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Final Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

BEAVERHEAD, BROADWATER, DEER LODGE, FLATHEAD, GALLATIN, GRANITE, JEFFERSON, LAKE, LINCOLN, MADISON, MINERAL, MISSOULA, PARK, POWELL, RAVALLI, SANDERS, SILVER BOW counties, and THE FLATHEAD RESERVATION, MONTANA

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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

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Draft Site-Specific Environmental Assessment

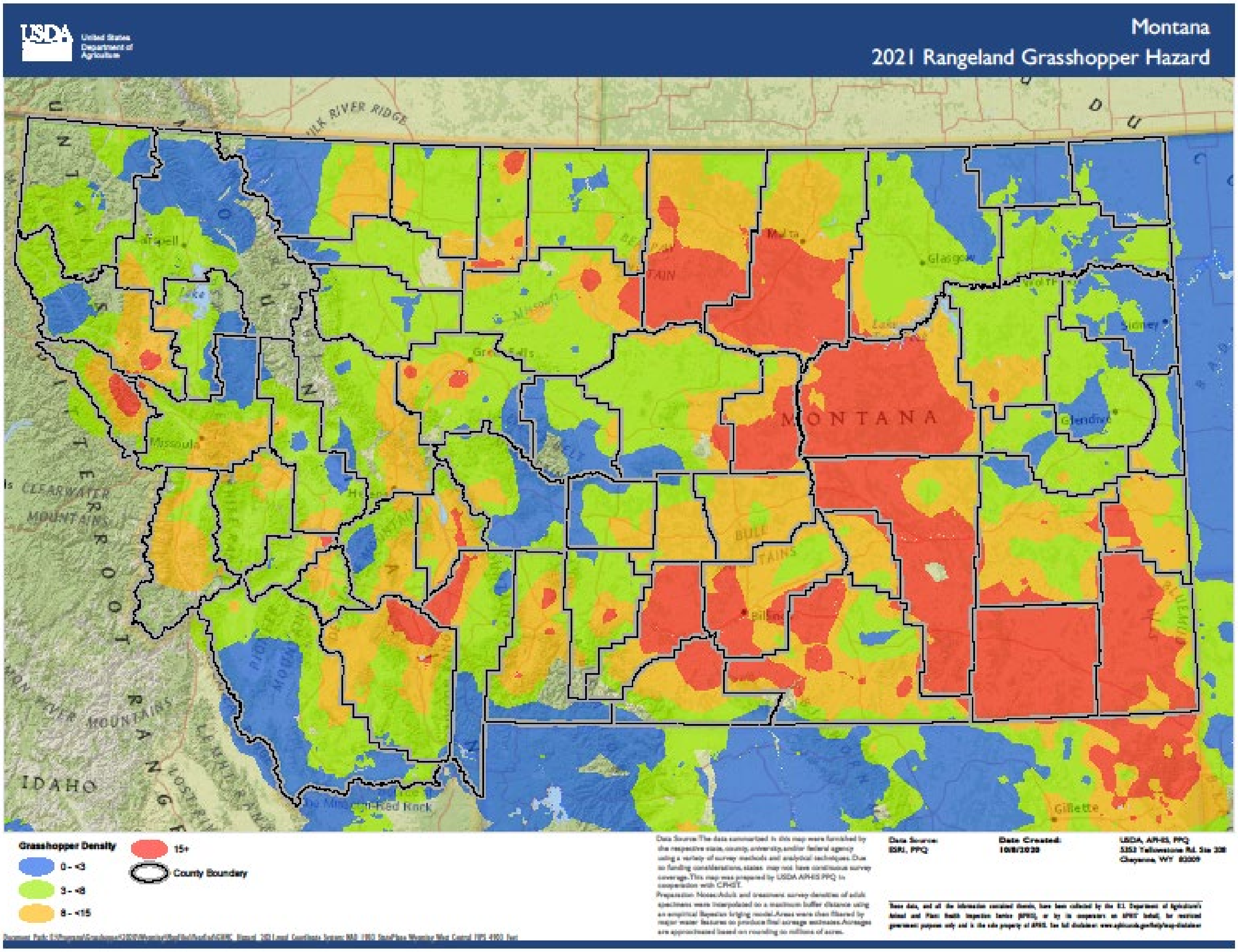
Rangeland Grasshopper and Mormon Cricket Suppression Program
BEAVERHEAD, BROADWATER, DEER LODGE, FLATHEAD, GALLATIN, GRANITE, JEFFERSON, LAKE, LINCOLN, MADISON, MINERAL, MISSOULA, PARK, POWELL, RAVALLI, SANDERS, SILVER BOW counties, and the FLATHEAD RESERVATION, MONTANA

I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers or Mormon crickets may occur in Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lincoln, Madison, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow counties, Montana. 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 stressing and/or causing the mortality of native and planted range plants or adjacent crops due to the feeding habits of large numbers of grasshoppers. The benefits of treatments include the suppressing of over abundant 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. Some populations that may not cause substantial damage to native rangeland may require treatment due to the secondary suppression benefits resulting from the high value of adjacent crops and damage to re-vegetation programs.



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 May 10, 2021 to September 24, 2021 in Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lincoln, Madison, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow counties, Montana.

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

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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 2021 Control Program for Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lincoln, Madison, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow counties, Montana.

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 damage to rangeland plant species.

In rangeland ecosystem areas of the United States, grasshopper populations can build up to economic infestation levels[1] 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 nymph 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

[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.

livestock, rotational time frame for grazing allotments, number of livestock in grazing allotment. Baseline thresholds for Mormon crickets are two per square yard and grasshoppers are eight per square yard, though neither of those thresholds guarantees justification for treatment alone. 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 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' authority for cooperation in this suppression program is based on Section 417 of the Plant Protection Act of 2000 (7 U.S.C. § 7717).

In April 2014, APHIS and the Forest Service (FS) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers on national forest system lands (Document #14-8100-0573-MU, April 22, 2014). This MOU clarifies that APHIS will prepare and issue to the public, site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the Forest Service.

The MOU further states that the responsible FS official will request, in writing, the inclusion of appropriate lands in the APHIS suppression project when treatment on national forest land is necessary. The FS must also approve a Pesticide Use Proposal (Form FS-2100-2) for APHIS to treat infestations.

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

In February 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 system lands (Document #15-8100- 0870-MU, October 15, 2015). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from 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 document and BLM approves the pesticide use proposal.

The MOU expired in October 2020. APHIS and BLM are in the process of updating this MOU and will continue to follow the expired MOU until the updated MOU is final.

In September 2016, APHIS and Bureau of Indian Affairs (BIA) signed a MOU detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on BIA managed lands, APHIS PPQ MOU # 16-8100-0941-MU, September 16, 2016). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BIA.

The MOU further states that the responsible BIA official will request, in writing, the inclusion of appropriate lands in the APHIS suppression project when treatment on Tribal 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 document and BIA 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 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 (FONSIs) where the effects of an action are primarily of regional or local concern, to normally provide notice of publication in a local or area newspaper of general circulation (7 CFR 372.7(b)(3)). These notices provide potentially locally affected individuals an additional opportunity to provide input into the decision-making process. Some states, including Montana, 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

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EAs. The process can occur formally and informally through meetings, conversations, or written comments from individuals and groups.

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

II. Alternatives

To engage in comprehensive NEPA risk analysis APHIS must frame potential agency decisions into distinct alternative actions. These program alternatives are then evaluated to determine the significance of environmental effects. The 2002 EIS presented three alternatives: (A) No Action; (B) Insecticide Applications at Conventional Rates and Complete Area Coverage; and (C) Reduced Agent Area Treatments (RAATs), and their potential impacts were described and analyzed in detail. The 2019 EIS was tiered to and updated the 2002 EIS. Therefore the 2019 EIS considered the environmental background or 'No Action' alternative of maintaining the program that was described in the 2002 EIS and Record of Decision. The 2019 EIS also considered an alternative where APHIS would not fund or participate in grasshopper suppression programs. The preferred alternative of the 2019 EIS allowed APHIS to update the program with new information and technologies that not were analyzed in the 2002 EIS. Copies of the complete 2002 and 2019 EIS documents are available for review at 1220 Cole Ave, Helena, MT 59601, or 1400 S 24th ST W, Suite 8A, Billings, MT 59102. 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 1 to this Draft EA.

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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 Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lincoln, Madison, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow counties, Montana and therefore the environmental baseline should describe a no treatment scenario.

A. No Suppression Program Alternative

Under Alternative A, the No Action alternative, APHIS would not conduct a program to suppress grasshopper infestations within Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lincoln, Madison, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow counties, Montana. 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, diflubenzuron, and malathion. These chemicals have varied modes of action. Carbaryl and malathion work by inhibiting acetylcholinesterase (enzymes involved in nerve impulses) and diflubenzuron inhibits the formation of chitin by insects. 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, as a result of treatment delays, then carbaryl or rarely malathion 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, diflubenzuron, or malathion 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; or
- 4.0 fluid ounces (0.31 lb a.i.) of malathion 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 20 feet for malathion, 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.

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, diflubenzuron, or malathion 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
- 8.0 fluid ounces (0.62 lb a.i.) of malathion per acre.

The potential generalized environmental effects of the application of carbaryl, diflubenzuron, and malathion, 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.

Sensitive Area Exclusion

PPQ grasshopper suppression actions will only occur on lands where PPQ has received a written request for assistance from the land manager or their representative. As part of that process, PPQ Montana asks each cooperator to complete a questionnaire that identifies sensitive sites on their property (Appendix D).

Sensitive sites can include: sage-grouse habitat; schools; residences; organic producers; surface water; bee hives; rangeland weed biological control sites; or any other site the landowner would like buffered or excluded from the treatment block. See Appendix A for specific buffers.

An APHIS or cooperating agency Geographic Information System (GIS) Specialist then creates a shapefile of the treatment block that outlines all sensitive sites, exclusions, and appropriate buffers. This layer will account for all natural surface water on the property utilizing both GIS data and landowner/manager input. Treatment maps are then ground-truthed by personnel to verify accuracy.

All aerial contractors are required to use GPS navigation equipment capable of uploading the produced shapefile of the treatment block. This GPS navigation equipment displays all sensitive sites and appropriate buffers so the contractor can turn off application equipment when flying over buffers. This GPS navigation equipment also records the aircraft's flight path and application equipment operation (on/off) allowing for a recording of the applications and real time assurance of appropriate calibration.

C. Experimental Treatments

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.

(1) Methods Development Studies

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

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

Rangeland Unit is also investigating the potential use of Unmanned Aircraft Systems (UAS) for a number of purposes related to grasshopper and Mormon cricket detection

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and treatment. UAS will be operated by FAA-licensed pilots with an aerial pesticide applicator's permit.

(2) Pesticides and Biopesticides Used in Studies

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

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

The proposed suppression program area included in the EA encompasses 26,647,331 acres within 17 counties in Western Montana. The counties are: Beaverhead ((population from July 1, 2016 Census estimates unless specified (9,401), Broadwater (5,747), Deer Lodge (9,085), Flathead (98,082), Gallatin (104,502), Granite (3,368), Jefferson (11,853), Lake (29,758), Lincoln (19,259), Madison (7,924), Mineral (4,184), Missoula (116,130), Park (16,114), Powell, (6,858), Ravalli (42,088), Sanders (11,534), and Silver Bow (34,553). Ownership or stewardship of the land in this area is as follows: USFS – 12,945,714 acres, Private – 9,868,590 acres, BLM – 1,323,375 acres, state – 1,181,565 acres, Other federal – 708,795 acres, and Indian Trust – 619,292 acres. Appendix 2 indicates the boundaries of the area covered by this EA. Specific treatment areas will be identified as an addendum to this document as they become identified.

This entire area is in the mountain region. The elevation ranges from 1,820 feet (the lowest point in Montana) in the northwest corner to 12,799 feet (Granite Peak – the highest point in Montana) in the southeast corner. The area is composed of plains foothills with moderate to steep slopes and complex mountains that can be very rugged with deep river canyons and sparse vegetation or timbered covered with open meadows. Annual precipitation varies from less than 10 inches in some foothill areas in the south to over 80 inches in some northern mountain areas. The area covered by this EA has the most diverse range of annual precipitation in the state.

Major water resources include, but are not limited to: Canyon Ferry Lake, Ennis Lake, Flathead Lake (the largest natural freshwater lake west of the Mississippi), Georgetown Lake, Hebgen Lake, Lake Koocanusa, Lake Mary Ronan, Lake McDonald, Lower Red Rock Lake, Quake Lake, Seeley Lake, Swan Lake, Upper Red Rock Lake, Whitefish Lake, Cabinet Gorge Reservoir, Clark Canyon Reservoir, Hungry Horse Reservoir, Kicking Horse Reservoir, Hyalite Reservoir, Lima Reservoir, Ninepipe Reservoir, Noxon Reservoir, Pablo Reservoir, Ruby River Reservoir, Willow Creek Reservoir, Beaverhead River, Big Hole River, Bitterroot River, Blackfoot River, Boulder River, Clark Fork River, Clearwater River, Flathead River, Gallatin River, Jefferson River, Jocko River, Kootenai River, Little Bitterroot River, Little Blackfoot River, Madison River, Missouri River, Red Rock River, Ruby River, Shields River, Spotted Bear River, Swan River, Thompson River, Tobacco River, Yaak River, Yellowstone River, Blacktail Deer Creek, Danaher Creek, Flint Creek, Grasshopper Creek, Nevada Creek, Rock Creek, Sixteen Mile Creek, and Swift Creek. Numerous small streams, ponds, lakes, reservoirs, seasonal streams, and stock ponds are located throughout the area.

Agriculture, being a primary industry in the Montana economy, and livestock grazing (primarily cattle, sheep, and horses) occurs in every county in the state. Typical vegetation types can be found in Table 2 – representative plant species. Generally the crops grown in the area covered by this EA are small grains such as wheat, barley and oats, irrigated and non-irrigated hay (alfalfa and grass), and potatoes.

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The 17 county seats represented in this EA have a very large variance in population totals – three county seats have less than 1,000 residents, three have 1,000-1,999 residents, one has 2,000-2,999 residents, three have 3,000-3,999 residents, one has 4,000-4,999 residents, one has 6,000-6,999 residents, one has 9,000-9,999 residents, one has 14,000-14,999 residents, one has 27,000-27,999 residents, one has 33,000- 33,999 residents, and one has over 57,000 residents. The county seat of Madison County is Virginia City with a population of 195 and the county seat of Missoula County is Missoula with a population of 69,122. Butte, the county seat of Silver Bow County, has the second largest population with 33,854. Superior, with a population of 851, is the second smallest and the county seat of Mineral County.

There is one Reservation within the boundaries of this EA. The Flathead Indian Reservation occupies portions of Flathead, Lake, Missoula, and Sanders Counties. Within this specific EA, National Forest land occupies some portion of every county. They are: Beaverhead-Deerlodge National Forest, Bitterroot National Forest, Flathead National Forest, Gallatin National Forest, Helena National Forest, Kaniksu National Forest, Kootenai National Forest, and Lolo National Forest.

In addition to the National Forests, other major recreation areas include Glacier and Yellowstone National Parks (no action is expected to be taken inside the boundaries of the Parks), Lewis and Clark Caverns, The National Bison Range, Lee Metcalf Wildlife Refuge, Red Rocks Lakes National Wildlife Refuge, Swan River National Wildlife Refuge, Bob Marshal Wilderness, Great Bear Wilderness, Lee Metcalf Wilderness, Mission Mountains Wilderness, Rattlesnake Wilderness and National Recreation Area, Souse Gulch Recreation Area, Welcome Creek Wilderness, Big Hole National Battlefield, Bannack Historic District, Grant-Kohrs Ranch National Historic Site, Sacagawea Historical Area, Virginia City Historic District, Madison Buffalo Jump State Monument, Madison Canyon Earthquake Area, Three Forks Of The Missouri (Missouri Headwaters), BLM lands, many smaller wildlife refuges and historic sites, Canyon Ferry Lake, Ennis Lake, Flathead Lake, Georgetown Lake, Hebgen Lake, Lake Koocanusa, Lake Mary Ronan, Lake McDonald, Lower Red Rock Lake, Quake Lake, Seely Lake, Swan Lake, Upper Red Rock Lake, Whitefish Lake, Cabinet Gorge Reservoir, Clark Canyon Reservoir, Hungry Horse Reservoir, Kicking Horse Reservoir, Hyalite Reservoir, Lima Reservoir, Ninepipe Reservoir, Noxon Reservoir, Pablo Reservoir, Ruby River Reservoir, Willow Creek Reservoir, Beaverhead River, Big Hole River, Bitterroot River, Blackfoot River, Boulder River, Clark Fork River, Clearwater River, Flathead River, Gallatin River, Jefferson River, Jocko River, Kootenai River, Little Bitterroot River, Little Blackfoot River, Madison River, Missouri River, Red Rock River, Ruby River, Shields River, Spotted Bear River, Swan River, Thompson River, Tobacco River, Yaak River, Yellowstone River, and numerous other lakes, reservoirs, rivers, streams, and other bodies of water used for recreational activities.

B. Site-Specific Considerations

1. Human Health

The population of the area covered by this EA is concentrated primarily in cities and towns. Hospitals are located in Anaconda (population – 9,085), Bozeman (45,250), Butte (33,853), Deer Lodge (2,994), Dillon (4,257), Ennis (890), Hamilton (4,674), Kalispell (22,761), Libby (2,678), Livingston (7,401), Missoula (72,364), Philipsburg (920), Plains (1,071), Polson (4,777), Ronan (2,016), Sheridan (677), Superior (826), Townsend (1,978), and Whitefish (7,279). In addition licensed ambulance service is available in Arlee (602, 2000 Census), Bigfork (4,270, 2010 Census), Big Sky (2,308, 2010 Census), Boulder (1,230), Columbia Falls (5,241), Condon (343, 2010 Census), Darby (763), Drummond (348), Emigrant (372, 2010 Census), Eureka (1,086), Frenchtown (1,825, 2010 Census), Gardiner (875, 2010 Census), Hot Springs (557), Lakeside (2,669, 2010 Census), Lima (224), Marion (886, 2010 Census), Noxon (218, 2010 Census), Olney (191, 2010 Census), Saint Ignatius (824), Seeley Lake (1,659, 2010 Census), Stevensville (1,963), Thompson Falls (1,356), Troy (890), Victor (745, 2010 Census), West Yellowstone (1,353), Whitehall (1,114), Wisdom (98, 2010 Census), Wise River (297), and Yaak (248, 2010 Census). Schools are located in most of the cities and towns. Since treatments are conducted in rural rangeland, no impact to these facilities is expected.
Agriculture is a primary economic factor for the area and single rural dwellings are widely scattered throughout the region. In the event a rural school house or inhabited dwelling is encountered, mitigative measures will be implemented to ensure no treatments occur within the required buffer zones.

Potential exposures to the general public from traditional application rates are infrequent and of low magnitude. These low exposures to the public pose little risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Program use of Carbaryl, Malathion, and Diflubenzuron had occurred routinely in many past programs, and there is a lack of any adverse health effects reported from these projects. Therefore, routine safety precautions are anticipated to continue to provide adequate protection of worker health.

Immunotoxic effects from Carbaryl and Malathion exposure are generally expected at concentrations much higher than those from grasshopper applications, but individuals with allergic or hypersensitive reactions to the insecticides or other chemicals in the formulated product could be affected. These individuals will be advised to avoid treatment areas at the time of application until the insecticide has time to dry on the treated vegetation.

2. Nontarget Species

The area assessed by this EA is inhabited by a large variety of organisms, including: terrestrial vertebrates and invertebrates, migratory birds, biocontrol agents, pollinators, aquatic organisms, plants (both native and introduced), etc.

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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.

Malathion and 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 wide spread and numerous lowered survival and lowered reproductive successin a small portion of their habitat would not constitute a significant threat to the population.

The wildlife risk assessment in the APHIS FEIS 2019 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 three pounds per 1000 sq. ft. in poultry houses when poultry are present. (http://www.cdms.net/Label-Database.) 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.

Domestic bees will be protected in accordance with operational procedures. Field level contacts with local beekeepers and the Montana Department of Agriculture will ensure safeguards for bees.

Biological Control agents used for controlling introduced weeds may be encountered within treatment areas. Local mitigation will be determined on a case by case basis in consultation with the local land managers.

3. Socioeconomic Issues

Recreation use is moderate over most of the affected area. There are several dispersed camping sites. Outdoor recreation in areas of high grasshopper/Mormon cricket populations may be adversely impacted due to annoyance of these insects.

Livestock grazing is one of the primary uses of most of the covered area, which provides summer range for ranching operations. Ranchers may graze cattle, sheep and/or horses in these areas. This rangeland may be utilized during the summer or reserved for fall and winter grazing.

A substantial threat to the animal productivity of these rangeland areas is the proliferation of grasshopper/Mormon cricket 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 insects 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 contributes to 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 grazing lands due to early loss of forage from insect damage will be forced to search for other rangeland, sell their livestock prematurely or purchase feed hay. It will affect other ranchers by increasing demand, and consequently, cost for hay and/or pasture in the area. This will have a beneficial effect on those providing the hay or range, and a negative impact on other ranchers who use these same resources throughout the area. In addition, grazing on impacted lands will compound the effects to vegetation of recent drought conditions over the last five years (e.g., continual heavy utilization by grasshoppers/crickets, 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 options 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 landowner, farmers and beekeepers. Crops near infested lands would be protected from devastating migrating hordes, resulting in higher crop production; hence, increased monetary returns.

4. Cultural Resources and Events

To ensure that historical or cultural sites, monuments, buildings or artifacts of special concern are not adversely affected by program treatments, APHIS will confer with BLM, USFS, or other appropriate land management agencies on a local level to protect these areas of special concern. APHIS will also confer with the appropriate Tribal Authority and with the BIA office at a local level to ensure that the timing and location of planned program treatments do not coincide or conflict with cultural events or observances, on Tribal and/or allotted lands.

5. Special Considerations for Certain Populations

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

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

The human population at most sites in grasshopper programs is diverse and lacks any special characteristics that implicate greater risks of adverse effects for any minority or low-income populations. A demographic review in the APHIS EIS 2002 revealed certain areas with large populations, and some with large American Indian populations. Low-income farmers and ranchers would comprise, by far, the largest group affected by APHIS program efforts in this area of concern.

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There is one Indian Reservation within the boundaries of this EA, the Flathead Indian Reservation (28,359 members). Member numbers are approximations and may or may not include tribal members living off and/or near the reservation.

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).

Treatments used for grasshoppers programs are primarily conducted on open rangelands where children would not be expected to be present during treatment or enter during the restricted entry period after treatment. Based on review of the insecticides and their use in programs, the risk assessment concludes that the likelihood of children being exposed to insecticides from a grasshopper program is very slight and that no disproportionate adverse effects to children are anticipated over the negligible effects to the general population

IV. Environmental Consequences

Each alternative described in this EA potentially has adverse environmental effects. The general environmental impacts of each alternative are discussed in detail in the 2002 and 2019 EIS. The specific impacts of the alternatives are highly dependent upon the particular action and location of infestation. The principal concerns associated with the alternatives are: (1) the potential effects of insecticides on human health (including subpopulations that might be at increased risk); and (2) impacts of insecticides on nontarget organisms (including threatened and endangered species).

APHIS has written human health and ecological risk assessments (HHERAs) to assess the insecticides and use patterns that are specific to the program. The risk assessments provide an in-depth technical analysis of the potential impacts of each insecticide to human health; and non-target fish and wildlife along with its environmental fate in soil, air, and water. The assessments rely on data required by the USEPA for pesticide product registrations, as well as peer-reviewed and other published literature. The HHERAs are heavily referenced in the EIS and this Draft. 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, diflubenzuron, or malathion, 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

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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.

b) Diflubenzuron

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

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

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

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

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

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

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

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

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

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

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

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

APHIS reduces the risk to native bees and pollinators through monitoring grasshopper 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 bees and pollinators compared to liquid carbaryl and malathion applications.

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

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

c) Malathion

Malathion is a broad-spectrum organophosphate insecticide widely used in agriculture on various food and feed crops, homeowner yards, ornamental nursery stock, building perimeters, pastures and rangeland, and regional pest eradication programs. The chemical's mode of action is through AChE inhibition, which disrupts nervous system function. While these effects are desired in controlling insects, they can have undesirable impacts to non-target organisms that are exposed to malathion. The grasshopper program currently uses the malathion end-use product Fyfanon® ULV AG, applied as a spray by ground or air.

Volatility is not expected to be a major pathway of exposure based on the low vapor pressure and Henry's Law constant that have been reported for malathion. The atmospheric vapor phase half-life of malathion is five hours (NIH, 2009b). Malathion's half-life in pond, lake, river, and other natural waters varied from 0.5 days to ten days, depending on pH (Guerrant et al., 1970), persisting longer in acidic aquatic environments. The reported half-life in water and sediment for the anaerobic aquatic metabolism study was 2.5 days at a range of pH values from 7.8 to 8.7 (USEPA, 2006). The persistence of malathion in soils depends primarily on microorganism activity, pH, and organic matter content. The persistence of malathion is decreased with microbial activity, moisture, and high pH (USEPA, 2016a) and the half-life of malathion in natural soil varies from two hours (Miles and Takashima, 1991) to 11 days (Neary, 1985; USEPA, 2006).

Malathion and associated degradates, in general, are soluble and do not adsorb strongly to soils (USEPA, 2000a). Inorganic degradation of malathion may be more important in soils that are relatively dry, alkaline, and low in organic content, such as those that predominate in the western program areas. Adsorption to organic matter and rapid degradation make it unlikely that detectable quantities of malathion would leach to groundwater (LaFleur, 1979). Malathion degradation products also have short half-lives. Malaoxon, the major malathion degradation product of toxicological concern, has half-lives less than one day in a variety of soil types (USEPA, 2016a). The half-life of malathion on foliage has been shown to range from one to six days (El-Refai and Hopkins, 1972; Nigg, 1986; Matsumara, 1985; USDA FS, 2008).

While livestock and horses may graze on rangeland the same day that the land is treated with malathion, the products used by the grasshopper program are labeled with rates and treatment intervals that are meant to protect livestock. Tolerances are set for the amount of malathion that is allowed in cattle fat (4 ppm), meat (4 ppm), and meat byproducts (4 ppm) (40 CFR Parts 180.111). The grasshopper program would treat at application rates indicated on product labels or lower, which would ensure approved residues levels. In addition, the program would make only one application a year.

USEPA found malathion moderately toxic to birds on a chronic basis, slightly toxic to mammals through dietary exposure, and acutely toxic to aquatic species (including freshwater as well as estuarine and marine species) (USEPA, 2000b, 2016b). Toxicity to aquatic vertebrates such as fish and larval amphibians, and aquatic invertebrates is variable based on test species and conditions. The data available on impacts to fish from malathion suggest effects could occur at levels above those expected from program applications. Consumption of contaminated prey is not expected to be a significant pathway of exposure for aquatic species based on expected residues and malathion's BCF (USEPA, 2016a; USDA APHIS, 2018d). Indirect effects to fish from impacts of malathion applications to aquatic plants are not expected (USDA APHIS, 2018d).

USEPA considers malathion highly toxic to bees if exposed to direct treatment on blooming crops or weeds. The Fyfanon® ULV AG label indicates not to apply product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area (USEPA, 2012a). Toxicity to other terrestrial invertebrates is variable based on the test organism and test conditions however malathion is considered toxic to most terrestrial invertebrates (USEPA, 2016b).

Indirect risks to mammals resulting from the loss of plants that serve as a food source would also be low due to the low phytotoxicity of malathion. The other possible indirect effect that should be considered is loss of invertebrate prey for those mammals that depend on insects and other invertebrates as a food source. Insects have a wide variety of sensitivities to malathion and a complete loss of invertebrates from a treated area is not expected because of low program rates and application techniques. In addition, the aerial and ground application buffers and untreated swaths provide refuge for invertebrates that serve as prey for insectivorous mammals and would expedite repopulation of areas that may have been treated.

APHIS expects that direct avian acute and chronic effects would be minimal for most species (USDA APHIS, 2018d). The preferred use of RAATs during application reduces these risks by reducing residues on treated food items and reducing the probability that they will only feed on contaminated food items. In addition, malathion degrades quickly in the environment and residues on food items are not expected to persist. Indirect effects on birds from the loss of habitat and food items are not expected because of malathion's low toxicity to plants and the implementation of RAATs that would reduce the potential impacts to invertebrates that serve as prey for avian species. Several field studies did not find significant indirect effects of malathion applications on avian fecundity (Dinkins et al., 2002; George et al., 1995; Howe, 1993; Howe et al., 1996; Norelius and Lockwood, 1999; Pascual, 1994).

Available toxicity data demonstrates that amphibians are less sensitive to malathion than fish. Program malathion residues are more than 560 times below the most sensitive acute toxicity value for amphibians. Sublethal effects, such as developmental delays, reduced food consumption and body weight, and teratogenesis (developmental defects that occur during embryonic or fetal growth), have been observed at levels well above those assessed from the program's use of malathion (USDA APHIS, 2018d). Program protection measures for aquatic water bodies and the available toxicity data for fish, aquatic invertebrates, and plants suggest low indirect risks related to reductions in habitat or aquatic prey items from malathion treatments.

Available data on malathion reptile toxicity suggest that, with the use of program measures, no lethal or sublethal impacts would be anticipated (USDA APHIS, 2015). Indirect risk to reptiles from the loss of food items is expected to be low due to the low application rates and implementation of preferred program measures such as RAATs (USDA APHIS, 2018d).

The risk to aquatic vertebrates and invertebrates is low for most species; however, some sensitive species that occur in shallow water habitats may be at risk. Program measures such application buffer zones, drift mitigation measures and the use of RAATs will reduce these risks.

Risks to terrestrial invertebrate populations are anticipated based on the available toxicity data for invertebrates and the broad spectrum activity of malathion (Swain, 1986; Quinn et al., 1991). The risk to terrestrial invertebrates can be reduced by the implementation of application buffers and the use of RAATs, which would reduce exposure and create refuge areas where malathion impacts would be reduced or eliminated. Smith et al. (2006) conducted field studies to evaluate the impacts of grasshopper treatments to non-target terrestrial invertebrates and found minimal impacts when making reduced rate applications with a reduced coverage area (i.e. RAATs) for a ULV end-use product of malathion. Impacts to pollinators have the potential to be significant, based on available toxicity data for honeybees that demonstrate high contact toxicity from malathion exposures (USDA APHIS, 2018d). However, risk to pollinators is reduced because of the short residual toxicity of malathion. In addition, the incorporation of other mitigation measures in the program, such as the use of RAATs and wind speed and direction mitigations that are designed to minimize exposure, reduce the potential for population-level impacts to terrestrial invertebrates.

Adverse human health effects from ULV applications of malathion to control grasshopper are not expected based on the low mammalian acute toxicity of malathion and low potential for human exposure. Malathion inhibits AChE in the central and peripheral nervous system with clinical signs of neurotoxicity that include tremors, salivation, urogenital staining, and decreased motor activity. USEPA indicates that malathion has "suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential" (USEPA, 2016c).

Adverse health risks to program workers and the general public from malathion exposure are also not expected due to low potential for exposure. APHIS treatments are conducted in rangeland areas consisting of widely scattered, single, rural dwellings in ranching communities, where agriculture is a primary industry. Label requirements to reduce exposure include minimizing spray drift, avoidance of water bodies and restricted entry interval. Program measures such as applying malathion once per season, lower application rates, application buffers and other measures further reduce the potential for exposure to the public.

d) Reduced Area Agent Treatments (RAATs)

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

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

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

RAATs reduces treatment costs and conserves non-target biological resources in untreated areas. The potential economic advantages of RAATs was proposed by Larsen and Foster

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

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

e) Experimental *Metarhizium robertsii* Applications

Metarhizium is a common entomopathogenic fungus genus containing several species, all of which are host-restricted to the Arthropoda, with some having greater host specificity to an insect family, or even a group of related genera. Once considered a single species based on morphology but split into a number of species based on DNA sequence data, the genus is found worldwide and is commonly used as a management alternative to chemicals (USDA, 2000; Lomer et al., 2001; Zimmerman, 2007; Roberts, 2018; Zhang et al. 2019). Two *Metarhizium*, *M. brunneum* strain F52 and *M. anisopliae* ESF1, are registered with the USEPA as insecticides and are commercially used against a range of pest insects.
No harm is expected to humans from exposure to *Metarhizium* by ingesting, inhaling, or touching products containing this active ingredient. No toxicity or adverse effects were seen when the active ingredient was tested in laboratory animals. *M. anisopliae* has undergone extensive toxicology testing for its registration in Africa and the registration of Green Guard in Australia. There has been no demonstrated adverse effect on humans from these products. There is a potential for an allergic reaction to dry conidia if a person is extensively exposed to the product and has a preexisting allergy to fungal spores. *Metarhizium* use in this program is not expected to cause adverse impacts to soil, water, or air. No adverse impacts from the use of *Metarhizium* biopesticides have been observed in almost 20 years of field trials in other countries.

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

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

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

Experimental LinOilEx Applications

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

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

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.

Individual landowners may conduct treatments of their own. These localized hotspot treatments are likely to be small in area such as garden plots or crop border treatments. Other federal or non-federal grasshopper control actions would not be conducted in the same area.

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.”

The human population at most sites in grasshopper programs is diverse and lacks any special characteristics that implicate greater risks of adverse effects for any minority or low-income populations. A demographic review in the APHIS EIS 2002 revealed certain areas with large populations, and some with large American Indian populations. Low income farmers and ranchers would comprise, by far, the largest group affected by APHIS program efforts in this area of concern.

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There is one Indian Reservation within the boundaries of this EA, the Flathead Indian Reservation (The Flathead Indian Reservation is home to the Confederated Salish and Kootenai tribes. The tribes are a combination of the Salish, the Pend d'Oreille and the Kootenai. Of the approximately 7,753 enrolled tribal members, about 5,000 live on or near the reservation. Another 1,100 Native Americans from other tribes and more than 10,000 non-Native Americans also live on the reservation.)

When planning a site-specific action related to grasshopper infestations, APHIS considers the potential for disproportionately high and adverse human health or environmental impacts of its actions on minority and low-income populations before any proposed action. In doing so, APHIS program managers will work closely with representatives of these populations in the locale of planned actions through public meetings.

APHIS intervention to locally suppress damaging insect infestations will stand to greatly benefit, rather than harm, low-income farmers and ranchers by helping them to control insect threats to their livelihood. Suppressing grasshopper/Mormon cricket infestations on adjacent federally administered or private range lands will increase inexpensive available forage for their livestock and will significantly decrease economic losses to their crop lands by invading insects. Suppression would reduce/negate the need to perform additional expensive crop pesticide treatments or to provide supplemental feed to their livestock which would further impact low- income individuals.

In past grasshopper programs, the U.S. Department of the Interior's (USDI) Bureau of Land Management or Bureau of Indian Affairs have notified the appropriate APHIS State Plant Health Director when any new or potentially threatening grasshopper infestation is discovered on BLM lands or Tribal and/or allotted lands held in trust and administered by BIA. Thus, APHIS has cooperated with BIA when grasshopper programs occur on trust lands. APHIS program managers will work with BIA and local Tribal Authorities to coordinate treatment programs.

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

Federal agencies consider a proposed action's potential effects on children to comply with E.O. 13045, "Protection of Children from Environmental Health Risks and Safety Risks." This E.O. requires each Federal agency, consistent with its mission, to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. APHIS has developed agency guidance for its programs to follow to ensure the protection of children (USDA APHIS, 1999).

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

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

Aerial Broadcast Applications (Liquid Chemical Methods)

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

Aerial Application of Baits (Dry Chemical Methods)

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

Ultra-Low Volume Aerial Application (Liquid Chemical Methods)

- Do not spray while school buses are operating in the treatment area.
- Do not apply within 500 feet of any school or recreational facility.

4. Tribal Consultation

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," calls for agency communication and collaboration with tribal officials when proposed Federal actions have potential tribal implications. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and tribal lands.

Prior to the treatment season, program personnel notify Tribal land managers of the potential for grasshopper 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) 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 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.

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On February 16, 2021, APHIS reached informal consultation with the USFWS office in Helena, MT (Appendix C). In this biological assessment PPQ-Montana determined that the proposed action will not affect grizzly bear *(Ursus arctos)*; Canada lynx, *(Lynx canadensis)*; black-footed ferret, (*Mustela nigripes)*; and whooping crane *(Grus Americana).* APHIS has determined the suppression program may affect, but is not likely to adversely affect the northern long-eared bat *(Myotis septentrionalis);* piping plover, *(Charadrius melodus)*; least tern, *(Sterna antillarum)*; red knot, (*Calidris canutus rufa*); yellow-billed cuckoo, (*Coccyzus americanus*); Spalding's catchfly, *(Silene spaldingii);* pallid sturgeon, *(Scaphirhynchus albus)*; white sturgeon, *(Acipenser transmontanus)*; and bull trout, *(Salvelinus confluentus);* Ute Ladies'-tresses, *(Spiranthes diluvialis);* water howellia, *(Howellia aquatilis);* Meltwater Lednian Stonefly, (*Lednia tumana);* and the Western Glacier Stone fly, (*Zapada glacier).*

Further, APHIS has determined that the suppression program will have no effect on Canada lynx *(Lynx canadensis)* or white sturgeon *(Acipenser transmontanus)* critical habitat, and may affect, but is unlikely to adversely affect critical habitat for the piping plover *(Charadrius melodus)* or bull trout *(Salvelinus confluentus).*

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. Baseline thresholds for Mormon crickets are two per square yard and grasshoppers are eight per square yard, though neither of those thresholds guarantees justification for treatment alone. 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.

APHIS also implements several BMP practices in their treatment strategies that are designed to protect nontarget invertebrates, including pollinators. APHIS minimizes insecticide use by using lower than labeled rates for all Program insecticides, alternating swaths during treatment, making only one application per season and minimizing use of liquid broad-spectrum insecticides. APHIS also continues to evaluate new monitoring and control methods designed to increase the response to economically damaging populations of grasshoppers and Mormon crickets while protecting rangeland resources such as pollinators.

APHIS-BLM Coordination and Mitigation Measures to Protect BLM Sensitive Species

Grasshopper and Mormon Cricket treatments could potentially disturb sensitive status species during critical life stages. In addition, grasshoppers provide a food source for many species, for instance grasshoppers and other insects are important for sage-grouse chicks during early brood rearing. However, extreme grasshopper outbreaks can cause massive defoliation and the loss of forbs, reducing nesting cover for the following spring and reducing another important food source for sage- grouse. An effective rangeland treatment program will balance these short- and long- term impacts. The goal is to reduce grasshopper numbers to what would be encountered in a normal year, leaving an ample food base while protecting rangeland resources. To coordinate treatment actions with the BLMs sensitive species program's goals some general guidelines are provided to ensure effective communication and timely responses to treatment requests.

Stipulations for use on BLM administered lands identified for treatment by non-BLM parties

This is a list of common stipulations to be used when grasshopper treatments are requested by outside parties to include BLM lands in the treatment area. GIS data will be provided to APHIS by the BLM MT/DKs State Office.

Stipulations

- Buffer all water bodies by 500 feet (a stream layer will be provided).
- Only authorize diflubenzuron for use on BLM-administered lands

- Timbered areas to be avoided when treatment occurs will be identified by the local BLM Field Office.
- Pre and post grasshopper treatment and monitoring data will be provided upon completion. This would include a post treatment monitoring report to show effectiveness. Each suppression program will conduct environmental monitoring as outlined in the current year's Environmental Monitoring Plan. This report to be submitted to the BLM MT/DKs Invasive Species Specialist at the State Office at the end of each treatment season.

General Guidelines for Treatment

1. Notify BLM local and state offices in a timely manner, no less than 3 business days, before spraying of proposed treatments.
2. Coordinate with local BLM offices to identify areas containing sensitive status species (see the BLM Montana list).
3. Coordinate with local BLM offices to identify exclusion areas, other mitigation measures, and sensitive site monitoring needed for the protection of important fish, wildlife, and plant habitat.

Mitigation Measures for Sage-grouse

1. Exclude key sage-grouse areas, primarily nesting and brood-rearing habitats, as identified by local BLM office. (BLM Sage Grouse Habitat areas defined in the 2015 Resource Management Plans and Sage-grouse Amendments will be provided).
2. RAATs is to be used in all sage-grouse habitat.
3. Exclude priority areas from treatment in May.

3\. No disruptive[1] ground activity within sage-grouse priority areas or within 3 miles of a sage-grouse lek outside of these areas from March 15 – June 30.

4\. Treat priority areas through aerial application only and limit ground treatments within 3 miles of a sage-grouse lek outside a priority area to after June 30.

5\. Avoid treatment in wet meadows areas as identified by field offices as important for sage-grouse brood rearing.

[1] Disruptive activity are activities likely to alter the behavior, displace, or cause excessive stress to existing animal populations occurring at a specific location and/or time, generally considered to be for more than one hour during a 24-hour period in a site-specific area. This does not include aerial RAATs.

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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.

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VII. Public Comments

USDA APHIS received three public responses to the publication of the 2021 Draft EAs (MT-21-01, MT-21-02, MT-21-03). Public comments were received from the Xerces Society, the Center for Biological Diversity, and the Montana Organic Association.

Xerces Society Comments and APHIS Responses

1. The EAs Fail to Disclose Treatment Request Locations and Do 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 EAs: "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 EAs, APHIS only conducts treatments after receiving requests. 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 must exist in APHIS files. We believe this information should be used to disclose maps of requested and higher probability treatment areas, together with an estimate of acres to be treated and likely method and chemical -- in the Draft EAs and certainly by the Final EAs. We find it hard to imagine a 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 EAs or as an Addendum to the Final EAs. After all, treatments commonly occur within weeks after the Final EAs are published, so much planning would have occurred by the time the Draft and Final EAs are published. Instead, as published, the Draft EAs provide almost no information in the way of solid information about where, how, and when the treatments may actually occur within the counties covered under the EAs, during the year 2021. As a result, it is impossible to determine if applications might occur to sensitive areas or species locations within the specified counties. Similarly, the scale of potential applications is left out. Without a description of the average size of treatments in this state and the range over say, the last 25 years, we don't know how to assess the potential impact of the treatments. 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 EAs, 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 3 adequately inform the public, describe the affected environment, and project impacts, APHIS should provide the treatment request areas with the EAs, even if actual treatments end up less than these.

Response: Treatment requests are received before the survey season begins, but they are very dynamic and can change week-to-week. 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 with diflubenzuron could no longer take place. Please see the APHIS responses to comments 1, 2, 3, 4 ,5, 6, 8, 54, 92, 93, 97, 100, and 159 in the 2020 EAs.

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 EAs 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 EAs contain 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 has 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.

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 authority to exclude, eradicate, and control plant pests, including grasshoppers. Specifically, language in the PPA provides authority for APHIS to protect rangeland from "economic

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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 20-26 of the 2021 EAs. 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 EAs, APHIS described risk as "reduced." Reduced compared to what, exactly? The inexactness and lack of specificity of such statements make the EAs of little utility for a citizen trying to determine the actual predicted impacts of insecticide spray on large blocks of Western rangelands.

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 Montana in 2021 meet the "economic infestation level." No site-specific data is presented in the EA that justifies the 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: 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. 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 EAs at all, nor is site-specific data presented for any of these, and the reader is left to simply assume that all treatments obviously meet the economic threshold.5 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

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should occur, shows that in Montana, it takes from 0-16 acres of rangeland to support one animal unitmonth (AUM). Currently, on federal BLM and Forest Service lands, the US taxpayer receives $1.35 per AUM. As a rough estimation, taking the median value within the carrying capacity range (8 acres per AUM), and calculating the value of the forage per acre as paid to the American taxpayer, the US taxpayer receives an estimated $0.17 per acre for the forage value on BLM or USFS federal rangelands in 2021 in Montana. Given that the direct costs of grasshopper treatments to the taxpayer appear to range from $2.20 up to $44.44/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.

Response: Please see APHIS' responses to comments 1 and 2 above.
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's. The analysis provided by the commenter assumes all lands treated by APHIS in Montana are public. This is not the case. Due to the nature of the land ownership in Montana being checkered board, private lands are often included in treatments in order for it to make biological sense. The private landowners pay a direct portion of treatment costs. Therefore, the assumptions made in the analysis provided by the commenter is an overestimate to the taxpayer. The value of the forage is not based only on the grazing fees assessed by BLM or 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 replacement feed costs in Montana greatly out way any treatment costs accrued by the agency. The Plant Protection Act of 2000 does not give authority to APHIS to purchase replacement feed for ranchers, only provides funding when available to suppress outbreak populations of grasshoppers to save forage. In Montana there are no overhead or Administrative costs associated with the ground treatment costs provided by APHIS. The administrative costs associated with contractors providing aerial treatments are minimal. The IPM Manual prepared by USDA discusses the cost benefit analysis for grasshopper suppression programs.

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).
● Montana 2021 EAs: “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 EAs, 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 EAs.
• 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 7 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 EAs 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 8 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 the APHIS AgDISP analysis, we believe it—and the EIS and EAs that appear to rely on it—likely

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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 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. 2 We use these figures later in estimating the effect of these estimated environmental concentrations on nontarget pollinators.9

• 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 EAs) 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 AHIS conduct a rigorous assessment of drift into untreated swaths and compare that to toxicity endpoints for representative species.

Response: 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 harm 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 16-22 of the 2021 EAs. 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.

The skip swath size in the studies are relevant to Montana treatments. For larger treatments, a class C or D aircraft is required and a standard treatment width would be 150 feet. This means that skip swaths at 50% would be 150 feet and at 33% up to 300 feet. The latter method would have a larger skip than the largest measured in the study but would only be applied on the largest scale infestation to minimize impacts across such a large landscape. For the safety of the applicator, it is a practice in Montana not to treat when the wind is blowing greater than 10MPH. Following the April 2019 APHIS Rangeland Grasshopper/Mormon Cricket Suppression Program Aerial Application Statement of Work, application aircraft will fly at a median altitude of 1 to 1.5 times the wingspan of the aircraft whenever possible. "Whenever possible" accounts for the varying topography of Montana's rangelands. 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. The swath width has been described in detail in the above discussion. The swath width that is skipped is the swath width of the treated swath. This again was described in the 2020 EA, please see comments, 10, 12, 14, 19, 20, 21, 23, 24, 25, 28, 41 of the 2020 EA.

6. **The EAs understate the risks of the insecticides diflubenzuron and carbaryl for exposed bees and other invertebrates.**

The single action alternative identifies three insecticide options 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 EAs give almost no actual information on how either of these three 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

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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.10 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 EAs for its analysis of effects is larval toxicity data. However, while the EAs disclose 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 EAs or EIS, so we turned elsewhere to figure out this relevant information. There is a standard tool, known as Bee Rex, which 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 µg 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 EAs (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 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 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. 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.

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Table 1. DIFLUBENZURON Bee Risk Assessment

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

* 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 (although the treatment request does state that no treatments will occur within ¼ mile of "where bees remain") and shrugs off the risk of diflubenzuron to pollinators in the EAs 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. 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 12 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.

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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-live 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).13 These results, which were not identified in the EAs 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).

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Table 2. Liquid CARBARYL Bee Risk Assessment							
				Adult RQs		Number of times LOC (Adult)	
Application Rate (lb ai/A)	Scenario	Pollen/nectar EEC (mg/kg)	Pollen/nectar EEC (ppb)	Acute dietary	Acute contact	Acute dietary	Acute Contact
1	Full	110	110,000	321	2455	803	6138
0.5	RAATS	55	55,000	161	1227	403	3068
0.339	pt. zero APHIS drift analysis in 2010 BA	37.3	37,300	109	832	803	6138
0.187	pt. 500 APHIS drift analysis in 2010 BA	20.6	20,600	60	459	150	1148

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 woud 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 EAs or the EIS is this made clear. 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. 14 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.

Response: Please see the APHIS responses to comments 10, 12, 14, 19, 20, 25, 28, and 41 in the 2020 EAs.

The commenter asserts the EA does not provide information on the possible effects of diflubenzuron and carbaryl sprays on bees and pollinators. That information is provided on pages 22 and 25-26. 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 LC_{50} and NOAEL. The residues are based on T-REX, an EPA terrestrial plant residue model, that is used to estimate exposure to food items consumed by birds and mammals. In the case of BeeREX they use residues that would be expected from direct application onto long grass. These values would not be anticipated to occur on pollen.

Additionally, nectar pesticide residues may be as much as an order of magnitude below levels that would occur on pollen (EFSA, 2017). The BeeREX model assumes that pesticide residues are equal in pollen and nectar. It is unclear how the commenter used effect concentrations expressed in mg/L (cited in the literature) to mg/kg which is not a direct conversion. APHIS invites them to share their modelling assumptions and inputs. APHIS notes that as is appropriate for a Tier 1 risk screening tool, BeeREX is very conservative method for estimating residues on pollen and nectar.

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

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

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

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

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 largescale 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 15 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 scavanger beetles." However, APHIS does not disclose that the plots studied by Catangui measured only 40 acres. This is a far cry from the ground treatments normally measuring thousands of acres or the aerial treatments measuring a minimum of ten thousand acres that are seen in the actual grasshopper suppression program. Small treated plots of 40 acres can be quickly recolonized from the edges. Large treated plots are quite a different story. Quinn et al. (1993) examined the co-occurrence of nontarget arthropods with specific grasshopper nymphal and adult stages and densities. The study reported that nymphs of most dominant 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

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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 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 6 Note that applying during this developmental stage is a necessity with the use of chitin-inhibiting insect growth regulators such as diflubenzuron the future, as they are released from the control of natural enemies."

Response: The commenter again refers to comments addressed in the 2020 EA's, please see response to comments 20, 43 and 55 from the 2020 EA's.
The commenter assumes that there are widespread treatments in Montana. Of the roughly 68 million acres of rangeland in Montana, 3.25 million have been requested for treatment. In the unlikely event that all treatments take place, 2.4% of Montana rangeland would be treated utilizing the RAATs method.
The commenter assumes APHIS will treat when requested. There have been seasons when the land managers have requested treatments, but because the populations did not merit treatments no treatments have occurred. The commenter failed to provide the methodology used in the research cited. Also, the commenter failed to describe if the outbreaks were gradient or eruptive in the research cited. Berryman (2008) describes in detail the population dynamics of these two types of outbreaks and methods to address these types of outbreaks. The commenter must understand that outbreaks reoccur to some degree due to favorable ecological factors and grasshopper populations respond. Consequently, grasshopper treatments may reoccur in the same vicinity.
The research cited did not indicate if RAATs methodology was used or not used during that research period of time.

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 the specific effects to the many declining bird species. The Montana EAs also include some information about sage grouse and some additional protective measures to protect sage grouse on BLM land. However, APHIS makes no mention of state level mandates, including Montana Executive Order 12-201, nor whether APHIS will comply with the Montana Sage-grouse Conservation Strategy. The EAs also do not specifically evaluate whether treatments would adversely affect sage grouse populations due to impacts to the prey base, and assume, without providing evidence, that flattening the fluctuations in grasshopper population will have no impact. 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 safe 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.

Response: The commenter assumes that there are widespread treatments in Montana. Of the roughly 68 million acres of rangeland in Montana, 3.25 million have been requested for treatment. In the unlikely event that all treatments take place, 2.4% of Montana rangeland would be treated utilizing the RAATs method. Birds are highly motive predators and will search for prey in areas with the treatment blocks where APHIS does not spray pesticides. For example the skip swaths where the RAATs method is employed or within protective buffers established around water resources or other sensitive sites.

Montana Executive Order (EO) 12-2015 Amending and Providing for Implementation of Montana Sage Grouse Conservation Strategy, is most likely the EO the commenter is referring to. Page 25, letter "i." of this EO exempts "Grasshopper/ Mormon Cricket control following RAATs protocol... from this strategy."

Historically, there have not been economic grasshopper populations in these large sagebrush habitat locations due to lack of grass and forb species which the economic damaging grasshopper species feed on.

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 EAs are 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.

Response: The commenter made similar comments addressed in the 2020 EA's. Please see the APHIS responses to comments 10, 12, 14, 19, 20, 25, 28 and 37 in the 2020 EAs.
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 diflubenzuron treatments is provided on pages 20-26 of the 2021 EAs. Additional descriptions of APHIS' analysis methods and discussion of the toxicology can be found in the 2019 EIS.

10. **Endangered Species Act Assessment**

The EAs included a Biological Assessment, with assessments of potential impacts, protective measures, and determinations for species and critical habitat protected under the Endangered Species Act. We thank APHIS for sharing this important information with the public. It is important that the public be aware of such determinations and the reasoning behind them. In several cases, the depth of the reasoning is scant, and/or incomplete. We suggest that in future assessments, the food preferences for each species, and any interdependencies with other species or species groups likely to be vulnerable to the effects of the program insecticides, be specifically addressed. The EAs also include a concurrence letter from US. Fish and Wildlife Service. The letter states that the Service bases its concurrence on the information provided in the BA by APHIS and information in their files. We do not know, for example, if the USFWS has information on drift predicted into untreated swaths and downwind untreated areas. This could have affected their concurrence, for example, their apparent agreement that a 150-foot buffer would be sufficient around known occupied maternity roost trees for the northern long-eared bat. Some protective measure clauses are unclear. For example, for least tern, the EAs state: "No aerial ULV application will be applied 2.5 miles up and down river to prevent abandonment of nesting least turn colonies due to aircraft flyovers and a possible decrease on the fishery forage base due to accidental aquatic application. A 0.25 mile no-aerial ULV application buffer on each side of the river and around other bodies of water containing least tern colonies will also be observed. This, in addition, would include a 500 foot no treatment zone around nesting colonies." It's not clear if the 2.5 mile buffer preventing aerial ULV treatment up and down river is to be applied around known nesting colony locations? Also, given that this species is no longer listed, will APHIS continue to abide by any protective measures to ensure continued recovery of this species? Another area where lack of clarity is present is in the discussion of protective measures for Spalding's catchfly. The Protective Measures listed in the EAs seem to state two contradictory things: "Mitigative measures will be similar to other insect pollinated plants: aerial applications of ULV pesticides will not be used within 3 miles of the occupied habitats to protect pollinators. The exception is the 2004 local concurrence with USFWS allowing aerial or ground applications of diflubenzuron or carbaryl bait within the Spalding's catchfly habitat." This lack of clarity makes it difficult to know what APHIS is committing to. Will diflubenzuron be allowed within Spalding's catchfly habitat areas? If so, APHIS has not discussed the potential for diflubenzuron to impact juvenile bees, and the long-term impact of this upon the persistence and viability of the Spalding's catchfly. If APHIS did not include this information in its BA, was USFWS apprised about the risks of diflubenzuron to the viability of this species, and thus is its concurrence adequately informed? Other protective measures that are listed are not consistent with the description of the program elsewhere in the EA. For example, in its assessment of red knot, APHIS states: "APHIS maintains a 500 foot buffer around all water bodies, which would exclude most riparian areas where the Red Knot is likely to occur." But the operational guidelines for the program do not state that all water bodies would be protected by a 500-foot buffer. Instead, the following is stated:19 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 APHIS then concludes that the activities under the grasshopper suppression program may affect but are not likely to adversely affect red knot. Is this conclusion based on the correct buffers? Finally, many of the protective measures pertain to "occupied" habitat (not potential habitat). APHIS does not state how it determines whether land is occupied by a listed species or not. The request letter, for example, alludes to sensitive sites but does not specifically state APHIS' the need to know where listed species are known to exist. How then, especially given the potential for treating very large and very far-flung lands, does APHIS determine occupied habitat?

Response: APHIS appreciates the commenter's suggested edits to 2021 Biological Opinion, and they will be taken into account in future informal consultations with the USFWS.

11. **Within the last year, the monarch butterfly has been designated a candidate species under the Endangered Species Act, but the EAs contain 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 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 under the Endangered Species Act. US Fish and Wildlife Service normally does consult on candidate species and instructs project leads to consider candidates in its effects analysis.20 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. 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.

Response: The Monarch butterfly was listed as a candidate species on December 15, 2020. The U.S. Fish and Wildlife Service's (USFWS) 12-month status review determined that it was "warranted but precluded". The Endangered Species Act (ESA) provides for a "warranted-but-precluded" finding when the Service does not have enough resources to complete the listing process, because the agency must first focus on higher-priority listing rules. "Warranted-but-precluded" findings require subsequent review each year until the USFWS undertakes a proposal or makes a not-warranted finding. APHIS is not required by ESA Section 7 consultations to consult on species that have been precluded from being listed as threatened and endangered (T&E) species.
The 2021 USFWS official species list for these Environmental Assessments (EAs) (MT-21-01, MT-21-02, and MT-21-03) covering the rangeland action areas for ESA Section 7 consultations with U.S. Fish and Wildlife Service, covered consultations on species from

this official list. The USFWS does not give concurrence for candidate species. As of this date, this species was not listed as a species of concern during the Tribal consultations. It has not been listed as a species of concern by Tribal Wildlife Department.

According to the Montana Natural Heritage Map Viewer data for 2020, Montana observations were limited to two observations in Custer County.

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

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

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

Milkweed poisons cattle and other livestock. The toxic agents are cardiac glycosides. To be poisoned, cattle can eat as little as 1.0 percent of their body weight in broad-leafed milkweed; amounts as low as 0.15 percent have poisoned sheep and goats (Clayton, 2021). Due to this factor, rangeland with milkweed would be at risk to cattle foraging, and is unlikely to be treated. In Montana, the Monarch Butterfly has not been collected in sweep net samples during Nymphal or Adult surveys for grasshopper/Mormon crickets.

See also comment and response to comment 81 of the 2020 EAs.

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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 EAs.**

    The EAs do 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/endangeredspecies/final-national-level-listed-species-biological-evaluation-carbaryl). 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. Species in Montana that are likely to be adversely affected by either of these chemicals, according to EPA's evaluation, are not mentioned in the APHIS EAs. For example, we note that the concurrence letter references a three mile buffer around any occupied habitat – within which no aerial spray would be permitted - for the three listed plant species (Spalding's catchfly, water howellia, and Ute Ladies tresses) to protect the plants and their pollinators. However, carbaryl bran bait may be used within these buffer areas, presumably to be applied by ground equipment. Was USFWS aware of the EPA determinations? Again, is this an informed concurrence? 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.

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

13. **APHIS must integrate its protective measures and guidelines in one cohesive framework.**

    With to the involvement of Montana BLM in this year's decision process and EAs prior to publication, the EAs contain several location where protective measures are referenced (e.g. concurrence letter, BAs, general operating guidelines, BLM stipulations, sage grouse section, etc.).

    Response: APHIS thanks the commenter for this suggestion and will consider it in the future.

14. **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 200-700 species of native bees (McKnight et al. 2018, Figure 1). Perhaps this is not surprising since the majority of rangeland plants require insectmediated 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 EAs. Many of the pollinators that

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call Montana home are already considered at-risk. See lists of at risk pollinators found 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 EAs do 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 Montana designates any invertebrates as species of greatest conservation need.22 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 EAs. 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 EAs make no mention of the fact that there are affirmative obligations incumbent on federal agencies with regard to protection of pollinators, regardless of whether they are federally listed. Federal documents related to pollinator health include:

● the 2014 Presidential Memorandum -- Creating a Federal Strategy to Promote the Health 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 a 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.

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. Historical use of Program insecticides demonstrate that diflubenzuron is the preferred insecticide for use. Over 90% of the acreage treated by the Program has been with diflubenzuron. Diflubenzuron poses a reduced risk to native bees and pollinators compared to liquid carbaryl and malathion applications. 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.

The commenter assumes that there are widespread treatments in Montana. Of the roughly 68 million acres of rangeland in Montana, 3.25 million have been requested for treatment. In the unlikely event that all treatments take place, 2.4% of Montana rangeland would be treated utilizing the RAATs method. Therefore, the risk of significant impacts to pollinators and arthropods as a group within the area covered by this EA are negligible.

15. 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.

Response: The commenter made the same comment in the 2020 EAs. Please see APHIS response to comment 40 and 41 in the 2020 EAs.
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.

16. **The EAs are 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 operational guidelines that insecticides shall not be applied directly to stock tanks. However, these guidelines do 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 24 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.

Response: Stock tanks are given the same buffer as any other surface water. This is addressed in Appendix D, question 6.

17. **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 difluenzuron'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.

Response: APHIS complies with the Clean Water Act as administered by the Montana Department of Environmental Quality. An NPDES permit is required if pollutants are discharged from a point source into waters of the United States.
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.

18. Special status lands

Montana contains numerous areas of special status lands. However, the EAs contain no analysis 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. This is especially disheartening, since these areas are so associated with some of the last refugia for declining species, as is made evident in the BA, which identifies the areas where species are known to occur. In addition there is no mention of whether the program is in compliance with the 1977 Montana Wilderness Study Area Act.

Response: The commenter made the same comment in the 2020 EAs. Please refer to APHIS responses to comments 49 of the 2020 EAs.

19. 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." Montana's questionnaire for landowners requesting treatment also includes a question about local organic producers. 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. Montana is the nation's largest producer of organic wheat and lentils. Depending on the location of treatments this could be a significant impact to the state. The general guidelines, crafted for the program as a whole, and included in each state's EAs, 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 philosophers of all landowners in the vicinity. We are concerned that some organic, and especially transitioning, parcels could be missed if APHIS does not cast a wide net to identify all locations where organic or transitioning farms exist.

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 sprayed to minimize harm and disturbance of that area.
The APHIS grasshopper program in Montana wants to notify organic producers in advance of proposed treatments. APHIS is requesting organic agriculture certifiers and producers provide grasshopper program managers maps and locations for any organic crops or transitioning properties located in the area covered by this EA. If organic producers can provide APHIS with Geographic Information Systems (GIS) shape files of organic farms, we can add them to our GIS database and appropriately buffer the organic crops from treatments that could occur on adjacent properties. Organic producers should maintain contact with neighboring property owners or land managers because grasshopper suppression treatments could occur independent of APHIS involvement. APHIS encourages organic producers to attend any meetings related to grasshopper suppression in your area (keep in contact with your local Extension Agents). Organic producers located in the red and orange colored areas of the grasshopper hazard map in the EA should contact the APHIS grasshopper program manager to discuss treatment plans as they develop. The Montana State Plant Health Director, Gary D. Adams, is the appropriate contact.

20. 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. The Montana EAs even include stipulations for treatments on BLM lands when those treatments are requested by non-BLM parties. In addition to our public lands concerns, 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. For example, determining occupied habitat on private land for listed species may be difficult or tricky.

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.

21. 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 previous years, nor the impact of those treatments. Based on our independent review, Montana’s history of recent treatments does not support its statement that the probability of an outbreak occurring in the same area as a previous outbreak is slim. Montana in fact has treated large areas in close proximity, and even in overlapping areas in recent years, and it appears that large treatment areas have been the norm for quite some time. 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.

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 land owners 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.

22. 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 EAs 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 28 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.

Response: The comments comparing rotational grazing to season long grazing are valid concerns. APHIS supports such management practices. However, the rotational grazing practices in Montana by the ranchers are not under the control of APHIS grasshopper program. Ranchers practice rotational grazing in Montana, 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 valid control practices presently. Fire Management of rangeland is not controlled by APHIS. This method would have to be implemented by the land management agencies.

23. 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 29 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 t 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.

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

Center for Biological Diversity Comments and APHIS Response

24. 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.

Response: The responses for comments 1 through 161 are found in the 2020 EAs. These responses are equally applicable for the 2021 EAs.

Montana Organic Association Comments and APHIS Responses

25. Develop a plan for direct outreach to organic and transitioning-to-organic producers.

a. This information is partially available through the USDA Organic Integrity Database. https://organic.ams.usda.gov/integrity/

b. APHIS should contact individual organic certifiers operating in the state for more details about these producers and their operations. These certifiers include the Montana Department of Agriculture Organic Program, Global Organic Alliance, Organic CropImprovement Association, Oregon Tilth, and Quality Assurance International.

c. APHIS should contact those producers within 4 miles of the identified treatment area to inform them of the work and provide the opportunity to contribute comments.

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 sprayed to minimize harm and disturbance of that area.

The APHIS grasshopper program in Montana wants to notify organic producers in advance of proposed treatments. APHIS is requesting organic agriculture certifiers and producers provide grasshopper program managers maps and locations for any organic crops or transitioning properties located in the area covered by this EA. If organic producers can provide APHIS with Geographic Information Systems (GIS) shape files of organic farms, we can add them to our GIS database and appropriately buffer the organic crops from treatments that could occur on adjacent properties. Organic producers should maintain contact with neighboring property owners or land managers because grasshopper suppression treatments could occur independent of APHIS involvement. APHIS encourages organic producers to attend any meetings related to grasshopper suppression in your area (keep in contact with your local Extension Agents). Organic producers located in the red and orange colored areas of the grasshopper hazard map in the EA should contact the APHIS grasshopper program manager to discuss treatment plans as they develop. The Montana State Plant Health Director, Gary D. Adams, is the appropriate contact.

26. Rather than rely on the supposition that "treatments used for grasshopper programs are primarily conducted on open rangelands where children would not be expected to be present during treatment or enter during the restricted entry period after treatment," the EA should include a plan for public outreach to residents and all who may be visiting the treatment area(s). This plan should include certified letters, public notices posted in print news, social media, and governmental offices, and road signage during treatment.

Response: APHIS prepares maps of the treatment area that exclude sensitive sites, such as schools, hospitals, day care centers, playgrounds, residences, campgrounds, organic crops, protected species, and surface water bodies 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. APHIS treatments are conducted on rural rangelands, where agriculture is a primary economic factor and widely scattered dwellings in low population density ranching communities are found. The program requires pilots avoiding flights over congested areas, water bodies, and other sensitive areas. Aerial applications are not allowed while school buses are operating in the treatment area; within 500 feet of schools or recreational facilities. APHIS appreciates the commenter's suggestions for better outreach and public notification procedures.

27. When considering experimental treatments, experimental biological methods that are consistent with USDA Organic Standards should receive preference.

Response: The commenter's suggestion to consider experimental biological methods that are consistent with USDA Organic Standards is vague. They may not understand the purpose of public comments on the scope and risk analysis contained in NEPA documents. APHIS appreciates the opportunity to conduct more thorough examinations of issues or concerns that public and governmental entities raise to improve the agency's environmental analysis for the grasshopper program. APHIS encourages the commenter to formulate their comments in a manner that identifies specific deficiencies in our NEPA documents.

28. **The EA should include more scientific data and analysis accompanied by more detailed maps regarding the grasshopper and Mormon cricket infestations.**

Response: APHIS encourages the commenter to read the Draft EAs and 2019 EIS for the grasshopper program more thoroughly. The commenter's suggestion to include more scientific data and analysis is vague. They may not understand the purpose of public comments on the scope and risk analysis contained in NEPA documents. APHIS appreciates the opportunity to conduct more thorough examinations of issues or concerns that public and governmental entities raise to improve the agency's environmental analysis for the grasshopper program. APHIS encourages the commenter to formulate their comments in a manner that identifies specific deficiencies in our NEPA documents.

Treatment requests are received before the survey season begins, but they are very dynamic and can change week-to-week. 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 with diflubenzuron could no longer take place. Please see the APHIS responses to comments 1, 2, 3, 4 ,5, 6, 8, 54, 92, 93, 97, 100, and 159 in the 2020 EAs.

29. **The EA should include more scientific data and analysis accompanied by more detailed maps regarding planned treatment areas and triggering thresholds for treatments.**

Response: Refer to 2019 EIS. This comment is very similar to the previous comment and APHIS' response is provided immediately above.

30. **The EA should document past treatments, including dates, application rates, and treatment outcomes, accompanied by more detailed maps for areas treated for grasshoppers and Mormon crickets.**

Response: The commenter does not link their suggestion to include information on past treatments to any potential environmental effects that APHIS should examine in greater depth. They may not understand the purpose of public comments on the scope and risk analysis contained in NEPA documents. APHIS appreciates the opportunity to conduct more thorough examinations of issues or concerns that public and governmental entities raise to improve the agency's environmental analysis for the grasshopper program. APHIS encourages the commenter to formulate their comments in a manner that identifies specific deficiencies in our NEPA documents. The commenter's desire for more operational information about grasshopper treatments does not necessitate revision of the EA.

31. **The EA should include more information about the food chain implications of the treatment methods.**

Response: The commenter should read the 2019 EIS for the APHIS grasshopper program to learn more about the broader effects of grasshopper suppression on rangeland ecology, including herbivory and predation between various trophic levels.

32. The EA should include more information about the potential aerosol and aquatic drift of the proposed treatment methods.

Response: The commenter should read the 2019 EIS for the APHIS grasshopper program to learn more about potential spray (aerosol) drift resulting from treatments. 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 believes these buffers eliminate the potential for substantial deposition and movement of program applied pesticides in water bodies (aquatic drift).

33. The EA should identify the Indirect impacts on aquatic and terrestrial invertebrates, including food chain disruptions.

Response: The commenter should read the 2019 EIS for the APHIS grasshopper program to learn more about potential direct and indirect effects on aquatic and terrestrial invertebrates. As noted in the response to comment 32 directly above, APHIS believes these buffers eliminate the potential for substantial deposition and movement of program applied pesticides in water bodies. Therefore any effects on aquatic invertebrates that might occur from accidental spray drift to water bodies would be isolated, temporary and not cause significant impacts.

34. The EA should include the provision for evaluating the results of treatments on targeted and non-targeted insect species, at appropriate intervals over the course of 2 years or longer.

Response: The commenter does not provide enough detail on the cited "provision" for APHIS to include further discussion or analysis in the EA. APHIS does collect annual survey data on grasshopper nymphal and adult populations that are the target of our suppression program. Grasshopper species dynamics have been documented at 230 unique sites, every year, across Montana beginning in the early 1990's. Monitoring for all non-target rangeland insect species is beyond the scope of this program.

35. The EA should identify provisions for compensating USDA-certified organic producers for the unintentional effects of treatment methods, including those that compromise organic certificates for the three-year clean-out period.

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Response: There is no authority in the PPA for compensation The commenter's suggestion, that the EA should identify how organic crop producers could be compensated for accidental contamination of their fields, displays a fundamental misunderstanding of the purpose of public comments during the preparation of NEPA documents. APHIS appreciates the opportunity to conduct more thorough examinations of issues or concerns that public and governmental entities raise to improve the agency's environmental analysis for the grasshopper program. APHIS encourages the commenter to formulate their comments in a manner that identifies specific deficiencies in our NEPA documents. If the commenter desires compensation provisions for organic producers accidentally effected by APHIS pest control programs we suggest you might bring these political and economic concerns to agency leadership.

36. APHIS's EA should include and identify MOA as an organization consulted in the "Listing of Agencies and Persons Consulted" for this and future work affecting Montana's USDA organic certified producers.

Response: The List of Agencies and Persons Consulted provides contact information for entities who contributed substantially to the preparation of the risk analysis and development of the EA. APHIS believes MOA wishes to be included in any direct distribution of future Grasshopper/Mormon Cricket Suppression Program Draft EAs published for public comments in Montana.

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Appendix A - APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program FY-2021 Treatment Guidelines Version 2/5/2021

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.

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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

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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:

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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.

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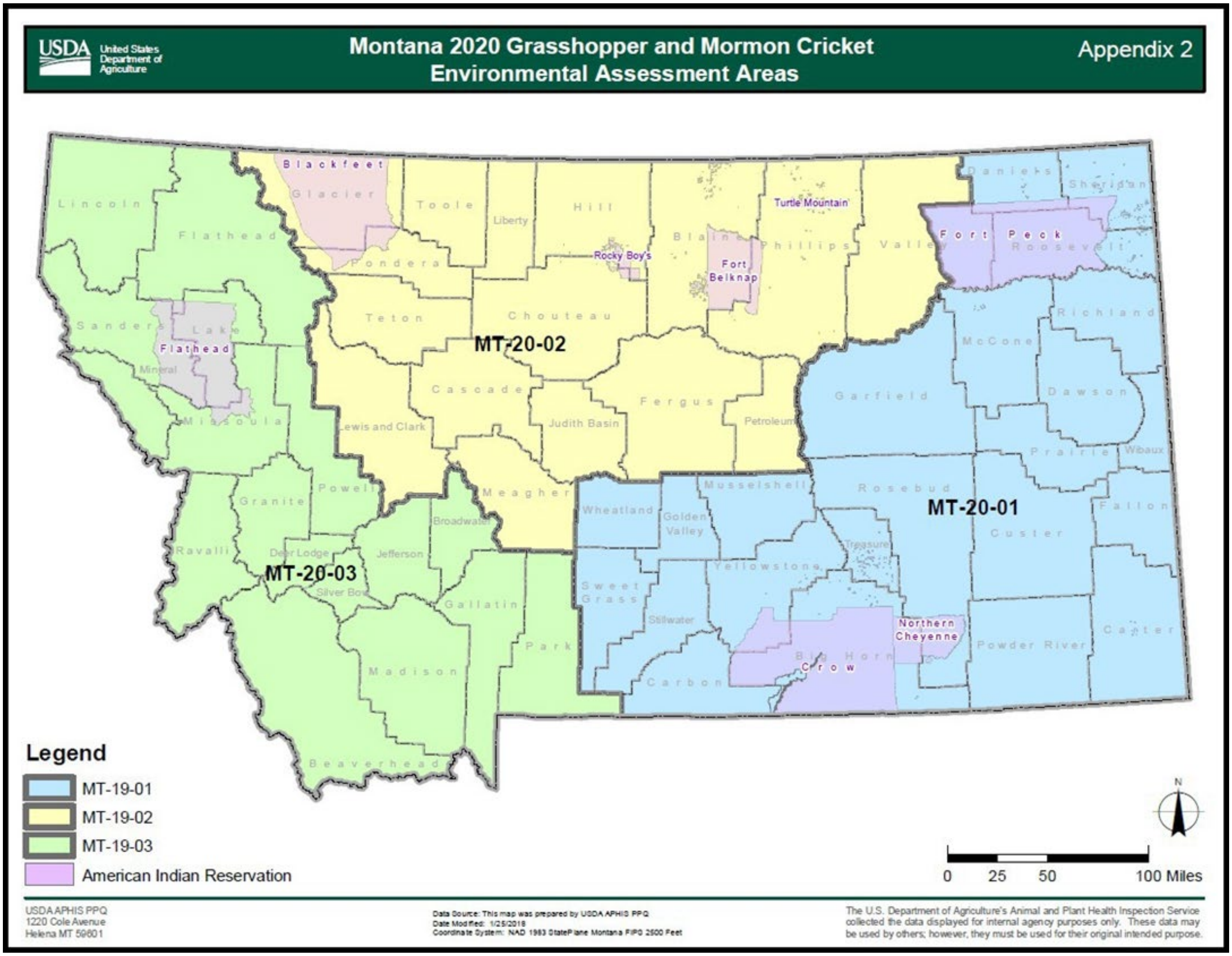
Appendix B: Map of the Affected Environment



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Appendix C: Biological Assessment and Concurrence Letter

2021 Biological Assessment

For

Montana

Rangeland Grasshopper and Mormon Cricket Suppression Program

01/06/2021
Prepared by USDA, APHIS, PPQ
1220 Cole Ave.
Helena, MT 59601

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

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2021 Biological Assessment for Rangeland Grasshopper and Mormon Cricket Suppression Program, Montana
01/06/2021

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 Montana 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 Montana 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 Montana. Our determinations of effect for listed species, proposed species, critical habitat, and proposed critical habitat 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, the 2004 Montana BA, and local discussions with FWS.

APHIS has determined that the proposed action will not affect grizzly bear *(Ursus arctos)*; Canada lynx, *(Lynx canadensis)*; black-footed ferret, (*Mustela nigripes)*; and whooping crane *(Grus Americana).* APHIS has determined the suppression program may affect, but is not likely to adversely affect the northern long-eared bat *(Myotis septentrionalis);* piping plover, *(Charadrius melodus)*; least tern, *(Sterna antillarum)*; red knot, (*Calidris canutus rufa*); yellow-billed cuckoo, (*Coccyzus americanus*); Spalding's catchfly, *(Silene spaldingii);* pallid sturgeon, *(Scaphirhynchus albus)*; white sturgeon, *(Acipenser transmontanus)*; and bull trout, *(Salvelinus confluentus);* Ute Ladies'-tresses, *(Spiranthes diluvialis);* water howellia, *(Howellia aquatilis);* Meltwater Lednian Stonefly, (*Lednia tumana);* and the Western Glacier Stone fly, (*Zapada glacier).*

APHIS has determined that the suppression program will have no effect on Canada lynx *(Lynx canadensis)* or white sturgeon *(Acipenser transmontanus)* critical habitat, and may affect, but is unlikely to adversely affect critical habitat for the piping plover *(Charadrius melodus)* or bull trout *(Salvelinus confluentus).*

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

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2.0 PURPOSE

This BA is for grasshopper/Mormon cricket control activities in the entire state of Montana. APHIS is requesting Endangered Species Act (ESA), section 7, informal consultation for those species that have been listed or proposed for listing in Montana since the October 3, 1995 FWS letter to Carl Bausch and for all listed species in those counties for the use of the growth regulator, Diflubenzuron. The agreements for Montana reached between APHIS and FWS will be in effect until a BO for the entire Rangeland Grasshopper Cooperative Management Program is issued and the nationwide, formal consultation process is completed.

Therefore, this BA will address species which have been proposed for listing since 1995 and have thus not been addressed in previous Biological Opinions. This BA also addresses the use of diflubenzuron as it relates to species previously addressed in past biological opinions.

Most 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. On occasion, modified RAATs (less agent and/or treated area than conventional treatments, but more than RAATs) may be used.

APHIS respectfully requests informal ESA consultation on listed and proposed species in Montana. 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.

Three environmental assessments (EAs), tiered to the 2019 Rangeland Grasshopper and Mormon Cricket Suppression Program Final Environmental Impact Statement (FEIS), are being prepared in anticipation of treatments in the State of Montana. 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 EAs 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 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 2002 FEIS analyzes the alternatives available to APHIS when a Federal land management agency, Tribe or

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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, malathion, and diflubenzuron. Four alternatives are considered: 1) No action, 2) insecticide applications at conventional rates and complete area coverage, 3) reduced agent area treatments (RAATs), and 4) modified RAATs.

Conventional rates for these agents are:
- 16 fluid ounces (0.50 pound active ingredient (lb a.i.)) of carbaryl spray per acre,
- 10 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
- 8 fluid ounces (0.62lb a.i.) of malathion per acre.

Rates utilizing RAATs are:
- 8 fluid ounces (0.25 pound active ingredient (lb a.i.)) of carbaryl spray per treated acre,
- 10 pounds (0.20 lb a.i.) of 2-5 percent carbaryl bait per treated acre,
- .75 to 1.0 fluid ounce (0.012 lb a.i.) of diflubenzuron per treated acre, or
- 4 fluid ounces (0.31lb a.i.) of malathion per treated acre

Malathion and carbaryl 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 30-50 foot swaths alternating with 30- 50 foot untreated swaths are used for ground applications. With RAATs techniques, malathion is applied at a rate of four fl. oz. per acre or 342 grams of active ingredient in 100 foot treated swaths alternating with 25 foot untreated swaths. An example of modified RAATs by ground application may incorporate 5 percent carbaryl bait containing .50 a.i. in 30-50 foot swaths alternating with 30-50 foot untreated swaths.

Diflubenzuron is a growth regulator that functions as a chitin inhibitor affecting the formation and/or deposition of chitin in the insect’s exoskeleton. Application rates range from .75 to 1.0 fluid ounce (fl. oz.) per acre in rangeland and 1.0 fl. oz. per acre in border protection situations where nearby agricultural lands are being threatened by grasshoppers originating in adjacent federally managed rangeland.

4.0 ASSESSMENTS:

4.1 MAMMALS

4.1.1 **Bear, grizzly**, *Ursus arctos horribilis*

4.1.1.1 Status:

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The grizzly bear was designated as Threatened on March 11, 1967. On November 17, 2000, the grizzly bear was designated as Experimental Population, Non-Essential in the Bitterroot area of Idaho and Montana (Final Special Rule, 17.84(l)).

4.1.1.2 Habitat and Distribution:

Grizzly bears are distributed throughout mountainous and transition prairie areas throughout Montana. Four Grizzly Bear Recovery Areas and adjacent Distribution Areas (or Primary Conservation Areas) are located throughout western Montana. (See Attachments 1 and 1a).

4.1.1.3 Assessment:

Any of the proposed actions are not likely to jeopardize the continued existence of the grizzly. This conclusion is based on the characteristics of the insecticides, application rates, and size of the species in relationship to the factors discussed on page 12 of the 1987 FWS Biological Opinion. This conclusion is adopted for Diflubenzuron.
Due to the wide-ranging habits (wandering nature) of the grizzly bear it is unlikely that either aircraft disturbance or toxic effects will be a factor.

4.1.1.4 Protective measures:

No treatment programs will be conducted in the current Grizzly Bear Distribution Areas (which includes the Grizzly Bear Recovery Areas) in Montana. These are areas where one would reasonably expect to find grizzly bear use occurring during most years.

4.1.1.5 Determination:

The risk analysis provided in the BA leads to the conclusion that the Program will have no effect on the grizzly bear as a result of the proposed pesticides at the proposed rates of application. Refer to the January 1987 APHIS BA and the June 1, 1987 FWS Biological Opinion.

4.1.2 **Lynx, Canada,** *Lynx Canadensis*

4.1.2.1 Status:

The Canada lynx was designated as Threatened on March 24, 2000.

4.1.2.2 Habitat and Distribution:

Canada lynx are highly dependent on snowshoe hare. In the western U.S., lynx live in sub alpine coniferous forests of northern latitudes. Canada lynx avoid openings such as clear cuts and grasslands because snowshoe hares also are unlikely to use such areas and because these areas lack the cover necessary for both species.

4.1.2.3 Assessment:

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Grasshopper treatments generally occur only over open habitat common to grasshoppers. Due to the wide-ranging habits of the Canada lynx it is unlikely that either aircraft disturbance or toxic effects will be a factor.

The proposed actions will not adversely affect the snowshoe hare, the Canada lynx's primary food source. These conclusions are based on the characteristics of the insecticides, application rates, and size and habits of the species. These factors are similar to those previously consulted on for the grizzly bear and gray wolf.

4.1.2.4 Protective measures:

APHIS will not treat forested areas or rangelands that are not adjacent to crops but are surrounded by forest and are above 4000 feet in elevation.

4.1.2.5 Determination:

There will be no effect on the Canada lynx as a result of the proposed pesticides at the proposed rates of application and treatments are unlikely to occur in or near suitable habitat.

4.1.4 **Ferret, black-footed**, *Mustela nigripes*

4.1.4.1 Status:

The black-footed ferret was designated as Endangered on March 11, 1967 and on August 21, 1991 as Experimental Population, Non-Essential in parts of Montana and other states.

4.1.3.2 Habitat and Distribution:

Black-footed ferrets are directly correlated with active prairie dog towns. Proctor (1998) developed a GIS model to provide a method for creating habitat maps outlining suitable black-tailed prairie dog habitat on lands in the northern Great Plains short grass prairie at a scale that will identify regional potential for prairie dog ecosystem recovery, "including the needs of associated species." Preferred and potential suitable habitat categories were developed… The categories that identified suitable habitat for black-tailed prairie dogs were the preferred (favored vegetation and favored slope), potential (favored slope, less favored vegetation) and potential (favored vegetation and less favored slope). Favored vegetation can be described as very low cover grassland, salt- desert shrub, dry salt-flats, and mixed barren sites. Favored slope has a 0-4% slope and less favored slope ranges 4-25% slope (Proctor 1998). Montana counties containing preferred habitat include the following: Treasure (43 acres), Golden Valley (1,007 acres), Rosebud (147,671 acres), Powder River (166,425 acres), Wheatland (1,448 acres), Musselshell (93,015 acres), Sweet Grass (2,965 acres), Carbon (65,269 acres), Blaine (276,860 acres), Stillwater (4,571 acres), Yellowstone (52,855 acres), Big Horn (8,399 acres), Park (4,204 acres), Gallatin (17,151 acres), Carter (444,645 acres), and Custer (233,128acres).

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The elimination of black-footed ferrets throughout their historic range is thought to be directly related to widespread disease outbreaks, primarily sylvatic plague, land-use modifications to its native rangeland habitat, and large-scale use of toxicants to control black-tailed prairie dogs, the ferret's primary prey species. The ferret was thought to be extinct in 1979, when the last animal captured from a population in Mellette County, South Dakota died in captivity. In the wake of the rediscovery of the species in the wild in 1981 near Meeteetse, Wyoming, in 1989, the Service instituted the survey protocol Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act, designed to detect ferrets in potentially suitable habitats. Despite the fact that thousands of hours of survey effort have been expended throughout the historic range of the species since 1981 in an attempt to locate additional extant populations, to date no other wild populations have ever been detected.

The failure to locate additional extant black-footed ferret populations, coupled with the ubiquity of sylvatic plague throughout the historic range of the species, has prompted the U.S. Fish and Wildlife Service to determine that the black-footed ferret has been extirpated throughout its range, except where it has been purposely reintroduced using captive-reared or translocated wild individuals. Purposeful reintroduction of black-footed ferrets has occurred at 29 reintroduction sites in 8 states since 1991, and reintroductions have taken place through the use of two ESA regulatory mechanisms. Under the authority of Section 10(j) of the ESA, experimental, non-essential populations of ferrets have been established in portions of Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. These rulemaking procedures have removed the need for Section 7 consultations with regard to the black-footed ferret, except on lands administered by the Service and the National Park Service. More recently, ferrets have been reintroduced through the Black-footed Ferret Programmatic Safe Harbor Agreement (BFF PSHA), which uses authorities described in Section 10(a)(1)(A) of the ESA.

4.1.3.3 Assessment:

The black-footed ferret was analyzed in the January 1987 APHIS BA for possible effects resulting from the Rangeland Grasshopper Cooperative Management Program. The APHIS/FWS ESA formal consultations concluded that the species continued existence would not be jeopardized by the proposed program. This conclusion is adopted for Diflubenzuron.

4.1.3.4 Protective measures:

APHIS will avoid treatment in the four defined reintroduction areas for the black-footed ferret. (See Attachment 3).

4.1.3.5 Determination:

Treatments will have no effect on black-footed ferrets because of proposed pesticides and the proposed rates of application.

4.1.4 **Northern Long-Eared Bat** – *Myotis septentrionalis*

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4.1.4.1 Status:

The Northern Long-Eared Bat was designated Threatened on May 04, 2015.

4.1.4.2 Habitat and Distribution:

During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. Northern long-eared bat spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

The Northern Long-Eared Bat may occur in the following Montana counties: Carter, Custer, Dawson, Fallon, Powder River, Prairie, Richland, Roosevelt, and Wibaux. See the attached Northern Long-Eared Bat Species Occurrence, Montana map, attachment 11.
Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces.

4.1.4.3 Assessment:

Grasshopper suppression activities generally occur only over open rangeland habitat common to grasshoppers. Due to the habitat in which the woodland northern long-eared bat inhabit (forested areas; caves and caverns; buildings) it is unlikely that either aircraft disturbance or toxic effects will be a factor. APHIS grasshopper suppression activities may affect, but are not likely to adversely affect northern long-eared bat.

4.1.4.4 Protective measures:

APHIS will consult with land managers requesting grasshopper suppression program activities prior to conducting treatments in northern long-eared bat priority areas and exclude sensitive areas based on that consultation on a site by site basis. APHIS will also consult with the Montana Natural Heritage Program in advance of treatment in areas northern long-eared bat may be present to ascertain whether known NLEB hibernaculum or known occupied maternity roost trees occur in the proposed treatment areas. No grasshopper suppression treatments will take place within 0.25 miles of all known occupied northern long-eared bat hibernacula or habit modeled by the National Heritage Program mapper, and a 150 foot buffer will be maintained around known occupied maternity roost trees.

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4.1.4.5 Determination:

APHIS has determined that the 2021 USDA APHIS PPQ Montana Grasshopper/Mormon Cricket Suppression Program may affect, but is not likely to adversely affect the Northern Long-Eared Bat.

4.2. BIRDS

4.2.1 **Plover, piping,** *Charadrius melodus*

4.2.1.1 Status:

The piping plover was designated Threatened on December 11, 1985.

4.2.1.2 Habitat and Distribution:

Populations are thought to exist in Garfield, McCone, Phillips, Pondera, Richland, Roosevelt, Sheridan and Valley counties, Montana. Habitat also occurs around Alkali Lake in Pondera county, Nelson reservoir and Bowdoin National Wildlife Refuge in Phillips county, and in and around Medicine Lake National Wildlife Refuge in Sheridan county. (See Attachment 6)

4.2.1.3 Assessment:

The 1995 Biological Opinion letter dated 10/3/95 to Mr. Bausch details the agreed-to measures for protecting the piping plover.

4.2.1.4 Protective measures:

The June 1, 1987, FWS Biological Opinion determined the need for protective measures to be used around bodies of water where piping plovers are known to nest. APHIS has adopted these measures for the use of diflubenzuron. For Montana, no aerial ULV treatments will occur within 0.25 mile of piping plover habitat. Where carbaryl bran bait is used, a 500-foot no-treatment zone will be maintained around piping plover habitat.

4.2.1.5 Determination:

Based on the determined protection measures, proposed pesticides and the proposed rates of application, grasshopper treatments are not likely to adversely affect the piping plover.

4.2.2 **Crane, whooping,** *Grus americana*

4.2.2.1 Status:

The whooping crane was designated Endangered on March 11, 1967.

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4.2.2.2 Habitat and Distribution:

Although there are reported occurrences, critical habitat has not been designated in Montana (50 FR; 17.95 (b).) The whooping crane may occur statewide with preferred stopovers in shallow wetlands or streams with sparse vegetation and good horizontal visibility. Whooping cranes have been observed in the following counties of Montana: Custer, Dawson, Fallon, McCone, Richland, Roosevelt, Sheridan, Valley, and Wibaux.

4.2.2.3 Assessment:

Most of the Aransas National Wildlife Refuge/Wood Buffalo National Park population will have likely migrated to more northern latitudes in Canada during the proposed program period of mid-May or later.

4.2.2.4 Protective measures:

As stated in the January 1987 BA and the June 1, 1987 Biological Opinion, APHIS shall ensure that no whooping cranes have wandered into a proposed treatment area. If whooping cranes are observed in the treatment area, local FWS personnel will be contacted to determine protective measures.

4.2.2.5 Determination:

Based on the proposed pesticides, the proposed rates of application, the timing of the proposed action, there will be no effect on this species from the treatment of grasshoppers in Montana.

***4.2.4* Tern, least,** *Sterna antillarum*

4.2.4.1 Status:

The interior least tern was designated Endangered on May 28, 1985.

4.2.4.2 Habitat and Distribution:

Ranges for least terns in Montana include sandbars and beaches of the Missouri and Yellowstone rivers in the following counties: Custer, Dawson, Garfield, McCone, Prairie, Richland, Roosevelt, Valley, and Wibaux.

4.2.4.3 Assessment:

In Montana the least terns begin to arrive on the breeding ground in mid-April and would be expected to be present when treatments are needed. The BA prepared by APHIS in January 1987 and the June 1, 1987; FWS Biological Opinion determined the need for protective measures to be used around nesting colonies.

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4.2.4.4 Protective measures:

No aerial ULV application will be applied 2.5 miles up and down river to prevent abandonment of nesting least turn colonies due to aircraft flyovers and a possible decrease on the fishery forage base due to accidental aquatic application. A 0.25 mile no-aerial ULV application buffer on each side of the river and around other bodies of water containing least tern colonies will also be observed. This, in addition, would include a 500 foot no treatment zone around nesting colonies.

These protective measures are in compliance with the June 1, 1987, FWS Biological Opinion for malathion and carbaryl. APHIS has adopted these measures for the use of Diflubenzuron.

4.2.4.5 Determination:

APHIS determines these measures are not likely to adversely affect the least tern and its breeding habitat as a result of the protective measures, proposed pesticides, and the proposed rates of application.

4.2.5 **Yellow-Billed Cuckoo**, *Coccyzus americanus*

4.2.5.1 Status:

The yellow-billed cuckoo was designated Threatened on November 3, 2014.

4.2.5.2 Habitat and Distribution:

The Yellow-billed cuckoo inhabits the canopies of deciduous trees such as cottonwoods and willows that line large rivers. The yellow-billed cuckoo is primarily an invertivore that mainly eats caterpillars, other insects, some fruits, sometimes small lizards and frogs and bird eggs (Terres 1980). It gleans food from branches or foliage, or sallies from a perch to catch prey on the wing (Ehrlich et al. 1992).

Montana counties in which Yellow-Billed Cuckoo are known or believed to occur in: Flathead, Lake, Missoula, and Ravalli Counties. See the Yellow-Billed Cuckoo Species Occurrence Map Montana, attachment 9.

4.2.5.3 Assessment:

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 APHIS suppression activities may affect, but are not likely to adversely affect the yellow-billed cuckoo.

4.2.5.4 Protective measures:

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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.

4.2.5.5 Determination:

APHIS has determined that the 2021 USDA APHIS PPQ Montana Grasshopper/Mormon Cricket Suppression Program may affect, but is not likely to adversely affect the yellow-billed cuckoo.

4.2.6 **Red Knot** – *Calidris canutus rufa*

4.2.6.1 Status:

The red knot was designated Threatened on January 12, 2015

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4.2.6.2 Habitat and Distribution:

The status of the red knot has not been ranked in Montana as it is rarely recorded in the State. The Montana Natural Heritage Program's database shows 34 detections for red knot between 1982 and 2013, averaging 2.9 birds per year across the past 30 years. The number of individuals recorded generally ranged from one to four birds and on only three occasions were eight or more birds recorded. Red knots were detected both during spring migration (20 records in May) and fall migration (14 records between late July and mid-September). While *Calidris canutus* records come from locations across the State, including west of the continental divide, a majority of records (roughly 64 percent) come from three areas in the northern part of the State: Freezeout Lake and Benton Lake NWR near Great Falls, Bowdoin NWR near Malta, and scattered lakes in the northeast corner of the State, including Medicine Lake NWR. Even in these areas there are many years in which red knots are not recorded—there is no evidence that these locations are used annually or frequently as stopover sites (Montana Fish, Wildlife, and Parks (MFWP) 2013). However, from a relatively small sample of Texas-wintering knots from which geolocator data have been retrieved, two stopped in northern Montana during migration (D. Newstead pers. comm. May 16, 2014).

Across all (six) subspecies, Calidris canutus is a specialized molluscivore, eating hard-shelled mollusks, sometimes supplemented with easily accessed softer invertebrate prey, such as shrimp- and crab-like organisms, marine worms, and horseshoe crab eggs (Piersma and van Gils 2011, p. 9; Harrington 2001, pp. 9–11).

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Available information suggests that red knots use inland saline lakes as stopover habitat in the Northern Great Plains (Newstead et al. 2013, p. 57; North Dakota Game and Fish Department (NDGFD) 2013; Western Hemisphere Shorebird Reserve Network (WHSRN) 2012; Skagen et al. 1999). We have little information to indicate whether or not red knots may also utilize inland freshwater habitats during migration, but data suggest that certain freshwater areas may warrant further study as potential stopover habitats (C. Dovichin pers. comm. May 6, 2014; eBird.org 2014; Russell 2014, entire). Best available data indicate that small numbers of red knots sometimes use manmade freshwater habitats (e.g., impoundments) along inland migration routes (eBird.org 2014; Russell 2014, entire; Central Flyway Council 2013; NDGFD 2013; Oklahoma Department of Wildlife Conservation (ODWC) 2013; A. Simnor pers. comm. October 15, 2012). In Montana, Red Knots are known to or may occur in the following counties: Cascade, Fallon, Garfield, Golden Valley, Lewis and Clark, Liberty, Madison, Musselshell, Phillips, Roosevelt, Rosebud, Sheridan, Teton, Valley, and Yellowstone. (See Attachment 10).

4.2.6.3 Assessment:

Grasshopper suppression activities generally occur only over open rangeland habitat common to grasshoppers. Red knot are likely only to be in Montana as they migrate. During migration, red knot tend to use riparian areas containing bodies of water. Due to the habitat in which the red knot would inhabit during migratory stop overs, it is unlikely that either aircraft disturbance or toxic effects will be a factor. APHIS grasshopper suppression activities may affect, but are not likely to adversely affect red knot.

4.2.6.4 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 Red Knot 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.

4.2.6.5 Determination:

APHIS has determined that the 2021 USDA APHIS PPQ Montana Grasshopper/Mormon Cricket Suppression activities may affect, but are not likely to adversely affect red knot.

4.3 FISH

4.3.1 **Sturgeon, Pallid,** *Scaphirhynchus albus*

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4.3.1.1 Status:

The pallid sturgeon was designated Endangered on September 6, 1990.
4.3.1.2 Habitat and Distribution:

Pallid sturgeon may be present in the Missouri River, from its mouth to Morony Dam, Montana, in the Poplar River from the confluence with the Missouri River upstream 10 river miles, in the Marias River from the confluence with the Missouri River upstream 20 river miles, in the Milk River from the confluence with the Missouri River upstream 45 river miles, in the lower Yellowstone River below the Cartersville Diversion Dam, in the Powder River from the confluence with the Yellowstone River upstream to the confluence of the Little Powder River (Broadus), and in the Tongue River from the confluence with the Yellowstone River upstream 20 river miles. These fish are well adapted to life on the bottom in swift waters of large, turbid, free-flowing rivers. Habitat loss is a reason for decline, mainly from the construction of dams. Large woody debris is an important component of pallid sturgeon habitat. (See Attachment 11)

4.3.1.3 Assessment:

The APHIS/FWS ESA formal consultations concluded that the species continued existence would not be jeopardized by the proposed program. This conclusion is adopted for Diflubenzuron.

4.3.1.4 Protective measures:

In concurrence with the April 16, 1990, FWS Biological Opinion, a 0.25 mile no-aerial, ULV buffer would be implemented from known habitats. Within the 0.25 mile, only carbaryl bran bait will be used. APHIS has adopted these measures for the use of diflubenzuron.

4.3.1.5 Determination:

These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers and would not likely adversely affect the Pallid Sturgeon as a result of the protective measures, proposed pesticides, and the proposed rates of application.

4.3.2 **Sturgeon, White**, *Acipenser transmontanus*

4.3.2.1 Status:

The white sturgeon was designated Endangered on September 6, 1994

4.3.2.2 Habitat and Distribution:

Occurrences of Kootenai River White Sturgeon (KRWS) in Western Montana are isolated to the Kootenai River, downstream of Kootenai Falls (approximately 31 river miles downstream from Libby Dam). Montana has less than 30 miles of white sturgeon habitat in the Kootenai River.

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Occurrences of adult and sub adult KRWS in the Kootenai River within Montana have been documented, however, no confirmed records of spawning have occurred in the past 20 years.

Individuals reach sexual maturity between the ages 9-16 years (4-6 ft. in length), and females do not spawn annually but rather at intervals of 3-11 years, depending on food availability. KRWS spawn during the spring runoff period when water temperatures reach 8-19 C. Outside of the spawning period, 4 large adults typically occur in the larger deeper pools of the main river channel, while juveniles and sub adults seasonally occupy sloughs off the main channel. (See Attachment 12).

4.3.2.3 Assessment:

Treatments are highly unlikely to occur near white sturgeon habitat. The APHIS/FWS ESA formal consultations concluded that the species continued existence would not be jeopardized by the proposed program. This conclusion is adopted for Diflubenzuron.

4.3.2.4 Protective measures:

Mitigative measures will be modeled after the 9/16/93 and 12/6/94 FWS Biological Opinions. Buffers around areas of occurrence of 0.50 mile for the use of Malathion and 0.25 mile for the use of aerially applied carbaryl and adopted for diflubenzuron. Within the 0.25 mile buffer, only carbaryl bran bait will be used.

4.3.2.5 Determination:

These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers. The Program may affect, but is not likely adversely affect the white sturgeon as a result of the protective measures, proposed pesticides, and the proposed rates of application.

4.3.3 **Trout, Bull**, *Salvelinus confluentus*

4.3.3.1 Status:

The bull trout was listed as Threatened 1999. Critical Habitat for the bull trout was designated in 2010, for streams lakes, and reservoirs in the Clark Fork, Flathead, and Kootenai River basins. (See Attachment 13).

4.3.3.2 Habitat and Distribution:

Bull trout occur throughout the Flathead, Kootenai, Clark Fork, Bitterroot, Blackfoot, St. Regis, and Saint Mary's River drainages, and their tributaries, in Montana. Juvenile bull trout typically move downstream as spring runoff is increasing, while migratory adults typically move upstream to spawn after runoff peaks and begins to recede. Spawning typically occurs September through November in the clear, cold gravels of headwater streams. (See Attachments 13 and 13a-m).

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4.3.3.3 Assessment:

Treatments are unlikely to occur near bull trout habitat. Mitigative measures will be consistent with those for the pallid sturgeon as addressed in the April 16, 1990, FWS Biological Opinion.

4.3.3.4 Protective measures:

A 0.25 mile no-aerial ULV buffer would be implemented from known habitats of the bull trout, and critical habitat will not be treated. Within the 0.25 mile buffer, only carbaryl bran bait will be used. These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers.

4.3.3.5 Determination:

These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers. APHIS determines that the Program would not likely adversely affect the bull trout as a result of the protective measures, proposed pesticides, and the proposed rates of application.

4.4 PLANTS

4.4.1 **Ladies'-tresses, Ute**, *Spiranthes diluvialis*

4.4.1.1 Status:

The Ute Ladies'-Tresses was designated as threatened on January 17, 1992.

4.4.1.2 Habitat and Distribution:

This perennial orchid occurs in mesic or wet meadows and riparian/wetland habitats formed by springs, seeps, lakes, and streams. It is presently known in five counties in Montana: Beaverhead, Broadwater, Gallatin, Jefferson, and Madison (see attachment 6).

4.4.1.3 Assessment:

Bumblebees are the most important pollinators of the Ute Ladies'-tresses orchid.

4.4.1.4 Protective measures:

As outlined in the 8/29/91 Biological Opinion, aerial applications of ULV pesticides will not be used within 3 miles of the occupied habitats to protect pollinators. Within the 3-mile buffer, only carbaryl bran bait will be used. No treatments will be performed in Ute Ladies-tresses habitat.

4.4.1.5 Determination:

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These measures may affect, but are not likely to affect the Ute Ladies'-Tresses.

4.4.2 **Howellia, Water**, *Howellia aquatilis*

4.4.2.1 Status:

The water howellia was designated at threatened on July 14, 1994.

4.4.2.2 Habitat and Distribution:

This aquatic annual plant occurs in wetlands habitats and is primarily self-pollinated. Montana populations occur in wetlands of Swan Lake, and Missoula counties.

4.4.2.3 Assessment:

Treatments in the vicinity of water howellia habitat are highly unlikely.

4.4.2.4 Protective measures:

As outlined in the 9/16/93 and 12/6/94 Biological Opinions, aerial applications of ULV pesticides will not be used within 3 miles of the occupied habitats to protect pollinators. No treatments will be performed on water howellia habitat.

4.4.2.5 Determination:

The Program may affect, but is not likely to affect the Water Howelia.

4.4.3 **Catchfly, Spalding's**, *Silene spaldingii*

4.4.3.1 Status:

The Spalding's Catchfly was designated as threatened on October 10, 2001.

4.4.3.2 Habitat and Distribution:

Spalding's catchfly is a long-lived perennial herb in the pink or carnation family and occurs in four Montana counties: Flathead, Lake, Lincoln, and Sanders. Habitat is restricted to remnants of the prairie grasslands of eastern Washington, Northern Oregon, Northern Idaho, and western Montana.

4.4.3.3 Assessment:

Bumblebees are importan pollinators of the Spalding's catchfly. Treatments in Spalding's catchfly areas will only be conducted with carbaryl bait or diflubenzuron.

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4.4.3.4 Protective measures:

Mitigative measures will be similar to other insect pollinated plants: aerial applications of ULV pesticides will not be used within 3 miles of the occupied habitats to protect pollinators. The exception is the 2004 local concurrence with USFWS allowing aerial or ground applications of diflubenzuron or carbaryl bait within the Spalding's catchfly habitat. Prior to any treatments in Flathead, Lake, Lincoln, and Sanders counties, the local FWS will be consulted to determine presence of Spalding's Catchfly in the proposed treatments area. Buffered areas may be reduced if concurrence is obtained with the local FWS.

4.4.3.5 Determination:

These measures may affect, but are not likely to affect the Spalding's Catchfly. Use of diflubenzuron or carbaryl bait will have no significant impact on pollinators.

4.5 Invertebrates

4.5.1 **Meltwater Lednian Stonefly**, *Lednia tumana*

4.5.1.1 Status:

On November 21, 2019, USFWS listed the Meltwater Lednian Stonefly as threatened.

4.5.1.2 Habitat and Distribution:

High elevation alpine streams in Glacier National Park, Bob Marshall and Great Bear Wilderness, and on the Flathead Indian Reservation.

4.5.1.3 Assessment:

Treatments are unlikely to occur near meltwater lednian stonefly habitat.
Mitigative measures will be consistent with those for the pallid sturgeon as address in the April 16, 1990, FWS Biological Opinion. The APHIS/FWS ESA formal consultations concluded that the species continued existence would not be jeopardized by the proposed program. This conclusion is adopted for the meltwater lednian stonefly and for diflubenzuron.

4.5.1.4 Protective measures:

A 0.25 mile no-aerial ULV buffer would be implemented from known habitats of the meltwater lednian stonefly, and proposed critical habitat will not be treated. Within the 0.25 mile buffer, only carbaryl bait will be used. These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers.

4.5.1.5 Determination:

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APHIS has determined that the 2021 USDA APHIS PPQ Montana Grasshopper/Mormon Cricket Suppression Program activities may affect, but are not likely to adversely affect the meltwater lednian stonefly.

4.5.2 **Western Glacier Stonefly**, *Zapada glacier*

4.5.2.1 Status:

On November 21, 2019 the USFWS listed the western glacier stonefly as threatened.

4.5.2.2 Habitat and Distribution:

High elevation alpine streams in Glacier National Park and the Absaroka-Beartooth Wilderness.

4.5.2.3 Assessment:

Treatments are unlikely to occur near western glacier stonefly habitat.

Mitigative measures will be consistent with those for the pallid sturgeon as addressed in the April 16, 1990, FWS Biological Opinion. The APHIS/FWS ESA formal consultations concluded that the species continued existence would not be jeopardized by the proposed program. This conclusion is adopted for the western glacier stonefly and for diflubenzuron.

4.5.2.4 Protective measures:

A 0.25 mile no-aerial ULV buffer would be implemented from known habitats of the western glacier stonefly, and proposed critical habitat will not be treated. Within the 0.25 mile buffer, only carbaryl bran bait will be used. These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers.

4.5.2.5 Determination:

APHIS has determined that the 2021 USDA APHIS PPQ Montana Grasshopper/Mormon Cricket Suppression Program activities may affect, but are not likely to adversely affect the Western Glacier Stonefly.

5.0 CRITICAL HABITAT

Section 7 of the Endangered Species Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to destroy or adversely modify critical habitat.

5.1 Canada Lynx, *Lynx Canadensis*

Critical habitat for the Canada Lynx exists in the following counties in Montana: Carbon, Flathead, Gallatin, Glacier, Lake, Lewis and Clark, Lincoln, Missoula, Park, Pondera, Powell, Stillwater, Sweet Grass, and Teton counties above 4,000 feet in elevation (See Attachment 2).

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Critical habitat primary constituent elements for the Canada lynx include boreal forests that include a mosaic of differing stages of forest succession containing: a) Snowshoe hares and their habitat including dense understories of shrubs and mature multistoried stands with conifer boughs touching the snow surface, b) Winter conditions that provide and maintain deep fluffy snow for extended periods of time, c) Sites for denning that have abundant coarse woody debris, such as downed trees and root wads, and: d) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range (FWS 2014).

APHIS will not conduct any treatments on or near Canada Lynx critical habitat, and therefore will have no effect on Canada Lynx critical habitat.

5.2 Piping Plover, *Charadrius melodus*
Critical habitat for the Northern Great Plains Breeding Population of the Piping Plover was designated September 11, 2002. Montana critical habitats include: alkali lakes in Sheridan County; the Missouri river and Fort Peck reservoir shoreline in Garfield, McCone, Phillips, Richland, Roosevelt, and Valley counties; Bowdoin National Wildlife Refuge in Phillips County. Habitat includes prairie alkaline wetlands and surrounding shoreline, including 200 feet (ft), 61 meters (m) of uplands above the high water mark; river channels and associated sandbars, and islands; reservoirs and their sparsely vegetated shorelines, peninsulas, and islands; and inland lakes and their sparsely vegetated shorelines and peninsulas.

No aerial ULV treatments will occur within 0.25 mile of piping plover critical habitat. Where carbaryl bran bait is used, a 500-foot no-treatment zone will be maintained around piping plover critical habitat.

Based on the determined protection measures, proposed pesticides and the proposed rates of application, grasshopper treatments may affect, but are unlikely to adversely affect any piping plover critical habitat.

5.3 Sturgeon, White, *Acipenser transmontanus*
Critical habitat for the Kootenai River Population of the White Sturgeon was designated on September 6, 2001. However, there is no White Sturgeon critical habitat in Montana. Therefore grasshopper suppression programs will have no effect on White Sturgeon critical habitat.

5.4 Bull Trout, *Salvelinus confluentus*
Throughout the Flathead, Kootenai, Clark Fork, Bitterroot, Blackfoot, St. Regis, and Saint Mary's River drainages, and their tributaries, there are approximately 3,225 river miles and 223,740 acres of lakes and reservoirs designated as bull trout critical habitat in Montana. Treatments are unlikely to occur near bull trout critical habitat, and therefore may affect, but are unlikely to adversely affect any critical habitat.

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In the event a treatment takes place near bull trout critical habitat, a 0.25 mile no-aerial ULV buffer would be implemented will not be treated. Within the 0.25 mile buffer, only carbaryl bran bait will be used. These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers.

6.0 SUMMARY

This BA addresses the effects of grasshopper program activities on species listed since the 1995 BO and additionally provides measures for all earlier species that may be impacted by applications of diflubenzuron. 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 grizzly bear *(Ursus arctos)*; Canada lynx, *(Lynx canadensis)*; black-footed ferret, (*Mustela nigripes)*; and whooping crane *(Grus Americana).* APHIS has determined the suppression program may affect, but is not likely to adversely affect the northern long-eared bat *(Myotis septentrionalis);* piping plover, *(Charadrius melodus)*; least tern, *(Sterna antillarum)*; red knot, (*Calidris canutus rufa*); yellow-billed cuckoo, (*Coccyzus americanus*); Spalding's catchfly, *(Silene spaldingii);* pallid sturgeon, *(Scaphirhynchus albus)*; white sturgeon, *(Acipenser transmontanus)*; and bull trout, *(Salvelinus confluentus);* Ute Ladies'-tresses, *(Spiranthes diluvialis);* water howellia, *(Howellia aquatilis);* Meltwater Lednian Stonefly, (*Lednia tumana);* and the Western Glacier Stone fly, (*Zapada glacier).*

APHIS has determined that the suppression program will have no effect on Canada lynx *(Lynx canadensis)* or white sturgeon *(Acipenser transmontanus)* critical habitat, and may affect, but is unlikely to adversely affect critical habitat for the piping plover *(Charadrius melodus)* or bull trout *(Salvelinus confluentus).*

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, as appropriate, the results gained from the seven year, 30 million dollar GHIPM project to ensure grasshopper control activities have little impact on the environment.

7.0 Experimental Treatments: (applied using air and/or ground equipment)

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

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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

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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).

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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

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

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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.

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M.00 – APHIS (I)
06E11000-2021-I-0203
06E11000-2021-CPA-0013

February 16, 2021

Gary D. Adams, State Plant Health Director, Montana
Animal and Plant Health Inspection Service, Plant Protection and Quarantine
1629 Avenue D, Suite A-5
Billings, Montana 59102

Dear Mr. Adams:

Thank you for your January 6, 2021, letter requesting U.S. Fish and Wildlife Service (Service) concurrence on your determination of effects for listed species and designated critical habitats in your 2021 Biological Assessment (BA; APHIS 2021) for the Rangeland Grasshopper and Mormon Cricket Suppression Program (Program) in Montana. This response is provided under the authority of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543), the Migratory Bird Treaty Act (MBTA)(16 U.S.C. 703-712), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.).

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 Montana in 2021. APHIS proposes chemical treatments of rangelands, which may include application of carbaryl, malathion, and/or diflubenzuron. Carbaryl would be applied by aerial spraying or distributing bran bait; malathion, and diflubenzuron would be applied by aerial spraying. Treatment rates are detailed in the BA (page 5) and would generally be less than standard application rates. Most treatments would be applied using reduced area agent treatment (RAATs) techniques, which generally reduce, by up to 50 percent, the amount of active ingredient applied relative to standard application rates.

In addition, APHIS proposes experimental treatments (ranging from less than 1 square-foot up to 640 acres). Locations for these treatments are to be determined and may or may not be within Montana. These experimental treatments would test the efficacy of new chemical and biological control compounds and/or new methods of application of the same chemicals listed in the preceding paragraph (see BA, pages 23-26 for details). New chemical and biological control compounds may include: LinOilEx (a proprietary formulation of natural oils and household products), *Metarhizium robertsii* (a native fungal pathogen), and/or *Beauveria bassiana* (a native fungal pathogen). The locations of experimental treatments will be coordinated with the Service and other agencies to ensure that these treatments are not applied in habitats, including designated critical habitats, for listed or other sensitive species.

APHIS has consulted with the Service on the Program (both National and State-specific consultations have been or are being conducted) since 1987. Information on the history of consultations on the Program is available in our prior letters, including Service (1995) and Service (2019), and in your BA (APHIS 2021). This letter addresses the Program only within Montana for the current calendar year.

Listed Species

APHIS has determined that the proposed action will have *no effect* to the grizzly bear *(Ursus arctos)*, Canada lynx *(Lynx canadensis)*, black-footed ferret (*Mustela nigripes)*, and whooping crane *(Grus americana*) and to designated critical habitats for white sturgeon *(Acipenser transmontanus)* and Canada lynx. APHIS has also determined that the Program *may affect, but is not likely to adversely affect* the northern long-eared bat (*Myotis septentrionalis*), piping plover *(Charadrius melodus)*, interior least tern *(Sterna antillarum)*, red knot (*Calidris canutus rufa*), yellow-billed cuckoo (*Coccyzus americanus*), pallid sturgeon *(Scaphirhynchus albus)*, white sturgeon, bull trout *(Salvelinus confluentus),* meltwater lednian stonefly (*Lednia tumana*), western glacier stonefly (*Zapada glacier*), Ute Ladies'-tresses *(Spiranthes diluvialis)*, water howellia *(Howellia aquatilis)*, and Spalding's catchfly *(Silene spaldingii)* and designated critical habitats for piping plover and bull trout.

The Service acknowledges your *no effect* determinations for grizzly bear, Canada lynx, blackfooted ferret, whooping crane, and designated critical habitats for white sturgeon and Canada lynx.

The interior least tern has been removed from the list of threatened and endangered species, effective February 12, 2021 (86 FR 2564). Consultation on this species pursuant to the ESA is no longer necessary. We appreciate your efforts (discussed in the Migratory Birds section, below) to conserve this and other migratory bird species.

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Upon review of the 2021 BA, the Service concurs with your *may affect, but is not likely to adversely affect* determinations for northern long-eared bat, piping plover*,* red knot, yellowbilled cuckoo, pallid sturgeon, white sturgeon, bull trout, meltwater lednian stonefly, western glacier stonefly, Ute Ladies'-tresses, water howellia, Spalding's catchfly, and designated critical habitats for piping plover and bull trout. The Service bases its concurrence on the information and analysis in the BA, including protective measures as stated in the BA, and information in our files. This concurrence is contingent upon the implementation of those committed protective measures. In most cases, there is little overlap between the rangelands that would be treated and habitat for these species. In addition, the BA proposes a suite of species-specific buffers and site-specific pre-treatment analyses (as detailed below) that further reduce the potential for listed species to be affected. No treatment would occur within critical habitat and a 0.25-mile buffer would be maintained for any aerial spraying near critical habitat for both piping plover and bull trout.

For the 3 listed plants, no aerial spray treatments would be implemented within 3 miles of occupied habitat to protect the plants and their pollinators. Carbaryl bran bait may be used within the buffers. The 3-mile buffer may be reduced for Spalding's catchfly, but only if sitespecific follow-up consultation with the Service indicates that the species is not likely to be adversely affected.

No aerial spray treatments would be implemented within 0.25 mile of piping plover nesting habitat. No Carbaryl bran bait treatments would be implemented within 500 feet of piping plover nesting habitat.

The red knot is uncommon in Montana and only present during migration. This shorebird is most likely to be present near water bodies and riparian areas. The yellow-billed cuckoo has been observed in Montana west of the continental divide (only the western distinct population segment of this species is listed), but little information is available on its distribution and its breeding status is unknown (66 FR 38615). The yellow-billed cuckoo requires riparian habitats within its summer/breeding range and migrates to South America to overwinter. No treatments would occur in riparian areas or within 500 feet of water bodies.

The two listed stoneflies require cold, high elevation, headwater streams and are known almost entirely from National Park and National Forest lands. Treatments are generally unlikely to be implemented near suitable habitat for either species. In addition, no aerial spraying would be allowed within 0.25 mile of habitat for either species.

Regarding the 3 listed fishes, no treatments would be implemented within 500 feet of water bodies and no aerial spraying would be implemented within 0.25 mile of occupied habitats. In addition, treatments are generally unlikely to be implemented near suitable habitat for bull trout or white sturgeon.

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Northern long-eared bats use a variety of forested habitats for roosting and feeding in summer and hibernate in caves and mines (hibernacula) in winter. Thus, there is little overlap between habitat for this species and the open rangelands proposed for treatment. In addition, APHIS would consult local land managers and the Montana Natural Heritage Program (MNHP) for information on specific treatment sites and would avoid treatments within 0.25 mile of northern long-eared bat habitat as modeled by MNHP and of known hibernacula for the species.

Regarding the proposed experimental treatments, because specific treatments and locations thereof are undetermined at this time, we do not have sufficient information to do a speciesspecific analysis. However, we expect that APHIS' proposed coordination with us and other agencies and their proposed avoidance of habitats (including designated critical habitats) for listed species, will be sufficient to avoid adverse effects to all of the species and critical habitats discussed above. In the unlikely event that adverse effects cannot be avoided, consultation should be re-initiated as discussed in the following paragraph.

This concludes informal consultation pursuant to the regulations implementing section 7(a)(2) of the Endangered Species Act, 50 C.F.R. 402.13. This project should be re-analyzed if new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed species or designated critical habitat that was not considered in this consultation; and/or, if a new species is proposed or listed or critical habitat is proposed or designated that may be affected by this project.

Greater Sage-Grouse

The greater sage-grouse, no longer considered a candidate for listing under the ESA, occurs in eastern and southwest Montana in sagebrush, sagebrush-grasslands, and associated agricultural lands. This species is managed by Montana Fish, Wildlife and Parks (FWP) and sagebrush habitats are managed by FWP, Department of Natural Resources and Conservation (DNRC) as well as by the Bureau of Land Management (BLM) on BLM-administered lands.

Grasshopper suppression program activities may be subject to Montana Executive Order 122015. We recommend that you consult the Montana Sage-Grouse Habitat Conservation Program website (https://sagegrouse.mt.gov/) and interactive map to assist in determining where designated greater sage-grouse habitat occurs relative to proposed suppression activities. We further recommend that proposed suppression activities be coordinated with the Montana DNRC, Conservation and Resource Development Division, regarding any applicable required compliance with Montana Executive Order 12-2015 and the Montana sage-grouse conservation strategy.

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Migratory Birds

In accordance with Executive Order 13186, MBTA, 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. Impacts will be 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 any potential impacts to migratory bird populations. We recommend that the
Service's Nationwide Standard Conservation Measures for migratory birds (https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservationmeasures/nationwide-standard-conservation-measures.php) be considered as applicable and practicable in order to minimize potential localized migratory bird impacts. The Service also encourages APHIS pursuant to Executive Order 13186 (January 17, 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, to enter into a Memorandum of Understanding with the Service that outlines a collaborative approach to promote the conservation of migratory bird populations.

Bald and Golden Eagles

We provide the following for your information should eagle nests occur in the vicinity of proposed treatment areas.
The bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are protected from a variety of harmful actions via take prohibitions in both the Migratory Bird Treaty Act[2] (MBTA; 16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. 668–668d). The BGEPA, enacted in 1940 and amended several times, prohibits take of bald eagles and golden eagles, including their parts, nests, young or eggs, except where otherwise permitted pursuant to Federal regulations. Incidental take of eagles from actions such as electrocutions from power lines or wind turbine strikes are prohibited unless specifically authorized via an eagle incidental take permit from US Fish

[2] On December 22, 2017, the Department of the Interior's (DOI) Office of the Solicitor Memorandum M-37050 titled The Migratory Bird Treaty Act Does Not Prohibit Incidental Take https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf) concludes that the MBTA's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs. The MBTA list of protected species includes bald and golden eagles, and the law has been an effective tool to pursue incidental take cases involving eagles. However, the primary law protecting eagles is the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S. Code § 668), since the bald eagle was delisted under the Endangered Species Act in 2007. Memorandum-37050 does not affect the ability of the Service to refer entities for prosecution that have violated the take prohibitions for eagles established by the BGEPA.

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and Wildlife Service (Service). BGEPA provides 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." BGEPA defines take to include the following actions: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Service expanded this definition by regulation to include the term "destroy" to ensure that "take" also encompasses destruction of eagle nests. Also the Service defined the term disturb which 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.

The Service has developed guidance for the public regarding means to avoid take of bald and golden eagles:

- The 2007 *National Bald Eagle Management Guidelines* serve to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of BGEPA may apply. They provide conservation recommendations to help people avoid and/or minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the BGEPA. https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGu idelines.pdf

The Service also has promulgated new permit regulations under BGEPA:

- New eagle permit regulations, as allowed under BGEPA, were promulgated by the Service in 2009 (74 FR 46836; Sept. 11, 2009) and revised in 2016 (81 FR 91494; Dec. 16, 2016). The regulations authorize the limited take of bald and golden eagles where the take to be authorized is associated with otherwise lawful activities. These regulations also establish permit provisions for intentional take of eagle nests where necessary to ensure public health and safety, in addition to other limited circumstances. The revisions in 2016 included changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees in order to clarify, improve implementation and increase compliance while still protecting eagles. https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/2016-29908.pdf

The Service's Office of Law Enforcement carries out its mission to protect eagles through investigations and enforcement, as well as by fostering relationships with individuals, companies, industries and agencies that have taken effective steps to avoid take, including incidental take of these species, and encouraging others to implement measures to avoid take. The Office of Law Enforcement focuses its resources on investigating individuals and entities that take eagles without identifying and implementing all reasonable, prudent, and effective measures to avoid that take. Those individuals and entities are encouraged to work closely with Service biologists to identify available protective measures, and to implement those measures during all activities or situations where their action or inaction may result in the take of eagles.

The Service appreciates your efforts to ensure the conservation of threatened and endangered species as part of our joint responsibilities under the ESA. Should you have any questions, please contact Jacob Martin within our office at (406) 449-5225, extension 215.

Sincerely,

Jacob M Martin

for Jodi L. Bush
Office
Supervisor

References

Animal and Plant Health Inspection Service. 2021. 2021 Biological assessment for Montana, rangeland grasshopper and Mormon cricket suppression program, 01/06/2021, 28 pp. plus maps.

U.S. Fish and Wildlife Service. 1995. Letter from Deputy Director, Mountain Prairie Region to Deputy Director, Animal and Plant Health Inspection Service regarding nine biological opinions on the rangeland grasshopper and Mormon cricket suppression program. 36 pp.

U.S. Fish and Wildlife Service. 2019. Letter from Jodi Bush, Field Supervisor, Montana Ecological Services Field Office, to Gary D. Adams, State Plant Health Director, Montana, Animal and Plant Health Inspection Service regarding the 2019 rangeland grasshopper and Mormon cricket suppression program. 6 pp.

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Appendix D: Letter of Request and Landowner Questionnaire

2021: USDA, APHIS, PPQ, Montana Grasshopper Suppression Program Site Specific Information Questionnaire and Request for Assistance.

DWP #: ___________________________(USDA use only)

REQUEST FOR ASSITANCE

I/We __________________________________ request USDA, APHIS, PPQ to assist with grasshopper suppression in 2021.

_______________________________________ _______________

Agency / Ranch / Group / Individual Signature *Date*

PROJECT-QUESTIONNAIRE:
Please complete the following questions in their entirety. The information requested is imperative to successfully conducting any grasshopper suppression treatments.

Agency/Ranch/Group/Individual Name:

____

Authorized Representative Name:

____

(Designate an Authorized Representative to Communicate with if applicable)

1. Is there any key sage-grouse habitat in the proposed treatment area that should be excluded?
   ☐ Yes ☐ No
   If yes, please delineate clearly on the program map.

2. Are there any schools in the proposed treatment area?
   ☐ Yes ☐ No
   If yes, please indicate clearly on the program map.

3. A. Are there any residences in the proposed treatment area?
   ☐ Yes ☐ No
   If yes, please indicate clearly on the program map.

   B. Have all residents been notified of the treatment?
   ☐ Yes ☐ No
   If no, how will they be notified prior to treatment?

   ____

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4. Are there any commercial or hobby honeybees in the proposed treatment area?
   ☐ Yes ☐ No
   If yes, what is the contact information for the beekeepers?

   ____

   Will the bees be moved prior to treatment?
   ☐ Yes ☐ No
   If no, identify actions:
   ____Treatments will not occur within ¼ mile of where bees remain. Identify all bee yards clearly on proposed treatment map.

5. Are there any Organic producers in the area or adjacent to requested treatment area?
   ☐ Yes ☐ No
   If yes, what is the contact information for the Organic producers?

   ____

   ____

6. Is there surface water (stock ponds, wetlands, streams) within the boundaries of the proposed treatment area that require the 500 ft. buffer?
   ☐ Yes ☐ No
   If yes, please delineate clearly all surface water on the proposed treatment map.

7. A. Are there any airstrips in or near the proposed treatment area?
   ☐ Yes ☐ No
   If yes, please indicate distance to the block or location on map <u>and</u> list contact information for strip owner/manager(s).

   ____

   ____

   B. Is there a source of clean water for mixing with pesticide formulations?
   ☐ Yes ☐ No

8. Please list any crops (defined as "planted with intent to harvest" and CRP (considered crop) within the borders of the proposed treatment and identify on the map.

   ____

   ____

   ____

9. Are there any rangeland weed biological control sites that should be avoided?
   ☐ Yes ☐ No

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If yes, please indicate clearly on the proposed program map.

10. List all other hazards or sensitive sites in the proposed treatment area that should be avoided.

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____

____

11. What percentage of ground would not be treated, due to tree-cover, etc.?

    Describe:____

12. List land ownership acres and estimate costs to cooperator.

    a. Federal/Trust Acres ________________x $0 = __________________________

    b. State Acres ____________________x $ 2.00= __________________________

    c. Private Acres ___________________x $3.00 = __________________________

    d. Private Crop Acres_______________x $4.50 = ___________________________

    e. Total private cost share secured for payment at completion of program
       $_________________

    The estimates above are generally on the high-end of recent programs. Factors are driven primarily on commercial applicator bids. Those bids change based on: total acres to be treated, percentage of exclusions in block, terrain, ferry distance, distance from their home operations, competitive bids, and other factors.

13. If Contracting Bids are higher than expected, what is your maximum cost/acre acceptable?
    $________/acre

14. Cooperative Agreement Signed? ☐ Yes ☐ No Date:__________

Are there any other factors important for consideration of this Cooperative Project?

____________________	____________________	______
Printed Name	Signature of Representative	Date