Environmental Assessment for Rangeland Grasshopper & Mormon Cricket Suppression Program

OREGON

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

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Table of Contents

Acronyms and Abbreviations

ac	acre
a.i.	active ingredient
AChE	acetylcholinesterase
APHIS	Animal and Plant Health Inspection Service
BCF	bioconcentration factor
BLM	Bureau of Land Management
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
EA	environmental assessment
e.g.	example given (Latin, exempli gratia, “for the sake of example”)
EIS	environmental impact statement
E.O.	Executive Order
FONSI	finding of no significant impact
FR	Federal Register
FS	Forest Service
g	gram
ha	hectare
HHERA	human health and ecological risk assessments
i.e.	in explanation (Latin, id est “in other words.”)
IPM	integrated pest management
lb	pound
MBTA	Migratory Bird Treaty Act
MOU	memorandum of understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIH	National Institute of Health
ppm	parts per million
PPE	personal protective equipment
PPQ	Plant Protection and Quarantine
RAATs	reduced agent area treatments
S&T	Science and Technology
ULV	ultra-low volume
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services

Draft Site-Specific Environmental Assessment for Rangeland Grasshopper and Mormon Cricket Mitigation Program

In Baker, Crook, Deschutes, Gilliam, Grant, Harney, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler, Eastern Oregon Counties

I. Need for Proposed Action

A. Purpose and Need Statement

Infestations of grasshoppers or Mormon crickets may occur in the seventeen eastern Oregon counties listed above. The Animal and Plant Health Inspection Service (APHIS) may, upon request by land managers, conduct treatments to suppress grasshopper infestations as part of the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program. The term 'grasshopper' used in this environmental assessment (EA) refers to both grasshoppers and Mormon crickets, unless differentiation is necessary.

The goal of proposed grasshopper suppression actions as analyzed in this EA is to generally reduce grasshopper populations and their feeding impacts to acceptable levels. Populations of grasshoppers that may justify suppression work by APHIS in Oregon are considered on a case-by-case basis and require land-manager requests in writing. The work is also subject the availability of funding and the appropriateness of timing to likely achieve an ecologically effective result.

Benefits of control may include protection of rangeland ecosystem resources and adjacent cropland against damaging grasshopper impacts for the current year, as well as reducing the potential for continued elevated damage in future years. 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 other herbivores including wildlife and livestock can also be reduced, and rare plants may be adversely impacted by severe grasshopper feeding. Additionally, controlling grasshopper outbreaks may prevent grasshoppers from becoming migratory and invading adjacent areas.

This EA analyzes potential effects of the preferred proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from May through July of 2021 in the seventeen eastern Oregon counties listed above.

This EA is prepared in accordance with the requirements under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code § 4321 *et. seq.*) and the NEPA procedural requirements promulgated by the Council on Environmental Quality, United States Department of Agriculture (USDA), and APHIS. A decision will be made by APHIS based on the analysis presented in this EA, the results of public involvement, and consultation with other agencies and individuals. A selection of one of the program alternatives will be made by APHIS for the current year Program in Oregon.

B. Background Discussion

Rangelands provide goods and services, including food, fiber, recreational opportunities, and grazing land for cattle (Havstad et al., 2007; Follett and Reed, 2010). Grasshoppers are part of rangeland ecosystems, serving as food for wildlife and playing an important role in nutrient cycling. However, grasshoppers and Mormon crickets have the potential to occur at high population levels (Belovsky et al., 1996) that result in competition with other herbivores for rangeland forage and can result in depletion of other rangeland species. In rangeland ecosystem areas of the United States, grasshopper populations can build up to economic infestation levels despite even the best land management practices and individual land-manager suppression efforts, justifying a treatment program as described in this assessment.

Economic infestation level refers to both a measurement of the damage that is caused by a population of pest species unto a natural resource in quantitative terms and a qualitative descriptor of any population that has reached an economically significant and threatening level. For rangeland grasshoppers, an economic infestation level can be measured quantitatively on a case-by-case basis with knowledge of factors including: the economic value of available forage (as measured by productivity and composition), crops or other imperiled resources; the damage potential of the grasshoppers present (as determined by species complex, age, and density); and accessibility and cost of alternatives to the damaged resources. Short-term economic benefits accrue during the year of treatment, but additional multi-year benefits may also be likely to accrue and can be considered as part of the total value gained by treatment (i.e further loss prevented). In decision making, these factors are combined to estimate if an overall 'economic threshold' has been reached that can begin to justify treatment. (If the cost of treatment is estimated to be *equal to or less than* the predicted cost of taking no action. Finally, though less common than the above considerations, potential losses that are more challenging to quantify in economic terms may also be considered as part of the decision-making processes. Examples of this may include perceived or physical damage to recreational opportunities and cultural resources, or the creation of significant nuisances or hazards to public safety.

When economic infestation levels occur, a rapid and effective response may be requested to reduce the destruction of rangeland vegetation. In some cases, a response may be requested to prevent migratory grasshopper populations from invading adjacent areas. In most circumstances, APHIS is not able to accurately predict treatment areas and treatment strategies months or even weeks before grasshopper populations reach economic infestation levels. The need for rapid and effective response when an outbreak occurs limits the options available to APHIS to inform the public other than those stakeholders who could be directly affected by the actual application. The emergency response aspect is why site-specific treatment details cannot be known, analyzed, and published in advance.

Over the past half-century of grasshopper survey in Oregon, patterns of reoccurring economic infestation levels have been mapped to show where future outbreaks are likely to re-occur (see figure 1 below), though outbreaks in a given year are not necessarily limited to the areas with the most frequent historical outbreaks. Program treatments by APHIS are far more limited than indicated by these historic outbreak areas, being almost always focused to limited areas where public concern is high and the available decision making factors (see 'site-specific data' in next paragraph) show a clear need for action that will justify the public expense and comport with all legal environmental requirement.

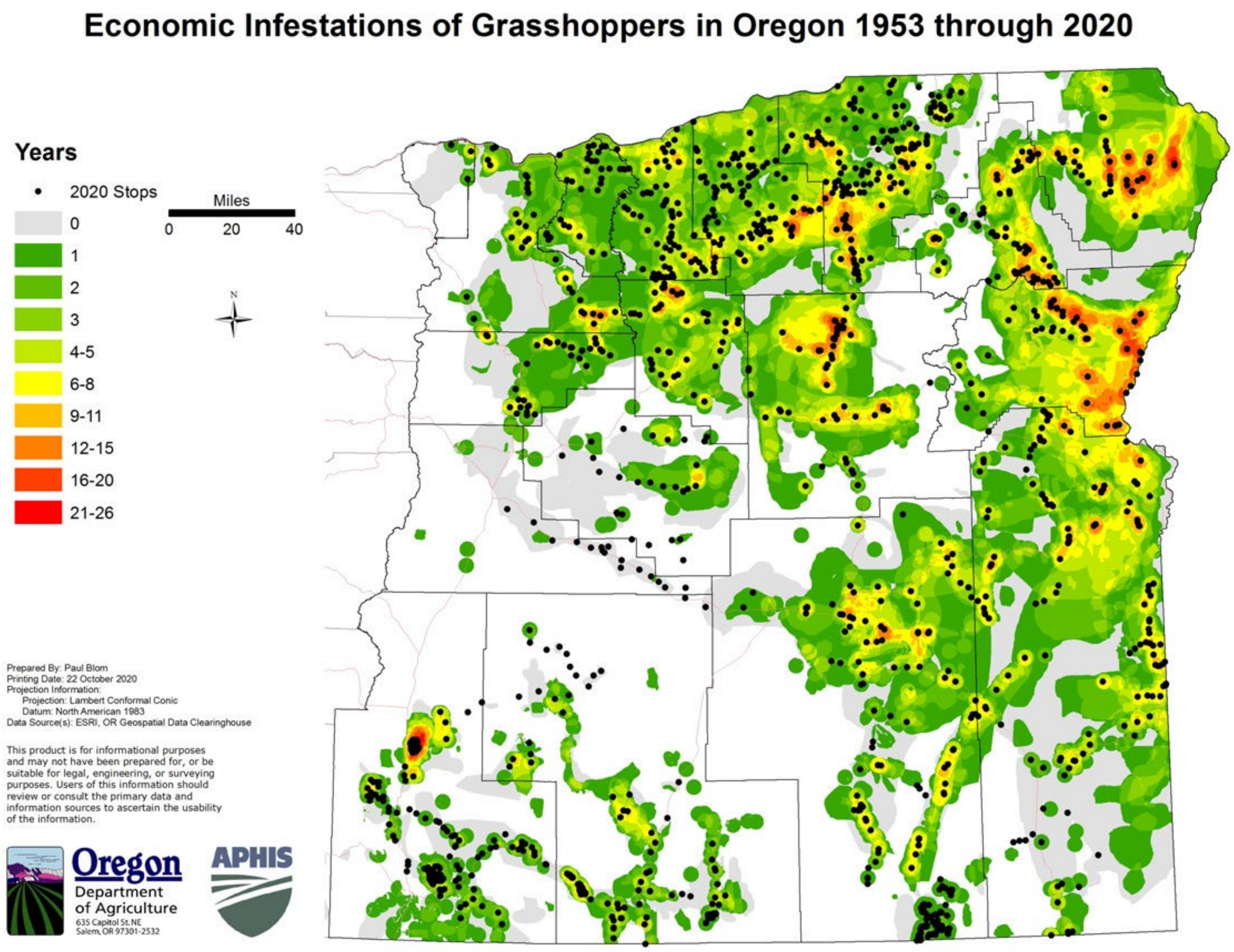

Figure 1: Number of Economically Infested Years for Grasshoppers in Oregon 1953 – 2020 Overlaid with 2020 survey locations indicated by black dots (1:2300k)

Historically, for the purposes of monitoring grasshopper populations across the Western US, a threshold of 8 grasshoppers per square yard or greater is considered an acceptable, if not fully definitive, economic infestation level. For the purposes of determining if a treatment is justified (i.e. an economic threshold is reached), many other factors must be considered, as well as a consensus by the parties involved in requesting and actuating the work. Much higher density levels are frequently encountered in high risk areas, and this density specific data is mapped and provided to the public in both weekly and annual reports in Oregon as part of a cooperative program with the Oregon Department of Agriculture (ODA). These reports can more precisely indicate where treatment activity may be warranted, including Program treatments. But density alone, no matter how high, in addition to fluctuating from year to year due to many difficult to forecast factors, is only one of the major considerations that need to be assessed in determining if a particular infestation has truly reached an economic threshold to justify treatment, as summarized in the USDA Agricultural Research Service (ARS) publication, Grasshopper Integrated Pest Management (IPM) User Handbook, "Recognizing and Managing Potential Outbreak Conditions" (Section IV.8, page 2):

> Broader Ecological and Economic Considerations
>
> In developing control strategies for grasshoppers, managers must base their decisions on more than the density of grasshoppers. The observed grasshopper density must be considered in a broader ecological and economic context:
>
> - the available forage base provided by plants and the potential reduction of this base by current and future grasshopper densities;
> - the economic value of the forage base lost to grasshoppers;
> - the economic cost of controlling grasshoppers; and
> - the ecological mechanisms that may be controlling grasshopper numbers, and how control efforts might change these mechanisms and future grasshopper densities.
>
> The Grasshopper Integrated Pest Management (GHIPM) Project has demonstrated that reference to a single grasshopper density… as constituting outbreak conditions is no longer adequate: density must be assessed in its ecological and economic context.

The full USDA-ARS IPM handbook is at: www.ars.usda.gov/pa/nparl/pmru/IPMHandbook.

Final site-specific data used to make treatment decisions are gathered during spring nymph surveys. Emergent trends may also be supported by the observation history know to the land manager(s) as well as trends documented in previous years of survey and various environmental data. Site-specific data include: grasshopper densities, species complexes, dominant species status, developmental phenology, terrain, soil types, general range conditions, local weather patterns (wind, temp., precipitation), slope and aspect of hatching beds, animal unit months (AUM's) present in grazing allotments, forage damage estimates, number of potential AUM's consumed by grasshopper populations, potential AUM's managed for allotment and value of the AUM, estimated cost of replacement feed for livestock, rotational time frame for grazing allotments, number of livestock in grazing allotment, and recent history of site enrichment projects that may be imperiled (e.g. re-seeding, post-fire rehabilitation, or other land-manager enhancement work). These are all factors that may be considered when determining if an economic threshold has been reached for proposed Program sites.

APHIS surveys grasshopper populations on rangeland in the Western United States, provides technical assistance on grasshopper biology to land managers, and may cooperatively suppress grasshoppers when direct intervention is requested by a Federal land management agency or a State agriculture department (on behalf of a State or local government, or a private group or individual). APHIS' enabling legislation provides, in relevant part, that "on request of the administering agency or the agriculture department of an affected State, the Secretary, to protect rangeland, shall immediately treat Federal, State, or private lands that are infested with grasshoppers or Mormon crickets…" (7 U.S.C. § 7717(c)(1)). The need for rapid and effective response 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 grasshopper populations and effectively protect rangeland.

In June 2002, APHIS completed an environmental impact statement (EIS) document concerning suppression of grasshopper populations in 17 Western States (Rangeland Grasshopper and Mormon Cricket Suppression Program, Environmental Impact Statement, June 21, 2002). The EIS described the actions available to APHIS to reduce the damage caused by grasshopper populations in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. During November 2019, APHIS published an updated EIS to incorporate the available data and analyze the environmental risk of new program tools. The risk analysis in the 2019 EIS is incorporated by reference.

In October 2015, APHIS and the Bureau of Land Management (BLM) signed a memorandum of understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers on BLM lands (Document #15-8100-0870-MU, October 15, 2015). 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 economically 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 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 land is necessary. The BLM must also prepare a Pesticide Use Proposal (Form FS-2100-2) 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 prepares and approves the Pesticide Use Proposal.

APHIS supports the use of IPM principles in the management of grasshoppers. APHIS provides technical assistance to land managers including the use of IPM. However, implementation of on-the-ground IPM activities is limited to land management agencies and Tribes, as well as private landowners, themselves. In addition, APHIS' authority under the Plant Protection Act is to treat Federal, State and private lands for grasshopper populations. APHIS' technical assistance occurs under each of the three alternatives proposed in the EIS.

In addition to providing technical assistance, APHIS completed the Grasshopper Integrated Pest Management (GIPM) project. One of the goals of the GIPM is to develop new methods of suppressing grasshopper populations that will reduce non-target effects. One of the methods that has been developed to reduce the amount of pesticide used in suppression activities and is a component of IPM is Reduced Agent Area Treatments (RAATs), which is the preferred proposed action described in this EA. APHIS continues to evaluate new suppression tools and methods for grasshopper populations, including biological control, and as stated in the EIS, will implement those methods once proven effective and approved for use in the United States.

C. About This Process

The NEPA 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 act swiftly with respect to those requests. Surveys help to determine general areas, among the millions of acres where harmful grasshopper infestations may occur in the spring of the following year. Survey data provides the best estimate of future grasshopper populations, while short-term climate or environmental factors change where the specific treatments will be needed. Therefore, examining specific treatment areas for environmental risk analysis under NEPA is typically 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.

Public involvement under the CEQ Regulations for Implementing the Procedural Provisions of NEPA distinguishes federal actions with effects of national concern from those with effects primarily of local concern (40 CFR 1506.6). The grasshopper suppression program EIS was published in the Federal Register (APHIS-2016-0045), and met all applicable notice and comment requirements for a federal action with effects of national concern. This process provided individuals and national groups the ability to participate in the development of alternatives and provide comment. Our subsequent state-based actions have the potential for effects of local concern, and we publish them according to the provisions that apply to federal actions with effects primarily of local concern. This includes the USDA APHIS NEPA Implementation Procedures, which allows for EAs and findings of no significant impact (FONSIs) where the effects of an action are primarily of regional or local concern, to normally provide notice of publication in a local or area newspaper of general circulation (7 CFR 372.7(b)(3)). These notices provide potentially locally affected individuals an additional opportunity to provide input into the decision-making process. Some states, including Oregon, also provide additional opportunities for local public involvement, such as public meetings. In addition, when an interested party asks to be informed APHIS ensures their contact information is added to the list of interested stakeholders.

APHIS uses the scoping process to enlist land managers and the public to identify alternatives and issues to be considered during the development of a grasshopper or Mormon cricket suppression program. Scoping was helpful in the preparation of the draft EAs. The process can occur formally and informally through meetings, conversations, or written comments from individuals and groups.

The current EIS provides a solid analytical foundation; however, it may not be enough to satisfy NEPA completely for actual treatment proposals. The program typically prepares a Draft EA tiered to the current EIS for each of the 17 Western States, or portion of a state, that may receive a request for treatment. The Draft EA analyzes aspects of environmental quality that could be affected by treatments in the area where grasshopper outbreaks are anticipated. The Draft EA will be made available to the public for a 30-day comment period. When the program receives a treatment request and determines that treatment is necessary, the specific site within the state will be evaluated to determine if environmental factors were thoroughly evaluated in the Draft EA. If all environmental issues were accounted for in the Draft EA, the program will prepare a Final EA and FONSI. Once the FONSI has been finalized copies of those documents will be sent to any parties that submitted comments on the Draft EA, and to other appropriate stakeholders. To allow the program to respond to comments in a timely manner, the Final EA and FONSI will be posted to the APHIS website. The program will also publish a notice of availability in the same manner used to advertise the availability of the Draft EA.

II. Alternatives

To engage in comprehensive NEPA risk analysis APHIS must frame potential agency decisions into distinct alternative actions. These program alternatives are then evaluated to determine the significance of environmental effects. The 2002 EIS presented three alternatives: (A) No Action; (B) Insecticide Applications at Conventional Rates and Complete Area Coverage; and (C) Reduced Agent Area Treatments (RAATs), and their potential impacts were described and analyzed in detail. The 2019 EIS was tiered to and updated the 2002 EIS. Therefore the 2019 EIS considered the environmental background or 'No Action' alternative of maintaining the program that was described in the 2002 EIS and Record of Decision. The 2019 EIS also considered an alternative where APHIS would not fund or participate in grasshopper suppression programs. The preferred alternative of the 2019 EIS allowed APHIS to update the program with new information and technologies that not were analyzed in the 2002 EIS. Copies of the complete 2002 and 2019 EIS documents are available for review at the USDA APHIS PPQ office, 6035 NE 78th Court Portland, Oregon 97218. These documents are also available at the Rangeland Grasshopper and Mormon Cricket Program website www.aphis.usda.gov/plant-health/grasshopper.

All insecticides used by APHIS for grasshopper suppression are used in accordance with applicable product label instructions and restrictions. Representative product specimen labels can be accessed at the Crop Data Management Systems, Incorporated 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 will be implemented in accordance with APHIS' treatment guidelines and operational procedures, included as Appendix 1 to this Draft EA.

This Draft EA analyzes the significance of environmental effects that could result from the alternatives described below. These alternatives differ from those described in the 2019 EIS because grasshopper treatments are not likely to occur in most of the geographical area covered in the NEPA documents for this program and therefore the environmental baseline should describe a no treatment scenario.

A. No Suppression Program Alternative

Under Alternative A, the No Action alternative, APHIS would not conduct a program to suppress grasshopper infestations with Oregon. Under this alternative, APHIS may opt to provide limited technical assistance, but any suppression program would be implemented without direct assistance or oversight by APHIS.

B. Insecticide Applications at Conventional Rates or Reduced Agent Area Treatments with Adaptive Management Strategy (Preferred Alternative)

Under Alternative B, the Preferred Alternative, APHIS would manage a grasshopper treatment program using techniques and tools discussed hereafter to suppress outbreaks. The insecticides available for use by APHIS include the U.S. Environmental Protection Agency (USEPA) registered chemicals carbaryl, diflubenzuron, and malathion. These chemicals have varied modes of action. Carbaryl and malathion work by inhibiting acetylcholinesterase (enzymes involved in nerve impulses) and diflubenzuron inhibits the formation of chitin by insects. In Oregon at this time, APHIS is only considering the use of liquid formulations of diflubenzuron or solid bait formulations of carbaryl for grasshopper programs conducted by APHIS. Malathion and liquid formulations of carbaryl are not currently being considered for use in Oregon for the Program and will therefore not be discussed further in this document.

APHIS would make a single application per year to a treatment area and could apply insecticide at an APHIS rate conventionally used for grasshopper suppression treatments, or more typically as reduced agent area treatments (RAATs). APHIS selects which insecticides and rates are appropriate for suppression of a grasshopper outbreak based on several biological, logistical, environmental, and economical criteria. The identification of grasshopper species and their life stage largely determines the choice of insecticides used among those available to the program. RAATs are the most common application method for all program insecticides, and only rarely do rangeland pest conditions warrant full coverage and higher rates.

Typically, the decision to use diflubenzuron, the pesticide most used by the program, is determined by the life stage of the dominant species within the outbreak population, since diflubenzuron can produce 90 to 97% grasshopper mortality in immature populations, but is not considered effective for mitigating mature grasshoppers. If the window for the use of diflubenzuron closes, as may occur due to treatment delays, then carbaryl bait is the only remaining control option being considered for use in Oregon by APHIS at this time. Certain species are more susceptible to carbaryl bait, but other species have been found not to be attracted to carbaryl bait, which can limit the effectiveness of this option.

The RAATs strategy is effective for grasshopper suppression because the insecticide controls grasshoppers within treated swaths while conserving grasshopper predators, parasites, and other potentially susceptible non-target biota in the swaths not directly treated. RAATs can substantially decrease the rate of insecticide applied by either using lower insecticide concentrations or decreasing the deposition of insecticide applied by alternating one or more treatment swaths. Both options are most often incorporated simultaneously into RAATs. Either carbaryl bait or diflubenzuron would be considered under this alternative, typically at the following application rates:

- 10.0 pounds (0.20 lb a.i.) of 2 percent carbaryl bait per acre
- 0.75 or 1.0 fluid ounce (0.012 lb a.i.) of diflubenzuron per acre (sub-label rates)

The width of the area not directly treated (the untreated swath) under the RAATs approach is not standardized. The proportion of land treated in a RAATs approach is a complex function of the rate of grasshopper movement, which is a function of developmental stage, population density, and weather (Narisu et al., 1999, 2000), as well as the properties of the insecticide (insecticides with longer residuals allow wider spacing between treated swaths). Foster et al. (2000) left 20 to 50% of their study plots untreated, while Lockwood et al. (2000) left 20 to 67% of their treatment areas untreated. Currently the grasshopper program typically leaves 50% of a spray block untreated for ground applications where the swath width is between 20 and 45 feet. For aerial applications, the skipped swath width is typically no more than 200 feet for diflubenzuron. The selection of insecticide and the use of an associated swath widths is site dependent. Rather than suppress grasshopper populations to the greatest extent possible, the goal of this method is to suppress grasshopper populations to less than the economic infestation level.

Insecticide applications at conventional rates and complete area coverage, is an approach that APHIS has used in the past but is currently uncommon. Under this alternative, pesticide would cover all treatable sites within the designated treatment block per label directions. The application rates under this alternative are typically at the following application rates:

- 10.0 pounds (0.50 lb a.i.) of 5 percent carbaryl bait per acre
- 1.0 fluid ounce (0.016 lb a.i.) of diflubenzuron per acre (still a sub-label rate)

The potential generalized environmental effects of the application of carbaryl bait, diflubenzuron, and other pesticides are discussed in detail in the 2019 EIS. A description of anticipated site-specific impacts from this alternative may be found in Part IV of this document.

C. Experimental Treatments

APHIS-PPQ continues to refine its methods of grasshopper management in order to improve the abilities of the Rangeland Grasshopper and Mormon Cricket Suppression Program (herein referred to as the Program) to make it more economically feasible, and environmentally acceptable. These refinements can include reduced rates of currently used pesticides, improved formulations, development of more target-specific baits, development of biological pesticide suppression alternatives, and improvements to aerial (e.g., incorporating the use of Unmanned Aircraft Systems (UAS)) and ground application equipment. A division of APHIS-PPQ, Science and Technology's (S&T) Phoenix Lab is located in Arizona and its Rangeland Grasshopper and Mormon Cricket Management Team (Rangeland Unit) conducts methods development and evaluations on behalf of the Program. The Rangeland Unit's primary mission is to comply with Section 7717 of the Plant

Protection Act and protect the health of rangelands (wildlife habitats and where domestic livestock graze) against economically damaging cyclical outbreaks of grasshoppers. The Rangeland Unit tests and develops more effective, economical, and less environmentally harmful management methods for the Program and its federal, state, tribal, and private stakeholders.

To achieve this mission, experimental plots ranging in area from less than one foot to 640 acres are used and often replicated. The primary purpose of these experiments is to test and develop improved methods of management for grasshoppers. This often includes testing and refining pesticide and biopesticide formulations that may be incorporated into the Program. These investigations often occur in the summer (May-August) and the locations typically vary annually. The plots often include "no treatment" (or control) areas that are monitored to compare with treated areas. Some of these plots may be monitored for additional years to gather information on the effects of utilized pesticides on non-target arthropods. Note that an Experimental Use Permit is not needed when testing non-labeled experimental pesticides if the use is limited to laboratory or greenhouse tests ,or limited replicated field Trials involving 10 acres or less per pest for terrestrial tests.

Studies and experimental plots are typically located on large acreages of rangelands and the Rangeland Unit often works on private land with the permission of landowners. Locations of experimental trials will be made available to the appropriate agencies in order to ensure these activities are not conducted near sensitive species or habitats. Due to the small size of the experimental plots, no adverse effects to the environment, including protected species and their critical habitats, are expected, and great care is taken to avoid sensitive areas of concern prior to initiating studies.

1. Methods Development Studies

Methods development studies may use planes and all-terrain vehicles (ATVs) to apply labeled pesticides using conventional applications and the Reduced Agent Area Treatments (RAATs) methodology. The experiments may include the use of an ultra-low volume sprayer system for applying biopesticides (such as native fungal pathogens). Mixtures of native pathogens and low doses of pesticides may be conducted to determine if these multiple stressor combinations enhance mortality. Aircraft will be operated by Federal Aviation Administration-licensed pilots with an aerial pesticide applicator's permit.

Rangeland Unit often uses one square foot micro plots covered by various types of cages depending on the study type and species used. These types of study plots are preferred for Mormon cricket treatments and those involving non-labeled experimental pesticides or biopesticides. Our most common application method for micro plots is simulating aerial applications via the Field Aerial Application Spray Simulation Tower Technique (FAASSTT). This system consists of a large tube enclosed on all sides except for the bottom, so micro plot treatments can be accurately applied to only the intended treatment target. Treatments are applied with the FAASSTT in micro doses via a syringe and airbrush apparatus mounted in the top.

Rangeland Unit is also investigating the potential use of Unmanned Aircraft Systems (UAS) for a number of purposes related to grasshopper detection and treatment. UAS will be operated by FAA-licensed pilots with an aerial pesticide applicator's permit.

2. Pesticides and Biopesticides Used in Studies

Pesticides likely to be involved in studies currently include those approved for Program use:

Liquids: Diflubenzuron (e.g., Dimilin 2L and generics: currently Unforgiven and Cavalier 2L). Program standard application rates are: diflubenzuron - 1.0 fl. oz./acre in a total volume of 31 fl. oz./acre. Experimental rates often vary, but the doses are lower than standard Program rates unless otherwise noted.

Baits: Carbaryl at Program standard application rates: 2% bait at 10 lbs./acre (2 lbs. AI/acre) or 5% bait at 4 lbs./acre (2 lbs. AI/acre).

LinOilEx: (Formulation 103), a proprietary combination of easily available natural oils and some commonly encountered household products, created by Manfred Hartbauer, University of Graz, Austria. Note that LinOilEx (Formulation 103) is experimental; for more information, see "Potential Impacts of LinOilEx Applications" in the section "Information on Experimental Treatments."

Biopesticides likely to be involved in studies currently include:

Metarhizium robertsii (isolate DWR2009): A native fungal pathogen. Note that Metarhizium robertsii (isolate DWR2009) is experimental; for more information, see "Potential Impacts of Metarhizium robertsii Applications" in the section "Information on Experimental Treatments."

Beauveria bassiana GHA: a native fungal pathogen sold commercially and registered for use across the U.S.

3. Description of Possible Studies

At this time, it is not decided where in the 17 states most of the following proposed experimental field studies will occur. The final location decision is dependent upon grasshopper and/or Mormon cricket population densities, and availability of suitable sites.

Possible Study 1: Building on experimental field season research undertaken in 2020, we plan to further evaluate the efficacy of aerial treatments of Program insecticides using UAS. This study plans to use replicated 10 acre plots. Mortality will be then be observed for a duration of time to determine efficacy. Possible variants of this study (all of which will adhere to FAA regulations) may include night flights and treating with multiple UAS simultaneously (swarming).

Possible Study 2: Evaluate persistence of the experimental biopesticide DWR2009 in bait form by coating wheat bran with the pathogen. A species of local abundance will be placed into replicated microplot cages and fed the baits by hand. Mortality and sporulation will be then be observed for a duration of time to determine persistence in both the field and lab.

Possible Study 3: Evaluate efficacy of the experimental biopesticide DWR2009 in bait form by coating wheat bran with the pathogen. A species of local abundance will be placed into replicated microplot cages and fed the baits by hand. Mortality and sporulation will be then be observed for a duration of time to determine efficacy in both the field and lab.

Possible Study 4: A stressor study to evaluate efficacy of the experimental biopesticide DWR2009 in liquid form when combined with Dimilin 2L. The FAASSTT will be utilized to apply varying dose levels of Dimilin 2L (below label rates) in order to compare efficacy, starting at the rate of 1.0 fl. oz./acre. Replicated microplots will be treated and then a species of local abundance will be placed into each cage. Mortality will be then be observed for a duration of time to determine efficacy.

Possible Study 5: Evaluate efficacy of the experimental biopesticide DWR2009 in liquid and bait form (by coating wheat bran with the pathogen) using ultra-ultra low volume RAATs (involves a timing device and ULV nozzles) and a 10 acre plot. ATV-mounted liquid and bait spreaders will be utilized to apply DWR2009. Specimens will be periodically collected to observe mortality and sporulation for a duration of time to determine efficacy.

Possible Study 6: Evaluate efficacy of the experimental, non-traditional pesticide LinOilEx (Formulation 103). A micro-FAASSTT (airbrush system mounted on a 5 gal bucket) will be utilized to apply varying dose levels in order to compare efficacy, starting at the base rate of 6.64 ml/cage. A species of local abundance will be placed into replicated microplot cages and sprayed directly. Mortality will be then be observed for a duration of time to determine efficacy.

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, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and, Wheeler (see Appendix 1, Map 1). These 17 counties comprise most of the eastern two thirds of Oregon. The total area is approximately 67,000 square miles (42,880,000 acres).

Generally, it is not possible to predict the precise locations where grasshopper outbreaks will occur in any given year (see further information in section I. Need for Proposed Action, part B. Background Discussion). Although this assessment covers all the rangeland in the 17 counties, APHIS's attention to the affected environment will concentrate on the areas of historical grasshopper outbreaks, as delineated by trends indicated in previous years of survey work, as well as land-manager requests for mitigating support.

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

Figure 2 - Ecoregions of Eastern Oregon

<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 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.

Blue Mountains: 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.

Snake River Plain: 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 has natural sagebrush steppe vegetation which is used for cattle grazing.

Central Basin and Range: 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 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.

Within the potential treatment area, average January temperatures 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 18.79″ in Union County to a low of 9.15″ in Sherman. The average annual precipitation for the entire region is 11.54″ (Bradbury 2001).

The region contains several watersheds or drainages, most flow into the Columbia River or its major tributary the Snake River. Major drainages are the Deschutes, 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 the region 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 basins 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 Klamath River Basin watershed or drainage covers most of Klamath County. It drains directly into the Pacific Ocean. Major sub-drainages in this system are the Lost River, Williamson River, Sprague River, Upper Klamath Lake, and Upper Klamath River. Many manmade reservoirs have been constructed for irrigation, flood control, and power generation. Gerber is a large reservoir in Klamath County. Smaller reservoirs include J.C. Boyle, Willow Valley, and Whiteline. Crater Lake occupies the caldera of Mount Mazama and is the deepest Lake in North America. It contains the largest volume of water of any lake in Oregon. Several other high mountain lakes occur in Klamath County such as Odell, Crescent, Davis, and Lake of the Woods. Klamath Lake has the largest surface area of any lake in Oregon. Other lower elevation bodies of water in the county include Agency Lake, Swan Lake, Aspen Lake, and the Klamath Marsh.

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, shrub land, and woodlands are present across the general area. Grasshopper treatments would occur only in rangelands (grass and shrub lands, not in forests). Some of the rangelands are utilized for livestock grazing, but rangelands also provide habitat for native and introduced game and non-game animal species.

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.

80 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. Widespread grasshopper outbreaks are typically comprised primarily of the Melanoplini tribe (spur-throated grasshoppers), though localized outbreaks in the 1990s and 2000s have included many *Camnula pellucida* (clear-winged grasshopper).

B. Site-Specific Considerations

1. Human Health

In 2016, the estimated population of the 17 counties within the potential treatment area was over 510,000 (www.census.gov). 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 about

4.2 persons per square mile. Schools are located in most of the cities and towns, and no impact to these facilities is expected since treatments are conducted in rural rangelands.

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 essentially no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Program use of carbaryl 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.

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, mitigation measures in the Treatment Guidelines will be implemented, and no adverse impacts are expected.

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.

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 potential 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.

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 honeybees, 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. Two species that the Grasshopper Suppression Program has received comments on in the past are the Leona's little blue butterfly (*Philotiella leona*) and the monarch butterfly (*Danaus plexippus*). The Leona's little blue butterfly is only found in Klamath County near the Klamath Marsh, but the monarch butterfly is found throughout North and Central America. The suppression area covers an area considered to by spring and summer breeding areas for the monarch butterfly (xerces.org).

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.

A diverse complement of terrestrial plants occurs within the proposed suppression area. Many are considered as non-native, invasive weeds including annual grasses (e.g. cheat grass, venenata), annual forbs (e.g. diffuse knapweed, Scotch thistle, yellow starthistle), perennial forbs (e.g. Canada thistle, Russian thistle, leafy spurge, white top), and woody plants (e.g. Russian olive, tamarisk). A full complement of native plants (e.g. sagebrush, bitterbrush, numerous grasses and forbs) have coevolved with and provide habitat for native and domesticated animal species, while providing broad ecological services, such as stabilizing 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 various 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 N-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seedling germination, and plant growth.

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, sugar beets, 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 sugar beets. Tree fruit production is important in Wasco and Umatilla Counties (Bradbury 2001). Processing plants add value in several of the rural communities.

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.

There is a significant amount of acreage in organic production in the area. In 2008, there were 116 farms with 83,333 acres certified organic in these 17 counties.

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 in the potential suppression area 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, Klamath Marsh, Bear Valley, Lower and Upper Klamath National Wildlife Refuges, 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.

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.

There are five federally recognized Indian tribes in this area. According to the 2016 Oregon Blue Book (http://bluebook.state.or.us), the Confederated Tribes of Warm Springs had a Tribal Member population of 4,800 and a 644,000 acre reservation near Madras, OR. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have 2893 enrolled members and a 172,000 acre reservation near Pendleton, OR. The Burns Paiute Tribe has 349 members, a 13,736 acre reservation near Burns, OR. The Fort McDermitt Paiute-Shoshone Tribe's reservation straddles the Oregon-Nevada border, 18,829 acres are in Oregon.

The Klamath Tribes exercise court affirmed treaty rights within the 1954 former Klamath Reservation Boundary, approximately 1.8 million acres in the northern half of the county. This area includes the Klamath Marsh National Wildlife Refuge and large portions of the Freemont-Winema Forests. In addition to treaty resources in this area, cultural resources and tribal traditional use areas extend beyond the 1954 Reservation Boundary to the aboriginal homelands of the Klamath Tribes.

The 1855 Treaty that created the Warm Springs and Umatilla Reservations reserved specific rights in the Treaty, which include the right to hunt and gather traditional foods and medicines on open and unclaimed lands. These rights are generally referred to as "Treaty reserved rights" and extend to approximately 16.4 million acres of ceded land in

Washington and Oregon. Other Native Americans may practice traditional food and medicine gathering in the proposed suppression area.

5. Special Considerations for Certain Populations

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.

According to U.S. Census Bureau 2016 estimates (www.census.gov), the population makeup of Oregon is 87.4% White. Hispanic or Latino of any race is the next most numerous group comprising 12.8 %. Other identifiable groups include Black or African American 2.1%, American Indian and Alaska Native 1.8 %, Asian 4.5%, and Native Hawaiian and Other Pacific Islander 0.4%. Hispanic workers are often engaged in production and processing of crops.

The number of persons in the area below the poverty level in 2016 ranged from 22.9% in Malheur County to 10.6% in Deschutes County. Median household income ranged from $54,441 in Morrow County to $33,400 in Wheeler County. Comparing the potential suppression area to Oregon, the average percentage of persons below poverty in the 17 eastern Oregon counties is 15.8% versus 13.3% for the State of Oregon. The median household income for the State of Oregon is $53,270, but the average median household income in the 17 eastern Oregon counties is $42,655. The higher percentage of persons below poverty and the lower average median household income in the 17 eastern Oregon counties indicate that those areas may have a significantly higher proportion of low-income populations compared to the state as a whole.

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

The increased scientific knowledge about the environmental health risks and safety risks associated with hazardous substance exposures to children and recognition of these issues in Congress and Federal agencies 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 those risks. APHIS has developed agency guidance for its programs to follow to ensure the protection of children (USDA, APHIS, 1999).

IV. Environmental Consequences

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 and 2019 EIS. The specific impacts of the alternatives are highly dependent upon the particular action and location of infestation. The principal concerns associated with the alternatives are: (1) the potential effects of insecticides on human health (including subpopulations that might be at increased risk); and (2) impacts of insecticides on nontarget organisms (including threatened and endangered species).

APHIS has written human health and ecological risk assessments (HHERAs) to assess the insecticides and use patterns that are specific to the program. The risk assessments provide an in-depth technical analysis of the potential impacts of each insecticide to human health; and non-target fish and wildlife along with its environmental fate in soil, air, and water. The assessments rely on data required by the USEPA for pesticide product registrations, as well as peer-reviewed and other published literature. The HHERAs are heavily referenced in the EIS and this Draft EA. These Environmental Documents can be found at the following website: www.aphis.usda.gov/plant-health/grasshopper.

A. *Environmental Consequences of the Alternatives*

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

1. No Suppression Program Alternative

Under this alternative, APHIS would not conduct a program to suppress grasshoppers. If APHIS does not participate in any grasshopper suppression program, Federal land management agencies, State agriculture departments, local governments, private groups or individuals, may not effectively combat outbreaks in a coordinated effort. Without the technical assistance and coordination that APHIS provides during grasshopper outbreaks, the uncoordinated programs could use insecticides that APHIS considers too environmentally harsh. Multiple treatments and excessive amount of insecticide could be applied in efforts to suppress or even locally eradicate grasshopper populations. There are approximately 100 pesticide products registered by USEPA for use on rangelands and against grasshoppers (Purdue University, 2018). It is not possible to accurately predict the environmental consequences of the No Action alternative because the type and amount of insecticides that could be used in this scenario are unknown. However, the environmental impacts could be much greater than under the APHIS led suppression program alternative due to lack of treatment knowledge or coordination among the groups.

The potential environmental impacts from the No Action alternative, where other agencies and land managers do not control outbreaks, stem primarily from grasshoppers consuming vast amounts of vegetation in rangelands and surrounding areas. Grasshoppers are generalist feeders, eating grasses and forbs first and often moving to cultivated crops. High grasshopper density of one or several species and the resulting defoliation may reach an economic threshold where the damage caused by grasshoppers exceeds the cost of controlling the grasshoppers. Researchers determined that during typical grasshopper infestation years, approximately 20% of forage rangeland is removed, valued at a dollar adjusted amount of $900 million. This value represents 32-63% of the total value of rangeland across the western states (Rashford et al., 2012). Other market and non-market values such as carbon sequestration, general ecosystem services, and recreational use may also be impacted by pest outbreaks in rangeland.

Vegetation damage during serious grasshopper outbreaks may be so severe that all grasses and forbs are destroyed; thus, plant growth is impaired for several years. Rare plants may be consumed during critical times of development such as during seed production, and loss of important plant species, or seed production may lead to reduced biological diversity of the rangeland habitats, potentially creating opportunities for the expansion of invasive and exotic weeds (Lockwood and Latchininsky, 2000). When grasshoppers consume plant cover, soil is more susceptible to the drying effects of the sun, making plant roots less capable of holding soil in place. Soil damage results in erosion and disruption of nutrient cycling, water infiltration, seed germination, and other ecological processes which are important components of rangeland ecosystems (Latchininsky et al., 2011).

When the density of grasshoppers reaches economic infestation levels, grasshoppers begin to compete with livestock for food by reducing available forage (Wakeland and Shull, 1936; Belovsky, 2000; Pfadt, 2002; Branson et al., 2006; Bradshaw et al., 2018). Ranchers could offset some of the costs by leasing rangeland in another area and relocating their livestock, finding other means to feed their animals by purchasing hay or grain, or selling their livestock. Ranchers could also incur economic losses from personal attempts to control grasshopper damage to rangeland. Local communities could see adverse economic impacts to the entire area. Grasshoppers that infest rangeland could move to surrounding croplands. Farmers could incur economic losses from attempts to chemically control grasshopper populations or due to the loss of their crops. The general public could see an increase in the cost of meat, crops, and their byproducts.

2. Insecticide Applications at Conventional Rates or Reduced Agent Area Treatments with Adaptive Management Strategy

Under Alternative 2, APHIS would participate in grasshopper programs with the option of using one of the following insecticides depending upon the various factors related to the grasshopper outbreak and the site-specific characteristics. The use of an insecticide would typically occur at half the conventional application rates following the RAATs strategy. APHIS would apply a single treatment to affected rangeland areas to suppress grasshopper outbreak populations by a range of 35 to 98 percent, depending upon the insecticide used.

a) Carbaryl

Carbaryl is a member of the N-methyl carbamate class of insecticides, which affect the nervous system via cholinesterase inhibition. Inhibiting the enzyme acetylcholinesterase (AChE) causes nervous system signals to persist longer than normal. While these effects are desired in controlling insects, they can have undesirable impacts to non-target organisms that are exposed. The APHIS HHERAs assessed available laboratory studies regarding the toxicity of carbaryl on fish and wildlife. In summary, the document indicates the chemical is highly toxic to insects, including native bees, honeybees, and aquatic insects; slightly to highly toxic to fish; highly to very highly toxic to most aquatic crustaceans, moderately toxic to mammals, minimally toxic to birds; moderately to highly toxic to several terrestrial arthropod predators; and slightly to highly toxic to larval amphibians (USDA APHIS, 2018a). However, adherence to label requirements and additional program measures designed to prevent carbaryl from reaching sensitive habitats or mitigate exposure of non-target organisms will reduce environmental effects of treatments.

The offsite movement and deposition of carbaryl after treatments is unlikely because it does not significantly vaporize from the soil, water, or treated surfaces (Dobroski et al., 1985). Temperature, pH, light, oxygen, and the presence of microorganisms and organic material are factors that contribute to how quickly carbaryl will degrade in water. Hydrolysis, the breaking of a chemical bond with water, is the primary degradation pathway for carbaryl at pH 7 and above. In natural water, carbaryl is expected to degrade faster than in laboratory settings due to the presence of microorganisms. The half-lives of carbaryl in natural waters varied between 0.3 to 4.7 days (Stanley and Trial, 1980; Bonderenko et al., 2004). Degradation in the latter study was temperature dependent with shorter half-lives at higher temperatures. Aerobic aquatic metabolism of carbaryl reported half-life ranged of 4.9 to 8.3 days compared to anaerobic (without oxygen) aquatic metabolism range of 15.3 to 72 days (Thomson and Strachan, 1981; USEPA, 2003). Carbaryl is not persistent in soil due to multiple degradation pathways including hydrolysis, photolysis, and microbial metabolism. Little transport of carbaryl through runoff or leaching to groundwater is expected due to the low water solubility, moderate sorption, and rapid degradation in soils. There are no reports of carbaryl detection in groundwater, and less than 1% of granule carbaryl applied to a sloping plot was detected in runoff (Caro et al., 1974).

Acute and chronic risks to mammals are expected to be low to moderate based on the available toxicity data and conservative assumptions that were used to evaluate risk. There is the potential for impacts to small mammal populations that rely on terrestrial invertebrates for food. However, based on the toxicity data for terrestrial plants, minimal risks of indirect effects are expected to mammals that rely on plant material for food. Carbaryl has a reported half-life on vegetation of three to ten days, suggesting mammal exposure would be short-term. Direct risks to mammals from carbaryl bait applications is expected to be minimal based on oral, dermal, and inhalation studies (USDA APHIS, 2018a).

Numerous studies have reported no effects on bird populations in areas treated with carbaryl (Buckner et al., 1973; Richmond et al., 1979; McEwen et al., 1996). Some applications of formulated carbaryl were found to cause depressed AChE levels (Zinkl et al., 1977; Gramlich, 1979); however, the doses were twice those proposed for the full coverage application in the grasshopper program.

While sublethal effects have been noted in fish with depressed AChE, as well as some impacts to amphibians (i.e. days to metamorphosis) and aquatic invertebrates in the field due to carbaryl, the application rates and measured aquatic residues observed in these studies are well above values that would be expected from current program operations. Indirect risks to amphibian and fish species can occur through the loss of habitat or reduction in prey, yet data suggests that carbaryl risk to aquatic plants that may serve as habitat, or food, for fish and aquatic invertebrates is very low.

Product use restrictions appear on the USEPA-approved label and attempt to keep carbaryl out of waterways. Carbaryl must not be applied directly to water, or to areas where surface water is present (USEPA, 2012c). The USEPA-approved use rates and patterns and the additional mitigations imposed by the grasshopper program, such as using RAATs and application buffers, where applicable, further minimize aquatic exposure and risk.

Most rangeland plants require insect-mediated pollination. Native, solitary bee species are important pollinators on western rangeland (Tepedino, 1979). Potential negative effects of insecticides on pollinators are of concern because a decrease in their numbers has been associated with a decline in fruit and seed production of plants. Laboratory studies have indicated that bees are sensitive to carbaryl applications, but the studies were at rates above those proposed in the program. The reduced rates of carbaryl used in the program and the implementation of application buffers should significantly reduce exposure of carbaryl applications to pollinators. In areas of direct application where impacts may occur, alternating swaths and reduced rates (i.e., RAATs) would reduce risk. Potential negative effects of grasshopper program insecticides on bee populations may also be mitigated by the more common use of carbaryl baits than the ULV spray formulation. Studies with carbaryl bran bait have found no sublethal effects on adults or larvae bees (Peach et al., 1994, 1995).

Carbaryl can cause cholinesterase inhibition (i.e., overstimulate the nervous system) in humans resulting in nausea, headaches, dizziness, anxiety, and mental confusion, as well as convulsions, coma, and respiratory depression at high levels of exposure (NIH, 2009a; Beauvais, 2014). USEPA classifies carbaryl as "likely to be carcinogenic to humans" based on vascular tumors in mice (USEPA, 2007, 2015a, 2017a).

USEPA regulates the amount of pesticide residues that can remain in or on food or feed commodities as the result of a pesticide application. The agency does this by setting a tolerance, which is the maximum residue level of a pesticide, usually measured in parts per million (ppm), that can legally be present in food or feed. USEPA-registered carbaryl products used by the grasshopper program are labeled with rates and treatment intervals that are meant to protect livestock and keep chemical residues in cattle at acceptable levels (thereby protecting human health). While livestock and horses may graze on rangeland the same day that the land is sprayed, in order to keep tolerances to acceptable levels, carbaryl spray applications on rangeland are limited to half a pound active ingredient per acre per year (USEPA, 2012c). The grasshopper program would treat at or below use rates that appear on the label, as well as follow all appropriate label mitigations, which would ensure residues are below the tolerance levels.

Adverse human health effects from the proposed program of bait applications of the carbaryl 5% and 2% baits formulations to control grasshoppers are not expected based on low potential for human exposure to carbaryl and the favorable environmental fate and effects data. Technical grade (approximately 100% of the insecticide product is composed of the active ingredient) carbaryl exhibits moderate acute oral toxicity in rats, low acute dermal toxicity in rabbits, and very low acute inhalation toxicity in rats. Technical carbaryl is not a primary eye or skin irritant in rabbits and is not a dermal sensitization in guinea pig (USEPA, 2007). This data can be extrapolated and applied to humans revealing low health risks associated with carbaryl.

The proposed use of carbaryl in a bait formulation, use of RAATs, and adherence to label requirements, substantially reduces the potential for exposure to humans. Program workers are the most likely human population to be exposed. APHIS does not expect adverse health risks to workers based on low potential for exposure to carbaryl when applied according to label directions and use of personal protective equipment (PPE) (e.g., long-sleeved shirt and long pants, shoes plus socks, chemical-resistant gloves, and chemical-resistant apron) (USEPA, 2012c) during loading and applications. APHIS quantified the potential health risks associated with accidental worker exposure to carbaryl during mixing, loading, and applications. The quantitative risk evaluation results, finding no concerns for adverse health risk for program workers, are available at: http://www.aphis.usda.gov/plant-health/grasshopper.

Adherence to label requirements and additional program measures designed to reduce exposure to workers and the public (e.g., mitigations to protect water sources, mitigations to limit spray drift, and restricted-entry intervals) result in low health risk to all human population segments.

b) Diflubenzuron

Diflubenzuron is a restricted use pesticide (only certified applicators or persons under their direct supervision may make applications) registered with USEPA as an insect growth regulator. It specifically interferes with chitin synthesis, the formation of the insect's exoskeleton. Larvae of affected insects are unable to molt properly. While this effect is desirable in controlling certain insects, it can have undesirable impacts to non-target organisms that are exposed.

USEPA considers diflubenzuron relatively non-persistent and immobile under normal use conditions and stable to hydrolysis and photolysis. The chemical is considered unlikely to contaminate ground water or surface water (USEPA, 1997). The vapor pressure of diflubenzuron is relatively low, as is the Henry's Law Constant value, suggesting the chemical will not volatilize readily into the atmosphere from soil, plants or water. Therefore, exposure from volatilization is expected to be minimal. Due to its low solubility (0.2 mg/L) and preferential binding to organic matter, diflubenzuron seldom persists more than a few days in water (Schaefer and Dupras, 1977; Schaefer et al., 1980). Mobility and leachability of diflubenzuron in soils is low, and residues are usually not detectable after seven days (Eisler, 2000). Aerobic aquatic half-life data in water and sediment was reported as 26.0 days (USEPA, 1997). Diflubenzuron applied to foliage remains adsorbed to leaf surfaces for several weeks with little or no absorption or translocation from plant surfaces (Eisler, 1992, 2000). Field dissipation studies in California citrus and Oregon apple orchards reported half-live values of 68.2 to 78 days (USEPA, 2018). Diflubenzuron persistence varies depending on site conditions and rangeland persistence is unfortunately not available. Diflubenzuron degradation is microbially mediated with soil aerobic half-lives much less than dissipation half-lives. Diflubenzuron treatments are expected to have minimal effects on terrestrial plants. Both laboratory and field studies demonstrate no effects using diflubenzuron over a range of application rates, and the direct risk to terrestrial plants is expected to be minimal (USDA APHIS, 2018c).

Dimilin® 2L is labeled with rates and treatment intervals that are meant to protect livestock and keep residues in cattle at acceptable levels (thereby, protecting human health). Tolerances are set for the amount of diflubenzuron that is allowed in cattle fat (0.05 ppm) and meat (0.05 ppm) (40 CFR Parts 180.377). The grasshopper program would treat at application rates indicated on product labels or lower, which should ensure approved residues levels.

APHIS' literature review found that on an acute basis, diflubenzuron is considered toxic to some aquatic invertebrates and practically non-toxic to adult honeybees. However, diflubenzuron is toxic to larval honeybees (USEPA, 2018). It is slightly nontoxic to practically nontoxic to fish and birds and has very slight acute oral toxicity to mammals, with the most sensitive endpoint from exposure being the occurrence of methemoglobinemia (a condition that impairs the ability of the blood to carry oxygen). Minimal direct risk to amphibians and reptiles is expected, although there is some uncertainty due to lack of information (USDA APHIS, 2018c; USEPA, 2018).

Risk is low for most non-target species based on laboratory toxicity data, USEPA approved use rates and patterns, and additional mitigations such as the use of lower rates and RAATs that further reduces risk. Risk is greatest for sensitive terrestrial and aquatic invertebrates that may be exposed to diflubenzuron residues.

In a review of mammalian field studies, Dimilin® applications at a rate of 60 to 280 g a.i./ha had no effects on the abundance and reproduction in voles, field mice, and shrews (USDA FS, 2004). These rates are approximately three to 16 times greater than the highest application rate proposed in the program. Potential indirect impacts from application of diflubenzuron on small mammals includes loss of habitat or food items. Mice on treated plots consumed fewer lepidopteran (order of insects that includes butterflies and moths) larvae compared to controls; however, the total amount of food consumed did not differ between treated and untreated plots. Body measurements, weight, and fat content in mice collected from treated and non-treated areas did not differ.

Poisoning of insectivorous birds by diflubenzuron after spraying in orchards at labeled rates is unlikely due to low toxicity (Muzzarelli, 1986). The primary concern for bird species is related to an indirect effect on insectivorous species from a decrease in insect prey. At the proposed application rates, grasshoppers have the highest risk of being impacted while other taxa have a much reduced risk because the lack of effects seen in multiple field studies on other taxa of invertebrates at use rates much higher than those proposed for the program. Shifting diets in insectivorous birds in response to prey densities is not uncommon in undisturbed areas (Rosenberg et al., 1982; Cooper et al., 1990; Sample et al., 1993).

Indirect risk to fish species can be defined as a loss of habitat or prey base that provides food and shelter for fish populations, however these impacts are not expected based on the available fish and invertebrate toxicity data (USDA APHIS, 2018c). A review of several aquatic field studies demonstrated that when effects were observed it was at diflubenzuron levels not expected from program activities (Fischer and Hall, 1992; USEPA, 1997; Eisler, 2000; USDA FS, 2004).

Diflubenzuron applications have the potential to affect chitin production in various other beneficial terrestrial invertebrates. Multiple field studies in a variety of application settings, including grasshopper control, have been conducted regarding the impacts of diflubenzuron to terrestrial invertebrates. Based on the available data, sensitivity of terrestrial invertebrates to diflubenzuron is highly variable depending on which group of insects and which life stages are being exposed. Immature grasshoppers, beetle larvae, lepidopteran larvae, and chewing herbivorous insects appear to be more susceptible to diflubenzuron than other invertebrates. Within this group, however, grasshoppers appear to be more sensitive to the proposed use rates for the program. Honeybees, parasitic wasps, predatory insects, and sucking insects show greater tolerance to diflubenzuron exposure (Murphy et al., 1994; Eisler, 2000; USDA FS, 2004).

Diflubenzuron is moderately toxic to spiders and mites (USDA APHIS, 2018c). Deakle and Bradley (1982) measured the effects of four diflubenzuron applications on predators of *Heliothis* spp. at a rate of 0.06 lb a.i./ac and found no effects on several predator groups. This supported earlier studies by Keever et al. (1977) that demonstrated no effects on the arthropod predator community after multiple applications of diflubenzuron in cotton fields. Grasshopper integrated pest management (IPM) field studies have shown diflubenzuron to have a minimal impact on ants, spiders, predatory beetles, and scavenger beetles. There was no significant reduction in populations of these species from seven to 76 days after treatment. Although ant populations exhibited declines of up to 50 percent, these reductions were temporary, and population recovery was described as immediate (Catangui et al., 1996).

Due to its mode of action, diflubenzuron has greater activity on immature stages of terrestrial invertebrates. Based on standardized laboratory testing diflubenzuron is considered practically non-toxic to adult honeybees. The contact LD50 value for the honeybee, *Apis mellifera*, is reported at greater than 114.8 µg a.i./bee while the oral LD50 value was reported at greater than 30 µg a.i./bee. USEPA (2018) reports diflubenzuron toxicity values to adult honeybees are typically greater than the highest test concentration using the end-use product or technical active ingredient. The lack of toxicity to honeybees, as well as other bees, in laboratory studies has been confirmed in additional studies (Nation et al., 1986; Chandel and Gupta, 1992; Mommaerts et al., 2006). Mommaerts et al. (2006) and Thompson et al. (2005) documented sublethal effects on reproduction-related endpoints for the bumble bee, *Bombus terrestris* and *A. mellifera*, respectively, testing a formulation of diflubenzuron. However, these effects were observed at much higher use rates relative to those used in the program.

Insecticide applications to rangelands have the potential to impact pollinators, and in turn, vegetation and various rangeland species that depend on pollinated vegetation. Based on the review of laboratory and field toxicity data for terrestrial invertebrates, applications of diflubenzuron are expected to have minimal risk to pollinators of terrestrial plants. The use of RAATs provide additional benefits by using reduced rates and creating untreated swaths within the spray block that will further reduce the potential risk to pollinators.

APHIS reduces the risk to native bees and pollinators through monitoring grasshopper populations and making pesticide applications in a manner that reduces the risk to this group of nontarget invertebrates. Monitoring grasshopper populations allows APHIS to determine if populations require treatment and to make treatments in a timely manner reducing pesticide use and emphasizing the use of Program insecticides that are not broad spectrum. Historical use of Program insecticides demonstrate that diflubenzuron is the preferred insecticide for use. Over 90% of the acreage treated by the Program has been with diflubenzuron. Diflubenzuron poses a reduced risk to native bees and pollinators compared to liquid carbaryl and malathion applications.

Adverse human health effects from ground or aerial ULV applications of diflubenzuron to control grasshoppers are not expected based on the low acute toxicity of diflubenzuron and low potential for human exposure. The adverse health effects of diflubenzuron to mammals and humans involves damage to hemoglobin in blood and the transport of oxygen. Diflubenzuron causes the formation of methemoglobin. Methemoglobin is a form of hemoglobin that is not able to transport oxygen (USDA FS, 2004). USEPA classifies diflubenzuron as non-carcinogenic to humans (USEPA, 2015b).

Program workers adverse health risks are not likely when diflubenzuron is applied according to label directions that reduce or eliminate exposures. Adverse health risk to the general public in treatment areas is not expected due to the low potential for exposure resulting from low population density in the treatment areas, adherence to label requirements, program measures designed to reduce exposure to the public, and low toxicity to mammals.

c) Reduced Area Agent Treatments (RAATs)

The use of RAATS is the most common application method for all program insecticides and would continue to be so, accept in rare pest conditions that warrant full coverage and higher rates. The goal of the RAATs strategy is to suppress grasshopper populations to a desired level, rather than to reduce those populations to the greatest possible extent. This strategy has both economic and environmental benefits. APHIS would apply a single application of insecticide per year, typically using a RAATs strategy that decreases the rate of insecticide applied by either using lower insecticide spray concentrations, or by alternating one or more treatment swaths. Usually RAATs applications use both lower concentrations and skip treatment swaths. The RAATs strategy suppresses grasshoppers within treated swaths, while conserving grasshopper predators and parasites in swaths that are not treated.

The concept of reducing the treatment area of insecticides while also applying less insecticide per treated acre was developed in 1995, with the first field tests of RAATs in Wyoming (Lockwood and Schell, 1997). Applications can be made either aerially or with ground-based equipment (Deneke and Keyser, 2011). Studies using the RAATs strategy have shown good control (up to 85% of that achieved with a total area insecticide application) at a significantly lower cost and less insecticide, and with a markedly higher abundance of non-target organisms following application (Lockwood et al., 2000; Deneke and Keyser, 2011). Levels of control may also depend on variables such as body size of targeted grasshoppers, growth rate of forage, and the amount of coverage obtained by the spray applications (Deneke and Keyser, 2011). Control rates may also be augmented by the necrophilic and necrophagic behavior of grasshoppers, in which grasshoppers are attracted to volatile fatty acids emanating from cadavers of dead grasshoppers and move into treated swaths to cannibalize cadavers (Lockwood et al., 2002; Smith and Lockwood, 2003). Under optimal conditions, RAATs decrease control costs, as well as host plant losses and environmental effects (Lockwood et al., 2000; Lockwood et al., 2002).

The efficacy of a RAATs strategy in reducing grasshoppers is, therefore, less than conventional treatments and more variable. Foster et al. (2000) reported that grasshopper mortality using RAATs was reduced 2 to 15% from conventional treatments, depending on the insecticide, while Lockwood et al. (2000) reported 0 to 26% difference in mortality between conventional and RAATs methods. APHIS will consider the effects of not suppressing grasshoppers to the greatest extent possible as part of the treatment planning process.

RAATs reduces treatment costs and conserves non-target biological resources in untreated areas. The potential economic advantages of RAATs was proposed by Larsen and Foster (1996), and empirically demonstrated by Lockwood and Schell (1997). Widespread efforts to communicate the advantages of RAATs across the Western States were undertaken in 1998 and have continued on an annual basis. The viability of RAATs at an operational scale was initially demonstrated by Lockwood et al. (2000), and subsequently confirmed by Foster et al. (2000). The first government agencies to adopt RAATs in their grasshopper suppression programs were the Platte and Goshen County Weed and Pest Districts in Wyoming; they also funded research at the University of Wyoming to support the initial studies in 1995. This method is now commonly used by government agencies and private landowners in States where grasshopper control is required.

Reduced rates should prove beneficial for the environment. All APHIS grasshopper treatments using carbaryl, diflubenzuron, or malathion are conducted in adherence with USEPA-approved label directions. Labeled application rates for grasshopper control tend to be lower than rates used against other pests. In addition, use rates proposed for grasshopper control by APHIS are lower than rates used by private landowners.

d) Experimental *Metarhizium robertsii* Applications

Metarhizium is a common entomopathogenic fungus genus containing several species, all of which are host-restricted to the Arthropoda, with some having greater host specificity to an insect family, or even a group of related genera. Once considered a single species based on morphology but split into a number of species based on DNA sequence data, the genus is found worldwide and is commonly used as a management alternative to chemicals (USDA, 2000; Lomer et al., 2001; Zimmerman, 2007; Roberts, 2018; Zhang et al. 2019). Two *Metarhizium*, *M. brunneum* strain F52 and *M. anisopliae* ESF1, are registered with the USEPA as insecticides and are commercially used against a range of pest insects.

No harm is expected to humans from exposure to *Metarhizium* by ingesting, inhaling, or touching products containing this active ingredient. No toxicity or adverse effects were seen when the active ingredient was tested in laboratory animals. *M. anisopliae* has undergone extensive toxicology testing for its registration in Africa and the registration of Green Guard in Australia. There has been no demonstrated adverse effect on humans from these products. There is a potential for an allergic reaction to dry conidia if a person is extensively exposed to the product and has a preexisting allergy to fungal spores. *Metarhizium* use in this program is not expected to cause adverse impacts to soil, water, or air. No adverse impacts from the use of *Metarhizium* biopesticides have been observed in almost 20 years of field trials in other countries.

From 2005 to 2017, a massive project (led by Donald W. Roberts, Utah State University, in collaboration with USDA and others, and funded by APHIS-PPQ-S&T) was undertaken to collect 38,052 soil samples from across the 17 western states, from areas that were historically known to have large populations of grasshoppers and/or Mormon crickets. The purpose of these collections was to locate a domestic alternative to the nonindigenous *M. acridum*, used around the world for management of grasshopper (usually locust) populations, particularly in Australia and sub-Sahelian Africa, but also in Mexico and Brazil. The use of such a pathogen would be highly useful to the Program as a biopesticide. Approximately 2,400 new isolates of *Metarhizium* spp., *Beauveria* spp. and other entomopathogenic fungi were found. Many of these fungi isolates were selected for lab and field trials with grasshoppers and Mormon crickets, the most promising being strain DWR2009 belonging to the species *M. robertsii* (Bischoff et al., 2009). The DWR2009 isolate is still undergoing lab and field testing for efficacy against orthopterans. This species is closely related to *M. anisopliae*, which is commonly found worldwide and discernible only on the basis of diagnostic DNA sequences (Roberts, 2018).

There is the potential for prolonged persistence in the environment of a domestic isolate from one area brought to another. Despite this possibility, potential environmental impact is minimal given the widespread and common nature of *Metarhizium* in the western United States and because the DWR2009 isolate have been chosen for their optimized effects on orthopterans (Roberts, 2018). Although entomopathogenic fungi can reduce grasshopper populations, a substantial portion of the treated population are able to resist the infection through thermoregulation. Molecular systematics analyses (by the Roberts Lab; Bischoff et al., 2009; Kepler et al., 2014; Mayerhofer et al., 2019) revealed DWR2009 is very closely related to many other strains within *M. robertsii*, all of which are basically biologically equivalent to each other. In fact, *Metarhizium robertsii* can only be really differentiated from other species by a multiplexed PCR assay based on two gene sequences. Furthermore, it is likely that persistence effects would mirror those found to be the case for *M. anisopliae* and *M. acridum*. Both of these species need optimal temperature ranges to thrive, as well as relatively humid conditions (Zimmerman, 2007; EA, 2010). In particular, *M. acridum* does not persist in semi-arid and arid environments, which is what rangeland habitats are, where U.S. grasshopper outbreaks occur (EA, 2010). If the DWR2009 strain derived biopesticide is spread outside of the experimental plots exceptional rates of fungal infection are not anticipated. Since *M. anisopliae* is a generalist entomopathogen, lethal effects on non-target arthropods have been reported, but are more commonly observed in laboratory experiments than in the field. Plus, such effects are dependent on how the pathogen is applied; i.e., its intended target and application method play roles in non-target effects (Zimmerman, 2007). During experiments, the Rangeland Unit will spray ultra-low volumes (on 10 acres or less) of DWR2009 on grasshopper and Mormon cricket species from aircraft, or through the FAASSTT system. The Rangeland Unit may also coat small amounts of grasshopper bait with the DWR2009.

For the following four reasons, overall environmental impact by experimental studies utilizing *Metarhizium robertsii* applications should not be significant: 1) various strains of the pathogen are already common in rangeland habitats; 2) “behavioral fever” enables species to often “burn out” the infection by basking, allowing infected grasshoppers and Mormon crickets to escape death by mycosis; 3) fungal pathogens are fairly susceptible to heat and ultraviolet light, greatly reducing the environmental persistence of spores to a few days on treated foliage or ground; and 4) at least three days of 98-100% relative humidity is required for fungal outgrowth and sporulation (reproduction) from infected cadavers (Lomer et al., 2001; Zimmerman, 2007; EA, 2010; Roberts, 2018).

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e) Experimental LinOilEx Applications

LinOilEx (Formulation 103) is a non-traditional pesticide alternative still in the early stages of development. Its mode of action appears to be topical, often inducing a “freezing” effect in treated specimens whereby they appear to have been mid-movement when they die. Previous studies by its creator using locusts and katydids showed promise in its efficacy (Abdelatti and Hartbauer, 2019), so the Rangeland Unit decided to test it. Initial Mormon cricket microplot field studies and grasshopper lab studies are intriguing and warrant further field investigations via microplot cage experiments. The formulation is proprietary, but includes linseed oil, lecithin, wintergreen oil, and caraway oil mixed into a bicarbonate emulsion.

Target effects on locust and katydids in initial studies were high while non-target results were mixed, with one tested beetle species, as well as wheat seedlings, experiencing almost no impact. Another tested beetle species did experience relatively high mortality, but well-below target levels (Abdelatti and Hartbauer, 2019). The mode of action appears to be topical, meaning that direct contact with the formulation is needed to induce mortality. The Rangeland Unit's initial studies demonstrated that indirect contact, by spraying vegetation, did not induce mortality. Together, these data suggest that overall environmental impact by experimental studies utilizing LinOilEx applications is expected to be relatively minimal.

Reference

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B. Other Environmental Considerations

1. Cumulative Impacts

Cumulative impact, as defined in the Council on Environmental Quality (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."

Potential cumulative impacts associated with the No Action alternative where APHIS would not take part in any grasshopper suppression program include the continued increase in grasshopper populations and potential expansion of populations into neighboring range and cropland. In addition, State and private land managers could apply insecticides to manage grasshopper populations however, land managers may opt not to use RAATs, which would increase insecticides applied to the rangeland. Increased insecticide applications from the lack of coordination or foregoing RAATs methods could increase the exposure risk to non-target species. In addition, land managers may not employ the extra program measures designed to reduce exposure to the public and the environment to insecticides.

Potential cumulative impacts associated with the Preferred Alternative are not expected to be significant because the program applies an insecticide application once during a treatment. The program may treat an area with different insecticides but does not overlap the treatments. The program does not mix or combine insecticides. Based on historical outbreaks in the United States, the probability of an outbreak occurring in the same area where treatment occurred in the previous year is unlikely; however, given time, populations eventually will reach economically damaging thresholds and require treatment. The insecticide application reduces the insect population down to levels that cause an acceptable level of economic damage. The duration of treatment activity, which is relatively short since it is a one-time application, and the lack of repeated treatments in the same area in the same year reduce the possibility of significant cumulative impacts.

Potential cumulative impacts resulting from the use of insecticides include insect pest resistance, synergistic chemical effects, chemical persistence and bioaccumulation in the environment. The program use of reduced insecticide application rates (i.e. ULV and RAATs) are expected to mitigate the development of insect resistance to the insecticides. Grasshopper outbreaks in the United States occur cyclically so applications do not occur to the same population over time further eliminating the selection pressure increasing the chances of insecticide resistance.

The insecticides proposed for use in the program have a variety of agricultural and non-agricultural uses. There may be an increased use of these insecticides in an area under suppression when private, State, or Federal entities make applications to control other pests. However, the vast majority of the land where program treatments occur is uncultivated rangeland and additional treatments by landowners or managers are very uncommon making possible cumulative or synergistic chemical effects extremely unlikely.

The insecticides proposed for use in the grasshopper program are not anticipated to persist in the environment or bioaccumulate. Therefore, a grasshopper outbreak that occurs in an area previously treated for grasshoppers is unlikely to cause an accumulation of insecticides from previous program treatments.

The proposed experimental treatments are short-term and would take place in a very limited area. The purpose of the field tests conducted by the Rangeland Unit will help determine whether APHIS would eventually include the following as options for the Program: 1) the use of UAS to aerially apply Program insecticides, 2) the use of the biopesticide *Metarhizium robertsii* (isolate DWR2009), and 3) the use of the non-traditional insecticide LinOilEx. The data generated by these studies would likely be used as part of the EPA registration process for this biopesticide. Inclusion of effective and environmentally friendly insecticides would provide the Program additional control options for grasshoppers and Mormon crickets in sensitive habitats. If successful, the use of *M. robertsii* could decrease the amount of chemical insecticides used in rangeland against grasshoppers and Mormon crickets.

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

Federal agencies identify and address the disproportionately high and adverse human health or environmental effects of their proposed activities, as described in E.O. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

APHIS will consider the potential for disproportionately high and adverse human health or environmental impacts of its actions on minority and low-income communities in a specific program areas. APHIS has evaluated the proposed grasshopper program at the general level of the 17 listed Oregon counties, and has determined that there is no disproportionately high and adverse human health or environmental effects on minority populations or low-income populations evident at this broad geographic level of general planning.

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

Federal agencies consider a proposed action's potential effects on children to comply with E.O. 13045, "Protection of Children from Environmental Health Risks and Safety Risks." This E.O. requires each Federal agency, consistent with its mission, to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure 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).

APHIS' HHERAs evaluated the potential exposure to each insecticide used in the program and risks associated with these insecticides to residents, including children. The HHERAs for the proposed program insecticides, located at http://www.aphis.usda.gov/plant-health/grasshopper, suggest that no disproportionate risks to children, as part of the general public, are anticipated.

Impacts on children will be minimized by the implementation of the treatment guidelines:

Aerial Broadcast Applications (Liquid Chemical Methods)

1) Notify all residents within treatment areas, or their designated representatives, prior to proposed operations. Advise them of the control method to be used, the proposed method of application, and precautions to be taken (e.g., advise parents to keep children and pets indoors during ULV treatment). Refer to label recommendations related to restricted entry period.
2) No treatments will occur over congested urban areas. For all flights over congested areas, the contractor must submit a plan to the appropriate Federal Aviation Administration District Office and this office must approve of the plan; a letter of authorization signed by city or town authorities must accompany each plan. Whenever possible, the program plans aerial ferrying and turnaround routes to avoid flights over congested areas, bodies of water, and other sensitive areas that are not to be treated.

Aerial Application of Baits (Dry Chemical Methods)

Do not apply within 500 feet of any school or recreational facility.

4. Tribal Consultation

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," calls for agency communication and collaboration with tribal officials when proposed Federal actions have potential tribal implications. The Archaeological Resources

Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and tribal lands.

Prior to the treatment season, program personnel notify Tribal land managers of the potential for grasshopper outbreaks on their lands. Consultation with local Tribal representatives takes place prior to treatment programs to inform fully the Tribes of possible actions APHIS may take on Tribal lands. Treatments typically do not occur at cultural sites, and drift from a program treatment at such locations is not expected to adversely affect natural surfaces, such as rock formations and carvings. APHIS would also confer with the appropriate Tribal authority to ensure that the timing and location of a planned program treatment does not coincide or conflict with cultural events or observances on Tribal lands.

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

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703–712) established a Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird.

APHIS will support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or reducing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions. Impacts are minimized as a result of buffers to water, habitat, nesting areas, riparian areas, and the use of RAATs. For any given treatment, only a portion of the environment will be treated, therefore minimizing potential impacts to migratory bird populations.

6. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) and its implementing regulations require Federal agencies to ensure their actions are not likely to jeopardize the continued existence of listed threatened or endangered species or result in the destruction or adverse modification of critical habitat. Numerous federally listed species and areas of designated critical habitat occur within the 17-State program area, although not all occur within or near potential grasshopper suppression areas or within the area under consideration by through this EA.

APHIS considers whether listed species, species proposed for listing, experimental populations, or critical habitat are present in the proposed suppression area. Before treatments are conducted, APHIS contacts the U.S Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) (where applicable) to determine if listed species are present in the suppression area, and whether mitigations or protection measures must be implemented to protect listed species or critical habitat.

APHIS completed a programmatic Section 7 consultation with NMFS for use of carbaryl, and diflubenzuron to suppress grasshoppers in the 17-state program area because of the listed salmonid (*Oncorhynchus* spp.) and critical habitat. To minimize the possibility of insecticides from reaching salmonid habitat, APHIS implements the following protection measures:

- RAATs are used in all areas adjacent to salmonid habitat
- Insecticides are not aerially applied in a a 1,500 foot buffer zones for diflubenzuron along stream corridors
- Insecticides will not be applied when wind speeds exceed 10 miles per hour. APHIS will attempt to avoid insecticide application if the wind is blowing towards salmonid habitat
- Insecticide applications are avoided when precipitation is likely or during temperature inversions

APHIS determined that with the implementation of these measures, the grasshopper suppression program may affect, but is not likely to adversely affect listed salmonids or designated critical habitat in the program area. NMFS concurred with this determination in a letter dated April 12, 2010.

APHIS submitted a programmatic biological assessment for grasshopper suppression in the 17-state program area and requested consultation with USFWS on March 9, 2015. With the incorporation and use of application buffers and other operational procedures APHIS anticipates that any impacts associated with the use and fate of program insecticides will be insignificant and discountable to listed species and their habitats. Based on an assessment of the potential exposure, response, and subsequent risk characterization of program operations, APHIS concludes the proposed action is not likely to adversely affect listed species or critical habitat in the program area. APHIS has requested concurrence from the USFWS on these determinations. Until this programmatic Section 7 consultation with USFWS is completed, APHIS will conduct consultations with USFWS field offices at the local level.

APHIS considers the role of pollinators in any consultations conducted with the FWS to protect federally-listed plants. Mitigation measures, such as no treatment buffers are applied with consideration of the protection of pollinators that are important to a listed plant species.

7. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. During the breeding season, bald eagles are sensitive to a variety of human activities. Grasshopper management activities could cause disturbance of nesting eagles, depending on the duration, noise levels, extent of the area affected by the activity, prior experiences that eagles have with humans, and tolerance of the individual nesting pair. Also, disruptive activities in or near eagle foraging areas can interfere with bald eagle feeding, reducing chances of survival. USFWS has provided recommendations for avoiding disturbance at foraging areas and communal roost sites that are applicable to grasshopper management programs (USFWS, 2007).

No toxic effects are anticipated on eagles as a direct consequence of insecticide treatments. Toxic effects on the principle food source, fish, are not expected because insecticide treatments will not be conducted over rivers or lakes. Buffers protective of aquatic biota are applied to their habitats to ensure that there are no indirect effects from loss of prey.

8. Additional Species of Concern

There may be species that are of special concern to land management agencies, the public, or other groups and individuals in proposed treatment areas. For example, the sage grouse populations have declined throughout most of their entire range, with habitat loss being a major factor in their decline.

Grasshopper suppression programs reduce grasshoppers and at least some other insects in the treatment area that can be a food item for sage grouse chicks. As indicated in previous sections on impacts to birds, there is low potential that the program insecticides would be toxic to sage grouse, either by direct exposure to the insecticides or indirectly through immature sage grouse eating moribund grasshoppers.

Because grasshopper numbers are so high in an outbreak year, treatments would not likely reduce the number of grasshoppers below levels present in a normal year. Should grasshoppers be unavailable in small, localized areas, sage grouse chicks may consume other insects, which sage grouse chicks likely do in years when grasshopper numbers are naturally low. By suppressing grasshoppers, rangeland vegetation is available for use by other species, including sage grouse, and rangeland areas are less susceptible to invasive plants that may be undesirable for sage grouse habitat.

Protection of Greater Safe-Grouse

In March 2010, the USFWS determined that protection of the greater sage-grouse under the Endangered Species Act was warranted. However, listing the greater sage-grouse was precluded by the need to address other species' listings facing greater risk of extinction (USFWS 2010). Then on October 2, 2015, they announced a 12-month finding on petitions to list the greater sage-grouse both range-wide and the Columbia Basin population, as an endangered or threatened species (USFWS 2016). After review of the best available scientific and commercial information, they found that the Columbia Basin population does not qualify as a distinct population segment. In addition, they found listing the greater sage-grouse was not warranted for protection under the Act at the time.

Greater sage-grouse in Oregon are found in Union, Baker, Deschutes, Crook, Lake, Harney and Malheur counties. Sage-grouse have not been observed in Klamath County since 1993 (USFWS 2010). In 2015, the Oregon Department of Fish and Wildlife finalized the "The Oregon Sage-Grouse Action Plan" to help manage sage-grouse populations in Oregon. This plan was an update to previous versions from 2005 and 2011 (Hagen 2005, ODFW 2011, Sage-Grouse Conservation Partnership 2015). The strategy relies upon Core Areas of habitat that are essential to sage-grouse conservation. The maps and data provide a tool for planning and identifying appropriate avoidance areas and mitigation in the event of human development in sage-grouse habitats. The Core Area maps, available on ODFW's website, define areas that should be targeted for conservation actions or avoided when large scale disturbances are proposed. Core Area maps also provide a broad-scale filter to assist planners, County, State and Federal agencies in identifying areas of likely high and low resource conflicts associated with development proposals. APHIS will ensure that all suppression activities conducted in Oregon are consistent with the measures identified within the 2015 plan, specifically those found in Section IV and Appendix 4 (Sage-Grouse Conservation Partnership 2015).

The BLM developed protective measures for greater sage-grouse to be implemented on BLM-administered lands. The APHIS will follow recommendations in the "Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment" (BLM 2015). The Amendment requires implementation of a 1.2-mile spatial buffer from leks; hourly restrictions from two hours before sunset to two hours after sunrise to avoid disturbance to sage-grouse occupied leks; restrictions on use of non-specific insecticides in brood-rearing habitat during brood-rearing period; and 0.25 mile spatial buffer for noise and related disruptive activities when conducting management activities. Information found in the BLM Instruction Memorandum No. 2012-043, dated December 22, 2011, will also be adhered to for all spray activity on BLM administered lands (BLM 2011).

Insect reduction as a result of rangeland grasshopper control has been found to reduce brood sizes in a wild sage-grouse population (Johnson 1987). In order to reduce the reliance on insecticides for control of rangeland grasshoppers, Johnson (1987) recommends the use of "Integrated Pest Management" (IPM) for control of rangeland grasshoppers. IPM uses naturally occurring pest controls such as weather, disease, predators, parasites, physical and chemical control, as well as habitat modification to keep grasshoppers from surpassing intolerable levels (Johnson 1987). In addition, sage-grouse brood areas should be located if not already known, and protected from insecticide spraying (Johnson 1987). Grasshopper con IPM will be recommended to land managers requesting assistance, including the ARS handbook and associated website on this subject.

Columbia spotted frog Great Basin DPS

The Columbia spotted frog Great Basin DPS (Great Basin DPS) is known to occur in Lake, Harney, Malheur, and Grant counties, Oregon. In addition to the counties in Oregon, the Great Basin DPS is also known to occur in portions of Idaho and Nevada. The Great Basin DPS is widely distributed throughout southeastern Oregon, and local populations are isolated from each other by natural or human-induced habitat barriers. Threats to the Great Basin DPS include poor management of habitat including water development, improper grazing, mining activities, and nonnative species.

The Service recommends APHIS avoid pesticide spraying of habitat for the Great Basin DPS and buffer the area surrounding Columbia spotted frog habitat similar to measures taken for Oregon spotted frog covered under this consultation in order to reduce risk of exposure of the Great Basin DPS to pesticide chemicals. We recommend that APHIS provide information to the Service regarding how they will avoid areas occupied by the Great Basin DPS prior to commencing with spray projects. The Service is available to assist APHIS to minimize and avoid impacts to the Great Basin DPS.

9. Fires and Human Health Hazards

Various compounds are released in smoke during wildland fires, including carbon monoxide (CO), carbon dioxide, nitrous oxides, sulfur dioxide, hydrogen chloride, aerosols, polynuclear aromatic hydrocarbons contained within fine particulate matter (a byproduct of the combustion of organic matter such as wood), aldehydes, and most notably formaldehyde produced from the incomplete combustion of burning biomass (Reisen and Brown, 2009; Burling et al., 2010; Broyles, 2013). Particulate matter, CO, benzene, acrolein, and formaldehyde have been identified as compounds of particular concern in wildland fire smoke (Reinhardt and Ottmar, 2004).

Many of the naturally occurring products associated with combustion from wildfires may also be present as a result of combustion of program insecticides that are applied to rangeland. These combustion byproducts will be at lower quantities due to the short half-lives of most of the program insecticides and their low use rates. Other minor combustion products specific to each insecticide may also be present as a result of combustion from a rangeland fire but these are typically less toxic based on available human health data, available at: www.aphis.usda.gov/plant-health/grasshopper.

The safety data sheet for each insecticide identifies these combustion products for each insecticide as well as recommendations for PPE. The PPE is similar to what typically is used in fighting wildfires. Material applied in the field will be at a much lower concentration than what would occur in a fire involving a concentrated formulation. Therefore, the PPE worn by rangeland firefighters would also be protective of any additional exposure resulting from the burning of residual insecticides.

10. Cultural and Historical Resources

Federal actions must seek to avoid, minimize, and mitigate potential negative impacts to cultural and historic resources as part of compliance with the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act of 1979, and NEPA. Section 106 of the NHPA requires Federal agencies to provide the Advisory Council on Historic Preservation with an opportunity to comment on their findings.

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.

There are five federally recognized Indian tribes in this area. According to the 2016 Oregon Blue Book (http://bluebook.state.or.us), the Confederated Tribes of Warm Springs had a Tribal Member population of 4,800 and a 644,000 acre reservation near Madras, OR. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have 2893 enrolled members and a 172,000 acre reservation near Pendleton, OR. The Burns Paiute Tribe has 349 members, a 13,736 acre reservation near Burns, OR. The Fort McDermitt Paiute-Shoshone Tribe's reservation straddles the Oregon-Nevada border, 18,829 acres are in Oregon.

The Klamath Tribes exercise court affirmed treaty rights within the 1954 former Klamath Reservation Boundary, approximately 1.8 million acres in the northern half of the county. This area includes the Klamath Marsh National Wildlife Refuge and large portions of the Freemont-Winema Forests. In addition to treaty resources in this area, cultural resources and tribal traditional use areas extend beyond the 1954 Reservation Boundary to the aboriginal homelands of the Klamath Tribes.

The 1855 Treaty that created the Warm Springs and Umatilla Reservations reserved specific rights in the Treaty, which include the right to hunt and gather traditional foods and medicines on open and unclaimed lands. These rights are generally referred to as "Treaty reserved rights" and extend to approximately 16.4 million acres of ceded land in Washington and Oregon. Other Native Americans may practice traditional food and medicine gathering in the proposed suppression area.

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VI. Listing of Agencies and Persons Consulted

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Blom, Paul, Entomologist, Oregon Department of Agriculture, 10507 N. McAllister, LaGrande, OR 97850

Appendix A - APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program

FY-2021 Treatment Guidelines

The objectives of the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program are to 1) conduct surveys in the Western States; 2) provide technical assistance to land managers and private landowners; and 3) when funds permit, suppress economically damaging grasshopper and Mormon cricket outbreaks on Federal, Tribal, State, and/or private rangeland. The Plant Protection Act of 2000 provides APHIS the authority to take these actions.

<u>General Guidelines for Grasshopper / Mormon Cricket Treatments</u>

1. All treatments must be in accordance with:
    a. the Plant Protection Act of 2000;
    b. applicable environmental laws and policies such as: the National Environmental Policy Act, the Endangered Species Act, the Federal Insecticide, Fungicide, and Rodenticide Act, and the Clean Water Act (including National Pollutant Discharge Elimination System requirements – if applicable);
    c. applicable state laws;
    d. APHIS Directives pertaining to the proposed action;
    e. Memoranda of Understanding with other Federal agencies.

2. Subject to the availability of funds, upon request of the administering agency, the agriculture department of an affected State, or private landowners, APHIS, to protect rangeland, shall immediately treat Federal, Tribal, State, or private lands that are infested with grasshoppers or Mormon crickets at levels of economic infestation, unless APHIS determines that delaying treatment will not cause greater economic damage to adjacent owners of rangeland. In carrying out this section, APHIS shall work in conjunction with other Federal, State, Tribal, and private prevention, control, or suppression efforts to protect rangeland.

3. Prior to the treatment season, conduct meetings or provide guidance that allows for public participation in the decision-making process. In addition, notify Federal, State and Tribal land managers and private landowners of the potential for grasshopper and Mormon cricket outbreaks on their lands. Request that the land manager / landowner advise APHIS of any sensitive sites that may exist in the proposed treatment areas.

4. Consultation with local Tribal representatives will take place prior to treatment programs to fully inform the Tribes of possible actions APHIS may take on Tribal lands.

5. On APHIS run suppression programs, the Federal government will bear the cost of treatment up to 100 percent on Federal and Tribal Trust land, 50 percent of the cost on State land, and 33 percent of cost on private land. There is an additional 16.15% charge, however, on any funds received by APHIS for federal involvement with suppression treatments.

6. Land managers are responsible for the overall management of rangeland under their control to prevent or reduce the severity of grasshopper and Mormon cricket outbreaks. Land

managers are encouraged to have implemented Integrated Pest Management Systems prior to requesting a treatment. In the absence of available funding or in the place of APHIS funding, the Federal land management agency, Tribal authority or other party/ies may opt to reimburse APHIS for suppression treatments. Interagency agreements or reimbursement agreements must be completed prior to the start of treatments which will be charged thereto.

7. There are situations where APHIS may be requested to treat rangeland that also includes small areas where crops are being grown (typically less than 10 percent of the treatment area). In those situations, the crop owner pays the entire treatment costs on the croplands.

   NOTE: The insecticide being considered must be labeled for the included crop as well as rangeland and current Worker Protection Standards must be followed by the applicator and private landowner.

8. In some cases, rangeland treatments may be conducted by other federal agencies (e.g., Forest Service, Bureau of Land Management, or Bureau of Indian Affairs) or by non-federal entities (e.g., Grazing Association or County Pest District). APHIS may choose to assist these groups in a variety of ways, such as:
   a. loaning equipment (an agreement may be required):
   b. contributing in-kind services such as surveys to determine insect species, instars, and infestation levels;
   c. monitoring for effectiveness of the treatment;
   d. providing technical guidance.

9. In areas considered for treatment, State-registered beekeepers and organic producers shall be notified in advance of proposed treatments. If necessary, non-treated buffer zones can be established.

<u>Operational Procedures</u>

GENERAL PROCEDURES FOR ALL AERIAL AND GROUND APPLICATIONS

1. Follow all applicable Federal, Tribal, State, and local laws and regulations in conducting grasshopper and Mormon cricket suppression treatments.

2. Notify residents within treatment areas, or their designated representatives, prior to proposed operations. Advise them of the control method to be used, proposed method of application, and precautions to be taken.

3. One of the following insecticides that are labeled for rangeland use can be used for a suppression treatment of grasshoppers and Mormon crickets:
   A. Carbaryl
      a. solid bait
      b. ultra-low volume (ULV) spray
   B. Diflubenzuron ULV spray
   C. Malathion ULV spray

4. Do not apply insecticides directly to water bodies (defined herein as reservoirs, lakes, ponds, pools left by seasonal streams, springs, wetlands, and perennial streams and rivers).

Furthermore, provide the following buffers for water bodies:

- 500-foot buffer with aerial liquid insecticide.
- 200-foot buffer with ground liquid insecticide.
- 200-foot buffer with aerial bait.
- 50-foot buffer with ground bait.

5. Instruct program personnel in the safe use of equipment, materials, and procedures; supervise to ensure safety procedures are properly followed.

6. Conduct mixing, loading, and unloading in an approved area where an accidental spill would not contaminate a water body.

7. Each aerial suppression program will have a Contracting Officer's Representative (COR) OR a Treatment Manager on site. Each State will have at least one COR available to assist the Contracting Officer (CO) in GH/MC aerial suppression programs.

   NOTE: A Treatment Manager is an individual that the COR has delegated authority to oversee the actual suppression treatment; someone who is on the treatment site and overseeing / coordinating the treatment and communicating with the COR. No specific training is required, but knowledge of the Aerial Application Manual and treatment experience is critical; attendance to the Aerial Applicators Workshop is very beneficial.

8. Each suppression program will conduct environmental monitoring as outlined in the current year's Environmental Monitoring Plan.

   APHIS will assess and monitor rangeland treatments for the efficacy of the treatment, to verify that a suppression treatment program has properly been implemented, and to assure that any environmentally sensitive sites are protected.

9. APHIS reporting requirements associated with grasshopper / Mormon cricket suppression treatments can be found in the APHIS Grasshopper Program Guidebook: http://www.aphis.usda.gov/import_export/plants/manuals/domestic/downloads/grasshopper.pdf

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

1. APHIS Aerial treatment contracts will adhere to the current year's Statement of Work (SOW).

2. Minimize the potential for drift and volatilization by not using ULV sprays when the following conditions exist in the spray area:

   a. Wind velocity exceeds 10 miles per hour (unless state law requires lower wind speed);
   b. Rain is falling or is imminent;
   c. Dew is present over large areas within the treatment block;
   d. There is air turbulence that could affect the spray deposition;

e. Temperature inversions (ground temperature higher than air temperature) develop and deposition onto the ground is affected.

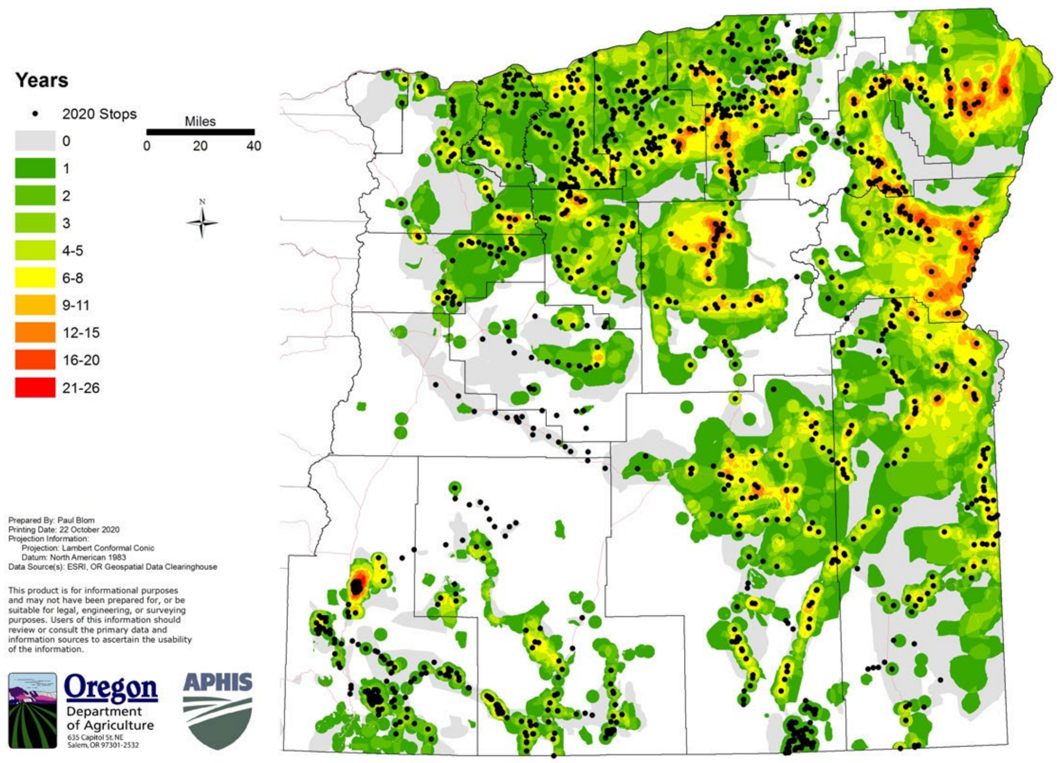
3. Weather conditions will be monitored and documented during application and treatment will be suspended when conditions could jeopardize the correct spray placement or pilot safety.

4. Application aircraft will fly at a median altitude of 1 to 1.5 times the wingspan of the aircraft whenever possible or as specified by the COR or the Treatment Manager.

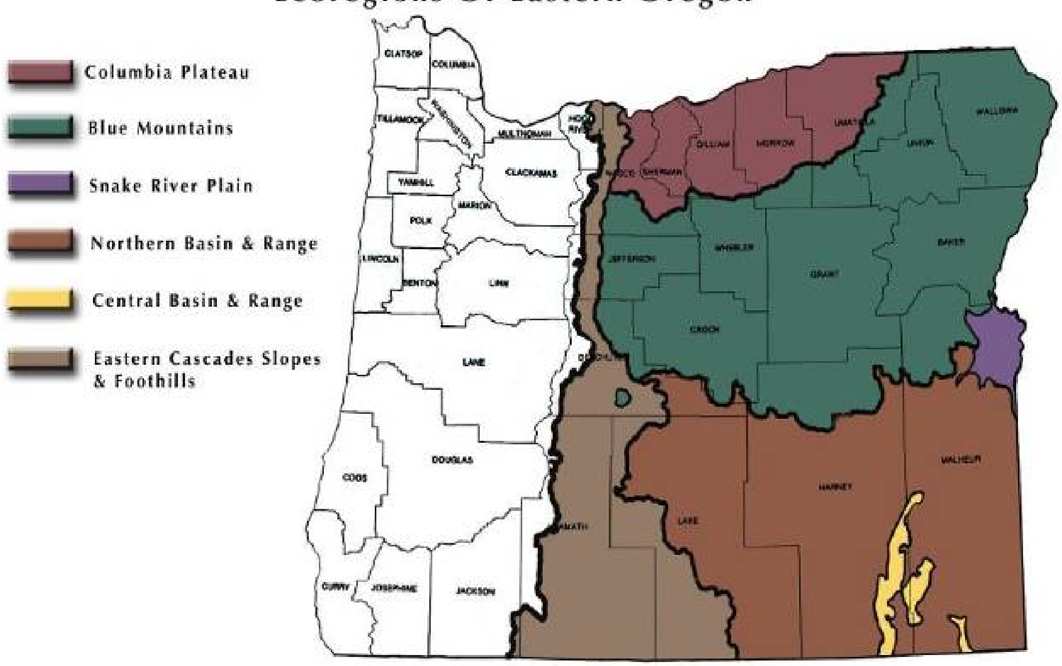
5. Whenever possible, plan aerial ferrying and turnaround routes to avoid flights over congested areas, water bodies, and other sensitive areas that are not to be treated.

Appendix B: Map of the Affected Environment

Economic Infestations of Grasshoppers in Oregon 1953 through 2020



Ecoregions Of Eastern Oregon



Appendix C: Endangered Species Act Correspondence

Bridget Moran
Field Office Supervisor
US Fish & Wildlife Service
Bend Field Office
63095 Deschutes Market Road
Bend, Oregon 97701
Phone: 541-383-7146

January 19th, 2021

Dear Supervisor Moran:

The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), in conjunction with Federal, State, and local cooperators, is preparing for possible grasshopper/ Mormon cricket mitigation programs on rangeland in eastern Oregon again this year. This letter is to request an informal exchange of Section 7 consultation information between the Service and APHIS to ensure that any grasshopper suppression programs conducted by APHIS in Oregon are in compliance with the Endangered Species Act (ESA).

As required by APHIS policy, until the programmatic Biological Assessment (BA) for the Grasshopper Program is completed it is necessary for State APHIS Offices to consult with their local FWS to assure compliance with the ESA. The local consultations must be completed prior to any treatments and completion is indicated by receipt of a letter of concurrence from the Service.

APHIS has prepared a 2021 BA for Oregon that arrives at affects determinations for each listed species and critical habitats which occur in the proposed action area. Where it is determined that the action may affect a listed species or its habitat, the BA specifies mitigation measures that are designed to reduce the potential effects to the point where they are not likely to adversely affect the listed species or its habitat. This BA also addresses the chemical diflubenzuron (Dimilin) and the RAATs (Reduced Agent-Area Treatment) strategy as treatment alternatives which were not considered in the last National Programmatic Biological Opinion, October 3, 1995.

The informal local consultation process has been used to obtain concurrence from your agency on the effects determinations made by APHIS. There are no additions to this BA from recent year's consultations, and we are proposing the same mitigation and conservation measures that were agreed to in previous years.

Please provide any coordination necessary with the Klamath Falls, La Grande, and Bend Field Offices. A written response from the Service is requested indicating whether you concur with the 'not likely to adversely affect' (NLAA) determinations in the Biological Assessment.

Specifically, a written response is requested regarding the continued concurrence that potential grasshopper program mitigation activities have a NLAA determination, for the following ESA-listed threatened or endangered species and their designated critical habitats (referenced by (CH)):

- Yellow-billed cuckoo (*Coccyzus americanus*)
- Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*);
- Hutton tui chub (*Gila bicolor* spp.);
- Warner sucker (CH) (*Catostomus warnerensis*);
- Lost River sucker (CH) (*Deltistes luxatus*);
- Shortnose sucker (CH) (*Chasmiste brevirostris*);
- Bull trout (CH) (*Salvelinus confluentus*);
- Applegate's milk-vetch (*Astragalus applegatei*);
- Howell's spectacular thelypody (*Thelypodium howellii spectabilis*);
- Spalding's catchfly (*Silene spaldingii*);
- Oregon spotted frog (CH) (*Rana pretiosa*).

For the species for which APHIS has arrived at 'no effect' determinations, please provide input if the Service has information to indicate otherwise. If there is no information to indicate that a determination other than "no effect" is warranted, then no further review of those species is necessary. APHIS has consulted separately with NOAA Fisheries for effects determinations for ESA-listed anadromous fishes.

Your cooperation and timely response in assisting APHIS to meet its ESA responsibilities are appreciated.

Sincerely,

COLIN PARK
Plant Health Safeguarding Specialist
USDA, APHIS, PPQ

Enclosed: 2021 APHIS Biological Assessment

FISH AND WILDLIFE SERVICE

Bend Field Office 63095 Deschutes Market Road
Bend, Oregon 97701

File Number: 01EOFW00-2021-I-0195 2021
File Name: APHIS Grasshopper Suppression Program 2021
TS Number: 21-191
TAILS: 01EOFW00-2021-I-0195 2021
Doc Type: Final

March 4, 2021

Colin Park, Plant Health Safeguarding Specialist
USDA, APHIS, PPQ
6035 NE 78th Court, Suite 100
Portland, Oregon 97218

Subject: Concurrence on the effects to listed species and critical habitat from Oregon Grasshopper Mitigation by USDA APHIS PPQ

Dear Mr. Park:

The U.S. Fish and Wildlife Service (Service) has reviewed the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service's (APHIS) Plant Protection and Quarantine (PPQ) program's request for concurrence that the Grasshopper Mitigation Program (Program) *may affect but is not likely to adversely affect* species or habitats listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; Act). Your January 19, 2021 request for informal consultation and accompanying biological assessment (Assessment; APHIS 2021) was received by the Service on the same day. The species and their critical habitats subject to informal consultation pursuant to section 7 of the Act are presented in Table 1 below.

APHIS also determined that implementation of the Program will have no effect on the following species: Canada lynx (*Lynx canadensis*), Gray wolf (*Canis lupus*; delisted in 2020), Northern spotted owl (*Strix occidentalis caurin*), Gentner's fritillary (*Fritillaria gentneri*), MacFarlane's four-o'clock (*Mirabilis macfarlanii*), Malheur wire-lettuce (*Stephanomeria malheurensis*), Whitebark pine (*Pinus albicaulis*), Slender Orcutt grass (*Orcuttia tenuis*), and Green's Tuctoria (*Tuctoria greenei*). The regulations implementing section 7 of the Act do not require the Service to review or concur with no effect determinations. However, the Service acknowledges that the basis for these no effect determinations is clear and reasonable.

APHIS also included protective measures for formerly designated candidate species: greater sage-grouse (*Centrocercus urophasianus*) and the Columbia spotted frog (*Rana luteiventris*). Additionally, the Service is re ommending protection of the recently delisted species, Borax Lake chub (*Gila boraxobius*).

Table 1. This list includes federally-listed species and their proposed or designated critical habitat, where applicable, for which APHIS has determined that implementation the Program may affect, but is not likely to adversely affect.

Species	Status	Critical Habitat
Western DPS of Yellow-billed cuckoo (*Coccyzus americanus*)	Threatened	Proposed

Oregon spotted frog (*Rana pretiosa*)	Threatened	Final Designated
Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)	Threatened	No Critical Habitat Designated
Hutton tui chub (*Gila bicolor* spp.)	Threatened	No Critical Habitat Designated
Warner sucker (*Catostomus warnerensis*)	Threatened	Final Designated
Lost River sucker (*Deltistes luxatus*)	Endangered	Final Designated
Shortnose sucker (*Chasmistes brevirostris*)	Endangered	Final Designated
Bull trout (*Salvelinus confluentus*)	Threatened	Final Designated
Applegate's milk-vetch (*Astragalus applegatei*)	Endangered	No Critical Habitat Designated
Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*)	Threatened	No Critical Habitat Designated
Spalding's campion (*Silene spaldingii*)	Threatened	No Critical Habitat Designated

In November 2019, APHIS published an updated Environmental Impact Statement (EIS) document, from the original 2002 EIS, concerning suppression of grasshopper (*Camnula pellucida*) and Mormon cricket (*Anabrus simplex*) populations in 17 western states, and incorporated the available data and analysis of the environmental risk of new program tools. The EIS described the actions available to APHIS to reduce the damage caused by grasshopper populations in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. APHIS includes discussion of information cited in the 2019 EIS and refers to it as "incorporated by reference" in the Assessment. The Service would like to clarify that the Service is not concurring on the 2019 EIS proposed action. The reference to the 2019 EIS is for informational purposes only and not as a request for consultation on that proposed action.

The proposed action which is being consulted on, is the "Site-Specific Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program - Oregon" (OR- 21-01) prepared by APHIS (EA) which describes site specific issues related to potential grasshopper suppression programs. The described action is located in Baker, Crook, Deschutes, Gilliam, Grant, Harney, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler counties of Oregon

After several coordination meetings between APHIS and the Service prior to the informal consultation conducted in 2003, APHIS developed a proposed action with protective buffers designed to prevent application of pesticides within a prescribed distance of listed species to prevent effects from spray application. In order to implement the avoidance buffers, APHIS will need to survey for certain species whose distributions are unknown or poorly understood. Such surveys are not likely needed for fish species or frogs for whose distributions are limited to specific habitats such as waterways, or plants that are sessile and whose distributions are well known. Since yellow-billed cuckoo distribution is not well understood or unknown in the project area, it may be necessary to consult recent survey records or conduct surveys of high potential for nesting and foraging habitat prior to implementing the suppression program.

PROPOSED ACTION

The proposed action is a statewide program for grasshopper and Mormon cricket suppression activities described in the site-specific EA (OR-21-01) tiered to the 2002 EIS. APHIS treatment programs also follow the Treatment Guidelines (included in the EA) and the Grasshopper Program Statement of Work (or Prospectus) developed by APHIS. Suppression treatments could be implemented from May through August, but typically are implemented during June and July.

The chemical control methods used by APHIS include the use of liquid sprays of diflubenzuron, carbaryl, and a bait formulation of carbaryl, applied at conventional rates and as reduced agent area treatments (RAATs). The preferred chemical control methods for treatment of grasshoppers in Oregon by APHIS PPQ include the use of liquid spray diflubenzuron and carbaryl in a bait formulation applied as RAATs.

Under this Program, APHIS would make a single application per year to a treatment area and could apply insecticide at rate conventionally used for grasshopper suppression treatments, or more typically as RAATs. APHIS will select which insecticides and rates are most appropriate for suppression of a grasshopper outbreak based on several biological, logistical, environmental, and economical criteria. The identification of grasshopper species and their life stage largely determines the choice of insecticides used among those available to the program. RAATs are the most common application method for all program insecticides, and only rarely do rangeland pest conditions warrant full coverage and higher rates. Under this Program, carbaryl or diflubenzuron would cover all treatable sites within the designated treatment block per label directions, typically at the following application rates:

- 10.0 pounds (0.20 lb a.i.) of 2 percent carbaryl bait per acre;
- 0.75 or 1.0 fluid ounce (0.012 lb a.i.) of diflubenzuron per acre.

Starting in 2017, APHIS removed the use of malathion from the proposed action based on review of recent information and the Environmental Protection Agency's (EPA) January 2016 Assessment regarding the environmental effects of malathion (Lentz 2017, *in litt)*. Additionally, APHIS is suspending their investigation of the use of chlorantraniliprole, which was included on a provisional basis in the 2020 Assessment (Park 2021, *in litt*). Thus, chlorantraniliprole will not be considered for use in the program in 2021 and is not included in this consultation. Service concurrence is limited to the use of diflubenzuron and carbaryl as described in the proposed action in APHIS' 2021 Assessment.

The propose action maintains a standard, programmatic 500 foot buffer from water for all aerial ULV treatments, a 200 foot buffer from water for all aerial bait treatments, a 200 foot buffer from water for all liquid ground treatments, and a 50 foot buffer from water for all ground bait treatments. These standard buffers are in place to reduce the chance that a pesticide used for grasshopper suppression will enter water. In order to protect listed plant species, APHIS will implement the following measures from the edge of known listed plant species locations: a 3 mile buffer for aerial applications will be used for from known locations of listed plant species. Carbaryl bait ground application may be used up to 50 feet from the edge of known locations of listed plant species.

EFFECTS TO FEDERALLY LISTED WILDLIFE AND THEIR CRITICAL HABITAT

The buffers are mandatory as part of the proposed action and are designed to avoid contamination of listed species habitats. APHIS's assessment concludes the buffers reduce or eliminate the potential for direct exposure to the listed species and reduces the chance of indirect effects being substantial enough to adversely affect the listed species. The buffers were not derived by specific impact and distance data, but are based on field tests demonstrating the absence of detectable levels of chemical. APHIS's determination is the project's protective measures reduce the potential effects of the action to the point that the effects are insignificant or the probability of adverse effect is discountable and therefore the project may affect but is not likely to adversely affect the listed species.

The Assessment does not seem to reflect the most current available information for Applegate's milk-vetch (e.g., on page 20, APHIS incorrectly identified Ewauna flats as the largest population; however, the Collins population is the largest). The Service completed a 5-yr status review of Applegate's milk-vetch in 2019 (https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=Q25T) and we recommend APHIS use the best available information in future Assessments.

CONCURRENCE

The Service reviewed the project described in the Assessment in accordance with section 7(a)(2) of the Act. Based on the Service's review of the Assessment and other information, we concur with APHIS's determination that the Program actions proposed for 2021, in 17 counties of Oregon (described previously) may affect, but are not likely to adversely affect the 11 endangered and threatened species listed in Table 1, nor their designated critical habitats, where applicable.

Our concurrence with your "not likely to adversely affect" determination for threatened and endangered species is based on the conservation measures that will be incorporated into the action. Our concurrence considers the following factors as described in the proposed action:

1. All applicable Federal, State, Tribal, and local environmental laws and regulations will be followed in conducting suppression activities.

2. Information displayed in the Assessment on effects from application of diflubenzuron and carbaryl support the conclusion that adverse effects to listed species are avoided

under the proposed action. APHIS will restrict or avoid insecticide applications such that indirect effects to listed species and their habitats will be insignificant and discountable.

3. APHIS will avoid applying pesticides in areas of known or potentially occupied threatened and endangered species habitat to reduce direct and indirect effects consistent with Table 2 of the Assessment. Potential indirect effects described in the assessment include reductions in insect prey for local populations of birds, impacts to aquatic environments, and effects on plant productivity from reductions in non-target pollinator insect populations.

The Service recommends that changes be made to Table 2 of the Assessment to reflect the most current available information regarding the known occurrences of Lost River sucker, shortnose sucker, and bull trout. Lost River sucker occurs only in Klamath County (Table 2 indicates they only occur in Lake County), shortnose sucker occurs in both Klamath and Lake counties (Table 2 indicates they only occur in Lake County), and bull trout does occur in Klamath County (Table 2 indicates they are absent from Klamath County). These corrections are important to ensure item 8 below is implemented appropriately.

4. Pesticides will not be applied in areas known to have a high water table, or where sub surface leaching is likely. Carbaryl bait will not be applied within 500 feet of any water which contains threatened and endangered species at any time. Known migratory habitats would be treated as occupied habitat unless otherwise directed by the Service prior to treatment.

5. Aerial spray applications of diflubenzuron or carbaryl will not be conducted within 0.5 mile of any flowing or standing water which contains threatened and endangered fish species at any time. Aerial spray applications will not occur within 500 feet of occupied Oregon spotted frog habitat at any time. Ground application of diflubenzuron or carbaryl, will not be conducted within 500 feet of any flowing or standing water which contains threatened and endangered fish species at any time. Ground application will not be conducted within 200 feet of occupied Oregon spotted frog habitat at any time. Known migratory habitats will be considered as occupied habitat unless otherwise directed by the Service prior to treatment. Aerial application of pesticides will not be conducted when winds exceed ten miles per hour. To avoid drift and volatilization, aerial application of pesticides will not be conducted when it is raining or rain is imminent, when foliage is wet, when it is foggy, when temperature exceeds 80 degrees Fahrenheit, when there is air turbulence, or when a temperature inversion exists in the project area. Boundaries and buffers will be clearly marked. Aircraft used in aerial application will be equipped with systems to prevent nozzle dribble when the spray mechanism is disabled and emergency shut off valves to minimize pesticide loss in the event of broken lines, or system malfunctions.

6. All mixing and loading will be done in approved areas where spills cannot enter any body of water. All pesticide tanks will be leak proof and constructed of corrosion resistant materials. Aircraft used in aerial application will be equipped with APHIS-approved differentially corrected global positioning systems that guide pilots along desired flight paths with an accuracy of plus or minus three feet. Free flying will not be allowed.

7. APHIS will monitor insecticide applications and will document compliance with the protective measures in the Assessment. Emphasis should be on determining the effectiveness of avoidance buffers for listed species including indirect affects to prey animals and pollinators and indirect transportation of insecticide products to non-target areas, including all water bodies.

8. APHIS will notify the Service before any application of pesticide and determine the location of any listed or proposed threatened or endangered listed species. APHIS will provide the Service with maps and GIS shape files of proposed treatment areas for the

Service to use to determine accurate locations of the action in relation to known species locations.

This concurrence is based on APHIS's implementation of the avoidance and mitigation measures outlined above. To assist in future consultations we request you provide the Service a summary of environmental monitoring activities conducted each year in which suppression activities are conducted. Please provide this summary prior to initiation of your next grasshopper and cricket suppression activity.

This concludes informal consultation on the subject action. This informal consultation does not exempt APHIS from prohibition of take under section 7(a)(2) of the ESA for any of the 11 species listed above. This informal consultation may be superseded by a future programmatic consultation and covers only those activities carried out in 2021 as described in the Assessment. As provided in 50 CFR § 402.16, reinitiation of consultation may be necessary if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered herein; (2) the action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered herein; or
(3) a new species is listed or critical habitat designated that may be affected by the action.

ADDITIONAL (NON-LISTED) SPECIES PROTECTION

In addition to the above species listed under the Act, the Service maintains a list of species that are candidates for listing. Candidate species are plants and animals for which the Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species are separate from species that are listed as threatened or endangered, in that they do not receive the regulatory protections of the Act. In previous consultations, APHIS considered protective measures for the greater sage-grouse and Columbia spotted frog; however these species have subsequently been removed (USFWS 2015, 2016) from the candidate list. In addition, APHIS will continue to provide protective measures and consult the Service annually on Borax Lake chub which was delisted on July 13, 2020, due to recovery. The Service values ongoing conservation and protection of these species to prevent the need to list in the future, thus we are including the following recommendations.

<u>Greater Sage-Grouse</u>

In March 2010, the Service determined that protection of the greater sage-grouse under the Act was warranted. However, listing the greater sage-grouse was precluded by the need to address other species' listings facing greater risk of extinction (USFWS 2010). On October 2, 2015, the Service announced a 12-month finding on petitions to list the greater sage-grouse both rangewide and the Columbia Basin population, as an endangered or threatened species under the Act (USFWS 2016). After review of the best available scientific and commercial information, the Service found that the Columbia Basin population does not qualify as a distinct population segment (DPS). In addition, the Service found listing the greater sage-grouse was not warranted for protection under the Act at the time.

Greater sage-grouse in Oregon are found in Union, Baker, Deschutes, Crook, Lake, Harney and Malheur counties. Sage-grouse have not been observed in Klamath County since 1993 (USFWS

2010). In 2015, the Oregon Department of Fish and Wildlife finalized the "The Oregon Sage-Grouse Action Plan" to help manage sage-grouse populations in Oregon. This plan was an update to previous versions from 2005 and 2011 (Hagen 2005, ODFW 2011, Sage-Grouse Conservation Partnership 2015). The strategy relies upon Core Areas of habitat that are essential to sage-grouse conservation. The maps and data provide a tool for planning and identifying appropriate avoidance areas and mitigation in the event of human development in sage-grouse habitats. The Core Area maps, available on ODFW's website, define areas that should be targeted for conservation actions or avoided when large scale disturbances are proposed. Core Area maps also provide a broad-scale filter to assist planners, County, State and Federal agencies in identifying areas of likely high and low resource conflicts associated with development proposals. APHIS should ensure that all suppression activities conducted in Oregon are consistent with the measures identified within the 2015 plan, specifically those found in Section IV and Appendix 4 (Sage-Grouse Conservation Partnership 2015).

The Bureau of Land Management (BLM) developed protective measures for greater sage-grouse to be implemented on BLM-administered lands. The Service recommends the APHIS follow recommendations in the "Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment" (BLM 2015). The Amendment requires implementation of a 1.2-mile spatial buffer from leks; hourly restrictions from two hours before sunset to two hours after sunrise to avoid disturbance to sage-grouse occupied leks; restrictions on use of non-specific insecticides in brood-rearing habitat during brood-rearing period; and 0.25 mile spatial buffer for noise and related disruptive activities when conducting management activities. The Service also recommends following information found in the BLM Instruction Memorandum No. 2012-043, dated December 22, 2011, for all spray activity on BLM administered lands (BLM 2011) which the APHIS references in the proposed action.

Insect reduction as a result of rangeland grasshopper control has been found to reduce brood sizes in a wild sage-grouse population (Johnson 1987). In order to reduce the reliance on insecticides for control of rangeland grasshoppers, Johnson (1987) recommends the use of "Integrated Pest Management" (IPM) for control of rangeland grasshoppers. IPM uses naturally occurring pest controls such as weather, disease, predators, parasites, physical and chemical control, as well as habitat modification to keep grasshoppers from surpassing intolerable levels (Johnson 1987). In addition, sage-grouse brood areas should be located if not already known, and protected from insecticide spraying (Johnson 1987). Grasshopper control should also be

delayed in brood-rearing areas to allow for maximal chick development before spraying reduces their insect forage (Johnson 1987). The Service recommends APHIS use these guidelines to avoid pesticide spraying of nesting and brood-rearing areas for sage-grouse in order to prevent further declines from current sage-grouse population levels.

The Service recommends APHIS study the potential effect of the rangeland grasshopper and Mormon cricket control program on greater sage-grouse, particularly related to reduction in insects as forage, within nesting and brood-rearing habitat. We request that APHIS provide us with information regarding how they will avoid areas occupied by greater sage-grouse during time periods of greater sage-grouse chick foraging and development.

<u>Columbia spotted frog Great Basin DPS</u>

The Columbia spotted frog Great Basin DPS (Great Basin DPS) is known to occur in Lake, Harney, Malheur, and Grant counties, Oregon. In addition to the counties in Oregon, the Great Basin DPS is also known to occur in portions of Idaho and Nevada. The Great Basin DPS is widely distributed throughout southeastern Oregon, and local populations are isolated from each other by natural or human-induced habitat barriers. Threats to the Great Basin DPS include poor management of habitat including water development, improper grazing, mining activities, and nonnative species.

The Service recommends APHIS avoid pesticide spraying of habitat for the Great Basin DPS and buffer the area surrounding Columbia spotted frog habitat similar to measures taken for Oregon spotted frog covered under this consultation in order to reduce risk of exposure of the Great Basin DPS to pesticide chemicals. We recommend that APHIS provide information to the Service regarding how they will avoid areas occupied by the Great Basin DPS prior to commencing with spray projects. The Service is available to assist APHIS to minimize and avoid impacts to the Great Basin DPS.

Borax Lake Chub

Borax Lake chub was delisted from the Act on July 13, 2020, due to recovery. This species is found in Borax Lake, a shallow 10-acre, thermal spring fed lake in Harney County, Oregon. The lake is named for its concentration of borax, and its ecosystem is considered highly susceptible to modification due to irrigation and geothermal projects.

The Service recommends APHIS avoid pesticide spraying of habitat for Borax Lake chub and buffer the area surrounding Borax Lake chub habit similar to measures taken for other listed fish species covered under this consultation in order to reduce the risk of exposure of Borax Lake chub to pesticide chemicals. We recommend that APHIS provide information to the Service regarding how they will avoid areas occupied by Borax Lake chub prior to commencing with spray projects. The Service is available to assist APHIS to minimize and avoid impacts to Borax Lake chub.

We appreciate the opportunity to work with you on this action. Please note that the proposed action requires further coordination to inform the Service of pesticide application activities in areas of any listed threatened or endangered species. If we can be of further assistance, please contact me at (541) 383-7146 or Dawn Davis at (775-532-4029).

Sincerely,

Bridget Moran Field Supervisor

cc: Marisa Meyer, FWS, La Grande, Oregon
Daniel Blake, FWS, Klamath Falls, Oregon

Appendix D: Public Comments and Responses to Draft EA

APHIS response to public comments on EA-OR-2021-01

APHIS received the following four sets of comments on the draft version of this EA (listed alphabetically with a response appended to each comment):

Baker County Commission, 1 comment received on 2/8/2021:

Baker County fully supports Alternative B, "Insecticide Applications at Conventional Rates or Reduced Agent Area Treatments with Adaptive Management Strategy".

It is very important to our local, rural economy that rangelands be managed for productive forage to provide for livestock grazing. Baker County contains 51.5% public lands most of which are open livestock allotments during the summer months. A reduction in forage has significant impact on cattle health and gain which adversely impacts producers and their livelihoods.

Response:

Thank you for your engagement on this program. This program is driven by local voices such as this, describing real world impacts of grasshoppers and the financial concerns which are numerated in your statement. It can be hard to find a balance that everyone can support, but we are working together as a community to respond to periodic outbreaks of damaging grasshoppers in ecologically and economically sensible ways whenever possible, and the concerns of stakeholders such as the constituents of rural Oregon counties need to be heard by everyone involved, that is:

- *Federal land managers,*
- *APHIS,*
- *Oregon Department of Agriculture (who does the bulk of our survey and outreach work),*
- *University extension,*
- *Interest groups with opposing views on land management,*
- *And the public at large.*

It is somewhat rare to get comments submitted formally in response to our draft EA expressing justified support such as this, though Baker County Commission is a frequent exception, which is ironic considering how constantly such viewpoints and concerns are expressed to us 'on the front line' in every possible way during grasshopper outbreaks.

Center for Biological Diversity, 1 comment received on 3/15/2021:

All comments from last year are equally applicable this year as the 2021 draft EA suffers from the same or similar deficiencies as the 2020 one, and are hereby incorporated by reference and attached as Appendix A. Also, comments on this EA by the Xerces Society for Invertebrate Conservation from 2021 and the Xerces Society along with the Center for 2020 are equally applicable, and are hereby incorporated by reference and attached as Appendix B and C respectively.

Response:

Thank you for your engagement on this program. APHIS values criticism of the program to ensure that it meets the highest possible environmental standards as demanded by the public at large and non-profit interest groups such the Center for Biological Diversity (The Center).

We have reviewed the reference material provided, again. APHIS does not agree however that the comments in Appendix A are 'equally applicable' to the EA in question now, in fact many of the comments therein did not seem to be actually specific to OR-EA-2020-01, but rather applied grossly to other states' EAs. It was somewhat difficult to interpret such comments even when they were purported to be addressing the EA in question. Furthermore, the current EA has in fact been significantly revised from its previous iteration, often in response to relevant and meaningful comments received in 2020. Though many things may be somewhat or possibly even largely applicable, this is far from clear and highly speculative for APHIS to have to try to editorialize on behalf of The Center's perspective. Therefore, to try to apply the previous year's comments to this year's EA is simply not feasible for us, nor how the comment process is expected to work from our understanding.

No actual further comment, other than the above, was provided for APHIS to respond to that is directly and clearly in response to the draft EA in question. APHIS did provide responses to comments for many draft EAs in 2020 for the APHIS grasshopper program in western states, including many from The Center, and responses to the comments specific to this EA from the Xerces Society can be found further on.

Western Watersheds Project, 10 comments received on 3/15/2021:

Comment 1:

Spraying of chemical agents to "control" insect populations should never be considered for use on public lands due to the wider ecological harm that it causes to native species, ecosystems, water resources and human health. When we interfere with the functioning of ecosystems to such an extent, the repercussions, both known and unknown, can be devastating. We do not know the long-term ecological consequences of the use of Diflubenzuron or Carbaryl to the environment and they should be considered to be dangerous under the Precautionary Principle.

Response:

Thank you for your engagement on this program. APHIS values criticism of the program to ensure that it meets the highest possible environmental standards as demanded by the public at large and recommended by non-profit environmental advocacy groups such the Western Watersheds Project (WWP).

This is an ambitious perspective, but demonstrably does not match current land management realities at large or current public demand. It is unclear why or how a relatively limited program such as APHIS' current grasshopper management activities as outlined in the draft EA could or should change the current understanding of pesticide risks, as regulated by the Environmental Protection Agency, under the Federal Insecticide, Fungicide, and Rodenticide Act of 1972.

APHIS disagrees with the statement in three fundamental ways: 1) APHIS proposal in the EA is not widespread, rather it is very targeted, as explained in the document extensively. 2) Public lands where grasshopper treatment by APHIS is considered do not represent pristine and intact wilderness where human intervention is rare, rather they are already being actively managed by their public stewards for the public good to a great extent, as demanded by the public. 3) Finally, one could also use the precautionary principal to demonstrate that it is naïve to say that any class of tool (e.g. 'pesticides') cannot possibly be used safely and effectively, since the cost of not using such tools is clear, while the risk of using them is not clear.

Recommendation:

APHIS would appreciate more specific criticisms of the draft EA on its merits regarding the concerns expressed here. Analysis of concerns are exactly the purpose of the National Environmental Policy Act process, however if they do not constructively relate to the actual document and proposal, the discussion becomes very circular and non-productive (e.g. 'pesticides are too dangerous to use, therefore we should never use them').

Comment 2:

USDA has failed to consider a reasonable alternative that addresses the issue of lost ranching income without the need to spray hazardous insecticides on public lands. Why not discontinue your program and establish a fund that directly pays ranchers for any losses accrued as a result of insect outbreaks? This seems like a win-win-win. Good for the environment, good for the public and good for ranchers.

Response:

APHIS is not authorized to address issues of lost ranching income by any conceivable means; however it is required by the Plant Protection Act to help control economic grasshopper outbreaks. In the current era, that would necessarily include the responsible use of chemical pesticides as part of an Integrated Pest Management (IPM) approach, which was in fact developed to be a responsible method for the use of such chemical tools following irresponsible uses of chemicals widely in the mid-20th century. Furthermore, what the specific hazard of concern here is not clear.

Comment 3:

We are poisoning ourselves and the planet at a level that is unsustainable and untenable.

Present and future generations of all species (humans included) are at great risk under our current land management regimes. The sixth mass extinction is well underway and it is attributed entirely to human activities (Shivanna 2020). Climate disruption, biodiversity loss and industrial/chemical pollution make up the trifecta of crises. Wide-spread aerial insecticide spraying is an unnecessary and reckless activity that exacerbates our perilous situation.

Response:

APHIS agrees with the scientific consensus that there are significant global challenges and dynamic processes underway due to collective human activity on the planet earth, including those mentioned. APHIS does not agree however with the generalization that this EA is proposing anything like wide-

spread aerial insecticide spraying. In fact, the point of it is to describe in detail how limited (i.e. carefully targeted) such activities for this program will be. The clarification of the limits of the program are how the NEPA process functions to ensure public resources are used in environmentally responsible ways. This was the goal of NEPA, and a quick review of the history of irresponsible uses of pest control chemicals of the mid-20th century, including on the public's behalf, will demonstrate that has been effective in limiting this since its implementation. Of course an actual reading of this EA will show that a return to such practices is in no way being proposed here, and a review of the program will demonstrate this has not been the case for this program for many decades, since shortly after the establishment of NEPA.

Comment 4:

Less than 2% of our nation's beef supply is produced from public lands grazing (Fisher et al 2016) yet the ecological damages are immense and unsustainable (Testimony of Erik Molvar 2018). In addition to the direct impacts from livestock grazing on public lands, supporting government programs such as APHIS cause additional ecological harm in support of industry at great expense to the American taxpayer [sic]. State-sponsored ecocide in support of the livestock industry must come to an end.

Response:

Another broad argument, that is perhaps a basis for a non-profit interest group, while being far too vague to be of demonstrable critique of the document in question. APHIS does not agree that the proposed actions described in this EA will result in 'state-sponsored ecocide' and how one could specifically argue the contrary is unclear. The concerns raised here are of more generally political interest than specifically functional for the practical analysis laid out in this EA. It bears repeating that the goal of APHIS in reducing grasshopper outbreaks with very targeted actions is driven by public support and follows the best IPM practices currently available, as well as consultation with all tasked environmental agencies as proscribed by NEPA and other laws.

Comment 5:

USDA Must Establish an Adequate Baseline

USDA has violated NEPA by failing to establish an adequate baseline. USDA does not know the trends and populations status of all endangered species, sensitive species (including greater sage-grouse) in the areas they wish to spray insecticides. In large part because the agency does not know where their project areas are until "outbreaks" occur. "The establishment of a 'baseline is not an independent legal requirement, but rather, a practical requirement in environmental analysis often employed to identify the environmental consequences of a proposed agency action.'" [Listed citations are not contested by APHIS and removed for clarity.]

Response:

APHIS consults with the US Fish & Wildlife Service and the National Marine Fisheries Service to establish such baselines, specifically to comply with the Endanger Species Act (ESA), as required by law. In general, APHIS relies on the latest available published information on such baseline statuses, Letters of Concurrence and other consultation from the tasked agencies listed above, as well as consultation with local land managers to determine their knowledge of such baselines and their guidance in protecting them as public land stewards. If necessary, however, APHIS will further this work to ensure there are no harmful effects on possibly present but under-studied endangered species that could result from these *very targeted, extremely limited spray programs. Our automatic buffering of water and other sensitive sites and the environmental monitoring of these programmatic standards is furthermore shared with these agencies to ensure their continued support. Lastly, it is a mischaracterization to state that APHIS doesn't know where outbreaks may occur: potential projects will be within the programmatic area described in the EA, and the plans for protecting endangered species are reviewed extensively both in this EA process and prior to actual treatments, when precise survey data comes in and exact treatment areas can be finalized in mid spring.*

Comment 6:

The Proposed Alternative Constitutes a Major Federal Action That Would Significantly Affect the Human Environment for Which an EIS is Required

NEPA serves two purposes:

1. "It ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts," and
2. It "guarantees that the relevant information will be made available to the larger audience that may also play a role in both the decision making process and the implementation of that decision." An EIS must be prepared for all "major Federal actions significantly affecting the quality of the human environment." An agency may avoid an EIS only if the action will have "no significant impact." The Council on Environmental Quality's (CEQ) regulations define "significance" in terms of "context" and "intensity." Context "simply delimits the scope of the agency's action, including the interests affected." [Listed citations are not contested by APHIS and removed for clarity.]

Response:

As stated in this EA, Environmental Impact Statements are tiered to this document. (For review, these are available here: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/ea/grasshopper-cricket-ea/grasshopper-cricket-by-state.)

Comment 7:

The EA is programmatic in nature, and does not contain site-specific analysis of project areas. It is clear that site-specific analysis is required prior to insecticide spraying. The paper NEPA's Site Specific Requirement states: Approval of specific projects, such as construction or management activities located in a defined geographic area. The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.

Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. [Listed citations are not contested by APHIS and removed for clarity.]

Response:

APHIS would strongly argue that 17 counties in eastern Oregon that share significant ecological and demographic features does not in any way represent 'the world as a whole'. If features of a specific area *are not well represented by this EA when a project is moved forward, APHIS agrees that an additional EA would be required for that activity. Potential projects will be within the programmatic area described in the EA, and prior to actual treatments, when precise survey data comes in and exact treatment areas can be finalized in mid spring, any alterations to the EA would need to go through an additional NEPA defined process.*

Comment 8:

The EA Fails to Address Economic Requirements in the Plant Protection Act

2000 Plant Protection Act §7717 Control of Grasshopper and Mormon Crickets (b) (c) states:

"In general, subject to the availability of funds pursuant to this section, on request of the administering agency or the agriculture department of an affected State, the Secretary, to protect rangeland, shall immediately treat Federal, State, or private lands that are infested with grasshoppers or Mormon crickets at levels of economic infestation, unless the Secretary determines that delaying treatment will not cause greater economic damage to adjacent owners of rangeland."

The EA contains no economic data and the USDA is operating in the dark. What constitutes a level of "economic infestation"? How will the USDA know when to delay a treatment with economic information to guide their decision making?

Response:

This EA does in fact contain a significant amount of information on what constitutes an economic infestation. It is unclear exactly what is being requested in such decision making beyond the level of detail already provided, besides quantitative data. PPA require that economic considerations are made, not that the quantitative data for such be published and reviewed. Quantitative data in dynamic ecological systems are generally not readily available to any publishable level of detail for land managers specifically, rather general trends are estimated as best as possible by the people tasked with doing so, while typically erroring on the side of non-treatment. Treatment is delayed frequently, by ANY of the reasons listed in the EA. As a side note, APHIS would also argue that this is a concern of fiscal and political policy, rather than an environmental concern strictly covered by the scope of NEPA. Nonetheless, this EA goes to great length to layout a general set of economically grounded principles that are used to determine this exact matter (i.e. what does 'economic infestation' mean). APHIS looks forward to the possibility of improving such real time economic data capturing and transparency as requested here and would like to have such tools. But currently, APHIS and local land managers use the best tools available to them to make fiscally and ecologically sound decisions, and there is a history of such actions available for review and scrutiny at the level of detail that is being requested here. APHIS would welcome scrutiny of its past decisions to provide the kind of hard economic analysis being wished for here, and has complied with FOIA requests in 2020, presumably to that end.

Comment 9:

NPEDS Permits Are Required When Spraying Near Water Bodies

Even if USDA is not spraying directly over water bodies, wind can carry chemicals long distances polluting lakes, ponds and streams. A NPEDS permit is required when spray near water.

Response:

The buffers for any kind of water which are laid out in this EA mean that APHIS is not spraying near water. APHIS also conducts environmental monitoring to show that this is the case.

Comment 10:

The EA Fails to Thoroughly Consider Impacts to Sage-Grouse

The state Greater Sage-Grouse Approved Resource Management Plans (ARMPAs) were developed as a last ditch effort to recover sage-grouse to prevent the listing of the species under the Endangered Species Act (ESA) across the West despite a determination in 2015 by the U.S. Fish and Wildlife Service that they were indeed eligible for ESA listing. The EA appears to be dismissive of the imperiled status of the bird because they were not listed under the ESA. Due to the lack of information concerning site-specific project areas, USDA is flying blind when it comes to sage-grouse protections. The known deadly effects of Organophosphorus Insecticides to Sage-Grouse (Blus et al. 1989) have not been considered in depth and thoroughly discussed in this EA. Insecticides and pesticides should not be used anywhere near sage-grouse habitat.

Will sage-grouse population data be collected or researched for an area before determining if that area will be sprayed? Will ARMPA Sage Grouse Focal Areas or Priority Habitat Management Areas be off limits to spraying? Are there long term impacts to food sources? How will impacts to leks be avoided when flying in an airplane? What impacts do your insecticides of choice have on brood rearing birds?

Response:

Sage grouse are buffered as required by existing best management practices, including the plan listed in the comment, as well as additional memoranda and expert opinions noted in the EA. APHIS consults with and follows the latest best practices numerated in USF&W consultation (and summarized in the EA), and any further requests from local management agencies requesting treatments, such as the BLM. The final EA is updated with the latest results of that effort from this year. Organophosphorus pesticides are not considered for use in this EA, which will hopefully explain why they were not discussed in this EA.

Xerces Society, 17 comments received on 3/15/2021:

Comment 1:

The EA Fails to Disclose Treatment Request Locations and Does Not Adequately Describe the Affected Environment or Analyze Impacts to the Affected Environment

APHIS claims that its grasshopper suppression efforts are akin to an “emergency.” For example, the following is stated in the EA: *“The need for rapid and effective response when an outbreak occurs limits the options available to APHIS to inform the public other than those stakeholders who could be directly affected by theactual application. The emergency response aspect is why site-specific treatment details cannot be known, analyzed, and published in advance.”*

In this age of information, when the entire world can be informed of a decision via the push of a button,such an explanation for failing to inform the public--in advance--of treatment locations, acres, and methods falls rather flat. As APHIS explains in the EA, APHIS only conducts treatments after receiving requests. Moreover it is our understanding that a state's treatment requests must be submitted for funding approval to headquarters in Washington D.C., and that this budget requesting work occurs during the winter. Therefore, this information must exist in APHIS files, and there is no valid reason for not disclosing more specific treatment maps, together with an estimate of acres to be treated and likelymethod and chemical -- in the Draft EA and certainly by the Final EA. After all, treatments commonly occur within weeks after the Final EA is published, so APHIS doesn't start planning for these after the Final EA.

Instead, as published, the Draft EA provides almost no information in the way of solid information aboutwhere, how, and when the treatments may actually occur within the counties covered under the EA, during the year 2021. As a result, it is impossible to determine if applications might occur to sensitive areas or species locations within the specified counties. Similarly, the scale of potential applications is left out. Without a description of the average size of treatments in this state and the range over say, the last 25 years, we don't know how to assess the potential impact of the treatments.

This lack of transparency about the location of actual treatment areas, particularly on public lands, is adisservice to the public and prevents the public from reviewing sufficient information to be able to gauge the justification for and the risks involved in the suppression effort. Furthermore, as a result of the lack of specificity in the EA, it is impossible to determine whether effects would actually be significant or not.

Obviously, final treatment decisions should hinge on a firm understanding of nymphal densities as well as other conditions related to the economic threshold, as described by APHIS, and it could be that APHISwould decide not to treat an area that was included in a budget request. Nonetheless, in order to adequately inform the public, describe the affected environment, and project impacts, APHIS should provide the treatment request areas with the EA, even if actual treatments end up less than these.

Recommendation**:** Our recommendation is the same as last year since this EA possesses the same inadequacies in terms of specific information. We urge APHIS to delay the publication of a FONSI until after all treatment areas have been delineated and are identified to the public, using maps and providing acreage. Site-specific information related to the resources and values of these locations should then be included. This would provide the public with much better understanding of the justification for the treatment, the actual number of acres to be treated and their location, the methodto be used, and the scale of potential effects to local resources. This specific information should be posted at the APHIS website as soon as it is available, sent to interested parties, and made available forpublic comment.

In future years, we urge APHIS to delay release of the EA until after treatment requests are received andall treatment areas have been delineated and are identified to the public.

Response:

Thank you for your engagement on this program. APHIS values criticism of the program to ensure that it meets the highest possible environmental standards as demanded by the public at large and recommended by non-profit environmental advocacy groups such the Xerces Society.

The potential treatment area is described in the EA, however the exact locations within that cannot be determined in advance of spring hatch, and that timeframe does not allow for additional review during the active season, unless the commentor would prefer knowing exact details of an area that would need treatment over the demand of the public to have economically and ecologically effective treatment (e.g. spraying broad spectrum pesticides in July in an area the public has had time to review in detail). This is not how modern Integrated Pest Management (IPM) science best management practices work, and would not be in anyone's best interest, certainly not the public's.

Annual reports are provided to all interested parties in the fall of the year prior which show areas around the state where (public or private) treatments may be warranted. APHIS would refer interested parties to this for a rough forecast of precise locations, rather than the EA, though the EA is specific to 17 eastern Oregon counties which share many relevant features. Furthermore, APHIS programs frequently repeat in specific areas where the public demand for such work is high and this information could also be reviewed for trends, such as was provided in 2020 by APHIS and other agencies for a FOIA request. Specific criticism of the work from those angles would be welcome, however this demand does not seem to be that practical, rather it seems to be intended to prevent APHIS from using IPM.

Finally, when an actual program location is considered by APHIS in early spring, it is reviewed for any possible considerations suggesting significant impacts that were not discussed in the Draft EA, that might require major revision of APHIS' analysis and another public comment period before completing the Final EA. In sum, APHIS does not agree that "almost no information in the way of solid information about where, how, and when the treatments may actually occur" is stated in this EA, rather this is precisely the purpose of this document. If the commentor can specify where, how, and when this EA actually fails to do so, that would be most constructive and welcome input.

Comment 2:

APHIS includes only a single action alternative and fails to analyze other reasonable alternatives, such as buying substitute forage for affected leaseholders. In addition, the single action alternative combines conventional and RAATs applications in one alternative, while theconsequences do not fully explore and explain the relative impacts of these two methods.

As described in the 2019 EIS, potential outcomes of forage loss on a leaseholder's plot of land, should itbe untreated, could be the rancher seeking to buy alternative sources of forage, leasing alternative lands, or selling livestock. The EIS did not fully evaluate these options, so it is important that the EA go further. For example, a reasonable alternative that could be examined would be for the federal government to subsidize, fully or partially, purchased hay. But in its current form, the EA includes no discussion of a reasonable alternative such as this.

Instead, the EA contain a single action alternative that encompasses suppression treatments using eitherthe "conventional" method (i.e. full rates, blanket coverage) or the RAATs method (i.e. reduced rates, skipped swaths). Given that these two options are combined into a single alternative the consequences section should be careful to fully analyze the impact of the treatments at the conventional rates with blanket coverage. However in many cases APHIS focuses simply on the RAATs method and does not discuss impact from the "conventional" method. As an example, this language is included for the discussion of carbaryl impacts on pollinators: *"In areas of direct application where impacts may occur, alternating swaths and reduced rates (i.e., RAATs) would reduce risk."* In other cases, APHIS provides an assessment but does not indicate if its risk conclusion applies to the conventional method and the RAATs method, or one or the other.

Recommendation**:** APHIS should include a reasonable alternative to chemical suppression, such as buying alternate forage for affected landowners. Given the many other values of, and ecosystem services provided by, public lands, it only makes sense to consider such an alternative. In addition, APHIS should separate the conventional from the RAATs method into two different alternatives, and analyze them accordingly.

Response:

APHIS is not authorized to address issues of lost ranching income by any conceivable means; however it is required by the Plant Protection Act to help control economic grasshopper outbreaks. There have been instances in Oregon where Federal neighbors did supply ranchers with hay, however this is far outside of APHIS' mandate, except that it would be a potential consequence of the non-treatment option considered in the EA.

The RAATs method and the conventional treatment method are not significantly different in measurable terms that have been documented, as is perhaps clear from a lack of a citation in the comment. RAATs is the preferred method in Oregon and is almost always employed if timing is good to have an ecological effect, if for no other reason than the cost to the tax-payer is cut in half, and is often required by the land management agency requesting treatment, since this is the most efficient and least damaging method available, and has been since USDA developed and proved these methods several decades ago.

Comment 3:

Impacts are described as "reduced" in many portions of the environmental consequence section, but APHIS rarely describes "reduced" in comparison to anything else.

APHIS liberally employs relative language to create an impression of low risk. For example, in numerouslocations in the environmental consequences section of the EA, APHIS described risk as "reduced." Reduced compared to what, exactly? The inexactness and lack of specificity of such statements make the EA of little utility for a citizen trying to determine the actual predicted impacts of insecticide spray on large blocks of Western rangelands.

Recommendation**:** APHIS must be more clear, specific, and careful about how it describes risk. The useof relative terms such as “reduced” should be avoided unless APHIS is very clear about the factors and results being compared.

Response:

Specific citations where the use of this term is unclear are not provided. This would be a contextual argument, so it is not possible to determine exactly what is in question here. In general, “reduced” can be defined as: “to diminish in size, amount, extent, or number”. Impacts are expected to be reduced by reduction of application and/or volume of pesticides or other mitigation measures such as buffers that are described in detail in the EA. Beyond this, it is hard to respond to this comment in detail.

Comment 4:

APHIS has not demonstrated that treatments in Oregon in 2021 meet the “economic infestation level.” No site-specific data is presented in the EA that justifies the treatmentbased on the “economic infestation level.”

The APHIS grasshopper suppression program draws its authority from the Plant Protection Act of 2000(7 U.S.C § 7717). The statute authorizes APHIS to authority to exclude, eradicate, and control plant pests, including grasshoppers. Specifically, language in the PPA provides authority for APHIS to protectrangeland from “economic infestation” of grasshoppers. In its recent EIS updating the program (APHIS2019), the Agency describes its determination of an economic infestation as follows:

The “level of economic infestation” is a measurement of the economic losses caused by a particular population level of grasshoppers to the infested rangeland. This value is determined on a case-by-case basis with knowledge of many factors including, but not limited to, the following: economic use of available forage or crops; grasshopper species, age, and density present; rangeland productivity and composition; accessibility and cost of alternative forage; andweather patterns. In decision-making, the level of economic infestation is balanced against the cost of treating to determine an ‘economic threshold’ below which there would not be an overall benefit for the treatment. Short-term economic benefits accrue during the years of treatments, but additional long-term benefit may accrue and be considered in deciding the total value gainedby a treatment.

Such a measure is in accordance with general IPM principles that treatments should only occur if it is judged that the cost of the treatment is less than the revenues expected to be received for the product.

One would expect that APHIS would have undertaken such an analysis in the EIS or the site-specific EAs—or at least model it—so as to determine whether the treatments might be justified because theyhave reached a “level of economic infestation.” Yet none of the variables are discussed in the EA at all,nor is site-specific data presented for any of these, and the reader is left to simply assume that all treatments obviously meet the economic threshold.

On public lands, from a taxpayer point of view, it makes sense that—as the grasshopper suppression effort is a federally supported program—costs of the treatment to the taxpayer should be compared tothe revenues received by the taxpayer for the values being protected (livestock forage) on public lands.

Typical costs per acre can be obtained from previous treatments. For example, according to an Arizona2017 Project Planning and Reporting Worksheet for DWP# AZ-2017-02 Revision #1 (Post treatment report) the cost of treatment amounted to $8.72/treated acre, or $3.99/"protected acre." (The first figure applies to the cost for areas directly sprayed, the latter figure calculates a larger "protected acre" figure assuming that treatment effects radiate out into untreated swaths. This report was obtained through a FOIArequest.) In 2019, similar post-treatment reports report the costs as $9.39 per treated acre and $4.41 per "protected acre". Note that these costs summaries only include what appear to be the direct costs of treatment (i.e.salaries and per diem of the applicators, chemical, etc.). Administrative costs do not appear to be included in these cost estimates, nor do nymph or adult survey costs.

Information from a FAIRS Report (obtained through FOIA, not from APHIS' environmental documents)for aerial applications in Wyoming appear to indicate that aerial contracts cost between $9.76-
$14.61/acre. However, the report is not easy to interpret and it is unclear if these are correct costs/acre.

In determining whether a treatment is economically justified, one must ask what is the revenue expected to be received for the product? CARMA, the model used by APHIS to determine if a treatmentshould occur, shows that in Oregon, it takes from 1-19 acres of rangeland to support one animal unit- month (AUM). Currently, on federal BLM and Forest Service lands, the US taxpayer receives $1.35 per AUM. As a rough estimation, taking the average within the carrying capacity range (10 acres per AUM), and calculating the value of the forage per acre as paid to the American taxpayer, the US taxpayer receives an estimated $0.14 per acre for the forage value on BLM or USFS federal rangelands in Arizona.

Given that the direct costs of grasshopper treatments to the taxpayer appear to range from $3.99 up to $14.61/acre, it is clear that the economic threshold is nowhere near being met. The program makes noeconomic sense from the point of view of the taxpayer.

Recommendation*:* Available data suggest that APHIS does not have adequate support to demonstrate that it treats only after lands reach an "economic infestation" according to its own definition. In addition, there appears to be insufficient support to demonstrate that APHIS will meet an economic threshold before treating. APHIS must disclose its analysis that it has determined the lands to be treatedmeet the level of economic infestation according to its definition, and APHIS must demonstrate in each EA, that treatment is justified by meeting an economic threshold. On federal lands, costs of protecting the forage must be compared to the revenues received for the program. If site-specific data such as rangeland productivity are not available or current, APHIS should use known values from recently available comparable data. In addition, if insecticide applications are proposed to suppress grasshoppers, APHIS should also explore other options as an Alternative in the EA, such as buying substitute forage. We are aware that public lands are sometimes treated as a way to protect adjoining private lands. This is troubling; public lands should not be subjected to large-scale treatments to protect private interests.

Response:

This comment questions the worth of grasshopper suppression on rangeland. Its exact points however are difficult to parse out in terms of just which of the demands it attempts to place on the program are grounded in law. The commenter attempts a primarily fiscal argument, but does not follow through on analysis of what is actually specified in the EA, in favor of saying the matters are not discussed at all. Furthermore, NEPA requires environmental risk analysis and it is not clear that APHIS is required to demonstrate any economic analysis in an Environmental Assessment, beyond laying out the conditions under which such would be necessary, that is justifying a cause for action.

While the goal of IPM is agreed to by all--that is, the timely intervention that is a net benefit both ecologically and economically--the comment falsely claims that no attempt is made to describe a model for its determination (or even what variables would be for such). Contrary to this, the factors involved that APHIS and land managers should evaluate in moving forward with treatments are described in the EA. APHIS should perhaps add the one that is presented here, as a stand in for the more wholistic model presented in the EA, that is the revenue from grazing allotments. Presumably this transfer of funds would be somewhat impacted, potentially, though not directly, and so was not included in the EA. In the long term though, it is possible that grazing allotments would go unfilled due to low productivity, which could add to the net benefit of an efficient IPM program on grasshopper impacted habitats.

Comment 5:

APHIS relies too heavily on broad assertions that untreated swaths will mitigate risk. Untreated swaths are presented as mitigation for pollinators and refugia for beneficial insects, but drift from ULV treatments into untreated swaths at typical aircraft heights is not fully disclosed, while studies are mischaracterized.

This EA and the EIS claim that the use of untreated swaths will mitigate impacts to natural enemies,bees, and other wildlife. For example:

- Final EIS p. 34: “With less area being treated, more beneficial grasshoppers and pollinators willsurvive treatment.”
- Final EIS P. 57: “The use of RAATS provide additional benefits by creating reduced rates and/or untreated swaths within the spray block that will further reduce the potential risk to pollinators.”
- Final EIS p. 26. “Studies using the RAATs strategy have shown good control (up to 85% of that achieved with a traditional blanket insecticide application) at a significantly lower cost and lessinsecticide, and with a markedly higher abundance of non-target organisms following application (Lockwood et al., 2000; Deneke and Keyser, 2011).
- Oregon 2021 EA: “Based on the review of laboratory and field toxicity data for terrestrial invertebrates, applications of diflubenzuron are expected to have minimal risk to pollinators ofterrestrial plants. The use of RAATs provide additional benefits by using reduced rates and creating untreated swaths within the spray block that will further reduce the potential risk to pollinators.”

However, the width of the skipped swaths is not designated in advance in the EA, and there is nominimum width specified.

APHIS' citation of a study by Lockwood et al. (2000) to claim that RAATS treatments result in "a markedly higher abundance of non-target organisms following application" appears to be far too rosy anassessment. We note that:

1) The study authors make clear that reduced impact to non-target arthropods was "*presumably due to the wider swath spacing width* [which measured 30.5 and 60 m in the study]"**.** Obviously,these swath widths are on the high end of what could be used under the EA.

2) APHIS leaves out one of the key findings of the study: For carbaryl, the RAATs treatment showed*lower* abundance and biomass of non-targets after treatment compared to the blanket treatments on one of the two ranches at the end of the sampling period (28 days). Also, on bothranches, abundance and biomass reached their lowest points at the end of the study after treatment with carbaryl, so we don't know how long it took for recovery to occur.

   Moreover, many features of the study several features of the study make it less than useful forpredicting impacts under APHIS' current program. We note that:

3) This study only investigated RAATs effects to non-targets for carbaryl, malathion, and fipronil,not on diflubenzuron.

4) In addition, the study measured highest wind speeds at 6.0 mph, well below the maximum rate allowed under the operating guidelines indicated in the 2021 Treatment Guidelines (10 mph foraerial applications, no maximum wind speed specified for ground applications).

5) The experimental treatment areas in the study (243 ha or 600 acres) were quite small compared to aerial treatment sizes that occur in reality (minimum 10,000 acres for aerial treatments). Thiscould have allowed for recolonization from around the edges that would result in more rapid recovery, compared to a real-world treatment, some of which measure tens of thousands of acres.

APHIS also cited Deneke and Kyser (2011) to justify its statement that RAATs results in a "markedly higher abundance of non-target organisms following application." Deneke and Kyser's publication is anextension publication, not a research publication, and contains absolutely no data to show that RAATs conserves non-targets.

Neither the EA nor the 2019 EIS presented estimated environmental concentrations (EECs) in the untreated swaths and simply included statements that untreated swaths would reduce risk to nontargets. To fully understand expected environmental concentrations in treated swaths, it is important to have a clear assessment of drift under the conditions that occur under the APHIS grasshopper program. While APHIS' 2019 EIS described its use of a quantitative analysis of drift anticipated from ULV aerial applications (see HHERA for diflubenzuron) to estimate deposition into aquatic areas, the information presented in the EIS and HHERA is insufficient to fully understand expected environmental concentrations in untreated swaths. To better understand this issue, we looked more closely at several drift analyses and studies to better understand the potential for drift.

EPA (2018) in its most recent ecological risk assessment for diflubenzuron, included a low volume aerial drift analysis using the model AgDrift. EPA assumed a volume mean diameter (VMD) of 90 µm [note that this is approximately 2/3 of the VMD used in the APHIS analysis]. Under EPA's analysis, the drift fraction comprises 19% at 150 ft. However, this analysis is likely not helpful for most aerial APHIS grasshopper program applications, as the EPA analysis is basedon a boom height of 10 feet while APHIS aerial release heights are typically much higher.

Schleier et al. (2012) performed field studies to measure environmental concentrations of ground-based ULV-applied insecticides. Sites contained little vegetative structure and a flat topography. The authors observed that an average of 10.4% of the insecticides sprayed settled out within 180 m (591 ft.) of the spray source. According to the authors, these results are similarto measurements in other studies of ground-based ULV applications using both pyrethroid and organophosphate insecticides, which found 1 to 30% of the insecticide sprayed deposits on the ground within 100 m (328 ft) of the spray source.

According to information APHIS provided to NMFS in a 2010 Biological Assessment (obtained through a FOIA request), actual aerial release heights are likely to be in the area of 75' above the ground (APHIS 2010). Modeling of drift using aerial methods and a 75' release height was conducted using the model AgDISP in this BA; modeling using ground methods was conducted using the model AgDRIFT. In both cases the droplet size was set as "very fine to fine" which corresponds to a Volume Mean Diameter (VMD) of 137.5 um.

Outputs from the models are very difficult to interpret from the information in the BA which is only presented as a chart with the y-axis at a scale too coarse to adequately interpret the resultsand decline at different points distant from the spray. However, for the aerial diflubenzuron application, it appears that the model predicts deposition at point zero (below the treated swath) to be approximately 1 mg/m^2. APHIS states subsequently that the model predicts deposition at 500 feet to measure 0.87 mg/m2. Translated into lb/acre this means a deposition of 0.009 lb/A at point zero and 0.0078 lb/acre at 500 foot distance, with approximately a straight line of decreasing deposition between those two points. (We use these figures later in estimating the effect of these estimated environmental concentrations on non-target pollinators.)

According to drift experts, the most important variables affecting drift are droplet size, wind speed, andrelease height (Teske et al. 2003). In analyzing these three drift analyses, we note that neither the Dimilin 2L label nor the Sevin XLR Plus label requires a minimum droplet size for ULV applications on grasslands and non-crop areas, for the control of grasshoppers and Mormon crickets. However, other uses of ULV technology for pest control assume much smaller droplet sizes than what APHIS has assumed (VMD of 137.5). For example, for ULV applications used in adult mosquito control operations, VMD measures between 8 and 30 µm and 90% of the droplet spectrum should be smaller than 50 µm (Schleier et al. 2012). EPA estimates VMD for ULV applications as 90 µm (USEPA 2018).

The EPA analysis is of very limited utility based on the release height, as pointed out above. And while itis helpful to have found the APHIS AgDISP analysis, we believe it—and the EIS and EAs that appear to rely on it—likely underestimates drift, and the resulting risk to non-targets within skipped swaths, as a result of several factors:

1) The APHIS AgDISP analysis only analyzed deposition at the lower end of the application rate corresponding to 0.75 lb/acre (0.012 lb/A) rather than the upper end of the application rate thatcorresponds to 1 oz/acre (0.016 lb/A) which is a rate often specified in contracts.

2) The APHIS aerial AgDISP analysis was conducted with a VMD of 137.5, far larger than thosepredicted for other ULV analyses. APHIS never explains exactly why.
3) The number of flight lines are not specified in the input, yet according to the AgDrift user guide, "*the application area (swath width multiplied by the number of flight lines) can potentially havea major impact*" on drift (Teske et al. 2003).
4) APHIS Program operational guidelines (included as an appendix in the EA) do not specify any minimum or maximum droplet size therefore it is unknown what nozzles are actually being usedand what droplet sizes are actually being emitted.

In conclusion, APHIS has not presented evidence that its RAATs method, even with skipped swaths 200feet, will "provide additional benefits" or significantly increase the survival of pollinators or other beneficials within the treated blocks. Given the enormous size of many treated blocks (a minimum size for treatment is typically 10,000 acres, while treatment blocks of 100,000-150,000 acres are not uncommon in some states) and the limited mobility and small home ranges of many terrestrial invertebrates, it is essential that AHIS conduct a rigorous assessment of drift into untreated swaths andcompare that to toxicity endpoints for representative species.

Recommendation**:** APHIS should commit to minimum untreated swath widths wide enough to meaningfully minimize exposure to bees and other beneficials. APHIS must use science-based methodologies to assess actual risk from the proposed treatments and institute untreated swaths thatwould ensure meaningful protections for bees and other beneficials. APHIS should disclose its quantitative analysis and the EECs it expects--by distance-- into untreated swaths for each application method it proposes. APHIS must also specify in its operational procedures the use of nozzles that will result in droplet spectra that accord with its analysis.

Response:

The EA in question does not include ULV formulations (e.g. Sevin XLR), so much of this three page long comment is seemingly irrelevant to a discussion of the program in Oregon. Furthermore, it is implied that some pesticides in question are broad spectrum & impacting adult insects, which is also not the case in this EA.

APHIS has specific requirements for its treatment contracts, including nozzles specs that are tested for efficacy. Though not discussed in the EA since its relevance to NEPA is not immediately clear, in general, vastly over-spraying a treatment block as stipulated (e.g. not having sufficient non-spray widths or spraying out of bounds) would be flagged and considered a breach of contract in arial treatments.

It is not exactly clear how this comment generally relates to the EA in question, besides the commentor not being credulous of RAATs as it is intended as a methodology. Since as mentioned above, RAATs and conventional treatment are considered as a single option, since there is very little difference in outcome that is demonstrable between the two approaches, and in theory either would be acceptable. In practice however, RAATs have become the standard, and generally has been implemented many times with the expected reduction in volume and acreage in evidence. Furthermore, real time environmental monitoring occurs to watch for wind or temperature conditions that might cause unacceptable levels of drift—this management practice is described in the EA.

Comment 6:

The EA understate the risks of the insecticides diflubenzuron and carbaryl for exposed bees and other invertebrates.

The single action alternative identifies two insecticide options (liquid diflubenzuron and carbaryl bait), and states that the choice of which to use will be site-specific, without being clear about how that choice of insecticide is made. Still, according to the EIS, diflubenzuron was used on 93% of all acres treated between 2006 and 2017 and the Program used malathion only once since 2006. In addition, theEA indicate that ground treatments may occur, but the EIS states "*In most years, the Program uses aircraft to apply insecticide treatments."* If past is prologue, then we can expect that a majority of treatments that will occur under this EA will be with diflubenzuron (Dimilin 2L; EPA Reg. No. 400-461) applied via aircraft.

The EA give almost no actual information on how either of these two chemicals will impact bees in the sprayed swaths, in the unsprayed swaths, or beyond the treatment block. This is unfortunate, as pollinators, including bumble bee species within the range of potential treatments, are facing significantdeclines (National Research Council 2007; Cameron et al. 2011).

Diflubenzuron*:* Diflubenzuron is an insect growth regulator and functions by disrupting synthesis of chitin, a molecule necessary to the formation of an insect's cuticle or outer shell. An insect larva or nymph exposed to diflubenzuron is unable to successfully molt and thus dies. Chitin is not limited to insect cuticles, but is also, for example, a component of mollusk radula, fish scales and fungi cell walls.

While insect growth regulators are often considered "selective", pollinators such as native bees and butterflies have no inherent protection against diflubenzuron and immatures are vulnerable to injuryand death if exposed.

The risk assessment included for diflubenzuron (attached to the 2019 EIS) makes little to no mention ofan important attribute of this insect growth regulator that EPA (in its 2018 Ecological Risk Assessment) does point out. Namely that tests run according to standardized adult testing guidelines may mask effects: "Chitin synthesis is particularly important in the early life stages of insects, as they molt and form a new exoskeleton in various growth stages. Thus, aquatic guideline tests, (or terrestrial invertebrate acute tests), which typically run for 48 hours, may not capture a molting stage, and thus underrepresent acute toxicity. Single doses may cause mortality, if received at a vulnerable time.

Consequently, conclusions from RQs based on acute toxicity studies for invertebrates may not fullyrepresent actual risk."

Given its toxicity to juveniles, rather than adults, the relevant laboratory toxicity data that should be reported by APHIS in the EA for its analysis of effects is larval toxicity data. However, while the EA discloses that diflubenzuron would result in greater activity on immatures, APHIS leaves out key information, such as the expected environmental concentration (EEC) from application, and how those concentrations compare to toxicity levels for immatures. After all, for bees, pollen collected by adults during breeding season (which coincides, for many species, with grasshopper spray windows) will meanexposure to developing larvae of bees, who may consume contaminated pollen placed in the nest by adults.

Forced to do this analysis ourselves, we located this relevant information elsewhere. There is a standardtool, known as Bee Rex, that calculates EECs from deposition to pollen and/or nectar, based on application rate (USEPA 2017). Bee Rex also allows for a comparison between the estimated environmental concentration and the acute or sublethal toxic endpoint for adults and/or larvae. For honey bees (the surrogate species for invertebrate risk assessment in the absence of other data), USEPA(2018) reported a chronic 21-day ED50 and NOAEL of 0.012 and <0.0064 µg a.i./larva, respectively.

Using these values, we conducted an assessment of the potential chronic dietary risk to bee larvae. Weutilized deposition values assuming no drift under both the full and reduced rates as specified in the EA(0.75 or 1.0 fluid ounce per acre (0.012-0.016 lb a.i./ac)). We also utilized deposition values using the point zero and point 500 feet (since we could not deduce an actual value for a 100-foot or 200-foot deposition rate, we used the deposition rate at 500 feet from the APHIS BA to NMFS. This would be a low end estimate since it's 2.5-5X further than the furthest edge of an unsprayed swath) analyses presented in the APHIS drift analysis included in its BA to NMFSas mentioned above. Table 1 shows the outputs with Expected Environmental Concentrations and Risk Quotients, as calculated by the BeeRex tool. (APHIS presents no information in the EA that indicates the EECs would be any less than this, therefore these values are assumed to be the correct EECs within treated swaths at these two rates.)

Table 1. DIFLUBENZURON Bee Risk Assessment

Application Rate (lb ai/A)	Scenario	Pollen/nectar EEC (mg/kg)	ollen/nectar EEC (ppb)	l RQ Chronic dietary	Number of times LOC (Larval)
0.16	Full	1.76	1760	18.1	18
0.12	RAATS	1.32	1320	13.6	14
0.009	pt. zero APHIS drift analysis in 2010 BA	0.981	981	10.1	10
0.0078	pt. 500 APHIS drift analysis in 2010 BA	0.858	858	8.8	9

Risk quotients (RQ) of 1.0 based on ED50 indicate that the estimated environmental concentration is sufficient to kill 50% of exposed bees after the chronic exposure. The Level of Concern (LOC) is an interpretation of the RQ. Normally the LOC is established at RQ=1.0. However for acute risk to bees, because of bees' great ecological and agricultural importance, combined with concern about the risks posed to them by pesticides, EPA sets the LOC value at RQ=0.4. Chronic risk to bees is still evaluated with an LOC at RQ=1.0 (USEPA, 2014). As indicated in Table 1, even at 500 feet from the application site,using APHIS predictions for deposition, RQs range from 8.8 to 18.1 while LOCs range from 9-18. LOC values this high indicate a high risk of harm for exposed bee larvae.

However, APHIS discounted the risk of diflubenzuron to pollinators in the EA as follows:

Based on the review of laboratory and field toxicity data for terrestrial invertebrates, applications of diflubenzuron are expected to have minimal risk to pollinators of terrestrialplants.

APHIS also cites Mommaerts et al. (2006), noting that reproductive effects were observed on bumble bees, but claiming that these effects were observed at much higher use rates than those used in the program. Unfortunately, this is incorrect. Mommaerts et al. (2006) conducted dose-response assays and found that exposure to diflubenzuron resulted in reproductive effects in *Bombus terrestris*, with only the doses at 0.001 (one thousandth) of maximum field recommended concentrations (MFRC) in pollen and 0.0001 (one ten thousandth) in sugar water resulting in effects statistically similar to controls.The MFRC for diflubenzuron is listed in the study as 288 mg/L (equivalent to 288,000 ppb). At 1/10,000 of this level, diflubenzuron effects would be similar to controls only at levels at or below 28.8 ppb while at 1/1000 of this level, diflubenzuron “no effect” concentrations would be equivalent to 288 ppb.

Recall that the EECs for diflubenzuron under the program are expected to range from 1320 ppb to 1760ppb as shown in Table 1 (RAATs rate, full rate, respectively). The Mommaerts study thus shows the opposite of what APHIS claims – that reproductive effects would be expected at the EECs expected for grasshopper suppression, even at the lower rate anticipated to be used under RAATS and even at 500 feet away. This raises concern that the application of diflubenzuron at the specified RAATS rates may cause severe impacts to bumble bee reproduction within treated areas.

Moreover, APHIS points out that the alfalfa leafcutting bee (*Megachile rotundata*) and the alkali bee (*Nomia melanderi*) are both considered more susceptible than honey bees or *Bombus to* diflubenzuron.Additionally the EIS discloses that under some circumstances, Dimilin may be quite persistent; field dissipation studies in California citrus and Oregon apple orchards reported half-live values of 68.2 to 78days. Rangeland persistence is unfortunately not available, but diflubenzuron applied to plants remainsadsorbed to leaf surfaces for several weeks.

Carbaryl: According to EPA (2017b), carbaryl is considered highly toxic by contact means to the honey bee, with an acute adult contact LD50 of 1.1 ug/bee. The APHIS 2019 EA describes the oral LC50 value as
0.1 ug/bee. (Honey bee toxicity values for technical-grade carbaryl are used here since the APHIS EA did not include information on the toxicity of the formulated product that it uses.) Larval bee toxicity was not available from the APHIS 2019 EA.

Oregon has chosen to only allow the bait formulation of carbaryl this year. It is our understanding that baits as used in the grasshopper suppression program do not represent an exposure risk to bees since they do not pick it up deliberately. Therefore, carbaryl bait, while highly toxic to those insects that wouldingest it, at least avoids some of the exposure concerns of carbaryl spray.

Recommendation***:*** Faced with significant and concerning pollinator declines, APHIS should take into account the risk to native bees and butterflies from these treatments. At a minimum, APHIS should be presenting a more thorough and accurate analysis on the impacts of selected pesticides to pollinators and other beneficial insects. Research findings do portend worrying results for native pollinators and other beneficial insects exposed in the treated areas, even for diflubenzuron. APHIS should constrain its treatments to take into account pollinator conservation needs—especially where species of greatest conservation need are located—and improve its monitoring capability to try to understand what non-target effects actually occur as a result of the different treatments.

Response:

Information on the possible effects of diflubenzuron on bees and pollinators is provided in the EA, which is also tiered to more extensive analysis in the 2019 EIS (page 45-46 and 55-57) and the HHERAs for Carbaryl (page 21 and 44) and Diflubenzuron (pages 13-14, 29-30) that addresses risk to pollinators including bees and their larval stages.

The commenter's risk quotient (RQ) analysis compares their calculated estimated environmental concentration (EEC, from the BeeREX Tier 1 risk screening tool) to the dietary LC_{50} and NOAEL. The residues are based on T-REX, an EPA terrestrial plant residue model, that is used to estimate exposure to food items consumed by birds and mammals. In the case of BeeREX they use residues that would be expected from direct application onto long grass. These values would not be anticipated to occur on pollen. Additionally, nectar pesticide residues may be as much as an order of magnitude below levels that would occur on pollen (EFSA, 2017). The BeeREX model assumes that pesticide residues are equal in pollen and nectar. It is unclear how the commenter used effect concentrations expressed in mg/L (cited in the literature) to mg/kg which is not a direct conversion. APHIS invites them to share their modelling assumptions and inputs. APHIS notes that as is appropriate for a Tier 1 risk screening tool, BeeREX is very conservative method for estimating residues on pollen and nectar.

APHIS conducted a thorough risk analysis based on published toxicological studies for carbaryl and diflubenzuron and that analysis is provided in the HHERAs. The commenter asserts that APHIS incorrectly evaluated the exposure data presented in the Mommaerts et al. study of chitin synthesis inhibitors, including diflubenzuron. The researchers exposed bees via a contact application of 288 mg/L aqueous concentration which was topically applied to the dorsal thorax of each worker with a micropipette. Bumblebees also ingested orally sugar/water treated with the same concentration of diflubenzuron solution over a period of 11 weeks. Pollen was sprayed with the same concentration of diflubenzuron until saturation and then supplied to the nests. The bumble bees were not restricted in how much of these contaminated solutions they could consume.

APHIS's review of the study did not identify findings of effects caused by diflubenzuron at the concentrations represented above by the commenter, "Mommaerts et al. (2006) conducted dose-response assays and found that exposure to diflubenzuron resulted in reproductive effects in Bombus terrestris, with only the doses at 0.001 (one thousandth) of maximum field recommended concentrations (MFRC) in pollen and 0.0001 (one ten thousandth) in sugar water resulting in effects statistically similar to controls." The researchers instead estimated mean LC_{50} concentrations based on the chronic exposure routes described above. These were 25 mg a.i/L dermal contact, 0.32 mg a.i/L ingested sugar-water, and 0.95 mg a.i/L pollen. The researchers noted, "In practice, bumblebees will rarely be exposed to such high concentrations, but these experiments have been undertaken to evaluate with certainty the safety and compatibility of compounds with bumblebees." They elaborated, "the present authors agree that, before making final conclusions, it is necessary that the laboratory-based results are validated with risk assessments for these insecticides in field related conditions."

APHIS believes conversion and comparison of program applied foliar spray rates to the concentrations of the solutions applied in this study would rely on unrealistic exposure scenarios. An exposure scenario *where pollinators are exposed continuously for 11-weeks is not expected to occur in the APHIS grasshopper and Mormon cricket suppression program. In field applications diflubenzuron levels would decline over the 11-week exposure period due to degradation, flowering plants that have diflubenzuron residues would no longer be available for foraging by pollinators as flowers naturally die and do not provide pollen and nectar, and other plants would bloom after application without residues of diflubenzuron.*

APHIS recognizes that there may be exposure and risk to some pollinators at certain times of the application season from liquid insecticide applications used to control grasshopper and Mormon cricket populations. APHIS reduces the exposure and risk to pollinators by using rates well below those labeled for use by EPA. Current labeling for grasshopper treatments also allows multiple applications per season. APHIS uses one application per season further reducing the risk to pollinators when compared to the current number of applications that can be made in a year to rangeland.

Comment 7:

APHIS never analyzes the possibility that its suppression effort may actually worsen future outbreaks of grasshoppers.

Prior to chemical suppression of grasshoppers in the Americas, grasshoppers were regulated primarilyby natural processes, including natural enemies such as birds, predatory insects, diseases, and even competition with other grasshoppers.

Chemical suppression of grasshoppers runs the very real risk of disrupting these important natural regulation processes, potentially setting the stage for worsened outbreaks in the future. This is not an idle thought – this possibility has explored by respected grasshopper researchers in a number of publications. For example, see Joern (2000) who discussed this information and concluded that large-scale grasshopper control may contribute to grasshopper problems. An analysis of adjoining Montana and Wyoming counties supported this analysis, showing that where large-scale chemical control was notregularly applied, acute problems rapidly disappeared and long intervening periods of low grasshopper density persisted. Conversely, in places where a history of control existed, chronic, long-term increases in grasshopper populations were observed (Lockwood et al. 1988).

Lockwood et al. (1996-2000) explored identified infested areas, their sizes and what happened to themin subsequent years. Data was presented for 15 untreated and 4 untreated areas. Of these, only two untreated areas grew in size in their 2nd year, and most winked out by the 2nd year, not reappearing by the 3rd year. This is powerful evidence that not treating is a viable decision, or that treating is not warranted in the first year, at least for small infestations, and at least if the goal is to minimize the chance that an outbreak/hotspot would result in something worse in the following year.

APHIS rationalizes its program, often stretching science to the point beyond where it is credible. For example, APHIS cites a study by Catangui et al. (1996-2000) which investigated the effects of Dimilin on non-target arthropods at concentrations similar to those used in the rangeland grasshopper suppressionprogram. In APHIS' characterization, the study showed that treatment with Dimilin should be of no concern since applications resulted in "minimal impact on ants, spiders, predatory and scavanger beetles." However, APHIS does not disclose that the plots studied by Catangui measured only 40 acres. This is a far cry from the ground treatments normally measuring thousands of acres or the aerial treatments measuring a minimum of ten thousand acres that are seen in the actual grasshopper suppression program. Small treated plots of 40 acres can be quickly recolonized from the edges. Large treated plots are quite a different story.

Quinn et al. (1993) examined the co-occurrence of nontarget arthropods with specific grasshopper nymphal and adult stages and densities. The study reported that nymphs of most dominant grasshopperspecies were associated with Carabidae, Lycosidae, Sphecidae and Asilidae, all groups known to prey on grasshoppers. The authors state that "*the results suggest that insecticides applied to rangeland when*

most grasshoppers are middle to late instars will have a maximum impact on nontarget arthropods." (Note that applying during this developmental stage is a necessity with the use of chitin-inhibiting insect growth regulators such as diflubenzuron.)

Large scale treatment effects on ground beetles were investigated by Quinn et al. 1991. While this studywas more akin to real-life treatments in the design, and found that initial large effects on ground beetleshad disappeared by the 2nd year, this study did not investigate diflubenzuron, only malathion, carbaryl bait. The authors also state that "*the lack of a carryover effect in the second year is most likely due to thetiming of grasshopper control treatments…adult ground beetles probably were very active several weeksbefore the treatment date and may have already reproduced before treatments were applied. Insects may also have immigrated into the evaluation plots after treatment."*

Since diflubenzuron would kill juvenile stages of insects and is more persistent than either malathion orcarbaryl, it could have quite a different effect than these two chemicals. Therefore this study cannot berelied upon to insinuate that recovery would be similar to recovery under a carbaryl or malathion treatment.

Researchers even warned about the potential for treatments to worsen outbreaks in the Grasshopper IPM handbook. In Section IV.8 (Recognizing and Managing Potential Outbreak Conditions) Belovsky et al.cautioned:

"Pest managers need to consider more than the economic value of lost forage production or the outcry of individual ranchers. Grasshopper control might provide short-term relief but worsen future problems in these environments. From GHIPM findings (see VII.14), it appears that grasshopper populations in these environments have a high potential for being limited by naturalenemies. Pesticide applications that reduce grasshopper numbers could also reduce natural enemy numbers directly by outright poisoning of the invertebrate natural enemies, or indirectly by lowering the numbers of vertebrate predators as their invertebrate prey are reduced.

Therefore, the ultimate result of control efforts could be an increase in grasshopper numbers forthe future, as they are released from the control of natural enemies."

Recommendation: In its EA, APHIS must address the role of natural enemies, their ability to regulate grasshopper populations, and the risk to these natural enemies posed by chemical treatments. APHIS must not stretch the science beyond where it is credible. APHIS should work with its research arm andresearch partners to conduct meaningful research exploring natural enemies, competition, and other natural processes that hold the potential of regulating grasshopper populations without the use of chemicals.

Response:

The science does not support the substance of this comment, including a thorough reading of the ARS cited source. For other citations it is not clear how applicable they are, such as how they would apply to the specific application methods being proposed.*

Of fundamental mischaracterization, is the assumption that the proposals in this EA result in widespread treatments in Oregon, rather than the targeted programs that occur in limited areas in any given year and err on the side on non-treatment. When grasshoppers are in outbreak conditions, they are generally only limited by disease and climatic conditions, not predators or parasitoids which become quickly satiated, as it well established in literature, including the ARS developed IPM handbook: [IPM Handbook Overview : USDA ARS](#)*.*

The quote taken from the ARS publication ([*https://www.ars.usda.gov/ARSUserFiles/30320505/grasshopper/Extras/PDFs/IPM%20Handbook/IV8.pdf*](https://www.ars.usda.gov/ARSUserFiles/30320505/grasshopper/Extras/PDFs/IPM%20Handbook/IV8.pdf) *)*
, which APHIS frequently provides to cooperators for IPM reference, is given out of context and does not apply to the proposed work in the way that is implied, for the following reasons:

- *There is a strong distinction between* *__low-productivity__* *land which: Can be damaged by low densities of grasshoppers; but is generally controlled by trophic means (pests, predators and disease); and may want to be treated by land manager but is often not advisable for various reasons (including the specific long-term effects Xerces references), and is usually discouraged by APHIS.*

- *__Mid-productivity__, a hybrid of the two extremes. (Also generally not something that APHIS focus much control efforts on, at least in Oregon, unless they are part of a larger strategy.)*

- *Finally, high productivity sites where in essence, grasshoppers are never controlled by trophic webs, except for them not having enough food to eat, or weather conditions making them very vulnerable. The generally available amount of food makes control by trophic means not scalable even under poor conditions. These are the situation that warrant control in Oregon, where high productivity meets grasshopper population booms and natural enemies do not ever scale, regardless of land management decisions or treatment history.*

So, we agree that protecting beneficial species is an important part of crop and rangeland management, and that treatment of low-productivity sites where grasshoppers can be limited by natural enemies may do more long-term harm than good. However we also agree with the further points in the ARS publication which state that in other situations, especially where ample food is available for grasshoppers, that natural enemies play an insignificant role in providing any level of control under most climatic condition.

Therefore, as outlined in our operating procedures, APHIS recommends that land managers look at many ecological factors before formally requesting treatments, and we will happily provide them with information such as the quote given, that will recommend moderation under low to moderate productivity areas. The authors recommendation does not however, at any time, apply to areas with *quantitatively high levels of grasshoppers.*

Comment 8:

APHIS fails to meaningfully analyze the risk to grassland birds, many of which are declining.

McAtee (1953) examined 40,000 bird stomachs and reported that >200 spp prey on grasshoppers. Suchavian predators of grasshoppers include species often seen in Western areas, such as kestrel, and meadowlark. Avian predators of grasshoppers also include grassland birds in decline, that merit specialconsideration, including sage-grouse, Swainson's hawk, long-billed curlew, sage thrasher, and others.

According to McEwen (1987), grasshoppers are especially important for the raising of young by the majority of bird species. McEwen et al. (1996) cites a number of resources in stating that bird predationcommonly reduces grasshopper densities on rangeland by 30-50 percent.

Despite this strong linkage between grasshoppers and the health of rangeland bird communities, APHIS only analyzes the direct toxic effect of insecticidal treatments to birds, and fails to analyze theindirect effects from loss of forage to these declining bird species.

Recommendation: APHIS must address the potential for indirect impacts to rangeland birds, especiallythose experiencing declining populations from these or other stressors.

Response:

The commenter assumes that there are widespread treatments for this program, which is not the case. Birds are highly motive predators and will search for prey in areas within the treatment blocks where APHIS does not apply pesticides. For example, this would include the skip swaths where the RAATs method is employed or within protective buffers established around water resources or other sensitive sites. APHIS implements conservation measures by creating treatment buffers to protect migratory birds and native bird species that may be in the project area. Protective measures are taken to avoid habitat of ground-nesting birds when driving vehicles off designated roads or trails. Treatment activities also do not occur near trees to protect potential active raptor nesting sites.

Under FWS Section 7 Act there is no requirement to consult on sensitive species. However, when there is concern by land management agencies for certain species, APHIS considers such requests mandatory, such as management plans by BLM for the greater sage grouse, or any other species. This is reflected somewhat in the EA, but ultimately is more of a practical mater for working with cooperators respectively.

Comment 9:

It is unrealistic to assume that APHIS can comply with mitigation measures designed to protect bees on pesticide labels.

APHIS claims that it will adhere to applicable mitigations designed to protect bees that are found on product labels. For example, the Final EIS categorically states that *"Product use restrictions and suggestions to protect bees appear on US EPA approved product labels and are followed by the grasshopper program. Mitigations such as not applying to rangeland when plants visited by bees are in bloom, notifying beekeepers within 1 mile of treatment areas at least 48 hours before product is applied,limiting application times to within 2 hours of sunrise or sunset when bees are least active, appear on product labels such as Sevin® XLR Plus. Similar use restrictions and recommendations do not appear on bait labels because risks to bees are reduced. APHIS would adhere to any applicable mitigations that appear on product labels."*

It should be remembered that bumble bees fly earlier and later in the day than honey bees and limitingapplication times to within 2 hours of sunrise or sunset may not be protective. In addition, while diflubenzuron is toxic to larval and developing forms of numerous insects, it appears that Lepidoptera (butterflies and moths, many of which are at-risk as emphasized in Xerces' comment letter from 2020) are more sensitive, as a group, than other species.

The Dimilin 2L label instructs the user to "minimize exposure of the product to bees" and to "minimizedrift of this product on to beehives or to off-site pollinator attractive habitat."

However, if treated habitat is flowering and bees are active (as would be anticipated during any of theproposed treatment months), it is not clear how applications for grasshopper/Mormon cricket controlcan minimize exposure to bees. Except for reduced rates and/or untreated swath widths, the EA is silent on how it will avoid impact to pollinators. It has already been shown that within sprayed areas, risk quotients at expected application rates would be well above 1.0. Leaving skipped widths is also not a full solution at expected widths since, due to drift, untreated swaths are highly likely to be exposed to levels above risk quotients (seeabove comment).

In cropland areas, applicators sometimes minimize exposure to bees by applying at night. From examination of some of the flight records from past grasshopper treatments, it is clear that this is not the norm for the program, at least for aerial treatments.

Recommendation: APHIS must explain how its treatments are in compliance with the pesticide labels,and if necessary, incorporate additional mitigations to ensure that it is not in violation of federal pesticide laws.

Response:

As previously acknowledged in these comments, the EA does not involve Sevin XLR Plus, which is the basis of most of this comment. As to not impacting bee species with Dimilin, that is discussed in the EA. To briefly summarize, adult foraging insects are not impacted by this growth regulator chemical. Further, the preferred, often required method of RAATs will leave about 50% of the project area untreated. Finally, beekeepers in the are notified and their hives are considered sensitive sites and buffered. In sum, it is very realistic to assume that the EA proposal as described will not significantly impact native or livestock bee species populations throughout the 17 counties in eastern Oregon where grasshopper *treatments could occur.*

Comment 10:

The EA lacks information to justify its determination of No Effect and Not Likely to Adversely Effect to species listed under the Endangered Species Act.

According to the EA, programmatic consultation with the US Fish and Wildlife Service on species listedunder the Endangered Species Act was initiated in 2015, but is not yet complete. The backup is for APHIS to consult at the local level.

The EA includes a cover letter to US Fish and Wildlife Service which discloses its NLAA calls on certain species, but does not include the species for which it determined No Effect. The cover letter does not contain information on critical habitat or the justification for any determinations. Since the Services do not evaluate No Effect calls to listed species, including justification for such calls in the body of the EA isespecially important.

No concurrence letter is included. Due to the absence of such concurrence at this stage, it is incumbentupon APHIS to disclose its determinations for all species and the measures it plans to implement to avoid impacts to listed species.

Operationally, how will listed species' protected locations be identified for ground and aerial applicators? How will such locations, buffer widths listed in the protective measures, and any specific instructions (i.e. use of carbaryl bait only) for some species be mapped and communicated to applicators? The EA are silent on these important questions that would support its ESA conclusions.

Recommendation: APHIS should include its consultation submittal to the services in the Draft EA, even (and especially) if a letter of concurrence is not yet available. In the Final EA, the letters of concurrence should be attached. Under the ESA there must be disclosure of potential impacts under the treatments, an analysis of whether the project would jeopardize the continued existence or modify or destroy the critical habitat for each adversely affected listed species, according to any active ingredients that may beselected. Pesticide specific conservation measures for each listed species (actions to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the proposedaction), where appropriate, should be explicitly addressed and adopted.

For each species to be protected within the project area, APHIS must provide to applicators a set of clearset of directions outlining protective measures for the listed and proposed species found within this project area. In addition to these measures, APHIS should adopt the following operational guideline

across all site-specific EAs: "Use Global Positioning System (GPS) coordinates for pilot guidance on theparameters of the spray block. Ground flagging or markers should accompany GPS coordinates in delineating the project area as well as areas to omit from treatment (e.g., boundaries and buffers for bodies of water, habitats of protected species, etc.)."

Response:

The species listed in the 2021 USF&WS Official Species Lists for the action areas during the consultation process for OR-21-01 have been finalized with USFWS. Consultation with the USF&WS was still ongoing at the time that the Draft EA was submitted for comments.
The letter from the USFWS Biologist with discussion of no-effect calls for the proposed action areas was received and is included in the appendix of this final draft.

Comment 11:

Within the last year, the monarch butterfly has been designated a candidate species under the Endangered Species Act, but the EA contains no information about impacts to or consultation for this species.

No information is available about the potential for effects to the monarch butterfly, recently designateda Candidate species under the Endangered Species Act,

In fall 2018 and fall 2019, the annual Xerces Western Monarch Thanksgiving Count showed that the population hit a new low: volunteers counted under 30,000 monarchs—less than 1% of the population'shistoric size.

Habitat suitability modeling for monarch butterfly in the counties covered by this EA shows there are concentrations of potentially highly suitable monarch habitat in Oregon within the area potentially subject to grasshopper suppression this year (Dilts et al. 2018). In 2016 and 2017, the U.S. Department of Agriculture National Resources Conservation Service's (NRCS) developed regional Monarch Butterfly Wildlife Habitat Evaluation Guides, and discouraged placement of monarch breeding habitat within 38 m(125 ft.) of crop fields treated with herbicides or insecticides (NRCS 2016).

Recommendation: APHIS must not conduct any treatments prior analyzing effects to the monarch butterfly as required under the ESA. As detailed by Pelton and McKnight in a blog post dated January 19,2021, only 1,914 monarchs were counted at all the 246 western overwintering sites during the 2020- 2021 overwintering season. This is a shocking 99.9% decline since the 1980s. Given this horrendous decline of the western monarch population, it is beyond conceivable that APHIS would determine a No Effect. Therefore, no grasshopper suppression work should proceed in 2021 until the USFWS office, withfull awareness of the extreme plight of the western monarch, issues its concurrence, this is made public,and APHIS implements any required conservation measures. Given the NRCS guidelines about placement of habitat, any insecticide use in or near existing or potential habitat should be out of the question.

Response:

The Monarch butterfly was listed as a candidate species on December 15, 2020. The U.S. Fish and Wildlife Service's (USFWS) 12-month status review determined that it was "warranted but precluded". The Endangered Species Act (ESA) provides for a "warranted-but-precluded" finding when the Service does not have enough resources to *complete the listing process, because the agency must first focus on higher-priority listing rules. "Warranted-but-precluded" findings require subsequent review each year until the USFWS undertakes a proposal or makes a not-warranted finding. APHIS is not required by ESA Section 7 consultations to consult on species that have been precluded from being listed as threatened and endangered (T&E) species.*

The 2021 USFWS official species list for this Environmental Assessment (EA) (WA-21-01) covering the rangeland action areas for ESA Section 7 consultations with U.S. Fish and Wildlife Service, covered consultations on species from this official list. The USFWS does not give concurrence for candidate species.

The commenter cited an article by the USDA - National Resource Conservation Service (NRCS) (2016) for Monarch Butterfly Wildlife Habitat Evaluation Guides, but these guides deal with crop lands not rangelands. According to (USDA NCRS (2020), the NRCS agency's primary geographic focus for monarch habitat has been in Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Ohio, Oklahoma, Texas, and Wisconsin, the primary eastern monarch migration corridor in a 10-state area of the central United States (USDA NRCS,. 2020).

On August 26, 2014, a petition to protect the Monarch Butterfly under the ESA was submitted on behalf of the Center for Biological Diversity, Xerces Society, Center for Food Safety, and Dr. Lincoln Brower. In this petition under the factors and the justification listed ,"The ESA states that a species shall be determined to be endangered or threatened based on any one of five factors (16 U.S.C. § 1533 (a)(1)): 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its continued existence". The monarch is threatened by all five of these factors and thus warrants protection under the Act. The petition failed to describe in any manner, under the factors listed in the petition if any decline of milkweed populations occurred in rangeland habitats. All descriptions under the factors described dealt with decline of populations in cropland settings due to the heavy use of chemicals to control pests to crops. APHIS believes the types and amounts of chemicals being used in cropland settings are more varied and greater than chemicals being used in open rangeland settings where relatively rare grasshopper suppression treatments occur. The commenter did not provide data or justification to explain any decline in the amount of milkweed or if any milkweed is even present on rangelands was given.

Monarchs require milkweed for both oviposition and larval feeding. The correct phenology, or timing, of both monarchs and nectar plants and milkweed is important for monarch survival (USFWS, 2020). The ecological requirements of a healthy monarch population are summarized by Redford et al. (2011). In order to be self-sustaining, a population must be demographically, genetically, and physically healthy without the following ecological requirements sufficient seasonally and geographically specific quantity and quality of milkweed, breeding season nectar, migration nectar, and overwintering resources to support large healthy population sizes can occur.

Milkweed poisons cattle and other livestock. The toxic agents are cardiac glycosides. To be poisoned, cattle can eat as little as 1.0 percent of their body weight in broad-leafed milkweed; amounts as low as 0.15 percent have poisoned sheep and goats (Clayton, 2021).
Due to this factor, rangeland with milkweed would be at risk to cattle foraging, and is unlikely to be treated.

Comment 11:

Carbaryl has been analyzed on listed species nationwide with widespread "likely to adversely affect" determinations –but no mention of this or mitigation for its harmful effects is found in the EA.

The EA do not mention a recent nationwide consultation effort on carbaryl's effect to listed species. Inits Biological Evaluation that it forwarded to the Services, EPA determined that carbaryl is likely to adversely affect 1,542 species (see https://www.epa.gov/endangered-species/draft-national-level- listed-species-biological-evaluation-carbaryl). Such a determination by EPA is cause for a high level of concern. At a minimum, one would expect to find disclosure of these determinations and inclusion of mitigation for carbaryl's harmful effects to listedspecies. Instead, no mention is made.

Recommendation**:** The listed species determinations for carbaryl should be disclosed in the EA and should preclude the use of carbaryl in the grasshopper suppression effort until and unless a final Biological Opinion is issued and the suppression program implements all required measures under theOpinion.

Response:

Carbaryl is proposed for used in a responsible way as described in this EA, and is not represented by the focus of this study. The results of this broad study do not clearly negate the plans laid out for its responsible use in this EA.

Comment 11:

Vulnerable pollinators and arthropods as a group are put at risk by the proposed action, despite widespread reports of insect decline and affirmative federal obligations for federalagencies put into place several years ago.

The geographic area covered by this EA may be home to 500-1,000 species of native bees (McKnight etal. 2018, Figure 1). Perhaps this is not surprising since the majority of rangeland plants require insect- mediated pollination. Native, solitary bee species are important pollinators on western rangeland.
Hence, pollinators are important not only for their own sake but for the overall diversity and productivity of native rangelands, including listed plant species. However, this essential role that pollinators play in the conservation of native plant communities is given very short shrift in the EA.

Many of the pollinators that call Oregon home are already considered at-risk. See lists of at risk pollinators found in Oregon in Attachments 1 and 2 from our comment letter submitted in 2020, (thesecomments are also attached to our 20201 email submitting this comment letter).

Unfortunately, pollinators are just a piece of a larger ominous development facing insects as a whole.Recent reports suggest that insects are experiencing a multicontinental crisis that is apparent as reductions in abundance, diversity, and biomass (Forister et al. 2019).

Despite this very real crisis in biodiversity, the EA does not disclose which, if any, invertebrates withinthe geographic area are listed as sensitive by federal land management agencies or as Species of Conservation Concern, or whether the state of Oregon designates any invertebrates as species of greatest conservation need.

APHIS stands to worsen the plight of pollinators and of insects as a group through implementation of its grasshopper suppression program as described in the EA. In particular, the status of at-risk native bees and at-risk native butterflies may worsen as a result of insecticide treatments for grasshopper control.

In addition, the EA make no mention of the fact that there are affirmative obligations incumbent on federal agencies with regard to protection of pollinators, regardless of whether they are federally listed.Federal documents related to pollinator health include:

- the 2014 Presidential Memorandum -- Creating a Federal Strategy to Promote the Health ofHoney Bees and Other Pollinators
- the National Strategy to Promote the Health of Honey Bees and Other Pollinators
- the Pollinator-Friendly BMPs for Federal Lands
- The Pollinator Research Action Plan

Under the *Presidential Memorandum* executive departments are directed as follows:

Executive departments and agencies shall, as appropriate, take immediate measures to support pollinators during the 2014 growing season and thereafter. These measures may include planting pollinator-friendly vegetation and increasing flower diversity in plantings, limiting mowing practices, and avoiding the use of pesticides in sensitive pollinator habitats through integrated vegetation and pest management practices.

Under the *Pollinator-Friendly BMPs for Federal Lands*, federal agencies are directed to:

- Determine the types of pollinators in the project area and their vulnerability to pesticides, takinginto consideration pesticide chemistry, toxicity, and mode of action. Consult local Cooperative Extension or state departments of agriculture for more information.
- Minimize the direct contact that pollinators might have with pesticides that can cause harm andthe contact that they might have with vegetation sprayed with pesticides that are toxic to pollinators. Try to keep portions of pollinator habitat free of pesticide use.
- Plan timing and location of pesticide applications to avoid adverse effects on pollinator

populations. Apply pesticides that are harmful to pollinators when pollinators are not active orwhen flowers are not present.

And the *National Strategy to Promote the Health of Honey Bees and Other Pollinators* includes as a oneof three key goals:

Restore or enhance 7 million acres of land for pollinators over the next 5 years through Federal actions and public-private partnerships.

Recommendation***:*** In the face of declining pollinator and insect populations and the existence of federaldirectives for agencies to support and conserve pollinators and their habitat, APHIS must not conduct business as usual. APHIS should identify the at-risk pollinator species potentially present in the geographic area of the EA and map their ranges prior to approving any treatment requests. To assist APHIS in this analysis, we appended tables of at-risk bee and butterfly species potentially located withinthe project area in last year's comment letter. Prior to treatment, APHIS should ensure that it has identified specific, actionable measures it will take to protect the habitat of at-risk pollinator species from contamination that may occur as a result of exposure to treatment.

Some ways to enact protections for at-risk pollinators above and beyond those included in the EAinclude:

- Survey for butterfly host plants and avoid any applications to host plants.
- Time pesticide applications to avoid exposure to at risk species.
- Do not apply pesticides (especially insecticides) when pollinators (adult and immature) arepresent or expected to be present.
- Avoid aerial applications.
- Avoid using malathion and liquid carbaryl.
- Include large buffers around all water sources, including intermittent and ephemeral streams,wetlands, and permanent streams and rivers, as well as threatened and endangered species, habitat, honey bee hives, and any human-inhabited area. For example, Tepedino (2000) recommends a three-mile buffer around rare plant populations, as many of these are pollinatedby solitary bees that are susceptible to grasshopper control chemicals. (See McKnight et al. (2018) and Pelton et al. (2018) for more.)

Response:

It is generous to have these extensive protective measures laid out in whole cloth, but perhaps it would be more productive at this stage in the process to look at the protective measures that are currently proposed in this EA and note specifically where they might possibly be deficient. APHIS would argue that they are sufficient to not have a significant impact on any species other than the grasshopper outbreak target in the limited area where treatment is considered warranted. Additionally of note in regards to some sections of this comment that recommend management strategies: APHIS is not a land management agency so can not actively manage for anything other than its role in limiting damaging insects as described by the PPA, including economic grasshopper infestations.

Comment 12:

Freshwater mussels are at risk across the country and need particular attention.

The Dimilin label indicates that the product is toxic to mollusks.

Nationally, more than 90 mussel species are federally listed as endangered and threatened, and more than 70% are thought to be in decline. About 32 species are thought to have already gone extinct. In thewestern U.S., populations of western pearlshell, California floater, and western ridged mussel are all in decline, especially in Arizona, California, Montana, and Utah.

The 2019 EIS includes an aquatic residue analysis but does not take the next risk assessment step ofcomparing its residue analysis to known toxicity endpoints for freshwater mussels or other aquatic invertebrates.

Recommendation**:** While the mitigations that are identified for aquatic habitats in the EA are heartening, the diflubenzuron label indicates that the chemical is subject to runoff for months after application, and areas supporting listed mussels need greater protection. APHIS must disclose impactsto at-risk mussels where they are present. In addition, APHIS should use larger buffers to protect freshwater mussels, such as those designated for listed salmonids in other states. In addition, APHIS should include monitoring for the presence and health of mussels in streams that traverse or are adjacent to treatment areas as part of its monitoring strategy.

Response:

APHIS buffers waterways to the current extent described herein to prevent injury to any aquatic species. This is also verified by environmental monitoring of sensitive sites (i.e. spray cards). Should species achieve protected status under the ESA they would be buffered by an additional distance. Consultation on these matters is on going and significantly helps the program to be more focused, far in excess of what is required by law from the pesticide label (FIFRA).

Comment 12:

The EA is silent on buffers around stock tanks. These can be important reservoirs of biodiversity, even as they may be better known for being home to many non-native species.

The EA does not identify any buffers that will be observed to prevent pesticide overspray or drift into these habitats. Studies of these habitats (Hale et al. 2014; Hasse and Best 2020) have shown that stockponds/tanks are important surrogate habitats for native species, and can be equivalent to natural habitats in terms of total abundance and richness of aquatic invertebrates.

Recommendation: APHIS should recognize the potential for stock pond/tanks to contribute significantlyto the diversity of aquatic invertebrates in rangelands. APHIS should identify and map all stock tanks/ponds and specify a buffer around stock ponds/tanks from chemical treatment at least equivalent to that specified for wetlands, in order to protect aquatic diversity.

Response:

Stock tanks are considered sensitive sites and are buffered like other water bodies or wetlands.

Comment 13:

APHIS includes no information about whether an NPDES permit has been obtained, and what provisions it includes.

APHIS includes no information about whether an NPDES permit has been obtained, and what provisionsit includes. As described on the Dimilin 2L label, diflubenzuron is susceptible to runoff, and could result in discharges to surface water. Under the Clean Water Act, discharges require permit coverage underthe National Pollutant Discharge Elimination System.

Recommendation: APHIS must disclose whether its program has obtained an NPDES permit, or whetherthis requirement has been waived (and if so, why).

Response:

APHIS does not apply pesticide to surface water under this program, and the buffers described herein assure that this is the intention. In Oregon, it has been determined that NPDES permits are not required for drift or other unintended spills into water bodies. That would be considered an accident and handled as such. Finally, APHIS uses environmental monitoring to detect such accidents and has plans in place to respond quickly.

Comment 14:

Special status lands

The EA makes mention of the presence of various special status lands. However, there is no mention ofimpacts to or any specific protections to be accorded to special status lands such as Wilderness areas, Wilderness study areas, National Monuments, Research Natural Areas, National Wildlife Refuges, and designated or proposed Areas of Critical Environmental Concern within potential treatment areas.

Recommendation: These special status areas have been designated for specific purposes and generallydiscourage human intervention with the natural ecosystem. Grasshopper suppression should not be undertaken in such areas.

Response:

It is taken for granted that such spaces are not likely to have grasshopper treatment requests. If there is somewhere in particular in the 17 counties that are covered in this EA where this is a likely concern, that would be constructive information to help with this EA. There is no information available to APHIS to *expect that this is a reasonable concern.*

Comment 15:

Cumulative effects analysis

The EA does not adequately disclose the locations where spraying has occurred in the past, nor did the APHIS 2019 EIS. The EA does include a map “Economic Infestation of Grasshoppers in Oregon 1953 through 2020.” At first glance this map is helpful but it is not clear if the colors represent the number ofyears in which a location has had repeat infestations? In addition, the areas that were actually treated are not shown in the map (as opposed to the areas infested).

In the EA, APHIS states that cumulative effects “are not significant” partly because the probability of an outbreak occurring in the same area as a previous outbreak is unlikely. However, the map does not support this (again, if we are to interpret the colors as the number of years of infestation during the 67 year period shown). Also, APHIS does not disclose the scale of treatments in any of those years, nor the impact of those treatments. APHIS places emphasis on the fact that its policy dictates that only one treatment a year is conducted, but does not address nearby impacts on private or state lands where more than one treatment may be conducted, which could contribute to cumulative impacts. In addition,ecological impacts can be severe even if a repeat treatment is unlikely if treatment results in adverse effects to a species confined to a small range, already in decline, or both.

Recommendation: To have an adequate understanding of cumulative impacts, APHIS must disclosewhere spraying has occurred in the past, and what impacts have resulted, as part of the current condition assessment.

Response:

This critique is highly speculative, in that even if such impacts were noted in areas where treatments have occurred, correlation does not equal causation. APHIS is glad that the map showing high populations of grasshoppers over the last near century of survey was of interest. Treatments frequently occur that are not monitored by APHIS. Essentially we have outbreak information presented here, and it is unclear how any amount of further information would lead to an understanding of cumulative impacts of anything, let alone the very targeted work that APHIS does for this program. The FOIA request of 2020 could be an avenue for pursuing this question, but it is unclear what further role it would be suitable for APHIS to play in this investigation.

Comment 16:

For APHIS and its cooperative land management agencies, building resilience into the system should be the key goal.

APHIS does not identify how it coordinates with land management agencies, such as the BLM, to addresssite-specific sensitive issues such as sage grouse, Resource Management Plan requirements, limitations on special status lands, etc. Due to the spatial specificity of such issues, the national MOUs simplycannot adequately address such concerns.

Unfortunately APHIS also makes no mention in the EA of what is most sorely needed: cooperation and planning with land managers to take appropriate steps to prevent the types of grasshopper and cricketoutbreaks that are now dealt with by chemical controls. We believe that APHIS and its land management partners need to invest in longer-term strategic thinking regarding grasshopper management on Western rangelands. Building resilience into the system should be the key goal.

According to the Rangeland Management section of the Grasshopper IPM handbook, high diversity in canopy structure and plant species composition tends to support high diversity in grasshopper speciesand this diversity and composition tend to provide stability and to suppress pest species that exploit disturbance.

Emphasizing cultural techniques through appropriate grazing management could help to reduce relianceon pesticide applications and allow abiotic and biotic factors to regulate grasshopper and Mormon cricket populations to the greatest extent possible. For example Onsager (2000) found that (compared to season-long grazing) rotational grazing resulted in significantly less adult *Melanoplus sanguinipe*s grasshoppers and significantly less damage to forage. Under rotational grazing, the nymphs developed significantly slower and their stage-specific survival rates were significantly lower and less variable.
Consequently, significantly fewer adults were produced significantly later in the season under rotationalgrazing. Seasonal presence of all grasshopper species combined averaged 3.3X higher under season-longgrazing than under rotational grazing. Local outbreaks that generated 18 and 27 adult grasshoppers per square meter under season-long grazing in 1997 and 1998, respectively, did not occur under rotational grazing. The outbreaks consumed 91% and 168%, respectively, as much forage as had been allocated forlivestock, as opposed to 10% and 23%, respectively, under rotational grazing.

In addition, some research suggests that grasshoppers could be managed without insecticides by carefully timing fire and grazing to manage vegetation and reduce habitat suitability for target species (Capinera and Sechrist 1982; Welch et al. 1991; Fielding and Brusven 1995; O'Neill et al. 2003; Bransonet al. 2006). While more research is needed to develop species- and region-specific management treatments that use alternatives to pesticides (Vermeire et al. 2004), there is likely enough data to employ cultural techniques now.

As described above (see item 8 in this comment letter), birds may consume 50% of grasshoppers on site.Ensuring healthy bird populations is critical for long-term grasshopper management.

Another argument for re-thinking the chemical-centric suppression program is that the costs of the program constrain APHIS' ability to respond to treatment requests. In addition, climate change poses athreat that may alter the frequency and locations of outbreaks.

Recommendation: The operating guidelines state "*landowners requesting treatment are encouraged to have implemented IPM prior to undergoing treatment.*" This does not go far enough. APHIS must elevatethe expectation of preventative approaches in its cooperative agreements with other land management agencies. APHIS can collaborate with agencies (such as the Natural Resource Conservation Service (NRCS), the Farm Service Agency (FSA), and State Extension program) to facilitate discussion and disseminate information to ranchers about preventative measures that can be taken and alternatives to pesticide use [sic]. APHIS and/or collaborating agencies should investigate and implement opportunities to incentivize healthy range management practices.

APHIS and its partners should be approaching the problem by keeping a focus on the potential to reducegrasshopper carrying capacity by making the rangeland environment less hospitable for the pests.

APHIS must not take a limited view of its role and responsibilities, and should utilize any available mechanism to require land management agencies to diminish the severity, frequency and duration of grasshopper outbreaks by utilizing cultural management actions. For example, Memoranda of Understanding (MOUs) should be examined and updated to ensure that land management agencies areaccountable in utilizing cultural techniques to diminish the carrying capacity of pest species.

Longer-term strategic thinking should include:

- Prevent conditions that allow grasshopper and Mormon cricket populations to reach outbreakconditions by employing diverse management techniques (e.g., biological, physical, and cultural).
- Implement frequent and intense monitoring to identify populations that can be controlled withsmall ground-based pesticide application equipment.
- If pesticides are used, select active ingredients and application methods to minimize risks tonontarget organisms.
- Monitor sites before and after application of any insecticide to determine the efficacy of thepest management technique as well as if there is an impact on water quality or non-target species.

Response:

APHIS is not specifically tasked with these responsibilities, however the ARS IPM website—cited by the commentor above—is shared frequently, and the general understanding of the most practical IPM science available is included whenever possible in outreach efforts. As stated previously however, APHIS does not agree that there are always viable alternatives to selective pesticide use during grasshopper outbreaks, rather the alternative to non-action is often simply a continued and prolonged duration of damaging grasshopper populations, which are potentially limiting to the health and flora species abundance of the ecosystems in general.

Comment 17:

Overall Transparency of the APHIS Grasshopper / Mormon Cricket Suppression Program Must Be Improved.

We appreciate that public notice of this site-specific EA and its comment period was posted at the APHIS website. Grasshopper suppression efforts, especially those on federal lands, are of more than local concern. The action being proposed is a federal action, proposing to use federal taxpayer funds. The species of the United States, our natural heritage, do not observe ownership, county, tribal, or state boundaries. As such, APHIS should not claim that grasshopper suppression actions are only of local interest. All proposed grasshopper suppression actions and environmental documents should be noticedproperly to stakeholders across the United States. The proper and accepted way of doing this is to publish notices and decisions in the Federal Register.

We understand that this program may have attracted little public attention in the past. This is not a validreason for not using broad methods to invite public participation, such as notices of availability in the Federal Register. It is past time for APHIS to be more transparent about its actions, particularly on public lands. To do so will build trust. As such, there is little to lose and much to gain.

Recommendation: We recommend that, in the future, notice of open public comment periods for all site-specific EAs for grasshopper suppression be posted in the Federal Register, and documents made available for review at regulations.gov and at the APHIS grasshopper website. In addition, we make thefollowing recommendations:

- Actual proposed treatment areas should be mapped and shared with the public when each state APHIS office submits its treatment budget request. Special status lands and sensitive designations should be disclosed on these maps.
- Later refinements to locations should be mapped and shared with the public prior to treatments.
- Nymphal survey results should be provided as soon as available and prior to treatments,in map and table form (counts by species at each survey point, not total counts by survey point).
- Economic threshold analysis needs to be conducted and disclosed especially for treatments on public lands.
- Consultation documents, including APHIS' transmittal to the Services describing the listed species, APHIS determinations, and APHIS rationale for those determinations, should be shared with the public in the draft EA, along with the concurrence letter if ithas been transmitted to APHIS.
- Results of environmental monitoring associated with treatments (i.e. drift cards, water samples) should be disclosed.

Response:

Please see the response to the first comment. APHIS works to actively provide notification to anyone who has expressed interest and to the public at large via notice in the Oregonian newspaper. It is unclear what would be gained by publishing a national distribution for this notice would provide. This is well beyond 'local' publication for these matters which typically occur over 100 miles away.