Site-Specific Environmental Assessment

Rangeland Grasshopper and Mormon Cricket Suppression Program

OREGON

Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and, Wheeler Counties

EA Number: OR-06-01

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Table of Contents

Appendices

Site-Specific Environmental Assessment
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I. Need for Proposed Action

A. Purpose and Need Statement

Grasshoppers and/or Mormon crickets (hereafter referred to collectively as grasshoppers) have the potential for sudden and explosive population increases. Outbreaks are usually preceded by several years of gradual increases in grasshopper numbers, followed by a year in which conditions favor grasshopper development. Outbreaks are difficult to predict because they depend greatly on climatic variables that cannot be predicted. The intensity of grasshopper outbreaks depends largely on the rate of population increase the previous year and temperature and moisture conditions at the time of hatching and early nymphal development.

To assist in predicting where potential grasshopper outbreaks may occur, the Animal and Plant Health Inspection Service (APHIS) and Oregon Department of Agriculture (ODA) conduct annual surveys of grasshopper populations in Oregon. Adult grasshopper surveys conducted by the APHIS and ODA during the summer of 2005 reveal areas where numbers of grasshoppers may be at economically damaging levels in 2006. The 2005 Oregon Grasshopper Survey Summary included as Section II. D, and the Summary Map can be found in Appendix 2, Map 2.

If outbreaks develop, contacts and coordination will be made with involved landowners, land managers, and federal, state, and local government officials**.** A request for APHIS assistance is voluntary. In response to requests from land owners/managers, APHIS would determine if an outbreak has reached an economically or environmentally critical level. If so, an appropriate treatment would be developed, taking into account additional site specific information.

Populations of grasshoppers that trigger the need for a suppression program are considered on a case-by-case basis. There is no specific infestation level that triggers APHIS' participation. Participation here is based on the potential damage grasshoppers' cause, and the benefits of treatments. When grasshopper numbers become extreme, their feeding on available vegetation can lead to denuded areas, thus eliminating seed production and increasing soil erosion. Forage and habitat for some wildlife species and livestock will also be reduced. Rare plants may be adversely impacted by severe grasshopper feeding. Benefits of controlling grasshopper outbreaks include increasing the forage available for wildlife and livestock, reduced soil erosion, protecting wildlife habitat, and preventing grasshoppers from becoming migratory and causing further damage to adjacent crops or rangeland. Some populations that may not cause substantial damage to native rangeland may require treatment due to the secondary suppression benefits resulting from the high value of adjacent crops, and the protection of rangeland revegetation programs.

The goal of the proposed suppression program analyzed in this EA is to reduce grasshopper populations to an acceptable level in order to protect rangeland ecosystems and/or cropland adjacent to rangeland.

This environmental assessment (EA) analyzes potential environmental consequences of the proposed action and its alternatives. This EA applies to proposed suppression programs that could take place from May 1 to July 31 in the Oregon counties of Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and, Wheeler (see Appendix 2, map 1). A decision will be made by APHIS based on the analysis presented in this EA, the results of public involvement, and consultation with other state and federal agencies. Three alternates are analyzed here, no action, and two chemical control alternatives. A selection of one of the three alternatives will be made by APHIS for suppression programs in Eastern Oregon.

This EA is prepared in accordance with the requirements under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code (U.S.C.) § 4321 *et. seq.*) and the NEPA procedural requirements promulgated by the Council on Environmental Quality, United States Department of Agriculture (USDA), and APHIS.

B. Background Discussion

In rangeland ecosystems in the Western United States, grasshoppers are a natural component of the biota. Different species of grasshoppers forage on different preferred grasses, forbs and shrubs. They perform beneficial functions by recycling nutrients and serving as food for other animal species. They are native to Western rangelands and they have evolved to occupy various niches in the ecosystem. Even though these ecosystems have been impacted by various forms of human activity and invasion by foreign plant and animal species, grasshoppers are usually beneficial with respect to human values.

Additionally, integrated pest management (IPM) systems can help hold grasshopper populations below economically damaging levels. Management tools such as mechanical control, biological control, cultural control, and/or selective use of chemicals can be implemented by farmers, ranchers and land managers to delay or avert economic grasshopper outbreaks.

However, grasshopper populations can build up to levels of economic infestation despite even the best land management and other efforts to prevent outbreaks. At such a time, a rapid and effective response may be requested and needed to reduce the destruction of rangeland vegetation. In some cases, a response is also needed to prevent grasshopper migration to cropland adjacent to rangeland.

APHIS conducts surveys for grasshopper populations on rangeland in the Western United States, provides technical assistance on grasshopper management to land owners/managers, and cooperatively suppresses grasshoppers when direct intervention is requested by a Federal land management agency or a State agriculture department (on behalf of a State agency, a local government, or a private group or individual) and deemed necessary. The need for rapid and effective suppression of grasshoppers when an outbreak occurs limits the options available to APHIS. The application of an insecticide within all or part of the outbreak area is the response available to APHIS to rapidly suppress or reduce (but not eradicate) grasshopper populations and effectively protect rangeland.

In June 2002, APHIS completed an Environmental Impact Statement document “Rangeland Grasshopper and Mormon Cricket Suppression Program, Final Environmental Impact Statement, June 21, 2002” (2002 FEIS) concerning suppression of grasshopper populations in 17 Western States. The 2002 FEIS describes the actions available to APHIS to reduce the destruction caused by grasshopper populations in the states of Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington and Wyoming.

APHIS’ authority for cooperation in this suppression program is based on Section 417 of the Plant Protection Act of 2000 (7 U.S.C. § 7717). In general this statute directs APHIS to control actual or potential economic grasshopper and Mormon cricket outbreaks on Federal, State, or private lands. **APHIS’ participation is subject to available funds, and at the request of a State or Federal land manager.** For the discussions in this EA, it is understood that no control measures will be undertaken by APHIS without both of these conditions being met.

The state of Oregon has the following laws that are relevant to grasshopper control:

- *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.

In May 2002, APHIS and the Forest Service (FS) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on national forest system lands (Document #02-IA-11132020-106, May 29, 2002). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress damaging grasshopper populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the FS.

The MOU further states that the responsible FS official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on national forest land is necessary. FS will provide information on location of T&E species, sensitive sites, and other resource issues. The FS must also approve a Pesticide Use Proposal (Form FS-2100-2) for APHIS to treat outbreaks. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and FS approves the Pesticide Use Proposal.

In February, 2003, APHIS and Bureau of Land Management (BLM) signed a MOU detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on BLM managed lands, APHIS PPQ MOU # 03-8100-0870-MU. This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BLM.

The MOU further states that the responsible BLM official will request, in writing, the inclusion of appropriate lands in the APHIS suppression project when treatment on BLM managed land is necessary. BLM will provide information on location of T&E species, sensitive sites, and other resource issues. The BLM must also prepare a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BLM approves the Pesticide Use Proposal.

In June, 2004, APHIS and Bureau of Indian Affairs (BIA) signed a MOU detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on BIA managed lands, APHIS PPQ MOU # 04-8100-0941-MU. This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BIA.

The MOU further states that the responsible BIA and tribal officials will request, in writing, the inclusion of appropriate lands in the APHIS suppression project when treatment on BIA managed land is necessary. Requests should include information on the location and dates of all tribal ceremonies and/or cultural events that will be in or near the proposed treatment area(s). In addition, request should include information on the location of any T&E species, the location and nature of any sensitive or "not to be treated" sites. The BIA must also prepare a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BIA approves the Pesticide Use Proposal.

A Pesticide Use Proposal is the tracking mechanism by which pesticide use on federally managed land is reported to the Environmental Protection Agency (EPA). EPA's role is to track use under the Federal Insecticide Fungicide and Rodenticide Act as amended (Public Law (P.L.) 92-516). Responsibility for administering the act is vested in the EPA.

C. About This Process

The EA process for grasshopper management is complicated by the fact that there is very little time between requests for treatment and the need for APHIS to take action with respect to those requests. Late summer and fall surveys help to determine general areas, among the millions of acres that potentially could be affected, where grasshopper infestations may occur the following spring. There is considerable uncertainty, however, in the forecasts, so that framing specific proposals for analysis under NEPA is not possible. At the same time, the program strives to alert the public in a timely manner to its more concrete treatment plans and avoid or minimize harm to the environment in implementing those plans. Requests for assistance can come at any time. However, treatments will occur when grasshoppers can be effectively controlled, from shortly after they hatch until the majority has become adults. The exact timing of these events varies based on climate and elevation. In Oregon treatments may occur from mid-May through July.

Public input is an important part of our decision making process. On December 10, 2003 APHIS mailed a scoping document to individuals and organizations that either indicated an interest in grasshopper programs in the past, or APHIS felt may provide useful input in the preparation of this EA. This scoping letter is also available on the ODA website, http://egov.oregon.gov/ODA/PLANT/ippm_control.shtml. Comments are still being accepted and can be submitted at any time. Comments received will assist APHIS in the preparation of this and future EA's.

The 2002 FEIS provides a solid analytical and regulatory foundation; however, it may not be enough to satisfy NEPA completely for actual treatment proposals, and the "conventional" EA process will seldom, if ever, meet the program's timeframe of need. Thus, APHIS PPQ has initiated a two-stage NEPA process designed to accommodate program needs and meet environmental safeguarding requirements.

The first stage involves issuing an initial finding of no significant impact (FONSI) based on the findings of an EA. The EA and signed FONSI will be made available to the public with a 30 day comment period. The second stage occurs when an actual treatment program is requested by a land owner/manager, and involves preparing a supplement to the EA.

For the first stage, this EA will analyze aspects of environmental quality that could be affected by grasshopper treatment in the Oregon counties of Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and, Wheeler. The EA and FONSI will be made available to the public for a 30-day comment period. If comments are received during the comment period, they will be addressed in stage 2 of the process.

Stage 2 will only be initiated when the program receives a treatment request from a landowner/manager, and it is determined that treatment is necessary and possible. The proposed treatment site, within the area covered under this EA, will be examined to determine if environmental issues exist that were not covered in this EA. This stage is intended mainly to insure that significant impacts in the specific treatment area will not occur. APHIS will examine all site-specific characteristics and determine a preferred alternative which meets program needs (see pages 12-13). Many factors are considered including type and density of vegetation, grasshopper species involved, terrain, life stage of the grasshoppers, protective measures for sensitive sites/species, costs, and logistics. A supplemental determination will be prepared to document this finding and would also address any comments received on this EA and the initial FONSI. Supplemental determinations prepared for specific treatment sites will be provided to all parties who commented on the EA and FONSI. There will not be a waiting period after the supplement is issued. If a suppression program is selected, it will be carried out within a short period of time, although comments may still be submitted.

EA's will updated as needed. Generally for years when funding is available for suppression programs, they will be updated annually to reflect current survey information and maps. These documents and other grasshopper program related information can be found at the ODA, Plant Division website; http://egov.oregon.gov/ODA/PLANT/ippm_control.shtml.

II. Alternatives

The alternatives presented in the 2002 FEIS and considered for the proposed action in this EA are: (A) no action; (B) insecticide applications at conventional rates and complete area coverage, and (C) reduced agent area treatments (RAATS). Each of these alternatives, their control methods, and their potential impacts were described and analyzed in detail in the 2002 FEIS. Copies of the complete 2002 FEIS document are available for review at Animal and Plant Health Inspection Service, Plant Protection and Quarantine, 6135 NE 80th Avenue, Suite A-5, Portland, Oregon 97218-4033, (503) 326-2814. It is also available at the APHIS web site, http://www.aphis.usda.gov/ppd/es/gh.html.

The 2002 FEIS is intended to explore and explain potential environmental effects associated with grasshopper suppression programs that could occur in 17 Western States (Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming). The 2002 FEIS outlines the importance of grasshoppers as a natural part of the rangeland ecosystem. However, grasshopper outbreaks can compete with livestock for rangeland forage and cause devastating damage to crops and rangeland ecosystems. Rather than opting for a specific proposed action from the alternatives presented, the 2002 FEIS analyzes in detail the environmental impacts associated with each programmatic action alternative related to grasshopper suppression based on new information and technologies.

All insecticides used by APHIS for grasshopper suppression are used in accordance with all applicable product label instructions and restrictions. Representative product specimen labels can be accessed at the Crop Data Management Systems, Inc. web site at www.cdms.net/manuf/manuf.asp. Labels for actual products used in suppression programs will vary, depending on supply issues.

All insecticide treatments conducted by APHIS would be implemented in accordance with the APHIS' "FY-2006 Guidelines for Treatment of Rangeland for the Suppression of Grasshoppers and Mormon Crickets" (Treatment Guidelines), included as Appendix 1 to this EA. These Treatment Guidelines were developed by APHIS to provide established safety guidelines which will be employed in the 17 Western states where grasshopper suppression programs may occur.

A. No Action Alternative

Under Alternative A, the no action alternative, APHIS would not fund or participate in any program to suppress grasshopper infestations. Under this alternative, APHIS may opt to provide limited technical assistance, but any suppression program would be implemented by a Federal land management agency, a State agriculture department, a local government, or a private group or individual.

B. Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative

Alternative B, insecticide applications at conventional rates and complete area coverage, is generally the approach that APHIS has used for many years. Under this alternative, carbaryl, diflubenzuron (Dimilin®), or malathion will be employed. Carbaryl and malathion are insecticides that have traditionally been used by APHIS. The insect growth regulator, diflubenzuron, is also included in this alternative. Applications would cover all treatable sites within the infested area (total or blanket coverage) per label directions. The application rates under this alternative are as follows:

- 16.0 fluid ounces (0.50 pound active ingredient (lb a.i.)) of carbaryl spray per acre,
- 10.0 pounds (0.50 lb a.i.) of 5% carbaryl bait per acre,
- 1.0 fluid ounce (0.016 lb a.i.) of diflubenzuron per acre, or
- 8.0 fluid ounces (0.62 lb a.i.) of malathion per acre.

In accordance with EPA regulations, these insecticides may be applied at lower rates than those listed above. Additionally, coverage may be reduced to less than the full area coverage, resulting in lesser effects to nontarget organisms.

The potential generalized environmental effects of the application of carbaryl, diflubenzuron, and malathion, under this alternative are discussed in detail in the 2002 FEIS (Environmental Consequences of Alternative 2: Insecticide Applications at Conventional Rates and Complete Area Coverage, pp. 38-48). A description of anticipated site-specific impacts from this alternative may be found in Part IV of this document.

C. Reduced Agent Area Treatments (RAATs) Alternative

RAATs, is a recently developed grasshopper suppression method in which the rate of insecticide is reduced from conventional levels, and treated swaths are alternated with swaths that are not treated. The RAATs strategy relies on the effects of an insecticide to suppress grasshoppers within treated swaths while conserving grasshopper predators and parasites in swaths not treated. Carbaryl, diflubenzuron, or malathion would be considered under this alternative at the following application rates:

- 8.0 fluid ounces (0.25 lb a.i.) of carbaryl spray per acre,
- 10.0 pounds (0.20 lb a.i.) of 2 percent carbaryl bait per acre,
- 0.75 fluid ounce (0.012 lb a.i.) of diflubenzuron per acre, or
- 4.0 fluid ounces (0.31 lb a.i.) of malathion per acre.

The amount of area not treated (the untreated swath) under the RAATs approach is not standardized. In the past, the area infested with grasshoppers that remains untreated has ranged from 20 to 67 percent. The 2002 FEIS analyzed the reduced pesticide application rates associated with the RAATs approach but assumed pesticide coverage on 100 percent of the area as a worst-case assumption. This assumption was made because there is no way to predict how much area would actually be left untreated as a result of the specific action requiring this EA. Rather than suppress grasshopper populations to the greatest extent possible, the goal of this alternative is to suppress grasshopper populations to a desired level.

The amount of area not receiving pesticide may vary based on factors such as choice of chemical, site characteristics, grasshopper life stage, grasshopper density, and value of the resource being protected.

The potential environmental effects of the application of carbaryl, diflubenzuron, and malathion under this alternative are discussed in detail in the 2002 FEIS (Environmental Consequences of Alternative 3: Reduced Agent Area Treatments (RAATs), pp. 49–57). A description of anticipated site-specific impacts from this proposed treatment may be found in Part IV of this document.

D. Treatment Strategies

The insecticides available to APHIS are diflubenzuron, carbaryl (spray and bait), and malathion. The decision on which insecticide to use, if any, depends on a variety of factors specific to a given site and situation. Each of these insecticides has characteristics that dictate its desirability for a treatment.

Diflubenzuron is a chitin inhibitor, and only kills grasshoppers or other insects when they are in their immature stages. It will not kill adult grasshoppers. It cannot be used late in the season because the grasshoppers are no longer molting, and thus not susceptible. In Oregon, the efficacy of diflubenzuron is notably decreased by the first week of July because of grasshopper maturity**.** This material would not normally be used after the third week of June, for most species of grasshoppers in Oregon. Insects usually die seven to ten days after treatment. Diflubenzuron is reported to have a residual activity against grasshoppers lasting up to 28 days. Diflubenzuron is less harmful to other insects, including pollinators, than the other chemicals. It is essentially harmless to vertebrates. Diflubenzuron must be applied as a spray mixed with water and crop or vegetable oil. It is normally applied by air for grasshoppers on rangeland, but can also be applied by ground. It is the least costly option per acre treated. The formulation of diflubenzuron approved for use by APHIS is Dimilin 2L ®.

Carbaryl bait acts faster than diflubenzuron. It kills adult and immature grasshoppers and other insects that feed on the bait. It has a broader spectrum of insecticidal activity than diflubenzuron, but the bait must be ingested to be lethal. Therefore it is preferred over carbaryl or malathion sprays, in areas where foraging bees are a concern. It is the most costly option. It can be used effectively any time during the grasshopper season. It can be applied by air or ground. Carbaryl bait is applied in greater mass than any of the other treatments (up to 10 lbs. dry material per acre) and creates a greater logistical problem because of the amount of material which must be stored, transported and applied. Carbaryl bait can be applied by air in some situations when and where liquid insecticides cannot. Although no aerial applications of any insecticide can be conducted when wind speeds exceed 10 mph, carbaryl bait can be applied when air temperatures are too high to permit effective applications of sprays. Additionally, when terrain is too rough to maintain flying at the low altitude consistent with effective spray application, bait can be applied by flying at a safe altitude over the ground. Thus, the window of opportunity to apply bait is greater than for sprays. The carbaryl bait formulations approved for use by APHIS include products which impregnate carbaryl into wheat bran, rolled whole wheat, and pellets manufactured from grape and apple pumice.

Carbaryl spray is a broad spectrum contact insecticide that is more effective in cool weather than hot weather. It kills adult and immature grasshoppers and other insects. It has a knock-down effect intermediate between diflubenzuron and malathion sprays, and it has a residual activity of up to 14 days. It is normally applied by air for grasshoppers on rangeland, but can also be applied by ground. It is intermediate in cost. It carries higher risk for nontarget species than diflubenzuron or carbaryl bait. Because of the residual toxicity to bees, it is not likely to be a treatment of choice in areas where foraging bees are a concern. The carbaryl formulation approved for use by APHIS is Sevin XLR Plus which uses water as the carrier.

Malathion spray is a broad spectrum contact insecticide that is more effective in hot weather than cool weather. It kills adult and immature grasshoppers and other insects. It has an immediate knock-down effect and has essentially no residual activity. It is normally applied by air for grasshoppers on rangeland, but can also be applied by ground. It is intermediate in cost. It carries higher risk for nontarget species than diflubenzuron or carbaryl bait. The formulations of malathion approved for use by APHIS are Ultra Low Volume (ULV) Concentrates. They are applied without an additional carrier.

Detailed information on the insecticides used by APHIS for grasshopper control is found in the 2002 FEIS pp 30-36. Information on surfactants or additives to sprays is found in the 2002 FEIS pp 36-37.

Requests for grasshopper suppression programs may come from Federal land managers or Oregon Department of Agriculture, at any time. Complaints from public land mangers, private landowners and other persons who are threatened by grasshopper outbreaks normally come when the outbreak is in progress. When a complaint is received, APHIS and ODA then determine the need for suppression measures based on several factors.

The first level of assessment is the overall grasshopper population density. This is determined through field survey and is expressed in grasshoppers per square yard. In addition to the density of grasshoppers, an assessment of the species composition and life stage will be made. Species without strong migratory habits are less of a concern to nearby croplands than those with strong migratory characteristics. Examples of grasshoppers with strong migratory habits include Mormon crickets (*Anabrus spp.*), *Melanoplus sanguinipes,* and *Camnula pellucida.* Examples of grasshoppers which are not highly migratory include the short-winged form of *Oedaleonotus enigma*, and *Hesperotettix viridis.*

Grasshopper populations which are not likely to threaten crops or cause significant damage to rangeland would not be treated.

Next, APHIS will determine, through consultation with FWS and land managers what protective measures, if any, will be necessary to protect sensitive species and/or sites. These could include T&E, candidate, and species of concern, critical habitats, organic crops, special sites, or other areas needing protection from program chemicals. The implementation of buffers may have an adverse impact on the efficacy of a potential program. A program will not be undertaken by APHIS if it is determined that protective measures will prevent effectively reducing grasshopper numbers to a desired level.

Following a decision to conduct a treatment, the pesticide would be chosen according to site specific conditions. This involves many factors including type and density of vegetation, acceptance of bait by the grasshopper species involved, terrain, climatic conditions, proximity to pollinators, life stage of the grasshopper, importance of rapid reduction of grasshopper density, need for residual control, costs, and logistics.

Because of their different modes of action, and suitability under different climatic conditions, the three pesticides can be sorted as follows:

Grasshopper Life stage	**Weather conditions**	**Pesticide**
Nymphs	Cool and wet	Diflubenzuron, Carbaryl
Nymphs	Hot and dry	Diflubenzuron, Malathion
Adults	Cool and wet	Carbaryl
Adults	Hot and dry	Carbaryl, Malathion

The insecticides would be applied in swaths which have a width determined for each treatment device (aircraft, truck-mounted spreader, or ATV-mounted spreader) and insecticide. For instance, an Ayres Turbine Thrush aircraft can deliver a 100 foot swath with spray, and an ATV-mounted bait spreader can deliver a 15 foot swath with bait.

Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative utilizes the approach of spacing the centerline of adjacent swaths one swath-width apart. RAATS utilizes variable spacing of the swaths. The distance between treated swaths may be varied by the program manager based on factors such as vegetation density, grasshopper population pressure and value of the resource being protected. For example, due to the short residual action of malathion, the untreated area will be minimal, and the untreated swath will not exceed 20 feet. For carbaryl and diflubenzuron, which have longer residual activity, the percent of the area left untreated can be greater. Untreated swaths can be up to 100 feet. In some situations, such as when grasshopper densities are extreme, late instars are present, or vegetation is dense it may be determined to reduce the size of the untreated swaths to increase effectiveness.

E. Oregon 2005 Survey Summary

The 2005 grasshopper survey season started in early May and ended in early September. Adult survey data showed economic levels of more than 8 grasshoppers per square yard on 64,751 acres in 8 counties of Eastern Oregon. The counties with the highest infestation levels were Klamath with 22,384 acres, Morrow with 16,066 acres, Baker with 12,340 acres, Union with 5,610 acres, Wallowa with 5,393 acres and Umatilla with 2,640 acres. Areas with significant infestations were around the Umatilla Army Depot in Hermiston, the US Navy Bombing Range in Boardman and in the Fort Klamath Valley. Infestations in the Klamath Marsh National Wildlife Refuge (Klamath Marsh NWR) were relatively low compared with previous years. Adult surveys in early September in the Klamath Marsh NWR showed an area of 81 acres at the old Lane Ranch infested with economic levels. A relatively wet spring may have delayed or prevented outbreaks on the Refuge and adjacent private pastureland. Grasshoppers were observed hatching in late July. At the end of June, early-localized infestations of nymphs were treated with dimilin ground applications. In total, 276 acres on the Refuge were protected with dimilin using 50% ATV RAATs technique (138 acres treated). A 97% control rate was recorded for the dimilin applications. According to commercial pesticide applicators, approximately 1,800 acres of private land were sprayed in Eastern Oregon against grasshopper infestations with malathion and dimilin.

In 2005, economic grasshopper infestations were reported for several new areas that included the Umatilla Army Depot, the US Navy Bombing Range and the Fort Klamath Valley. An aerial malathion application at the Depot was approved and prepared by USDA-APHIS following a request by the US Army. Due to logistical complications with the Depot's weapons destruction program the aerial application was ultimately cancelled. However, private landowners adjacent to the Depot applied malathion to control the grasshopper outbreak. An economic infestation of Camnula pellucida, the clear winged grasshopper, was reported from Fort Klamath. An estimated 20,000 acres of private pastureland showed levels between 8 and 24 grasshoppers per square yard. In a public meeting on September 7 with representatives of the ranchers, the Bureau of Reclamation, NRCS, USDA-APHIS and ODA recommendations were presented and discussed how to control potential grasshopper outbreaks in 2006.

Economic levels of grasshoppers were also recorded in Baker, Union and Wallowa counties. Most infestations were observed on private pastureland with levels ranging between 8 and 45 grasshoppers per square yard. The dominant species in these counties were Melanoplus sanguinipes, M. femurrubrum, M. packardi, Oedaleonotus enigma and Aulocara elliotti.

Mormon crickets, Anabrus simplex, were recorded in areas south of Arlington (approx. 3,100 acres), Gilliam County, south of Enterprise (766 acres) and Lostine (843 acres) in Wallowa County, in Halfway (one female caught), Baker County and in the Jordan Valley (unknown acreage), Malheur County.

We cannot reliably predict where grasshopper outbreaks will occur because outbreaks depend greatly on climatic conditions at the time of hatch and early development, factors which cannot be accurately predicted. However, the areas of economic grasshoppers in 2005 serve as indicators of potential problem areas for 2006. See Appendix 2, Map 2 for a visual summary of these survey results.

III. Affected Environment

A. Description of Affected Environment

The proposed suppression program area included in this EA encompasses rangeland in the Oregon counties of Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and, Wheeler (see Appendix 2, map 1). These 17 counties comprise most of the eastern two thirds of Oregon. The total area is 61,114 square miles (39,125,760 acres) (Bradbury 2001).

Generally, it is not possible to predict the precise locations where grasshopper outbreaks will occur in any given year. However, ODA has compiled historical annual survey data from 1953-2003. The result is a map showing areas where grasshoppers have historically been an economic problem in Oregon (see Appendix 2, Map 3). The areas of economic outbreaks are very consistent. This extensive historical data, allows us to make the assumption that it is unlikely that economic outbreaks will occur in areas other than those with historical infestations, as indicated in Map 3 (Appendix 2). Although this assessment covers all the rangeland in the 17 counties, our attention to the affected environment will concentrate on the areas of historical grasshopper outbreaks indicated in Map 3.

This area can be divided into six “level three” ecoregions based on similarities in geography, climate, and plant and animal communities (see Appendix 2, map 4) (Meacham *et. al.* 2001). The main feature that these ecoregions share is the dry climate created by rain shadow effect of the Cascade Range.

<u>Eastern Cascades Slopes and Foothills</u> – This zone is characterized by vegetation that creates a transition from the higher elevation, moister forests of the Cascades on the West to the lower elevation, drier areas dominated by shrubs and grassland on the east. Open forests of ponderosa and lodgepole pine predominate in this ecoregion. The vegetation is drought adapted and susceptible to wildfire. Volcanic cones and buttes are common in much of the region.

<u>Columbia Plateau</u> – This is an arid sagebrush steppe and grassland, surrounded on all sides by wetter, mostly forested, mountainous ecoregions. This region is underlain by a thick layer of lava rock. Particularly in the region’s eastern portion, where precipitation is greater, deep wind-deposited loess soils have been extensively cultivated for wheat.

<u>Blue Mountains</u>- This ecoregion is a complex of mountain ranges that are lower and more open than the neighboring Cascades and northern Rocky Mountains. Like the Cascades but unlike the Rockies, the Blue Mountains region is mostly volcanic in origin. Only its highest ranges, particularly the Wallowa and Elkhorn mountains, consist of intrusive rocks that rise above the dissected lava surface of the region. Much of this ecoregion is grazed by cattle, unlike the Cascades and northern Rockies.

<u>Snake River Plain</u> – This area is lower and less rugged than the surrounding basin and range ecoregions. A large percentage of the alluvial valleys bordering the Snake River are used for irrigated agriculture. Cattle feedlots and dairies are also common here. Except for the scattered barren lava fields, the remainder of the plains and low hills have natural sagebrush steppe vegetation which are used for cattle grazing.

<u>Central Basin and Range</u> – This ecoregion is composed of north-south trending fault block ranges and intervening drier basins. In the higher mountains, woodland, mountain brush and scattered open forest are found. Lower elevation basins, slopes and alluvial fans are either shrub and grass

covered, shrub-covered, or barren. The potential natural vegetation is, in order of decreasing elevation and ruggedness: scattered western spruce-fir forest, juniper woodland, sagebrush and salt brush-greasewood. The region is internally drained by ephemeral streams. In general, this region is warmer and drier than the Northern Basin and Range and has more shrub land and less grassland than the Snake River Plain. The land is primarily used for cattle grazing.

Northern Basin and Range – This ecoregion consists of dissected lava plains, rolling hills, alluvial fans, valleys, and scattered mountains. Mountains are more common in the eastern part. Overall, it is higher and cooler than the Snake River Plain, drier and more suited to agriculture than the Columbia Plateau and has fewer ranges than the Central Basin and Range. Sagebrush steppe is extensive here. Juniper dominated woodland occurs on the rugged stony uplands. Much of the region is used for rangeland. Generally all but the eastern third of the Oregon part of this ecoregion is internally drained.

Average January temperatures in this area range from 24.2° F in Wallowa County to 37.4° F in Jefferson County, with 30.9° F the average for the region. Average July temperatures range from 63° F in Wallowa County to 75.6° F in Malheur County, with 69.0° F the average for the region. Annual precipitation ranges from 30.85″ in Hood River County to a low of 9.15″ in Sherman. The average annual precipitation for the entire region is 13.62″ (Bradbury 2001).

This area is composed of several watersheds or drainages, most flow into the Columbia River or its major tributary the Snake River. Major drainages are the Deschutes, Hood River, John Day, and Umatilla which flow north into the Columbia. Along the eastern edge of Oregon the Grande Ronde, Imnaha, Powder, Malheur, and Owyhee River systems flow into the Snake. Major lakes in these drainages include Wallowa Lake, Paulina Lake, East Lake, and Ladd Marsh. Many manmade reservoirs have been constructed for irrigation, flood control, and power generation. Major reservoirs in the area include Lakes Bonneville, Celilo, Umatilla, and Wallula on the Columbia, Brownlee, Oxbow, and Hells Canyon on the Snake. Smaller reservoirs include Owyhee, Warm Springs, Prineville, Wickiup, and Billy Chinook.

Most of the southeastern part of this area lies within the Great Basin hydrologic region. In this arid area, large through-flowing rivers have not developed, and each watershed drains to its lowest point, where water is lost to evaporation and groundwater recharge. Here small rivers feed closed basin and marshes including Malheur Lake, Harney Lake, the Warner lakes, Summer Lake, Silver Lake, Lake Abert, Alvord Lake, Paulina Marsh and

Sycan Marsh. Goose Lake in Lake County drains into the Sacramento River drainage, and to the Pacific, only in very wet years (Meacham et. al. 2001).

The area contains many smaller bodies of water, including springs. Springs are often unconnected to stream systems or other water bodies. Due to lack of connectivity, biota found at spring can be endemic.

Grassland, shrubland, and woodlands are present across the general area. Grasshopper treatments would occur only in grass and shrublands, not in forests.

The rangelands are utilized for cattle and sheep grazing. They provide habitat for native and introduced game and non-game animal species. They are in an accelerated state of ecological change due to invasion by exotic plant species, changes in fire patterns, and intervention by humans.

Elevation and topography within the overall area vary considerably, from below 500 feet along the Columbia River to mountains over 9000 feet. Treatments would occur primarily on flatlands, foothills, and areas adjacent to cropland. Some treatments may occur on areas of rangeland where critical forage or revegetation projects are threatened. The rangeland of the Columbia Plateau is mostly between 1000-2000 feet elevation, while the rangeland of the Northern Basin and Range averages 3500-4500 feet. Most suppression treatments would occur at elevations below 6000 feet.

Up to 100 species of grasshoppers may occur within the proposed suppression area. Of these, no more than ten species have been known to reach outbreak status and threaten crops and/or valuable range resources in Oregon during the past five decades. The widespread grasshopper outbreaks of the mid-1980s were comprised primarily of the *Melanopli* group. Localized outbreaks in the 1990s and early 2000s have included mainly *Camnula pellucida.*

It is anticipated that potential treatments requests in 2006 would be most likely for *Aulocara elliotti, Camnula pellucida, Melanoplus sanguinipes, M. femurrubrum, M. packardi, Oedaleonotus enigma*, and possibly *Anabrus spp*. Oregon's list of ten most economic grasshopper species also includes *Ageneotettix deorum, Hesperotettix viridis, Melanopus bivittatus,* and *M. foedus.*

B. Site-Specific Considerations

1. Human Health

The population of the 17 counties in 2000 was 387,726 (Meacham *et. al.* 2001). Major cities, in order of decreasing population, include Bend, Deschutes County (pop. 50,650), Pendleton, Umatilla County (17,175), La

Grande, Union County (12,885), Redmond, Deschutes County (12, 810), Hermiston, Umatilla County (12,165), The Dalles, Wasco County (11,880), Ontario, Malheur County (10,910), Baker City, Baker County (10,155), Prineville, Crook County (7255), Milton-Freewater, Umatilla County (6720), Hood River, Hood River County (5135), Madras, Jefferson County (5080), Umatilla, Umatilla County (3625), Boardman, Morrow County (3070), Nyssa, Malheur County (3065), Burns, Harney County (2945), Lakeview, Lake County (2625), Enterprise, Wallowa County (2050), Union, Union County (2025), and John Day, Grant County (2010), Elgin, Union County (1785), Pilot Rock (1675), Irrigon (1540), and Athena (1280) Umatilla County, Joseph, Wallowa County (1270), and Prairie City, Grant County (1205) (Bradbury 2001).

The suppression program would be conducted on rangelands that are not normally inhabited by humans. Agriculture is a primary economic factor for the area and human habitation is widely scattered throughout the region, mainly on the edges of the rangeland. Most habitation is comprised of single-family farm or ranch houses, but some rangeland areas may have suburban developments or “ranchettes” nearby. Average population density in rural areas of eastern Oregon is 3.6 persons per square mile.

Schools are located in most of the cities and towns. Since treatments are conducted in rural rangeland, no impact to these facilities is expected. Recreationists may use the rangelands for hiking, biking, camping, bird watching, hunting, falconry or other uses. In the event a rural school house, inhabited dwelling, or recreational facility is encountered, mitigative measures in the 2005 Guidelines (Appendix 1) will be implemented, and no adverse impacts are expected.

Human health may be affected by the proposed actions. However, potential exposures to the general public from traditional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Program use of carbaryl, malathion, and diflubenzuron has occurred in many past programs, and no adverse health effects have been reported.

Children and persons with sensitivity to chemicals are those most likely to experience any negative effects. These individuals will be advised to avoid treatment areas at the time of application until the insecticide has time to dry on the treated vegetation.

Those most at risk during operations would be persons actually mixing or applying chemicals. These individuals will be advised to avoid treatment areas at the time of application until the insecticide has time to dry on the treated vegetation.

a. Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order (E.O.) 12898, Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations, was signed by President Clinton on February 11, 1994 (59 *Federal Register* (FR) 7269). This E.O. requires each Federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Consistent with this E.O., APHIS will consider the potential for disproportionately high and adverse human health or environmental effects on minority populations and low-income populations for any of its actions related to grasshopper suppression programs.

Population makeup in the proposed suppression area of Oregon (U.S. Census Bureau 2000) is 87.6% White. Hispanic or Latino of any race is the next most numerous group comprising 10.1 %. Other identifiable groups include Black or African American 0.5%, American Indian and Alaska Native 2.6 %, Asian 0.8%, and Native Hawaiian and Other Pacific Islander 0.2%. Hispanic workers are often engaged in production and processing of crops.

American Indian tribes control land on and off reservations in this 17 county area. There are four federally recognized Indian tribes in this area. The Confederated Tribes of the Warm Springs have an enrollment of 3956 and 644,000 acre reservation. The Confederated Tribes of the Umatilla have 2051 enrolled members and a 172,882 acre reservation. The Burns Paiute Tribe has 313 members and a 13,738 acre reservation (Bradbury 2001). The Fort McDermit Paiute Tribe reservation straddles the Oregon-Nevada border, 18,829 acres are in Oregon.

The number of persons in the area below the poverty level in 1999 ranged from 18.6% in Malheur County to 9.1% in Gilliam County. Median household income ranged from $41,847 in Deschutes County to $28,750 in Wheeler County. Per capita income varied from $13,895 in Malheur to $21,767 in Deschutes County in 1999. Compare suppression area to Oregon and US figures for persons below poverty which are 11.6%, 12.4% respectively; the median household incomes are $40,916, $41,994; and the per capita incomes are $20,940, $21,587 (U.S. Census Bureau 2000).

b. Executive Order No. 13045, Protection of Children from Environmental Health Risks and Safety Risks

Recognition of the increased scientific knowledge about the environmental health risks and safety risks associated with hazardous substance exposures to children brought about legislation and other requirements to protect the health and safety of children. On April 21, 1997, President Clinton signed E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885). This E.O. requires each Federal agency, consistent with its mission, to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. APHIS has developed agency guidance for its programs to follow to ensure the protection of children (USDA, APHIS, 1999).

In 2000 the population under 18 years of age in the counties within the proposed suppression area ranges from 30.8% in Morrow to 22.7% Wheeler. This compares with 24.7 % for the entire state of Oregon and 25.7% for the US (U.S. Census Bureau 2000).

2. Nontarget Species

Grasslands, open forest, shrub/brush lands, and their associated wetlands are the most likely to be involved in a grasshopper control program. These lands host a variety of wildlife species including terrestrial vertebrate and invertebrate animals (including grasshopper species which are not threatening valuable resources), aquatic organisms, and terrestrial plants (both native and introduced). The proposed actions could take place in areas that contain suitable habitat (see Appendix 2, Map 3).

Invertebrate organisms of special interest include biocontrol insects and pollinators. Land managers and others have released and managed biocontrol agents including insects and pathogens on many species of invasive plants within and near the suppression program area. These biocontrol agents are important in decreasing the overall population or the rate of reproduction of some species of undesirable rangeland plants, especially exotic invasive weeds.

Pollinators occur within and near the suppression program area. Pollinators include managed exotic and native insect species such as honey bees, leafcutter bees, and alkali bees which are commercially valuable for agriculture. Other species of insects and animals pollinate native and exotic plants and are necessary for the survival of some species.

Vertebrates occurring in the area include highly visible introduced and native mammalian species such as cattle, sheep, horses, mule deer, elk, pronghorn, and coyotes as well as smaller animals like rabbits, mice, gophers and bats. Birds comprise a large portion of the vertebrate species complex, and they also include exotic and native species. Some exotic game birds, like pheasant and partridge, have been deliberately introduced into the area, and other species such as starlings and pigeons have spread from other loci of introduction. Sage-obligate bird species, typified by sage grouse, are present in much of the Southern part of this area. Various reptiles and amphibians are also present. Many of the herbivorous vertebrate species compete with some species of grasshoppers for forage, while other species utilize grasshoppers and other insects as a food source. There is special concern about the role of grasshoppers as a food source for sage grouse, sharp-tail grouse, and other bird species.

The proposed suppression area contains a vast variety of terrestrial invertebrates, primarily insects and other arthropods. They include species which compete with grasshoppers and some which prey on grasshoppers. In turn, some species of grasshoppers may prey opportunistically on other invertebrates.

Aquatic organisms within the suppression area include plants and vertebrate and invertebrate animals. Some species of fish utilize grasshoppers as a significant food source during some parts of the year.

Springs are of special concern since they are often unconnected to stream systems or other water bodies. Due to lack of connectivity, biota found at springs can be endemic, and therefore particularly sensitive. Even if species at a particular spring are found elsewhere, the lack of connectivity to other populations would slow or prevent recolonization, especially for aquatic invertebrates that do not have a winged adult life stage.

A diverse complement of terrestrial plants occurs within the proposed suppression area. Many such as Canada thistle, Scotch thistle, puncturevine, purple loosestrife, spotted and diffuse knapweed, yellow starthistle, and leafy spurge are considered as non-native, invasive weeds. Native plants such as sagebrushes, bitterbrush, and various grasses provide forage and shelter for animal species and help stabilize the soil against erosion.

Biological soil crusts, also known as cryptogamic, microbiotic, cryptobiotic, and microphytic crusts, occur within the proposed suppression area. Biological soil crusts are formed by living organisms and their by-products, creating a crust of soil particles bound together by organic materials. Crusts are predominantly composed of cyanobacteria (formerly blue-green algae), green and brown algae, mosses, and lichens. Liverworts, fungi, and bacteria can also be important components. Crusts contribute to a number of functions in the environment. Because they are concentrated in the top 1 to 4 mm of soil, they primarily affect processes that occur at the land surface or soil-air interface. These include soil stability and erosion, atmospheric Nfixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seedling germination, and plant growth.

The proposed action could cause changes that may affect the behavior or physiological processes of some federally listed Threatened, Endangered, or Proposed species. The following table shows the federally listed species found in the covered area, and indicates in which counties they are found, including if any critical habitat (CH) is assigned or proposed (PCH). Critical habitat is a specific geographic area essential to the conservation of a T&E species which may require special protection.

Table 1. **Federally listed Threatened (T), Proposed Threatened (PT) and Endangered (E) species**

Common Name	Scientific Name	Status	Counties found
Fish			
Borax Lake Chub	*Gila boraxobius*	E	Harney (CH)
Bull Trout (Columbia R., Columbia Basin, and Klamath Basin populations)	*Salvelinus confluentus*	T	Baker, Crook, Deschutes, Grant, Harney, Hood River, Jefferson, Lake, Malheur, Umatilla, Union, Wasco, Wallowa (all CH)
Chinook Salmon (lower Columbia R.)	*Oncorhynchus (=Salmo) tshawytscha*	T	Hood River
Chinook Salmon (upper Columbia R. spring run)	*Oncorhynchus (=Salmo) tshawytscha*	E	Gilliam, Hood River, Morrow, Sherman, Umatilla, Wasco
Chinook Salmon (Snake R. fall run)	*Oncorhynchus (=Salmo) tshawytscha*	T	Gilliam (CH), Hood River (CH), Morrow (CH), Sherman (CH), Umatilla (CH), Union, Wasco (CH), Wallowa
Chinook Salmon (Snake R. spring/summer run)	*Oncorhynchus (=Salmo) tshawytscha*	T	Gilliam (CH), Hood River (CH), Morrow (CH), Sherman (CH), Umatilla (CH), Union, Wasco (CH), Wallowa
Coho Salmon (lower Columbia R./SW Washington)	*Oncorhynchus (=Salmo) kisutch*	PT	Hood River, Wasco
Chum Salmon (Columbia R.)	*Oncorhynchus (=Salmo) keta*	T	Hood River
Foskett Speckled Dace	*Rhinichthys osculus ssp.*	T	Lake
Hutton Tui Chub	*Gila* bicolor	T	Lake
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*	T	Harney, Malheur
Lost River Sucker	*Deltistes luxatus*	E	Lake (PCH)

Modoc Sucker	*Catostomus microps*	E	Lake (CH)
Shortnose Sucker	*Chasmistes brevirostris*	E	Lake (PCH)
Sockeye Salmon (Snake River, ID stock wherever found.)	*Oncorhynchus (=Salmo) nerka*	E	Hood River, Gilliam, Morrow, Sherman, Umatilla, Wasco (all CH)
Steelhead (middle Columbia R.)	Oncorhynchus (=Salmo) mykiss	T	Crook, Gilliam, Grant, Hood River, Jefferson, Morrow, Sherman, Umatilla, Wasco, Wheeler
Steelhead (upper Columbia R.)	Oncorhynchus (=Salmo) mykiss	E	Gilliam, Hood River, Morrow, Sherman, Umatilla, Wasco
Steelhead (Snake R. Basin)	*Oncorhynchus (=Salmo) mykiss*	T	Gilliam, Hood River, Morrow, Sherman, Umatilla, Union, Wasco, Wallowa
Steelhead (lower Columbia R.)	*Oncorhynchus (=Salmo) mykiss*	T	Hood River
Warner Sucker	*Catostomus warnerensis*	T	Lake (CH)
Birds			
Bald Eagle (lower 48 States)	*Haliaeetus leucocephalus*	T	All counties
Northern Spotted Owl	*Strix occidentalis caurina*	T	Deschutes, Hood River, Jefferson, Wasco (all CH)
Animals			
Canada Lynx (lower 48 States DPS)	*Lynx canadensis*	T	Baker, Crook, Grant, Harney, Malheur, Morrow, Umatilla, Union, Wallowa, Wheeler, Lake
Plants			
MacFarlane's Four-o'clock	*Mirabilis macfarlanei*	T	Wallowa (CH)
Spalding's Campion (Catchfly)	*Silene spaldingii*	T	Wallowa
Malheur Wire-lettuce	_*Stephanomeria malheurensis*	E	Harney (CH)
Howell's spectacular Thelypody	*Thelypodium howellii spectabilis*	T	Baker, Malheur, Union

Candidate species have no protection under the ESA, but their conservation status is of special concern to FWS and they are candidates for listing as threatened or endangered. Candidate species that occur in the area covered by this EA include Columbia spotted frog, *Rana luteiventris,* Oregon spotted frog, *R. pretiosa*, yellow-billed cuckoo, *Coccyzus americanus*, fisher, *Martes pennati*, Washington groundsquirrel, *Spermophilus washingtoni*, northern worm wood, *Artemesia campestris*, and slender moonwort, *Botrychium lineare*.

Many other species are accorded special status by federal land managers or by the State of Oregon. Data about these species are available from the respective land managers or at Oregon Department of Fish & Wildlife website, http://www.dfw.state.or.us/wildlife/pdf/sensitive_species.pdf.

3. Socioeconomic Issues

Agriculture is an important part of the area's economy and landscape. More than half the area is used for cropland or rangeland (Meacham *et. al.* 2001). Croplands are concentrated on the Columbia Plateau with other small, scattered pockets of mainly irrigated cropland in arable valleys. Crop growers in areas adjacent to possible suppression areas grow feed for dairies and feedlots as well as high value crop such as potatoes, sugarbeets, wheat, barley, oats, hay, grass seed, and a variety of other crops. Grain production is concentrated on the Columbia Plateau. Morrow and Umatilla counties especially produce alfalfa, corn, and potatoes. Central Oregon counties produce a variety of vegetable seeds, mint, grain, and hay. Malheur County is a major producer of seed crops, potatoes, onions and sugarbeets. Tree fruit production is important in Hood River, Wasco, and Umatilla Counties (Bradbury 2001). Processing plants add value in several of the rural communities. Gross farm and ranch sales for the area in 2001 were $1,091.7 million. Crops accounted for $700.1 million and animal products $391.6 million (ODA 2002).

Livestock grazing is one of the primary uses of rangeland in the covered area. It is the dominate agriculture in Harney and Lake Counties. Livestock enterprises include rangeland grazing by cattle, sheep, and horses; feedlots for beef; and concentrated dairy and hog farms. This rangeland may be utilized during the summer or reserved for fall and winter grazing. Livestock inventory on January 1, 2002 included total cattle (920,000), beef cows (435,000), dairy cattle (6100), hogs (4000) and sheep (56,100) (ODA 2002).

Other important industries for this area are forest products, recreation, power generation, and manufacturing (Bradbury 2001).

Acreage in organic production is increasing in the area. There were 11,931 acres registered in organic production in this area in 2002.

Beekeepers maintain hives to produce honey and other bee products on land which is included in the proposed treatment area as well as on land located near the proposed treatment area. Alfalfa, seed crops, and tree fruits rely on pollination from bees which may live or forage on or near proposed suppression areas.

Much of the land here is publicly owned. The area contains parts of six National Forests; Deschutes, Malheur, Umatilla, Wallowa-Whitman, Fremont-Winema, Ochoco; Crooked River National Grasslands; and Hell's Canyon National Recreation Area administered by USDA Forest Service. USDI Fish and Wildlife Service administers the Hart Mountain National Antelope Refuge, Malheur NWR, McKay Creek NWR, Cold Springs NWR, Umatilla NWR, and Deer Flats NWR. The USDI Bureau of Land Management administers much of the public rangeland and is the major landowner in the southeast and south-central part of Oregon. More than half the public forest and rangeland is leased for grazing (Meacham *et. al.* 2001). The remainder is either not farmable or set aside as protected areas.

This area also contains many parks, wilderness areas, public forests, and wilderness studies area administered by state or local governments. The Department of Interior, National Park Service administers John Day Fossil Beds National Monument. There may also be areas of rangeland habitat considered as "sensitive areas" for the survival of non-listed species of concern.

The general public uses rangelands in the proposed suppression area for a variety of recreational purposes including hiking; camping; wildlife, bird, and insect collecting and watching; hunting; falconry; shooting; plant collecting; rock and fossil collecting; artifact collecting; sightseeing; and dumping. Members of the general public traverse rangelands in or near the proposed suppression area by various means including on foot, horseback, all terrain vehicles, bicycles, motorcycles, four-wheel drive vehicles, snowmobiles, and aircraft.

Artificial surfaces in or near the proposed suppression area include the walls and roofs of buildings, painted finishes on automobiles, trailers, recreational vehicles, and road signs. See 2002 FEIS pp 71-72

The land most likely to be involved in a grasshopper suppression program would include active or idle rangeland, Conservation Reserve Program (CRP) land, and some cropland. Areas where grasshoppers have historically been an economic problem in Oregon are summarized in Appendix 2, Map 3.

4. Cultural Resources and Events

Cultural and historical sites include locations and artifacts associated with Native Americans, explorers, pioneers, religious groups and developers. Native American petroglyphs have been discovered in several areas within the proposed suppression area. Artifacts from knapping (stone tool making) occur within the proposed suppression area. Elements of the Oregon Trail transect portions of the proposed suppression area, and monuments have been erected in several places. Museums, displays and structures associated with mining, logging, Japanese internment camps, and irrigation development exist in areas near the proposed suppression area.

IV. Environmental Consequences

A. Environmental Consequences of the Alternatives

Each alternative described in this EA potentially has adverse environmental effects. The general environmental impacts of each alternative are discussed in detail in the 2002 FEIS. The specific impacts of the alternatives are highly dependent upon the particular action and location of infestation. The principal concerns associated with the alternatives that include insecticide application are: (1) the potential effects of the three pesticide options on human health (including subpopulations that might be at increased risk); and (2) impacts of pesticides on nontarget organisms (including threatened and endangered species). Assessments of the relative risk of each pesticide option are discussed in detail in the 2002 FEIS document.

Site-specific environmental consequences of the alternatives are discussed in this section.

1. No Action Alternative

Under this alternative, APHIS would not fund or participate in any program to suppress grasshoppers. If APHIS does not participate in any grasshopper suppression program, Federal land management agencies, State agriculture departments, local governments, or private groups or individuals, may not effectively combat outbreaks in a coordinated effort. In these situations, grasshopper outbreaks could develop and spread unimpeded.

Human health

There would be no exposure to the public from program chemicals under this alternative. However, without APHIS participation, local governments, or private groups or individuals may attempt to conduct widespread grasshopper programs. It is possible that a large amount of insecticides, including those with a greater risk to human health, could be applied, reapplied, and perhaps misapplied in an effort to suppress or even locally eradicate grasshopper populations. Such a scenario could lead to greater human exposure to a wider array of chemicals.

Some stakeholders have indicated that they are opposed to any treatments on public rangelands because they believe treatments would disrupt ecosystems. The anxiety levels of these stakeholders may be reduced if APHIS does not suppress grasshopper outbreaks.

Uncontrolled grasshopper outbreaks can have direct and indirect effects on the human population that depends on the crops and forage consumed by grasshoppers. When grasshopper populations reach outbreak levels they become migratory in nature, seeking out new areas of vegetation to feed on. Significant crop losses may occur when grasshoppers migrate from rangeland to cropland. Additional inputs of insecticides, potentially more harmful than program chemicals, may be required to protect crops. This would result in increased exposure of farm workers to insecticides.

The anxiety level of persons experiencing losses to crops and rangeland forage may increase if no action is taken to control grasshopper outbreaks.

Non-target species

An abundant supply of grasshoppers and other insects would be available as a food source for insectivorous animals. This includes birds and other animals which have been accorded sensitive species status by land managers and others.

Grasshoppers in unsuppressed outbreaks would consume agricultural and nonagricultural plants. The damage caused by grasshopper outbreaks could also pose a risk to rare, threatened, or endangered plants that often have a low number of individuals and limited distribution. Plants can be killed or weakened by grasshopper feeding. Some grasshoppers feed on seeds, so future generations of plants could be threatened.

Loss of plant cover would occur due to consumption by grasshoppers. Nesting and cover habitat may be degraded for birds and other wildlife. The herbaceous under story is important to nesting success by sage grouse (Connelly, et. al. 1994).

Rangeland which has been severely grazed by grasshoppers is more susceptible to invasion by nonnative plant species. Plant cover may protect the soil from the drying effects of the sun. The plant root systems which hold the soil in place may be weakened, leading to increased rates of erosion. Continued livestock grazing on grasshopper impacted lands will compound the effects to vegetation, soils, and water quality negatively impacting non-target species.

If APHIS does not participate in any grasshopper suppression programs, local governments, or private groups or individuals may attempt to conduct widespread grasshopper programs. Without the technical assistance and program coordination that APHIS can provide to grasshopper programs, it is possible that a large amount of insecticides, including those APHIS considers too environmentally harsh, could be applied, reapplied, and perhaps misapplied in an effort to suppress or even locally eradicate grasshopper populations. It is not possible to accurately predict the environmental consequences of the No Action alternative to non-target organisms because the type and amount of insecticides that could be used in this scenario are unknown.

Rangeland fires may be set by persons who desire suppression of the grasshoppers. Action of this type has not been documented, but individuals have threatened to set fires to destroy grasshopper outbreaks that are not controlled.

Socioeconomic issues

If left untreated, there is the risk that grasshopper outbreaks on rangeland would decrease the availability of forage for cattle and sheep. If sheep and cattle grazing become unprofitable, there may be disproportionate impact on the sheepherding and cattle raising professions. Livestock must compete with grasshoppers for available forage leading to monetary losses due to supplemental feed programs, the need to move stock to unaffected areas, and/or sell livestock prematurely. It will affect other ranchers by increasing demand, and consequently, cost for hay and/or pasture. This will have a beneficial effect on those providing the hay or range, and a negative impact on other ranchers who use these same resources. Continued grazing on impacted lands will compound the effects to vegetation, resulting in longer-term impacts on grazing forage production on these lands. The lack of treatment could result in the eventual magnification of grasshopper problems resulting in increased suppression efforts, increased suppression costs and the expansion of suppression needs onto lands where options are limited.

Unchecked movement of grasshopper outbreaks into crops would result in crop loss and additional expenditures for insecticidal control in the crop fields. Organic farmers may suffer significant losses if grasshopper outbreaks are not controlled on rangeland and migrate to organic cropland. Some organic farmers were forced to abandon their organic farming enterprise in Camas County, Idaho in 2000 due to invasion of grasshoppers from rangeland into organic alfalfa fields.

It has been suggested that rather than treat grasshopper outbreaks, the federal government should compensate farmers for losses they incur. In cases where grasshoppers migrate from rangeland onto high value cropland, USDA Risk Management Agency (RMA) currently offers multi-peril crop insurance (Sec. 501 7 USC 1501) which may compensate for losses due to insects if the policy holder utilizes appropriate pest control measures, but those measures fail. Forage is not a covered crop under this program. Normally, this payment is based on the failure of pest control spray practices due to untimely rainfall or some other natural event.

USDA Farm Service Agency (FSA) offers the Noninsured Crop Disaster Assistance Program (NAP) (7 CFR 1437.4) which provides financial assistance to eligible producers affected by natural disasters. Forage is considered a noninsured crop. To be eligible a natural disaster must result from a condition related to damaging weather or adverse natural occurrence, such as excessive heat, disease, or insect infestation. Normally grasshopper damage would not qualify for this program. However, the local FSA Office may make a determination that a grasshopper outbreak is a direct result of drought conditions that exist at the time. This program requires pre-enrollment, annual production reporting, and meeting a loss threshold.

The Grassland Reserve Program (GRP**)** is a new USDA FSA program designed to reward good range stewardship. This program is for working range, not set aside. In other words livestock numbers would be reduced, but not eliminated. A landowner must apply to enroll his rangeland in this program. Due a limited pool of money, selection criteria ensure only the highest priority areas are protected. The program offers landowners the option to grant an easement or enter into a long-term agreement to preserve and protect the ecological benefits of eligible land in exchange for annual rental payments.

Skold and Davis (1995) proposed a rangeland grasshopper insurance program. No authority currently exists for such a program.

APHIS has no control over these programs. Since they may provide an option for growers affected by grasshoppers, the local FSA and RMA manager will be invited to public meetings when a suppression program is being planned to explain these programs.

Cultural resources and events

Grasshoppers were a significant source of protein for indigenous North American people. They are no longer used as a human food source except as a novelty or recreational experience. They are used for fish bait, and selection of the No Action alternative would result in their abundant availability for these purposes.

Grasshopper populations at outbreak levels on rangeland would decrease the recreational satisfaction of some people utilizing rangeland resources, primarily those who do not like insects. Conversely, grasshopper populations at outbreak levels would increase the recreational satisfaction of those who enjoy spectacular biological phenomena.

2. Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative

Under Alternative 2, APHIS would participate in grasshopper programs with the option of using one of the insecticides carbaryl, diflubenzuron, or malathion, depending upon the various factors related to the grasshopper outbreak and the site-specific characteristics. The use of an insecticide would occur at the conventional rates. With only rare exceptions, APHIS would apply a single treatment in an outbreak year that would blanket affected rangeland areas in an attempt to suppress grasshopper outbreak populations by a range of 35 to 98 percent, depending upon the insecticide used. See 2002 EIS pp. 38-48 for general consequences.

Carbaryl

Carbaryl is of moderate acute oral toxicity to humans. The mode of toxic action of carbaryl occurs through inhibition of acetylcholinesterase (AChE) function in the nervous system. This inhibition is reversible over time if exposure to carbaryl ceases. The Environmental Protection Agency (EPA) has classified carbaryl as a possible human carcinogen (EPA, 1993). However, it is not considered to pose any mutagenic or genotoxic risk.

Potential exposures to the general public from conventional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. The potential for adverse effects to workers are negligible if proper safety procedures are followed, including wearing the required protective clothing. Carbaryl has been used routinely in other programs with no reports of adverse health effects. Therefore, routine safety precautions are expected to provide adequate worker health protection.

Carbaryl is of moderate acute oral toxicity to mammals (McEwen *et al*., 1996a). Carbaryl applied at Alternative 2 rates is unlikely to be directly toxic to upland birds, mammals, or reptiles. Field studies have shown that carbaryl applied as either ultra-low-volume (ULV) spray or bait at Alternative 2 rates posed little risk to killdeer (McEwen *et al*., 1996a), vesper sparrows (McEwen *et al*., 1996a; Adam *et al*., 1994), or golden eagles (McEwen *et al*., 1996b) in the treatment areas. AChE inhibition at 40 to 60 percent can affect coordination, behavior, and foraging ability in vertebrates. Multi-year studies conducted at several grasshopper treatment areas have shown AChE inhibition at levels of no more that 40 percent with most at less than 20 percent (McEwen *et al*., 1996a). Carbaryl is not subject to significant bioaccumulation due to its low water solubility and low octanol-water partition coefficient (Dobroski *et al*., 1985).

Carbaryl will most likely affect nontarget insects that are exposed to ULV carbaryl spray or that consume carbaryl bait within the grasshopper treatment area. Field studies have shown that affected insect populations can recover rapidly and generally have suffered no long-term effects, including some insects that are particularly sensitive to carbaryl, such as bees (Catangui *et al*., 1996). The use of carbaryl in bait form generally has considerable environmental advantages over liquid insecticide applications: bait is easier than liquid spray applications to direct toward the target area, bait is more specific to grasshoppers, and bait affects fewer nontarget organisms than sprays (Quinn, 1996).

Operational procedures are in place to prevent carbaryl from entering water. However, should carbaryl enter water, there is the potential to affect the aquatic invertebrate assemblage, especially amphipods. Field studies with carbaryl concluded that there was no biologically significant effect on aquatic resources, although invertebrate downstream drift increased for a short period after treatment due to toxic effects (Beyers *et al*., 1995). Carbaryl is moderately toxic to most fish (Mayer and Ellersieck, 1986).

Diflubenzuron

The acute oral toxicity of diflubenzuron formulations to humans ranges from very slight to slight. The most sensitive indicator of exposure and effects of diflubenzuron in humans is the formation of methemoglobin (a compound in blood responsible for the transport of oxygen) in blood.

Potential exposures to the general public from Alternative 2 application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of methemoglobinemia (a condition where the heme iron in blood is chemically oxidized and lacks the ability to properly transport oxygen), direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures are higher than the general public but are not expected to pose any risk of adverse health effects.

Because diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by diflubenzuron. In addition, adult insects, including wild and cultivated bees, would be mostly unaffected by diflubenzuron applications (Schroeder *et al*., 1980; Emmett and Archer, 1980). Among birds, nestling growth rates, behavior data, and survival of wild American kestrels in diflubenzuron treated areas showed no significant differences among kestrels in treated areas and untreated areas (McEwen *et al*., 1996b). The acute oral toxicity of diflubenzuron to mammals ranges from very slight to slight. Little, if any, bioaccumulation of diflubenzuron would be expected (Opdycke *et al*., 1982).

Diflubenzuron is most likely to affect immature terrestrial insects and early life stages of aquatic invertebrates (Eisler, 2000). While this would reduce the prey base within the treatment area for organisms that feed on insects, adult insects, including grasshoppers, would remain available as prey items. Many of the aquatic organisms most susceptible to diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to diflubenzuron, but these decreases would be expected to be temporary given the rapid regeneration time of many aquatic invertebrates.

Malathion

Malathion is of slight acute oral toxicity to humans. The mode of toxic action of malathion occurs through inhibition of AChE function in the nervous system. Unlike carbaryl, AChE inhibition from malathion is not readily reversible over time if exposure ceases. However, strong inhibition of AChE from malathion occurs only when chemical oxidation results in formation of the metabolite malaoxon. Human metabolism of malathion favors hydroxylation and seldom produces much malaoxon.

Potential exposures to the general public from conventional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures are higher, but still have little potential for adverse health effects except under accidental scenarios. Malathion has been used routinely in other programs with no reports of adverse health effects. Therefore, routine safety precautions are expected to continue to provide adequate protection of worker health.

EPA has recently reviewed the potential for carcinogenic effects from malathion. EPA's classification describes malathion as having suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential (EPA, 2000). This indicates that any carcinogenic potential of malathion cannot be quantified based upon EPA's weight of evidence determination in this classification. The low exposures to malathion from program applications would not be expected to pose carcinogenic risks to workers or the general public.

Malathion is of slight acute oral toxicity to mammals. There is little possibility of toxicity-induced mortality of upland birds, mammals, or reptiles, and no direct toxic effects have been observed in field studies. Malathion is not directly toxic to vertebrates at the concentrations used for grasshopper suppression, but it may be possible that sublethal effects to nervous system functions caused by AChE inhibition may lead directly to decreased survival. AChE inhibition at 40 to 60 percent affects coordination, behavior, and foraging ability in vertebrates. Multi-year studies at several grasshopper treatment areas have shown AChE inhibition at levels of no more than 40 percent with most at less than 20 percent (McEwen *et al*., 1996a). Field studies of birds within malathion treatment areas showed that, in general, the total number of birds and bird reproduction were not different from untreated areas (McEwen *et al*., 1996a). Malathion does not bioaccumulate (HSDB, 1990; Tsuda *et al*., 1989).

Malathion will most likely affect nontarget insects within a treatment area. Large reductions in some insect populations would be expected after a malathion treatment under Alternative 2. While the number of insects would be diminished, there would be some insects remaining. The remaining insects would be available prey items for insectivorous organisms, and those insects with short generation times may soon increase.

Malathion is highly toxic to some fish and aquatic invertebrates. Operational procedures are in place to prevent malathion from entering water. Therefore, malathion concentrations in water, as a result of grasshopper treatments, is not expected to present a risk to aquatic organisms, especially those organisms with short generation times.

The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the program use of insecticides (see Appendix 1, treatment guidelines).

Human Health

Human exposure to program insecticides could occur. Exposures and effects are discussed in the 2002 FEIS pp. 39-40, 43, and 46-47. Personnel working on the suppression program would be exposed during handling, loading and application of the insecticides. Potential exposure of the general public would be infrequent and of low magnitude. Implementation of the Operational Procedures (Appendix 1) would minimize public exposure and protect workers from harmful exposure. Individuals with hypersensitivity to the insecticides, carriers, and adjuvants might be affected. APHIS will seek lists of hypersensitive individuals from state and county health departments and would contact persons who reside near proposed treatment areas prior to treatment. Hypersensitive individuals would be advised to avoid treatment areas and the areas surrounding them.

Many persons are opposed to any treatments on public rangelands because they believe treatments would disrupt ecosystems. The anxiety levels of these stakeholders may be increased. Conversely, the anxiety level of persons whose livelihoods are being protected by treatments of grasshoppers, typically originating from public lands, would decrease.

Pesticide spills could expose individuals to excessive levels of insecticide. APHIS maintains spill kits and insures that program personnel are familiar with procedures to mitigate effects associated with a spill.

Non-target species

Exposure to program insecticides could occur. Exposures and effects on representative species in each non-target group are discussed in the 2002 FEIS Appendix B and part V. C. pp. 39-48.

Under this alternative grasshopper feeding damage would be reduced to rangeland plants, including desirable and undesirable plants, and to crops adjacent to rangeland. Reduction of the grasshopper feeding damage may be viewed as having both negative and positive impacts. Population densities of some nontarget insects and other arthropods would be reduced. Food sources for some insectivorous animal species would be reduced. Nontarget plant and animal species would be exposed to insecticides.

Nontarget insect species which would be put at risk by treatments under this alternative include non-native biological control agents and pollinators. Any chemical applied to control grasshoppers has the potential to cause adverse impacts to biological control agents that been released by government agencies or private individuals to control noxious weeds or arthropod pests. APHIS will consult with land managers to determine the location and status of biological control agent populations and would select treatment options (including buffering areas) which minimize negative impacts on the populations.

Managed pollinators include native leafcutter and alkali bees, and non-native honeybee. Honeybees are found throughout and near the proposed suppression area. Malathion and carbaryl sprays are very toxic to bees. Leafcutter and alkali bees may be found in the proposed treatment area, but are usually encountered in crop areas adjacent to the rangeland. APHIS will conduct surveys and consult with landowners to determine if managed pollinators are in or near proposed treatment areas. Measures to protect bees are in the Operational Guidelines (Appendix 1).

Unmanaged native pollinators include a vast array of insects and other animals. In general, the insect fauna within this group is more susceptible to malathion and carbaryl sprays than to the other treatment options. To maximize the protection of these organisms, APHIS would select diflubenzuron spray or carbaryl bait whenever they would be efficacious to control grasshopper outbreaks.

This alternative may result in the reduction of insects as a food source for rangeland insectivores, such as sage grouse and sharptail grouse chicks. The use of the insecticides (diflubenzuron and carbaryl bait) which are more selective for grasshoppers than for most other species leaves alternative insect fauna for foraging insectivores (Paige and Ritter 1999). Because APHIS would only treat significant outbreak populations, numbers of grasshoppers surviving the treatment can provide ample nourishment for the insectivores. Additionally, Martin et. al. (2000) and Howe, et. al. (2000) found that grassland and shrub steppe bird species were able to make adaptive changes when insecticidal spray reduced the numbers and changed the composition of insect prey species.

There would be a temporary decrease in insect biodiversity within treatment areas. Malathion and carbaryl sprays would decrease the biodiversity more than diflubenzuron spray and carbaryl bait treatments.

The program chemicals have no phytotoxicity to most plants when applied at label rates. The chemicals act quickly to reduce grasshopper infestations, thus minimizing damage to vegetation from grasshopper foraging. Chemical controls have the potential for indirect affects on plants that depend on certain insects (bees and ants), for pollination and seed dispersal. These insects' numbers may have been depressed by chemical control. The effect on plants by a control program will be less than the loss of growth and seed production caused by the total elimination of most vegetation by grasshoppers during an outbreak.

Impacts to non-target species from livestock grazing is unlikely to be affected by this alternative.

Pesticide spills could expose wildlife to excessive levels of insecticide. APHIS maintains spill kits and insures that program personnel are familiar with procedures to mitigate effects associated with a spill.

Negative impacts to nontarget organisms would be minimized by the implementation of the Guidelines for Treatment (Appendix 1).

Socioeconomic issues

A discussion of the socioeconomic impacts of grasshopper treatments are discussed on pages 61-74 of the 2002 FEIS.

Under this alternative, there is a reduced risk that grasshopper outbreaks on rangeland would decrease the availability of forage for cattle and sheep. There is also a reduced risk of unchecked movement of grasshopper outbreaks into crops resulting in crop loss and additional expenditures for insecticidal control in the crop fields.

Organic farmers face less risk of significant losses from grasshopper outbreaks on rangeland which could emigrate to organic cropland. However, organic farmers would be put at increased risk of contamination from spray originating from grasshopper suppression programs. APHIS will procure a listing of certified organic growers and determine buffers needed to protect organic farm operations.

Air pollutants will be produced by fuel combustion in airplanes, vehicles, and machinery used in grasshopper control activities. Allowable emission levels and concentrations are enforced by state air control agencies. The amounts of these pollutants are not expected to exceed the normal background levels, and should have a negligible temporary effect on air quality.

Increases in ozone concentration from the volatilization of pesticides and carriers are also expected to be negligible. The chemicals approved for use have low vapor pressure and are essentially nonvolatile.

Negative socioeconomic impacts would be minimized by the implementation of the Treatment Guidelines (Appendix 1).

Cultural resources and events

The availability of grasshoppers for fish bait and other human uses would be reduced from outbreak levels to more normal levels. Persons using rangelands for recreation would respond to grasshoppers as they do under normal conditions versus under outbreak conditions.

If Native American tribal lands will be involved in a program area, tribes will be consulted. Tribal representatives will have the opportunity to identify any cultural sites, such as native plants use areas, which might be impacted. Consultation will allow for mitigation of impacts to these sites.

Artificial surfaces

Malathion and carbaryl spray can damage some painted surfaces. Automotive and sign finishes are susceptible to damage, and their owners could suffer economic loss repairing cosmetic damage. Public notice of malathion and carbaryl spray programs will include a warning about how to avoid potential damage. APHIS will consult with land managers if malathion or carbaryl spray was going to be used so they could elect to cover or remove signs during treatment. APHIS will consult with land managers to ensure that Native American petroglyphs are excluded from spray areas.

3. Reduced Area Agent Treatments (RAATs) Alternative

Under Alternative 3, one of the insecticides carbaryl, diflubenzuron, or malathion would be used at a reduced rate and over reduced areas of coverage. Rarely would APHIS apply more than a single treatment to an area per year. The maximum insecticide application rate under the RAATs strategy is reduced 50 percent from the conventional rates for carbaryl and malathion and 25 percent from the Alternative 2 rate for diflubenzuron.

Although this strategy involves leaving variable amounts of land not directly treated, the risk assessment conducted for the 2002 EIS assumed 100 percent area coverage because not all possible scenarios could be analyzed. However, when utilized in grasshopper suppression, the amount of untreated area in RAATs often ranges from 20 to 67 percent of the total infested area but can be adjusted to meet site-specific needs.

Carbaryl

Potential exposures to the general public and workers from RAATs application rates are lower than those from conventional application rates, and adverse effects decrease commensurately with decreased magnitude of exposure. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Routine safety precautions are expected to provide adequate protection of worker health at the lower application rates under RAATs.

Carbaryl will most likely affect nontarget insects that are exposed to liquid carbaryl or that consume carbaryl bait. While carbaryl applied at a RAATs rate will reduce susceptible insect populations, the decrease will be less than under conventional rates. Carbaryl ULV applications applied in alternate swaths have been shown to affect terrestrial arthropods less than malathion applied in a similar fashion.

Direct toxicity of carbaryl to birds, mammals, and reptiles is unlikely in swaths treated with carbaryl under a RAATs approach. Carbaryl bait also has minimal potential for direct effects on birds and mammals. Field studies indicated that bee populations did not decline after carbaryl bait treatments, and American kestrels were unaffected by bait applications made at a RAATs rate. Using alternating swaths will furthermore reduce adverse effects because organisms that are in untreated swaths will be mostly unexposed to carbaryl.

Operational procedures are in place to prevent carbaryl from entering water. Carbaryl applied at a RAATs rate has the potential to affect invertebrates in aquatic ecosystems. However, these affects would be less than effects expected under Alternative 2. Fish are not likely to be affected at any concentrations that could be expected under this Alternative.

Diflubenzuron

Potential exposures and adverse effects to the general public and workers from RAATs application rates are commensurately less than conventional application rates. These low exposures to the public pose no risk of methemoglobinemia, direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures pose negligible risk of adverse health effects.

Because diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by diflubenzuron. Diflubenzuron exposures at Alternative 3 rates are not hazardous to terrestrial mammals, birds, and other vertebrates. Insects in untreated swaths would have little to no exposure, and adult insects in the treated swaths are not susceptible to diflubenzuron's mode of action. The indirect effects to insectivores would be negligible as not all insects in the treatment area will be affected by diflubenzuron.

Diflubenzuron is most likely to affect immature terrestrial insects and, if it enters water, will affect early life stages of aquatic invertebrates. While diflubenzuron would reduce insects within the treatment area, insects in untreated swaths would have little to no exposure. Many of the aquatic organisms most susceptible to diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to diflubenzuron, but these decreases may be temporary given the rapid regeneration time of many aquatic invertebrates.

Malathion

Potential exposures to the general public and workers from RAATs application rates are of a commensurately lower magnitude than conventional rates. These low exposures to the public pose no risk of direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity.

Potential risks to workers are negligible if proper safety procedures are adhered to, including the use of required protective clothing. Malathion has been used routinely in other programs with no reports of adverse health effects. The low exposures to malathion from program applications are not expected to pose any carcinogenic risks to workers or the general public.

Malathion applied at a RAATs rate will cause mortalities to susceptible insects. Organisms in untreated areas will be mostly unaffected. Field applications of malathion at a RAATs rate and applied in alternate swaths resulted in less reduction in nontarget organisms than would occur in blanket treatments. Birds in RAATs areas were not substantially affected. Operational procedures are in place to prevent malathion from entering water. Implementing RAATs method will further reduce the risk to aquatic invertebrates. Any losses would soon be compensated for by the surviving organisms given the rapid generation time of most aquatic invertebrates and the rapid degradation of malathion in most water bodies.

The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the program use of insecticides (see Appendix 1, Guidelines for Treatment).

Human health

Human exposure to insecticides could occur. Exposures and effects are discussed in the 2002 FEIS pp. 50, 52, and 55. Personnel working on the suppression program would be exposed during handling, loading and application of the insecticides. Potential exposure of the general public would be infrequent and of low magnitude. Potential for exposure would be less than under the Insecticide Applications at Conventional Rates Alternative. Implementation of the Operational Procedures (Appendix 1) would minimize public exposure and protect workers from harmful exposure. Individuals with hypersensitivity to the insecticides, carriers, and adjuvants might be affected. APHIS will seek lists of hypersensitive individuals from state and county health departments and would contact persons who reside near proposed treatment areas prior to treatment. Hypersensitive individuals would be advised to avoid treatment areas and the areas surrounding them.

Many persons are opposed to any treatments on public rangelands because they believe treatments will disrupt ecosystems. The anxiety levels of these stakeholders may be increased, but perhaps not to the same level as would result from implementation of Insecticide Applications at Conventional Rates Alternative. The anxiety level of persons whose livelihood is being protected by treatments will decrease.

Pesticide spills could expose individuals to excessive levels of insecticide. APHIS maintains spill kits and insures that program personnel are familiar with procedures to mitigate effects associated with a spill.

Non-target species

Exposure to program insecticides would occur. Exposures and effects on representative species in each non-target group are discussed in the 2002 FEIS Appendix B and part V. C. pp. 50-57.

Under this alternative grasshopper feeding damage would be reduced to rangeland plants, including desirable and undesirable plants, and to crops adjacent to rangeland. Reduction of the grasshopper feeding damage may be viewed as having both negative and positive impacts. Population densities of some nontarget insects and other arthropods would be reduced. Food sources for some insectivorous animal species would be reduced. Nontarget plant and animal species would be exposed to insecticides. The general level of reduction in feeding damage, nontarget population densities, food sources, and insecticide exposure would be somewhat less than under Insecticide Applications at Conventional Rates Alternative.

Nontarget insect species which would be put at risk by treatments under this alternative include non-native biological control agents and pollinators. The level of risk would be somewhat less than under Insecticide Applications at Conventional Rates Alternative. Any chemical applied to control grasshoppers has the potential to cause adverse impacts to biological control agents that been released by government agencies or private individuals to control noxious weeds or arthropod pests. APHIS will consult with land managers to determine the location and status of biological control agent populations and would select treatment options (including buffering areas) which minimize negative impacts on the populations.

Managed pollinators include native leafcutter and alkali bees, and non-native honeybee. Honeybees are found throughout and near the proposed suppression area. Malathion and carbaryl sprays are very toxic to bees. Leafcutter and alkali bees may be found in the proposed treatment area, but are usually encountered in crop areas adjacent to the rangeland. APHIS will conduct surveys and consult with landowners to determine if managed pollinators are in or near proposed treatment areas. Measures to protect bees are in the Operational Guidelines (Appendix 1). The risk to managed pollinators would be similar to the risk under Insecticide Applications at Conventional Rates Alternative.

Unmanaged native pollinators include a vast array of insects and other animals. In general, the insect fauna within this group is more susceptible to malathion and carbaryl sprays than to the other treatment options. To maximize the protection of these organisms, APHIS would select diflubenzuron spray or carbaryl bait whenever they would be efficacious to control grasshopper outbreaks. The risk to unmanaged native pollinators would be somewhat less than the risk under Insecticide Applications at Conventional Rates Alternative.

This alternative may result in the reduction of insects as a food source for rangeland insectivores, such as sage grouse and sharptail grouse chicks. The reduction in rates and coverage along with the use of the insecticides (diflubenzuron and carbaryl bait) which are more selective for grasshoppers than for most other species leaves alternative insect fauna for foraging insectivores (Paige and Ritter 1999). Because APHIS would only treat significant outbreak populations, numbers of grasshoppers surviving the treatment can provide ample nourishment for the insectivores. Additionally, Martin et. al. (2000) and Howe, et. al. (2000) found that grassland and shrub steppe bird species were able to make adaptive changes when insecticidal spray reduced the numbers and changed the composition of insect prey species. Reduction in prey available to insectivores would be significantly less than under Insecticide Applications at Conventional Rates Alternative.

There would be a temporary decrease in insect biodiversity within treatment areas. Although, significantly less than under Insecticide Applications at Conventional Rates Alternative. Malathion and carbaryl sprays would decrease the biodiversity more than diflubenzuron spray and carbaryl bait treatments.

Impacts to non-target species from livestock grazing is unlikely to be affected by this alternative.

Pesticide spills could expose wildlife to excessive levels of insecticide. APHIS maintains spill kits and insures that program personnel are familiar with procedures to mitigate effects associated with a spill. The risk of pesticide spills is roughly equivalent to the risk under the Conventional Rates Alternative.

Negative impacts to nontarget organisms would be minimized by the implementation of the Guidelines for Treatment (Appendix 1).

Socioeconomic issues

A discussion of the socioeconomic impacts of grasshopper treatments are discussed on pages 61-74 of the 2002 FEIS.

Under this alternative, there is a reduced risk that grasshopper outbreaks on rangeland would decrease the availability of forage for cattle and sheep. There is also a reduced risk of unchecked movement of grasshopper outbreaks into crops resulting in crop loss and additional expenditures for insecticidal control in the crop fields. The risk of grasshopper damage is somewhat higher than under the Conventional Rates Alternative. Because of reduced insecticidal rates and coverage, the RAATS Alternative requires ideal treatment conditions to effectively suppress an outbreak.

Organic farmers face less risk of significant losses from grasshopper outbreaks on rangeland which could migrate to organic cropland. The risk of grasshopper damage is somewhat higher than under the Conventional Rates Alternative. Organic farmers would be put at increased risk of contamination from spray originating from grasshopper suppression programs. This risk is somewhat less than under the Conventional Rates Alternative because less insecticide is applied in a treatment area. APHIS will procure a listing of certified organic growers and determine buffers needed to protect organic farm operations.

Air pollutants will be produced by fuel combustion in airplanes, vehicles, and machinery used in grasshopper control activities. Allowable emission levels and concentrations are enforced by state air control agencies. The amounts of these pollutants are not expected to exceed the normal background levels, and should have a negligible temporary effect on air quality. The effects on air quality will be roughly equivalent to the risk under the Conventional Rates Alternative.

Increases in ozone concentration from the volatilization of pesticides and carriers are also expected to be negligible. The chemicals approved for use have low vapor pressure and are essentially nonvolatile.

Negative socioeconomic impacts would be minimized by the implementation of the Treatment Guidelines (Appendix 1).

Cultural resources and events

The availability of grasshoppers for fish bait and other human uses would be reduced from outbreak levels to more normal levels. The availability of grasshoppers would be somewhat greater than under Insecticide Applications at Conventional Rates Alternative. Persons using rangelands for recreation would respond to grasshoppers as they do under normal conditions versus under outbreak conditions.

If Native American tribal lands will be involved in a program area, tribes will be consulted. Tribal representatives will have the opportunity to identify any cultural sites, such as native plants use areas, which might be impacted. Consultation will allow for mitigation of impacts to these sites, which will be roughly equivalent to the impact under the Conventional Rates Alternative.

Artificial surfaces

Malathion and carbaryl spray can damage some painted surfaces. Automotive and sign finishes are susceptible to damage, and their owners could suffer economic loss repairing cosmetic damage. Public notice of malathion and carbaryl spray programs will include a warning about how to avoid potential damage. APHIS will consult with land managers if malathion or carbaryl spray was going to be used so they could elect to cover or remove signs during treatment. APHIS will consult with land managers to insure that Native American petroglyphs are excluded from spray areas. Probability of damage to artificial surfaces would be less in the RAATS Alternative than in the Conventional Rates Alternative.

B. Other Environmental Considerations

1. Cumulative Impacts

Cumulative impact, as defined in the CEQ NEPA implementing regulations (40 CFR § 1508.7) "is the impact on the environment which results from the incremental impact of the action when added to the past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The pesticide used and type of application will influence overall impacts.

Depending on the specific exposure scenario and the nature of the available data, the consequences of cumulative exposures are assessed in a variety of ways in the 2002 FEIS.

Some individuals may be exposed to more than one treatment type, either in their job as applicators or because they frequent areas where different types of treatment are applied. Such exposures are considered connected actions, that is, one or more actions that an individual may take that could affect the individual's risk to the insecticides used to suppress grasshoppers. In addition, all individuals are exposed to a multitude of chemicals and biological organisms every day in foods, medicines, household products, and other environmental chemicals.

Under APHIS programs, rangeland areas normally are only treated one time per season to suppress grasshopper populations. Label restrictions and cost share constraints limit projects to one treatment. If used, periodic treatments may have a longer term impact, since the exposure period is longer. However, the pesticides used breakdown relatively quickly in the environment and biological populations are quick to recover.

Use of pesticides by land managers for other pest control operations (ex. noxious weed control or mosquito control) in rangeland areas receiving grasshopper treatments may result in cumulative impacts. Such a scenario is unlikely due to differing application areas and modes of action. APHIS will consult with land managers to determine if herbicides or insecticides have been utilized within the past year on any proposed spray area within the proposed suppression area. APHIS will not apply any insecticide in a manner that conflicts with EPA requirements regarding multiple treatments or to an area known to have been treated recently with a pesticide known to have harmful cumulative effects with carbaryl, diflubenzuron or malathion.

Cumulative effects are not expected to significantly affect human health or the environment in program areas. Residues of the pesticides used are not expected to persist in the environment from year to year. If analysis of a proposed control area identifies potential cumulative impacts, these impacts will be further described in a supplement to this EA.

2. Synergistic Effects

There may be situations where it is appropriate to use one insecticide or formulation in one part of a treatment area and a different insecticide or formulation in another part of that same treatment area with all applications conducted according to the label directions. For example, ultra-low-volume (ULV) malathion may be used over the majority of a treatment area, but areas of special consideration may be treated with carbaryl bait. Should these situations occur, no area would be treated with more than one insecticide, except for minor overlap in the border area, and there would be no mixing or combination of insecticides.

APHIS will not apply any insecticide in a manner that conflicts with EPA requirements regarding multiple treatments or to an area known to have been treated recently with a pesticide known to have synergistic effects with carbaryl, diflubenzuron or malathion. If analysis of a proposed control area identifies potential synergistic effects, these effects will be further described in a supplement to this EA.

Diflubenzuron
Diflubenzuron is only reported to be synergistic with the defoliant DEF. Because the defoliant is unlikely to be applied concurrently with grasshopper suppression treatments, there is minimal risk of synergistic effects (2002 FEIS p B-16).

Carbaryl
The only studies of chemical interactions with carbaryl indicate that toxicity of organophosphates combined with carbaryl is additive not synergistic (2002 FEIS p B-13).

Malathion
Although the toxicity of malathion may be potentiated by some other organophosphates and carbamates, it is impossible to predict multiple exposures and synergism from applications not related to this program. Organophosphate insecticides are routinely used in mosquito control programs and on crops in some areas near proposed treatment areas. There is some potential for synergistic effects resulting from the combination of malathion and inadvertent simultaneous pesticide application by the public; however, notification of residents adjacent to treatment areas about program treatments helps to minimize this risk. (2002 FEIS p B-21).

3. Inert Ingredients and Metabolites

A full discussion of inert ingredients and metabolites is found in the 2002 FEIS pp B-12, B-15, and B-20.

4. Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Consistent with Executive Order No. 12898, consideration has been made to the potential for disproportionately high and adverse human health or environmental effects on any minority and low-income populations.

Although specific data are not available, observations indicate that Hispanics and Asians are the minority groups which would be most impacted by the suppression programs because of their involvement in agricultural production systems.

No Action Alternative may cause low income and minority farm workers to be exposed to additional insecticides applied to cropland. No Action Alternative may increase costs of operation for low income and minority farm operators.

Insecticide Applications at Conventional or RAAT Rate Alternatives would be expected to have no disproportionate impact on minority or low income populations.

Human health effects on individuals with poor nutritional status are analyzed in the 2002 EIS pp B-24, B-27, and B-28.

5. Executive Order No. 13045, Protection of Children from Environmental Health Risks and Safety Risks

Consistent with Executive Order No. 13045, APHIS has considered the potential for disproportional high and adverse environmental health and safety risks to children.

The human health risk assessment for the 2002 FEIS analyzed the effects of exposure to children from the three insecticides. Based on review of the insecticides and their use in the grasshopper program, the risk assessment concluded that the likelihood of children being exposed to insecticides is very slight and that no disproportionate adverse effects to children are anticipated over the negligible effects to the general population. Treatments are primarily conducted on open rangelands where children would not be expected to be present during treatment or enter should there be any restricted entry period after treatment. No urban areas or schools would be subject to treatment under the proposed action.

The potential for impacts of pesticides on children would be minimized by the implementation of the Operating Procedures (Appendix 1).

6. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

In accordance with various environmental statutes, APHIS routinely conducts programs in a manner that minimizes impact to the environment, including any impact to migratory birds. In January 2001, President Clinton signed Executive Order 13186 to ensure that all government programs protect migratory birds to the extent practicable. To further its purposes, this Executive Order requires each agency with a potential to impact migratory birds to enter into an MOU with FWS. In compliance with the Executive Order, APHIS is currently working with FWS to develop such an MOU.

7. Endangered Species Act

Policies and procedures for protecting endangered and threatened species of wildlife and plants were established by the Endangered Species Act (ESA) of 1973, as amended (16 United States Code (U.S.C.) • 1531 *et seq*.). The ESA is designed to ensure the protection of Endangered and Threatened species and the habitats upon which they depend for survival. Regulations implementing the provisions of the ESA have been issued. In accordance with Section 7 of the ESA, consultation is to be conducted for any action authorized, funded, or carried out by a Federal agency that may affect listed endangered or threatened species or their habitats. APHIS also includes proposed species in their consultations. Consultations are conducted with Fish and Wildlife Service (FWS), Department of Interior, for terrestrial species and most aquatic species, and with NOAA Fisheries, U.S. Department of Commerce, for marine and anadromous species.

The most recent national biological opinion (BO) on the grasshopper program issued by FWS was issued in July 21, 1995. APHIS prepared a national biological assessment (BA) for the 1998 program, but no BO was issued because control programs were not anticipated that year. In February 2005 APHIS presented a Programmatic Biological Assessment (BA), along with a threat matrix, for all listed species, to FWS for comment. FWS responded in June 2005 with a request for more information on toxicity data, buffer models, and long-term effects from these programs. Although this National Consultation is proceeding, a Programmatic Biological Opinion will not likely be issued in time for grasshopper/Mormon cricket suppression programs in 2006. In order to comply with section 7 requirements APHIS will conduct informal consultations with FWS, and NOAA Fisheries, locally. The 1995 BO and 1998 BA will be used as a basis for these local consultations and are incorporated into this EA by reference. Locally, a BA was completed to address effects to Oregon Threatened and Endangered (T & E) species listed since the 1995 BO, to include protective measures for the use of diflubenzuron, a chemical alternative not consider in the 1995 BO, and to include mitigation measures for the RAAT methodology, also not consider in the 1995 BO. This local BA is incorporated into this EA by reference.

APHIS has initiated informal consultation with FWS, Oregon State Office and NOAA Fisheries, Portland Habitat Branch. These consultations will result in concurrences to APHIS' no effect or not likely to adversely effect determinations in the respective BA's. Concurrence was received for 2003-2005. Informal consultation for 2006 is currently ongoing to determine protective measures which may be needed in addition to those derived from earlier Biological Opinions. FWS and NOAA Fisheries letters of concurrence and other correspondence are (will be) included in Appendix 3.

The following table is a summary of protection measures developed for federally listed species that may be associated with grasshopper suppression programs in this EA's area of Oregon. These measures were agreed to by APHIS through Formal Section 7 Consultation with the US Fish and Wildlife Service and found in the 1995 FWS Biological Opinion (BO), or through local informal consultation with FWS and NOAA Fisheries for the use of diflubenzuron, the RAAT methodology, and species listed since the 1995 national BO. Protection measures required for a not likely to adversely affect determination, and findings of no effect, previously approved by FWS, are referenced by the date of the biological opinion (ex. FWS mm/dd/yy). Measures developed between APHIS and FWS or NOAA Fisheries during local consultation are referenced by year (ex. FWS 2004, NOAA 2004). This document also updates these references by using information provided by the Services to include current nomenclature and changes in listing status.

Table 2. Current and Proposed Protection Measures and Determinations to Protect Threatened (T), Endangered (E), or Proposed (PT) Species

Name, Species, and Status,	Determination	Protective Measures from 1995 Biological Opinion	Proposed Protective Measures for Oregon
Bald Eagle (T) *Haliaeetus leucocephalus*	Not likely to adversely affect (NLAA)	Maintain a 1-mile radius treatment-free zone around active bald eagle eyries found on rivers or lakes with no flyovers of this area by contract pilots. A 2.5 mile no-aerial ULV spray zone will be maintained upstream and downstream from the nest site as a forage area. This will include a 0.25 mile buffer along each side of the rivers. Lakes will be protected by a 0.25 no-	Same measures as 1995 BO for diflubenzuron and RAATs application method. FWS 2005

		aerial ULV spray buffer if they are considered foraging areas of the bald eagle. FWS 06/01/87	
Lahontan Cutthroat Trout (T) *Oncorhynchus clarki henshawi*	NLAA	No aerial application of ULV (spray) pesticides within 0.25 mile of occupied habitats. Only carbaryl bait will be used within 0.25 miles. FWS 06/01/87	Same measures as 1995 BO for diflubenzuron and RAATs application method. FWS (pending)
Borax Lake Chub (E) (CH) *Gila boraxobius*	NLAA	No aerial ULV application of malathion should be applied within 1 mile of occupied habitat. A 0.25 mile no-aerial ULV application of carbaryl should be adhered to FWS 06/01/87	No diflubenzuron application within 0.5 miles of occupied habitat. Carbaryl bait can be used to within 500 feet of occupied habitat. Same buffers for RAATs application method. FWS (pending)
Foskett Speckled Dace (T) *Rhinichthys osculus ssp.*	NLAA		
Hutton Tui Chub (T) *Gila bicolor spp.*	NLAA		
Modoc sucker (E) (CH) *Catostomus microps*	NLAA		
Warner Sucker (T) (CH) *Catostomus warnerensis*	NLAA		
Lost River Sucker (E) (PCH) *Deltistes luxatus*	NLAA	Buffers around areas of occurrence of 0.5 mile for the use of malathion and 0.25 mile for the use of aerially applied carbaryl. Within the buffers, only carbaryl bait will be used. (FWS 07/26/88)	No diflubenzuron application within 0.5 miles of occupied habitat. Carbaryl bait can be used to within 500 feet of occupied habitat. Same buffers for RAATs application method. FWS (pending)
Shortnose Sucker (E) (PCH) *Chasmiste brevirostris*	NLAA		
Malheur Wire-lettuce (E) (CH) *Stephanomeria malheurensis*	NLAA	Aerial applications of ULV (spray) pesticides will not be used within 3 miles of these species occupied habitats. Within the 3 mile buffer, only carbaryl bait will be used. FWS 09/24/92, 06/01/87	Same measures as 1995 BO for diflubenzuron and RAATs application method. No ground bait application within 50 feet of known locations or critical habitat. FWS 2005
Northern Spotted Owl (T) (CH) *Strix occidentalis caurin*	No effect	Occurs primarily in old growth forest and not in rangeland. FWS 08/03/91	No effect determination for diflubenzuron and RAATs application method. FWS 2005
MacFarlane's Four-o'clock (T) (CH) *Mirabilis macfarlanii*	No Effect	No control will occur in the Snake River Canyon habitat of this species. FWS 06/01/87	No effect determination for diflubenzuron and RAATs application method. FWS 2005

Listed since 1995			
Bull Trout (T) (CH) *Salvelinus confluentus*	NLAA	Listed since 1995	No ULV (liquid) treatments will occur within 0.5 miles of occupied habitat. Carbaryl bait will not be used within 500 feet of occupied habitat. Known migratory habitats will be treated as occupied habitat unless otherwise directed by FWS personnel prior to treatments. FWS (pending)
Chinook Salmon (T, E) (CH) *Oncorhynchus (=Salmo) tshawytscha*	NLAA	Listed since 1995	No ULV (liquid) treatments will occur within 0.25 miles of occupied habitat. No ground application of liquids will occur within 200 feet, and carbaryl bait will not be used within 500 feet by air and 200 feet by ground, of occupied habitat. Known migratory habitats will be treated as occupied habitat unless otherwise directed by NOAA Fisheries personnel prior to treatments. NOAA (pending)
Chum Salmon (T) *Oncorhynchus (=Salmo) keta*	NLAA		
Coho Salmon (T) *Oncorhynchus (=Salmo) kisutch*	NLAA		
Sockeye Salmon (E) (CH) *Oncorhynchus (=Salmo) nerka*	NLAA		
Steelhead (T, E) *Oncorhynchus (=Salmo) mykiss*	NLAA		
Howell's Spectacular Thelypody (T) *Thelypodium howellii Spectabilis*	NLAA	Listed since 1995	Aerial applications of ULV (spray) pesticides will not be used within 3 miles of these species occupied habitats. Within the 3 mile buffer, only carbaryl bait will be used. Same measures for RAATs application method. No ground bait application within 50 feet of known locations or critical habitat. FWS 2005
Spalding's Catchfly (T) *Silene spaldingii*	NLAA		
Canada Lynx (T) *Lynx Canadensis*	No Effect	Listed since 1995	Known ranges of the Canada lynx and its travel corridors, in Oregon, will not be considered for treatment. FWS 2005

8. Additional Protective Measures Which Are Not Included in FY 2006 Treatment Guidelines (Appendix 1)

• APHIS will perform on-site examination of proposed suppression spray areas to determine the presence of water (defined in Appendix 1).

• Biological control release sites will be considered on an individual basis in consultation with the land manager to determine which insecticides might be used and/or how much buffer space should be allowed.

• APHIS will procure a listing of certified organic growers and determine buffers needed to protect organic farm operations on an individual basis.

• Prior to making a final decision on whether to treat and which method to use, APHIS will request the land manager to provide information on the existence and location of any sensitive areas or species of concern. FWS and NOAA Fisheries will be contacted to determine the location of any listed or proposed T&E species. The appropriate mitigation measures will be applied. When treating state or federal land, APHIS will consider requests of the land manager with respect to candidate species, non-listed species of concern, critical habitats, and other areas of concern.

9. Monitoring

APHIS has developed an Environmental Monitoring Plan (EMP) for the grasshopper suppression program. This document was prepared by the APHIS Environmental Monitoring Team, and is incorporated in this EA by reference.

Monitoring involves the evaluation of various aspects of the grasshopper suppression programs. There are three aspects of the programs that may be monitored. The first is the efficacy of the treatment. APHIS will determine how effective the application of an insecticide has been in suppressing the grasshopper population within a treatment area and will report the results in a Work Achievement Report to the Western Region and the land manager.

The second area included in monitoring is safety. This includes ensuring the safety of the program personnel through medical monitoring conducted specifically to determine risks of a hazardous material. (See APHIS Safety and Health Manual (USDA, APHIS, 1998) available online at: http://www.aphis.usda.gov/mrpbs/safety_security_manual.html).

The third area of monitoring is environmental monitoring. APHIS Directive 5640.1 commits APHIS to a policy of monitoring the effects of Federal programs on the environment. Environmental monitoring includes such activities as checking to make sure the insecticides are applied in accordance with the labels, and that sensitive sites and organisms are protected. The environmental monitoring recommended for grasshopper suppression programs involves monitoring sensitive sites such as bodies of water used for human consumption or recreation, or which have wildlife value, habitats of T&E species, habitats of other sensitive wildlife species, edible crops, and any sites for which the public has expressed concern or where humans might congregate (e.g., schools, parks, hospitals).

The need for specific environmental monitoring on any suppression programs in Oregon will be based upon APHIS current policy (EMP), consultation with land managers, and consideration of sensitive areas for T&E or other species of concern.

V. Literature Cited

Adams, J.S., Knight, R.L., McEwen, L.C., and George, T.L., 1994. Survival and growth of nestling vesper sparrow exposed to experimental food reductions. The Condor 96:739–748.

Beyers, D.W., Farmer, M.S., and Sikoski, P.J., 1995. Effects of rangeland aerial application of Sevin-4-Oil® on fish and aquatic invertebrate drift in the Little Missouri River, North Dakota. Archives of Environmental Contamination and Toxicology 28:27–34.

Bradbury, Bill. 2001. Oregon Blue Book 2001-2002. Oregon Secretary of State, Portland, Oregon. 465pp.

Catangui, M.A., Fuller, B.W., and Walz, A.W., 1996. Impact of Dimilin® on nontarget arthropods and its efficacy against rangeland grasshoppers. *In* U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1996. Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No. 1809. Sec. VII.3. Washington, DC.

Connelly, J. W. 1994. Sage Grouse Ecology. Proj. no. W-160-R-21, Completion Report Idaho Department of Fish and Game. 90pp.

Dobroski, C.J., O'Neill, E.J., Donohue, J.M., and Curley, W.H., 1985. Carbaryl: a profile of its behavior in the environment. Roy F. Weston, Inc., West Chester, PA, and V.J. Ciccone and Associates, Inc., Woodbridge, VA.

Eisler, R., 2000. Handbook of chemical risk assessment: health hazards to humans, plants, and animals. Lewis Publishers, New York.

Emmett, B.J., and Archer, B.M, 1980. The toxicity of diflubenzuron to honey bee (*Apis melifera* L.) Colonies in apple orchards. Plant Pathology 29:637–183.

EPA – see U.S. Environmental Protection Agency

Hazardous Substances Database, 1990. On-line database. National Library of Medicine, Bethesda, MD.

Howe, Frank P., et al. 2000. Diet Switching and Food Delivery by Shrubsteppe Passerines in Response to an Experimental Reduction in Food. *Western North American Naturalist* 60:139-154.

HSDB – see Hazardous Substances Database

Martin, Pamela A., et al. 2000. Effects of Two Grasshopper Control Insecticides on Food Resources and Reproductive Success of Two Species of Grassland Songbirds. *Environmental Toxicology and Chemistry* Vol. 19. No. 12: 2987-2996.

Mayer, F.L., Jr, and Ellersieck, M.C., 1986. Manual of acute toxicity: interpretation and data base for 410 chemicals and 66 species of freshwater animals. Resource Publication 160. Department of the Interior, Fish and Wildlife Service, Washington, DC.

McEwen, L.C., Althouse, C.M., and Peterson, B.E., 1996a. Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on nontarget animal life. *In* U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1996. Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No. 1809. Sec. III.2. Washington, DC.

McEwen, L.C., Petersen, B.E., and Althouse, C.M., 1996b. Bioindicator species for evaluating potential effects of pesticides on threatened and endangered wildlife. *In* U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1996. Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No. 1809. Sec. III.7. Washington, DC.

Meacham, J.E., E. B. Steiner, et. al.. 2001. Atlas of Oregon, Second Edition. University of Oregon Press, UO Infographics Lab, Department of Geology. Eugene, Oregon. CD-ROM.

Oregon Department of Agriculture and USDA, National Agricultural Statistics Service. 2002. 2001-2002 Oregon Agriculture and Fisheries Statistics. 80pp.

Opdycke, J.C., Miller, R.W., and Menzer, R.E., 1982. Metabolism and fate of diflubenzuron in swine. Journal of Agricultural Food and Chemistry 30:1223–1227.

Paige, Christine & Ritter, Sharon A. 1999. Birds in a Sagebrush Sea: Managing Sagebrush Habitats for Bird Communities. Partners in Flight, Western Working Group.

Quinn, M.A., 1996. Impact of control programs on nontarget arthropods. *In* U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1996. Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No. 1809. Sec. III.3. Washington, DC.

Schroeder, W.J., Sutton, R.A., and Beavers, L.B., 1980. *Diaprepes abbreviatus*: Fate of diflubenzuron and effect on nontarget pest and beneficial species after application to citrus for weevil control. J. Econ. Entomol. 73:637–638.

Skold, M.D. and Davis, R.M., 1995. A Rangeland Grasshopper Insurance Program. Journal of Agricultural and Resource Economics. 20(1):1-10.

Tsuda, T., Aoki, S., Kojima, M., and Harada, H., 1989. Bioconcentration and excretion of diazinon, IBP, malathion, and fenitrothion by willow shiner. Toxicology and Environmental Chemistry 24:185–190.

USDA – see U.S. Department of Agriculture

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1998. Safety and health manual. Safety, Health, and Environmental Staff, Riverdale, MD. February 28, 1998. [online] available: http://www.aphis.usda.gov/mrpbs/safety_security_manual.html.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2002. Rangeland Grasshopper and Mormon Cricket Suppression Final Environmental Impact Statement. October 15, 2002. [online] available: http://www.aphis.usda.gov/ppd/es/gh.html.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2006. APHIS Rangeland Grasshopper/Mormon Cricket Suppression Program Aerial Application Statement of Work. January 2006

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1998. Biological Assessment for Rangeland Grasshopper Cooperative Management Program. April 28, 1998.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2006. 2006 Biological Assessment for Rangeland Grasshopper/Mormon Cricket Suppression Programs in Oregon - F&WS. January 17, 2006.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2006. 2006 Biological Assessment for Rangeland Grasshopper/Mormon Cricket Suppression Programs in Oregon – NOAA Fisheries. March 9, 2006.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2005. Environmental Monitoring Plan for 2005 Rangeland and Mormon Cricket Suppression Program. April 2005.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2006. Site-Specific Environmental Assessment, Rangeland and Mormon Cricket Suppression Program, Oregon, No. OR-06-02. March 10, 2006.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1999. APHIS Directive 5600.3, Evaluating APHIS programs and activities for ensuring protection of children from environmental health risks and safety risks. September 3, 1999. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Riverdale, MD. [online] available: http://www.aphis.usda.gov/library/directives.

U.S. Environmental Protection Agency, 1993. Carcinogenicity peer review of carbaryl, 1–napthyl n–methylcarbamate. MRID 421889—01, 02. Memorandum from Ray Landolt, Toxicological Branch II, October 7, 1993, 35 pp

U.S. Environmental Protection Agency, 2000. Cancer Assessment Document #2. Evaluation of the carcinogenic potential of malathion. Report of the 12 April 2000 meeting and its 29 attachments. April 28, 2000. U.S. Environmental Protection Agency, Washington, DC.

U.S. Department of Interior, Fish and Wildlife Service, 1995. Biological Opinion for Rangeland Grasshopper Cooperative Management Program. July 21, 1995. Ladd, Wilber N. Jr., Acting Regional Director, FWS Region 6.

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