

Environmental Assessment

Gypsy Moth Eradication Program

Clackamas County

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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, in cooperation with USDA, Animal and Plant Health Inspection Service (APHIS), proposes to eradicate the gypsy moth infestation in Clackamas County, Oregon. 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. Therefore, no new EIS programmatic analysis other than that found in the EIS need 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. 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 the infestation 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 worst pests of trees and shrubs 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. This gypsy moth infestation has spread relentlessly and now covers the entire northeastern part of the United States from Maine south to North Carolina and west to Michigan and Wisconsin. Gypsy moth caterpillars alter ecosystems and disrupt people's lives when in high numbers. Heavy infestations cause defoliation and tree mortality. Defoliated trees are also vulnerable to other insects and diseases that may kill them. Heavy defoliation alters wildlife habitat, changes water quality, reduces property and esthetic values, and reduces the recreation value of forested areas. When present in large numbers, gypsy moth caterpillars can be a nuisance, as well as a hazard to health and safety (USDA 1995, EIS pp. 1-4).

Gypsy moths are notorious hitchhikers. Egg masses and pupae can be attached to nursery stock and Christmas trees, and vehicles, camping equipment, and outdoor household articles that people bring with them when they come to Oregon. A wide host range would allow gypsy moth 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 in many different isolated locations, primarily in western Oregon.

Two strains of gypsy moth and possibly their hybrids now threaten Oregon. Gypsy moths introduced into Oregon from eastern North America are sometimes referred to as North American gypsy moths. Asian gypsy moths are a strain of the same species that comes from eastern Russia and Asia. Asian gypsy moths have arrived in Oregon as egg masses on ships. Containers and products coming from East Asia pose a consistent risk as trade with these areas expands. Asian gypsy moths could also reach Oregon via Europe. They have become established in Germany and other European countries where they are hybridizing with European gypsy moths.

Asian gypsy moths differ from North American gypsy moths because the Asian females can fly long distances. North American gypsy moth females have fully developed wings but they cannot fly. Asian gypsy moths also feed on a wider range of host trees, including some such as larch that are not favored by

North American gypsy moths. Asian gypsy moth caterpillars also develop more quickly and grow somewhat larger.

The two strains of gypsy moths look very similar; they can not be reliably separated by visual examination. Scientists developed genetic tests to distinguish one strain from the other. There are now several of these tests available. One challenge has been that Asian gene markers used in these tests are present at low frequencies in established gypsy moth populations in eastern North America (Prasher and Mastro 1994). Since the two strains are known to interbreed, these results may indicate that hybridization has occurred.

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 found to be 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 which were apparently hybrids (N.C. Dept. of Agric. 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. Follow-up trapping indicated that the moth did not become established. In the early 1980's, however, detection programs revealed several established infestations of gypsy moth located 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 the mid-1980's in Lane County. In the summer of 1984, traps in Eugene and Lowell caught large numbers of male moths. Trapping patterns were then expanded and over 19,000 male gypsy moths were collected from an area of 355 square miles. 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; 7,135 acres were treated in 1987 and 2,995 in 1988 -- all with *B.t.k.* applied three times by air per year. Following the 1988 treatment, delimitation trapping collected only 1 moth. The total cost of detection, eradication and trapping for Lane County from 1984 to 1989 was estimated to be \$18 million.

After the last eradication sprays in 1988 in Lane County, two moths were caught in the Eugene/Springfield area in both 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 at all were caught in Lane County in 1992. No eradication treatments were made in Lane County from 1989 through 1994. In 1995, however, a 80 acre aerial spray program using *B.t.k.* was conducted to eradicate a breeding population of gypsy moths at Veneta, Lane County. The program was a success. At another site near Dorena Lake/Schwarz Park, Lane Co., three moths were trapped in 1995 and 34 in 1996. This resulted in the smallest gypsy moth aerial spray program ever conducted in Oregon. In the spring of 1997, 70 acres were sprayed aurally with *B.t.k.* at the Dorena Lake/Schwarz Park site. In 2004, an 183 acre eradication area was treated by air with *B.t.k.* in the south hills area of Eugene, Lane County to eradicate a gypsy moth infestation. Delimitation trapping will continue in 2005 at the Eugene site to monitor the success of the eradication effort.

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 to flood the area with sterile insects and 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. In both 1989 and 1991 small 4-acre areas in Lake Oswego were treated with ground applications of *B.t.k.* No eradication treatments were made in 1990.

The fourth largest eradication program in the state was completed in 1992 on 8,388 acres in North Portland. *B.t.k.*, applied by helicopter, was used to eradicate an infestation of Asian gypsy moth that arrived on ships that had previously visited Russian ports. A second Asian gypsy moth infestation was eradicated in 2001 in Portland's Forest Park by aerial application of *B.t.k.* over 910 acres .

Eradication programs 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/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 retreated in 1999 although the eradication boundary was shifted slightly. This was because 19 gypsy moths were trapped on both sides of the eastern spray treatment boundary after the eradication effort there in the spring of 1998. All these programs combined use of *B.t.k.* treatments with mass trapping. Because of the small eradication blocks and good accessibility, *B.t.k.* sprays were applied from the ground.

Elsewhere in the state, small infestations in Josephine County were eradicated in 1988 and 1992. *B.t.k.* was applied by helicopter to rural residential areas of Philomath (Benton County, 440 acres) in 1993, Carver (Clackamas County, 270 acres) in 1994 and Fisher (Lincoln County, 706 acres) in 2003 to eradicate infestations at these three sites. A small infestation was ground sprayed using *B.t.k.* in Jackson County in 1995. The latest eradication in Jackson County occurred in 2001 when *B.t.k.* was applied by air over 160 acres in Ashland to control a North American gypsy moth infestation. No gypsy moth eradication program occurred in Oregon in 2002.

For a review of gypsy moth detection and eradication programs in Oregon through 1988, see Oregon Dept. of Agriculture (1989) and annual reports for 1989 through 2004. Hitchhiking gypsy moths will continue to arrive in Oregon and other non-infested states. At some time in the future, gypsy moths may become permanently established in the West and if that happens, gypsy moths will spread naturally into Oregon. Until that happens, it is expected that eradication of all isolated infestations that result from accidental introductions will continue to be the goal of the U.S. Department of Agriculture, Oregon Department of Agriculture and comparable agencies in non-infested states.

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. Under the EIS, geography determines the proposed actions from among eradication, slow-the-spread, suppression, and no action.

The following is a description of geography in U.S. with regard to gypsy moth. The area of the United States where the European strain of the gypsy moth is established is called the **generally infested area**. Next to this area is a band 50 to 100 miles wide, called the **transition area**, where the gypsy moth is spreading from the generally infested area. The area where the gypsy moth is not established, is called the **uninfested area**. Isolated infestations resulting from accidental spread of the gypsy moth by people are found in this area. Different management strategies apply in these areas: suppression in the generally infested area, slow the spread in the transition area, and eradication of isolated infestations of the European strain in the uninfested area. In addition, the Asian strain may be eradicated wherever possible, including the generally infested area.

Our proposed action for Clackamas County in 2005 is based on trapping and egg mass searching results during 2004. About 19,036 gypsy moth traps were placed statewide in 2004. Traps were concentrated in western Oregon where most population centers and gypsy moth host plants are located. However, all cities and towns statewide are considered at risk and are trapped each year. The standard detection trap density is two to four traps/mi² in cities and one to two traps/mi² in rural areas. Special high-risk sites such as national parks, public and private campgrounds and RV parks are trapped each year. Traps were also

placed around major ports and waterways at risk of travel by ships carrying Asian gypsy moth egg masses. Major ports including the ports of Portland, Astoria and Coos Bay in Oregon, were trapped at a high density for a radius of five miles. Along the Columbia River in Clatsop and Columbia counties, the trapping density was 16 traps/ mi.² for three miles inland, followed by 4 traps/ mi.² for another two miles inland. In the Portland metro area (Clackamas, Multnomah and Washington counties), the trapping density was 4-9 traps/ mi.². Coos Bay (Coos Co) had a trap density of 9/mi.². At sites where gypsy moths are caught, delimitation traps are placed at densities of 16-49 traps for five or more square miles for two years following detection. Delimitation traps are placed as soon as possible following initial detection to delimit new infestations the same year if possible. Delimitation traps are also placed to monitor the success of eradication programs. The core of an eradication area may be mass-trapped at densities of 3-9 traps/acre.

In 2004 no moths were caught in or near the 2004 Eugene eradication area in Lane County. This is an area where 16 gypsy moths were caught in 2003 and 183 acres were aerially treated with three applications of *B.t.k.* in the spring of 2004. Four gypsy moths were detected in Oregon in 2004 at one new and two old sites, the lowest number since 1989. Additional traps were placed at all sites after detection. All moths were submitted to the USDA Otis Pest Survey, Detection and Exclusion Lab and determined by genetic analysis to be of the North American strain. Two gypsy moths were trapped in the Eagle Creek area (Clackamas County) near where one gypsy moth was found in 2003. ODA inspections determined that a nursery with growing sites in the immediate vicinity of the two positive traps and another trap catch in 2003 had imported containerized nursery stock (1-3 gal. size spruce) with viable egg masses and with larval skins and pupal cases from Ontario, Canada, in September 2004. The shipment was accompanied by a Canadian phytosanitary certificate indicating the shipment had been inspected and found free of quarantine pests. USDA APHIS PPQ issued an Emergency Action Notification requiring the infested shipment be destroyed or returned to sender. It was returned to Canada in a sealed van. Further inspections at the nursery's Eagle Creek growing site found one old and two new egg masses (one viable, one infertile) and one pupal case on blue spruce nursery stock imported from the same Ontario nursery in August 2003. These spruce trees had been planted at the Eagle Creek site shortly after their arrival in 2003. This material is thought to be the source of the moths caught in 2003 and 2004. This nursery is currently operating under an ODA administrative directive, which prohibits the movement of nursery stock from the 2003-infested shipment and requires 100% inspection of other nursery stock to be shipped to non-infested states. Once any proposed eradication treatments are completed next spring, nursery stock can then move without restrictions.

Distribution of a Gypsy Moth Alert flyer, information gathering and egg mass searching have now been completed at the Eagle Creek site. Trap catch and egg mass search information indicates that the Eagle Creek area in Clackamas County now has a breeding population of gypsy moths.

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.
- 2) Suppression. The U.S. Department of Agriculture would reduce the adverse effects of the gypsy moth only in the generally infested area.
- 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.
- 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.
- 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.
- 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.

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. Density of traps is nine or more traps per acre.
- 5) Mating disruption. Aerially-applied tiny plastic flakes or beads contain synthetic gypsy moth sex pheromone. 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. The sterile adults mate with fertile adults but viable offspring are not produced. If successful, the effect is population reduction and eventual elimination of the infestation.

The preferred option proposed for this eradication project is option 1) *B.t.k.* Option 4) Intensive/ Mass trapping at a density of up to 3-9 traps/acre will be employed after the eradication to determine the effectiveness of the *B.t.k.* treatment. Intensive/Mass trapping can also remove any remnant populations of 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 Eagle Creek, Clackamas County in 2005 in order to avoid the impacts detailed below.

Objective 1: Apply the biological insecticide *B.t.k.* to the 268 acre eradication area centered on a nursery operation in the block bordered by Weitz Lane, Hwy 224 and Dowty Road in Eagle Creek (see the enclosed map for eradication area). This is the site where two male gypsy moths were trapped and three egg masses and a pupal case were found. *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) per acre about 7-14 days apart in late April and early May; exact timing depends on weather. Ideally, the *B.t.k.* application should target early instars 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 populations of gypsy moths. This targets the adult stage of the gypsy moth. 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. Two years of negative trapping results following the *B.t.k.* treatments would indicate the infestation has been eradicated.

Need for Action

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. Overwintering eggs hatch from their egg masses during spring. Larvae feed on leaves of more than 500 species of trees and shrubs in forest, agriculture and urban plantings. On average, about four million acres are defoliated in the eastern United States annually (EIS 1995). In Oregon, larvae in new infestations pupate and emerge as adults, typically from mid July

through August. Detection and delimitation trapping is conducted during these peak flight times. Adults mate and females lay overwintering egg masses each containing up to 1000 eggs. Host plants in Oregon include major forestry, agricultural and urban species of trees and shrubs. Oregon's economy, natural resources, environmental quality and human health would be negatively affected by the establishment of gypsy moths. Details follow.

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. Because their females are strong flyers, the Asian strain would be expected to spread much more quickly than the North American strain. In addition, their ability to survive well on a broader range of host trees puts additional Oregon natural resources at increased risk.

The potential impacts of Asian gypsy moth on the Pacific Northwest were summarized by USDA Forest Service (1992). The Forest Service estimated direct resource losses for Asian gypsy moth for the time period between 1992 and 2040 as follows: commercial timber, (larch only) \$0.8 - 1.4 billion, (hardwood) \$0.7-\$1.2 billion; recreation, travel, and tourism, \$2 billion. Suppression costs were estimated to be: developed commercial, residential, and recreation properties, \$735 million; commercial timber, \$77 million; and Christmas tree plantations, \$9 million. Full impact of gypsy moth establishment in the West would be expected to be more delayed than for Asian gypsy moth. However, impacts of quarantines resulting from a non-suppressed gypsy moth population are expected to be immediate as discussed below.

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 first response of Oregon's most important market state, California, to the discovery of the Lane County gypsy moth infestation was to place an embargo on all forest products and live plant material originating from all of Lane County. While this embargo was soon replaced with a more reasonable USDA "high hazard" gypsy moth quarantine, the disruption of normal marketing relationships caused by the embargo remained. Those Christmas tree growers near the heavier infestation sites were subject to loss of export markets due to quarantine fumigation requirements for interstate movement of the trees. Individual growers claimed losses as high as 80 percent to the fumigation process with some loss claims as high as \$200,000. Until 1989, all Christmas tree growers inside the quarantine area were required to apply chemical insecticides to obtain certification for interstate movement, thus, increasing their production costs and pesticide usage in the area. Failure to eradicate the current infestation would have had a progressively greater adverse impact on the Christmas tree industry, which exports 90% of its production and claimed an annual value of more than \$158 million to the state of Oregon during 2003. Similarly, the \$779 million annual sales of production nursery stock grown in Oregon in 2003, are generated almost entirely from export markets in other states and countries. Our most lucrative markets are those located closest to Oregon in states not yet infested with gypsy moth, and from which we can expect serious quarantine restrictions on nursery stock originating from infested areas.

State and federal quarantines imposed on wood products industries during the mid 1980's Lane County infestation did not seriously affect these businesses. Nevertheless, their product movements and handling procedures were subject to limitations imposed by compliance agreements with the Oregon Department of Agriculture. If the new gypsy moth infestation in Clackamas County is allowed to spread, similar embargoes and quarantines would be implemented and would become increasingly restrictive and expensive to comply with. Greenhouse and nursery products have been Oregon's largest agricultural industry (with highest cash value) since 1994. The Christmas tree industry has also increased steadily during the last several years.

The potential impact of gypsy moth quarantines on Oregon would be similar to those outlined in a Risk Assessment for British Columbia (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." "...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 erected a quarantine in response to a large gypsy moth infestation in Vancouver Island in B.C. during 1998-1999. Oregonians would also face disruptive and expensive trade barriers if gypsy moth became established in Oregon.

Reforestation. The immediate threat to forest products industries is quarantine, but the long term impact of gypsy moth infestations on reforestation of major timber species may be just as important. Douglas-fir and western hemlock have proven to be good hosts for gypsy moth caterpillars in laboratory studies. Some defoliation of Douglas-fir was observed in heavily infested areas of Lane County in 1984. In places where there is a favorable mix of broadleaf and conifer hosts of gypsy moth, defoliation of young conifers may result in serious growth loss or tree mortality of important timber species. Hardwood hosts of gypsy moth, not now considered economic timber species, are receiving greater scrutiny from researchers and foresters. The continued presence of gypsy moth infestations in Oregon would decrease the economic potential of this undeveloped resource which presently covers some 2-3 million acres in western Oregon. In fact, hardwoods are becoming economically valuable in the western US. There are some companies that deal specifically with hardwoods.

Tourism. While the native hardwood species are not now important economic wood product species, they are very important components of the watershed species complex and contribute significantly to the scenic beauty of the Oregon environment. If the gypsy moth defoliates these species as it does similar hardwood species in the Northeast, Oregon would lose full use of parks, campgrounds and residential yards during the larval stage of the insect. This, along with the loss of watershed value and scenic beauty, could have a serious impact on the environment and tourist use of facilities located in gypsy moth-affected areas. May and June are important tourism months in Oregon. The value of tourism to Oregon in 2003 was \$6.3 billion. A significant proportion of the tourists comes from states which would be expected to impose serious limitations on the return of recreational vehicles into their states from a gypsy moth-infested Oregon.

Ecological Impacts

Eradication of gypsy moth infestations in Oregon is also essential to protect Oregon from the adverse ecological effects of gypsy moth establishment. These ecological effects are expected to be similar to those of Asian gypsy moth, which were examined by the Forest Service (1992). Oaks, alder, willow, hazelnut and other deciduous hosts are especially preferred by gypsy moths. About 475,153 acres were defoliated by gypsy moth in eastern states in 1999, 1.4 million acres defoliated in 2000, 1.9 million acres in 2001, 242,239 acres in 2003 and 170,873 acres in 2004 (GMDigest 2004). The reduction of gypsy moth defoliation in mid 1990's was at least partially due to the dramatic increase of the pathogenic fungus, *Entomophaga maimaiga* in the field (Schneeberger 1996). The worst year on record was 1981 when over twelve million acres (18,750 square miles) were defoliated.

Gypsy moth feeding can lead to changes in forest stand composition. Oak trees in the East have been killed by repeated defoliation and are usually replaced by other vegetation. If this occurred in Oregon, animals feeding on acorns would be directly affected. Nesting sites and cover would be reduced. Defoliation of riparian areas would cause increased short-term, but reduced long-term 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 concerned, threatened or endangered species (plant, insect, fish or other 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, watershed, and other critical areas by gypsy moth in the Eagle Creek area could expose watershed to direct sunlight and can increase the water temperature, which negatively impacts the threatened salmon and other fish species in the area. Other concerned, threatened or endangered species (birds, reptiles, mammals, plant, insect and others) may also be impacted due to gypsy moth defoliation and its resulting habitat modification.

Environmental quality. While the extent of environmental damage which the gypsy moth can do by way of host plant defoliation is difficult to predict, the increased use of pesticides associated with living with gypsy moth is not. Even at relatively low levels of infestation, pressure is increased for use of chemical sprays to certify certain plant products, including Christmas trees, for interstate marketing. This would apply to nursery stock and forest products at mill storage areas. These application sites would likely receive more pesticide treatments, as would residential sites within urban and suburban settings. Natural areas, such as 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; over 79,000 acres were treated in 2004 (GMDigest 2004).

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 gypsy moths were allowed to become established in Oregon. During outbreaks, gypsy moth 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 US.

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 were made to obtain and address issues and concerns among individuals and organizations that will be affected by the proposed gypsy moth eradication project. Starting in August 2004 and continuing during the fall and winter, residents near the sites where gypsy moths were caught and egg masses and other life stages were found were informally contacted in person by ODA staff to alert them to the presence of the gypsy moth infestation. Staff also provided interested residents with the Gypsy Moth Alert brochure.

A public information meeting was scheduled by ODA for 7 to 9 pm on February 17, 2005 at the Eagle Creek Elementary School, 30391 SE Hwy 211, Eagle Creek, OR 97022. Notices were prepared and sent by ODA to property residents and landowners within and adjacent to the proposed eradication area in early February 2005. The same notice was also sent to Eagle Creek-Barton Community Planning Organization and to Clackamas County and Estacada city government offices at the same time. Notices of the meeting were also published in the Estacada News and Oregonian newspapers before the meeting (Appendix A). A news release announcing the public information meeting was also distributed on Thursday, February 3, 2005. The public information meeting notice included information on the gypsy moth situation, ODA's eradication proposal, and the availability of the draft Environmental Assessment. Letters indicating ODA's proposal and enclosing a draft copy of the Environmental Assessment were also mailed to interested individuals and organizations in early February 2005. An ODA staff member also attended the Eagle Creek-Barton Community Planning Organization's meeting on February 10, 2005 to inform the community about the gypsy moth situation and ODA's eradication proposal. The ODA staff encouraged meeting attendees to come to the ODA's public information meeting to learn detailed information on the topic.

About 18 adults and five children from the public and seven people from various government agencies attended the public information meeting at the Eagle Creek Elementary School on February 17, 2005. ODA presented the information at the meeting. Oregon Health Services and Clackamas County public health officials presented information on *B.t.k.* with regard to its potential health effects. Representatives from other agencies and organizations present at the meeting included: Oregon Department of Environmental Quality, Oregon Health Services, Clackamas County Public Health.

The following questions were raised by the audience at the public information meeting. Some of these questions were related to the environmental assessment, but others were not. All questions were addressed orally by staff from ODA or from Oregon Health Services and/or Clackamas County Public Health at the meeting. No written comments were received regarding the proposed eradication project or the EA. All questions relevant to the environmental assessment were addressed in the 1995 EIS or the environmental assessment. None of the questions raised issues that were not addressed in the 1995 EIS or the environmental assessment. Readers are encouraged to consult both documents.

Questions from the public information meeting in Eagle Creek:

- Where is the gypsy moth from?
- Why not use a virus to control gypsy moths?
- Is there any effect on birds that feed on the caterpillars that ingest the *B.t.k.*?
- Does *B.t.k.* affect all moths and butterflies?
- Is the nursery where the gypsy moth was found under quarantine?
- Are spruce trees the gypsy moth's favorite host?
- What effect does *B.t.k.* have on other animals?
- Is *B.t.k.* related to mold?
- Can *B.t.k.* make asthma sufferers sick?
- What studies have been done to determine the long-term effects of *B.t.k.*?
- Could the *B.t.k.* insecticide have any health implications that could be similar to the anthrax disease?
- Can *B.t.k.* cause gastronomic problems in people?
- I have low immunity and am sensitive to chemicals. What precautions should I take? How long should I stay indoors?
- Are there studies on the long-term carcinogenic effects of *Btk* on humans?
- What is the life expectancy of *B.t.k.* after application? How long does it take for the *B.t.k.* to break down in the environment?
- What steps have been taken to prevent any further gypsy moth introductions?
- What are the alternatives to spraying? What about mass-trapping?
- In reference to the *B.t.k.* MSDS sheet, are there any more details available on the ingredients?
- If I have food allergies, how long does it take for the *B.t.k.* residue to break down?
- What impact does *B.t.k.* residue have on ground water and spring water that feed into the Clackamas River?
- Has the Ontario shipper sent gypsy moth-infested material to any other places?
- Who has the final say on implementing the proposed spray?

Other concerns expressed by the public include:

- dislike of spraying even a biological insecticide above their private residences and properties and
- a preference for an organically-approved insecticide effective at eradicating gypsy moth.

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. That inert ingredients are not disclosed to the public has caused concern. Some of the inert ingredients are approved for use in foods. Concerns were expressed about 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 a need for public education on the possible effects of eradication measures have 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 and 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 gypsy moths' natural enemies, wildlife, honeybees, locally farmed livestock, pets, fish pond 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. Concern has 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 earlier 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 been expressed by Christmas tree growers in particular about the negative impact of the gypsy moth on their markets. Concern has been expressed by land owners 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 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 falls into one of the three categories addressed in the 1995 EIS. Readers are encouraged to consult the 1995 final EIS for details.

Citizens and organizations were urged to write to the Insect Pest Prevention and Management Program Supervisor 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 proposal or another alternative. However, no written comments from concerned parties and individuals on the draft EA were received. Thus, none is included in the final EA.

C. AFFECTED ENVIRONMENT

An extensive general description of the physical and biological environment was prepared for the 1986 Oregon Environmental Assessment Gypsy Moth Eradication Spray Program: Lane and Douglas Counties. Much of the information is applicable to western Oregon and is therefore incorporated by reference in this environmental assessment.

Location

Eagle Creek, Clackamas County. The 268 acre eradication area is the area proposed to receive *B.t.k.* treatment sufficient to eradicate the 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 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 U.S. are typically 200 to 500 feet.

The proposed eradication area (268 acres) is in a rural residential area bordered by a riparian zone to the southwest in Eagle Creek. The exact location of the proposed eradication area is centered around the positive gypsy moth catches and infestation at a nursery operation within T2S R3E Sec. 36 and T2S R4E Sec. 31. The boundary begins at a point along Hwy 224 north of Hwy 211 at N 45.3597, W 122.3612 (GPS readings of latitude and longitude), then proceeds along the Hwy 224 south for 2644 feet to a point at N 45.3537, W122.3555. It then turns 90° west and proceeds along the property boundary of Patterson's Nursery for 1417 feet to a point at N 45.3518, W122.3602. From here it turns 90° south and proceeds for 691 feet to a point at N 45.3501, W122.3590 located on Weitz Lane. It then turns 90° west and proceeds along Weitz Lane for 1306 feet to the end of the road at a point at N 45.3484, W122.3634. It then turns 90° north and proceeds for 457 feet to a point at N 45.3495, W122.3644. It then turns 90° west and proceeds for 777 feet to a point at N 45.3484, W122.3670. It then turns 65° north and proceeds for 803 feet to a point at N 45.3496, W122.3696. It then turns 19° north and proceeds for 2208 feet crossing over the Dowty Rd to a point at N 45.3543, W122.3751. From here, it turns 101° east and proceeds for 4083 feet to the starting point (see attached map).

The eradication area is within the Eagle Creek area of Clackamas County. The area is mostly farmland intermingled with riparian zone and wooded rural lots. The main farm operations in the eradication area and vicinity include nurseries, dairy farm, Christmas tree farm and ranching operations. Trees and shrubs in the area include a mixture of hardwoods and softwoods, primarily oak, maple, apple, cherry, hawthorn, birch, mountain ash, wild rose, blackberry, Douglas fir, pine, spruce and cedar. These plants grow mostly in residential front or back yards or along streets and highways. Many trees, especially tall Douglas firs, are along the Eagle creek on the southwest side of the eradication area. Nurseries in the area grow a variety of low level vegetation and shrubs, mostly landscape plants including pine, spruce, false cypress, arborvite, hemlock, cedar, maple, rhododendron, boxwood, dogwood, English laurel, European beech, lilac, viburnum and kalmia. About 70% plants grown in the nursery are conifers. Some Douglas fir trees in the area may be over 100 feet tall. No natural ponds, lakes or permanent streams are present within the 268 acre eradication area. However, one artificial lagoon (two connected holding ponds) used for irrigation, is on the nursery farm inside the eradication area. A small portion of each of two intermittent or seasonal streams (apparently unnamed) is also present within the eradication area and might have water within them. Two backyard fishponds are immediately outside the eradication area. Eagle Creek runs parallel to the southwest boundary of the eradication area, and at the closest point, is about 500 feet away. This is a permanent stream that runs into the Clackamas River to the west. Bonnie Lure State Recreation Area along Eagle Creek is about 900 feet beyond the eradication area boundary. Terrain in the proposed eradication area is generally flat without much elevation change, typical farmland. Toward the riparian area on the southwest, the ground sinks to Eagle Creek with an elevation change from 320 to 220 feet above sea level. A small power station at the corner of Hwy 224 and Burnett Rd, low level power lines of about 50 feet tall along Hwy 224 and a tall cell phone tower outside the northernmost corner of the eradication boundary constitute some of the potential flight hazards. These as well as tall trees and Hwy 224 will require extra caution during aerial application.

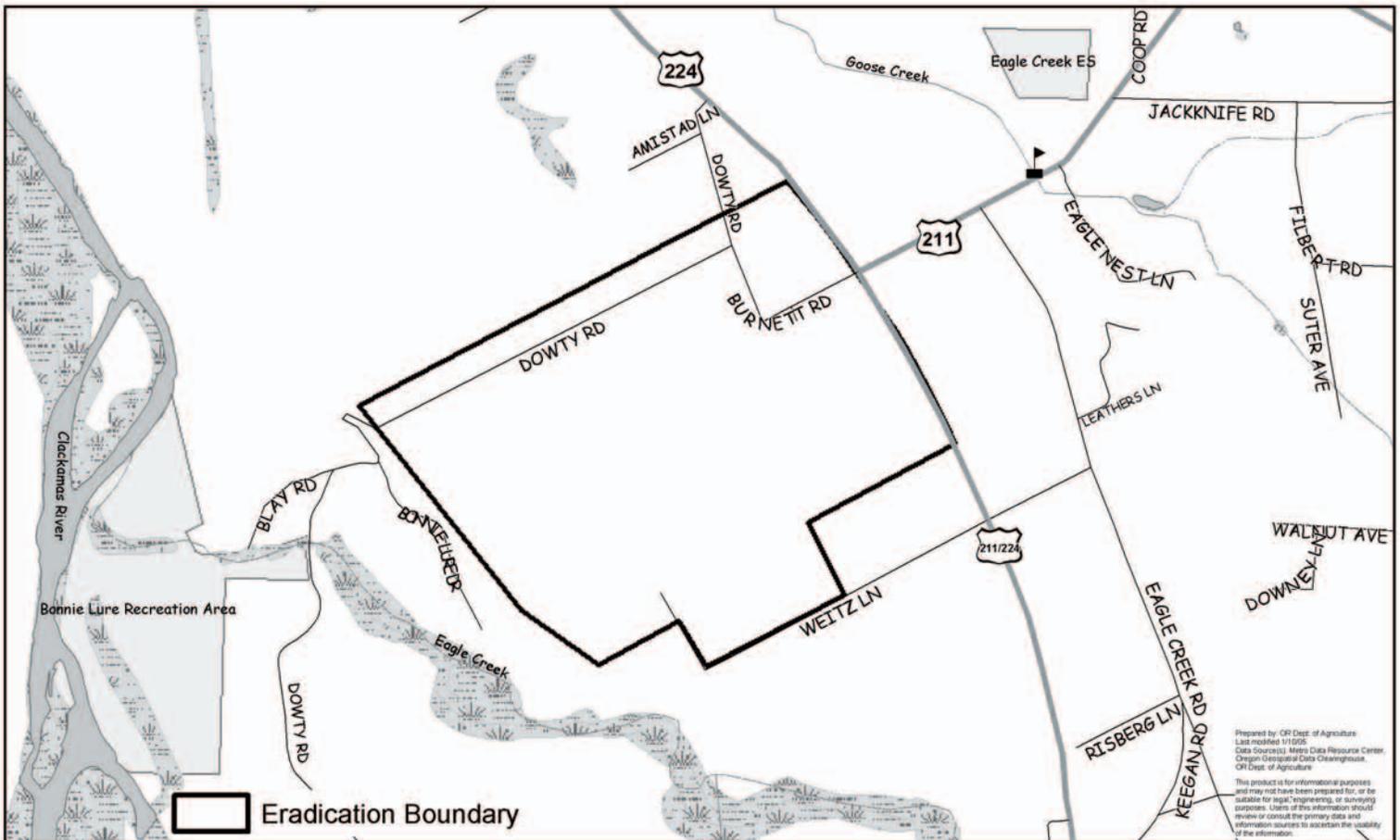
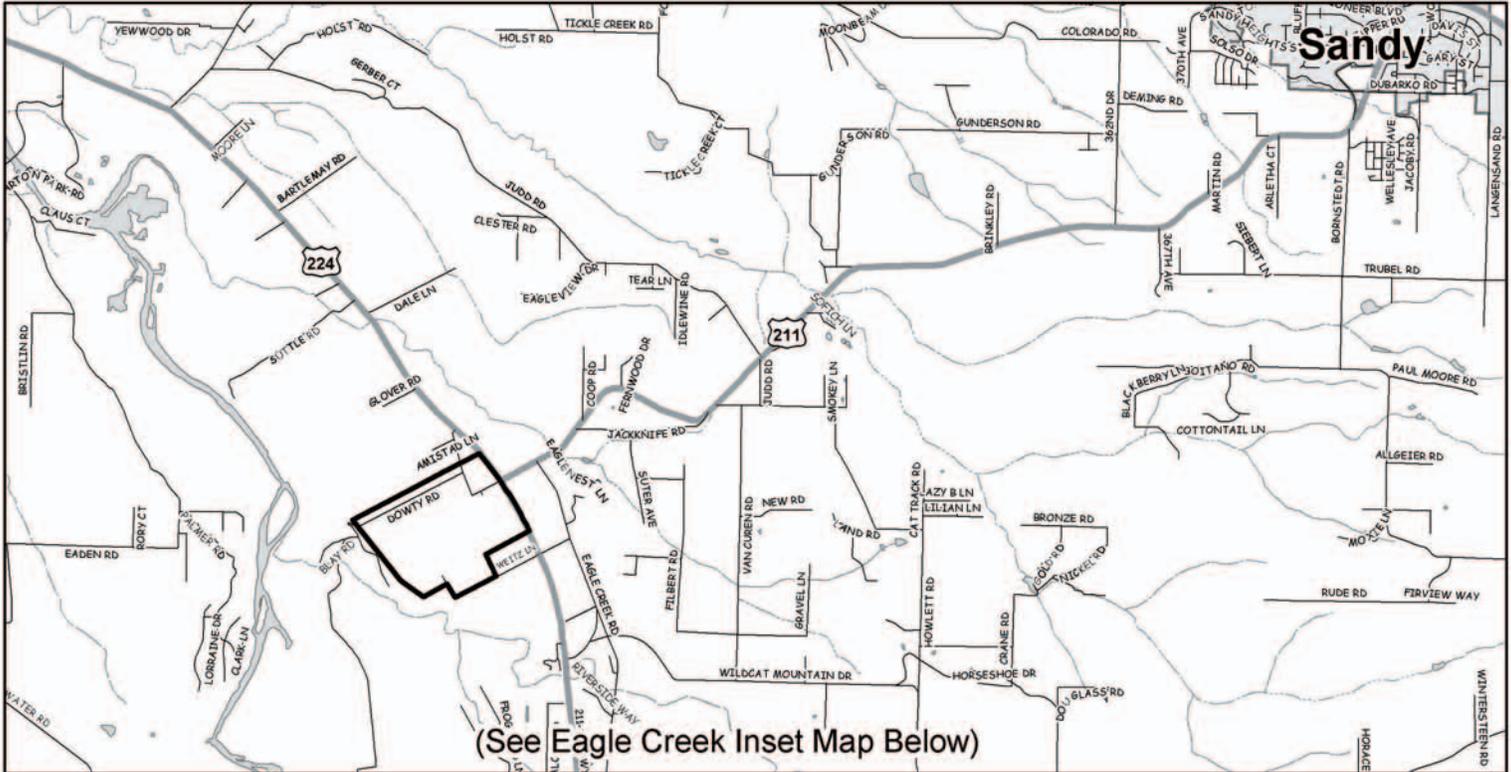
Environmental Factors

Nine threatened or endangered species may occur within or around the proposed eradication area in Eagle Creek, Clackamas County. These include one bird (bald eagle *Haliaeetus leucocephalus*), two fish (steelhead *Oncorhynchus mykiss* and Chinook salmon *Oncorhynchus tshawytscha*) and six plants (Golden Indian paintbrush *Castilleja levisecta*, Willamette daisy *Erigeron decumbens* var. *decumbens*, Howellia *Howellia aquatilis*, Bradshaw's lomatium *Lomatium bradshawii*, Kincaid's lupine *Lupinus sulphureus* var. *kincaidii* and Nelson's checker-mallow *Sidalcea nelsoniana*). Three candidate species

Proposed 2005 Gypsy Moth Eradication Program Eagle Creek, Clackamas County

Proposed 268 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.



(fisher *Martes pennanti*, Oregon spotted frog *Rana pretiosa* and Coho salmon *Oncorhynchus kisutch*) and many species of concern may also be present in the area (Appendix B). Species of concern are those taxa whose conservation status is of concern to the US Fish and Wildlife Service, but for which further information is needed.

The bald eagle (*Haliaeetus leucocephalus*) can occur in the area surrounding the proposed eradication area. However, ground inspection did not indicate any nesting sites within or close by the proposed eradication area in Eagle Creek. The nearest bald eagle nest was about one mile northwest of the proposed eradication area. The nest was identified during 2000-2003. Disturbance and noise by a low flying helicopter are the only factors that can impact the eagle if any is around. Eradication sprays with *B.t.k.* are unlikely to affect the eagle or its food sources.

Six bird species of concern may also occur near the eradication area. These include band-tailed pigeon *Columba fasciata*, olive-sided flycatcher *Contopus cooperi* (= *borealis*), yellow-breasted chat *Icteria virens*, mountain quail *Oreortyx pictus*, Oregon vesper sparrow *Pooecetes gramineus affinis* and purple martin *Progne subis*. Band-tailed pigeons usually forage on trees whereas mountain quail forages mostly on ground. The food source for both of these birds includes plant seeds (such as berries) and other vegetation materials. These birds eat insects occasionally but insects are not their main food source. Flycatchers and purple martins are insectivorous and can prey on a variety of insect orders including mosquitoes and lepidopteran caterpillars. They are more frequently found in riparian habitats. The yellow-breasted chat and Oregon vesper sparrow are tree foragers. Their main diet includes insect species such as weevils, other beetles, ants, moths, bees, wasps etc. and also berries from plants. The literature indicates that many insectivorous birds can prey on other insects if a particular diet group is not available (e.g., Gaddis 1987). The eradication area (especially the 2005 eradication area) is small. Any local lepidopteran species affected are likely to re-invade the area from neighboring habitats.

Four species of fish, steelhead *Oncorhynchus mykiss*, Chinook salmon *Oncorhynchus tshawytscha*, Coho salmon *Oncorhynchus kisutch* and Pacific lamprey *Lampetra tridentata* may be found in the nearby Clackamas River and Eagle Creek, which are more than 500 feet away to the southwest of the proposed eradication area. The first two species of fish are threatened. The third species is a candidate to be listed as threatened or endangered species whereas the last one is a species of concern. The food source for these fish may include aquatic insects and other invertebrates in the river and creek. Because the *B.t.k.* treatment will not affect aquatic invertebrates, the proposed eradication treatment using *B.t.k.* should not have any effect on these fish. Additionally, the habitat of these fish is effectively buffered because the proposed eradication area lies outside the creek and the river.

One fisher species (*Martes pennanti*), two rodent species (red tree vole *Arborimus longicaudus* and camas pocket gopher *Thomomys bulbivorus*) and six bat species may occur in the proposed eradication area. These bats include Pacific western big-eared bat (*Corynorhinus townsendii townsendii*), silver-haired bat (*Lasiorycteris noctivagans*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*) and Yuma myotis (*Myotis yumanensis*). The fisher is a candidate species whereas rodents and bats are species of concern. The fisher and rodents can live in the riparian wooded areas along the Clackamas River and its tributaries. The fisher is carnivorous. Its main food source includes voles, squirrels, mice etc. The nearest sighting of fisher is about two miles south of the proposed eradication area by the Clackamas River. The red tree vole is omnivorous and eats mostly plant seeds and other vegetation materials. It also eats invertebrates sometimes. The camas pocket gopher likes sandy areas and digs tunnels in the soil. Its main food source includes bulbs (such as lilies and onions), roots of trees, carrots, potatoes and grasses. The bats are mostly insectivorous and will forage for moths and other insects at night. The Pacific western big-eared bat is a cave dweller. Its main diet is moths. However, this species is not expected to be present in or near the proposed eradication area because there are no caves nearby. The remaining five bat species are tree dwellers, and can possibly be present in or near the proposed eradication area. These bats eat mostly other species of insects (non-moths) and forage a much larger area. Females won't reach their breeding stage (peak feeding period) until June or July in Oregon. The eradication area is relatively small and is not expected to have a significant impact on the food supply of these bats. Furthermore, moths and butterflies are expected to move back into the treated area from surrounding areas. If any of the bats is affected due to the decline in food supply, the effects will be temporary and localized, with no long-term impact to any bat species.

Three rare frogs (Oregon spotted frog *Rana pretiosa*, tailed frog *Ascaphus truei* and northern red-legged frog *Rana aurora aurora*), one turtle (northwestern pond turtle *Emys marmorata marmorata*) and one salamander (Oregon slender salamander *Batrachoseps wrighti*) may also occur in the surrounding area. The Oregon spotted frog is a candidate species whereas the rest four species are species of concern. The frogs, turtle and salamander require aquatic or semiaquatic habitats and are omnivorous with a preference for invertebrates. Their main food source is probably aquatic insects and other invertebrates in streams, rivers or ponds. No natural ponds, lakes or permanent streams are present within the 268 acre eradication area. However, one artificial lagoon (two connected holding ponds) used for irrigation, is on the nursery farm inside the eradication area. A small portion of each of two intermittent or seasonal streams (apparently unnamed) is also present within the eradication area and might have water within them. The proposed action should not affect the frogs, turtle and salamander because as used in this program, *B.t.k.* will not affect aquatic invertebrates even if they are present in any of these or nearby water bodies.

Rare plants found in the vicinity of the Eagle Creek eradication area include six endangered or threatened species (Golden Indian paintbrush *Castilleja levisecta*, Willamette daisy *Erigeron decumbens* var. *decumbens*, Howellia *Howellia aquatilis*, Bradshaw's lomatium *Lomatium bradshawii*, kincaid's lupine *Lupinus sulphureus* var. *kincaidii* and Nelson's checker-mallow *Sidalcea nelsoniana*) and four species of concern (white top aster *Aster curtus*, pale larkspur *Delphinium leucophaeum*, peacock larkspur *Delphinium pavonaceum* and thin-leaved peavine *Lathyrus holochlorus*). None of these plants are pollinated by Lepidoptera (butterflies and moths). They are pollinated by wind, humming birds or bees. Only one species, thin-leaved peavine, actually occurs in the eradication area. The rest occur outside a minimum of one-mile radius of the proposed eradication block. The proposed action, therefore, should not adversely affect these plants.

The proposed project and no-action alternative are not expected to affect federally listed or sensitive plants. The no-action alternative may increase the spread of noxious and undesirable weeds as tree canopies become defoliated.

The proposed action is not expected to have any significant impact on threatened or endangered species, or on any candidate species or species of concern in Eagle Creek area. The no-action alternative, however, may adversely affect the steelhead, Chinook salmon and Coho salmon, and other threatened or sensitive species due to tree defoliation and subsequent modification to the habitat in the area.

Human Factors

No unusual hazards are known in the proposed eradication area. About a dozen properties are located within the proposed 268 acre eradication area; all are single family residences. No schools, hospitals, or day care centers exist within the proposed eradication area. However, one church – the Eagle Creek Presbyterian Church, lies within the proposed eradication area near the east boundary. Two school bus routes serving the Eagle Creek Elementary School, Estacada Junior High School and Estacada High School, travel through the proposed 2005 eradication area. These school buses travel along Dowty Rd., Burnett Rd and Weitz Ln. During the morning school buses go through the area twice, once between 7:00 – 7:20 am for the elementary school and another between 8:20-8:40 am for the junior high and high school. The midday bus runs between noon and 1:00 pm for kindergarten drop-off and the afternoon buses run between 2:30-4:45 pm. Property lots in the area are relatively large, mostly farm land. The Bonnie Lure State Recreation Area in the vicinity is used by the public for hiking, fishing, playing or family leisure activities.

Agriculture, forestry, tourism and recreation are probably among the most important industries affecting humans around Eagle Creek. Eagle Creek is located east of Oregon City, north of Estacada, and west of Sandy in Clackamas County. The nearby Clackamas River and Mount Hood National Forest provide good opportunities for recreation and tourism. Eagle Creek used to be a logging community but now is oriented more towards agriculture with nursery probably being the most important type of agriculture. Some local residents have home orchards, gardens or small wood lots. Clackamas County ranked 2nd, with a total value of \$341 million, in agriculture production in Oregon in 2003. Establishment of gypsy moth would be expected to affect adversely these industries because trees and shrubs in nurseries, private wood lots and recreation areas can serve as hosts to gypsy moth. Broadleaf trees are important components of the

local flora, especially along rivers/streams and streets, and are preferred hosts by gypsy moth. Parks and recreation areas with defoliated trees and shrubs would be less attractive to tourists and local citizens.

Effects of alternatives 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 at the Eagle Creek site are analyzed in the 1995 gypsy moth programmatic EIS. These alternatives were considered as treatment options for any gypsy moth eradication programs in the USA. 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

Alternatives not considered for use in the proposed eradication program this year are

- 2) Diflubenzuron. This insect growth regulator has a broader non-target host range than *B.t.k.* and can kill many other insects beside larvae of moths and butterflies. Its use may adversely affect populations of other insects including beneficial ones.
- 3) Gypsy moth virus. Gypchek is very host specific but is not widely available in the market and is still somewhat experimental for eradication programs. Results with gypcheck have been variable.
- 5) Mating disruption. This method is still experimental 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.
- 6) Sterile insect releases. This method is also experimental and its effect on gypsy moth infestations is variable.

These alternatives were not considered in detail because the probability that they would achieve the program goal of eradication was judged to be too low or could not 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. Application of *B.t.k.* poses little risk to human health or the environment. *B.t.k.*'s host range is limited to caterpillars of Lepidoptera (moth and butterflies). There are

no threatened or endangered species of Lepidoptera in or near our proposed eradication area in Eagle Creek. Mass trapping removes male moths from the environment, thus reducing the chance of females attracting mates. It can be an effective control tool when the gypsy moth infestation is low. However, its effectiveness as a control tool varies, and largely depends on gypsy moth populations. Mass/intensive trapping can be an excellent monitoring tool to detect 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 decade, 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 18 years of experience with the use of *B.t.k.* as an eradicator for 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 eradicating many gypsy moth infestations in Oregon. 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 setting 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 attempted as an eradication tool, but results have been unreliable. This technique, however, is very useful when used in combination with other techniques. Any captured male moths are removed from the breeding population. More importantly, the number and pattern of catches help evaluate treatments and pin-point 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. The Eagle Creek site is suitable for aerial applications because of the large area and limited accessibility. Three aerial applications of *B.t.k.* at a rate of 24 B.I.U.s per acre would be applied to a 268 acre eradication area in 2005. The three treatments will occur in late April or early May, about 7-14 days apart. Exact timing depends on weather. 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, intensive/mass trapping programs will be used to monitor the effectiveness of the *B.t.k.* applications and to pinpoint the location of any remaining populations in the area. Trap densities in the core areas may be up to 3 to 9 traps per acre.

E. ENVIRONMENTAL CONSEQUENCES

This section will address 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 are hereby incorporated by reference.

Bacillus thuringiensis var. kurstaki

B.t.k. is a naturally occurring soil bacterium. When sprayed on foliage and ingested, it is toxic to most caterpillars (larvae of butterflies and moths). 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 designated by EPA as exempt from residue tolerances. This means that no limitations on the amount of material are 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 corns 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) did an exhaustive world literature review on *Bt* and authored a book – *Bacillus thuringiensis: Biology, Ecology and Safety*. After examining the literature, they concluded “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 the *Bacillus thuringiensis* by Canadian scientists (Joung & Cote, 2000) produced similar conclusions. A more recent, extensive review was submitted by Syracuse Environmental Research Associates, Inc. (2004) to USDA Forest Service. 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% to 94% or more. The risk characterization for other wildlife species is unambiguous: under foreseeable conditions of exposure, adverse effects are unlikely to be observed.” It further concluded “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’acqua 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 one symptom complex or of involvement of any single organ system. Symptoms were those common to any community, e.g., nausea, headache/dysphoria, rash, 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; mostly urban residential neighborhoods of Tacoma, Washington and Portland, Oregon. Between the two states over 300 complaints of human illness were received mostly via telephone "hotlines". No cases of infection were confirmed though 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 which 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 in which *B.t.k.* was sprayed aerially and by ground, was carried out in the eastern suburbs of Auckland. The report concluded that there was no evidence of a causal association between *B.t.k.* spray and health effects or significant health problems that occurred among the population of the sprayed area during or following sprays.

In 1999, The Capital Health Region of Victoria, British Columbia, coordinated a human health study of possible short term health effects of aerial spraying of the biological pesticide, Foray[®] 48B, on southern Vancouver Island. The study was performed as a condition necessary for the spraying 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 be reregistered to ensure that they meet current standards. In 1998 the United States Environmental Protection Agency (EPA) published 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 impacted 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 Lepidoptera larvae (caterpillars) present in the proposed spray area would likely be killed by the application of *B.t.k.* In turn, those animals dependent on caterpillars for food theoretically may be affected. Sometimes, even nontarget lepidoterans near the treatment area will be impacted due to drift (Whaley *et. al.* 1998). However, depressions in caterpillar populations are expected to be temporary due to recolonization from adjacent areas and the high reproductive capacity of most insects. There have been several studies conducted to examine these impacts.

During the 1986-87 gypsy moth program in Oregon, a study assessed the direct impact of *B.t.k.* on non-target Lepidoptera larvae in the canopy of Oregon white oak. 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 prespray levels in those blocks. A comparison of treated and untreated plots, however, 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 (Severns 2002) on the effects of *B.t.k.* on non-target butterfly community in western Oregon showed similar impacts. The species richness and density was negatively impacted during the first two years following the *B.t.k.* sprays of 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 larvae experience the greatest impacts (Sample *et al.* 1993).

***B.t.k.* and aquatic insects.** Some aquatic insects are susceptible to other strains of *B.t.* (e.g., *B.t.* var. *israelensis* is used to control black flies), but *B.t.* var. *kurstaki*, the strain used for gypsy moth control, is harmless to aquatic insects at concentrations that would be expected to result from aerial sprays (Edit 1985, Kreuzweiser *et al.* 1992). No natural ponds, lakes or permanent streams are present within the 268 acre eradication area. However, one artificial lagoon (two connected holding ponds) used for irrigation, is on the nursery farm inside the eradication area. A small portion of each of two intermittent or seasonal streams (apparently unnamed) is also present within the eradication area and might have water within them. Two backyard fishponds are immediately outside the eradication area. Eagle Creek is about 500 feet southwest of the eradication area and the Clackamas River is more than 1500 feet away to the west. When *B.t.k.* is used for gypsy moth suppression 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 from Oregon examined the indirect effect of *B.t.k.* on the reproductive success of insectivorous birds through a possible reduction in food supply for their nestlings. The study reported no significant differences between treated and untreated areas in numbers of eggs hatched and in nestling growth and development. When caterpillars weren't 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 at *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 the predominant effect of *B.t.k.* on gypsy moth parasitoids is indirect, through effects on its host species. At least two parasitoid species, *Cotesia melanoscelus* and *Rogas lymantriae*, have increased rates of parasitism in areas sprayed with *B.t.k.* (Wallner *et al.* 1983, Webb *et al.* 1989). Field studies on insects other than lepidopterans and their parasitoids and predators have found few other species or groups that are affected.

***B.t.k.* and water quality, soil condition and microclimate.** Water quality and soil condition should not be directly affected by *B.t.k.* as *B.t.k.* is not likely to affect most aquatic organisms and is

naturally present in soils worldwide. *B.t.k.* reduces the amount of defoliation by leaf-eating caterpillars. Therefore, changes in microclimate due to defoliation are not expected after *B.t.k.* application.

***B.t.k.* and recreation and agriculture.** Potential positive effects on tourism, recreation, forestry and agriculture are expected because *B.t.k.* as applied in the proposed action will eradicate the gypsy moth infestation and eliminate the negative effects due to gypsy moth defoliation.

***B.t.k.* and domestic/farm animals.** Domestic animals such as dogs, cats and farm animals such as cattle and horses, are not expected to be affected by the *B.t.k.* applications as proposed in this program. Although there are no known studies of the effect of direct exposure of these animals to *B.t.k.*, other studies where *B.t.k.* were injected or ingested by laboratory or wild animals including mice, rabbit, sheep, rodents and shrew, indicated that *B.t.k.* did not affect these animals more than the untreated checks (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 discussed 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 (up to 2-3 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 seem 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 applications on the degree the wasp *Ooencyrtus kuvanae* parasitizes gypsy moth eggs (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 Eagle Creek may be the three *B.t.k.* applications which extend the time of potential exposure and risk to a greater number of non-target lepidopterans. However, because the proposed eradication area is relatively small, the opportunity for recolonization from the surrounding areas is great. Another possible cumulative impact at the Eagle Creek site will be if the treatment needs to be conducted again in 2006 due to the spread of gypsy moth to areas larger than expected. For example, if the gypsy moth infestation spread to areas larger than the 2005 eradication area, i.e., larger than 268 acres, then an enlarged area may be sprayed in 2006. If that happens, the cumulative impacts may be the *B.t.k.*

applications over two consecutive years which extend the time of potential exposure and risk to a greater number of non-target lepidopterans.

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. Little or no effects on water quality, microclimate and soil productivity are likely due to use of *B.t.k.* or disparlure, 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 are likely to nontarget caterpillars. Cumulative effects to nontarget species are not anticipated due to recolonization. No effects to water quality or forest and soil health.	Yes
Gypchek®	No	No effect.	No effect.	No
Diflubenzuron	No	No long or short term effects anticipated at low exposure	Effects are anticipated to nontarget insects and possibly to 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

Programmatic monitoring following the eradication program will be conducted until two years of negative trapping results indicate the gypsy moth infestation has been eradicated. Pheromone traps will be used to monitor the infestation and to determine the success of the eradication program at the Eagle Creek site. This type of programmatic monitoring following *B.t.k.* treatment has been conducted in Oregon during the last 20 years for all 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 in the Eagle Creek site, the procedures for aerial treatments are applicable to this year's project.

Ground & Aerial Treatments

-- Oregon Department of Agriculture will work with the Department of Human Services, Health 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 area.

-- 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.

-- Concerned species and areas may be buffered as needed.

Aerial Treatments

-- 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% probability) to occur before adequate drying time has elapsed, i.e., within 6 hours of application.
- Foliage is wet such that drops of water are present on needle or leaf ends or can be shaken from branches. *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%.
- The air turbulence (thermal updrafts, etc.) is so great as to affect normal application seriously.
- Temperature inversions are present with no air movement sufficient to interrupt the proper settling and penetration of material through the canopy.

-- Aerial *B.t.k.* application will be suspended whenever the *B.t.k.* does not appear to be settling in the target area.

-- Aerial *B.t.k.* applications (using a rotary atomizer as a spray device) will be made by helicopter flying at or in excess of 50 feet above the tree canopy. The project pilots and aircraft will adhere to all FAA requirements.

-- 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 prior to spraying. Small aerial projects may not require an observation aircraft.

-- Helispot managers and other contract administrators can exercise shutdown authority when they observe aircraft safety or application violations.

-- Spray deposition cards will be utilized to monitor droplet size and coverage.

-- 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.

-- School bus routes will not be directly sprayed when children are present.

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 the Eagle Creek area 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 at the 268 acre eradication area in 2005. The three treatments will begin in late April or early May, about 7-14 days apart. Exact timing depends on weather. Mitigation measures described in the 2005 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, an intensive/mass trapping program will be used to monitor the effectiveness of the *B.t.k.* applications and to pinpoint the location of any remaining populations in the Eagle Creek area. Trap densities in the core area may be up to 3 to 9 traps per acre. If more moths are caught, additional egg mass searches and treatments will be considered for 2006. Two years of negative trapping results following the treatments would 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.*), followed by mass/intensive trapping, will have minimal 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 areas. No long-term, irreversible effects to non-target butterflies or moths 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 inert ingredients in the *B.t.k.* products being considered have been reviewed by State health professionals and do not present a health risk as used in this program.
- 5.) There are nine federally listed threatened or endangered species near the proposed eradication area in Eagle Creek but none occurs within the proposed eradication area. Only one concerned plant species – thin-leaved peavine, actually occurs in the eradication area. All threatened, endangered or otherwise concerned species occur outside a minimum of one-mile radius of the proposed eradication area, and therefore, should not be adversely affected by the proposed actions.

H. AGENCIES AND PERSONS CONSULTED

Audubon Society of Portland
(Bob Salinger)
5151 NW Cornell Rd.

For information on sensitive
bird species.

Portland, OR 97210
(503) 292-9501 ext 122

National Marine Fisheries Service
(Jim Turner)
525 NE Oregon Street, Suite 500
Portland, OR 97232
(503) 231-6894

For information on threatened
and endangered fish species

Oregon Natural Heritage Information Center
Oregon State University
(Sue Vrillakas, Cliff Alton)
1322 SE Morrison Street
Portland, OR 97214
(503) 731-3070 ext 103

For information on threatened
and endangered species.

Northwest Coalition for Alternatives to Pesticides
(Caroline Cox)
P.O. Box 1393
Eugene, OR 97440
(541) 344-5044

For review and comment.

Oregon Dept. of Agriculture
(Bob Meinke)
635 Capitol St. NE
Salem, OR 97301
(541) 737-2317

For information on concerned
plant species.

Oregon Dept. of Environmental Quality
(Elliot Zais, Neal Mullane, Ranei Nomura)
2020 SW 4th Ave., Suite 400
Portland, OR 97201
(503) 229-5292 or 229-5263

For review and comment.

Oregon Dept. of Environmental Quality
(Mike Kortenhof)
750 Front St. Suite 120
Salem, OR 97301
(503) 378-8240 ext 267

For review and comment.

Oregon Dept .of Fish and Wildlife
(Holly Michael)
17330 S. E. Evelyn St.
Clackamas, OR 97015
(503) 657-2000 X 230

For assistance on threatened and
endangered species. For review and
comment.

Oregon Department of Forestry
(Dave Overhulser)
2600 State St.
Salem, OR 97310
(503) 945-7396

For review and comment.

Oregon Department of Human Resources, Health Services
(Michael Heumann, Catherine Thomsen)
800 NE Oregon Street, Suite 827
Portland, OR 97232-2162
(503) 731-4573

For assistance on measures
to safeguard human health,
and for review and comment.

Clackamas Co. Public Health
(Alan Melnick, M.D.)
2051 Kaen Road
Oregon City, OR 97045
(503) 742-5350

For assistance on measures
to safeguard human health,
and for review and comment.

Oregon Environmental Council
(John Charles)
520 SW 6th Ave., Suite 940
Portland, OR 97204
(503) 222-1963

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.

Paul Hammond
2435 E. Applegate
Philomath, OR 97370
(541) 929-3894

For information on threatened
or endangered Lepidoptera.

U.S.D.A. Forest Service
(Dave Bridgwater, Iral Ragenovich)
P.O. Box 3623
333 SW First Ave
Portland, OR 97208
(503) 808-2666

For review and comment.

U.S. Fish & Wildlife Service
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 & REVIEWERS

Preparers: Barry Bai and Kathleen Johnson, Oregon Department of Agriculture, Salem, OR 97301.
Reviewers: Dan Hilburn and Alan Mudge, Oregon Department of Agriculture, Salem, OR 97301.
Charles Divan and Charles Bare, USDA, APHIS, 4700 River Road, Riverdale, MD 20737.

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Public Information Meeting
"The Gypsy Moth Problem"
Thursday, February 17, 2005
7:00-9:00pm
Eagle Creek Elementary School
30391 SE Highway 211
Eagle Creek, OR 97022

The Oregon Department of Agriculture is proposing to eradicate a gypsy moth infestation detected in the Weitz Lane - Dowty Rd. area of Eagle Creek, Clackamas County. The department proposes to use three applications by helicopter of the biological insecticide *Bacillus thuringiensis* var. *kurstaki* (Btk) in late April - May 2005, to eradicate gypsy moth from the area. An intensive pheromone trapping program would follow. The eradication area is about 268 acres roughly centered between Weitz Lane to the south and Dowty Rd. to the north.

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: Kathleen Johnson 1-800-525-0137, Bruce Pokarney 503-986-4559, TTY (hearing impaired), 503-986-4762; or by email at gypsymoth@oda.state.or.us.**

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

Appendix B. Letters Concerning Threatened & Endangered Species



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Oregon Fish and Wildlife Office

2600 SE 98th Avenue, Suite 100

Portland, Oregon 97266

Phone: (503) 231-6179 FAX: (503) 231-6195

Reply To: 8330.SP12(05)
File Name: Sp0100.wpd
TS Number: 05-604

DEC 27 2004

Barry Bai
Oregon Department of Agriculture
635 Capitol Street NE
Salem, Oregon 97301-2532

Subject: Eagle Creek Project
USFWS Reference # 1-7-05-SP-0100

Dear Dr. Bai:

This is in response to your letter, dated November 30, 2004, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Eagle Creek Project in Clackamas County. The Fish and Wildlife Service (Service) received your correspondence on December 6, 2004.

We have attached a list (Enclosure A) of threatened and endangered species that may occur within the area of the Eagle Creek Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Oregon Department of Agriculture (ODA) requirements under the Act are outlined in Enclosure B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, ODA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Enclosure B, as well as 50 CFR 402.12.

If ODA determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, ODA is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Enclosure A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published May 4, 2004, in the Federal Register (Vol. 69, No. 86, 24876) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, ODA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, ODA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages ODA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Kevin Maurice or Corissa Larvik at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact NOAA Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,



for Kemper M. McMaster
State Supervisor

Enclosures
1-7-05-SP-0100

cc electronic:
Nongame, Oregon Department of Fish and Wildlife, Salem, Oregon.

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES,
 CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE
 AREA OF THE EAGLE CREEK PROJECT
 1-7-05-SP-0100

LISTED SPECIES^{1/}Birds

Bald eagle^{3/} *Haliaeetus leucocephalus* T

Fish

Steelhead (Lower Columbia River)^{7/} *Oncorhynchus mykiss* **T

Chinook salmon (Lower Columbia River)^{8/} *Oncorhynchus tshawytscha* **T

Chinook salmon (Upper Willamette River)^{8/} *Oncorhynchus tshawytscha* **T

Plants

Golden Indian paintbrush^{10/} *Castilleja levisecta* T

Willamette daisy^{11/} *Erigeron decumbens* var. *decumbens* E

Howellia *Howellia aquatilis* T

Bradshaw's lomatium *Lomatium bradshawii* E

Kincaid's lupine^{11/} *Lupinus sulphureus* var. *kincaidii* T

Nelson's checker-mallow *Sidalcea nelsoniana* T

PROPOSED SPECIES

None

CANDIDATE SPECIES^{12/}Mammals

Fisher^{13/} *Martes pennanti*

Amphibians and Reptiles

Oregon spotted frog *Rana pretiosa*

Fish

Coho salmon (Lower Columbia River)^{15/} *Oncorhynchus kisutch* **CF

SPECIES OF CONCERNMammals

Red tree vole *Arborimus longicaudus*

Pacific western big-eared bat *Corynorhinus townsendii townsendii*

Silver-haired bat *Lasiorycteris noctivagans*

Long-eared myotis (bat) *Myotis evotis*

Fringed myotis (bat) *Myotis thysanodes*

Long-legged myotis (bat) *Myotis volans*

Yuma myotis (bat) *Myotis yumanensis*

Camas pocket gopher *Thomomys bulbivorus*

Birds

Band-tailed pigeon
Olive-sided flycatcher
Yellow-breasted chat
Mountain quail
Oregon vesper sparrow
Purple martin

Columba fasciata
Contopus cooperi borealis
Icteria virens
Oreortyx pictus
Pooecetes gramineus affinis
Progne subis

Amphibians and Reptiles

Tailed frog
Oregon slender salamander
Northwestern pond turtle
Northern red-legged frog

Ascaphus truei
Batrachoseps wrighti
Emys marmorata marmorata
Rana aurora aurora

Fish

Pacific lamprey

Lampetra tridentata

Plants

White top aster
Pale larkspur
Peacock larkspur
Thin-leaved peavine

Aster curtus
Delphinium leucophaeum
Delphinium pavonaceum
Lathyrus holochlorus

(E) - Listed Endangered

(T) - Listed 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

(S) - Suspected

(D) - Documented

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

(CF) - Candidate: National Marine Fisheries Service designation for any species being considered by the Secretary for listing for endangered or threatened species, but not yet the subject of a proposed rule.

** Consultation with National Marine Fisheries Service may be required.

^{1/} U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12

^{2/} Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle

^{3/} Federal Register Vol. 63, No. 53, March 19, 1998, Final Rule-West Coast Steelhead

^{4/} Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon

^{10/} Federal Register Vol. 62, No. 112, June 11, 1997, Final Rule-Castilleja levisecta

^{11/} Federal Register Vol. 65, No. 16, January 25, 2000, Final Rule-Erigeron decumbens var. decumbens, Lupinus sulphureus ssp. kincaidii and Fender's blue butterfly

^{12/} Federal Register Vol. 69, No. 86, May 4, 2004, Notice of Review - Candidate or Proposed Animals and Plants

^{13/} Federal Register Vol. 62, No. 87, May 6, 1997, Final Rule-Coho Salmon

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

- 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;
- 2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and
- 3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects¹

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

¹A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332. (2)c). On projects other than construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

OREGON NATURAL HERITAGE INFORMATION CENTER

Institute for Natural Resources



OREGON STATE UNIVERSITY
1322 SE Morrison Street
Portland, Oregon 97214-2423

January 13, 2005

Barry Bai
Oregon Department of Agriculture
635 Capitol Street NE
Salem, OR 97301-2532

Dear Dr. Bai:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Eagle Creek Gypsy Moth Project in Township 2 South, Range 3 East, Section 36, and Township 2 South, Range 4 East, Section 31, W.M.

Fifteen (15) records were noted within a two-mile radius of your project and are included on the enclosed computer printout. A key to the fields is also included.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

This data is confidential and for the specific purposes of your project and is **not to be distributed**.

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Cliff Alton', with a long horizontal flourish extending to the right.

Cliff Alton
Conservation Information Assistant

encl.: invoice (H-011305-CWA2)
computer printout and data key

Scientific Name: *Haliaeetus leucocephalus*Common Name: **Bald eagle**

Federal Status: LT

GRANK: G4

NHP List: 4

Category: Vertebrate Animal

State Status: LT

SRANK: S4B,S4N

HP Track: Y

ELCODE: ABNKC10010

EO ID: 26014

First Obs: 2000

Last Obs: 2003

Confirmed:

Directions: Goose Creek

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas	WV	Point [Areal - Estimated (50 m)]
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>
002S003E 25	45122-C4 Redland	1709001106 - ROARING RIVER
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
Private	Private	

EO Type:

Minimum Elev.(m): 76

Annual Observations

EO Data: See annual observations.

- 2003 - 2 fledged
- 2002 - breeding failure
- 2001 - 2 fledged
- 2000 - 2 fledged

EO Comments:

Protection:

Management:

General: Isaacs and Anthony nest 995, 1003, and 1077. 2001: Nest 995 no longer exists.

Scientific Name: *Oncorhynchus kisutch pop. 1*Common Name: **Coho salmon (Lower Columbia River/SW Washington Coast ESU)**

Federal Status: C

GRANK: G4T2Q

NHP List: 1

Category: Vertebrate Animal

State Status: LE

SRANK: S2

HP Track: Y

ELCODE: AFCHA02031

EO ID: 920

First Obs:

Last Obs: 1999-PRE

Confirmed:

Directions: EAGLE CREEK & TRIBUTARIES

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas	WC WV	Data currently not available.
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>
	45122-C1 Salmon	17090011 - Clackamas
	45122-C2 Cherryville	
	45122-C3 Estacada	
	45122-C4 Redland	
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
FEDERAL AND PRIVATE		CLACKAMAS RANGER DISTRICT ESTACADA RANGER DISTRICT

EO Type: SPAWNING & REARING - fish Minimum Elev.(m):

Annual Observations

EO Data: 1991-1992; ESTIMATED ABUNDANCE BY ODFW OF EARLY AND LATE RUN COHO (MIXED HATCHERY & WILD) PASSING NORTH FORK CLACKAMAS DAM WAS 3,118 ADULTS. THE PREVIOUS YEAR THIS ESTIMATE WAS 686 COHO. 1990; ODFW CONDUCTED SPAWNING SURVEYS ON 2.1 MILES OF DEEP CREEK, 1.4 MILES OF TICKLE CREEK AND 0.4 MILES OF EAGLE CREEK AND OBSERVED 4, 1, AND 18 ADULTS RESPECTIVELY. 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 1999. 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 COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT. FISH HATCHERIES ARE LOCATED ON EAGLE CREEK AND DELPH CREEK.

Scientific Name: ***Oncorhynchus kisutch pop. 1***Common Name: **Coho salmon (Lower Columbia River/SW Washington Coast ESU)**

Federal Status: C

GRANK: G4T2Q

NHP List: 1

Category: Vertebrate Animal

State Status: LE

SRANK: S2

HP Track: Y

ELCODE: AFCHA02031

EO ID: 2483

First Obs:

Last Obs: 1999-PRE

Confirmed:

Directions: DEEP CREEK AND TRIBUTARIES

County Name

Clackamas

Ecoregion

WC

WV

Source Feature [Uncertainty Type (Distance)]

Data currently not available.

Town-Range Sec NoteQuadCodeQuadNameWatershed

45122-C3 Estacada

1709001106 - ROARING RIVER

45122-D3 Sandy

45122-D4 Damascus

Owner Name/Type

FEDERAL AND PRIVATE

Owner CommentsManaged Area Name

CLACKAMAS RANGER DISTRICT

ESTACADA RANGER DISTRICT

EO Type: SPAWNING & REARING - fish Minimum Elev.(m):

EO Data: 1991-1992; ESTIMATED ABUNDANCE BY ODFW OF EARLY AND LATE RUN COHO (MIXED HATCHERY & WILD) PASSING NORTH FORK CLACKAMAS DAM WAS 3,118 ADULTS. THE PREVIOUS YEAR THIS ESTIMATE WAS 686 COHO. 1990; ODFW CONDUCTED SPAWNING SURVEYS ON 2.1 MILES OF DEEP CREEK, 1.4 MILES OF TICKLE CREEK AND 0.4 MILES OF EAGLE CREEK AND OBSERVED 4, 1, AND 18 ADULTS RESPECTIVELY. ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE.

Annual Observations

EO Comments:

Protection:

Management:

General: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. 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 COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Scientific Name: ***Oncorhynchus kisutch pop. 1***Common Name: **Coho salmon (Lower Columbia River/SW Washington Coast ESU)**

Federal Status: C

GRANK: G4T2Q

NHP List: 1

Category: Vertebrate Animal

State Status: LE

SRANK: S2

HP Track: Y

ELCODE: AFCHA02031

EO ID: 4112

First Obs:

Last Obs: 1999-PRE

Confirmed:

Directions: CLACKAMAS RIVER

County Name

Clackamas

EcoregionSource Feature [Uncertainty Type (Distance)]

Data currently not available.

Town-Range Sec NoteQuadCodeQuadNameWatershed

45122-C3 Estacada

17090011 - Clackamas

45122-C4 Redland

45122-C5 Oregon City

45122-D4 Damascus

45122-D5 Gladstone

Owner Name/TypeOwner CommentsManaged Area Name

EO Type: MIGRATION - fish Minimum Elev.(m):

EO Data: ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE

Annual Observations

EO Comments:

Protection:

Management:

General: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. 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 COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Scientific Name: ***Oncorhynchus kisutch pop. 1***

Common Name: **Coho salmon (Lower Columbia River/SW Washington Coast ESU)**

Federal Status: C GRANK: G4T2Q NHP List: 1 Category: Vertebrate Animal

State Status: LE SRANK: S2 HP Track: Y ELCODE: AFCHA02031

EO ID: 5636 First Obs: Last Obs: 1999-PRE Confirmed:

Directions: GOOSE CREEK

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas		Data currently not available.

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Watershed</u>
			45122-C3	Estacada	1709001106 - ROARING RIVER
			45122-C4	Redland	

<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
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EO Type: SPAWNING & REARING - fish Minimum Elev.(m): Annual Observations

EO Data: 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 1999. 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 COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Scientific Name: ***Oncorhynchus kisutch pop. 1***

Common Name: **Coho salmon (Lower Columbia River/SW Washington Coast ESU)**

Federal Status: C GRANK: G4T2Q NHP List: 1 Category: Vertebrate Animal

State Status: LE SRANK: S2 HP Track: Y ELCODE: AFCHA02031

EO ID: 13341 First Obs: Last Obs: 1999-PRE Confirmed:

Directions: CLEAR CREEK & TRIBUTARIES

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas		Data currently not available.

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Watershed</u>
			45122-B3	Elwood	1709001106 - ROARING RIVER
			45122-C3	Estacada	
			45122-C4	Redland	
			45122-D4	Damascus	

<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
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EO Type: SPAWNING & REARING - fish Minimum Elev.(m): Annual Observations

EO Data: 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 1999. 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 COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

Scientific Name: ***Oncorhynchus kisutch pop. 1***

Common Name: **Coho salmon (Lower Columbia River/SW Washington Coast ESU)**

Federal Status: C GRANK: G4T2Q NHP List: 1 Category: Vertebrate Animal

State Status: LE	SRANK: S2	HP Track: Y	ELCODE: AFCHA02031
EO ID: 17489	First Obs:	Last Obs: 1999-PRE	Confirmed:
Directions: FOSTER CREEK			
<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>	
Clackamas		Data currently not available.	
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>	
	45122-C4 Redland	1709001106 - ROARING RIVER	
	45122-D4 Damascus		
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>	
EO Type: SPAWNING & REARING - fish	Minimum Elev.(m):	<u>Annual Observations</u>	
EO Data: 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 1999. 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 COHO IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.			

Scientific Name: ***Oncorhynchus tshawytscha pop. 23***
Common Name: **Chinook salmon (Upper Willamette River ESU, spring run)**
Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal
State Status: SRANK: S2 HP Track: Y ELCODE: AFCHA02052
EO ID: 411 First Obs: Last Obs: 1999-PRE Confirmed:
Directions: CLACKAMAS RIVER

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>	
Clackamas		Data currently not available.	
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>	
	45122-C4 Redland	17090011 - Clackamas	
	45122-C5 Oregon City		
	45122-D4 Damascus		
	45122-D5 Gladstone		
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>	
EO Type: REARING & MIGRATION - fish	Minimum Elev.(m):	<u>Annual Observations</u>	
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.			

Scientific Name: ***Oncorhynchus tshawytscha pop. 23***
Common Name: **Chinook salmon (Upper Willamette River ESU, spring run)**
Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal
State Status: SRANK: S2 HP Track: Y ELCODE: AFCHA02052
EO ID: 12652 First Obs: Last Obs: 1999-PRE Confirmed:
Directions: CLACKAMAS RIVER & TRIBUTARIES

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>	
Clackamas		Data currently not available.	

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Watershed</u>
			44121-H7	Pinhead Buttes	17090011 - Clackamas
			44121-H8	Mount Lowe	
			44122-H1	Bull of the Woods	
			44122-H2	Bagby Hot Spring	
			45121-A8	Mount Mitchell	
			45122-A1	Fish Creek Mountain	
			45122-A2	Wanderers Peak	
			45122-B1	Three Lynx	
			45122-B2	Bedford Point	
			45122-B3	Elwood	
			45122-C2	Cherryville	
			45122-C3	Estacada	
			45122-C4	Redland	

<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
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EO Type: SPAWNING & REARING - fish Minimum Elev.(m): Annual Observations

EO Data: SPRING RUN. ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE. ODFW SALMONID DISTRIBUTION DOCUMENTATION 1998: CLACKAMAS RIVER, S. FK. CLACKAMAS RIVER, COLLAWASH RIVER, ROARING RIVER, FISH CREEK. 1997: N. FK. CLACKAMAS RIVER, HOT SPRINGS FK. COLLAWASH RIVER, PINHEAD CREEK. 1955: CLACKAMAS RIVER. 1940: CLACKAMAS 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. CLACKAMAS HATCHERY IS LOCATED ON THE CLACKAMAS RIVER NEAR MCIVER STATE PARK. EAGLE CREEK FISH HATCHERY IS LOCATED ON EAGLE CREEK. DELPH CREEK HATCHERY IS LOCATED ON A TRIBUTARY OF EAGLE CREEK.

Scientific Name: ***Oncorhynchus tshawytscha pop. 22***

Common Name: **Chinook salmon (Lower Columbia River ESU, fall run)**

Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal

State Status: SC SRANK: S2 HP Track: Y ELCODE: AFCHA0205Y

EO ID: 7122 First Obs: Last Obs: 1999-PRE Confirmed:

Directions: CLACKAMAS RIVER & TRIBUTARIES

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas		Data currently not available.

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Watershed</u>
			45122-C3	Estacada	17090011 - Clackamas
			45122-C4	Redland	
			45122-C5	Oregon City	
			45122-D4	Damascus	
			45122-D5	Gladstone	

<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
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EO Type: SPAWNING & REARING - fish Minimum Elev.(m): Annual Observations

EO Data: FALL 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 1999. 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. CLACKAMAS HATCHERY IS LOCATED ON THE CLACKAMAS RIVER NEAR MCIVER STATE PARK. EAGLE CREEK FISH HATCHERY AND DELPH CREEK HATCHERY ARE LOCATED UPSTREAM EAGLE CREEK AND A TRIBUTARY.

Scientific Name: ***Oncorhynchus mykiss pop. 27***

Common Name: **Steelhead (Lower Columbia River ESU, winter run)**

Federal Status: LT GRANK: G5T2Q NHP List: 1 Category: Vertebrate Animal

State Status: SC SRANK: S2 HP Track: Y ELCODE: AFCHA02132

EO ID: 4653 First Obs: Last Obs: 1999-PRE Confirmed:

Directions: CLACKAMAS RIVER & TRIBUTARIES

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas		Data currently not available.
Marion		

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Watershed</u>
			45122-B3	Elwood	17090011 - Clackamas
			45122-C1	Salmon	
			45122-C2	Cherryville	
			45122-C3	Estacada	
			45122-C4	Redland	
			45122-D3	Sandy	
			45122-D4	Damascus	
			45122-D5	Gladstone	

<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
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EO Type: SPAWNING & REARING - fish Minimum Elev.(m): Annual Observations

EO Data: WINTER 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 1999. 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 STEELHEAD IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT. FISH HATCHERIES ARE LOCATED ON THE CLACKAMAS RIVER NEAR MCIVER STATE PARK, EAGLE CREEK AND DELPH CREEK.

Scientific Name: ***Martes pennanti***

Common Name: **Fisher**

Federal Status: C/SOC GRANK: G5 NHP List: 2 Category: Vertebrate Animal

State Status: SC SRANK: S2 HP Track: Y ELCODE: AMAJF01020

EO ID: 21159 First Obs: 1980 Last Obs: 1980-09 Confirmed:

Directions: CLACKAMAS RIVER; NORTH OF ESTACADA NEAR CURRINSVILLE

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas	WV	Point [Areal - Estimated (1500 m)]

<u>Town-Range</u>	<u>Sec</u>	<u>Note</u>	<u>QuadCode</u>	<u>QuadName</u>	<u>Watershed</u>
003S004E	08		45122-C3	Estacada	1709001105 - LOWER CLACKAMAS RIVER
					1709001106 - ROARING RIVER

<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
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EO Type: Minimum Elev.(m): 137 Annual Observations

EO Data: ONE FISHER SIGHTED BY PUGH AND REPORTED TO DISTRICT BIOLOGIST

EO Comments:

Protection:

Management:

General: OBSERVER RELIABILITY - GOOD

Scientific Name: *Lathyrus holochlorus*Common Name: **Thin-leaved peavine**

Federal Status: SOC

GRANK: G2

NHP List: 1

Category: Vascular Plant

State Status:

SRANK: S2

HP Track: Y

ELCODE: PDFAB250B0

EO ID: 20456

First Obs: 1925-05-05

Last Obs: 1925-05-25

Confirmed: Y

Directions: EAGLE CREEK (MAPPED IN GENERAL AREA OF TOWN OF EAGLE CREEK-CORNELIUS, ONHP, 4-81)

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas	WV	Point [Areal - Estimated (8050 m)]
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>
002S004E 31	45122-C3 Estacada	1709001106 - ROARING RIVER
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>

EO Type: Minimum Elev.(m): -339

Annual Observations

EO Data: HERBARIUM COLLECTION: SUKSDORF, 1925, #3325, WTU

EO Comments: NO HABITAT GIVEN

Protection:

Management:

General: HERBARIUM COLLECTION: SUKSDORF #3325, 5-5-1925, WTU

Scientific Name: *Sidalcea nelsoniana*Common Name: **Nelson's sidalcea**

Federal Status: LT

GRANK: G2

NHP List: 1

Category: Vascular Plant

State Status: LT

SRANK: S2

HP Track: Y

ELCODE: PDMAL110H0

EO ID: 13082

First Obs: 1999-07

Last Obs: 1999-07

Confirmed:

Directions: FOLSOM RD.

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas	WV	Point [Areal - Estimated (50 m)]
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>
003S004E 06	45122-C3 Estacada	1709001105 - LOWER CLACKAMAS RIVER
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>

EO Type: Minimum Elev.(m): 113

Annual Observations

EO Data: ONE PLANT, IN FLOWER.

* 1999 - 1

EO Comments: PLANT IN DITCH ON N-SIDE OF RD.

Protection:

Management:

General: 1999 PLANT SIGHTING REPORT PER PHONE CONVERSATION 1999-07-19 WITH KEITH KAROLY. WHILE LOOKING AT DELPHINIUM LEUCOPHAEUM #.021, NOTICED SIDNEL PLANT.

Scientific Name: *Delphinium leucophaeum*Common Name: **White rock larkspur**

Federal Status: SOC

GRANK: G2Q

NHP List: 1

Category: Vascular Plant

State Status: LE

SRANK: S2

HP Track: Y

ELCODE: PDRAN0B182

EO ID: 16453

First Obs: 1989

Last Obs: 1991-06-

Confirmed:

Directions: 1.5 MI NNW OF ESTACADA, ALONG FOLSOM RD 0.9 MI W OF HWY 211/224. MOST PLANTS ON SOUTH SIDE OF ROAD

<u>County Name</u>	<u>Ecoregion</u>	<u>Source Feature [Uncertainty Type (Distance)]</u>
Clackamas	WV	Polygon [Areal - Delimited (8 m)] Polygon [Areal - Delimited (8 m)] Polygon [Areal - Delimited (8 m)]
<u>Town-Range</u> <u>Sec</u> <u>Note</u>	<u>QuadCode</u> <u>QuadName</u>	<u>Watershed</u>
003S004E 07	45122-C3 Estacada	1709001105 - LOWER CLACKAMAS RIVER
003S004E 06		1709001106 - ROARING RIVER
<u>Owner Name/Type</u>	<u>Owner Comments</u>	<u>Managed Area Name</u>
PRIVATE		

EO Type:	Minimum Elev.(m): 113	<u>Annual Observations</u>
EO Data:	66 PLANTS IN FLOWER IN 10-100 SQ M (1989). 1991 REPORT: 23 PLANTS IN ALL, 6 IN BUD, 11 IN FLOWER, 2 SEEDLINGS, AND 4 IMMATURE. COVERED 1/2 ACRE. STABLE CONDITION.	• 1991 - 23 • 1989 - 66
EO Comments:	FORMER PRAIRIE, NOW ROADSIDE STRIP BETWEEN FENCE AND DITCH. SALEM SILT, LOAM, BOTTOM SLOPE POSITION, OPEN, DRY. ASSOC SPECIES: AREL, DACA, ACMI, ERLA, BRCO, VIDI	
Protection:	THREATS: ROADSIDE MOWING/SPRAYING	
Management:		
General:	1989 SIGHTING REPORT ED ALVERSON. 1991 BLM SIGHTING REPORT: MICHAEL WOODRIDGE	

15 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 Heritage Program 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 National Marine Fisheries Service 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 =species of concern, -PD =proposed delisting, -NL =not listed (in part of the range).
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	ORNHC 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 because we do not actively track them at this time.
EO ID	Unique identifier for the Element Occurrence (EO).
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.
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.
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.

Key to Oregon Natural Heritage Information Center Data

Field Name	Description
Source Feature	<p>A Source Feature is the initial translation of a discrete unit of observation data as a spatial feature.</p> <p>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.</p> <p>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.</p>
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>
Town-Range, Sec, and Note	United States rectangular land survey (also known as the Public Land Survey System) legal township, range, and section descriptions that best define the location of the Element Occurrence. 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 and Comments	Federal, State, Private, etc.
Managed Area Name	BLM District, USFS Forest, Private Preserve
EO Type	For animals, type of occurrence, eg. roost, nest, spawning, etc.
EO Data	Species and population biology - numbers, age, nesting success, vigor, phenology, disease, pollinators, etc.
EO Comments	Habitat information, e.g. aspect, slope, soils, associated species, community type, etc.
Minimum Elevation	Minimum elevation of the area covered by the range of the taxon, in meters. -339 or blank=not determined.
Annual Observation	Summary of yearly observation.
Protection	Comments on protectibility and threats.
Management	Comments on how the site is managed.
General	Miscellaneous comments.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
525 NE Oregon Street
PORTLAND, OREGON 97232-2737

Refer to:
OHB 2004-0235

February 8, 2005

Mr. Barry Bai
Oregon Department of Agriculture
635 Capitol Street, NE
Salem, Oregon 97301-2532

Re: Request for List of Species Which May Be Affected by Gypsy Moth Spraying Beside
Eagle Creek near Sandy, Clackamas County, Oregon

Dear Mr. Bai:

NOAA's National Marine Fisheries Service (NOAA Fisheries) received your December 1, 2004, letter requesting an updated list of threatened and endangered anadromous fish species which may be affected by the gypsy moth spraying. We have enclosed a list of those anadromous fish species that are listed as endangered or threatened under the Endangered Species Act (ESA), those that are proposed for listing, and those that are candidates for listing (Enclosure 1) in the state of Oregon. This inventory only includes species under NOAA Fisheries' jurisdiction that occur in the Pacific Northwest. The U.S. Fish and Wildlife Service should be contacted regarding the presence of species falling under its jurisdiction.

Available information indicates that ESA-listed anadromous fish species may be present near the proposed action area including Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River Chinook salmon, LCR steelhead (*O. mykiss*), and LCR coho salmon (*O. kisutch*), a species proposed for listing. This letter constitutes the required notification of the presence of a Federally-listed threatened or endangered species under NOAA Fisheries' jurisdiction in the permit area that may be affected by the proposed project (Appendix A to Part 330, Section C.13(5)(I)).

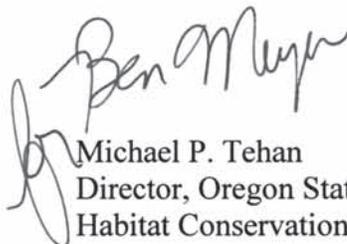
Additional information on listed species' distribution, copies of Federal Register documents designating ESA-listed species status, and links to various ESA consultation policies and tools may be found on our website at: www.nwr.noaa.gov. For information on the ESA section 7 consultation process, please refer to the ESA Section 7 implementing regulations, 50 C.F.R. Part 402.



In addition, please be aware that consultation under the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect designated essential fish habitat (EFH). All habitat in this project area is designated as EFH for Chinook and coho salmon. Additional information addressing EFH may be found on our website, above.

Questions regarding this letter should be directed to Jim Turner of my staff in the Oregon State Habitat Office at 503.231.6894.

Sincerely,

A handwritten signature in black ink, appearing to read "Ben Meyer" or similar, written over a printed name and title.

Michael P. Tehan
Director, Oregon State Habitat Office
Habitat Conservation Division

Enclosure (1): Endangered, Threatened, Proposed, and Candidate Species Occurring under NOAA Fisheries' Jurisdiction in Oregon

Endangered, Threatened, Proposed, and Candidate Species That Occur under NOAA Fisheries' Jurisdiction in Oregon

(T=threatened, E=endangered, P/T=proposed threatened, P/E Proposed Endangered. CH=critical habitat, PCH=proposed critical habitat ESU=Evolutionarily Significant Unit)

Listed Species

Coho Salmon (*Oncorhynchus kisutch*)

S. Oregon/N. California Coasts ESU(T)(CH)

Chinook Salmon (*O. tshawytscha*)

Snake River Fall-run ESU (T)(CH)

Snake River Spring/Summer-run ESU (T)(CH)

Lower Columbia River ESU (T)(PCH)

Upper Willamette River ESU (T)(PCH)

Upper Columbia River Spring-run ESU (E)(PCH)

Chum Salmon (*O. keta*)

Columbia River ESU (T)(PCH)

Sockeye Salmon (*O. nerka*)

Snake River ESU (E)(CH)

Steelhead (*O. mykiss*)

Upper Columbia River ESU (E)(PCH)

Snake River Basin ESU (T)(PCH)

Lower Columbia River ESU (T)(PCH)

Upper Willamette River ESU (T)(PCH)

Middle Columbia River ESU (T)(PCH)

Proposed for Listing

Coho Salmon (*Oncorhynchus kisutch*)

Oregon Coast ESU (P/T)(PCH)

Lower Columbia River/SW Washington ESU (P/T)(PCH)

Candidates for Listing

Steelhead

Oregon Coast ESU

Biological Insecticide

Foray® 48B

Flowable Concentrate

ACTIVE INGREDIENT:

Bacillus thuringiensis, subsp. *kurstaki*, strain
 ABTS-351, fermentation solids and solubles 17.19%
OTHER INGREDIENTS 82.81%
TOTAL 100.00%

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

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

EPA Reg. No. 73049-46
EPA Est. No. 33762-IA-001

List No. 60178

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- 1.0 First Aid
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- 8.0 Handling & Mixing
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**KEEP OUT OF REACH OF CHILDREN
CAUTION**

1.0

FIRST AID	
If on skin or clothing	<ul style="list-style-type: none"> • Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
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	
<p>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.</p>	

2.0

PRECAUTIONARY STATEMENTS

2.1

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION**

Causes moderate eye irritation. Avoid contact with skin, eyes, open wounds or clothing. Wash thoroughly with soap and water after handling.

2.2

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

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

2.3

Agricultural Use Requirements:

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.

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.

2.4

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Users should 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.

2.5

Environmental Hazards

Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

3.0 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 agency responsible for pesticide regulation.

4.0 DIRECTIONS FOR USE BOOKLET

Apply this product only through aerial application.

5.0 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 and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Waterproof gloves
- Shoes plus socks

6.0 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.

7.0 APPLICATION

Foray 48B may be only applied by aerial equipment undiluted or with quantities of water sufficient to provide thorough coverage of plant parts to be protected. 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.

8.0 HANDLING & MIXING

Foray 48B may be applied undiluted, but 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. The spray adjuvant is to be added to the tank after the Foray 48B has been 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. You may use your 'closed-loop' system to siphon the required quantity of adjuvant or you may 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, the testing of physical compatibility by mixing all components in a small container in proportionate quantities will identify possible problems. Checking with an adjuvant supplier for advice on spray adjuvants that are compatible with biological pesticides such as Foray 48B, will help avoid incompatibilities.

9.0 SPRAY VOLUMES

Aerial Application: Use appropriate amount of Foray 48B 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. 5-10 gallons per acre is the normal minimum; in the eastern regions a minimum of 2-3 gallons is normally used. The minimum amount of water needed per acre will depend upon crop size, weather conditions, spray equipment used and local experience.

10.0 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, greater control can be achieved by a contact insecticide. Thorough coverage is essential for optimum performance.

10.1 Application Rates

Crop	Pests	Rate ¹ (oz./ acre)	Dosage ¹ (BIU/ acre)
Forests, Shade Trees, Ornamentals, Shrubs, Sugar Maple Trees,	Gypsy Moth & Asian Gypsy Moth, Elm Spanworm	21 - 107	8 - 40
Seed Orchards, Ornamental Fruit, Nut and Citrus Trees ²	Spruce Budworm, Browntail Moth, Douglas Fir Tussock Moth, Coneworm, Buck Moth	21 - 80	8 - 30
	Tussock Moths, Pine Butterfly, Bagworm, Leafrollers, Tortrix, Mimosa Webworm, Tent Caterpillar, Jackpine Budworm, Blackheaded Budworm, Saddled Prominent, Saddleback Caterpillar, Eastern and Western Hemlock Looper, Orangestriped Oakworm, Satin Moth	16 - 43	6 - 16
	Redhumped Caterpillars, Spring and Fall Cankerworm, California Oakworm, Fall Webworm	11 - 21	4 - 8

Special Instructions

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

² In 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.

This product can be mixed and used with other pesticides only in accordance with the most restrictive of label limitations and precautions. This product cannot be mixed with any product containing a label prohibition against such mixing. No label dosage rates may be exceeded.

11.0 DIRECTIONS FOR USE FOR NON-AGRICULTURAL APPLICATIONS

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 agency responsible for pesticide regulation.

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 climactic 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. Foray 48B is to be used for aerial application.

Foray 48B is used 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.

11.1 Application

Aerial Application: Foray 48B may be applied aerially, either alone or diluted with water at the dosages shown in the application rates table. Spray volumes of 32-128 ounces 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:
0.5 pts./acre	1/2 teaspoon
1.0 pts./acre	1 teaspoon
1.5 pts./acre	1-1/2 teaspoons
2.0 pts./acre	2 teaspoons
3.0 pts./acre	3 teaspoons
4.0 pts./acre	4 teaspoons

12.0 STORAGE AND DISPOSAL

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

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

Pesticide Disposal: Pesticide waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility in accordance with federal and local regulations.

Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

13.0 NOTICE OF WARRANTY

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.

