

Final Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

Adams, Benton, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman and Yakima Counties

Washington
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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

Site-Specific Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

Adams, Benton, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman, and Yakima
Eastern Washington Counties

I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers or Mormon crickets may occur on rangeland in the sixteen eastern Washington counties listed above. The Animal and Plant Health Inspection Service (APHIS) may, upon request by land managers or State departments of agriculture, conduct treatments to suppress grasshopper infestations as part of the Rangeland Grasshopper and Mormon Cricket Suppression Program (program). The term “grasshopper” used in this environmental assessment (EA) refers to both grasshoppers and Mormon crickets, unless differentiation is necessary.

Populations of grasshoppers that trigger the need for a suppression program are normally considered on a case-by-case basis. Participation is based on potential damage such as; grasshoppers which defoliate grasses by direct feeding on leaf and stem tissue and by cutting off leaves or stems and heads while feeding. High populations of grasshoppers on rangeland can damage plant crowns so severely that many grass plants will not recover. Some grasshopper species not only reduces grass forage by consuming it but also by cutting it down. The cut grass may become litter on the ground where it may also be used for food by grasshoppers or becomes wasted biomass. Potential areas where large populations may occur can be found in the 2021 Grasshopper Hazard Map in appendix B. The benefits of treatments include the suppressing of overabundant grasshopper populations to lower adverse impacts to range plants and adjacent crops. Treatment would also decrease the economic impact to local agricultural operations and permit normal range plant utilization by wildlife and livestock.

The goal of the proposed suppression program analyzed in this EA is to reduce grasshopper populations below economical infestation levels in order to protect rangeland ecosystems or cropland adjacent to rangeland.

This EA analyzes potential effects of the proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from May through September 2021 on rangeland in the sixteen eastern Washington 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 Control Program in Washington.

B. Background Discussion

Rangelands provide many goods and services, including food, fiber, recreational opportunities, and grazing land for cattle (Havstad et al., 2007; Follett and Reed, 2010). Grasshoppers and Mormon crickets 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 livestock and other herbivores for rangeland forage and can result in depletion of rangeland plant species.

In rangeland ecosystem areas of the United States, grasshopper populations can build up to economic infestation levels¹ despite even the best land management and other efforts to prevent outbreaks. At such a time, a rapid and effective response may be requested and needed to reduce the destruction of rangeland vegetation. In some cases, a response is needed to prevent grasshopper migration to cropland adjacent to rangeland. In most circumstances, APHIS is not able to accurately predict specific 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.

The site-specific data used to make treatment decisions in real time is gathered during spring nymphal surveys. The general site-specific data include: grasshopper densities, species complex, dominant species, dominant life stage, grazing allotment terrain, soil types, range conditions, local weather patterns (wind, temp., precipitation), slope and aspect for hatching beds, animal unit months (AUM's) present in grazing allotment, forage damage estimates, number of potential AUM's consumed by grasshopper population, 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. These are all factors that are considered when determining the economic infestation level.

APHIS surveys grasshopper populations on rangeland in the Western United States, provides technical assistance on grasshopper management to land owners and 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

¹ The “economic infestation level” 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; and weather 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 gained by treatment. Additional losses to rangeland habitat and cultural and personal values (e.g., aesthetics and cultural resources), although a part of decision making, are not part of the economic values in determining the necessity of treatment.

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.

APHIS has authority under the Plant Protection Act of 2000 (PPA) (7 United States Code (U.S.C.) § 7701) to take actions to control and minimize the economic, ecological, and human health impacts that harmful plant pests can cause. APHIS uses this authority to protect U.S. agriculture, forests, and other natural resources from harmful pest species.

Section 417 of the PPA (7 U.S.C. § 7717) authorizes APHIS' efforts to minimize the economic impacts of grasshoppers. Section 417(a) states that subject to the availability of funds, the Secretary "shall carry out a program to control grasshoppers and Mormon crickets on all Federal lands to protect rangeland." Section 417(c) (1) states that "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." Section 417(c)(2) states, "In carrying out this section, the Secretary shall work in conjunction with other Federal, State, and private prevention, control, or suppression efforts to protect rangeland."

APHIS has the authority to implement Section 417 of the PPA through the Rangeland Grasshopper and Mormon Cricket Suppression Program. The priorities of the APHIS program are:

- to conduct surveys for grasshopper and Mormon cricket populations on rangelands in the western United States,
- to provide technical assistance on grasshopper management to landowners/managers, and
- subject to the availability of funds, to suppress grasshoppers and Mormon crickets on rangeland when direct intervention is requested by the landowner/manager.

Additional information regarding technical assistance and other aspects of the program can be obtained from the USDA Agricultural Research Service site at <http://www.sidney.ars.usda.gov/grasshopper/index.htm>.

On September 16, 2016, APHIS and the Bureau of Indian Affairs (BIA) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers on BIA managed lands. This MOU clarifies that APHIS will prepare and issue to the public, site-specific environmental documents that evaluate potential impacts associated with the 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 BIA.

The MOU further states that the responsible BIA official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on BIA land is necessary. The BIA must also approve a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BIA approves the Pesticide Use Proposal.

In November 2019, APHIS and the Forest Service (FS) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers on FS managed lands (Document #19-8100-0573-MU, November 6, 2019). This MOU clarifies that APHIS will prepare and issue to the public, site-specific environmental documents that evaluate potential impacts associated with the 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 FS.

The MOU further states that the responsible FS official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on FS land is necessary. The FS must also approve a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and FS approves the Pesticide Use Proposal.

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 managed 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 the 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 approve a Pesticide Use Proposal for APHIS to treat infestations.

According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BLM approves the Pesticide Use Proposal.

APHIS supports the use of Integrated Pest Management (IPM) principles in the management of grasshoppers and Mormon Crickets. APHIS provides technical assistance to Federal, Tribal, State and private 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. In addition, APHIS' authority under the Plant Protection Act is to treat Federal, State and private lands for grasshoppers and Mormon cricket 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 and Mormon cricket populations that will reduce non-target effects. RAATs are one of the methods that has been developed to reduce the amount of pesticide used in suppression activities and is a component of IPM. APHIS continues to evaluate new suppression tools and methods for grasshopper and Mormon cricket 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.

Intergovernmental agreements between APHIS and cooperators with Tribal Nations may preclude disclosure of Tribal site-specific information to the public without the consent of the Tribal Administrator. Individuals may request information on the specific treatment areas on Tribal Lands from the individual Tribal Nations.

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 and Mormon cricket 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 (FONSI) 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 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. **The comment period will begin March 15 and end April 15, 2021.**

Comments can be sent to USDA, APHIS, PPQ, 222 N. Havana St., Spokane, Washington 99202 or by accessing the Rangeland Grasshopper and Mormon Cricket Program website for contact information: <http://www.aphis.usda.gov/plant-health/grasshopper> or email: george.a.bruno@usda.gov

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 were not analyzed in the 2002 EIS. Copies of the complete 2002 and 2019 EIS documents are available for review at USDA, APHIS, PPQ, 222 N Havana St.; Spokane, Washington 99202. These documents are also available at the Rangeland Grasshopper and Mormon Cricket Program web site: <http://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 A 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 rangeland in Arizona and therefore the environmental baseline should describe a no treatment scenario in those rangeland areas.

A. No Suppression Program Alternative

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

B. Insecticide Applications at Conventional Rates 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 and diflubenzuron. These chemicals have varied modes of action. Carbaryl works by inhibiting acetylcholinesterase (enzymes involved in nerve impulses) and diflubenzuron inhibits the formation of chitin by insects. 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

commonly used by the program, is determined by the life stage of the dominant species within the outbreak population. Diflubenzuron can produce 90 to 97% grasshopper mortality in nascent populations with a greater percentage of early instars. If the window for the use of diflubenzuron closes, because of treatment delays, then carbaryl are the remaining control options. Certain species are more susceptible to carbaryl bait, and sometimes that pesticide is the best control option.

The RAATs strategy is effective for grasshopper suppression because the insecticide controls grasshoppers within treated swaths while conserving grasshopper predators and parasites in swaths not directly treated. RAATs can 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 or diflubenzuron would be considered under this alternative, typically at the following application rates:

- 8.0 fluid ounces (0.25 lb a.i.) of carbaryl ULV spray per acre.
- 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;

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 100 feet for carbaryl and 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.

Applicators use of Trimble GPS Navigation equipment is used to navigate and capture shapefiles of the treatment areas. All sensitive sites are buffered out of the treatment area using flagging which is highly visible to the aerial applicator. All sensitive sites are reviewed in the daily briefing with APHIS personnel including the applicator working on the treatment site. Treatments are conducted to suppress large grasshopper populations to protect rangeland vegetation. Treatments are conducted using the Reduced Agent Area Treatment (RAAT's) method. This method of skipping swaths (fig.1) decreases the amount

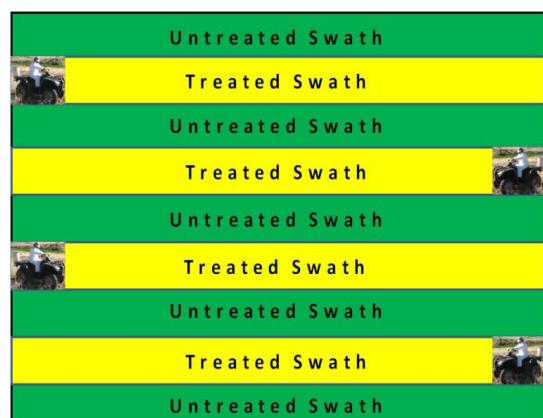


Figure 1. Reduced Agent Area Treatment (RAAT's)

of chemical and acreage treated still maintaining an effective kill rate. Swath widths usually range from 40-45 feet depending on ground equipment used. In Arizona, only ground equipment is used, no aerial treatments are conducted. Grasshoppers in untreated areas will tend to move to treated areas, thus becoming exposed to the insecticide. For example, if the area in figure 1 was 100 acres, with 50% RAAT's the acreage actually treated would be 50 acres. Protection would include the entire 100 acres, only exposing half the area with half the chemical amount compared to a conventional blanket treatment covering the entire 100 acres and the label rate of application.

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, carbaryl or diflubenzuron, 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:

- 16.0 fluid ounces (0.50 lb a.i.) of carbaryl spray per acre.
- 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; or

The potential generalized environmental effects of the application of carbaryl and diflubenzuron under this alternative 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 (For Research Purposes Only)

APHIS-PPQ continues to refine its methods of grasshopper and Mormon cricket 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 and Mormon crickets. 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 and Mormon crickets. 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.

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 and Mormon cricket detection and treatment. UAS will be operated by FAA-licensed pilots with an aerial pesticide applicator’s permit.

Pesticides and Biopesticides Used in Studies

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

- 1) Liquids: diflubenzuron (e.g., Dimilin 2L and generics: currently Unforgiven and Cavalier 2L) and carbaryl (e.g., Sevin XLR-PLUS). Program standard application rates are: diflubenzuron - 1.0 fl. oz./acre in a total volume of 31 fl. oz./acre; carbaryl - 16.0 fl. oz./acre in a total volume of 32 fl.

oz./acre. Experimental rates often vary, but the doses are lower than standard Program rates unless otherwise noted.

2) Baits: carbaryl. 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).

3) 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:

1) *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.”

2) *Beauveria bassiana* GHA, a native fungal pathogen sold commercially and registered for use across the U.S.

At this time, we are unsure where in the 17 states we will be doing most of the following proposed experimental field studies. 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

1. Geology, Topography and Climate

APHIS conducts adult grasshopper surveys in rangeland throughout the assessment area during the late summer of each year. The sixteen county assessment area (Adams, Benton, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman and Yakima Counties) located in Central and Eastern Washington, encompass approximately 41,828 square miles. This represents about 62.9 percent of the state's total area. The Federal Plant Protection Act of 2000 authorizes APHIS to treat rangeland.

The assessment area borders British Columbia, Canada to the North, Idaho to the East, Oregon to the South and the Cascade Range to the West. Portions of rangeland within the assessment area may be identified as having grasshopper populations that could indicate significant infestations in the following year.

The Columbia Basin, also known as the Columbia Plateau, is the predominate area in eastern Washington. The physiographic province is characterized by incised rivers, extensive plateaus, and anticlinal ridges rising to 4,000 feet above sea level. The region is underlain by Miocene Columbia River Basalt Group rocks and interbedded Neogene terrestrial sediments. To the southeast of the Columbia Basin are the Blue Mountains. The Blue Mountains are characterized by a broad uplift, reaching elevations of more than 6,000 feet above sea level. Windows of Paleozoic or Mesozoic metamorphic rocks are exposed at four locations where streams and rivers have incised deep canyons through the overlying rocks of the Columbia River Basalt Group. The basement rocks consist of Jurassic-Triassic limestone lenses, amphibole-quartz schist, greenstone, graywacke, sandstones, cherty dark argillite, and diorite (Washington Department of Natural Resources, DNR, 2010).

The Okanogan Highlands province is situated east of the Cascade Range and north of the

Columbia Basin. To the east and north, the highlands extend into northern Idaho and southern British Columbia, respectively. They are characterized by rounded mountains with elevations up to 8,000 feet above sea level and deep, narrow valleys. The Columbia River divides the Okanogan Highlands into two geographic regions: to the east of the river are the Selkirk, Chewelah, and Huckleberry Mountains; to the west are the Kettle, Sanpoil, and other mountains. The eastern portion of the Okanogan Highlands contains the oldest sedimentary and metamorphic rocks in the state. Precambrian Belt Supergroup, Windermere Group, and Deer Trail Group metasedimentary rocks extend from British Columbia south to the Columbia River. The nation's second largest magnesium operations are located near Addy, in Stevens County. Dolomite and magnesite are mined from the Stensgar Formation dolomite of the Deer Trail Group. Precambrian dikes and sills cut these ancient rocks. In the vicinity of Spokane, mountains such as Mica Peak consist of Precambrian high-grade metasedimentary rocks (DNR, 2010).

To the west of the Columbia Basin and the Okanogan Highlands is the Cascade Range. The Cascade Range is part of a vast mountain chain that extends from British Columbia to northern California. It separates the coastal Pacific lands from the interior of North America. The Cascades consist of an active volcanic arc superimposed upon bedrock of Paleozoic to Tertiary age. Pliocene to recent uplift has created high topographic relief. A major northwest-southeast structural break separates the Washington Cascades into northern and southern portions. In a general way, the structure follows the trace of Interstate 90 between Seattle and Ellensburg. The North Cascades consist of jagged mountains with numerous glaciers and are composed predominantly of Mesozoic crystalline and metamorphic rocks. The South Cascades contain mainly Tertiary to Holocene volcanic rocks. In the north, the structural fabric is extremely complex because of the unrelated "rock packages", called terranes, that have been brought in contact with each other by strike-slip and thrust faults. The North Cascades are also known for mylonite development, extensive areas of crushed and jumbled exotic rocks called melange, and plates of rock thrust over each other (DNR, 2010).

The assessment area has a highly varied climate ranging from near desert conditions in the south central Columbia basin (below 10 inches of precipitation a year) to over 40 inches in the mountainous areas found in both the northeastern and southeastern corners of the region. The area is part of the large inland basin between the Cascade and Rocky Mountains. In an easterly and northerly direction, the Rocky Mountains shield the inland basin from the winter season's cold air masses traveling southward across Canada. In a westerly direction, the Cascade Range forms a barrier to the easterly movement of moist and comparatively mild air in winter and cool air in summer. Some of the air from each of these source regions reaches this section of the State and produces a climate which has some of the characteristics of both continental and marine types. Most of the air masses and weather systems crossing eastern Washington are traveling under the influence of the prevailing westerly winds. Infrequently, dry continental air masses enter the inland basin from the north or east. In the summer season this air from over the continent results in low relative humidity and high temperatures, while in winter clear, cold weather prevails. Extremes in both summer and winter temperatures generally occur when the inland basin is under the influence of air from over the continent. East of the Cascades, in the assessment area, summers are warmer, winters are colder and precipitation is less than in western Washington (Western Regional Climate Center, WRCC, 2010).

The average number of clear or only partly cloudy days each month varies from five to 10 in winter, 12 to 18 in spring and fall, and 20 to 28 in summer. The percent of possible sunshine received each month is from 20 to 30 percent in winter, 50 to 60 percent in spring and fall and 80 to 85 percent in summer. The number of hours of sunshine possible on a clear day ranges from approximately eight in December to 16 in June. In the driest areas, rainfall is recorded on 70 days each year and on 120 days or more in the higher elevations near the eastern border and along the eastern slope of the Cascades (WRCC, 2010).

Annual precipitation ranges from seven to nine inches near the confluence of the Snake and Columbia Rivers, 15 to 30 inches along the eastern border and 75 to 90 inches near the summit of the Cascade Mountains. During July and August, it is not unusual for four to eight weeks to pass with only a few scattered showers. Thunderstorms can be expected on one to three days each month from April through September. Most thunderstorms in the warmest months occur as isolated cells covering only a few square miles. A few damaging hailstorms are reported each summer. Maximum rainfall intensities to expect in one out of ten years are .6 of an inch in one hour; 1.0 inch in three hours; 1.0 to 1.5 inches in six hours; and 1.2 to 2.0 inches in 12 hours (WRCC, 2010).

During the coldest months, a loss of heat by radiation at night and moist air crossing the Cascades and mixing with the colder air in the inland basin results in cloudiness and occasional freezing drizzle. A “chinook” wind which produces a rapid rise in temperature occurs a few times each winter. Frost penetration in the soil depends to some extent on the vegetative cover, snow cover and the duration of low temperatures. In an average winter, frost in the soil can be expected to reach a depth of 10 to 20 inches. During a few of the colder winters with little or no snow cover, frost has reached a depth of 25 to 35 inches (WRCC, 2010).

During most of the year, the prevailing direction of the wind is from the southwest or west. The frequency of northeasterly winds is greatest in the fall and winter. Wind velocities ranging from four to 12 mph can be expected 60 to 70 percent of the time; 13 to 24 mph, 15 to 24 percent of the time; and 25 mph or higher, one to two percent of the time. The highest wind velocities are from the southwest or west and are frequently associated with rapidly moving weather systems. Extreme wind velocities at 30 feet above the ground can be expected to reach 50 mph at least once in two years; 60 to 70 mph once in 50 years and 80 mph once in 100 years (WRCC, 2010).

2. Soil

In the area to the west (Cascade Range) and to the north (Okanogan Highlands) of the assessment area the predominant soil type is a cool, stony soil developed in a mantle of volcanic ash over loess and glacial till with medial or ashy topsoils. While in the valleys and near the rivers there are *soils derived from glacial outwash on river terraces; most soils are strongly loess-influenced in the upper part, gravelly or sandy in the lower part, and have low water-holding capacity; some are influenced by volcanic ash in the upper part.* In the western portion of the Columbia Basin there is also an area of *soils on unglaciated hills; loess-influenced, but primarily derived from weathered granitic rocks, andesite, sandstone or schist; soils have dark-colored, humus-rich topsoils; many have clay-enriched subsoils* (Washington State University, WSU, 2010).

The portion in the east and south of the assessment area in the Columbia Basin is comprised of soil types ranging from fine-silty, somewhat cool loessial soils that have clay enriched subsoils in the center and east portions of the assessment area to dry, coarse-silty loessial soils that formed under shrub-steppe vegetation in the south and center portions. Dry, sandy soils on terraces and dunes that have formed under sparse dune vegetation and have low water-holding capacity comprise much of the center portion of the assessment area stretching to the south where most of the problems with Mormon crickets have occurred (WSU, 2010).

A large portion of the assessment area was shaped by a final cataclysmic event known as the Spokane Flood. Toward the end of the last ice age, a glacial ice dam at the site of Pend Oreille Lake backed up the Clark Fork River flooding mountain valleys of western Montana. When the ice dam broke, the water surged across eastern Washington scouring away soil and eroding channels into the basalt. This significantly different landscape, prevalent throughout much of the assessment area is found nowhere else in the world. It has become known as the channeled scablands. Much of the rangeland is confined to places like the channeled scablands where cultivation may not be practical due to the shallow soil deposits.

3. Water Resources

The Columbia River is the largest river in the area. A large portion of the Columbia River that flows through this assessment area is actually a reservoir known as Franklin D. Roosevelt Lake. Grand Coulee Dam created this reservoir which extends 151 miles to the Canadian border and includes 82,000 acres of surface area. There are numerous dams in the Columbia River, creating smaller reservoirs within the assessment area.

There are several other major rivers and numerous mountain streams within this assessment area. The major rivers include: Snake River, Yakima River, Tieton River, Naches River, White Salmon River, Cle Elum River, Klickitat River, Palouse River, Pend Oreille River, Asotin River, Touchet River, Tucannon River, Joseph River, Grande Ronde River, Spokane River, Colville River, Kettle River, Sanpoil River, Okanogan River, Methow River, and Wenatchee River. Wildlife, recreation, fishing, irrigation, power, and navigation are a few of the important ways in which these rivers are utilized. Many other smaller streams also flow through this area providing habitat and water resources.

A prominent natural lake in the assessment area is Moses Lake in Grant County. However, most of the surface water in the assessment area is associated with the Columbia River Project which began with the completion of Grand Coulee Dam in 1941. Water pumped from Lake Roosevelt, the 125 mile lake formed by Grand Coulee Dam, is used to fill the reservoir of Banks Lake. Banks Lake captures enough water to irrigate over one million acres of Columbia Basin plateau through a network of canals extending as far south as the Oregon border. There are more than 6,000 miles of south leading canals, laterals, and wasteways. Drainage and seepage from this canal system have caused the formation of literally hundreds of new lakes in this region. Primary irrigation facilities are the Feeder Canal, Banks Lake, the Main, West, East High, and East Low Canals, Potholes Reservoir, and Potholes Canal.

There are numerous less prominent natural lakes throughout the assessment area. Many of the lakes are located at a high elevation in the Okanogan Highlands and the Cascade Range. Several of the natural lakes occurring in the assessment area are associated with the channeled scablands. Abundant perennial and intermittent lakes exist in the eroded scabland channels. Most of these lakes can be found in south central Lincoln, southwestern Spokane, northeastern Adams, and northwestern Whitman Counties. Other prominent natural lakes associated with rangeland areas include Rock Lake (Whitman Co.), Sprague Lake (Lincoln Co. and Adams Co.), Jameson Lake (Douglas Co.), and Kahlotus Lake (Franklin Co.).

Less prominent areas that may be classified as wetlands will be identified through local contact with state and Federal wildlife agencies prior to any program. Standard operational procedures (See Appendix 1 – rangeland treatment guidelines for grasshoppers) will be followed relative to treatments in areas with rivers, creeks, lakes, ponds, potholes, wetlands, irrigation canals and drains and intermittent bodies of water.

4. Vegetation and Agricultural Resources

In terms of natural vegetative cover, the assessment area is predominantly classified as sagebrush steppe. Exceptions would be the northern portion (Okanogan Highlands), the western portion (Cascade Range) and the Blue Mountains in the Southeast portion consisting primarily of conifer forests. Grasses, including various types of wheatgrass and fescue, are an important component to rangeland throughout the area providing feed for livestock and wildlife.

Approximately 14 million acres of this assessment area has been classified as land in farms for the 2018 Agricultural Census which represents over 90 percent of the total land in farms in Washington State. Wheat is grown on over 2 million acres in the assessment area. Approximately 300,000 acres are planted in orchards, primarily apples, with some pear and sweet cherries. Other crops grown include hay, grapes, barley, oats, corn and potatoes. Washington is the leading producing state in the nation for some of the commodities grown in this assessment area including apples, pears, and sweet cherries (U.S. National Agricultural Statistics Service, NASS, 2018).

The total value of agricultural crops in Washington State for 2018 was nearly 8 billion dollars. A vast majority of this total value is produced in the 20 county assessment area. Fruit production ranked as the number one value of production among the principle agricultural commodities produced in Washington State at a value of over 2 billion dollars in 2018. Grain, hay, dairy products and cattle are also important to the economy of this assessment area (NASS, 2018).

5. Other Environmental Resources

There is a significant amount of protected federal land in the assessment area. Along the western edge of the assessment area there are several federally designated wilderness areas. They include the Goat Rocks Wilderness, Mount Adams Wilderness, William O. Douglass Wilderness, Norse Peak Wilderness, Alpine Lakes Wilderness, Henry M. Jackson Wilderness, Glacier Peak Wilderness, Lake Chelan-Sawtooth Wilderness and the Pasayten Wilderness. In the Northwest portion of the assessment area there is a small segment of

North Cascades National Park and Lake Chelan National Recreation Area. In the most northeast portion of the assessment area is the Salmo-priest Wilderness Area. The Southeast corner holds the Wenaha-Tucannon Wilderness Area. Juniper Dunes Wilderness and the Hanford Reach National Monument are located in the Columbia Basin. There are small areas of land managed by the Bureau of Land Management and the Bureau of Reclamation throughout the assessment area.

In addition, there are also six National Forests in the assessment area including the Umatilla, Gifford Pinchot, Mt. Baker-Snoqualmie, Wenatchee, Okanogan and the Colville. Also, there are seven National Wildlife Refuges located in the assessment area including Conboy Lake, Saddle Mountain, Columbia, McNary, Toppenish, Turnbull and Little Pend Oreille.

The State of Washington Department of Natural Resources also has designated several areas as Natural Area Preserves and Natural Resources Conservation Areas in the assessment area. Additionally, Washington State Parks has designated a number of parks throughout the region.

Four Indian Reservations in eastern Washington are located in this assessment area. The largest is the Yakama Indian Reservation located in the southwest corner of the assessment area in Yakima County and Klickitat County. Just slightly smaller is the Colville Reservation which includes the southeast quarter of Okanogan County and the southern one half of Ferry County. The Spokane Reservation is located in southern Stevens County and the Kalispel Reservation is located in south-central Pend Oreille County. Timber, leased grazing, and mining are important to the economy of these reservations. All land managers will be consulted to identify specific boundaries and sensitive areas prior to any suppression program.

B. Site-Specific Considerations

1. Human Health

Treatments would only occur in rangeland environs. The 2019 EIS contains detailed hazard, exposure, and risk analyses for the chemicals available to APHIS. APHIS has incorporated by reference the analysis from the EIS and the associated risk assessments of pesticides which are mentioned in this EA. These documents are titled, The Final Human Health and Ecological Risk Assessments (USDA, APHIS 2018a, 2018b, 2018c, 2018d) for program pesticides which are available at the following website, <http://www.aphis.usda.gov/plant-health/grasshopper>.

Impacts to workers and the general public were analyzed for all possible routes of exposure (dermal, oral, inhalation) under a range of conditions designed to overestimate risk. The operational procedures and spraying conditions examined in those analyses conform to those expected for operations. The following discussion summarizes the hazards, potential exposure, and risk to workers and the general public for operations within these potential proposed treatment areas detailed in this EA. The operational procedures identified in Appendix 1 would be required in all cases and further mitigation measures are identified in

this section, as appropriate.

No treatments will occur over congested or residential areas, recreation areas, or schools. In less populated areas, mitigation measures will be implemented to ensure buffer zones are established surrounding any existing homes or schools. Refer to the Operational Procedures, Specific Procedures for Aerial and Ground Applications in Appendix A for further information.

Groundwater wells are a major source of domestic water supplies. Groundwater and surface water are the major rural and livestock water sources. No impact is anticipated to these sources. Strict adherence to label requirements and the USDA treatment guidelines (Appendix A) will be followed regarding treatments bordering open surface waters.

2. Non-target Species

Threatened & Endangered Species and Sensitive Species of Concern

The area assessed by this EA includes a variety of organisms i.e.; terrestrial vertebrates and invertebrates, migratory birds, biocontrol agents, pollinators, aquatic organisms, plants (both native and introduced), etc. APHIS will employ measures, such as buffer zones, to protect these species and their habitat. APHIS will also consult with local agency officials to determine appropriate protective measures.

FEDERALLY LISTED ENDANGERED SPECIES

Animals:

Pygmy rabbit (*Brachylagus idahoensis*) – Columbia Basin distinct population segment
Gray wolf (*Canis lupus*) – Proposed Endangered
Woodland caribou (*Rangifer tarandus caribou*)
Sockeye Salmon (*Oncorhynchus nerka*), Snake River
Chinook Salmon (*O. tshawytscha*), Upper Columbia River Spring-run

Plants:

Hackelia venusta (Showy stickseed)
Sidalcea oregana var. *calva* (Wenatchee Mountains checker-mallow)

FEDERALLY LISTED THREATENED SPECIES

Animals:

Bull trout (*Salvelinus confluentus*) – Columbia River distinct population segment
Grizzly bear (*Ursus arctos horribilis*)
Canada lynx (*Lynx Canadensis*)
Northern Spotted owl (*Strix occidentalis caurina*)
Coho Salmon (*O. kisutch*), Lower Columbia River
Chinook Salmon (*O. tshawytscha*), Snake River Spring/Summer-run, Snake River Fall-run, Lower Columbia River

Chum Salmon (*O. keta*), Columbia River
Steelhead (*O. mykiss*), Upper Columbia River, Middle Columbia River, Lower Columbia River, Snake River Basin
Marbled murrelet (*Brachyramphus marmoratus*)
Oregon Spotted frog (*Rana pretiosa*)
Yellow-billed cuckoo (*Coccyzus americanus*)

Plants:

Spiranthes diluvialis (Ute ladies'-tresses)
Silene spaldingii (Spalding's catchfly)
Howellia aquatilis (Water howellia)
Lesquerella tuplashensis (White Bluffs bladderpod)
Eriogonum codium (Umtanum Desert buckwheat)

Critical habitat has been designated within the assessment area for the Bull trout (Columbia River distinct population segment), Chinook Salmon (*O. tshawytscha*), Chum Salmon (*O. keta*), Coho Salmon (Lower Columbia River), Steelhead (*O. mykiss*), Canada lynx, Marbled murrelet, Northern Spotted owl, Oregon Spotted frog, Umtanum Desert buckwheat, White Bluffs bladderpod and the Wenatchee Mountains checker-mallow.

In addition, the U.S. Fish and Wildlife Service has listed four candidate species within the assessment area as follows:

FEDERALLY LISTED CANDIDATE SPECIES

Animals:

Washington ground squirrel (*Spermophilus washingtoni*)
Greater sage-grouse (*Centrocercus urophasianus*) – Columbia Basin distinct population segment

Plants:

Artemisia campestris ssp. *borealis* var. *wormskioldii* (Northern wormwood)
Pinus albicaulis (Whitebark pine)

Also, the Washington Department of Fish and Wildlife maintains a list of species of concern within Washington State and the assessment area on their web site <<http://wdfw.wa.gov/conservation/endangered>>.

A test was conducted in North Dakota relative to the effect of carbaryl bait on the nestling growth and survival of vesper sparrow. This study was designed to simulate the treatment of a small grasshopper infestation with carbaryl bait. There was no difference reported in any of the productivity parameters between nests on treated and untreated sites (Adams et al., 1994). Adult sparrows on treated sites had to forage farther from the nests to obtain food but did so successfully (McEwen et al., 1996). Any effects on non-target species due to bait treatments can be considered indirect; that is, the prey populations are affected, while no direct toxicity to the non-target species is likely to occur.

Bald and Golden Eagle Protection Act (BGEPA)

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb” means: "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

As listed in the National Bald Eagle Management Guidelines (USFWS, May 2007) and adapting recommendations from (Driscoll et al. 2006) the following mitigation measures will be followed.

Category G Helicopters and fixed-wing aircraft. Except for authorized biologists trained in survey techniques, avoid operating aircraft within 2,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity. In addition, Category A (Agriculture) and Category D (Off Road Vehicle Use) both provide the same guidance for use of ATV's or trucks: No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 1,000 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 1,000 feet.

Under the no action alternative, destruction of grasses and forbs by grasshoppers could cause localized disruption of food and cover for a number of wildlife species. Under chemical control there is a possibility of indirect effects on local wildlife populations, particularly insectivorous birds that depend on a readily available supply of insects, including grasshoppers, for their own food supply and for their young. We have found no valid data which suggests that (absent a spill) any species other than certain mice would be subjected to a dosage in excess of 1/5 of the LD50 for carbaryl (Pg. B-37 GH EIS.) Therefore, it is not apparent that any fatalities would be likely to occur as a result of carbaryl intoxication.

Carbaryl have been shown to reduce brain cholinesterase (ChE) (an enzyme important in nerve cell transmissions) levels in birds. Effects of ChE inhibition are not fully understood but could cause inability to gather food, escape predation, or care for young.

In any given treatment season, only a fraction (**less than 1 percent**) of the total rangeland in a region is likely to be sprayed for grasshopper control. For species that are widespread and numerous lowered survival and lowered reproductive success in a small portion of their habitat would not constitute a significant threat to the population.

The wildlife risk assessment in APHIS FEIS 2002 estimated wildlife doses of Malathion and carbaryl to representative rangeland species and compared them with toxicity reference levels. No dose of Malathion will approach or exceed the reference species LD50. Some individual animals may be at risk of fatality or behavioral alterations that make them more susceptible to predation resulting from ChE level changes in Malathion spraying for grasshopper control. However, most individual animals would not be seriously affected.

Carbaryl also poses a low risk to wildlife, with few fatalities likely to occur and a low risk of behavioral anomalies caused by cholinesterase depression. There is some chance of adverse effects on bird reproduction through the use of any of these chemicals or diesel oil through direct toxicity to developing embryos in birds' eggs.

Some species of herbivorous mammals and birds may consume wheat bran bait after it has been applied to grasshopper-infested areas. Carbaryl is moderately toxic to mammals and slightly toxic to birds. We have found no valid data which suggests that (absent a spill) any species other than certain mice would be subjected to a dosage in excess of 1/5 of the LD50 for carbaryl (Pg. B-37 GH EIS.) Therefore, it is not apparent that any fatalities would be likely to occur as a result of carbaryl intoxication. Additionally, we note that carbaryl 5% bait is labeled at 3 lbs. /1000ft² in poultry houses when poultry are present. (<http://www.cdms.net/manuf/>)

Chitin or chitin-like substances are not as important to terrestrial mammals, birds, and other vertebrates as chitin is to insects; therefore, the chitin inhibiting properties of diflubenzuron applications under the conditions of Alternative 2 such as reductions in the food base for insectivorous wildlife species, especially birds. As stated above, diflubenzuron is practically nontoxic to birds, including those birds that ingest moribund grasshoppers resulting from diflubenzuron applications, as described in Alternative 2.

While immature grasshoppers and other immature insects can be reduced up to 98 percent in area covered with diflubenzuron, some grasshoppers and other insects remain in the treatment area. Although the density of grasshoppers and other insects may be low, it is

most likely sufficient to sustain birds and other insectivores until insect populations recover. Those rangeland birds that feed primarily on grasshoppers may switch to other diet items. However, in some areas the reduced number of invertebrates necessary for bird survival and development may result in birds having less available food. In these cases, birds will either have less than optimal diets or travel to untreated areas for suitable prey items, causing a greater foraging effort and a possible increased susceptibility to predation. It also should be noted that suppressing grasshopper populations conserves rangeland vegetation that often is important habitat to rangeland wildlife. Habitat loss is frequently the most important factor leading to the decline of a species and reducing grasshopper densities can be an aid in reducing habitat loss.

All APHIS biological control programs for invasive weeds in Washington are coordinated with Federal and State agencies, County Weed Districts, City Municipalities, and private landowners. Noxious weed biological control agents are important in reducing weed density and all release sites would be considered on an individual basis in consultations with FWS and the land manager to determine if insecticide might be used and/or how much treatment buffer area should be allowed.

2. Socioeconomic Issues

Agricultural producers, including livestock producers, tree fruit and cultivated crop growers, are a major social group that could be impacted by grasshopper infestations. Relative to cooperative rangeland grasshopper suppression programs on private land, livestock owners would not request assistance unless they were confident that the program was cost-effective and economically justified. The chief commercial use of U.S. rangeland (including the assessment area) is livestock grazing to produce food, fiber, and draft animals (National Research Council (NRC), 1994). The protection of rangeland near crop production areas would likewise provide a measure of protection for adjacent crops. The 2019 EIS describes in detail the socioeconomic impacts expected for each of the alternatives.

Livestock grazing is one of the main uses of most of the affected area, which provides summer range for ranching operations. A substantial threat to the animal productivity of these rangeland areas is the proliferation of grasshopper populations. These insects have been serious pests in the Western States since early settlement. Weather conditions favoring the hatching and survival of large numbers of grasshoppers can cause outbreak populations, resulting in damage to vegetation. The consequences may reduce grazing for livestock and result in loss of food and habitat for wildlife. Livestock grazing on public lands contributes important cultural and social values to the area. Intertwined with the economic aspects of livestock operations are the lifestyles and culture that have co-evolved with Western ranching.

Ranchers displaced from public lands due to early loss of forage from grasshopper damage would be forced to search for other rangeland, to sell their livestock prematurely or to purchase feed hay. This would affect other ranchers (non-permittees) by increasing demand, and consequently, cost for hay and/or pasture in the area. This would have a beneficial effect on those providing the hay or range, and a negative impact on other ranchers who use these same resources throughout the area. In addition,

grazing on private lands resulting from this impact would compound the effects to vegetation of recently drought conditions over the last four years (e.g., continual heavy utilization by grasshoppers, wildlife and wildfire), resulting in longer-term impacts (e.g., decline or loss of some preferred forage species) on grazing forage production on these lands. The lack of treatment would result in the eventual magnification of grasshopper problems resulting in increased suppression efforts, increased suppression costs and the expansion of suppression needs onto lands where such operations are limited. For example, control needs on crop lands where chemical options are restricted because of pesticide label restrictions. Under the no action alternative, farmers would experience economic losses. The suppression of grasshoppers in the affected area would have beneficial economic impacts to local landowners, farmers, and beekeepers. Crops near infested lands would be protected from devastating migrating hordes, resulting in higher crop production; hence, increased monetary returns.

Recreation use is moderate over most of the affected area. There are several dispersed camping sites. Hunting seasons increase recreation use in the form of dispersed camping and general hunting activity. Hunting season occurs later in the year during a time when grasshopper populations have begun to dwindle, thus fewer are present. Hunters probably would not be affected. ATV use is fairly prevalent throughout. The presence of high densities of grasshoppers would result in fewer people engaging in recreational activities during the spring and summer within the affected areas. High grasshopper densities in the campsite detract considerably from the quality of the recreational experience. Grasshoppers tend to get into unsecured tents and food. The quality of the recreational experience for ATV users and horseback riders would also be indirectly impaired by high densities of grasshoppers. Large quantities of grasshoppers crossing roads and trails are killed by vehicle traffic, leaving windrows of dead grasshoppers in the travel way as well as providing a vehicular safety hazard by leaving slick residues on local roads. People who normally recreate in areas that are heavily infested would likely relocate them to areas that are not infested. Displacement of users would be more of an inconvenience to the public than an actual effect on the recreational values of the area.

Displacement would also increase pressure on other public lands as people move to new locations to camp and to engage in other recreational activities. Social capacity tolerances would be impacted. The potential for user conflict would increase, in particular as motorized recreationists displace to other already heavily used areas. Such locations would experience more pressure and may experience site degradation. Areas currently not impacted or used by dispersed campers may become subject to use and development as people look for areas for recreation which are not infested with grasshoppers. Small towns near the affected areas receive limited business from recreationists who visit public lands. Many local gas stations/public stores rely fairly heavily on summer business to support their operations.

3. Cultural Resources and Events

Treatments would not be expected to occur at cultural sites. A treatment is of short duration and generally would occur once in a program area during the season. However, to ensure that historical and cultural sites, monuments or buildings, or artifacts of special concern are

not adversely affected by program treatments, APHIS will include these concerns, along with recommended protective measures, in the pretreatment planning and discussions with the land managing agencies. APHIS will also confer with tribal authorities and, as needed, with the BIA office to ensure that the timing and location of a planned program treatment does not coincide or conflict with cultural events or observances on tribal and other Federal lands.

4. 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.

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 EA. These Environmental Documents can be found at the following website: <http://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 to 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 insecticides carbaryl or diflubenzuron 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 HHERA 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).

A number of 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.

The majority of 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 ULV applications of the carbaryl spray (Sevin® XLR Plus) and 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 Sevin® XLR Plus formulation, which contains a lower percent of the active ingredient than the technical grade formulation, is less toxic via the oral route, but is a mild irritant to eyes and skin. The proposed use of carbaryl as a ULV spray or a bait, 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 indicate no concerns for adverse health risk for program workers (<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.

Hatching Bed Treatments Using Carbaryl Bran Bait

Recently, APHIS has employed a strategy of identifying and treating Mormon cricket hatching beds in the spring with carbaryl wheat bran bait. This seems to provide an acceptable level of suppression within traditional outbreak areas. The bait is applied using ATV mounted spreaders at a rate of 10 lbs/ac to hatching beds that are generally from 5 acres to less than an acre in size. This method of control is highly selective and has minimal impact on the environment. (See environmental effects related to carbaryl bait application under the RAATs treatment strategy above).

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; Chadel 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 bee species and pollinators through monitoring grasshopper and Mormon cricket populations and making pesticide applications in a manner that reduces the risk to this group of nontarget invertebrates. Monitoring grasshopper and Mormon cricket 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 bee species 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 necrophagric 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.

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 Bureau of Land Management could apply herbicides for the control of federal noxious weeds throughout some of the potential grasshopper suppression areas. The timing of such treatments should not coincide, so there would be little reason to suspect that any adverse synergistic chemical effects would occur. In any event, before any APHIS program, discussions would be held with land-managing officials to ensure that the two programs would not cause increased injurious effects to any treatment area.

Private agricultural entities could apply herbicides or insecticides to their cropland during times which could coincide with APHIS programs. APHIS' policy requires that the grasshoppers may only be treated on private rangelands, so that cumulative impacts would not result.

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 has evaluated the proposed grasshopper program and has determined that there is no disproportionately high and adverse human health or environmental effects on minority populations or low-income populations.

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.

APHIS grasshopper insecticide treatments are conducted in rural rangeland areas, where agriculture is a primary industry. The areas consist of widely scattered, single, rural dwellings in ranching communities with low population density. The program notifies residents within treatment areas, or their designated representatives, prior to proposed operations to reduce the potential for incidental exposure to residents including children. Treatments are conducted primarily on open rangelands where children would not be expected to be present during treatment or to enter should there be any restricted entry period after treatment. The program also implements mitigation measures beyond label requirements to ensure that no treatments occur within the required buffer zones from structures, such as a 500-foot treatment buffer zone from schools and recreational areas. Program insecticides are not applied while school buses are operating in the treatment area.

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 and Mormon cricket 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, malathion, 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
- ULV sprays are used, which are between 50% and 66% of the USEPA recommended rate
- Insecticides are not aerially applied in a 3,500-foot buffer zones for carbaryl or malathion, or applied within 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. Local consultations are being conducted between APHIS and FWS regarding section 7 of the Endangered Species Act.

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 which would usually range from 3-7 gh/yd². 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.

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 (<http://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.

Consultation with the appropriate landowner, State Historic Preservation Office, National Trail's administrative office, or other appropriate agencies will be conducted when appropriate to ensure minimal impacts to cultural and historical resources in the proposed treatment areas.

V. Literature Cited

- Beauvais, S. 2014. Human exposure assessment document for carbaryl. Page 136. California Environmental Protection Agency, Department of Pesticide Regulation.
- Belovsky, G. E., A. Joern, and J. Lockwood. 1996. VII.16 Grasshoppers—Plus and Minus: The Grasshopper Problem on a Regional Basis and a Look at Beneficial Effects of Grasshoppers. Pages 1-5 in G. L. Cunningham and M. W. Sampson, editors. Grasshopper Integrated Pest Management User Handbook, Technical Bulletin No. 1809. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Washington, DC.
- Belovsky, G. E. 2000. Part 1. Grasshoppers as integral elements of grasslands. 1. Do grasshoppers diminish grassland productivity? A new perspective for control based on conservation. Pages 7-29 in J. A. Lockwood et al, editor. Grasshoppers and Grassland Health. Kluwer Academic Publishers, Netherlands.
- Bonderenko, S., J. Gan, D. L. Haver, and J. N. Kabashima. 2004. Persistence of selected organophosphate and carbamate insecticides in waters from coastal watershed. Env. Toxicol. Chem. 23:2649-2654.
- Bradshaw, J. D., K. H. Jenkins, and S. D. Whipple. 2018. Impact of grasshopper control on forage quality and availability in western Nebraska. Rangelands 40:71-76.
- Branson, D., A. Joern, and G. Sword. 2006. Sustainable management of insect herbivores in grassland ecosystems: new perspectives in grasshopper control. BioScience 56:743-755.
- Broyles, G. 2013. Wildland firefighter smoke exposure. Page 26. U.S. Department of Agriculture, Forest Service.
- Buckner, C. H., P. D. Kingsbury, B. B. McLeod, K. L. Mortensen, and D. G. H. Ray. 1973. The effects of pesticides on small forest vertebrates of the spruce woods provincial forest, Manitoba. The Manitoba Entomologist 7:37-45.
- Burling, I., R. Yokelson, D. Griffith, T. Johnson, P. Veres, J. Roberts, C. Warneke, S. Urbanski, J. Reardon, D. Weise, W. Hao, and J. de Gouw. 2010. Laboratory measures of trace gas emissions from biomass burning of fuel types from the southeastern and southwestern United States. Atmospheric Chemistry and Physics 10:11115-111130.
- Caro, J. H., H. P. Freeman, and B. C. Turner. 1974. Persistence in soil and losses in runoff of soil-incorporated carbaryl in a small watershed. J. Agricul. Food Chem. 22:860-863.
- Catangui, M.A., Fuller, B.W., and Walz, A.W., 1996. Impact of Dimilin® on nontarget arthropods and its efficacy against rangeland grasshoppers. In U.S. Department of

- Agriculture, Animal and Plant Health Inspection Service, 1996. Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No. 1809. Sec. VII.3. Washington, DC.
- Chadel, R.S., and P.R Gupta. 1992. Toxicity of diflubenzuron and penfluron to immature stages of *Apis cerana indica* and *Apis mellifera*. Apidologie 23:465–473.
- Cooper, R. J., K. M. Dodge, P. J. Marinat, S. B. Donahoe, and R. C. Whitmore. 1990. Effect of diflubenzuron application on eastern deciduous forest birds. J. Wildl. Mgmt. 54:486-493.
- Cordova, D., E. Benner, M. D. Sacher, J. J. Rauh, J. S. Sopa, G. Lahm, T. Selby, T. Stevenson, L. Flexner, S. Gutteridge, D. F. Rhoades, L. Wu, R. M. Smith, and Y. Tao. 2006. Anthranilic diamides: a new class of insecticides with a novel mode of action, ryanodine receptor activation. Pesticide Biochemistry and Physiology 84:196-214.
- Deakle, J. P. and J. R. Bradley, Jr. 1982. Effects of early season applications of diflubenzuron and azinphosmethyl on populations levels of certain arthropods in cotton fields. J. Georgia Entomol. Soc. 17:189-200.
- Deneke, D. and J. Keyser. 2011. Integrated Pest Management Strategies for Grasshopper Management in South Dakota. South Dakota State University Extension.
- Dinkins, M. F., A. L. Zimmermann, J. A. Dechant, B. D. Parkins, D. H. Johnson, L. D. Igl, C. M. Goldade, and B. R. Euliss. 2002. Effects of Management Practices on Grassland Birds: Horned Lark Northern Prairie Wildlife Research Center. Page 34. Northern Prairie Wildlife Research Center, Jamestown, ND.
- Dobroski, C. J., E. J. O'Neill, J. M. Donohue, and W. H. Curley. 1985. Carbaryl: a profile of its behaviors in the environment. Roy F. Weston, Inc. and V.J. Ciccone and Assoc., Inc., West Chester, PA; Woodbridge, VA.
- Eisler, R. 1992. Diflubenzuron Hazards to Fish, Wildlife, and Invertebrate: A Synoptic Review. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.
- Eisler, R., 2000. Handbook of chemical risk assessment: health hazards to humans, plants, and animals. Lewis Publishers, New York.
- El-Refai, A. and T. L. Hopkins. 1972. Malathion adsorption, translocation, and conversion to malaoxon in bean plants. J. Assoc. Official Analytical Chemists 55:526-531.
- Fischer, S. A. and L. W. Hall, Jr. 1992. Environmental concentrations and aquatic toxicity data on diflubenzuron (Dimilin). Critical Rev. in Toxicol. 22:45-79.
- Follett, R. F. and D. A. Reed. 2010. Soil carbon sequestration in grazing lands: societal benefits and policy implications. Rangeland Ecology & Management 63:4-15.
- Foster, R. N., K. C. Reuter, K. Fridley, D. Kurtenback, R. Flakus, R. Bohls, B. Radsick, J. B. Helbig, A. Wagner, and L. Jeck. 2000. Field and Economic Evaluation of Operational Scale Reduced Agent and Reduced Area Treatments (RAATs) for Management of Grasshoppers in South Dakota Rangeland. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Phoenix, AZ.
- George, T. L., L. C. McEwen, and B. E. Peterson. 1995. Effects of grasshopper control programs on rangeland breeding bird populations. J. Range Manage. 48:336–342.
- Gramlich, F. J. 1979. Effects of Sevin on songbird cholinesterase. Environmental Monitoring of Cooperative Spruce Budworm Control Projects. Maine Department of Conservation, Bureau of Forestry, Augusta, ME.
- Guerrant, G. O., L. E. Fetzer, Jr., and J. W. Miles. 1970. Pesticide residues in Hale County, Texas, before and after ultra-low-volume aerial applications of Malathion. Pesticide

- Monitoring J. 4:14-20.
- Havstad, K. M., D. P. Peters, R. Skaggs, J. Brown, B. Bestelmeyer, E. Fredrickson, J. Herrick, and J. Wright. 2007. Ecological services to and from rangelands of the United States. *Ecological Economics* 64:261-268.
- Howe, F. P. 1993. Effects of Grasshopper Insecticide Application on Diet, Food Delivery Rates, Growth, and Survival of Shrubsteppe Passarine. Page 108 PhD dissertation. Colorado State University, Fort Collins, CO.
- Howe, F. P., R. L. Knight, L. C. McEwen, and T. L. George. 1996. Direct and indirect effects of insecticide applications on growth and survival of nestling passerines. *Ecol. Appl.* 6:1314-1324.
- Kar, A., K. Mandal, and B. Singh. 2012. Environmental fate of cholorantraniliprole residues on cauliflower using QuEChERS technique. *Environ. Monit. Assess.* 85:1255-1263.
- Keever, D. W., J. R. Bradley, Jr, and M. C. Ganyard. 1977. Effects of diflubenzuron (Dimilin) on selected beneficial arthropods in cotton fields. *J. Econ. Entomol.* 6:832-836.
- LaFleur, K. S. 1979. Sorption of pesticides by model soils and agronomic soils: rates and equilibria. *Soil Sci.* 127:94-101.
- Larsen, J. and R. N. Foster. 1996. Using Hopper to Adapt Treatments and Costs to Needs and Resources. U.S. Department of Agriculture, Animal and Plant Health InspectionService Grasshopper Integrated Pest Management User Handbook, Washington, D.C.
- Larson, J. L., C. T. Redmond, and D. A. Potter. 2012. Comparative impact of an antrhanilic diamide and other insecticidal chemistries on beneficial invertebrates and ecosystem services in turfgrass. *Pest Management Science* 68:740-748.
- Latchininsky, A., G. Sword, M. Sergeev, M. Cigiliano, and M. Lecoq. 2011. Locusts and grasshoppers: behavior, ecology, and biogeography. *Psyche* 2011:1-4.
- Lockwood, J. A. and S. P. Schell. 1997. Decreasing economic and environmental costs through reduced area and agent insecticide treatments (RAATs) for the control of rangeland grasshoppers: empirical results and their implications for pest management. *J. Orthoptera Res.* 6:19-32.
- Lockwood, J., S. Schell, R. Foster, C. Reuter, and T. Rahadi. 2000. Reduced agent-area treatments (RAAT) for management of rangeland grasshoppers: efficacy and economics under operational conditions. *International Journal of Pest Management* 46:29-42.
- Lockwood, J. A. and A. Latchininsky. 2000. The Risks of Grasshoppers and Pest Management to Grassland Agroecosystems: An International Perspective on Human Well-Being and Environmental Health. Pages 193-215 in A. Latchininsky and M. Sergeev, editors. *Grasshoppers and Grassland Health*. Kluwer Academic Publishers.
- Lockwood, J., R. Anderson-Sprecher, and S. Schell. 2002. When less is more: optimization of reduced agent-area treatments (RAATs) for management of rangeland grasshoppers. *Crop Protection* 21:551-562.
- Matsumara, F. 1985. *Toxicology of insecticides*. Plenum Press, New York.
- McEwen, L.C., Althouse, C.M., and Peterson, B.E., 1996. Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on nontarget animal life. In U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1996. *Grasshopper Integrated Pest Management User Handbook*, Tech. Bul. No. 1809. Sec. III.2. Washington, DC.

- Miles, C. J. and S. Takashima. 1991. Fate of malathion and O.O.S. trimethyl phosphorothioate byproduct in Hawaiian soil and water. *Arch. Environ. Contam. Toxicol* 20:325-329.
- Mommaerts, V., Sterk, G., and G. Smagghe. 2006. Hazards and uptake of chitin synthesis inhibitors in bumblebees *Bombus terrestris*. *Pest Mgt. Science* 62:752–758.
- Murphy, C. F., P. C. Jepson, and B. A. Croft. 1994. Database analysis of the toxicity of antilocust pesticides to non-target, beneficial invertebrates. *Crop Protection* 13:413-420.
- Muzzarelli, R. 1986. Chitin synthesis inhibitors: effects on insects and on nontarget organisms. *CRC Critical Review of Environmental Control* 16:141-146.
- Narisu, J., A. Lockwood, and S. P. Schell. 1999. A novel mark-capture technique and its application to monitoring the direction and distance of local movements of rangeland grasshoppers (Orthoptera: Acrididae) in context of pest management. *J. Appl. Ecol.* 36:604-617.
- Narisu, J., A. Lockwood, and S. P. Schell. 2000. Rangeland grasshopper movement as a function of wind and topography: implications for pest movement. *J. Appl. Ecol.* 36:604-617.
- Nation, J.L., Robinson, F.A., Yu, S.J., and A.B. Bolten. 1986. Influence upon honeybees of chronic exposure to very low levels of selected insecticides in their diet. *J. Apic. Res.* 25:170–177.
- Neary, D. G. 1985. Fate of pesticides in Florida's forests: an overview of potential impacts of water quality. Pages 18-24 in *Procs. Soil and Crop Sci. Soc. of FL*.
- Nigg, H. N., R. D. Cannizzaro, and J. H. Stamper. 1986. Diflubenzuron surface residues in Florida citrus. *Bul. Environ. Contam. Toxicol.* 36:833-838.
- NIH. 2009a. Carbaryl, CASRN: 63-25-2. National Institutes of Health, U.S. National Library of Medicine, Toxnet, Hazardous Substances Database.
- NIH. 2009b. National Institutes of Health, U.S. National Library of Medicine, Hazardous Substances Database.
- Norelius, E. E. and J. A. Lockwood. 1999. The effects of reduced agent-area insecticide treatments for rangeland grasshopper (Orthoptera: Acrididae) control on bird densities. *Archives of Environmental Contamination and Toxicology* 37:519-528.
- Pascual, J. A. 1994. No effects of a forest spraying of malathion on breeding blue tits (*Parus caeruleus*). *Environ. Toxicol. Chem.* 13:1127–1131.
- Peach, M. P., D. G. Alston, and V. J. Tepedino. 1994. Bees and bran bait: is carbaryl bran bait lethal to alfalfa leafcutting bee (Hymenoptera: Megachilidae) adults or larvae? *J. Econ. Entomol.* 87:311-317.
- Peach, M. P., D. G. Alston, and V. J. Tepedino. 1995. Sublethal effects of carbaryl bran bait on nesting performance, parental investment, and offspring size and sex ratio of the alfalfa leafcutting bee (Hymenoptera: Megachilidae). *Environ. Entomol.* 24:34-39.
- Pfadt, R. E. 2002. Field Guide to Common Western Grasshoppers, Third Edition. Wyoming Agricultural Experiment Station Bulletin 912. Laramie, Wyoming.
- Purdue University. 2018. National Pesticide Information Retrieval System. West Lafayette, IN.
- Quinn, M. A., R. L. Kepner, D. D. Walgenbach, R. N. Foster, R. A. Bohls, P. D. Pooler, K. C. Reuter, and J. L. Swain. 1991. Effect of habitat and perturbation on populations and community structure of darkling beetles (Coleoptera: tenebrionidae) on mixed

- grass rangeland. Environ. Entomol. 19:1746-1755.
- Rashford, B. S., A. V. Latchininsky, and J. P. Ritten. 2012. An Economic Analysis of the Comprehensive Uses of Western Rangelands. U.S. Department of Agriculture, Animal and Plant Health Inspection Service.
- Reinhardt, T. and R. Ottmar. 2004. Baseline measurements of smoke exposure among wildland firefighters. Journal of Occupational and Environmental Hygiene 1:593-606.
- Reisen, F. and S. Brown. 2009. Australian firefighters' exposure to air toxics during bushfire burns of autumn 2005 and 2006. Environment International 35:342-353.
- Richmond, M. L., C. J. Henny, R. L. Floyd, R. W. Mannan, D. W. Finch, and L. R. DeWeese. 1979. Effects of Sevin 4-oil, Dimilin, and Orthene on Forest Birds in Northeastern Oregon. USDA, Pacific SW Forest and Range Experiment Station.
- Rosenberg, K. V., R. D. Ohmart, and B. W. Anderson. 1982. Community organization of riparian breeding birds: response to an annual resource peak. The Auk 99:260-274.
- Sample, B. E., R. J. Cooper, and R. C. Whitmore. 1993. Dietary shifts among songbirds from a diflubenzuron-treated forest. The Condor 95:616-624.
- Schaefer, C. H., A. E. Colwell, and E. F. Dupras, Jr. 1980. The occurrence of p-chloroaniline and p-c chlorophenylurea from the degradation of pesticide in water and fish. Proceedings of the 48th Ann. Meeting Mosquito Vector Cont. Assoc.:84-89.
- Schaefer, C. H. and E. F. Dupras, Jr. 1977. Residues of diflubenzuron [1-(4-chlorophenyl)-3(2,6-difluorobenzoyl) urea] in pasture soil, vegetation, and water following aerial applications. J. Agric. Food Chem. 25:1026-1030.
- Smith, D. and J. Lockwood. 2003. Horizontal and trophic transfer of diflubenzuron and fipronil among grasshoppers and between grasshoppers and darkling beetles (Tenebrionidae). Archives of Environmental Contamination and Toxicology 44:377-382.
- Smith, D. I., J. A. Lockwood, A. V. Latchininsky, and D. E. Legg. 2006. Changes in non-target populations following applications of liquid bait formulations of insecticides for control of rangeland grasshoppers. Internat. J. Pest Mgt. 52:125-139.
- Stanley, J. G. and J. G. Trial. 1980. Disappearance constants of carbaryl from streams contaminated by forest spraying. Bul. Environ. Contam. Toxicol. 25:771-776.
- Swain, J. L. 1986. Effect of Chemical Grasshopper Controls on Non-Target Arthropods of Rangeland in Chaves County, New Mexico. New Mexico State University.
- Tepedino, V. J. 1979. The importance of bees and other insect planetaries in maintaining floral species composition. Great Basin Naturalist Memoirs 3:139-150.
- Thompson, H.M, Wilkins, S. Battersby, A.H., Waite, R.J., and D. Wilkinson. 2005. The effects of four insect growth-regulating (IGR) insecticides on honeybee (*Apis mellifera* L.) colony development, queen rearing and drone sperm production. Ecotoxicology 14:757-769.
- Thomson, D. L. K. and W. M. J. Strachan. 1981. Biodegradation of carbaryl in simulated aquatic environment. Bul. Environ. Contam. Toxicol. 27:412-417.
- USDA APHIS— see U.S. Department of Agriculture, Animal and Plant Health Inspection Service
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1999. APHIS Directive 5600.3, Evaluating APHIS programs and activities for ensuring protection of children from environmental health risks and safety risks. September 3, 1999.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service,

- Riverdale, MD. [online] available: <http://www.aphis.usda.gov/library/directives>.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2015. Biological Assessment for the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program. Page 162. U.S. Department of Agriculture, Animal and Plant Health Inspection Service.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018a. Human Health and Ecological Risk Assessment for Carbaryl Rangeland Grasshopper and Mormon Cricket Suppression Applications. United States Department of Agriculture, Animal and Plant Health Inspection Service.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018c. Human Health and Ecological Risk Assessment for Diflubenzuron Rangeland Grasshopper and Mormon Cricket Suppression Applications. United States Department of Agriculture, Animal and Plant Health Inspection Service.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018d. Human Health and Ecological Risk Assessment for Malathion Rangeland Grasshopper and Mormon Cricket Suppression Applications. United States Department of Agriculture, Animal and Plant Health Inspection Service.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2019. Rangeland Grasshopper and Mormon Cricket Suppression Program Final Environmental Impact Statement. United States Department of Agriculture, Animal and Plant Health Inspection Service.
- USDA FS. 2004. Control/eradication agents for the gypsy moth—human health and ecological risk assessment for diflubenzuron (final report). United States Department of Agriculture, Forest Service
- USDA FS. 2008. Malathion- Human Health and Ecological Risk Assessment. U.S. Department of Agriculture, Forest Service.
- USEPA – See U.S. Environmental Protection Agency
- U.S. Environmental Protection Agency. 1997. Reregistration Eligibility Decision (RED): Diflubenzuron. U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2000a. Malathion Reregistration Eligibility Document Environmental Fate and Effects. Page 146. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances.
- U.S. Environmental Protection Agency. 2000b. Reregistration Eligibility Decision (RED) for Malathion. U.S. Environmental Protection Agency.
- USEPA. 2003. Environmental Fate and Ecological Risk Assessment for Re-Registration of Carbaryl. U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2006. Malathion Reregistration Eligibility Document. Page 147. U.S. Environmental Protection Agency, Office of Pesticide Programs.
- U.S. Environmental Protection Agency. 2007. Reregistration Eligibility Decision (RED) for Carbaryl. Page 47. U.S. Environmental Protection Agency, Prevention, Pesticides and Toxic Substances.
- U.S. Environmental Protection Agency. 2012a. Fyfanon ULV AG. U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2012c. Sevin XLR Plus Label. Pages 1-40 Pesticide Product and Label System. U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2015a. Annual Cancer Report 2015, Chemicals Evaluated for Carcinogenic Potential Page 34. U.S. Environmental Protection

- Agency, Office of Pesticide Programs.
- U.S. Environmental Protection Agency. 2015b. Memorandum - Diflubenzuron: human health risk assessment for an amended Section 3 registration for carrot, peach subgroup 12-12B, plum subgroup 12-12C, pepper/eggplant subgroup 8010B, cottonseed subgroup 20C, alfalfa (regional restrictions) and R175 Crop Group Conversion for tree nut group 14-12. Page 71 U.S. Environmental Protection Agency, Office of Pesticide Programs.
- U.S. Environmental Protection Agency. 2016a. Appendix 3-1: Environmental transport and fate data analysis for malathion. In: Biological Evaluation Chapters for Malathion ESA Assessment.
- U.S. Environmental Protection Agency. 2016b. Chapter 2: Malathion Effects Characterization for ESA Assessment. In: Biological Evaluation Chapters for Malathion ESA Assessment.
- U.S. Environmental Protection Agency. 2016c. Malathion: Human Health Draft Risk Assessment for Registration Review. Page 258. U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2017a. Memorandum - Carbaryl: Draft Human Health Risk Assessment in Support of Registration Review. Page 113 U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2017b. Prevathon Label. U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. 2018. Preliminary Risk Assessment to Support the Registration Review of Diflubenzuron.
- USFWS. 2007. National Bald Eagle Management Guidelines. Page 23 pp. U.S. Fish and Wildlife Service.
- Wakeland, C. and W. E. Shull. 1936. The Mormon cricket with suggestions for its control, Extension Bulletin No. 100. University of Idaho, College of Agriculture, Idaho Agricultural Extension.
- Zinkl, J. G., C. J. Henny, and L. R. DeWeese. 1977. Brain cholinesterase activities of birds from forests sprayed with trichlorfon (Dylox) and carbaryl (Sevin 4-oil). Bul. Environ. Contam. Toxicol. 17:379-386.

VI. Listing of Agencies and Persons Consulted

Bureau of Land Management Debra Plummer, Natural Resource Specialist 1103 N. Fancher Spokane, Washington 99212-1275	Washington Department of Fish & Wildlife Paul La Riviere, Habitat Biologist 2620 N. Commercial Avenue Pasco, Washington 99301
Bureau of Land Management Neil Hedges, Wildlife Biologist 915 Walla Walla Avenue Washington 98801	Washington Department of Fish & Wildlife Kevin Robinette, Habitat Manager 2315 N Discovery Place Wenatchee, Spokane Valley, Washington 99216
Bureau of Land Management James Fisher, Field Manager 915 Walla Walla Avenue Wenatchee, Washington 98801	Washington Department of Fish & Wildlife Laurie Guggenmos, PHS 600 Capitol Way North Olympia, Washington 98501-1091
Bureau of Land Management James Pease, NRS 1103 N. Fancher Spokane, Washington 99212-1275	US Fish & Wildlife Service Gregg Kurz, Wildlife Biologist 215 Melody Lane Wenatchee, WA 98801
National Marine Fisheries Service Dale Bambrick, E. Washington Team Leader 304 S. Water Street, #200 Ellensburg, Washington 98926	US Fish and Wildlife Service Heather Fuller, Wildlife Biologist 11103 E. Montgomery Drive Spokane, WA 99206
US Fish & Wildlife Service Chris Warren, Wildlife Biologist 11103 E. Montgomery Drive Spokane, Washington 99206	Colville Confederated Tribes Kodi Jo Jaspers, Wildlife Biologist 21 st Colville Street Nespelem, WA 99155
Washington Department of Fish & Wildlife Greg Fitzgerald, Habitat Biologist 1550 Alder Street NW Ephrata, Washington 98823	Colville Confederated Tribes Danielle Blevins, Soil and Range Conservationist 21 st Colville Street Nespelem, WA 99155

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.

General Guidelines for Grasshopper / Mormon Cricket Treatments

- 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 / land owner 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.

Operational Procedures

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
 - i) solid bait
 - ii) 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.

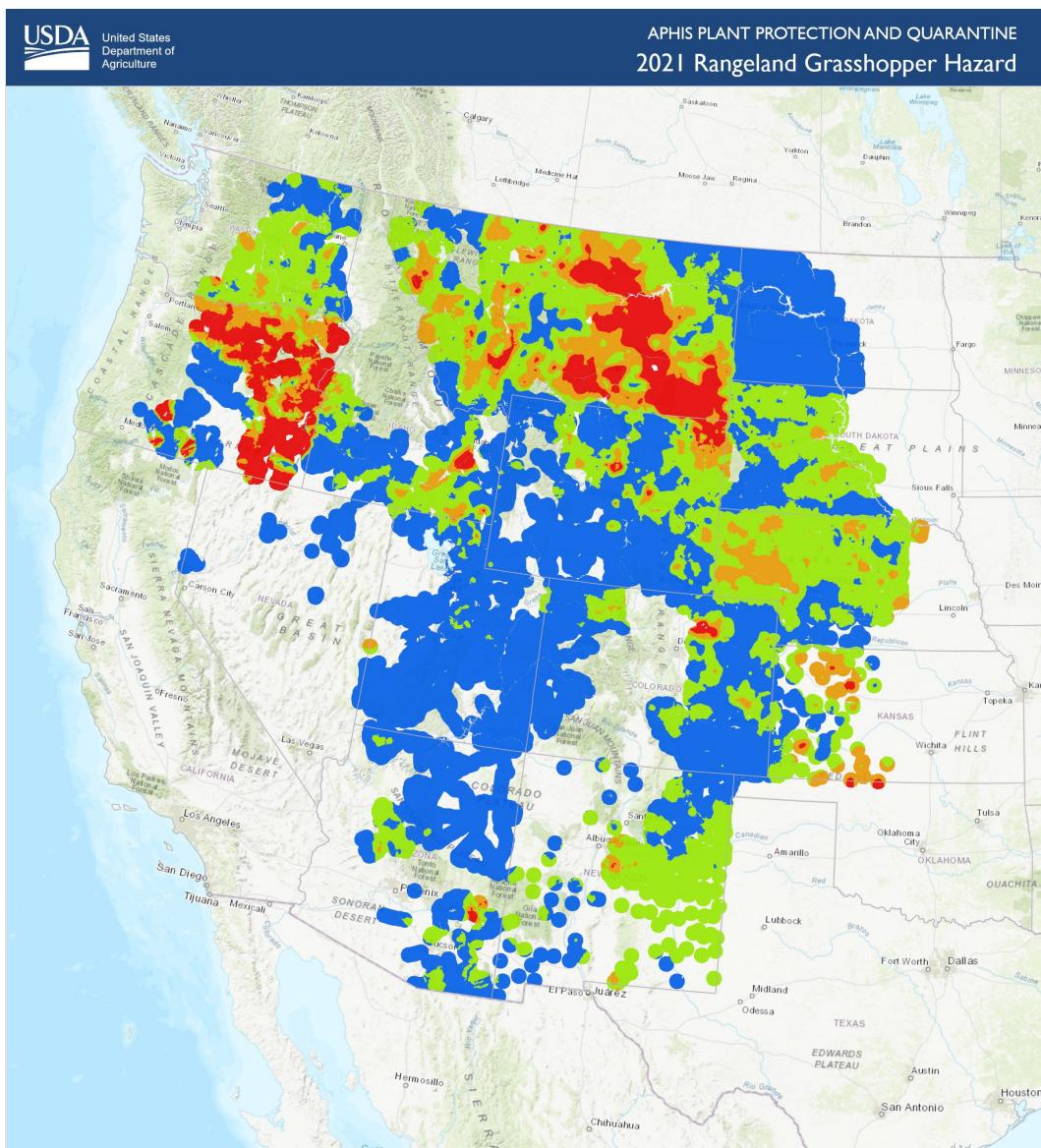
- 9) APHIS reporting requirements associated with grasshopper / Mormon cricket suppression treatments can be found in the APHIS Grasshopper Program Guidebook:
http://www.aphis.usda.gov/import_export/plants/manuals/domestic/downloads/grasshopper.pdf

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: Grasshopper Hazard Map of the Affected Environment



Grasshoppers per sq. yd.

Based on 2020 Adult Survey

- | Based on 2020 Adult Survey | | |
|----------------------------|---------------------|--|
| 0 - <3 | 246.6 million acres | |
| 3 - <8 | 164.1 million acres | |
| 8 - <15 | 49.6 million acres | |
| 15+ | 34.6 million acres | |

Data Source: The data summarized in this map were furnished by the respective state, county, university, and/or federal agency using a variety of survey methods and analytical techniques. Due to funding considerations, states may not have continuous survey coverage. This map was prepared by USDA APHIS PPQ in cooperation with CPHST.

Preparation Notes: Adult and treatment survey densities of adult specimens were interpolated to a maximum buffer distance using an empirical Bayesian kriging model. Areas were then filtered by major water features to produce final acreage estimates. Acreages are approximated based on rounding to millions of acres.



USDA, APHIS, PPQ
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Date Created:
10/8/2020

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Appendix C: Map of the Affected Environment



Appendix D: FWS/NMFS Correspondence

February 25, 2021 - Telephone conversation with Greg Kurz, Fish & Wildlife Biologist, and Jeff Krupka, Supervisor FWS Biologist U.S. Fish and Wildlife Service, Wenatchee Field office to discuss Environmental Conservation Online System (ECOS) and Section 7 consultation as required by the Endangered Species Act of 1973. Discussed potential Mormon cricket/Grasshopper ground treatment locations in southeastern Franklin County and southwestern Grant County. Confirmed through local consultation and ECOS that there would be no threat to non-target species, migratory and local birds species, native bees, pollinators and “no effect” on federally designated threatened or endangered species using carbaryl bait ground treatments within proposed treatment areas.

Telephone conversation with Kodi Jo Jaspers, Colville Confederated Tribes, Wildlife Biologist to discuss potential Mormon cricket/Grasshopper treatments on the Colville Reservation. Greater Sage Grouse and Sharp-tailed Grouse locations will be excluded from treatments. Confirmed through local consultation that any treatment applications within proposed treatment areas would have “no effect” on federally designated threatened or endangered species at present time.

Telephone conversation with Dale Bambrick, Eastern Washington Team Leader, NMFS regarding listed anadromous fish species and critical habitat associated with the assessment area. Given the location and nature of the proposed Mormon cricket hatching bed treatment programs, it was determined that there would be “no effect” on T&E listed species. No federally designated threatened or endangered species occur within the treatment areas at the present time. No treatments will take place within at least a mile of any lakes, rivers or streams.

From: [Kurz, Gregg](#)
To: [Bruno, George A - APHIS](#)
Subject: Re: [EXTERNAL] Updated - 2021 Biological Assessment for APHIS Rangeland Grasshopper Program in Washington
Date: Wednesday, March 24, 2021 4:49:46 PM

Hello George,

Thanks for sending the updated BA. As we discussed on the phone, the implementing regulations for section 7 of the Endangered Species Act do require a Federal action agency to obtain written concurrence from the Service if they determine that their proposed action will not affect listed species or critical habitat, nor do these regulations provide a legal mechanism for the Service to concur with such a determination.

That said, based on the project location and known occurrences of the species addressed in the BA, the Service has no reason to disagree with your no effect determinations. Thank you for coordinating with us on this project

Gregg Kurz

Shrub-Steppe Zone Supervisor
U.S. Fish and Wildlife Service Central Washington Field Office 215 Melody Lane
Wenatchee, WA 98801
509-665-3508 ex: 2007

From: Bruno, George A - APHIS <george.a.bruno@usda.gov>
Sent: Wednesday, March 24, 2021 11:39 AM
To: Kurz, Gregg <gregg_kurz@fws.gov>
Subject: [EXTERNAL] Updated - 2021 Biological Assessment for APHIS Rangeland Grasshopper Program in Washington

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Gregg,

Per our conversation, I have updated the BA to include no effect for the Columbia Basin pygmy rabbit.

Thank you.
George

George Bruno
Domestic Programs Coordinator USDA APHIS PPQ
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Biological Assessment

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For
Washington

Rangeland Grasshopper and Mormon Cricket Suppression Program

03/23/2021

Prepared by USDA, APHIS, PPQ

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**BIOLOGICAL ASSESSMENT (BA) FOR STATEWIDE CONSULTATION AND
CONFERENCE FOR 2021 GH/MC PROGRAMS IN WASHINGTON.**

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
Program, Washington

03/23/2021

1.0 INTRODUCTION

The Animal and Plant Health Inspection Service (APHIS), in conjunction with Federal agencies, State departments of agriculture, Native American tribes, and private individuals is planning to conduct grasshopper/Mormon cricket control programs in Washington in 2021. This document is intended as statewide consultation and conference with the U.S. Fish and Wildlife Service (FWS) regarding the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program.

Beginning in 1987, APHIS has consulted with the FWS on a national level for the Rangeland Grasshopper Cooperative Management Program. Biological Opinions (BO) were issued annually by FWS from 1987 through 1995 for the national program. A letter dated October 3, 1995 from FWS to APHIS concurred with buffers and other measures agreed to by APHIS for Washington and superseded all previous consultations. Since then, funding constraints and other considerations have drastically reduced grasshopper/Mormon cricket control activities.

APHIS is requesting initiation of informal consultation for the implementation of the 2021 Mormon cricket and grasshopper suppression program on rangeland in the Juniper Dunes Management Area (BLM) in southeastern Franklin County and rangeland in West Saddle Mountains (BLM) in southern Grant County. (Project maps of both areas are attached.)

Our determinations of effect for listed species are based on the October 3, 1995 FWS letter, the analysis provided in the 2019 Environmental Impact Statement (EIS) for APHIS suppression activities in 17 states, and local discussions with FWS. There is no Critical habitat for the listed species within the proposed project areas.

APHIS has determined that the proposed action **will not affect:** the threatened Yellow-billed Cuckoo, (*Coccyzus americanus*); threatened Bull Trout (*Salvelinus confluentus*); and endangered Columbia Basin Pygmy Rabbit (*Brachylagus idahoensis*).

With this letter, APHIS is requesting concurrence with our determination for listed species that may occur in Washington within the area of the proposed 2021 grasshopper suppression program.

03/23/2021

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
Program, Washington

2.0 PURPOSE

The purpose of the proposed action is to control Mormon cricket and grasshopper outbreaks on Bureau of Land Management (BLM) rangelands within the Juniper Dunes Management Area (JDMA) in southeastern Franklin County and the West Saddle Mountains in southern Grant County. The objective is to suppress economically damaging Mormon cricket infestations on BLM administered/managed rangelands, adjacent to high value privately owned agricultural lands using insecticide carbaryl bait within the identified project areas. No treatments will occur in the Juniper Dunes Wilderness.

All rangeland treatments and border protection programs will be applied utilizing the reduced agent area treatments (RAATs) techniques. RAATs treatments differ from traditional programs by applying fewer agents to fewer acres while maintaining efficacy.

APHIS respectfully requests informal ESA consultation on listed species in Washington. A written response from FWS is requested regarding FWS concurrence with the determinations in this assessment.

3.0 DESCRIPTION OF ACTION

This document incorporates by reference portions of the 1987 APHIS Rangeland Grasshopper Cooperative Management Program, Final Environmental Impact Statement (2019 APHIS FEIS) which discuss the purpose and needs, alternative strategies, affected environments, standard operational procedures, and environmental consequences of the grasshopper program.

An environmental assessment (EA), tiered to the 2019 Rangeland Grasshopper and Mormon Cricket Suppression Program Final Environmental Impact Statement (FEIS), is being prepared in anticipation of treatments in the State of Washington. When specific treatment areas are identified and become imminent, a site-specific addendum to the EA will be prepared. Grasshopper Program decisions are then based on the conclusions reached in the EA and the addendums. Only the program operational procedures and alternatives found in the 2019 FEIS are available to APHIS for use in any site-specific treatment.

Grasshopper populations may build up to levels of damaging infestations despite even the best land management and other efforts to prevent outbreaks. At such time, a rapid and effective

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
Program, Washington

03/23/2021

response may be requested and needed to reduce the destruction of rangeland vegetation, or in some cases, to also prevent grasshopper migration to private agricultural lands. The 2019 FEIS analyzes the alternatives available to APHIS when a Federal land management agency, Tribe or State agriculture departments (on behalf of a State, a local government, or a private group or individual) requests APHIS to suppress economically damaging grasshopper populations.

The chemical control methods will include the use of carbaryl bait by ground application. Three alternatives are considered: 1) No action, 2) insecticide applications at conventional rates and complete area coverage, 3) Reduced Agent Area Treatments (RAATs).

Conventional rates for these agents are:

- 10 pounds (0.50 lb a.i.) of 5 percent carbaryl bait per treated acre,

Rates utilizing RAATs are:

- 10 pounds (0.20 lb a.i.) of 2-5 percent carbaryl bait per treated acre,

Carbaryl is a broad spectrum contact insecticide used to control a wide variety of insects on agricultural crops, pastures and range grasses. Its mode of action is to inhibit acetyl cholinesterase (AChE) function in the nervous system. Reduced Area/Agent Treatments (RAATs) rates for carbaryl are 8-12 ounces per acre containing 280-420 grams of a.i. in 100 foot treated swaths alternating with 100 foot untreated for air applications. 2 percent carbaryl bait containing .20 lb a.i. in 30-40 foot swaths alternating with 30-40 foot untreated swaths are used for ground applications. An example of modified RAATs by ground application may incorporate 5 percent carbaryl bait containing .50 a.i. in 30-40 foot swaths alternating with 30-40 foot untreated swaths.

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4.0 ASSESSMENTS:

4.1 MAMMALS

4.1.1 Columbia Basin Pygmy Rabbit, (*Brachylagus idahoensis*)

4.1.1.1 Status:

On March 5, 2003, the USFWS listed the Columbia Basin pygmy rabbit as endangered under the Endangered Species Act (ESA). Because of the extreme risk of extinction, this population was given emergency protection under the ESA on November 30, 2001. WDFW developed the Washington State Recovery Plan for the Pygmy Rabbit in July 1995 (WDFW, 1995). The plan was modified in August 2001 and May 2003 (WDFW, 2003).

4.1.1.2 Habitat and Distribution:

Columbia Basin pygmy rabbits are the smallest rabbit in North America and the only rabbit to dig its own burrows. They are typically located in the deep loamy soils of sagebrush-dominated landscapes. Its distribution is scattered in the sagebrush-dominated shrub steppe areas of the Great Basin. This includes portions of Oregon, California, Nevada, Utah, Idaho, Montana, Wyoming, and Washington states. Washington populations are discontinuous from the rest of the species' range. Pygmy rabbits are typically found in areas that include tall, dense stands of sagebrush (*Artemisia spp.*) which they are highly dependent on to provide both food and shelter throughout the year. Pygmy rabbits in Washington State are part of the Columbia Basin Distinct Population Segment. Pygmy rabbits were thought to be extirpated from Washington by the mid-20th century, until a single unverified sighting was documented in Benton County in 1979 (USFWS 2012a). Since then, pygmy rabbits have only been found in southern Douglas and northern Grant counties (USFWS 2012a). Current reintroduction efforts are occurring in Douglas and Grant counties from captive-bred individuals as well as captured and translocated individuals from Oregon, Idaho, and Nevada (USFWS 2012a).

4.1.1.3 Assessment:

No pygmy rabbits or their sign were observed in the project area during annual grasshopper surveys conducted by APHIS in May and August 2020. While there is suitable sagebrush habitat in the project area, it is not within the expected historical distribution of the species. Since the most recent observation was unverified and occurred in 1979, it is anticipated that the pygmy rabbit does not occur in the project area. Therefore, the proposed Project would have no effect on pygmy rabbits.

4.1.1.4 Protective measures:

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Threats to pygmy rabbit survival are primarily habitat destruction or degradation. For any given grasshopper treatment, only a portion of the environment will be treated one time during the season, therefore minimizing any potential impact to the Columbia Basin pygmy rabbit and its habitat.

4.1.1.5 Determination:

Although Columbia Basin pygmy rabbit habitat occurs in the project area, it is unlikely that the pygmy rabbit occurs on the site. Based on the determined protective measures, habits of the species, characteristics of the insecticide, and application rates, grasshopper treatments occurring on rangeland within this species habitat, the proposed actions **will have no effect** on the Columbia Basin pygmy rabbit.

4.2. BIRDS

4.2.1 Yellow-billed cuckoo, (*Coccyzus americanus*)

4.2.1.1 Status:

Yellow-billed cuckoo (*Coccyzus americanus*) was federally listed as threatened on October 3, 2014. Critical habitat was proposed for designation on August 15, 2014, but excluded Washington State (USFWS 2015a).

4.2.1.2 Habitat and Distribution:

Yellow-billed cuckoo require large, tree riparian corridors, preferably deciduous, with dense, low, scrubby vegetation greater than 50 acres. Nests are often placed in willows along streams and rivers, with nearby cottonwoods serving as foraging sites. (USFWS 2015a).

The western population has experienced major declines in its breeding range since the 1800s. Very few recent observations of the species have occurred in Washington State, with only about 12 records between 1950 and 2000 (WDFW 2012). The Yellow-billed cuckoo inhabits the canopies of deciduous trees such as cottonwoods and willows along large rivers.

4.2.1.3 Assessment:

Yellow-billed Cuckoo are not known to occur within the project area and are not expected to be present. Given the arid nature of the project areas, the lack of streams, rivers, bodies of water or riparian forests to provide suitable habitat for Yellow-billed Cuckoo, it is unlikely that it would be present within the proposed action area. The project areas do contain sparingly populated trees,

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however, no cottonwood trees and willows or riparian areas are present that would be the cuckoo's typical habitat. Due to the riparian nature of the yellow-billed cuckoo and the fact that APHIS suppression activities will not occur in riparian areas, it is believed that grasshopper treatments are not likely to adversely affect the yellow-billed cuckoo. No yellow-billed cuckoos, or suitable nesting habitat were observed within the project areas during APHIS grasshopper surveys conducted in May and August 2020.

4.2.1.4 Protective measures:

In accordance with Executive Order 13186, Migratory Bird Act, 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 minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions. APHIS maintains a 500 foot buffer around all water bodies, which would exclude most riparian areas where the Yellow-billed cuckoo is likely to occur. Impacts will be minimized as a result of buffers to water, habitat, nesting areas, subsequently riparian areas, and the use of RAATs. For any given treatment, only a portion of the environment will be treated, therefore minimizing any potential impact to migratory bird populations.

4.2.1.5 Determination:

No riparian areas occur in the boundaries of proposed treatment areas. The common species of trees for nesting are not present in proposed treatment areas. There are no known occurrences of yellow-billed cuckoo near the project and the action area does not contain the extensive canopy/woodlands habitat the species requires; therefore, it is determined the grasshopper treatments **will have no effect** on yellow-billed cuckoo.

4.3.1 Trout, Bull, *Salvelinus confluentus*

4.3.1.1 Status:

Bull trout were originally listed as threatened on July 10, 1998. Critical habitat for Bull trout was designated on September 30, 2010. The Upper Columbia River, including the Hanford Reach is listed as part of the Columbia River Distinct Population Segment [75 FR 63898].

4.3.1.2 Habitat and Distribution:

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03/23/2021

Bull trout are members of the char subgroup of the salmonidae family. They are typically associated with the colder streams in a river system and often spawn near cold-water springs, and areas of groundwater infiltration [64 FR 58911]. Suitable habitat requires clear and stable stream channels, clean spawning gravel, complex and diverse cover, and unblocked migration routes. In Washington, bull trout were historically found in major tributaries to the Columbia River on the eastside of the Cascades. Bull trout are widespread throughout tributaries of the Columbia River basin in Washington, Oregon, and Idaho, including its headwaters in Montana. Bull trout have declined in overall range and numbers of fish. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. Although some strongholds still exist, bull trout generally occur as isolated subpopulations in headwater lakes or tributaries where migratory fish have been lost.

4.3.1.3 Assessment:

The Proposed action will not involve insecticide applications or soil disturbance closer than 1.0 mile from bull trout utilized streams, tributaries of the Columbia River and Snake River where bull trout are known to occur. Further, the proposed action would not have any impacts on spawning and rearing habitat as the project areas are far from the designated critical habitat within the Snake River or Columbia River. Therefore, the proposed action would have no effect on designated critical habitat for bull trout. No critical habitat for bull trout occurs within the project areas.

4.3.1.4 Protective measures:

A 1.0 mile treatment buffer would be implemented from known habitats of the bull trout, and critical habitat will not be treated.

4.3.1.5 Determination:

APHIS determines that grasshopper treatment activities **will have no effect** on bull trout as a result of the protective measures, proposed insecticide, and the proposed rates of application.

6.0 SUMMARY

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
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This BA addresses the effects of grasshopper suppression program activities on species listed since the 1995 BO and additionally provides measures for all earlier species that may be impacted by applications of carbaryl. Information is provided on the biology and ecology of those species and protective measures are suggested when necessary because program activities could potentially affect those species or their habitats.

APHIS has determined that the proposed action will not affect yellow-billed cuckoo, (*Coccyzus americanus*); bull trout, (*Salvelinus confluentus*); and Columbia Basin pygmy rabbit (*Brachylagus idahoensis*).

Should there be species in the affected areas that become newly listed, newly proposed, or otherwise not mentioned in previous biological opinions, APHIS will adhere to buffers and other protective measures for similar species that have been specified in previous biological opinions. This will ensure that Grasshopper Program activities will not likely jeopardize the continued existence of either listed species or species proposed for listing, or adversely modify critical habitat for listed species. APHIS will continue to incorporate, protection and conservation measures to ensure grasshopper control activities have little impact on the environment.

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
Program, Washington

03/23/2021

Works Cited:

- (1) Biological Opinions, National Section 7 Consultations: U.S. Department of Interior, Fish and Wildlife Service; June 1, 1987; July 26, 1988; July 17, 1989; August 3, 1990; August 29, 1991; September 24, 1992; September 16, 1993; December 6, 1994; and July 21, 1995.
- (2) George, T. Luke, McEwen, Lowell C., and Petersen, Brett E., Effects of Grasshopper Control Programs on Rangeland Breeding Bird Populations, Journal of Range Management, July 1996, Vol. 48(4).
- (3) Grasshopper Integrated Pest Management User Handbook, U.S. Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection Quarantine, Technical Bulletin Number 1809.
- (4) Rangeland Grasshopper Cooperative Management Program, Final Environmental Impact Statement – 1987
- (5) Rangeland Grasshopper and Mormon Cricket Suppression Program, Final Environmental Impact Statement--2002 and 2019
- (6) Avian Power Line Interaction Committee (APLIC). 2006. Suggested practices for avian protection on power lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission, Washington, DC and Sacramento, CA. 207 pp.
- (7) Avian Power Line Interaction Committee (APLIC). 1995. Mitigating bird collisions with power lines: the state of the art in 1994. Edison Electric Inst., Washington, DC. 103 pp.
- (8) Eisler, R., 1992. Diflubenzuron hazards to fish, wildlife, and invertebrates: a synoptic review. Biol. Rpt. 4. Contaminant hazard review report 25. U.S. Department of the Interior, Fish and Wildlife Service. Washington, DC.
- (9) Willcox, H., and Coffey, T., 1978. Environmental impacts of diflubenzuron (Dimilin). insecticide. Forest Insect and Disease Management, U.S. Department of Agriculture, Forest Service, Broomall, PA. 18 pp.
- USDA APHIS – See U.S. Department of Agriculture, Animal and Plant Health Service
- (10) Catangui, M.A., Fuller, B.W., and Walz, A.W., 1996. Impact of Dimilin on nontarget arthropods and its efficiency against rangeland grasshoppers. *In* Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No.1809. Sec. VII.3. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Washington, DC.

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
Program, Washington

03/23/2021

- (11) Weiland, R.T., Judge, F.D., Pels, T., and Grosscurt, A.C., 2002. A literature review and new observations on the use of diflubenzuron for control of locusts and grasshoppers throughout the world. *J. Orthoptera Res.* 11(1):43-54.
- (12) Tingle, C.C.D. 1996. Sprayed barriers of diflubenzuron for control of the migratory locust (*Locusta migratoria capito* (Sauss.)) [Orthoptera: Acrididae] in Madagascar: short term impact on relative abundance of terrestrial non-target invertebrates. *Crop Protection* 15(6): 579-592.
- (13) Smith, D.I., Lockwood, J.A., Latchininsky, A.V., and Legg, D.E., 2006. Changes in non-target populations following applications of liquid bait formulations of insecticides for control of rangeland grasshoppers. *Internat. J. Pest Mgt.* 52(2):125-139.
- (14) *Coccyzus americanus*. In Nature Serve Explorer. Retrieved February 5, 2015, from <http://explorer.naturereserve.org/servlet/NatureServe?searchName=Coccyzus+americanus>

2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression
Program, Washington



United States Department of the Interior



FISH AND WILDLIFE SERVICE

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In Reply Refer To:

March 03, 2021

Consultation Code: 01EWFW00-2021-SLI-0736

Event Code: 01EWFW00-2021-E-01448

Project Name: 2021 Rangeland Grasshopper Suppression Program

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: <http://wdfw.wa.gov/mapping/phs/> or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at <http://www.fws.gov/pacific/eagle/for> information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: <http://www.nmfs.noaa.gov/pr/laws/mmpa/>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:

National Marine Fisheries Service: http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whetherany species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Project Summary

Consultation Code: 01EWFW00-2021-SLI-0736

Event Code: 01EWFW00-2021-E-01448

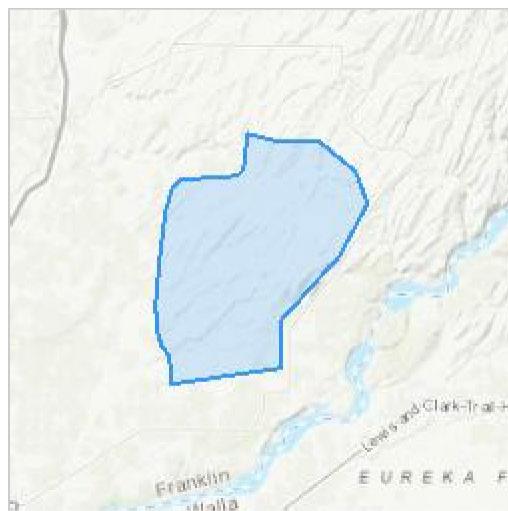
Project Name: 2021 Rangeland Grasshopper Suppression Program

Project Type: AGRICULTURE

Project Description: BLM - Juniper Dunes Management Area (500 Acres)

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@46.38016885000004,-118.86069976404974,14z>



Counties: Franklin County, Washington

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Yellow-billed Cuckoo <i>Coccyzus americanus</i> Population: Western U.S. DPS There is proposed critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout <i>Salvelinus confluentus</i> Population: U.S.A., conterminous, lower 48 states There is final critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

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In Reply Refer To:

March 11, 2021

Consultation Code: 01EWFW00-2021-SLI-0764

Event Code: 01EWFW00-2021-E-01507

Project Name: 2021 Rangeland Grasshopper Suppression Program

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: <http://wdfw.wa.gov/mapping/phs/> or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at <http://www.fws.gov/pacific/eagle/for> information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: <http://www.nmfs.noaa.gov/pr/laws/mmpa/>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:

National Marine Fisheries Service: http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whetherany species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
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Project Summary

Consultation Code: 01EWFW00-2021-SLI-0764

Event Code: 01EWFW00-2021-E-01507

Project Name: 2021 Rangeland Grasshopper Suppression Program

Project Type: Aquaculture

Project Description: BLM - Western Saddle Mountains (500 acres) Project

Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@46.79023815,-119.88774268659621,14z>



Counties: Grant County, Washington

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Columbia Basin Pygmy Rabbit <i>Brachylagus idahoensis</i> Population: Columbia Basin DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1126	Endangered

Birds

NAME	STATUS
Yellow-billed Cuckoo <i>Coccyzus americanus</i> Population: Western U.S. DPS There is proposed critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout <i>Salvelinus confluentus</i> Population: U.S.A., conterminous, lower 48 states There is final critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Appendix E: APHIS response to public comments on Washington's draft EA (EA Number: WA-21-01).

USDA APHIS received two public responses to the publication of the 2021 Draft Environmental Assessment (EA) (EA Number: WA-21-01). Public comments were received from the Xerces Society and from the Center for Biological Diversity (“Center”). Comments similar in nature were grouped under one response. Comments that were editorial in nature or requested additional citations are not addressed in the appendix but will be incorporated into the final EA, where appropriate. No APHIS PPQ grasshopper suppression programs occurred in Washington in 2020.

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 the actual 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. 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, the locations of areas where requests have been received, if any, must exist in APHIS files. We believe this information should be used to disclose maps of higher probability treatment areas, together with an estimate of acres to be treated and likely method and chemical -- in the Draft EA and certainly by the Final EA. We find it hard to imagine good reason for not disclosing more specific treatment maps, together with acreage estimates and proposed method and chemical – as soon as such information is available, certainly by the Final EA or as an Addendum to the Final EA. After all, treatments commonly occur within weeks after the Final EA is published, so much planning would have occurred by the time the Draft and Final EAs are published.

Instead, as published, the Draft EA provides almost no solid information about where, how, and when the treatments may actually occur in Eastern Washington in 2021, with the exception being that the Official Species List from the U.S. Fish and Wildlife Service provides species only for the Juniper Dunes Management Area in Franklin County.

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.

The lack of transparency about proposed and historical treatment areas, particularly on public lands, is a disservice 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 APHIS would 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: We urge APHIS to publicly disclose, in the Final EA, all areas that have been delineated for treatment, 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 method to 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 for public comment. Some states publish a supplemental determination if treatment areas are deemed to have not been analyzed thoroughly enough in the EA. As soon as available, we request to receive a copy of maps and acreages of all final treatment areas for 2021, whether or not a supplemental determination is published. Should a supplemental determination be published, please send a copy to us. In future years, we urge APHIS to delay release of the FONSI until after treatment requests are received and all treatment areas have been delineated and are identified to the public.

Response: Treatment requests are received before the survey season begins, but they are very dynamic and can change week-to-week. In Washington, requests for treatment from BLM are normally received from February through April. Arbitrarily publishing requested treatment locations in the draft EA would not accurately reflect future treatment actions. Treatment locations on public land cannot be described accurately in the EA because the exact location is only known after nymphal surveys are conducted. Grasshopper nymphal stages generally develop every 5-12 days depending on environmental temperature. If draft EAs are published after nymphal surveys dictate treatment locations, the grasshopper life stage would advance to the point that treatments could no longer take place. Please see the APHIS responses to comments 1, 2, 3, 4, 5, 6, 8, 54, 92 and 93 in the 2020 EA.

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 the consequences 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 it be 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 contains a single action alternative that encompasses suppression treatments using either the "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. Another reasonable alternative is not treating public lands. In addition, APHIS should separate the conventional from the RAATs method into two different alternatives, and analyze them accordingly.

Response: 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 exclude, eradicate, and control plant pests, including grasshoppers. Specifically, language in the PPA provides authority for APHIS to protect rangeland from "economic infestation" of grasshoppers. In its recent EIS updating the program (APHIS 2019), 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; and weather 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 gained by a treatment.

The Plant Protection Act of 2000 does not give authority to APHIS to purchase replacement feed for ranchers, but rather only provides funding when available to suppress outbreak populations of grasshoppers to save forage.

The commenter is correct that APHIS believes the use of RAATs mitigates the risk to non-target insects including pollinators. However, APHIS does not solely rely on the reduced deposition of pesticides in the untreated swaths to determine the potential harmful effects of grasshopper treatments will not cause significant impacts. The environmental consequences risk analysis of carbaryl and diflubenzuron treatments using conventional methods (total area coverage and higher application rates) is provided on pages 26-32 of the 2021 EA. Additional descriptions of APHIS' analysis methods and discussion of the toxicology can be found in the 2019 EIS.

3. Impacts are described as "reduced" in many portions of the environmental consequences 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 numerous locations 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 use of relative terms such as “reduced” should be avoided unless APHIS is very clear about the factors and results being compared.

Response: The commenter is too vague to be able to respond accurately to this comment. Often in the EA the term Reduced Agent Area Treatment (RAAT), typically described as the RAATs treatment method, is used. Compared to conventional blanket applications of pesticide, the RAATs strategy uses a reduced rate by alternating treatment swaths in a spray block, reducing application rates, or both.

4. APHIS has not demonstrated that treatments in Washington in 2021 would meet the “economic infestation level.” No site-specific data is presented in the EA that justifies treatment based 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 with the authority to exclude, eradicate, and control plant pests, including grasshoppers. Specifically, language in the PPA provides authority for APHIS to protect rangeland from “economic infestation” of grasshoppers. In its recent EIS updating the program (APHIS 2019), the Agency describes its determination of an economic infestation as follows:

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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 they have 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 would 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 to the 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 Arizona 2017 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.”¹ 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.

Information from a summary of treatments conducted across Western states in 2017, 2018, and 2019 shows treatment costs for treatment costs for treated acres ranging from \$4.43-\$35.00 (2107); \$9.34-\$45.44 (2018), and \$2.70-\$35.60 (2019).

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 treatment should occur, does not contain data for Eastern Washington that conveys the number of acres of rangeland to support one animal unit-month (AUM), however Oregon does. Relatively productive sites in NE Oregon have a grazing capacity of around 4 acres/AUM. Currently, on federal BLM and Forest Service lands, the US taxpayer receives \$1.35 per AUM. As a rough estimation, taking NE Oregon as a proxy and estimating carrying capacity as 4 acres per AUM) and calculating the value of the forage per acre as paid to the American taxpayer, the US taxpayer receives an estimated \$0.34 per acre for the forage value on BLM or USFS federal rangelands in 2021 in Washington.

Given that the direct costs of grasshopper treatments to the taxpayer appear to range from \$2.20 up to \$45.44/acre, it is clear that the economic threshold is nowhere near being met, at least on federal lands. The program makes no economic sense from the point of view of the taxpayer.

The ecological costs of treatment are not quantified in the EAs, but as we have pointed out in this EA, are numerous, and there is no evidence that they are not significant. It is unclear if the economic analysis that the PPA appears to require from APHIS is intended to include a quantitative assessment of ecological costs.

¹ 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 FOIA request.

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, at least on federal lands. 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 treated meet 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 is similar in nature to comments in the 2020 EA, please see the APHIS responses to comments 3, 4, 5, 6, 7, 8 from the 2020 EA. The analysis provided by the commenter assumes all lands treated by APHIS in Washington are public. This is not the case. The value of the forage is not based only on the grazing fees assessed by BLM or the USDA Forest Service (FS). There are a range of additional costs associated with replacement feed, the cost of hay, the cost to ship the hay, the cost and labor to move the hay to the rangeland, the cost of moving the cattle from the grazing allotments, the cost to provide or build a hay barn to store the hay, etc. The Plant Protection Act of 2000 does not give authority to APHIS to purchase replacement feed for ranchers, but rather only provides funding when available to suppress outbreak populations of grasshoppers to save forage. In Washington, there are no overhead or Administrative costs associated with ground treatment costs provided by APHIS. Administrative costs would be associated if contractors were provided for aerial treatments.

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 will survive 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 less insecticide, and with a markedly higher abundance of non-target organisms following application (Lockwood et al., 2000; Deneke and Keyser, 2011).
- Washington 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 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.”

However, the width of the skipped swaths is not designated in advance in the EA, and there is no minimum 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 an assessment. We note that:

- 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.
- 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 both ranches, 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 for predicting impacts under APHIS' current program. We note that:

- This study only investigated RAATS effects to non-targets for carbaryl, malathion, and fipronil, not on diflubenzuron.
- 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 for aerial applications, no maximum wind speed specified for ground applications).
- 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). This could 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 an extension 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.

- a) 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 based on a boom height of 10 feet while APHIS aerial release heights are typically much higher.
- b) 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 similar to 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.
- c) 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 results and 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/m². 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.²

According to drift experts, the most important variables affecting drift are droplet size, wind speed, and release 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 in predicting drift under the grasshopper spray program, based on the release height EPA used in its model, as pointed out above. And while it is 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:

- The APHIS AgDISP analysis only analyzed deposition at the lower end of the application rate for diflubenzuron - corresponding to 0.75 oz/acre (0.012 lb/A) rather than the upper end of the

² We use these figures later in estimating the effect of these estimated environmental concentrations on non-target pollinators.

application rate that corresponds to 1 oz/acre (0.016 lb/A) which is a rate often specified in contracts.

- The APHIS aerial AgDISP analysis was conducted with a VMD of 137.5, far larger than those predicted for other ULV analyses. APHIS never explains exactly why.
- 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 have a major impact*” on drift (Teske et al. 2003).
- 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 used and what droplet sizes are actually being emitted.

In conclusion, APHIS has not presented evidence that its RAATs method, even with skipped swaths 200 feet, 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 APHIS conduct a rigorous assessment of drift into untreated swaths and compare 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 that would 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 APHIS grasshopper program in Washington has not been involved in aerial grasshopper treatments for nearly 30 years. The commenter is correct that APHIS believes the use of RAATs mitigates the risk to non-target insects including pollinators. The environmental consequences risk analysis of carbaryl and diflubenzuron treatments using conventional methods (total area coverage and higher application rates) is provided on pages 26-32 of the 2021 EA. Additional descriptions of APHIS' analysis methods and discussion of the toxicology can be found in the 2019 EIS.

The commenter has expressed concern that APHIS' analysis modelling drift does not use the same variables values as similar analysis conducted by the US EPA. APHIS must explain that the EPA analysis is for general use of ULV pesticides while APHIS' analysis is based on multiple conservative estimations of operational procedures and variables for the grasshopper program. The commenter also cites a study (Schleier et al., 2012) and asserts the insecticide drift modelled and measured by the authors for ultra-low volume mosquito treatments are representative of the potential drift between treated and untreated swaths during a grasshopper suppression treatment using the RAATs method. APHIS disagrees with the commenter's understanding of the study based on the text of the article that states, “Ground-based ULV applications used for adult mosquito management are very different than agricultural pesticide applications because the nozzles produce an aerosol (droplets < 100 µm) and are pointed at a + 45° angle from the horizon. Ultra-low-volume applications used for adult mosquito management are most effective when the insecticide remains airborne and moves through the target area; in contrast, applications for agricultural pests are designed to minimize the movement of droplets (Hiscox et al., 2006).”

The commenter appreciates the graphical representation of spray drift provided by APHIS for the purpose of estimating pesticide deposition at various distances from the treated swath. The graphs are intended to explain how APHIS derived no-treatment distances for buffers intended to prevent harm to species protected by the Endangered Species Act. APHIS does not assert that spray drift is reduced to zero in untreated swaths, and that is not represented by the graphs or assumed by the risk analysis cited by the commenter (APHIS EAs, EIS, HHERAs). If the commenter agrees the graphs are reasonable representations of spray drift, and wishes to extrapolate the modeling to deposition resulting from APHIS' use of the RAATs method, the exponential drop of pesticide deposition close to the release point is more informative.

For Washington treatments the skip swath width is described on pages 8-9 of the 2021 EA. For ground treatments which use bait spreaders, the swath width skipped is at least the same swath width of the treated swath which can be expected to preserve pollinators and beneficial insects.

The ground treatment equipment used in carbaryl bait application is approximately 4 feet off the ground, the bait pellets are not capable of drift due to the size and weight of each pellet at that distance from the ground.

For the safety of the applicator and to eliminate drift potential, it is a practice in Washington not to treat when the wind is blowing greater than 10MPH. Regular environmental measurements (wind speed, wind direction, air temp) are taken before and during a treatment. The minimum swath width for treatments has been described in the EA's for 2020 and 2021. Please see comments, 10, 12, 14, 19, 20, 21, 23, 24, 25, 28, 41 of the 2020 EA.

6. The EA understates 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 (via bait or by liquid), 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, the EA indicates 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 gives 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 significant declines (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 injury and death if exposed.

The risk assessment included for diflubenzuron (attached to the 2019 EIS) makes little to no mention of an 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 fully represent 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 mean exposure to developing larvae of bees, who may consume contaminated pollen placed in the nest by adults.

We could not find such an analysis in the APHIS EA or EIS, so we turned elsewhere to figure out this relevant information. There is a standard tool, 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 honey bee 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 8-day larval LD50 of 0.044 ug ai/larvae and NOAEL of 0.0064 ug a.i./larva.

Using these values, we conducted an assessment of the potential acute and chronic dietary risk to bee larvae. We utilized 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 feet³ analyses presented in the APHIS drift analysis included in its BA

³ 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.

to NMFS as mentioned above. Table 1 shows the outputs with Expected Environmental Concentrations and Risk Quotients, as calculated by the Bee Rex tool.⁴

Table 1. DIFLUBENZURON Bee Risk Assessment

A p p l i c a t i o n R a t e (l b a i / A)	S ce n ar io	P o l e n / n e c t a r E E C (m g / k g)	P o l e n / n e c t a r E E C (p p b)	La rva l RQ s	C h r o n i c e d i e t a r y*	Nu mbe r of time s LO C (Lar val)	A c h r o n i c e d i e t a r y
0 .1 6	F ul l	1 .7 7 6	1 7 6 0	4 .9 9 0	3 4 .0	1 2	3 4
0 .1 2	R A A T S	1 .3 3 2	1 3 2 0	3 .7 7 5	2 5 .5	9	2 5

	pt ze ro A P H IS drift analy sis in 2 0 1 0 B A	0 . 9 1 8 1 1 .	9 8 1 .	2 . 8	1 9 1	7	1 9
	pt . 5 0 0 A P H IS drift analy sis in 2 0 1 0 B A	0 . 8 8 5 8 1 1 .	8 5 8 .	2 . 4	1 6 6	6	1 7

* In Bee Rex, EPA translates any mortality effect into an acute RQ value. In this case, the concentrations that resulted in mortality were reported as an 8-day LD50 (most acute studies are based on one-time or brief exposures).

An acute risk quotient (RQ) of 1.0 (or higher) indicates that the estimated environmental concentration is sufficient to kill 50% (or more) of exposed bees. 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. Using the deposition estimates above, larval acute RQs range from 2.4 – 4.9 (6-12X the EPA LOC threshold), depending on the scenario examined.

Chronic risk to bees is 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, chronic RQ is estimated at 16.6. At the release site, assuming drift, the chronic RQ is estimated to be 19.1, assuming no drift it would be 34 at the full rate. RQs are thus 17-34X the EPA LOC level.

Risk quotients this many times the LOC values indicate a potential for mortality and chronic harm to exposed bee larvae.

APHIS appeared to acknowledge the risk to bees in many of the 2020 EAs by instituting a 4-mile buffer around any known managed leafcutter or alkali managed bees and by including notification to all apiarists before a treatment. However, APHIS in 2021 left this buffer out of the standardized treatment guidelines and shrugs off 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 terrestrial plants.

⁴ 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 appropriate EECs at the specified deposition rates.

Due to the infeasibility of testing every known species for sensitivity to pesticides, EPA recognizes honey bees as the surrogates for the hundreds of native bees that may be present in the treated areas.

However, using surrogates requires a recognition of the limitations of this approach. Most native bees lead a solitary lifestyle and their larvae consume unprocessed pollen, and thus native bees may be more at risk than honey bees from equivalent levels of contamination in the environment.

In fact, in examining a study of bumble bees and diflubenzuron, APHIS cites Mommaerts et al. (2006), noting that reproductive effects were observed on bumble bees in this study, 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 1760 ppb as shown in Table 1 (RAATS rate, full rate, respectively). The Mommaerts study thus shows the **opposite** of what APHIS claims – that reproductive effects for bumblebees **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 (and incorrectly dismissed) 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-life values of 68.2 to 78 days. Rangeland persistence is unfortunately not available, but diflubenzuron applied to plants remains adsorbed to leaf surfaces for several weeks.

Lepidoptera also pollinate, if incidentally. Adults consume nectar while larvae eat leaf tissue. Lepidopteran larvae are not relatively protected in nests while developing (like bees are) but are fully exposed to the elements.

While studies of diflubenzuron effects to non-pest lepidopteran species can be hard to find, several studies of this chemical on pest species are identified in Eisler (1992). Eisler identified the following concerning results from published studies:

- In studies on Gypsy moth, all larvae died when exposed at 100 ug/kg food (100 ppb)
- Cabbage moth (*M. brassicae*), 90% larvae died when exposed to 2200 ppb in spray (3rd instar)
- Large white butterfly (*P. brassicae*), 50% of larvae died at 390 ppb.

The results from the gypsy moth and large white butterfly studies were conducted with exposures expected from applications under this grasshopper suppression program, while the cabbage moth study utilized a rate slightly higher than what would be expected from a full rate application with no drift (Table 1).

These results, which were not identified in the EA when APHIS discussed risk to pollinators, lend additional urgency to the need for APHIS to seriously reconsider the effects of diflubenzuron on pollinators.

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.⁵ Larval bee toxicity was not available from the APHIS 2019 EA.

We conducted a similar analysis of risk to bees using the BeeRex tool, as described above. According to APHIS’ HHERA (2019) for carbaryl, spray applications of the Sevin XLR Plus formulation applied at 16 or 8 fl. oz. per acre are equivalent to an application rate

of 0.5 and 0.25 lb a.i./A , respectively. To assess drift, input values from the APHIS analysis presented in its 2010 BA to NFMS were inferred from the chart in that BA. Using an application rate of 0.375 lb ai/A, at point zero, deposition is predicted at 38 mg/m² (0.339 lb ai/A). At 500 feet, deposition is predicted at 21 mg/m² (0.187 lb ai/A).

Table 2. CARBARYL Bee Risk Assessment

A p p l i c a t i o n R a t e (l b a i / A)	Sce nar io	P o l e n / n e c t a r E E C (m g / k g)	P o l e n / n e c t a r E E C (p p b)	Adu lt RQ s	A c u t e d i e t a r E E C (p p b)	A c u t e c o n t a r A c u t e d i e t a r A c u t e c o n t a r	Num ber of time s LO C (Ad ult)
0 .5	Ful l	5 5 , 0 0 0	5 5 , 0 0 0	1 6 1	1 .2 2	4 0 3	3
0 .2 5	RA AT S	2 7 .5 0 0	2 7 , 5 0 0	8 0	0 .6 1	2 0 0	2

0 .3 3 9	pt. zer o AP HI S drif t ana lysi s in 201 0 BA (ap plic rate =0. 375 lb ai/ A)	3 7 .3 3 0 0	3 7 , 3 0 0	1 0 9	0 .8 3	2 7 3	2
0 .1 8 7	pt. 500 AP HI S drif t ana lysi s in 201 0 BA (ap plic rate =0. 375 lb ai/ A)	2 0 .6 6	2 0 , 6 0 0	6 0	0 .4 6	1 5 0	1

⁵ 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.

Note that even at the deposition rate APHIS expects at 500 feet away from the spray line with a lower nominal application rate of 0.375 lb ai/acre (we have already noted that these predicted deposition rates could be underestimates at that distance, based on empirical data), APHIS would exceed the acute toxicity Level of Concern designated by EPA by 150X. All of the other deposition values have similarly disturbing exceedences of EPA's acute dietary LOC, while contact exposure also shows potential to exceed the LOC. **Nowhere within the EA or the EIS is this made clear.**

Given the lack of disclosure and the unacceptably high acute risk quotients reached with these deposition rates, carbaryl spray is an unacceptable option.

A study by Abivardi et al. (1999) looked at the effect of carbaryl contact toxicity to recently emerged adult codling moths (*Cydia pomonella*), finding that at 187.5 ng/cm² (which is equivalent to 0.016 lb/ac—the same as the highest application rate under the grasshopper program), more than 70% of exposed male moths died within 24 hours, while these rates killed 30% of the females within 24 hours.

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: Please see the APHIS responses to comments 10, 12, 13, 14, 19, 20, 24, 25, 28, and 41 in the 2020 EA. The EA provides information on the possible effects of diflubenzuron and carbaryl sprays on bees and pollinators. That information is provided on pages 30-36. The Draft EA is 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 LC50 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 LC50 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.

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 primarily by 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 not regularly 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 them in subsequent years. Data was presented for 15 untreated and 4 treated 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 suppression program. 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 scavenger 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 grasshopper species 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 instars⁶ will have a maximum impact on nontarget arthropods.*" [Emphasis added]

Large scale treatment effects on ground beetles were investigated by Quinn et al. 1991. While this study was more akin to real-life treatments in the design, and found that initial large effects on ground beetles had 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 the timing of grasshopper control treatments...adult ground beetles probably were very active several weeks before 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 or carbaryl, it could

have quite a different effect than these two chemicals. Therefore this study cannot be relied 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

⁶ Note that applying during this developmental stage is a necessity with the use of chitin-inhibiting insect growth regulators such as diflubenzuron.

grasshopper populations in these environments have a high potential for being limited by natural enemies. 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 for the 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 and research 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 commenter again refers to comments addressed in the 2020 EA, please see response to comments 20 and 43 from the 2020 EA.

The commenter assumes that there are widespread treatments in Washington and that APHIS will always treat when requested. This is not the case. There have been seasons, such as last year, when the land manager (BLM) requested treatments, but because the populations did not merit treatments, no treatments occurred. Washington grasshopper ground bait treatments in recent years have been a few hundred acres scattered throughout tens of thousands of acres of rangeland of the action areas considered in the EA. The commenter also does not seem to understand that grasshopper outbreaks can follow a gradient or eruptive population growth curve. Berryman (2008) describes in detail the population dynamics of these two types of outbreaks and methods to address these types of outbreaks. APHIS would like to clarify that outbreaks reoccur to some degree due to favorable ecological factors which would elicit a corresponding grasshopper population response. Consequently, grasshopper treatments may reoccur in the same vicinity.

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. Such avian 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 special consideration, 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 predation commonly 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 in very general terms the direct and indirect toxic effects of insecticidal treatments to birds, and fails to analyze specific effects to the many declining bird species.

The EA does not reference the state Species of Greatest Conservation Need (SGCN) list for birds. Approximately half of these are found in Eastern Washington and a majority are declining. Nothing is said about these species, including conservation measures for the Greater sage-grouse, a species that relies on grasshoppers as important food for chicks. The EA should explore the impacts to this and other declining bird species.

A recent study estimated a net loss of nearly 3 billion birds since 1970, or 29% of 1970 abundance in North America (Rosenberg et al. 2019). It is critical to recognize that grassland birds—an important group of species that extends well beyond the iconic sage grouse—have suffered the largest decline (53%) among habitat-based groups since 1970, while populations of six species of grassland birds have declined by 65-94%. This is never disclosed in the EA nor considered in the cumulative effects analysis. Habitat loss is a huge driver of declines, yet pesticides still play a role (Hill et al. 2013), especially if their prey is affected. Birds are themselves ‘free’ insect control as described above (also see Bock et al. 1992), hence negative effects for birds could actually increase insect pests.

Recommendation: APHIS must more thoroughly address the risk of direct and indirect impacts to rangeland birds, factoring in the noted declines documented for grassland birds, and looking closely at its assumptions for diflubenzuron treatment, including drift into untreated swaths.

Response: The commenter assumes that there are widespread treatments in Washington. Birds are highly motive predators and will search for prey in areas within and outside 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.

In Washington, 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, in Washington when there is concern by land management agencies (federal, state, etc.) for certain species, APHIS implements protective measures for those species of concern when warranted.

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 limiting application 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 to diflubenzuron, as a group, than most other taxa (Eisler 1992).

The Dimilin 2L label instructs the user to “minimize exposure of the product to bees” and to “minimize drift of this product on to beehives or to off-site pollinator attractive habitat.” The Sevin XLR Plus label instructs applicators: “Do not apply this product to target crops or weeds in bloom.”

However, if treated habitat is flowering and bees are active (as would be anticipated during any of the proposed treatment months), it is not clear how applications for grasshopper/Mormon cricket control can avoid blooming plants in the treated areas or 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 (see above 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: The commenter made similar comments addressed in the 2020 EA. Please see the APHIS responses to comments 10, 12, 14, 19, 20, 24, 25, 28 and 37 in the 2020 EA.

The commenter is correct that APHIS believes the use of RAATs mitigates the risk to non-target insects including pollinators and bees. APHIS does not believe the adherence to product use restrictions mitigates all harm to these species. Instead APHIS has analyzed the benefits of relatively small grasshopper treatments against the potential for significant impacts to bee populations within the large area covered by the EAs. The environmental consequences risk analysis of carbaryl and dislubenzuron treatments is provided on pages 30-36 of the 2021 EA. Additional descriptions of APHIS' analysis methods and discussion of the toxicology can be found in the 2019 EIS.

10. The EA lacks a biological evaluation disclosing determinations for listed, proposed and candidate species.

No information is available that discloses the rationale for apparent “no-effect” calls on the part of the agency

The EA states that a programmatic consultation with the US Fish and Wildlife Service on species listed under the Endangered Species Act was initiated in 2015, but is not yet complete. The backup is for APHIS to consult at the local level, which is apparently in progress. No concurrence letter was included in the Draft EA. An Official Species List from USFWS is included, but only for the Juniper Dunes Management Area.

The EA does not include information disclosing or supporting its determinations of what effects would be on listed species, pursuant to the Endangered Species Act. One of the appendices does include documentation of call notes with FWS and discussion of no-effect calls from carbaryl bait. Since the Services do not evaluate No Effect calls to listed species, including justification for such calls in the body of the EA is especially important.

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

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. 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. APHIS must ensure that all determinations are supported by thorough analysis and accurate disclosure of the scientific studies underlying its reasoning. 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 be selected. 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 proposed action), 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 clear set of directions outlining protective measures for the listed and proposed species found within this project area. Listed species’ protected locations must be mapped out for ground and aerial applicators, including all buffer widths listed in the protective measures, and any specific instructions (i.e. use of carbaryl bait only) for some species. 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 the parameters 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 USFWS Official Species Lists for the action areas during the consultation process for WA-21-01 have been finalized with USFWS. Consultation with the Supervisory Biologist for USFWS 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 March 24, 2021 and is included in Appendix E in the final EA WA-21-01.

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 in the EAs about the potential for effects to the monarch butterfly, recently designated a Candidate species under the Endangered Species Act. On December 15, 2020, the U.S. Fish and Wildlife Service announced that listing the monarch butterfly under the Endangered Species Act is warranted, but precluded by other priorities, [making the monarch a candidate species](#). US Fish and Wildlife Service normally does consult on candidate species and instructs project leads to consider candidates in its effects analysis. Therefore it appears to be an oversight that monarchs have not been included. APHIS must address the oversight and analyze impact to the monarch under the alternatives prior to implementing the action alternative.

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’s historic size. 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.](#)

[Habitat suitability modeling](#) for monarch butterfly in the counties covered by this EA (Dilts et al. 2018) shows there are large concentrations of potentially highly suitable monarch habitat in Washington, that could potentially be subject to grasshopper suppression.

A recent paper ([Waterbury et al. 2019](#)) examined milkweed distribution and monarch breeding in Washington and Idaho. Their study contains maps of potential and occupied habitat and documented key threats, of which insecticide use was considered one.

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).

The risk of carbaryl applications may be unacceptably high for lepidoptera, including the monarch, based on data from Abivardi et al. (1999) as explained earlier in this comment letter. In addition, lepidopteran species are often quite sensitive to diflubenzuron, as documented elsewhere in this comment letter, therefore, impacts to this highly diminished species from diflubenzuron should be specifically analyzed.

Recommendation: APHIS must not conduct any treatments prior analyzing effects to the monarch butterfly as required under the ESA. Known concentrations of milkweed stands exist in Washington. APHIS should work with Waterbury and other experts to identify these areas and work to strenuously avoid any applications near these areas. Given its new candidate status, APHIS should consult on this species. It is beyond conceivable that APHIS would determine a No Effect. No grasshopper suppression work should proceed in 2021 until the USFWS office, with full 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. 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 NCFS (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-leaved 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. To date, there are no milkweed species in any proposed rangeland treatment areas in Washington.

12. 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 does not mention a recent nationwide consultation effort on carbaryl’s effect to listed species. In its Biological Evaluation that it forwarded to the Services, EPA determined that carbaryl is likely to adversely affect nearly all listed species nationwide (see

<https://www.epa.gov/endangered-species/final-national-level-listed-species-biological-evaluation-carbar-v1>). Species in Washington likely to be adversely affected are not mentioned. In addition, the US Fish and Wildlife Service recently determined that malathion is likely to adversely affect the vast majority of listed species across the country.

Such determinations by EPA and the Services are 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 and malathion’s harmful effects to listed species. 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 the Opinion.

Response: The commenter made the same comment in 2020, please see the APHIS responses to comment 17 in the 2020 EA.

13. 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 federal agencies 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 et al. 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 Washington home are already considered at-risk. See lists of at risk pollinators in our comment letter submitted in 2020 (these comments are attached for reference to our email submitting this 2021 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 within the geographic area are listed as sensitive by federal land management agencies or as Species of Conservation Concern, or whether the state of Washington 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 makes 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 of Honey 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, taking into 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 and the 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 or when flowers are not present.

And the *National Strategy to Promote the Health of Honey Bees and Other Pollinators* includes as one of 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 federal directives 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 within the 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 EA include:

- 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) are present 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 pollinated by solitary bees that are susceptible to grasshopper control chemicals.

See McKnight et al. (2018) and Pelton et al. (2018) for more.

Response: APHIS reduces the risk to native bees and pollinators through monitoring grasshopper and Mormon cricket populations and making pesticide applications in a manner that reduces the risk to this group of nontarget invertebrates. Monitoring grasshopper and Mormon cricket 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. In recent years, Washington APHIS has only been involved in small scale treatments using carbaryl bait which poses a reduced risk to native bees and pollinators compared to liquid carbaryl and malathion applications. In addition, APHIS used RAATs to treat approximately 99% of the acres historically treated by the Program. When using the RAATs method APHIS applies pesticides below the labeled rates further reducing the amount of insecticide used by the program. APHIS also emphasizes the use of carbaryl bait, where applicable, as a means to suppress pest populations while protecting native bees and pollinators. Grasshopper suppression treatments typically occur in the early morning when pollinators are less active. These methods of applications have been shown to mitigate harm to nontarget invertebrates. Therefore, the risk of significant impacts to pollinators and arthropods as a group within the area covered by this EA are negligible.

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

The Dimilin label indicates that the product is toxic to mollusks. The Sevin XLR Plus label indicates that the product is extremely toxic to aquatic invertebrates.

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 the western 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 of comparing 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 impacts to 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: The commenter made the same comment in the 2020 EA. Please see APHIS response to comment 38 and 39 in the 2020 EA.

All bodies of water are buffered according to APHIS Treatment guidelines and the protective measures agreed upon during the consultation process. If the land manager requests a greater buffer distance around water or other sensitive sites APHIS follows that request.

APHIS believes the buffers for aquatic habitats are protective of the freshwater mussels the commenter has identified. Implementation of the proposed buffers along with the other mitigation measures will provide protection of mussel food items as well as any freshwater fish hosts that are required for transformation of glochidia to juvenile mussels.

15. 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 stock ponds/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 significantly to 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 given the same buffer as any other surface water. Please see APHIS response to comment 40 and 41 in the 2020 EA.

16. 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 provisions it 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 under the National Pollutant Discharge Elimination System. An NPDES permit may be required. Even if an NPDES isn't required for certain activities, APHIS still has a duty to comply with state water quality standards under the Clean Water Act. Further, an NPDES permit does not absolve the agency of its duty to disclose impacts to water quality under NEPA.

Aquatic impacts could occur weeks or months beyond the treatment period, given diflubenzuron's persistence. It is not clear if environmental monitoring is conducted in such a way as to pick up delayed transfer of diflubenzuron to nearby waterways.

Recommendation: APHIS must disclose whether its program has obtained an NPDES permit, or whether this requirement has been waived (and if so, why). APHIS must comply with state water quality standards and disclose impacts to water quality in the EA. APHIS should also disclose its environmental monitoring reports at its website and conduct environmental monitoring in such a way as to test for runoff effects weeks or months after treatment, in addition to drift at the time of treatment.

Response: APHIS Washington complies with the Clean Water Act as administered by the WA Department of Ecology. An NPDES permit is not applicable for our grasshopper treatment program in Washington because any treatment ground applications would be terrestrial, occurring far from water sources.

APHIS employs several mitigation measures intended to mitigate offsite transport of pesticides to sensitive habitats, including waterbodies. APHIS reduces the potential for drift and volatilization by not using ultra-low volume (ULV) sprays when the following conditions exist in the spray area:

- Wind velocity exceeds 10 miles per hour (unless state law requires lower windspeed)*
- Rain is falling or is imminent*
- Dew is present over large areas within the treatment block*
- There is air turbulence that could affect the spray deposition*

APHIS also does not apply insecticides directly to water bodies such as reservoirs, lakes, ponds, pools left by seasonal streams, springs, wetlands, and perennial streams and rivers. APHIS also follows all other label restrictions designed to protect aquatic habitats. Furthermore, APHIS uses 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*

APHIS agrees with the commenter that NPDES permits do not absolve Federal agencies from complying with NEPA.

17. Special status lands

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

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

Response: The commenter made the same comment in the 2020 EA. Please refer to APHIS responses to comments 48 of the 2020 EA.

18. Avoidance of Lands Where Organic or Transitioning Production Occurs

The general treatment guidelines for 2021 state: “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.”

We are concerned about the potential for drift and runoff to certified organic or transitioning lands. Certified organic farmers who receive drift, even if unintentional, would risk losing certification for three years. That would mean these producers would also lose any income from those acres, and they would then have to manage affected lands completely separately from other unaffected acres.

Organic producers place a large emphasis on improving biodiversity on their lands, per the National Organic Standard. Many organic farmers approach this by establishing or conserving permanent pollinator and native habitat – an effort that can take years.

Washington is a significant producer of organic apples and other organic crops, yet nowhere in the EA is this mentioned. Depending on the location of treatments, drift into organic or transitioning production areas could be a significant impact to the state.

The general guidelines, crafted for the program as a whole, and included in each state’s EA, leave a number of questions about notification and avoidance of impacts to organic or transitioning producers, including:

- It is unclear if each state maintains a complete registry of organic and transitioning producers, and if that registry is spatially referenced. Many producers farm land in disparate locations. There are a number of certifying organizations across the west, not just the states. It is unclear if these different organizations share information, and if APHIS would be accessing a complete list in any locality.
- It is unclear what the notification process to organic and transitioning producers is. A public meeting is likely to not be sufficient. Given the short time frames between final treatment decisions and the fact that treatments usually occur in the early, critical part of the growing season, it also seems likely that some organic producers could completely miss a notification.
- APHIS appears to make the establishment of buffers optional. Given the issues we’ve outlined with notification, optional buffers are not a sufficient protection.
- While it is helpful that landowners requesting treatment are asked to identify organic producers in their vicinity, landowners may not, and should not be expected to, know the exact agricultural processes and philosophies of all landowners in the vicinity. We are concerned that some organic

Recommendation: APHIS should more clearly explain its process for identifying and notifying organic producers in the EA. The identification and notification process should include multiple sources beyond any state list, even if redundant, to ensure that any organic or transitioning producer is accounted for in the spatial footprint of the spray. APHIS should not just notify but also confirm notification for each organic producer, to ensure that its communication has reached its recipient. Given the large drift potential and its previous protocol for native managed bees, APHIS should not leave buffers open-ended but should institute a minimum 4-mile buffer around each identified organic or transitioning parcel. Organic trade associations and sites such as driftwatch.org and other spatial locators should be used to the full extent of their availability.

Response: APHIS only treats rangeland where the land manager or property owner has requested suppression of grasshopper infestations. APHIS employs several mitigation measures intended to mitigate offsite transport of pesticides outside the treatment block to adjacent cropland. APHIS reduces the potential for drift and volatilization by not using ultra-low volume (ULV) sprays when the following conditions exist in the spray area:

- Wind velocity exceeds 10 miles per hour (unless state law requires lower windspeed)
- Rain is falling or is imminent
- Dew is present over large areas within the treatment block
- There is air turbulence that could affect the spray deposition

APHIS prepares maps of the treatment area that exclude sensitive sites, such as organic crops from the treatment area. The Program also notifies residents within treatment areas, or their designated representatives prior to proposed

treatments. They are advised of the control method to be used, proposed method of application, and precautions to be taken. If necessary, non-treated buffer zones are established to protect these resources. A buffer zone is a distance or space around a sensitive area that will not be treated to minimize harm and disturbance of that area.

The APHIS grasshopper program in Washington would notify all crop producers, including organic, in advance of proposed treatments occurring near their properties. APHIS would request organic agriculture certifiers and producers to provide grasshopper program managers maps and locations for any organic crops or transitioning properties located in the area covered by this EA.

19. Extent of treatment to private lands

We have concerns about grasshopper treatments on public lands, which have resource values above and beyond cattle forage that must be taken into account. The EA notes that APHIS will also take requests for treatment from private landowners. We are also concerned about impacts to resources and species that overlap with private lands and the scope of APHIS's program, which is not supposed to be geared toward private lands.

Recommendation: APHIS should clarify whether and how it decides to spray private lands and what the likely impacts of that would be.

Response: APHIS understands the commenter is concerned about grasshopper treatments on public and private lands. APHIS believes a more thorough examination of the EAs and EIS will reduce those concerns. The commenter is mistaken in their assertion that APHIS grasshopper treatments are not intended to occur on or benefit private lands. APHIS complies fully with the Endangered Species Act for all areas where treatments might occur. Those documents are included in the EA to alleviate public concerns.

20. Cumulative effects analysis

The EA does not adequately disclose the locations where spraying has occurred in the past, nor did the APHIS 2019 EIS. In the EA, APHIS states that cumulative effects "are not expected to be significant" basing its reasoning on the assertion that the probability of an outbreak occurring in the same area as a previous outbreak is unlikely. Yet, APHIS does not disclose the scale of treatments in any of those years, nor the impact of those treatments.

APHIS also 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.

In addition, impacts to migratory species from cumulative exposures (such as honeybees which, as the EA discloses, are in large part transported to California during the almond bloom) are not addressed.

Recommendation: To have an adequate understanding of cumulative impacts, APHIS must disclose where spraying has occurred in the past, and what impacts have resulted, as part of the current condition assessment. APHIS must also analyze cumulative impacts considering declining species, as these species will be more vulnerable to negative effects resulting from the treatments. APHIS must consider cumulative exposure to any migratory species, especially those that merit more intensive consideration due to their legal protections, ecological importance or economic importance.

Response: Cumulative impacts, as defined by the Council on Environmental Quality (CEQ), is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). Potential overlap of APHIS grasshopper suppression treatments are unlikely to result in significant cumulative impacts because the program applied pesticides are not persistent in the environment year to year. Grasshopper treatments conducted by state agencies or private landowners are unlikely to overlap where APHIS has conducted a treatment program. Potential environmental effects resulting from treatments conducted by other entities outside of APHIS treatment blocks will not contribute to potential cumulative significant impacts by APHIS as defined by CEQ. APHIS provided a more thorough analysis of potential cumulative impacts in the 2019 EIS for the grasshopper program.

21. 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 address site-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 simply cannot 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 cricket outbreaks 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 species and 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 reliance on 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 sanguinipes* 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 rotational grazing. Seasonal presence of all grasshopper species combined averaged 3.3X higher under season-long grazing 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 for livestock, 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; Branson et 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 a threat 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 elevate the 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. 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 reduce grasshopper 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 are accountable 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 outbreak conditions by employing diverse management techniques (e.g., biological, physical, and cultural).
- Implement frequent and intense monitoring to identify populations that can be controlled with small ground-based pesticide application equipment.
- If pesticides are used, select active ingredients and application methods to minimize risks to nontarget organisms.
- Monitor sites before and after application of any insecticide to determine the efficacy of the pest management technique as well as if there is an impact on water quality or non-target species.

Response: Public land managers have their own rangeland biologists to determine any potential impact on species of concern and limitations on special status lands. This information is conveyed to APHIS by means of a pesticide use proposal. The comments comparing rotational grazing to season long grazing are valid concerns. APHIS supports such management practices. However, the rotational grazing practices in Washington by the ranchers are not under the control of APHIS grasshopper program. Ranchers practice rotational grazing in Washington, APHIS only responds to the large outbreaks associated with the rangeland forage damage. Grazing practices are not under the control of APHIS. The research the commenter referenced concerning fire management, biological control, and other nonchemical methods are not presently valid control practices. Fire Management of rangeland is not controlled by APHIS. This method would have to be implemented by the land management agencies.

22. 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 assume that grasshopper suppression actions are only of local interest. All proposed grasshopper suppression actions and environmental documents should be noticed properly 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 valid reason 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 the following 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 it has been transmitted to APHIS.
- Results of environmental monitoring associated with treatments (i.e. drift cards, water samples) should be disclosed.

Response: The commenter made the same comment in the 2020 EA. Please refer to APHIS responses to comments 1, 2, 3, 51 and 55 of the 2020 EA.

Center for Biological Diversity Comments and APHIS Response

23. “All comments from last year are equally applicable this year as the 2021 draft EAs suffer from the same or similar deficiencies as the 2020 ones, are incorporated by reference and are attached as Appendix A. Also, comments on these EAs by the Xerces Society for Invertebrate Conservation from both 2021 and 2020 are equally applicable, incorporated by reference and attached as Appendix B and C, respectively”.

Response: The responses for comments 1 through 157 are found in the 2020 EA. These responses are equally applicable for the 2021 EA.

