? = Not yet ranked, or assigned rank is uncertain.
NHP list	All rare species in Oregon are assigned a list number of 1, 2, 3 or 4, where 1 =threatened or endangered throughout range, 2 =threatened or endangered in Oregon but more common elsewhere, 3 =Review List (more information is needed), 4 =Watch List (currently stable). A null value indicates the species is not currently on our rare species list.
HP Track	We currently obtain and computerize locational information for only those elements marked with Y (es). Those species marked with N (o) or W (atch) have incomplete data as we do not actively track them at this time.
EO NUM	The number of the Element Occurrence (EO) for this species. An element occurrence is an area of land or water where the species is or was known to occur and has conservation value. EOs are the main tracking unit for Heritage Programs.
EO ID	Unique identifier for the Element Occurrence (E O). Unique for each occurrence in the database.
First_obs	First reported sighting date for this occurrence in the form YYYY -MM-DD.
Last_obs	Last reported sighting date, usually in the form YYYY -MM-DD.

Key to Oregon Natural Heritage Information Center Data

Field Name	Description
Confirmed	Indication of whether taxonomic identification of the Element represented by this occurrence has been confirmed by a reliable individual. Blank=unknown, assumed to be correctly identified. Y=Yes, confident identification. ?=identification questions.
EO Rank	ORNHIC's determination of the viability of the occurrence.
Directions	Site name and/or directions to site.
County	County name(s) in which EO is mapped.
Ecoregion	Physiographic Province in which EO is mapped: CR =Coast Range, WV =Willamette Valley, KM =Klamath Mountains, WC =West slope and crest of the Cascades, EC =East slope of the Cascades, BM =Ochoco, Blue and Wallowa Mts., BR =Basin and Range, CB =Columbia Basin, SP =Snake River Plains.
Town-Range, Sec, and Note	United States rectangular land survey (also known as the Public Land Survey System) legal township, range, and section descriptions in which the EO is mapped. Township first (4 bytes), range second (4 bytes). For example: 004S029E = Township 4S, Range 29E. All locations are with reference to the Willamette Meridian. Fractional ranges or townships are indicated in the Note field.
Quadcode	USGS code for the USGS topographic quadrangle map(s) where the record is mapped.
Quadname	Name of the USGS topographic quadrangle map(s) where the record is mapped.
Watershed	Watershed(s), identified according to the U.S. Geological Survey (USGS) Hydrologic Unit Map 10-digit code, within which the Element Occurrence is located.
Owner Name/Type	Federal, State, Private, etc.
Managed Area Name	BLM District, USFS Forest, Private Preserve
Annual Observation	Summary of yearly observation.
Source Feature	A Source Feature is the initial translation of a discrete unit of observation data as a spatial feature. Creation of a Source Feature requires an interpretive process. The likely location and extent of an observation is determined through consideration of the amount and direction of any variability between the recorded and actual locations of the observation data. In most cases, the Source Feature is delineated to encompass locational uncertainty. A Source Feature can be a point, line, or polygon. The type of Source Feature developed depends on both the preceding conceptual feature type and the locational uncertainty associated with the feature.
Feature ID	Unique identifier for source feature.
Obs Date	Date of source feature observation.
Source Observation Data	Observations specific to the source feature.

Key to Oregon Natural Heritage Information Center Data

Field Name	Description
Uncertainty Type (Distance)	<p>The recorded location of an observation of an Element may vary from its true location due to many factors, including the level of expertise of the data collector, differences in survey techniques and equipment used, and the amount and type of information obtained. This inaccuracy is characterized as locational uncertainty, and is assessed for Source Feature(s) based on the uncertainty associated with the underlying information on the location of the observation.</p> <p>Four categories of locational uncertainty have been identified, as follows:</p> <p><u>Negligible</u> uncertainty is less than or equal to 6.25 meters in any dimension. Source Features with negligible uncertainty are based on a comprehensive field survey with high quality mapping and a high degree of certainty.</p> <p><u>Linear</u> uncertainty is greater than 6.25 meters, and varies along an axis (e. g., a path, stream, ridgeline). The true location of an observation with linear uncertainty may be visualized as effectively sliding along a line that delineates the uncertainty.</p> <p><u>Areal delimited</u> uncertainty is greater than 6.25 meters, and varies in more than one dimension. The true location of an observation can be visualized as floating within an area with a boundary that can be specifically delimited. Boundaries can be defined using roads, bodies of water, etc.</p> <p><u>Areal estimated</u> uncertainty is greater than 6.25 meters, and varies in more than one dimension. A boundary cannot be specifically delimited based on the observation information, i.e., the actual extent is unknown. The true location of the observation can be visualized as floating within an area for which boundaries cannot be specifically delimited. Source Features with areal estimated uncertainty require that the user specify an estimated uncertainty distance to be used for buffering the feature to incorporate the locational uncertainty.</p>
Use Class	How the source feature is used by migratory species (e.g. breeding, maternity colony, hibernaculum).
EO Type	For animals, type of occurrence, e.g. roost, nest, spawning.
EO Data	Summary of species and population biology for the EO – may include number observed, number of sites, reproduction data, assessment of viability, etc.
EO Comments	Habitat information, e.g. aspect, slope, soils, associated species, community type.
Minimum Elevation	Minimum elevation of the area covered by the range of the taxon, in meters. Negative numbers or blank=not determined.
Protection	Comments on protectibility and threats.
Management	Comments on how the site is managed.
General	Miscellaneous comments.

Appendix C: Product label

Flowable Concentrate

Foray® 48B

Biological Insecticide

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

List No. 60181-04



Active Ingredient:
 Bacillus thuringiensis subsp. kurstaki, 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).

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

**KEEP OUT OF REACH OF CHILDREN
 CAUTION**

FIRST AID	
If in eyes	<ul style="list-style-type: none"> • 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 dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95 or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

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 dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95 or P-95. 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. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

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.

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, 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 crop 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 approved for use on growing crops 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 crop 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 crop 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, Ornamental Fruit, Nut & Citrus Trees ²	Gypsy Moth & Asian Gypsy Moth Elm Spanworm	21 - 107
	Spruce Budworm Browntail Moth Douglas Fir Tussock Moth Coneworm Buck Moth	21 - 80
Forests, Shade Trees, Ornamentals, Shrubs, Sugar Maple Trees, Seed Orchards, Ornamental Fruit, Nut & Citrus Trees ²	Tussock Moths 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	16 - 43
	Redhumped Caterpillars Spring & Fall Cankerworm California Oakworm Fall Webworm	11 - 31

Special Instructions:

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

²In treating Gypsy Moth and Asian Gypsy Moth infected trees and shrubs in urban, rural, and semi-rural areas, exposure of non-target vegetation including, but not limited to, native and ornamental species and food or feed crops is permitted.

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 crop 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)
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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 pts./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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