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Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

BIG HORN, CARBON, CARTER, CUSTER, DANIELS, DAWSON, FALLON, GARFIELD, GOLDEN VALLEY, McCONE, MUSSELSHELL, POWDER RIVER, PRAIRIE, RICHLAND, ROOSEVELT, ROSEBUD, SHERIDAN, STILLWATER, SWEET GRASS, TREASURE, WHEATLAND, WIBAUX, YELLOWSTONE counties, and that portion of VALLEY County falling within the Fort Peck Indian Reservation, Crow Reservation, and Northern Cheyenne 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
BIG HORN, CARBON, CARTER, CUSTER, DANIELS, DAWSON, FALLON, GARFIELD, GOLDEN VALLEY, McCONE, MUSSELSHELL, POWDER RIVER, PRAIRIE, RICHLAND, ROOSEVELT, ROSEBUD, SHERIDAN, STILLWATER, SWEET GRASS, TREASURE, WHEATLAND, WIBAUX, YELLOWSTONE counties, and that portion of VALLEY County falling within the Fort Peck Indian Reservation, MONTANA

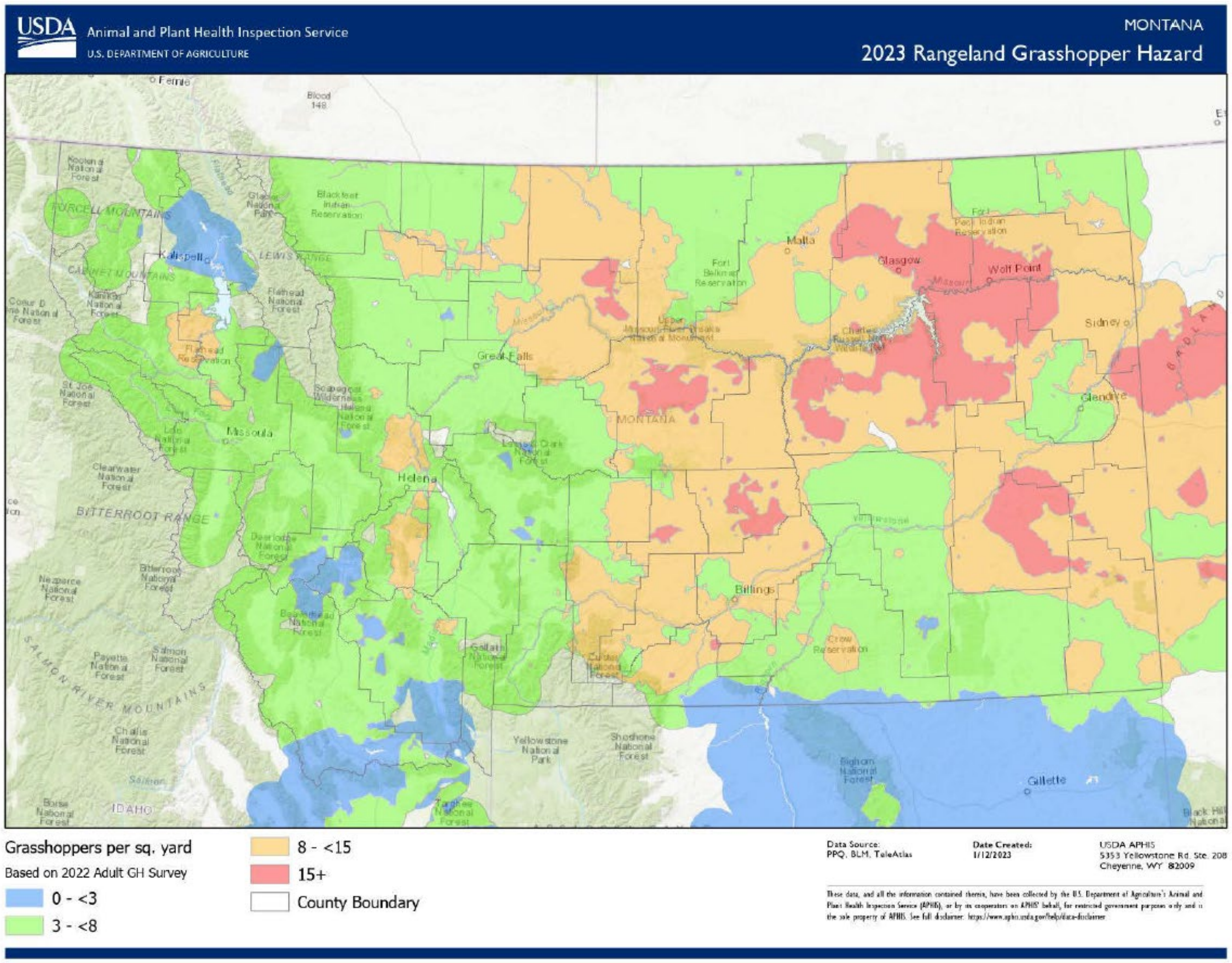
I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers or Mormon crickets may occur in Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, Golden Valley, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Treasure, Wheatland, Wibaux, Yellowstone counties, and that portion of Valley County falling within the Fort Peck Indian Reservation, 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. Land managers and property owners request APHIS assistance to control grasshopper outbreaks because of the potential damage to rangeland resources. 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 the natural resources of rangeland ecosystems, the value of livestock and wildlife forage, or cropland adjacent to rangeland.



This EA analyzes potential effects of the proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from May 15th, 2023 to May 14th, 2028 in Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, Golden Valley, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Treasure, Wheatland, Wibaux, Yellowstone counties, and that portion of Valley county falling within the Fort Peck Indian Reservation, 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 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 2023-28 Control Program for Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, Golden Valley, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass,

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Treasure, Wheatland, Wibaux, Yellowstone counties, and that portion of Valley County falling within the Fort Peck Indian Reservation, 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 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 landowners and managers, and may cooperatively suppress grasshoppers when direct intervention is requested by a Federal

[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.

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) 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 (USDA APHIS, 2019).

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 USDA 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 January 2022, 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 #22-8100-0870-MU, January 11, 2022). 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.

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. Reduced agent area treatments (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.

Scoping as defined by NEPA is an early and open process for determining the scope of issues to be addressed by the environmental risk analysis and for identifying the significant issues related to a proposed action (40 CFR 1501.7). APHIS uses the scoping process to enlist land managers and the public to identify alternatives and issues to be considered during the development of a grasshopper or Mormon cricket suppression program. Scoping was helpful in the preparation of the draft EAs. The process can occur formally and informally through meetings, conversations, or written comments from individuals and groups.

The current EIS provides a solid analytical foundation; however, it may not be enough to satisfy NEPA completely for actual treatment proposals. The program typically prepares a Draft EA tiered to the current EIS for each of the 17 Western States, or portion of a state, that may receive a request for treatment. The Draft EA analyzes aspects of environmental quality that could be affected by treatments in the area where grasshopper outbreaks are anticipated. The Draft EA will be made available to the public for a 30-day comment period. The program will prepare a Final EA and FONSI when the program determines that grasshopper suppression treatments are possible within a portion of the state, and that all environmental issues were accounted for in the Draft EA. 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 requests for treatments 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.

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II. Alternatives

To engage in comprehensive NEPA risk analysis APHIS must frame potential agency decisions into distinct action alternatives. 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 South 24th St West, 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.

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 Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, Golden Valley, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Treasure, Wheatland, Wibaux, Yellowstone counties, and that portion of Valley county falling within the Fort Peck Indian Reservation, 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 Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, Golden Valley, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Treasure, Wheatland, Wibaux, Yellowstone counties, and that portion of Valley County falling within the Fort Peck Indian Reservation, 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, chlorantraniliprole, diflubenzuron, and malathion. These chemicals have varied modes of action. Carbaryl and malathion work by inhibiting acetylcholinesterase (enzymes involved in nerve impulses). Chlorantraniliprole activates insect ryanodine receptors which causes an uncontrolled release of calcium, impairing insect muscle regulation and leading to paralysis. Diflubenzuron inhibits the formation of chitin by insects which causes weak exoskeletons. 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, chlorantraniliprole 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 treated and untreated swaths. Both options are most often incorporated simultaneously into RAATs. Either carbaryl, chlorantraniliprole, diflubenzuron, or malathion would be considered under this alternative, typically at the following per acre application rates (i.e. sprayed or spread directly from the aircraft or vehicle):

- 8.0 fluid ounces (0.25 lbs a.i./ac sprayed) of carbaryl spray;
- 10.0 pounds (0.20 lbs a.i./ac treated) of 2 percent carbaryl bait;
- 4.0 fluid ounces (0.013 lbs a.i./ac sprayed) of chlorantraniliprole;
- 0.75 or 1.0 fluid ounce (0.012 lbs a.i./ac sprayed) of diflubenzuron; or
- 4.0 fluid ounces (0.31 lbs a.i./ac sprayed) of malathion.

The width of the area not directly treated (the untreated swath) under the RAATs method is not standardized. The proportion of land treated during RAATs 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 recommended skipped swath width is typically no more than 100 feet for carbaryl (liquid), chlorantraniliprole, and diflubenzuron, and 25 feet for malathion. However, many federal government-organized treatments of rangelands tend to prefer to use a 50% skipped swath width, meaning if a fixed-wing aircraft's swath width is, for example, 150 ft., then the skipped habitat area will also be 150 ft. 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.

Contracts require that aircraft be able to accept shapefiles which identify boundaries and exclusions. Contractors must utilize the Global Positioning System (GPS) and the shapefiles to conduct applications and record flight patterns and pesticide is and isn't applied. Post-treatment flight logs and shapefiles are to be provided to APHIS following application.

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

- 16.0 fluid ounces (0.50 lbs a.i./ac sprayed) of carbaryl spray;
- 4.0 pounds (0.20 lbs a.i./ac treated) of 5 percent carbaryl bait;
- 4.0 pounds (0.09 lbs a.i./ac treated) of 2 percent carbaryl bait;
- 8.0 fluid ounces (0.027 lbs a.i./ac sprayed) of chlorantraniliprole;
- 1.0 fluid ounce (0.016 lbs a.i./ac sprayed) of diflubenzuron; or
- 8.0 fluid ounces (0.62 lbs a.i./ac sprayed) of malathion.

The potential generalized environmental effects of the application of carbaryl, chlorantraniliprole, 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 EA.

III. Affected Environment

A. Description of Affected Environment

The proposed suppression program area included in the EA encompasses 35,854,005 acres within 24 counties in Southern, Central and Eastern Montana of which 16,938,597 acres are considered rangeland. The counties are: Big Horn (population -13,124), Carbon (10,473), Carter (1,415), Custer (11,867), Daniels (1,661), Dawson (8,940), Fallon (3,049), Garfield (1,173), Golden Valley (823), McCone (1,729), Musselshell (4,730), Powder River (1,694), Prairie (1,088), Richland (11,491), Roosevelt (10,794), Rosebud (8,329), Sheridan (3,539), Stillwater (8,963), Sweet Grass (3,678), Treasure (762), Valley (7,578), Wheatland (2,069), Wibaux (937), and Yellowstone (164,731). Population estimates are from the 2020 Census. Ownership or stewardship of the land in this area is as follows: Private – 25,827,992 acres, BLM – 3,252,611 acres, Indian Trust – 2,847,400 acres, State –

2,041,700 acres, USFS – 1,409,183 acres, and Other Federal – 319,442 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.

Most of this area is in the short-grass prairie region but also includes smaller areas in the mountain region. The elevation ranges from 2,000 feet along the lower river valleys to over 12,000 feet in the Beartooth Mountains. The area is composed of glaciated and sedimentary plains with rolling hills, foothills with moderate to steep slopes, and complex mountains that can be very rugged with deep canyons and sparse vegetation or timber covered with open meadows. Annual precipitation varies from less than 10 inches a year in some semi-arid plains regions along the Missouri River and the Montana-Wyoming border to over 40 inches in the mountain areas in the south. The largest portion of the region falls within the 10-18 inches of precipitation per year range.

Major water resources include, but are not limited to: Missouri River, Yellowstone River, Bighorn River, Musselshell River, Stillwater River, Boulder River, Powder River, Tongue River, Little Bighorn River, Clarks Fork of the Yellowstone River, Little Missouri River, Little Powder River, Poplar River, Redwater River, Rosebud Creek, Cabin Creek, O'Fallon Creek, Beaver Creek, Pumpkin Creek, Mizpah Creek, Big Muddy Creek, Dry Creek, Little Dry Creek, Sunday Creek, Cottonwood Creek, Wolf Creek, Porcupine Creek, Little Porcupine Creek, Rock Creek, Sweet Grass Creek, Lodge Grass Creek, Fort Peck Lake, Bighorn Lake, Medicine Lake, Mystic Lake, Tongue River Reservoir, Lodge Grass Storage Reservoir, Cooney Reservoir, and Deadman's Basin Reservoir. Numerous small streams, ponds, reservoirs, lakes, seasonal streams, and stock ponds are located throughout the area.

Agriculture being the number one industry in the Montana economy, livestock grazing (primarily cattle, sheep, and horses) occurs in every county in the state. Generally, the crops grown in the area covered by this EA are small grains such as wheat, barley, oats, irrigated and non-irrigated hay (alfalfa and grass), and irrigated row crops such as sugar beets, corn (silage and grain), and beans.

There are three Indian Reservations within the boundaries of this EA. They are the Crow Indian Reservation within parts of Big Horn and Yellowstone Counties, the Fort Peck Indian Reservation within parts of Roosevelt, Daniels, Sheridan, and Valley Counties, and the Northern Cheyenne Indian Reservation in parts of Big Horn and Rosebud Counties.

Custer National Forest covers portions of southern Rosebud and eastern Powder River Counties, north central and eastern Carter County, southeastern and southwestern areas in Carbon County, and southern Stillwater and Sweet Grass Counties. A small portion of Lewis and Clark National Forest is in the northwest areas of Golden Valley and Wheatland Counties.

In addition to the National Forests, other major recreational areas include Fort Peck Lake, Bighorn Lake, Missouri River, Yellowstone River, Bighorn River, Tongue River Reservoir, Deadman's Basin Reservoir, Cooney Reservoir, Charles M. Russell National Wildlife Refuge, Medicine Lake National Wildlife Refuge, Makoshika State Park, Medicine Rocks State Park, Little Bighorn Battlefield, BLM lands including Pompey's Pillar National Monument, and many smaller wildlife refuges, historic sites and numerous streams, rivers, lakes, and other bodies of water used for recreational activities.

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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 Baker (population – 1,802), Billings (117,116), Circle (591), Columbus (1,857), Culbertson (753), Ekalaka (399), Forsyth (1,647), Glendive (4,873), Hardin (3,818), Harlowton (955), Jordan (356), Miles City (8,354), Plentywood (1,669), Poplar (758), Red Lodge (2,257), Roundup (1,742), Scobey (999), Sidney (6,346), Terry (562), and Wolf Point (2,517). In addition, licensed ambulance service is available in Absarokee (1,000), Big Timber (1,650), Bridger (662), Broadus (456), Colstrip (2,096), Fairview (896), Hysham (276), Joliet (577), Judith Gap (110), Lame Deer (1,896), Laurel (7,222), Lodge Grass (441), Lustre (200), Nye (38), Park City (1,023), Richey (164), Savage (303), Wibaux (462), and Worden (582). Population estimates are according to the 2020 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 schoolhouse or inhabited dwelling is encountered, Program mitigation measures will be implemented to ensure no treatments occur within the required buffer zones and impacted residents are notified prior to treatment. Additionally, all pesticide label precautions, and re-entry periods are followed.

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. An extensive list can be searched through The Montana Natural Heritage Program: www.mtnhp.org

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 widespread and numerous, lowered survival and lowered reproductive success in a small portion of their habitat would not constitute a significant threat to the population.

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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 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.

The APHIS FEIS 2019 summarized potential impacts from applications of Chlorantranilliprole and found that the insecticide application would pose minimal risk to vegetation, livestock, mammals, birds, fish and aquatic invertebrates, non-target terrestrial invertebrates/pollinators, and human health. There was a lack of amphibian and reptile data, however minimal risk to that group was also anticipated.

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 also 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 result in population outbreaks, 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 grasshopper and Mormon cricket outbreaks, 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,

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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.

Three Indian Reservations exist within the boundaries of this EA. They are the Crow Indian Reservation approximately 12,000 members), the Fort Peck Indian Reservation (approximately 10,000 members), and the Northern Cheyenne Indian Reservation (12,266 members). Member numbers are approximations and may or may not include tribal members living off and/or near each of the reservations

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).

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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. 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 the grasshopper 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, non-target wildlife, and its environmental fate in soil, air, and water. The assessments rely on data required by USEPA for pesticide product registrations, as well as peer-reviewed and other published literature. The HHERAs are heavily referenced in the EIS and this Draft EA is likewise tiered to that analysis. 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 types and amounts 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 on western 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 grasshopper outbreaks in rangeland.

Vegetation damage during serious grasshopper outbreaks may be so severe that all grasses and forbs are destroyed causing impaired plant growth for several years. Rare plants may be consumed during critical times of their 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 other agricultural products.

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, chlorantraniliprole, 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.

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's degradation in aerobic soil varies from rapid to slow with half-lives ranging from 4 to 253 days (USEPA, 2017a). Half-lives decrease with increasing pH from acidic to alkaline conditions. Under anaerobic soil conditions, carbaryl has a half-life of 72 days. 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); 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.

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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, 2012a). 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 pollinators to carbaryl treatments for grasshopper suppression. In areas of direct application where impacts may occur, alternating swaths and reduced rates (i.e., RAATs) would reduce risk. Potential negative effects of grasshopper program insecticides on bee populations may also be mitigated by the more common use of carbaryl baits than the ULV spray formulation. Studies with carbaryl bran bait have found no sublethal effects on adults or larvae bees (Peach et al., 1994, 1995).

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

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

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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 liquid 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, 2012a) 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) Chlorantraniliprole

Chlorantraniliprole (Rynaxypyr™) is a recently introduced insecticide that belongs to the anthranilic diamide insecticide class. The mode of action is the activation of insect ryanodine receptors which causes an uncontrolled release of calcium from smooth and striated muscles that impairs muscle regulation and causes paralysis in insects (USEPA, 2008). Although these receptors occur in mammals, the insecticide is very selective to insect ryanodine receptors with more than 350-fold differential selectivity compared to mammalian receptors (Cordova et.al. 2006, USEPA, 2008). Primary activity of chlorantraniliprole is through ingestion with some contact toxicity against lepidopteran pests but also against Orthoptera, Coleoptera, Diptera, and Hemiptera pests (Hannig et al., 2009).

Chlorantraniliprole is considered practically nontoxic via oral, dermal, and inhalation exposures (DuPont, 2011; USEPA, 2008). Median lethality values (LD50) from oral and dermal exposure to the active ingredient, chlorantraniliprole, and the proposed formulation exceeded the highest concentration tested (5,000 milligrams/kilogram (mg/kg)). Inhalation toxicity is also very low for the technical material and the formulation with median lethality values exceeding the highest test concentration (2.1 mg/L). Available acute toxicity data suggests that the acute toxicity between the active ingredient and the formulation are comparable. Prevathon® is not considered an irritant to the eyes or skin and is not a skin sensitizer. In addition, chlorantraniliprole is not considered to be carcinogenic or mutagenic, and is not known to cause reproductive or developmental toxicity. The no observable effect level (NOEL) in reproductive and developmental toxicity studies was 1,000 mg/kg/day, or the highest concentration tested (USEPA, 2008). Studies designed to assess neurotoxicity and effects on the immune system show no effects at a range of doses from the low mg/kg range to greater than 1,000 mg/kg.

Exposure and risk to all population groups is expected to be negligible. The potential for exposure is greatest for workers from handling and applying Prevathon®, however the very low toxicity and label required personal protective equipment result in minimal exposure and risk to this subgroup of the population. Exposure and risk to the general public will also be negligible based on Program use of Prevathon®. Conservative estimates of potential groundwater contamination using standard USEPA models suggest residues would be orders of magnitude below any levels of concern for the general public, including children. Drift may occur during applications however Program restrictions regarding treatment proximity to schools, and other measures to reduce drift, will minimize the potential for exposure and risk to the general public (USDA APHIS, 2013).

Toxicity to most non-target organisms is low based on available toxicity data. Acute fish toxicity is low with median lethality values (LC50) for freshwater and marine test species above the highest test concentration. Amphibian toxicity data does not appear to be available however based on the reported toxicity values for fish, the toxicity to amphibians is expected to be low. Aquatic invertebrates are more sensitive to the effects of chlorantraniliprole with median lethality and effect concentrations ranging from 0.0098 milligrams per liter (mg/L) for the freshwater cladoceran, *Daphnia magna*, to 1.15 mg/L for marine mysid shrimp (Barbee et al., 2010; EPA, 2012b). Chronic no observable effect concentrations (NOEC) range from 0.0045 mg/L for *D. magna* to 0.695 mg/L for a marine mysid (USEPA, 2012b). Available aquatic plant toxicity data suggests low toxicity of chlorantraniliprole to diatoms, algae, and aquatic macrophytes with median effect concentrations exceeding the highest test concentration (USEPA, 2008). Primary and secondary metabolites that could occur in aquatic environments are less toxic than the parent material when comparing toxicity values for the freshwater cladoceran, *D. magna* (USEPA, 2012b).

The exposure and risk to aquatic organisms from the proposed applications of Prevathon® will be negligible based on the low toxicity of chlorantraniliprole, and program restrictions regarding applications near surface water. The Program currently uses a 200-foot ground and 500-foot aerial application buffer from surface water. Using standardized drift modeling at the highest application rate proposed in this study results in shallow water residues of chlorantraniliprole that are approximately ten-fold below the most sensitive sublethal endpoint for aquatic invertebrates (USDA APHIS, 2018b). Residue values were also approximately ten-fold below the most sensitive acute toxicity value for aquatic vertebrates and four orders of magnitude below the acute toxicity values for fish. No indirect effects would be expected for aquatic vertebrates that depend on aquatic plants and invertebrates for habitat and prey from the proposed use of Prevathon®.

Acute toxicity for terrestrial wildlife such as mammals and birds is very low with median lethality values exceeding the highest concentration tested for mammals and birds, such as bobwhite quail and the mallard (USEPA, 2012b). Laboratory toxicity data for technical and formulated chlorantraniliprole shows that the product is practically non-toxic to honeybees in oral or contact exposures. In semi-field studies using two formulations reported NOECs ranging from 52.5 to 156.16 g a.i. chlorantraniliprole/ha (Dinter et al., 2009; USEPA, 2008). Three semi-field honeybee tunnel tests demonstrated no behavioral or flight intensity effects nor were any hive related impacts noted at a dose of 52.5 g/ha (Dinter et al., 2009). The lowest reported NOEC is approximately four times the proposed RAATs application rate for chlorantraniliprole and two times the proposed full rate. Similar NOECs have been observed for other invertebrates such as the hover fly, *Episyrphus balteatus*, ladybird beetle larvae, *Coccinella septempunctata*, green lacewing, *Chrysoperla carnea*, the plant bug, *Typhlodromus pyri*, and predatory mite, *Orius laevigatus* (USEPA, 2008; USEPA, 2012b). The low toxicity to non-target terrestrial invertebrates has also been observed in greenhouse and field applications. Gradish et al. (2011) reported low acute toxicity of formulated chlorantraniliprole to the parasitoid, *Eretmocerus eremicus*, the pirate bug, *Orius insidiosus* and the predatory mite, *Amblyseius swirskii*, in 48-hour exposures. Brugger et al. (2010) evaluated lethal and sublethal impacts of formulated chlorantraniliprole to seven parasitic hymenopterans and found no negative impacts on adult survival, percentage parasitism, or emergence when compared to controls at rates well above the full and RAATs program rates. The lack of toxicity in other insect groups at rates that are toxic to grasshoppers is related to the activity of chlorantraniliprole which is primarily through ingestion. Insects such as grasshoppers and larval Coleoptera and Lepidoptera would receive a larger dose consuming treated plant material compared to many of the non-target pests that have been evaluated in the literature.

Exposure and risk to terrestrial vertebrates that may consume treated plant material or insects in the proposed spray blocks will be negligible. USEPA exposure models to this group of non-target organisms from treated plant material and insects at maximum Prevathon® rates show that residues are at least two orders of magnitude below the most sensitive toxicity endpoint for wild mammals or birds (USDA APHIS, 2015). Indirect risk to this group of organisms is also not anticipated based on the selectivity of chlorantraniliprole to certain insect taxa and the relatively small areas of treatment. Additionally, the selective nature of chlorantraniliprole to certain insect taxa and the low application rates suggest that impacts to all terrestrial invertebrates would not be anticipated. Any decrease in chlorantraniliprole-sensitive terrestrial invertebrate numbers would be expected to be local in nature due to the size of the treatment plots and recovery would occur more rapidly than in larger treatment areas due to immigration and the selective nature of chlorantraniliprole to certain life stages of invertebrates.

The potential for impacts to soil, air and water quality are expected to be negligible based on the proposed use pattern and available environmental fate data for chlorantraniliprole. Air quality is not expected to be significantly impacted since chlorantraniliprole has chemical properties that demonstrate it is not likely to volatilize into the atmosphere (USEPA, 2008). There will be some insecticide present in the atmosphere within and adjacent to the spray block immediately after application as drift but this will be localized and of short duration. Chlorantraniliprole has low solubility in water (<1 mg/L) and is susceptible to sunlight with a half-life of 0.31 days. Microbial degradation in water and pH-related effects to chlorantraniliprole are minor with half-lives greater than 125 days (USEPA, 2008). Slow degradation in soil is also anticipated with half-lives ranging from 228 to 924 days in various soil types (USEPA, 2008). Chlorantraniliprole has a varying affinity for binding to soil, but is generally low, suggesting that it may be susceptible to run-off during storm events. However, the proposed use rates and program restrictions regarding buffers suggest that surface and ground water quality will not be impacted from the proposed Program use of chlorantraniliprole.

c) 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). 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 greatly 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. The treatment history of Program since the introduction of diflubenzuron demonstrates it is the preferred insecticide. Over 90% of the acreage treated by the Program has been with diflubenzuron.

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.

d) 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 (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).

The products used by the grasshopper program are labeled with rates and treatment intervals that are meant to protect livestock. Livestock and horses may graze on rangeland the same day that the land is treated with malathion. 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, 2012c). 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 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 (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.

e) 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 were 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, chlorantraniliprole, diflubenzuron, or malathion are conducted in adherence with USEPA-approved label directions. Labeled application rates for grasshopper control tend to be lower than rates used against other pests. In addition, use rates proposed for grasshopper control by APHIS are lower than rates used by private landowners.

B. Other Environmental Considerations

1. Cumulative Impacts

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

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

Potential cumulative impacts associated with the Preferred Alternative are not expected to be significant because the program applies an insecticide application once during a treatment season. 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 USDA conducted no aerial grasshopper suppression programs in Montana in 2022. It is unlikely that aerial treatments would be conducted in the same location if treatments occurred the previous year. 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 pesticides include insecticide 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 that increases 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, crop, or crop border treatments. Rangeland is unlikely to receive insecticide applications for any reason other than grasshopper or Mormon cricket suppression.

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.

Three Indian Reservations exist within the boundaries of this EA. They are the Crow Indian Reservation (12,000 members), the Fort Peck Indian Reservation (10,000), and the Northern Cheyenne Indian Reservation (12,266 members) according to the Office of Indian Affairs. Member numbers are approximations and may or may not include tribal members living off and/or near each of the reservations.

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.

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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 this EA.

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

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

- RAATs are used in all areas adjacent to salmonid habitat
- ULV sprays are used, which are between 50% and 66% of the USEPA recommended rate
- Insecticides are not aerially applied in a 3,500 foot buffer zones for carbaryl or malathion, or applied within a 1,500 foot buffer zones for diflubenzuron along stream corridors
- Insecticides will not be applied when wind speeds exceed 10 miles per hour. APHIS will attempt to avoid insecticide application if the wind is blowing towards salmonid habitat
- Insecticide applications are avoided when precipitation is likely or during temperature inversions

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

APHIS submitted a programmatic biological assessment for grasshopper suppression in the 17-state program area and requested consultation with USFWS on March 9, 2015. With the incorporation and use of application buffers and other operational procedures APHIS anticipated and continues to believe 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 concluded in the programmatic biological assessment 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 primarily conduct consultations with USFWS field offices at the local level annually.

APHIS considers the role of pollinators in any consultations conducted with the USFWS 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.

On March 7th, 2023, APHIS Provided *the 2023 USDA APHIS PPQ Rangeland Grasshopper and Mormon Cricket Suppression Program Biological Assessment* to the Montana 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);* Whitebark Pine (*Pinus albicaulis*); 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).*

APHIS completed consultation for Montana with FWS on May 1, 2023. Since consultation will continue annually, the Biological Assessment and Letter of Concurrence will not be added to this 5-year EA document.

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. However, rangeland grasshopper suppression treatments occur during the late spring or early summer, after the nesting season when eagle young typically will have already fledged. The Program also recognizes disruptive activities in or near eagle foraging areas can interfere with bald eagle feeding, reducing chances of survival. Program operational procedures that prevent applications near water bodies will reduce the possibility of disturbing eagle foraging activities. 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 principal 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.

7. Additional Species of Concern

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

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

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

All parties that request treatment are asked to identify sensitive sites that they wish not to be treated.

APHIS also implements several best management 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 respond 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 from previous years 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. 2023 and annually updated guidance in later years from the BLM State or Field Offices will be utilized for any treatments which include BLM-administered lands.

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.

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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.

8. 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 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.

9. 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.

V. Literature Cited

Barbee, G.C., McClain, W.R., Lanka, S.K. and M.J. Stout. 2010. Acute toxicity of chlorantraniliprole to non-target crayfish (*Procambarus clarkii*) associated with rice–crayfish cropping systems. Pest Manag. Sci. 66: 996–1001.

Beauvais, S. 2014. Human exposure assessment document for carbaryl. Page 136. California Environmental Protection Agency, Department of Pesticide Regulation.

Belovsky, G. E., A. Joern, and J. Lockwood. 1996. VII.16 Grasshoppers—Plus and Minus: The Grasshopper Problem on a Regional Basis and a Look at Beneficial Effects of Grasshoppers. Pages 1-5 in G. L. Cunningham and M. W. Sampson, editors. Grasshopper Integrated Pest Management User Handbook, Technical Bulletin No. 1809. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Washington, DC.

Belovsky, G. E. 2000. Part 1. Grasshoppers as integral elements of grasslands. 1. Do grasshoppers diminish grassland productivity? A new perspective for control based on conservation. Pages 7-29 in J. A. Lockwood et al, editor. Grasshoppers and Grassland Health. Kluwer Academic Publishers, Netherlands.

Bonderenko, S., J. Gan, D. L. Haver, and J. N. Kabashima. 2004. Persistence of selected organophosphate and carbamate insecticides in waters from coastal watershed. Env. Toxicol. Chem. 23:2649-2654.

Bradshaw, J. D., K. H. Jenkins, and S. D. Whipple. 2018. Impact of grasshopper control on forage quality and availability in western Nebraska. Rangelands 40:71-76.

Branson, D., A. Joern, and G. Sword. 2006. Sustainable management of insect herbivores in grassland ecosystems: new perspectives in grasshopper control. BioScience 56:743-755.

Broyles, G. 2013. Wildland firefighter smoke exposure. Page 26. U.S. Department of Agriculture, Forest Service.

Brugger, K.E., Cole, P.G., Newman, I.C., Parker, P., Scholz, B., Suvagia, P., Walker, G. and T.G. Hammond. 2010. Selectivity of chlorantraniliprole to parasitoid wasps. Pest Manag. Sci. 66: 1075–1081.

Buckner, C. H., P. D. Kingsbury, B. B. McLeod, K. L. Mortensen, and D. G. H. Ray. 1973. The effects of pesticides on small forest vertebrates of the spruce woods provincial forest, Manitoba. The Manitoba Entomologist 7:37-45.

Burling, I., R. Yokelson, D. Griffith, T. Johson, P. Veres, J. Roberts, C. Warneke, S. Urbanski, J. Reardon, D. Weise, W. Hao, and J. de Gouw. 2010. Laboratory measures of trace gas emissions from biomass burning of fuel types from the southeastern and southwestern United States. Atmospheric Chemistry and Physics 10:11115-111130.

Caro, J. H., H. P. Freeman, and B. C. Turner. 1974. Persistence in soil and losses in runoff of soil-incorporated carbaryl in a small watershed. J. Agricul. Food Chem. 22:860-863.

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

Chandel, R.S., and P.R Gupta. 1992. Toxicity of diflubenzuron and penfluron to immature stages of *Apis cerana indica* and *Apis mellifera*. Apidologie 23:465–473.

Cordova, D. E. E.A. Benner, M.D. Sacher, J.J. Rauh, J.S. Sopa, G.P. Lahm, T.P. Selby, T.M. Stevenson, L. Flexner, S. Gutteridge, D.F. Rhoades, L. Wu, R.M. Smith, Y. Tao (2006). Anthranilic diamides: a new class of insecticides with a novel mode of

action, ryanodine receptor activation. In *Pesticide Biochemistry and Physiology* (pp. 196-214).
Cooper, R. J., K. M. Dodge, P. J. Marinat, S. B. Donahoe, and R. C. Whitmore. 1990. Effect of diflubenzuron application on eastern deciduous forest birds. J. Wildl. Mgmt. 54:486-493.
Deakle, J. P. and J. R. Bradley, Jr. 1982. Effects of early season applications of diflubenzuron and azinphosmethyl on populations levels of certain arthropods in cotton fields. J. Georgia Entomol. Soc. 17:189-200.
Deneke, D. and J. Keyser. 2011. Integrated Pest Management Strategies for Grasshopper Management in South Dakota. South Dakota State University Extension.
Dinkins, M. F., A. L. Zimmermann, J. A. Dechant, B. D. Parkins, D. H. Johnson, L. D. Igl, C. M. Goldade, and B. R. Euliss. 2002. Effects of Management Practices on Grassland Birds: Horned Lark Northern Prairie Wildlife Research Center. Page 34. Northern Prairie Wildlife Research Center, Jamestown, ND.
Dinter, A., Brugger, K.E., Frost, N.M. and M.D. Woodward. 2009. Chlorantraniliprole (Rynaxypyr): A novel DuPont™ insecticide with low toxicity and low risk for honey bees (*Apis mellifera*) and bumble bees (*Bombus terrestris*) providing excellent tools for uses in integrated pest management. Hazards of pesticides to bees – 10th International Symposium of the ICP-Bee Protection Group. Pp. 84-96.
Dupont. 2011. Material Safety Data Sheet - Prevathon®.
Eisler, R. 1992. Diflubenzuron Hazards to Fish, Wildlife, and Invertebrate: A Synoptic Review. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.
Eisler, R., 2000. Handbook of chemical risk assessment: health hazards to humans, plants, and animals. Lewis Publishers, New York.
El-Refai, A. and T. L. Hopkins. 1972. Malathion adsorption, translocation, and conversion to malaoxon in bean plants. J. Assoc. Official Analytical Chemists 55:526-531.
Fischer, S. A. and L. W. Hall, Jr. 1992. Environmental concentrations and aquatic toxicity data on diflubenzuron (Dimilin). Critical Rev. in Toxicol. 22:45-79.
Follett, R. F. and D. A. Reed. 2010. Soil carbon sequestration in grazing lands: societal benefits and policy implications. Rangeland Ecology & Management 63:4-15.
Foster, R. N., K. C. Reuter, K. Fridley, D. Kurtenback, R. Flakus, R. Bohls, B. Radsick, J. B. Helbig, A. Wagner, and L. Jeck. 2000. Field and Economic Evaluation of Operational Scale Reduced Agent and Reduced Area Treatments (RAATs) for Management of Grasshoppers in South Dakota Rangeland. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Phoenix, AZ.
George, T. L., L. C. McEwen, and B. E. Peterson. 1995. Effects of grasshopper control programs on rangeland breeding bird populations. J. Range Manage. 48:336–342.
Gradish, A.E., Scott-Dupree, C.D., Shipp, L. and R. Harris. 2011. Effect of reduced risk pesticides on greenhouse vegetable arthropod biological control agents. Pest Manag. Sci. 67: 82–86.
Guerrant, G. O., L. E. Fetzer, Jr., and J. W. Miles. 1970. Pesticide residues in Hale County, Texas, before and after ultra-low-volume aerial applications of Malathion. Pesticide Monitoring J. 4:14-20.
Hannig, G.T., Ziegler, M. and P.G. Marcon. 2009. Feeding cessation effects of chlorantraniliprole, new anthralinic diamide insecticide, in comparison with several insecticides in distinct chemical classes and mode-of-action groups. Pest Manag. Sci. 65: 969–974.

Havstad, K. M., D. P. Peters, R. Skaggs, J. Brown, B. Bestelmeyer, E. Fredrickson, J. Herrick, and J. Wright. 2007. Ecological services to and from rangelands of the United States. Ecological Economics 64:261-268.
Howe, F. P., R. L. Knight, L. C. McEwen, and T. L. George. 1996. Direct and indirect effects of insecticide applications on growth and survival of nestling passerines. Ecol. Appl. 6:1314-1324.
Keever, D. W., J. R. Bradley, Jr, and M. C. Ganyard. 1977. Effects of diflubenzuron (Dimilin) on selected beneficial arthropods in cotton fields. J. Econ. Entomol. 6:832-836.
LaFleur, K. S. 1979. Sorption of pesticides by model soils and agronomic soils: rates and equilibria. Soil Sci. 127:94-101.
Larsen, J. and R. N. Foster. 1996. Using Hopper to Adapt Treatments and Costs to Needs and Resources. U.S. Department of Agriculture, Animal and Plant Health Inspection Service Grasshopper Integrated Pest Management User Handbook, Washington, D.C.
Latchininsky, A., G. Sword, M. Sergeev, M. Cigiliano, and M. Lecoq. 2011. Locusts and grasshoppers: behavior, ecology, and biogeography. Psyche 2011:1-4.
Lockwood, J. A. and S. P. Schell. 1997. Decreasing economic and environmental costs through reduced area and agent insecticide treatments (RAATs) for the control of rangeland grasshoppers: empirical results and their implications for pest management. J. Orthoptera Res. 6:19-32.
Lockwood, J., S. Schell, R. Foster, C. Reuter, and T. Rahadi. 2000. Reduced agent-area treatments (RAAT) for management of rangeland grasshoppers: efficacy and economics under operational conditions. International Journal of Pest Management 46:29-42.
Lockwood, J. A. and A. Latchininsky. 2000. The Risks of Grasshoppers and Pest Management to Grassland Agroecosystems: An International Perspective on Human Well-Being and Environmental Health. Pages 193-215 in A. Latchininsky and M. Sergeev, editors. Grasshoppers and Grassland Health. Kluwer Academic Publishers.
Lockwood, J., R. Anderson-Sprecher, and S. Schell. 2002. When less is more: optimization of reduced agent-area treatments (RAATs) for management of rangeland grasshoppers. Crop Protection 21:551-562.
Matsumara, F. 1985. Toxicology of insecticides. Plenum Press, New York.
McEwen, L.C., Althouse, C.M., and Peterson, B.E., 1996. Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on nontarget animal life. *In* U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 1996. Grasshopper Integrated Pest Management User Handbook, Tech. Bul. No. 1809. Sec. III.2. Washington, DC.
Miles, C. J. and S. Takashima. 1991. Fate of malathion and O.O.S. trimethyl phosphorothioate byproduct in Hawaiian soil and water. Arch. Environ. Contam. Toxicol 20:325-329.
Mommaerts, V., Sterk, G., and G. Smagghe. 2006. Hazards and uptake of chitin synthesis inhibitors in bumblebees *Bombus terrestris*. Pest Mgt. Science 62:752–758.
Murphy, C. F., P. C. Jepson, and B. A. Croft. 1994. Database analysis of the toxicity of antilocust pesticides to non-target, beneficial invertebrates. Crop Protection 13:413-420.
Muzzarelli, R. 1986. Chitin synthesis inhibitors: effects on insects and on nontarget organisms. CRC Critical Review of Environmental Control 16:141-146.

Narisu, J., A. Lockwood, and S. P. Schell. 1999. A novel mark-capture technique and its application to monitoring the direction and distance of local movements of rangeland grasshoppers (Orthoptera: Acridade) in context of pest management. J. Appl. Ecol. 36:604-617.

Narisu, J., A. Lockwood, and S. P. Schell. 2000. Rangeland grasshopper movement as a function of wind and topography: implications for pest movement. J. Appl. Ecol. 36:604-617.

Nation, J.L., Robinson, F.A., Yu, S.J., and A.B. Bolten. 1986. Influence upon honeybees of chronic exposure to very low levels of selected insecticides in their diet. J. Apic. Res. 25:170–177.

Nigg, H. N., R. D. Cannizzaro, and J. H. Stamper. 1986. Diflubenzuron surface residues in Florida citrus. Bul. Environ. Contam. Toxicol. 36:833-838.

NIH. 2009a. Carbaryl, CASRN: 63-25-2. National Institutes of Health, U.S. National Library of Medicine, Toxnet, Hazardous Substances Database.

NIH. 2009b. National Institutes of Health, U.S. National Library of Medicine, National Center for Biotechnology Information. PubChem. https://pubchem.ncbi.nlm.nih.gov/compound/4004

Norelius, E. E. and J. A. Lockwood. 1999. The effects of reduced agent-area insecticide treatments for rangeland grasshopper (Orthoptera: Acrididae) control on bird densities. Archives of Environmental Contamination and Toxicology 37:519-528.

Pascual, J. A. 1994. No effects of a forest spraying of malathion on breeding blue tits (*Parus caeruleus*). Environ. Toxicol. Chem. 13:1127–1131.

Peach, M. P., D. G. Alston, and V. J. Tepedino. 1994. Bees and bran bait: is carbaryl bran bait lethal to alfalfa leafcutting bee (Hymenoptera: Megachilidae) adults or larvae? J. Econ. Entomol. 87:311-317.

Peach, M. P., D. G. Alston, and V. J. Tepedino. 1995. Subleathal effects of carbaryl bran bait on nesting performance, parental investment, and offspring size and sex ratio of the alfalfa leafcutting bee (Hymenoptera: Megachilidae). Environ. Entomol. 24:34-39.

Pfadt, R. E. 2002. Field Guide to Common Western Grasshoppers, Third Edition. Wyoming Agricultural Experiment Station Bulletin 912. Laramie, Wyoming.

Purdue University. 2018. National Pesticide Information Retrieval System. West Lafayette, IN.

Quinn, M. A., R. L. Kepner, D. D. Walgenbach, R. N. Foster, R. A. Bohls, P. D. Pooler, K. C. Reuter, and J. L. Swain. 1991. Effect of habitat and perturbation on populations and community structure of darkling beetles (Coleoptera: tenebrionidae) on mixed grass rangeland. Environ. Entomol. 19:1746-1755.

Rashford, B. S., A. V. Latchininsky, and J. P. Ritten. 2012. An Economic Analysis of the Comprehensive Uses of Western Rangelands. U.S. Department of Agriculture, Animal and Plant Health Inspection Service.

Reinhardt, T. and R. Ottmar. 2004. Baseline measurements of smoke exposure among wildland firefighters. Journal of Occupational and Environmental Hygiene 1:593-606.

Reisen, F. and S. Brown. 2009. Australian firefighters' exposure to air toxics during bushfire burns of autumn 2005 and 2006. Environment International 35:342-353.

Richmond, M. L., C. J. Henny, R. L. Floyd, R. W. Mannan, D. W. Finch, and L. R. DeWeese. 1979. Effects of Sevin 4-oil, Dimilin, and Orthene on Forest Birds in Northeastern Oregon. USDA, Pacific SW Forest and Range Experiment Station.

`

Rosenberg, K. V., R. D. Ohmart, and B. W. Anderson. 1982. Community organization of riparian breeding birds: response to an annual resource peak. The Auk 99:260-274.

Sample, B. E., R. J. Cooper, and R. C. Whitmore. 1993. Dietary shifts among songbirds from a diflubenzuron-treated forest. The Condor 95:616-624.

Schaefer, C. H. and E. F. Dupras, Jr. 1977. Residues of diflubenzuron [1-(4-chlorophenyl)-3(2,6-difluorobenzoyl) urea] in pasture soil, vegetation, and water following aerial applications. J. Agric. Food Chem. 25:1026-1030.

Smith, D. and J. Lockwood. 2003. Horizontal and trophic transfer of diflubenzuron and fipronil among grasshoppers and between grasshoppers and darkling beetles (Tenebrionidae). Archives of Environmental Contamination and Toxicology 44:377-382.

Smith, D. I., J. A. Lockwood, A. V. Latchininsky, and D. E. Legg. 2006. Changes in non-target populations following applications of liquid bait formulations of insecticides for control of rangeland grasshoppers. Internat. J. Pest Mgt. 52:125-139.

Stanley, J. G. and J. G. Trial. 1980. Disappearance constants of carbaryl from streams contaminated by forest spraying. Bul. Environ. Contam. Toxicol. 25:771-776.

Tepedino, V. J. 1979. The importance of bees and other insect planetaries in maintaining floral species composition. Great Basin Naturalist Memoirs 3:139-150.

Thompson, H.M, Wilkins, S. Battersby, A.H., Waite, R.J., and D. Wilkinson. 2005. The effects of four insect growth-regulating (IGR) insecticides on honeybee (*Apis mellifera* L.) colony development, queen rearing and drone sperm production. Ecotoxicology 14:757–769.

Thomson, D. L. K. and W. M. J. Strachan. 1981. Biodegradation of carbaryl in simulated aquatic environment. Bul. Environ. Contam. Toxicol. 27:412-417.

U.S. Census Bureau (2020). Montana 2020 Census. Available: https://www.census.gov/library/stories/state-by-state/montana-population-change-between-census-decade.html

USDA APHIS– see U.S. Department of Agriculture, Animal and Plant Health Inspection Service

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

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, 2013. Rangeland grasshopper/Mormon cricket suppression program aerial application: statement of work. 41 pp.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2015. Biological Assessment for the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program. Page 162. U.S. Department of Agriculture, Animal and Plant Health Inspection Service.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018a. Human Health and Ecological Risk Assessment for Carbaryl Rangeland Grasshopper and Mormon Cricket Suppression Applications. United States Department of Agriculture, Animal and Plant Health Inspection Service.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018b. Human health and Ecological Risk Assessment for Chlorantraniliprole used in Rangeland grasshopper and Mormon Cricket Suppression Program. United States Department of Agriculture, Animal Plant and health Inspection Service.

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U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018c. Human Health and Ecological Risk Assessment for Diflubenzuron Rangeland Grasshopper and Mormon Cricket Suppression Applications. United States Department of Agriculture, Animal and Plant Health Inspection Service.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2018d. Human Health and Ecological Risk Assessment for Malathion Rangeland Grasshopper and Mormon Cricket Suppression Applications. United States Department of Agriculture, Animal and Plant Health Inspection Service.

U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2019. Rangeland Grasshopper and Mormon Cricket Suppression Program Final Environmental Impact Statement. United States Department of Agriculture, Animal and Plant Health Inspection Service.

USDA FS. 2004. Control/eradication agents for the gypsy moth—human health and ecological risk assessment for diflubenzuron (final report). United States Department of Agriculture, Forest Service

USDA FS. 2008. Malathion- Human Health and Ecological Risk Assessment. U.S. Department of Agriculture, Forest Service.

USEPA – See U.S. Environmental Protection Agency

U.S. Environmental Protection Agency. 1997. Reregistration Eligibility Decision (RED): Diflubenzuron. U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2000a. Malathion Reregistration Eligibility Document Environmental Fate and Effects. Page 146. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances.

U.S. Environmental Protection Agency. 2000b. Reregistration Eligibility Decision (RED) for Malathion. U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2003. Environmental Fate and Ecological Risk Assessment for Re-Registration of Carbaryl. U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2006. Malathion Reregistration Eligibility Document. Page 147. U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. Environmental Protection Agency. 2007. Reregistration Eligibility Decision (RED) for Carbaryl. Page 47. U.S. Environmental Protection Agency, Prevention, Pesticides and Toxic Substances.

U.S. Environmental Protection Agency, 2008. Pesticide fact sheet: Chlorantraniliprole. Office of Prevention, Pesticides and Toxic Substances. 77 pp.

U.S. Environmental Protection Agency. 2012a. Sevin XLR Plus Label. Pages 1-40 Pesticide Product and Label System. U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency, 2012b. Ecotox database accessed at: http://cfpub.epa.gov/ecotox/

U.S. Environmental Protection Agency. 2012c. Fyfanon ULV AG. U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2015a. Annual Cancer Report 2015, Chemicals Evaluated for Carcinogenic Potential Page 34. U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. Environmental Protection Agency. 2015b. Memorandum - Diflubenzuron: human health risk assessment for an amended Section 3 registration for carrot, peach subgroup 12-12B, plum subgroup 12-12C, pepper/eggplant subgroup 8010B, cottonseed subgroup 20C, alfalfa (regional restrictions) and R175 Crop Group

Conversion for tree nut group 14-12. Page 71 U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. Environmental Protection Agency. 2016a. Appendix 3-1: Environmental transport and fate data analysis for malathion. In: Biological Evaluation Chapters for Malathion ESA Assessment.

U.S. Environmental Protection Agency. 2016b. Chapter 2: Malathion Effects Characterization for ESA Assessment. In: Biological Evaluation Chapters for Malathion ESA Assessment.

U.S. Environmental Protection Agency. 2016c. Malathion: Human Health Draft Risk Assessment for Registration Review. Page 258. U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2017a. Memorandum - Carbaryl: Draft Human Health Risk Assessment in Support of Registration Review. Page 113 U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2018. Preliminary Risk Assessment to Support the Registration Review of Diflubenzuron.

USFWS. 2007. National Bald Eagle Management Guidelines. Page 23 pp. U.S. Fish and Wildlife Service.

Wakeland, C. and W. E. Shull. 1936. The Mormon cricket with suggestions for its control, Extension Bulletin No. 100. University of Idaho, College of Agriculture, Idaho Agricultural Extension.

Zinkl, J. G., C. J. Henny, and L. R. DeWeese. 1977. Brain cholinesterase activities of birds from forests sprayed with trichlorfon (Dylox) and carbaryl (Sevin 4-oil). Bul. Environ. Contam. Toxicol. 17:379-386.

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A. Appendix A - APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program

Treatment Guidelines
Version 01/09/2023

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

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rangeland, shall immediately treat Federal, Tribal, State, or private lands that are infested with grasshoppers or Mormon crickets at levels of economic infestation, unless APHIS determines that delaying treatment will not cause greater economic damage to adjacent owners of rangeland. In carrying out this section, APHIS shall work in conjunction with other Federal, State, Tribal, and private prevention, control, or suppression efforts to protect rangeland.

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

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

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

6. Land managers are responsible for the overall management of rangeland under their control to prevent or reduce the severity of grasshopper and Mormon cricket outbreaks. Land managers are encouraged to have implemented Integrated Pest Management Systems prior to requesting a treatment. In the absence of available funding or in the place of APHIS funding, the Federal land management agency, Tribal authority or other party/ies may opt to reimburse APHIS for suppression treatments. Interagency agreements or reimbursement agreements must be completed prior to the start of treatments which will be charged thereto.

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

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

8. In some cases, rangeland treatments may be conducted by other federal agencies (e.g., Forest Service, Bureau of Land Management, or Bureau of Indian Affairs) or by non-federal entities (e.g., Grazing Association or County Pest District). APHIS may choose to assist these groups in a variety of ways, such as:

a. loaning equipment (an agreement may be required):
b. contributing in-kind services such as surveys to determine insect species, instars, and infestation levels;
c. monitoring for effectiveness of the treatment;

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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
  a. solid bait
  b. ultra-low volume (ULV) spray

B. Diflubenzuron ULV spray

C. Malathion ULV spray

D. Chlorantraniliprole
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 /

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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 include:
   - A. Completion of a post-treatment report (Part C of the Project Planning and Reporting Worksheet (PPQ Form 62)
   - B. Providing an entry for each treatment in the PPQ Grasshopper/Mormon Cricket treatment database
   - C. For aerial treatments, providing copies of forms and treatment/plane data for input into the Federal Aviation Interactive Reporting System (FAIRS) by PPQ's designee

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

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

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

   - a. Wind velocity exceeds 10 miles per hour (unless state law requires lower wind speed);
   - b. Rain is falling or is imminent;
   - c. Dew is present over large areas within the treatment block;
   - d. There is air turbulence that could affect the spray deposition;
   - e. Temperature inversions (ground temperature higher than air temperature) develop and deposition onto the ground is affected.

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

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

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

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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.

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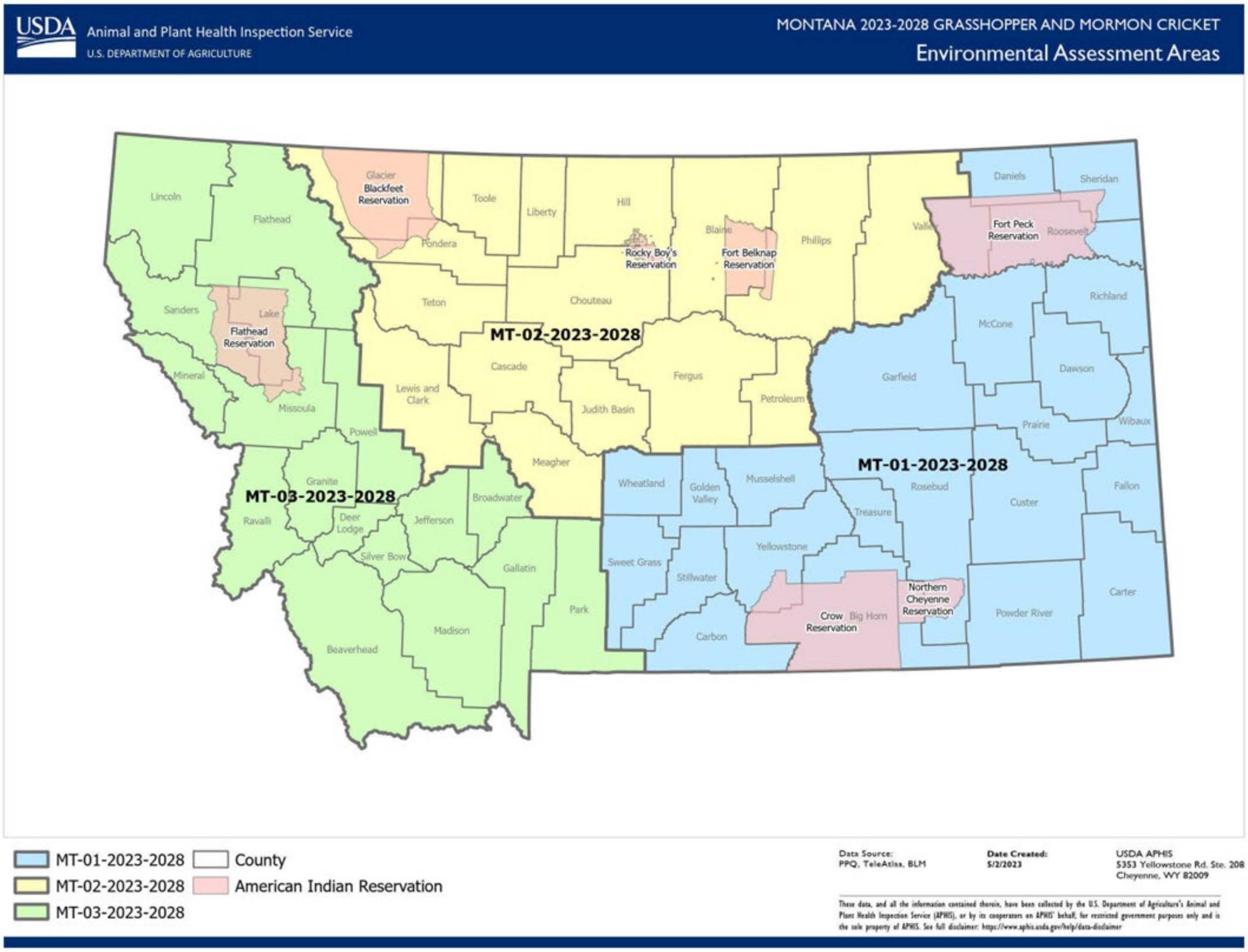
B. Appendix B: Map of the Affected Environment



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C. Appendix C: Letter of Request and Landowner Questionnaire

2023 : 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 2023.

______________________ ______________
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?
   ____
   ____

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.

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2023: USDA, APHIS, PPQ, Montana Grasshopper Suppression Program
Site Specific Information Questionnaire and Request for Assistance.

DWP #: ______________________ (USDA use only)

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 and 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
   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.

    This includes habitats for listed species or species of conservation interest.
    ____
    ____
    ____

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

    Describe: ____

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2023 : USDA, APHIS, PPQ, Montana Grasshopper Suppression Program
Site Specific Information Questionnaire and Request for Assistance.

DWP #: ______________________(USDA use only)

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?

____

____

____

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____

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______________________________ ______________________________ ____________
Printed Name Signature of Representative Date

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D. Appendix D: Public Comments

XERCES SOCIETY
for Invertebrate Conservation

Protecting the Life that Sustains Us

Mr. Gary D. Adams
USDA APHIS
submitted via email to:
Gary.D.Adams@usda.gov

April 19, 2023

For Open Comment Period
on the Draft Environmental Assessments
Rangeland Grasshopper and Mormon Cricket Suppression Program

For Montana, 2023-28
EA Numbers: MT-1-2023-28, MT-2-2023-28, MT-3-2023-28

Dear Mr. Adams:

We appreciate the opportunity to comment on the APHIS EAs addressing grasshopper suppression in the years 2023-28 within the subject areas in the State of Montana.

The Xerces Society for Invertebrate Conservation (Xerces Society) is an international nonprofit organization that protects the natural world through the conservation of invertebrates and their habitats. We work to raise awareness about the plight of invertebrates and to gain protection for the most vulnerable species before they decline to a level at which recovery is impossible.

Pesticide use is one of the contributing factors to the loss of many invertebrate species. The use of pesticide can also hinder recovery efforts for imperiled species.

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The staff and members of Western Watersheds Project (WWP) are concerned with the management of our public lands. WWP is a nonprofit organization dedicated to protecting and restoring western watersheds and wildlife through education, public policy initiatives, and legal advocacy. With members and supporters throughout the United States, including Montana, WWP actively works to protect and improve upland and riparian areas, water quality, fisheries, wildlife, and other natural resources and ecological values. WWP has field offices in Idaho, Montana, Wyoming, Arizona, Utah, Nevada and California.

The Center for Biological Diversity is a non-profit environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has 1.7 million members and online activists dedicated to the protection and restoration of endangered species and wild places, including thousands of members and supporters in Arizona, where our headquarters are located. The Center has worked for over thirty years to protect imperiled plants and wildlife, open space, air and water quality, and overall quality of life.

American Bird Conservancy is a 501(c)(3), non-profit membership organization whose mission is to conserve native birds and their habitats, working throughout the Americas to safeguard the rarest bird species, restore habitats, and reduce threats.

Please accept the following comments on the subject documents.

1. The EAs Fail to Adequately Involve the Public, Fail to Disclose to Involved Stakeholders Areas Likely for Treatment and Do Not Adequately Describe the Affected Environment or Analyze Impacts to the Affected Environment

APHIS states 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."*

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, which also help guide nymphal survey efforts. Moreover it is our understanding that a state's treatment requests must be submitted for funding approval to headquarters in Washington D.C., and that this budget requesting work occurs during the winter. Therefore, this information must exist in APHIS files. 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 the likely method of treatment and chemical to be used -- 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.

Some states (i.e. Oregon) publish survey data and reports week by week which also assists the general public in understanding which areas are being assessed, what grasshopper/Mormon cricket pressure may be, and where treatments are being considered. This practice should also be adopted in Montana so that the public can stay abreast, in real time, of the locations and severity of any grasshopper outbreaks, and gain a rough idea of the likelihood of treatments occurring in any particular area.

As published, the Draft EAs provide almost no solid information about where, how, and when the treatments may actually occur in 2023. As a result, it is impossible to determine if applications might occur to sensitive areas or species locations within the specified counties. While APHIS includes a statement that no aerial applications under the program occurred in 2022, the EAs do not address why

and whether grasshopper numbers are rising or falling relative to historic patterns. A meaningful addition would be a description of the average size of treatments in this state and a map of such treatments over a credible period, such as 2-3 decades, accompanied by detailed nymphal information and treatment request maps.

In addition, a site-specific EA should consider the particular environmental conditions of areas, including fluctuations that occur from year to year.

APHIS' lack of transparency about proposed and historical treatment areas, particularly on public lands, is a disservice to the public and prevents citizens 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 species-specific nymphal densities as well as other conditions related to the economic threshold, as described by APHIS, and it could be that APHIS would decide not to treat an area that was included in a budget request.

Nonetheless, in order to adequately inform the public, describe the affected environment, and ascertain impacts to critical ecological and social resources, APHIS should provide the treatment request areas with the EAs, even if actual treatments end up less than these.

Recommendation: In our comment letters on previous year's EAs we have repeatedly requested to receive a copy of maps and acreages of all final treatment areas. However, APHIS has neither provided those (except, in some cases for some states under formal FOIA requests) nor provided a reasonable explanation about why these taxpayer funded applications are necessary to keep secret.

We represent organizations that work to represent organisms without a voice--that could be impacted by the proposed actions either directly or indirectly. As such, we consider ourselves "stakeholders" and hereby request to be included among those whom APHIS informs of its proposed treatment areas once those are determined. It is time to end the secrecy around the extent and location and timing of these treatments.

We urge APHIS to delay the publication of a FONSI until all treatment areas have been delineated and are identified to the public, using maps and providing acreage. Site-specific information related to the resources and values of these locations should then be included. This would provide the public with a much better understanding of the justification for the treatment, the actual number of acres to be treated and their location, the method to be used, and the scale of potential effects to local resources. This specific information should be posted at the APHIS website as soon as it is available, sent to interested parties, and made available for public comment.

If APHIS chooses to finalize its EA and publish a FONSI earlier, it should at least provide its best estimate of where treatments will occur based on requests, nymphal survey information and historical treatment

data, and describe the affected environment and anticipated environmental consequences in those areas with greater detail.

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

<u>RESPONSE:</u> At the time of this final EA and FONSI, APHIS has received no formal requests for treatments in Montana, which is typical for the program. Winter budgeting does not consist of maps but generalized estimates of potential acres, generally per county, that may result in a request/requests for treatment.

Requests for actual treatments are often received once hatching has begun but before treatment plans are finalized. Requests from a BLM field office often only occur after a Field Office receives requests from lessors. The BLM has an additional 30-day NEPA process that follows APHIS' Final EA and FONSI.

The EAs do not fail to disclose the treatment request locations. The treatments can occur at any location within the action areas described in the EAs. The EAs describe geographically similar action areas which may have populations which require suppression. Any populations outside these action areas will not be treated. The commenter requests the exact locations to be treated, this level of detail is not necessary for a thorough risk analysis for significant impacts as required by NEPA. APHIS must remind the Xerces Society their comments should suggest how program activities could have significant impacts to the human environment and the NEPA public review process is not a forum to tell the agency how to conduct the surveys and the suppression activities. The EAs describe that any rangeland within the action area which have outbreak populations could be rangeland that could be treated. The timeline suggested by the commenter would not allow the draft EA to be published until after the exact acreage has been delimited, starting the 30-day public comment at that time. The BLM has an additional 30-day NEPA process that follows APHIS' Final EA and FONSI. If the proposed timeline was followed, no outbreak populations would ever be treated. The life cycle of the nymphal stages can develop every 5-12 days depending on the temperature. The commenter had similar comments in EAs from 2020 to present. Please see the APHIS responses to comments in past EAs.

The reports from Oregon are generated by the State rather than the USDA.

2. Use of "Emergency" Explanation to Avoid More Site-Specific Assessment of Impacts is Indefensible and Groundless

APHIS claims that its grasshopper suppression efforts are akin to an "emergency." For example, the following is stated in the EAs:

> *The emergency response aspect is why site-specific treatment details cannot be known, analyzed, and published in advance.*

The emergency explanation does not hold water when this program is given an annual budget and when grasshopper outbreak dynamics are reasonably well known. The Grasshopper IPM Project and subsequent studies did much to advance knowledge about grasshopper cycles and areas more prone to outbreak. For example, see Cigliano et al. (1995), which identified areas most prone to outbreak in Montana, and Schell and Lockwood (1997), which did the same in Wyoming. Also see Oregon's EA, which provides a map of similar historic information.

Even armed with this information, APHIS did not bother to take a closer look at the areas that might be most likely to be affected by grasshopper sprays. Nor did APHIS consider impacts to the ecological, scientific, or recreational resources across the geography covered by each EA. These are considerable, and include Important Bird Areas, Sagebrush Focal Areas and Greater Sage-Grouse Priority Habitat Management Areas, National Wildlife Refuges such as Warhorse National Wildlife Refuge, UL Bend National Wildlife Refuge, Lake Mason National Wildlife Refuge, which support breeding migratory birds and many other wildlife species, as well as various Wilderness Study Areas, such as the Terry Wilderness Study Area, and reservoirs that support fishing and camping. There are also National Parks, Wilderness areas, Areas of Critical Environmental Concern, and tribal and sacred lands within the geography that could be affected.

While APHIS may reasonably assert the need to respond quickly, that does not excuse ignoring existing information or refusing to do environmental disclosures as required by NEPA.

Recommendation: See above.

RESPONSE: APHIS regularly engages with the public about areas experiencing outbreak grasshopper and Mormon cricket populations. Previous year adult surveys can be used to predict areas of high populations, but one year's survey data does not always directly correlate to current populations. High variability of abiotic factors at a local level can significantly impact developing nymphal populations. Furthermore, grasshopper populations are mobile and can migrate into areas that were not forecasted to have outbreak populations.

Beginning with public meetings, APHIS is open and transparent with the public about what our surveys found last year, where we expect outbreaks to be possible this year, and any areas that could be impacted by grasshoppers or Mormon crickets.

The analyses of the EAs cover most areas in the state that have the criteria outlined above. However, it is impossible to know exactly where these treatments will occur in advance. The need for rapid response is akin to an emergency for rural communities who are significantly impacted by the economic damage caused by these pests. APHIS uses the EAs to capture the variability in these rural locations and can then work with local governments, conservation districts, state, and federal partners to rapidly respond to the public needs for treatments. Areas that meet the criteria, express a need and desire for treatments, and collaborate with APHIS have the potential to receive rapid response emergency treatments of the area when funds are available. Public is notified of treatments to the best of our ability via newspapers, meetings with local governments, and direct notice to those in the immediate treatment areas. APHIS only treats where land managers request suppression efforts and and exclude any areas where land managers request an exclusion.

All Montana Tribes are specifically consulted with through the NEPA process.

The commenter shared a similar opinion in their comments on the 2020-2022 EAs. Please see responses to those comments.

3. Rate for Carbaryl Bait is Erroneous.

The 2023 EA includes rates of application for each of the insecticides that might be used. For carbaryl bait, the 2023 EA states:

4.0 pounds (0.20 lbs a.i./ac treated) of 5 percent carbaryl bait

This needs correction. For 4 lbs of 2 percent carbaryl bait, that would represent 0.08 lb ai/acre.

RESPONSE: the calculation for 5 percent bait is correct. However, we have added an additional line for the 2 percent bait calculations at your request.

4. APHIS baselessly claims that it protects pollinators through the use of program insecticides that are not broad-spectrum.

Please note that we made this comment last year. Despite this, APHIS did not correct the record in its 2023 EAs. APHIS claims in its EAs that it reduces the risk to native bees and pollinators through several measures including preference for insecticides that are not broad-spectrum. As an example from the 2023 EAs:

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.

Yet APHIS identifies three potential insecticides in its operating guidelines included with the EAs that are considered broad-spectrum: carbaryl, diflubenzuron, and chlorantraniliprole.

It is common knowledge that carbaryl is a broad-spectrum chemicals that interfere with transmission of neural signals. (Use of baits can reduce exposure to certain insects; this option is available with carbaryl as used in the program).

Diflubenzuron has been in recent years the most commonly used insecticide under APHIS' grasshopper suppression program. Diflubenzuron is an insect growth regulator and functions by disrupting synthesis of chitin, a molecule necessary to the formation of an insect's cuticle or outer shell. An insect larva or nymph exposed to diflubenzuron is unable to successfully molt and thus dies. Chitin is not limited to insect cuticles, but is also, for example, a component of mollusk radula, fish scales and fungi cell walls.

The label for diflubenzuron itself calls the insecticide “broad-spectrum” (see Durant 2L label); therefore APHIS’ statement is not credible.

The highly regarded Pesticide Properties Database (PPDB) maintained by the University of Hertfordshire also calls chlorantraniliprole broad-spectrum. EPA in its 2020 problem formulation for chlorantraniliprole, EPA calls this active ingredient “non-selective”—in other words, broad-spectrum (EPA 2020).

Recommendation: APHIS should cease claiming that it preferentially uses chemicals that are not broad- spectrum. This is untrue and misleading. An accurate assessment regarding the impacts of these non- selective chemicals must also be included.

RESPONSE: The commenter expressed similar concerns that were addressed in the 2020-2022 EAs. Please see the APHIS responses to those comments.

APHIS understands the commenter’s concern that using diflubenzuron to control rangeland grasshoppers could affect populations of non-target insects. The U.S. Geological Survey study cited (Graham et al. 2008) did not find direct effects of diflubenzuron on arthropod communities. The researchers concluded, “At the order level, no consistent patterns of difference in proportional representation between treated and untreated sites at any of the three study areas indicate that treatment with diflubenzuron affects nontarget arthropods.” The researchers collected data at three rangeland field sites. At one of these study areas, Grouse Creek, they were able to conduct pre-treatment and post treatment surveys. The other two study areas had been treated the prior year, and so only post-treatment data was collected. At Grouse Creek no significant differences in pre- and post-treatment arthropod numbers occurred within the sprayed zone. Total arthropods did not differ in the sprayed zone. Only Orthoptera showed a decrease from pre- to post-treatment numbers in the sprayed zone, indicating that diflubenzuron did accomplish the management goal of decreasing Orthoptera numbers in the sprayed zone. APHIS appreciates the commenter sharing this study that further affirms the use of diflubenzuron to selectively control grasshoppers and Mormon crickets.

The commenter may have noted the researcher’s post-treatment comparisons of unsprayed and sprayed zones showed that spiders and non-ant Hymenoptera were significantly more abundant in the unsprayed zone following application of diflubenzuron. However, there were statistically significant differences in average abundance for the Hemiptera, non-ant Hymenoptera, and Orthoptera in the untreated and treated zones before the treatments.

APHIS wishes to clarify that while the researchers found the average numbers of Lepidoptera, Scorpions, and total arthropods differed markedly in the sprayed and unsprayed zones, but not to the point of statistical significance. The commenter expressed concern that Lepidoptera were more abundant in the unsprayed zone, but the researchers attributed this post-treatment difference to inherent differences in the Lepidoptera communities of the two zones. Based on the findings of this research, APHIS does not believe rangeland grasshopper treatments using diflubenzuron will have significant impacts on the environment.

APHIS wishes to remind the Xerces Society that the NEPA standard of risk evaluation is “Significant Impacts”. The commenter’s concern that grasshopper treatments might affect other organisms is valid. However, we believe based on our risk analysis those effects will not be long lasting or severe enough to cause significant impacts. Our operational procedures prevent or reduce the severity of these effects. For example, the use of a carbaryl bait instead of liquid, reduced pesticide application rates, one application per year and the use of alternating swaths vs full coverage. Lastly, we primarily use diflubenzuron treatments to which grasshoppers are more susceptible than other insects.

The commentor is incorrect when stating the Durant 2L (EPA Reg. No.: 91234-103) label states it is a “broad-spectrum” insecticide. While the company may market as having a broad-spectrum of pests the chemical can control, it is at highly variable rates well above those used in the Grasshopper and Mormon cricket Suppression Program

The commenter asserts the EA does not provide information on the possible effects of program chemicals on bees and pollinators. That information is provided under the Environmental Consequences section of the EA on pages 19 through 29. The Draft EA is tiered to more extensive analysis in the 2019 EIS (page 45-46, 55-57, and 65) and the HHERAs for Carbaryl (page 21 and 44), Malathion (pages 14-15, and 34), and Diflubenzuron (pages 13-14, 29-30) that addresses risk to pollinators including bees and their larval stages.

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 treatment season further reducing the risk to pollinators when compared to the current number of applications that can be made in a year to rangeland.

As stated by the commentor, diflubenzuron is the most commonly used insecticide under APHIS’ grasshopper suppression program including in Montana. When used at rates below label rates and alternating treated and untreated swaths, risks and impacts from exposure to non-targets are reduced when compared to full label rates at conventional 100% coverage.

APHIS anticipates that any impacts to fungi in rangeland that are treated with diflubenzuron will be reduced by the use of RAATS and the small areas of treatment relative to the total area of rangeland that would be left untreated. Fungi that are sensitive to diflubenzuron impacts would recolonize these areas after treatment and degradation of the insecticide. Aerobic and anaerobic soil half-lives for diflubenzuron are typically short reducing the time that fungi would be exposed to soil concentrations that could result in potential effects. The sensitivity of fungi to diflubenzuron is variable with impacts to some fungi but not to other species in toxicity studies. This was noted in the Ramos et al. 2017 paper referenced in the comment and the 2004 diflubenzuron risk assessment prepared by the U.S. Forest Service that summarized toxicity study results testing various fungal species. Diflubenzuron is also registered by the EPA Office of Pesticide Programs as a pre- and post-emergent insecticide for use on edible fungi.

5. APHIS includes only a single action alternative. APHIS fails to analyze other reasonable alternatives that could address any harm experienced by rangeland producers, 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 carefully and fully analyze the impact of the treatments at the conventional rates with blanket coverage. However in many cases APHIS focuses simply on the RAATs method and does not discuss impact from the "conventional" method. As an example, this language is included for the discussion of carbaryl impacts on pollinators: *"In areas of direct application where impacts may occur, alternating swaths and reduced rates (i.e., RAATs) would reduce risk."* In other cases, APHIS provides an assessment but does not indicate if its risk conclusion applies to the conventional method and the RAATs method, or one or the other.

In the description of Alternative B (page 10), APHIS appears to have inadvertently left out the range of lb ai/acre for diflubenzuron that corresponds with an application rate of 0.75-1 oz/acre. At this rate, APHIS should disclose that the lb/acre applied is 0.012—0.016 lb ai/ac. (Note that we made this comment last year.).

Recommendation: APHIS should include a reasonable alternative to chemical suppression, such as buying alternate forage for affected landowners, including through cooperative agreements with other agencies, if necessary, since the PPA doesn't address this specifically. Given the many other values of, and ecosystem services provided by, public lands, it only makes sense to consider such an alternative. Another reasonable alternative is not treating public lands. In addition, APHIS should separate the conventional from the RAATs method into two different alternatives, and analyze them accordingly.

RESPONSE: The APHIS grasshopper suppression program draws its authority from the Plant Protection Act of 2000 (7 U.S.C § 7717). The statute authorizes APHIS to 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. 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. APHIS informs cooperators about options of suppression, purchasing forage, or no action during public meeting presentations.

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 treatments using conventional methods (total area coverage and higher application rates) is provided on pages 18-26 of the 2022 EAs. Additional descriptions of APHIS’ analysis methods and discussion of the toxicology can be found in the 2019 EIS.

6. Statements on the effects of grasshopper damage are improperly supported.

In the EAs, APHIS asserts that under some outbreaks, vegetation damage is so severe that all grasses and forbs are destroyed, impairing plant growth for several years, but provides no citations to support this assertion. Furthermore, APHIS claims that grasshopper feeding results in soil drying which results in erosion, disruption of nutrient cycling, water infiltration, seed germination and other ecological processes. This assertion that grasshopper outbreaks lead to erosion, soil damage, and disruptions of rangeland ecosystems is based on a single study examining the effects of an outbreak of an introduced grasshopper in Hawaii in a non-rangeland ecosystem (Latchininsky et al. 2011). There are no data demonstrating similar extreme effects of grasshopper outbreaks in western rangelands, which have evolved with periodic grasshopper outbreaks. It is not appropriate to use the example from Hawaii in this context as justification for chemical treatments.

Recommendation: APHIS must substantiate its statements using science that is appropriate for the sites that will be treated under this EA, and avoid any impression of bias.

RESPONSE: APHIS acknowledges that Hawaii is the location of one study. Potential soil disruption is one of many reasons suppression may be considered.

7. Impacts of pesticide use 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 person trying to determine the actual predicted impacts of insecticide spray on large blocks of Western rangelands and do not provide an accurate scientific assessment.

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

<u>RESPONSE:</u> This comment is similar to comments made in previous EAs. Please refer to those responses. The comment is a vague critique of the risk analysis provided by APHIS in the EAs. 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. Other uses of the word "reduced" do quantify it's use.

8. APHIS ignores the significance of Montana to native pollinators, which 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 insect- mediated pollination. Native, solitary bee species are important pollinators on western rangeland.

Hence, pollinators are important not only for their own sake but for the overall diversity and productivity of native rangelands, including listed plant species. However, this essential role that pollinators play in the conservation of native plant communities is given very short shrift in the EAs.

Many of the pollinators that call Montana home are already considered at-risk. See lists of at risk pollinators found in Montana in Attachments 1 and 2 from our comment letter submitted in 2020. We ask you to incorporate those attachments by reference.

Pollinators, including bumble bee species that occur in Montana and are within the range of historic and possibly future treatments, are facing significant declines (National Research Council 2007; Cameron et al. 2011).

Bumble bees as a group, and several bumble bee species endemic to western states are perhaps the best known examples of pollinators in serious decline. Bumble bees are known to be important pollinators on many rangeland plants, including listed plant species such as Ute Ladies' Tresses and *Silene spaldingii*. Scientists recognize serious information gaps about the relative and interacting effects of stressors to bumble bee populations, especially the effects of pathogens, pesticides, climate change and habitat loss (see Graves et al. 2021).

Potential spray areas in Montana are within the range of at least two bumble bee species that have experienced declines in abundance and range contractions: *Bombus suckleyii* and *B. occidentalis*. Their decline statistics and range contractions are captured in a valuable IUCN overview of North American bumble bee species (Hatfield et al. 2015). For *B. suckleyi,* its relative abundance is less than 10% of its historic values. *B. occidentalis* abundance relative to historic values is only 28.5%. Both these species are being considered for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service.

Additional bumble bee species are known to occur near areas that have been the target of spraying by APHIS repeatedly in recent years. *Bombus fervidus*, a vunerable species that has experienced nearly a 50% decline, is resident in most counties of Eastern Montana where treatments are likely. There are also records of *Bombus pennsylvanicus*, a species in severe decline, in the southern and eastern parts of Montana, again near where sprays have occurred historically.

In Britain and the Netherlands, where multiple bumble bee and other bee species have gone extinct, there is evidence of decline in the abundances of insect pollinated plants.

As another example, the west coast lady butterfly (*Vanessa annabella*) is in steep decline. This species was historically common across much of the western U.S, and was locally abundant in some places, but has become increasingly rare across much of its range, despite continued monitoring and an increase in interest and participation in tracking butterflies among community scientist over the last 20 years.

Analyses conducted by Forister et al. 2022 demonstrate that *Vanessa annabella* has declined across its range, even in areas of its range with the highest habitat suitability. This same study recently ranked this species as one of the butterflies most at risk of extinction in the next 50 years, eclipsing other imperiled widespread species, such as the monarch butterfly (*Danaus plexippu*s). Additional analyses show that *V. annabella* is observed less frequently in 50% of its range in the recent time period, including areas of historically high habitat suitability.

Unfortunately, documented declines for pollinators are just echoes 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 consider the threats that treatments could pose to these dwindling bumble bees or other native bees that are dwindling but not yet on the Endangered Species List. The EA further fails to 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.

Specific risks to bees from the insecticides diflubenzuron, carbaryl, and chlorantraniliprole, as exemplified by studies and models using honey bees, are described elsewhere in this letter. But concerningly, researchers have outlined the many ways in which risk assessments may underestimate risk to native bees by relying exclusively on honey bee studies (see, for example Gradish et al. 2019). Native bees and honey bees have significant life history differences, including the following:

Honey bee queens do not forage; native bee queens do

Honey bee larvae do not eat raw pollen; native bee larvae do

Honey bees nest above the ground in hives; native bees mostly nest in the ground

Honey bees have well-defined caste systems and very large sizes; most native bees have little or no social organization and nests are very small.

Foraging exposure is different, for example foraging bumble bee adults may experience higher exposure due to their ability to be active during weather conditions and at times that honey bees do not forage, and because bumble fee foragers visit more flowers per day.

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 were described in our previous comment letters (see those).

Recommendation: In the face of declining pollinator and insect populations and the existence of federal directives for agencies to support and conserve pollinators and their habitat, APHIS must not conduct business as usual. APHIS should identify the at-risk pollinator species potentially present in the geographic area of the EAs and map their ranges prior to approving any treatment requests. Please see tables of at-risk bee and butterfly species potentially located within the project area in our 2020 comment letter. Prior to treatment, APHIS should ensure that it has identified specific, actionable measures it will take to protect the habitat of at-risk pollinator species from contamination that may occur as a result of exposure to treatment.

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

Survey for butterfly host plants and avoid any applications to host plants.

Time pesticide applications to avoid exposure to at risk species.

Do not apply pesticides (especially insecticides) when pollinators (adult and immature) are present or expected to be present.

Avoid aerial applications.

Avoid using malathion and liquid carbaryl.

Include larger buffers around all water sources, including intermittent and ephemeral streams, wetlands, and permanent streams and rivers, as well as threatened and endangered species habitat, honey bee hives, and any human-inhabited area. Buffers should be sufficient to reduce potential drift deposition to insignificant levels. For example, Tepedino (2000) recommends a three-mile buffer around rare plant populations, as many of these are pollinated by solitary bees that are susceptible to grasshopper control chemicals.

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

RESPONSE: The commenter made similar comments on EAs since 2021. Please refer to those responses.

The commenter assumes that there are widespread treatments in Montana. Of the roughly 68 million acres of rangeland in Montana, no formal requests for treatment have been received. In the event that treatments take place in 2023, less than 1% of Montana rangeland would likely 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.

9. APHIS has not demonstrated that treatments in Montana will meet the "economic infestation level." No site-specific data or procedures are presented in the EAs to satisfy APHIS' own description of how it determines that the "economic infestation level" is exceeded.

The APHIS grasshopper suppression program draws its authority from the Plant Protection Act of 2000 (7 U.S.C § 7717). The statute authorizes APHIS to exclude, eradicate, and control plant pests, including grasshoppers. Specifically, language in the PPA provides authority for APHIS to protect rangeland from "economic infestation" of grasshoppers. In its recent EIS updating the program (APHIS 2019), the Agency describes its determination of an economic infestation as follows:

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

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.

In the 2023-28 EAs, APHIS states *"The goal of the proposed suppression program analyzed in this EA is to reduce grasshopper populations below economical infestation levels in order to protect the natural resources of rangeland ecosystems, the value of livestock and wildlife forage, or cropland adjacent to rangeland."*

While the value of livestock forage is fairly easily obtained, APHIS did not—but should have—undertaken such an analysis in the EIS or the site-specific EA (or at least model it), 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 factors, nor are procedures shown that APHIS intends to abide by to determine when an economic threshold is exceeded. Instead the reader is left to simply assume that all treatments obviously meet the economic threshold.

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

In fact, the courts have held that "when an agency chooses to quantify the socioeconomic benefits of a proposed action, it would be arbitrary and capricious for the agency to undervalue the socioeconomic costs of that plan by failing to include a balanced quantification of those costs." *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F. Supp. 3d 1175, 1196–97 (D. Colo. 2014); *Motor Veh. Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *see also WildEarth Guardians v. Bernhardt*, CV 17-80-BLG-SPW, 2021 U.S. Dist. LEXIS 20792, *30 (D. Mont. Feb. 3, 2021).

Typical costs per acre can be obtained from previous treatments. For example, according to an Arizona 2017 Project Planning and Reporting Worksheet for DWP# AZ-2017-02 Revision #1 (Post treatment report) the cost of treatment amounted to $8.72/treated acre, or $3.99/"protected acre."[1] In 2019, similar post-treatment reports report the costs as $9.39 per treated acre and $4.41 per "protected acre". Note that these costs summaries only include what appear to be the direct costs of treatment (i.e. salaries and per diem of the applicators, chemical, etc.). Administrative costs do not appear to be included in these cost estimates, nor do nymph or adult survey costs.

Information from a FAIRS Report (obtained through FOIA, not from APHIS' environmental documents) for aerial applications in Wyoming appear to indicate that aerial contracts cost between $9.76-

$14.61/acre. However, the report is not easy to interpret and it is unclear if these are correct costs/acre.

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

$45.44 (2018), and $2.70-$35.60 (2019).

In determining whether a treatment is economically justified, one must ask what is the revenue expected to be received for the product? CARMA, the model used by APHIS to determine if a treatment should occur, shows that in Montana, it takes from 0-16 acres of rangeland to support one animal unit- month (AUM). Currently, on federal BLM and Forest Service lands, the US taxpayer receives $1.35 per AUM. Utilizing 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 currently receives an estimated $0.17 per acre for the forage value on BLM or USFS federal rangelands in Montana. Livestock permittees on federal lands are also provided with USDA-FSA Livestock Disaster Forage Program funds if there are natural events that impact their herds.[2] These funds reduce the economic impact of infestations for permittees and this should have been considered in the EA. Additionally, federal agency

[1] The first figure applies to the cost for areas directly sprayed, the latter figure calculates a larger "protected acre" figure assuming that treatment effects radiate out into untreated swaths. This report was obtained through a FOIA request.

[2] See: https://azgrazingclearinghouse.org/government-assistance-for-arizona-ranchers/

actions providing additional economic support for this already heavily subsidized industry at taxpayer expense must be carefully considered, analyzed, and disclosed to the public.

Given that the direct costs of grasshopper treatments to the taxpayer appear to range from $3.99 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, 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.

APHIS claims that treatments can reduce the likelihood of future outbreaks but this claim is not supported by evidence. Treatments are unreliable at thwarting outbreaks in subsequent years (Blickenstaff et al. 1974; Smith et al. 2006; Cigliano et al. 1995). At best, insecticide treatments may stem damage to forage and crops in the current year.

The EAs did not include APHIS' protocol for delineation surveys which occur in spring and summer to identify treatment areas. We know that APHIS encourages landowners to "sign up" for treatments, in an effort, it appears, to attract contract bids for the aerial effort, and perhaps to lower the per acre cost overall. Without inclusion of information about how APHIS selects nymphal survey points, how it determines which nymphal survey points are at an "economic" threshold, and how APHIS delineates treatment blocks and accounts for areas between survey points, we have legitimate concern that unjustified treatment may be occurring, with repercussions for sensitive ecological systems.

Coming up with the monetary value – or even a qualitative measure -- of wildlife forage is a completely different animal. APHIS provides zero information on how it would measure that the value of wildlife forage is threatened.

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

<u>RESPONSE:</u> This comment is similar in nature to comments in the 2020-2022 EAs, please see the APHIS responses to comments in those EAs. The analysis provided by the commenter assumes all lands treated by APHIS in Montana are public. This is not the case. Due to much of the land ownership in Montana being intermixed, private lands are often included in treatments in order for treatments 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 are 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, the cost of treating noxious weeds often introduced by hay, etc. The replacement feed costs in Montana greatly out way any treatment costs accrued by the agency.

10. The EAs fail to state that nearly all species of fungi examined contain chitin. Absent from the EAs is any discussion of how diflubenzuron could affect fungi within the affected landscape and the cascading effects on rangeland ecosystems.

Chitin is the second most abundant natural polymer after cellulose (Jimenez-Gomez and Cecilia 2020). In addition to being part of arthropod exoskeletons, chitin is found in nematodes and fungi, in fact, nearly all fungi contain chitin as part of their cell walls (Abo-Alsoud and El-Kady 2019). Fungi are vital components of rangeland ecosystem, with a “profound influence” on ecosystem resilience and invasion resistance in rangelands, according to a recent paper by Hovland et al. (2019). Fungi contribute to plant community structure by facilitating nutrient cycling ad uptake, contributing to soil structural stability, and mediating plant competition (Hovland et al. 2019).

Diflubenzuron inhibits fungal growth and development (Ramos et al. 2013; Zhou et al. 2017). In the EAs, APHIS neglected any mention of the potential for diflubenzuron applications to affect fungi and by extension, plant communities.

Recommendation: APHIS must examine the risks of diflubenzuron to fungal organisms and the plant-soil interface so important for rangeland ecosystems.

<u>Response:</u> APHIS anticipates that any impacts to fungi in rangeland that are treated with diflubenzuron will be reduced by the use of RAATS and the small areas of treatment relative to the total area of rangeland that would be left untreated. Fungi that are sensitive to diflubenzuron impacts would recolonize these areas after treatment and degradation of the insecticide. Aerobic and anaerobic soil half-lives for diflubenzuron are typically short reducing the time that fungi would be exposed to soil concentrations that could result in potential effects. The sensitivity of fungi to diflubenzuron is variable with impacts to some fungi but not to other species in toxicity studies. This was noted in the Ramos et al. 2017 paper referenced in the comment and the 2004 diflubenzuron risk assessment prepared by the U.S. Forest Service that summarized toxicity study results testing various fungal species. Diflubenzuron is also registered by the EPA Office of Pesticide Programs as a pre- and post-emergent insecticide for use on edible fungi.

11. The EAs understate the risks of the broad-spectrum insecticide diflubenzuron for exposed bees, lepidopterans, dung beetles, and other invertebrates. Diflubenzuron is toxic to a broad range of invertebrates as demonstrated in lab studies, field studies and models. APHIS mischaracterizes or minimizes studies that have demonstrated risk, while overemphasizing studies that found little risk.

In its EA, APHIS states:

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.

We dispute this conclusion and present data below that shows that important invertebrates of rangeland ecosystems are put at risk by the use of diflubenzuron.

Bees: APHIS only provides detail on toxic effects for adult bees, while ignoring or misstating effects to the life stage targeted by this insecticide: eggs and developing juveniles.

Common practice in risk assessment includes use of models to understand potential environmental concentrations, and comparing these to known toxicity endpoints for species or taxa of interest.

Another method is the use of field studies, with controls and/or pre and post treatment assessments to understand treatment effects.

APHIS did not utilize models of exposure in concert with toxicity endpoints to bolster its statement. Models do raise concern for bee mortality and for sublethal effects. As we described in our comments

on the 2021 EAs, at either the higher or lower application rates allowed by APHIS, diflubenzuron deposition on flowers and pollen (in the absence of drift or wind) is estimated to range from 1.32 – 1.76 mg/kg (equivalent to 1320-1760 ppb). Adults will collect contaminated pollen and place it in nests for consumption by developing juveniles. Comparing these deposition rates with EPA-reported toxicity endpoints, we determined that diflubenzuron at these rates would pose an acute dietary risk quotient of

4.9 and a chronic dietary risk quotient of 33.99. (A threshold value is 1.0.) Risk quotients this high above

1.0 indicate a high concern for exposed bees.

We also utilized diflubenzuron deposition values using the point zero and point 500 feet analyses presented in the APHIS drift analysis included in its 2010 BA to NMFS. Even at 500 feet from the spray, we estimate acute dietary larval RQ as 2.4 and chronic dietary RQ larval RQ as 16.6.

An acute risk quotient (RQ) of 1.0 (or higher) indicates that the estimated environmental concentration is sufficient to kill 50% 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 2.8 – 4.9 (7-12X the EPA LOC threshold) within sprayed swaths, depending on drift. Outside of sprayed swaths, even 500 foot distant from a spray, the diflubenzuron RQ estimate is 2.4, which is 6X the EPA Level of Concern.

Chronic risk to bees is evaluated with an LOC at RQ=1.0 (USEPA 2014). As indicated in our comment letter from 2021, 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. Diflubenzuron RQs are thus 17-34X the EPA Level of Concern.

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

Managed bees may also be at risk; data shows 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. APHIS appears to acknowledge the risk to managed bees in the 2023 EA by including notification to all State-registered beekeepers before a treatment, and offering buffers. However, APHIS then provides a contradictory and misleading statement that diflubenzuron is expected to have "minimal risk" to pollinators.

APHIS left out or misrepresented important studies examining impacts to native bumble bees. For example, APHIS misrepresents an important study of diflubenzuron on bumble bees (Mommaerts et al. 2006). The Mommaerts study found drastic reproductive failure at concentrations far below those that would be expected from program rates.

Considering that bumble bees (and other native bees) have inherently low fecundity, recovery may be slow in and near suppression areas. As a result, we have concerns that population level impacts could

occur to already declining native bees, resulting in potential impact to other species, such as flowering plants.

Other studies that have examined diflubenzuron impacts to bees are also left out or not adequately treated in the EA. For example, Camp et al. (2020) found that *Bombus terrestris* microcolonies fed with diflubenzuron resulted inhibited of drone production. Litsey et al. (2021) examined the impact to honey bee workers that had been exposed as larvae to chronic sublethal doses of insect growth disruptors.

Bees developmentally exposed to diflubenzuron had lower adult survival relative to controls.

Other invertebrates: APHIS also left out any mention of the results found in Graham et al. (2008), the largest field study of diflubenzuron ever conducted in Western rangelands. Graham et al. (2008) found that treated areas resulted in significantly lower abundance of non-ant Hymenoptera (this group includes bees) at two of the three treated sites compared to untreated areas Lepidoptera (butterflies and moths) also showed lower abundances in sprayed zones. Other groups that also perform pollination or contain important natural enemies were affected as well. For example, the study reported that flies and predatory and parasitic wasps were significantly lower shortly after treatments (Grouse Creek treatment), significantly lower one year post-treatment (Vernon treatment), and fewer in the Ibabah treatment. See the following figure.

Many of the effects noted in Graham were observed 1-year post treatment, a lag effect which is not unexpected since diflubenzuron acts to impede arthropod development, rather than killing adults directly.

Graham et al. 2008 (Study of APHIS aerial diflubenzuron treatment– Utah)

	Grouse Creek Treatment Area Treated May 2005 Pretreatment samples. Post-treatment samples 3-4 weeks after.	Ipabah Treatment Area Treated 2004 No pretreatment samples. Sampled 2005 (1 year post-treatment)	Vernon Treatment Area Treated 2004 No pretreatment samples. Sampled 2005 (1 year post-treatment)
	Short-term effects	**Lag effects**	**Lag effects**
	Abundance by Taxon in Treated Area (Compared to Untreated Controls)		
Beetles	Significantly lower	Markedly fewer	Significantly lower
Ants	Some genera increased, some decreased	Some genera increased, some decreased	Some genera increased, some decreased
Grasshoppers	Significantly lower	Significantly lower	Lower, not stat. significant
True bugs (esp. Lygaidae - Seed bugs)	Indications of sensitivity to treatment	Indications of sensitivity to treatment	Indications of sensitivity to treatment
Bees/ wasps	Significantly lower	Markedly fewer	Significantly lower
Flies	Significantly lower	Trend toward decreasing numbers	Significantly reduced
Lepidoptera	Increased slightly but not stat. significant	Markedly fewer	Lower, not stat. significant
Spiders	Significantly less abundant	Increased	Lower
Scorpions	Lower, not stat. significant	Significantly lower	N/A

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Nearly all of the other field studies of diflubenzuron impacts on non-targets cited by APHIS that were conducted in Western rangelands were of very small scale (40 acres or less) or were barrier treatments (not a method used in APHIS rangeland grasshopper suppression). Small acreage studies are of little use in gauging treatment impacts especially to more mobile invertebrates since small tested acres can be easily recolonized from the edges.

Dung beetles, an important group of insects that recycle nutrients, are affected by diflubenzuron. Fincher (1991) found that two dung-burying beetle species exhibited reduced larval emergence seven weeks after diflubenzuron treatment. Domingues and Mendes (2009) found that dung beetle adults exposed to diflubenzuron in manure produced significantly fewer offspring.

Lepidoptera are an important taxa in rangelands, serving as food for birds and pollinating flowering plants. Adults consume plant 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, including pesticide sprays.

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

In studies on Gypsy moth, all larvae died when exposed at 100 ug/kg food (100 ppb)

Cabbage moth (*M. brassicae*), 90% larvae died when exposed to 2200 ppb in spray (3rd instar)

Large white butterfly (P. brassicae), 50% of larvae died at 390 ppb.

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

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

Recommendation: Faced with significant and concerning pollinator declines, APHIS must better take into account the risk to native bees and butterflies from these treatments. APHIS should present a more thorough and accurate analysis on the impacts of selected pesticides to pollinators and other beneficial insects. Research findings do portend worrying results for native pollinators and other beneficial insects exposed in the treated areas, even for diflubenzuron. APHIS should constrain its treatments to take into account pollinator conservation needs—especially where Species of Greatest Conservation Need are located—and improve its monitoring capability to try to understand what non-target effects actually occur as a result of the different treatments. APHIS must examine the effects of its treatments to a broad range of beneficial rangeland invertebrates (including dung and other beetles) and find more sustainable ways to manage grasshopper/Mormon cricket outbreaks that do not put these beneficial organisms at risk.

RESPONSE: The commenter expressed similar concerns that were addressed in the 2020 - 2022 EAs. Please see the APHIS responses to those comments.

12. The EAs understate the risks of the broad-spectrum insecticide chlorantraniliprole for a range of exposed terrestrial invertebrates.

This year, states are initiating use of the insecticide chlorantraniliprole for the first time. Chlorantraniliprole is systemic, capable of being absorbed through the roots and migrating into other plant tissues, including leaf tissue, pollen, and nectar. While it appears less likely to be absorbed through leaves and stems, persistent residues in soil may be uptaken through the roots. The EAs make no mention of this. Chlorantraniliprole can be lethal to adult organisms, and (like diflubenzuron) affects larvae and eggs.

The data in the EAs on chlorantraniliprole (used to justify a finding of no significant effect for chlorantraniliprole) is woefully incomplete. Effects on butterflies and moths (Lepidopterans) is missing entirely. This is a major oversight, since chlorantraniliprole is described by Lahm et al. 2007 as having "exceptional" activity on Lepidoptera (butterflies and moths), while the product that contains chlorantraniliprole (Rynaxypyr) is described by FMC Corp. (2020) as "the industry standard for long residual control of Lepidopteran pests." Multiple studies studies have found pronounced effects on caterpillars (Krishnan et al. 2021; Liu et al. 2017; Adams et al. 2016; Coslor et al. 2019). Lepidopteran caterpillars are critical juvenile foods for many birds.

While APHIS acknowledges chlorantraniliprole is active on (toxic to) Coleoptera (beetles), an important order in rangeland ecosystems for dung recycling, food for other wildlife, and as predators, there is no examination of potential ecosystem effects from toxicity to important beetle organisms such as dung beetles. DePalo et al. (2017) found that chlorantraniliprole exhibited lethal effects on early instar larvae and adult ladybird beetles, along with a long-lasting activity, when exposed to the chemical. Birds themselves may even be at direct risk from chronic exposure of chlorantraniliprole (EPA 2020). EPA also points out that some terrestrial dicots are sensitive to the chemical.

Industry and extension officials have touted chlorantraniliprole's low toxicity to bees, however EPA (2020) points out that "the risk picture is incomplete due to a lack of toxicity data due to the potentially increased sensitivity of larval bees." Indeed, studies show that chlorantraniliprole suppresses bumble bee reproduction (Smagghe et al. 2013). Bumble bees are critical pollinators in rangeland ecosystems, including many listed plants. Chlorantraniliprole's soil persistence, discussed elsewhere in this letter, also poses a heightened risk of exposure to native bees, about 70% of which nest in the soil.

RESPONSE: Available laboratory toxicity data for technical and formulated chlorantraniliprole suggests that the product is practically non-toxic to honeybees in acute oral or contact exposures (EFSA, 2013; USEPA, 2008). In another laboratory study, the 48-hour median lethal concentration (LC50) was reported as greater than 100 micrograms (µg) a.i./bee, classifying chlorantraniliprole as practically non-toxic to honeybees (Zhu et al., 2015). Smagghe et al. (2013) reported that contact and pollen exposure to chlorantraniliprole had no effect on bumble bee survival, but exposure to dosed sugar water resulted in a 72-hour LC50 of 13.0 mg/L and a 7-week LC50 value of 7.0 mg/L. Gradish et al. (2010) reported no acute or sublethal impacts to the bumble bee, Bombus impatiens, at recommended application rates for pest control on vegetables in greenhouse applications.

Semi-field studies with two different formulations reported NOECs ranging from 52.5 to 156.16 g a.i. chlorantraniliprole/hectare (ha) (Dinter et al., 2009; USEPA, 2008). Three semi-field honeybee tunnel tests demonstrated no behavioral or flight intensity effects, nor were any hive-related impacts noted at a dose of 52.5 g/ha (Dinter et al., 2009). A similar lack of effects was noted in the bumble bees B. terrestris and B. impatiens, at an application rate of 40 g chlorantraniliprole/ha. In a field study, no effects on honeybee foraging, colony health and queen production were noted at chlorantraniliprole application rates of 230 g a.i./ha (Larson et al., 2013). The lowest reported NOEC from these studies is approximately four times the proposed RAATs application rate for chlorantraniliprole and two times the proposed full rate. Similar NOECs reported for honeybees and bumble bees have also been observed for other invertebrates such as the hover fly Episyrphus balteatus, ladybird beetle larvae Coccinella septempunctata, green lacewing Chrysoperla carnea, the plant bug Typhlodromus pyri, and predatory mite Orius laevigatus (USEPA, 2008, 2012). The low toxicity to nontarget terrestrial invertebrates has also been observed in greenhouse and field applications. Gradish et al. (2011) reported low acute toxicity of formulated chlorantraniliprole to the parasitoid Eretmocerus eremicus, the pirate bug Orius insidiosus, and the predatory mite Amblyseius swirskii, in 48-hour exposures. Brugger et al. (2010) evaluated lethal and sublethal impacts of formulated chlorantraniliprole to seven parasitic hymenopterans and found no negative impacts on adult survival, percentage parasitism, or emergence when compared to controls at rates well above the full and RAATs program rates. Tome et al. (2015) observed low toxicity of a formulation of chlorantraniliprole to two native species of stingless bees, Partamona helleri and Scaptotrigona xanthotrica. The lack of toxicity in other insect groups at rates that are toxic to grasshoppers is related to the activity of chlorantraniliprole, which is primarily through ingestion. Insects such as grasshoppers and larval Coleoptera and Lepidoptera would receive a larger dose from consuming treated plant material compared to many of the nontarget pests that have been evaluated.

Chlorantraniliprole has low toxicity to most soil borne invertebrates, with the springtail being the most sensitive test species. Lavtižar et al. (2016) evaluated the chronic effects of chlorantraniliprole to the springtail (Folsomia candida) in 28-day exposures with estimated half median effective concentration (EC50) values ranging from 0.16 to 0.76 mg/kg in various soil types. Similar studies using the isopod Porcellio scaber), the enchytraeid Enchytraeus crypticus, and oribatid mite Oppia nitens showed no sublethal effects at concentrations of 1,000 mg/kg. Other soil borne invertebrates, such as earthworms, have low sensitivity to chlorantraniliprole in acute and chronic exposures with NOEC and EC50 values, at, or greater than 1,000 mg/kg (EFSA, 2013).

13. APHIS fails to acknowledge the high risks of carbaryl to a wide variety of species (even when applied as baits).

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.[3] Larval bee toxicity was not available from the APHIS 2019 EA. However, we note that this year APHIS updated its information on carbaryl persistence, including information from EPA (2017) noting that some evaluations have found half-lives as long as 253 days. This suggests that carbaryl may be far more persistent than previously thought.

We conducted an analysis of risk to liquid carbaryl to bees in our 2021 comment letter. Even at the deposition rate APHIS expects at 500 feet away from the spray line with a lower nominal application rate of 0.375 lb ai/acre (we have already noted that these predicted deposition rates could be underestimates at that distance, based on empirical data), APHIS would exceed the acute toxicity Level of Concern designated by EPA 150-fold. All of the other deposition values have similarly disturbing exceedences of EPA's acute dietary LOC, while contact exposure also shows potential to exceed the LOC. Nowhere within the EA or the EIS is this made clear. In fact the opposite is stated in the EA: APHIS claims that there is no evidence that any species other than certain mice would be subjected to a dosage> 20% of LD50 for carbaryl. This is demonstrably false using APHIS' own deposition estimates.

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

In the EAs, APHIS states that "implementation of application buffers should significantly reduce exposure of pollinators to carbaryl treatments." But how could this be true when there are no general applications of buffers for the vast majority of bees, which are wild and cannot be protected by human owners?

[3] 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.

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.

Carbaryl baits are thought to pose less exposure to bees as the large size of the flakes means most particles would not be collected deliberately. Still, the potential for the bait to dissolve in nectar or for small particles to be picked up incidentally and mixed with pollen exists. Peach et al. (2008) found significant mortality to larval alfalfa leafcutter bees fed with pollen-nectar provisions (30% at 2 mg carbaryl; 18% at 1 mg carbaryl; control had 11% mortality). It is unknown how bait that may fall into ground nests affect bees. This is yet another study that APHIS left out of its analysis.

Carbaryl baits pose risks to other insects. Quinn et al. (1991) (yet another pertinent study not referenced in the EAs when discussing the impacts of carbaryl) examined the effects of large scale aerial treatments of carbaryl bait on carabid ground beetles (many of these are predaceous, others eat weed seeds). Baits resulted in large effects on ground beetles, with the most abundant species (Pasimachus elongatus, a predator species) declining by 75% in baited areas, while remaining unchanged in untreated areas. The second most abundant species (Discoderus parallelus, unknown food habits) also declined by 81% in the treated areas, while increasing in the untreated areas.

In a second study examining carbaryl bait effects on darkling beetles (Quinn et al. 1990), the authors found that darkling beetles declined 59%. Effects disappeared by the 2nd year. The authors attributed the lack of a carryover effect in the second year to the timing of the control treatments (they surmised that the beetles had reproduced prior to treatments), and to in-migration into the treated areas).

Other studies also found carbaryl baits affecting Coleoptera, with biomass diminished both in the short term and a year after application, compared to control areas (George et al., 1992).

Coleoptera (beetles) are important for a variety of ecological roles - food for mammals and birds, as dung burial and recycling, and predation on other insects.

There is evidence that Mormon cricket do not pose a significant risk to rangelands (McVean 1991). Therefore, bait treatments for Mormon crickets on rangelands are likely not justified.

Recommendation: APHIS must recognize the ecological impacts of applications of carbaryl, including applications put on as bait, which remains in widespread use in several states. To more effectively target non-mobile species such as Mormon crickets, APHIS should avoid block treatments and focus on barrier treatments. In addition, APHIS should limit its treatments to only areas near cropland, and work with landowners on proven methods to protect their crops as outlined in many extension documents.

<u>RESPONSE:</u> APHIS published in 2019 the Final Human Health and Ecological Risk Assessment for Carbaryl in Rangeland Grasshopper and Mormon Cricket Suppression Applications. The assessment analyzes risk of carbaryl in this program. The EPA published a review November 2022, for the label of carbaryl and the response to public comments regarding the use of carbaryl.

The EPA's response to comments regarding the use of carbaryl in APHIS grasshopper program are as follows. "The Agency's Biological and Economic Analysis Division (BEAD) has reviewed technical literature relevant to the USDA APHIS programs aimed at managing grasshoppers, crickets, as well as Forest Service and Park Service management programs aimed at wood-boring beetles in western US regions. The review concluded that for these uses carbaryl provides important pest control benefits and is one of a very limited set of effective control tactics available. For more information on the consideration of benefits, please see Assessment of Carbaryl (PC Code 056801) Usage, Benefits, and Risk Mitigation Impacts in Non-Crop Use Sites available in EPA's public docket (EPA-HQ-OPP-2010-0230). The Agency also discusses the resistance management role of carbaryl in its memorandum on agricultural uses; for that, please see Assessment of Carbaryl's (Chemical Code 056801) Benefits and Impacts of Potential Mitigation Measures in Agricultural Use Sites also available in EPA's public docket (EPA-HQ-OPP-2010-0230)."

14. 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.

The EAs and the EIS suggest 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 2023-2028 EAs: *"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 uncertain, as 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

  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 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 or chlorantraniliprole.
- 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 2022 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 present estimated environmental concentrations (EECs) in the untreated swaths and simply included statements that untreated swaths would reduce risk to nontargets. To fully understand expected environmental concentrations in treated swaths, it is important to have a clear assessment of drift under the conditions that occur under the APHIS grasshopper program. While APHIS' 2019 EIS described its use of a quantitative analysis of drift anticipated from ULV aerial applications (see HHERA for diflubenzuron) to estimate deposition into **aquatic areas**, the information presented in the EIS and HHERA is insufficient to fully understand expected environmental concentrations **in untreated swaths**. To better understand this issue, we looked more closely at several drift analyses and studies to better understand the potential for drift.

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

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

c) According to information APHIS provided to NMFS in a 2010 Biological Assessment (obtained through a FOIA request), aerial release heights may reach 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/m^2. APHIS states subsequently that the model predicts deposition at 500 feet to measure 0.87 mg/m^2. 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.[4]

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 based on the release height, 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 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 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.
- 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).

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

- 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 aerial 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.

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

<u>RESPONSE:</u> The commenter expressed similar concerns that were addressed in the 2020 - 2022 EAs. Please see the APHIS responses to those comments. APHIS believes current swathing is appropriate to both meet program objectives and mitigate risks.

15. APHIS must strengthen its collection of and presentation of environmental monitoring data.

The EAs state: "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."

Yet, if 2021's Environmental Monitoring Report is any indication, APHIS has a long way to go to achieve the goal of assuring that any environmentally sensitive sites are protected. The report on the 2021 spray program reveals that APHIS collected only 2 water samples, even though treatments that year were applied over a footprint of more than a million acres. It is unclear from the report whether cards were placed vertically, horizontally, or at an angle, of what material they were made, whether the distances shown were from the edge of the treatment block or not, whether samples were collected downwind and downstream or at a different orientation to the flow of air and water, etc.

Recommendations: APHIS must explain its methods more clearly, provide maps of monitoring points relative to spray blocks, describe the orientation of each card and the wind speeds range during each spray event where monitoring was conducted, and provide a statistically defensible number of monitoring samples. In addition, these reports should be made available to the public without having to resort to a FOIA. Environmental monitoring protocols could be strengthened by allowing public review of a draft report.

<u>RESPONSE:</u> All environmental monitoring is detailed in the March 2023 Environmental Monitoring Plan for the 2023 Rangeland Grasshopper and Mormon Cricket Suppression Program. A final report is prepared by the Environmental Compliance Unit.

16. Impacts to Greater Sage-grouse are not sufficiently explored nor is sage-grouse and their habitat sufficiently protected under the EAs.

Greater Sage-Grouse has seen its range cut in half and its population decreased 93 percent from historic numbers. An agreement is in place to prevent ESA listing through implementation of state-based conservation strategies.

Yet 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.

Large areas of Eastern Montana are designated as Priority Habitat Management Areas for Greater Sage- Grouse or as sagebrush focal areas. Sage grouse chicks are dependent upon several orders of insects until they mature enough to eat sagebrush. Although we have never seen a comprehensive set of maps or data outlining where APHIS applies grasshopper treatments, from contract solicitations it appears that Eastern Montana receives more grasshopper spray than any other part of the West.

While APHIS states that there is "low potential" for its treatments to harm sage-grouse individuals themselves, recent testing has shown direct effects on chicks in captive settings when exposed to carbaryl, including walking difficulties, dizziness, less food consumption, weakness, and less activity (Khanam, 2019).

Sage-grouse food sources may also be affected by the grasshopper and Mormon cricket treatments. Peterson (1970) identifies Coleoptera, Orthoptera (grasshoppers), Hymenoptera (primarily ants), and a variety of unidentified and immature insects as the most frequent components of sage-grouse chick diets based on crop analysis in Montana. Greg and Crawford (2009) identified Lepidoptera as important components associated w/ chick survival. Maintaining robust food supplies are important; Johnson (1987) found that insect reduction as a result of rangeland grasshopper control reduced brood sizes in a wild sage-grouse population.

The most robust studies of diflubenzuron (Graham et al. 2008) and carbaryl bait (Quinn et al. 1991 and 1992) replicated real-world APHIS treatments and tested the chemicals across thousands or tens of thousands of acres, sampled comparable unsprayed areas as controls, and conducted sampling a year after treatment to test for lag effects and recovery.

These studies found that orders of insects important to sage-grouse (and other species) were diminished due to the effects of grasshopper suppression. For example:

Carbaryl bait: Quinn et al. (1991) examined the effects of large scale aerial treatments of carbaryl bait on carabid ground beetles (many of these are predaceous, others eat weed seeds). Baits resulted in large effects on ground beetles, with the most abundant species (*Pasimachus elongatus*, a predator species) declining by 75% in baited areas, while remaining unchanged in untreated areas. The second most abundant species (*Discoderus parallelus, unknown food habits)* also declined by 81% in the treated areas, while increasing in the untreated areas.

In a second study examining effects on darkling beetles (Quinn et al. 1990), the authors found that darkling beetles declined 59%. Effects disappeared by the 2nd year. The authors attributed the lack of a carryover effect in the second year to the timing of the control treatments, (they surmised that the beetles had reproduced prior to treatments), and to in-migration into the treated areas).

George et al. (1992) also found carbaryl baits affecting Coleoptera, with biomass diminished both in the short term and a year after application, compared to control areas.

Carbaryl sprays are also highly toxic to lepidopterans as described above.

Diflubenzuron. Graham et al. (2008) found that treated areas resulted in significantly lower abundance of bees compared to untreated areas. Lepidoptera (butterflies and moths) also showed lower abundances in sprayed zones. Overall, the authors concluded that Coleoptera, Diptera, Hemiptera, non- ant Hymenoptera, Lepidoptera, Orthoptera, and Scorpiones, may be more susceptible to diflubenzuron. Differences between sprayed and unsprayed zones were greater when sampled a year after diflubenzuron application, suggesting that the effect may lag behind application. Non-ant Hymenoptera (including bees and predatory and parasitic wasps) were significantly lower in treated zones at two out of three treated sites. Ants showed differences at the genus level in their responses to diflubenzuron treatment. Some genera (for example, *Forelius*) had higher numbers in sprayed zones, while the abundance of other genera (for example, *Tapinoma*) was lower in sprayed zones.

Formica and *Tapinoma* tended to have lower numbers in treated zones, while *Forelius* and perhaps *Pheidole* tended to increase in treated zones. The effect on such a wide array of insect,

including orders important to sage-grouse, both shortly after treatment and one year later, suggests that APHIS needs to put into place stronger mitigations to eliminate any treatments on lek, nesting and brood-rearing areas and to buffer these areas widely.

Chlorantraniliprole: Chlorantraniliprole is also highly toxic to Lepidopterans as described above. As a broad-spectrum insecticide and as a chemical specifically chosen to target beetles in other locations (i.e. Japanese beetle eradication effort in Portland, OR), effects to Coleoptera which sage-grouse rely upon are likely.

BLM's Montana office has identified some mitigations in place to protect sage grouse on BLM land but these do not go far enough. Protecting habitat within 4 miles of the leks is especially important. After coming to the leks to mate, the females nest in the general vicinity of the leks, depending on the availability of suitable habitat. According to www.sagegrouseinitiative.com, most nesting occurs within 3 miles of leks, though some nests may be as far as 12 miles from the nearest lek.

Under the 2023 EA for Montana, it is clear that leks and surrounding areas are not adequately protected in Montana from aerial applications, even though these and surrounding areas are where most of the chicks are produced and where it is especially important that food sources include the insects that sage grouse chicks most need (grasshoppers, beetles, Lepidoptera, ants, and other insect species).

Conservation Recommendations from the USFWS to Oregon in its 2021 concurrence letter included the following: *"Sage-grouse brood areas should be located if not already known, and protected from insecticide spraying (Johnson 1987). Grasshopper control should also be delayed in brood-rearing areas to allow for maximal chick development before spraying reduces their insect forage (Johnson 1987).The*

Service recommends APHIS use these guidelines to avoid pesticide spraying of nesting and brood-rearing areas for sage-grouse in order to prevent further declines from current sage-grouse population levels. "

Recommendation*:* APHIS should address the deficiencies in its plan, and implement stronger protections for sage grouse in keeping with state and regional conservation strategies and USFWS recommendations. Since most chick rearing happens within a certain distance of leks, APHIS should implement firm no-treatment 4-mile buffers around leks (or wider to protect against drift) that prohibit the use of any insecticide. There is too much risk from the use of any of these chemicals to allow their use within chick-rearing areas.

RESPONSE: All requesting/cooperating land-managers are asked for areas that should be excluded, specifically for the sage grouse. In addition, the Montana Sage Grouse Habitat Conservation Program has determined annually since 2020 that, "Exempt activities are identified in Executive Order 12-2015 (EO), as described in Attachment F. The exemptions include herbicide and pesticide use including Grasshopper and Mormon cricket control following reduced agent-Area Treatments (RAATS) protocol. Therefore, this activity is exempt per the EO."

17. 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. For example, elimination of "non-pest" grasshoppers generated this concern from ARS scientist David Branson and collaborating researchers:

> *The overwhelming majority of grasshoppers killed in control programs are not causing the problem and may be beneficial."* (Branson et al. 2006)

The possibility that grasshopper control can worsen future outbreaks has explored by respected grasshopper researchers in a number of publications. For example, see Joern (2000) who discussed this information and concluded that large-scale grasshopper control may contribute to grasshopper problems. An analysis of adjoining Montana and Wyoming counties supported this analysis, showing that where large-scale chemical control was not regularly applied, acute problems rapidly disappeared and long intervening periods of low grasshopper density persisted. Conversely, in places where a history of control existed, chronic, long-term increases in grasshopper populations were observed (Lockwood et al. 1988).

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

APHIS often stretches science to the point beyond where it is credible. For example, APHIS cites a study by Catangui et al. (1996-2000) which investigated the effects of Dimilin on non-target arthropods at concentrations similar to those used in the rangeland grasshopper suppression program. In APHIS' characterization, the study showed that treatment with Dimilin should be of no concern since applications resulted in "minimal impact on ants, spiders, predatory and 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.

In contrast the field study of large scale applications by Graham et al (2008) found significant effects to important natural enemies of grasshoppers, including Diptera, and non-ant Hymenoptera. These groups contain important predators and parasitoids of grasshoppers and other organisms. These are the very organisms that help regulate grasshopper populations.

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 instars[5] will have a **maximum impact on nontarget arthropods**.*" [Emphasis added]

Large scale treatment effects on ground beetles were investigated by Quinn et al. 1991. While this study was more akin to real-life treatments in the design, and found that initial large effects on ground beetles had disappeared by the 2nd year, this study did not investigate diflubenzuron or chlorantraniliprole, only malathion and 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 (and chlorantraniliprole) would kill juvenile stages of insects and both are more persistent than either malathion or carbaryl, these chemicals could have quite a different effect than the two chemicals examined by Quinn et al. 1991. Therefore this study cannot be relied upon to assume 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 the future, as they are released from the control of natural enemies."*

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

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

Response: The commenter again refers to comments addressed in the 2020-22 EAs. Please see response to comments.

The commenter assumes that there are widespread treatments in Montana annually. Of the roughly 68 million acres of rangeland in Montana, no treatments occurred in 2022 and no formal requests have been requested for treatment in 2023. In the event that treatments take place in 2023, less than 1% of Montana rangeland would be treated utilizing the RAATs method.

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

The EAs do not discuss the state Species of Greatest Conservation Need (SGCN) list for birds (or other taxa) in Montana. Nothing is said about conservation measures for these species. The EA should explore the impacts to these focal species.

As a group, terrestrial birds rely heavily on grasshoppers and other insects for food. 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 Greater sage-grouse, Swainson's hawk, Sprague's pipit, Baird's sparrow, chestnut-collared longspur, 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 claims that use of RAATS (again not strictly defined in Alternative B therefore very squishy in its possible implementation) would leave an adequate prey base for these birds, even though the EAs simultaneously state that RAATS only reduces grasshopper mortality slightly compared to conventional application.

Based on the drift information we have seen and presented elsewhere in this comment letter, and the likelihood of at least short-term effects to the prey base that is documented in a variety of studies, we question the conclusion that even RAATs treatments within the habitat of declining bird species would not be likely to have a significant impact.

For example Sample et al. (1986) examined the effects of diflubenzuron exposure to nine species of songbirds. The data showed that while diflubenzuron is not directly toxic to vertebrates, birds were affected indirectly through reduced availability of Lepidoptera larvae. Birds possessed differing capabilities to compensate for these diflubenzuron-induced food reductions. Most birds adjusted by switching prey, while others consumed less food.

The EAs acknowledge that the use of diflubenzuron will **reduce immature insects up to 98%,** but goes on to state without evidence that the number of remaining insects are *"most likely sufficient to sustain birds and other insectivores until insect populations recover."* And goes on, "*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.*" The use of these broad-spectrum insecticides will inflict lasting damage on already imperiled bird populations.

As described above, other studies show that several groups of insects relied on by many birds, such as grasshoppers, beetles, and Lepidoptera, are adversely affected by diflubenzuron sprays and carbaryl bait, even when RAATs are employed (Graham et al. 2008; Quinn et al. 1991 and 1992).

A recent study estimated a net loss of nearly 3 billion birds since 1970, or 29% of 1970 abundance in North America (Rosenberg et al. 2019). It is critical to recognize that grassland birds—an important group of species that extends well beyond the iconic sage grouse—have suffered the largest decline (53%) among habitat-based groups since 1970, while populations of six species of grassland birds (Baird's sparrow, Cassin's sparrow, Chestnut-collared longspur, lark bunting, Sprague's pipit, and McCown's longspur) have declined by 65-94%. This is never disclosed in the EA nor considered in the cumulative effects analysis. The Prairie Pothole Region of the northern Great Plains is critical breeding, nesting and migration habitat for these grassland birds, including the species that have suffered major population declines.

Though direct effects on birds are listed as not likely, the indirect effects on vertebrates are not wholly accounted for. The loss of invertebrate prey, especially grasshoppers and lepidopteran larvae, are devastating grassland bird populations.

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. The use of broad-spectrum insecticides and other pesticides has been repeatedly found to impact bird populations via declining insect populations, including a study which "demonstrated that the use of fertilizers and pesticides had reduced the abundance of insects, with consequences for the abundance of insectivorous bird species…" (Møller et al., 2021).

Recommendation*:* APHIS must address the potential for indirect impacts to rangeland birds, factoring in the noted declines documented for grassland birds, looking closely at how the scale of treatments may impact populations, and considering the cumulative impact of insecticide exposure to prey in combination with existing stressors already impacting these imperiled birds.

RESPONSE: The commenter made similar comments in 2020-22 EAs. Please refer to those responses. The commenter assumes that there are widespread treatments in Montana annually. Of the roughly 68 million acres of rangeland in Montana, no treatments occurred in 2022 and no formal requests have been requested for treatment in 2023 to-date. In the event that treatments take place in 2023, less than 1% of Montana rangeland would be treated utilizing the RAATs method.

19. 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 both chlorantraniliprole and diflubenzuron than other taxa (Eisler 1992; Lahm et al. 2007).

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 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.

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

RESPONSE: The commenter made similar comments in 2020-22 EAs. Please refer to those responses.

20. Key Endangered Species Act information is missing

While the Montana 2023-28 EAs include its determinations, no information is provided to explain these determinations, nor are the specific buffers to protect listed, proposed, or candidate species described.

Neither the Biological Assessment nor the Concurrence letter is included in the Draft EAs.

Since the Services do not evaluate No Effect calls to listed species, including justification for such calls in the body of the EA is especially important.

Due to the absence of such concurrence at this stage, it is incumbent upon APHIS to disclose its determinations for all species and the measures it plans to implement to avoid impacts to listed species.

We provided several comments on inadequacies of the APHIS GH/MC Biological Assessment in our 2021 comment letter (for example, scant or incomplete reasoning to support conclusions, lack of analysis of impacts to pollinators or prey of listed species, lack of clarity on whether drift analyses were available to USFWS – and other comments) and hope that APHIS took steps to improve the 2023 BA. Please incorporate those comments by reference.

In the 2023 EAs, APHIS references “buffers and other operational procedures” that will be applied to protect listed species, but does not provide any detail on how large these would be and whether they would vary by chemical, formulation or application method. As a result it is impossible for us to evaluate the adequacy of protection for listed species. However, we note that in the concurrence letter from FWS included in the 2022 Final EAs, buffers for ground sprays were ambiguous. We urge APHIS to include adequate buffers from suitable habitat should ground applications be used.

Also, from last year's BA and concurrence, it appeared that Montana APHIS was planning to allow aerial or ground applications of diflubenzuron or carbaryl bait within 3 miles of the Spalding's catchfly habitat.

If so, APHIS has not discussed the potential for diflubenzuron (and chlorantraniliprole) 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 (and are they apprised this year about the risks of chlorantraniliprole to larval bees – see EPA (2017)) to the viability of this species, and thus is its concurrence adequately informed?

It is also unclear if APHIS will institute protections around only known occupied habitat or also around predicted suitable habitat (for example, see map of predicted suitable habitat for *Spiranthes diluvialis* from the Montana Natural Heritage Program (2020). Instituting buffers around predicted suitable habitat would be the prudent course of action for any listed species for which such modeling is available.

Finally, APHIS makes no mention of how it will consider upstream and watershed effects to species that utilize streams or rivers. The diflubenzuron label indicates that the chemical is subject to runoff for months after application. Given this, together with the vast size of past treatment areas, numbering in the hundreds of thousands of acres in many cases, such considerations

Recommendations: In the Draft EAs, APHIS should present its reasoning for the listed species determinations. In the Final EAs, the letters of concurrence must be attached. APHIS should clarify its protective measures in the Final EAs. If USFWS was not aware of toxicity information, modeled or empirical drift, or other exposure considerations, APHIS must provide its information to USFWS in a revised request for consultation. All determinations must be supported by thorough, complete analysis

and accurate disclosure of the scientific studies underlying their reasoning. Under the ESA there must be disclosure of potential impacts under the treatments, an analysis of whether the project would jeopardize the continued existence or modify or destroy the critical habitat for each adversely affected listed species, according to any active ingredients that may be selected. Determinations must include an analysis of direct and indirect effects to the listed species. Pesticide specific conservation measures for each listed species (actions to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the proposed action), where appropriate, should be explicitly addressed and adopted.

APHIS should institute buffers around predicted suitable habitat (not just occupied habitat) for any listed species for which such modeling is available. APHIS should include buffers even for ground applications for all species. APHIS should also consider upstream and watershed effects for aquatic species, and institute protections to guard against flushes of pesticide into their habitats.

For each species to be protected within the project area, APHIS must provide to applicators a set of clear directions outlining protective measures for the listed and proposed species found within this project area. In addition to these measures, APHIS should adopt the following operational guideline across all site-specific EAs: *"Use Global Positioning System (GPS) coordinates for pilot guidance on the parameters of the spray block. Ground flagging or markers should accompany GPS coordinates in delineating the project area as well as areas to omit from treatment (e.g., boundaries and buffers for bodies of water, habitats of protected species, etc.)."*

APHIS should also ensure that it has done due diligence in being aware of listed species or their habitat present on private land by asking specifically about this when gathering treatment requests.

RESPONSE: Every land manager who request suppression is specifically asked about threatened and endangered species and other sensitive sites to be excluded or mitigated.

Consultation with the USFWS under the Endangered Species Act is a separate process and occurs annually. The Biological Assessment and subsequent Concurrence Letter from USFWS will outline the agreed-to mitigation measures for those species. No suppression activities will occur until consultation between APHIS and USFWS is complete.

21. The monarch butterfly is now a candidate species under the Endangered Species Act, but APHIS provides no mention of protecting them or their host plant, milkweed, from pesticide exposure.

No information is available in the EAs about the potential for effects to the monarch butterfly, recently designated a Candidate species under the Endangered Species Act. Similarly no conservation measures are included. APHIS must address the oversight and analyze impacts to the monarch under all alternatives.

For example, 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). More recent conservation guidelines from the U.S. Fish and Wildlife Service also recommend more robust buffers from milkweed for aerial applications.

Unfortunately, none of the pesticides that APHIS includes in its program are specific to grasshoppers or Mormon crickets. All of the pesticides in the APHIS program are active on other taxa of invertebrates, including butterflies and moths. Malathion is in group 1b, carbaryl in group 1a, diflubenzuron in group 15, and chlorantraniliprole in group 28 and each of these groups are active on Lepidoptera (IRAC 2020).

As mentioned above, chlorantraniliprole is described by Lahm et al. 2007 as having "exceptional" activity on Lepidoptera (butterflies and moths), while the product that contains chlorantraniliprole (Rynaxypyr) is described by Crop Life America as "the industry standard for long residual control of Lepidopteran pests."

Applications of chlorantraniliprole by USDA APHIS would be expected to deposit on plant surfaces between 1430-2200 ppb in the absence of drift (based on EPA's Bee-Rex model). At just 1000 ppb, 83% mortality of caterpillars occurred in a study of chlorantraniliprole by Liu et al. (2017). More concerningly, 50% mortality of monarch caterpillars occurred when consuming leaves with deposits of chlorantraniliprole at merely 1.6 to 8.3 ppb (Krishnan et al. 2021; Krishnan et al. 2020), obviously raising concern that drift, which is unavoidable from any liquid spray, could adversely affect monarchs beyond the small 50' buffers designated in the EAs.

The risk of liquid carbaryl applications would also be unacceptably high for Lepidoptera, including the monarch, based on data from Abivardi et al. (1999) as explained earlier in this comment letter. Any of the liquid insecticides poses a concern to caterpillars of these species if exposed.

In addition, lepidopteran species are often quite sensitive to diflubenzuron, as documented elsewhere in this comment letter, therefore, impacts to this highly diminished species from diflubenzuron should be specifically analyzed.

Recommendation: We urge you to rethink and strengthen conservation measures for monarch butterfly. On monarch, buffering out known or potential milkweed areas would be an important conservation recommendation. Known and modeled habitat maps are available from at least three sources:

- Waterbury et al. 2019
- Dilts et al. 2019
- Western Monarch Milkweed Mapper

Any use of liquid insecticides warrants buffers from milkweed stands or areas where these may potentially occur. In order to limit harm to monarch, a species in steep decline, we recommend a 3-mile buffer from known or potential milkweed stands for aerial applications and a 1-mile buffer from known or potential milkweed stands for ground applications to provide a reasonable margin of conservation protection. Even these measures would not be able to protect migrating monarch who are nectaring outside of milkweed stands.

RESPONSE: The commenter posed a similar comment in 2021 and 2022. Please see the response to those comments.

22. Recent national consultation efforts (including a Biological Opinion) for carbaryl effects to listed species show the potential for widespread harm and even jeopardy.

The EAs do not mention a recent nationwide consultation effort on carbaryl's effect to listed species. In March 2023, National Marine Fisheries Service (NMFS) released its Biological Opinion on

carbaryl, finding grave harms from the chemical including determinations of jeopardy to 37 species. This is an extraordinary indictment of the chemical and finding of harm.

EPA released a final BE for carbaryl in March 2021 (EPA 2021). This BE made determinations of Likely to Adversely Affect (LAA) for 1,640 species and 736 species' critical habitats. The BE includes a documentation of a variety of effects to birds, mammals, insects, bees, fish, aquatic inverts, and plants. While the consultation has yet to be fully completed, these determinations are an indicator of widespread impact from use of this chemical. Mitigation under APHIS' program should be designed to eliminate, not just avoid, harmful effects from this very toxic chemical.

Species in Montana that are likely to be adversely affected by use of carbaryl, as determined in the BE, are nowhere mentioned in APHIS' EAs.

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

RESPONSE: The commenter referenced the draft Biological Opinion published by EPA, issued by NMFS concerning the use of carbaryl is likely to jeopardize 37 listed species and critical habitat. This document lists the carbaryl species conclusions are for 37 species that either are salmon, sockeye, steelhead, sturgeon, grouper, coral, and killer whale. These species do not occur in Montana.

The commenter failed to describe the Reasonable and Prudent Alternatives (RPA) issued in the Biological Opinion to be used to decrease the risk of exposure to listed species. NMFS believes the RPMs described below are necessary and appropriate to minimize the impacts of incidental take on threatened and endangered species:

RPM 1. Revise and approve all carbaryl and methomyl product labels and develop relevant EPA Endangered Species Protection Plan Bulletins to conserve ESA-listed species.

RPM 2. Improve ecological incident reporting, develop ESA educational materials, and report label compliance.

On November 22, 2022, the EPA issued an interim registration review for Carbaryl. The following requirement was added to the label which was recommended by NMFS in their Reasonable and Prudent Alternatives section of the BiOp. "**Direction for Use: Endangered Species Protection Requirements.** Before using this product, you must obtain a Bulletin at any time within six months of the day of application. To obtain Bulletins, consult http://www.epa.gov/espp".

APHIS acquired EPA bulletins for all T&E species in February 2023, even though the older labels on carbaryl products do not require this direction. According to EPA bulletins," no pesticide use limitations exist within the action areas (listed in the EA's), for the month/year and product selected, beyond the instructions specified on the pesticide label. Follow the use instructions on your label." APHIS is in compliance with EPA and the RPA issued in the BiOP.

23. Aquatic areas are not adequately protected with the existing buffers

Given the potential for drift (outlined above and charted in the APHIS 2010 BE to NMFS) and the critical importance of aquatic areas in arid rangeland environments, the current buffers for aquatic habitats do not provide enough margin of safety. Significant drift may still occur even with buffers of 500 feet. In addition, a huge number of rangeland species depend on riparian and aquatic areas.

Recommendation: APHIS should increase the margin of safety for riparian and aquatic habitats. Any buffer should be measured from the edge of the riparian or wetland habitat (not the streambed itself). Buffers should be strengthened to ensure that there is no likelihood of drift into these important habitats.

RESPONSE: This Comment is similar to a comment on the 2022 EA. As stated then, 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.

24. APHIS dismisses water quality concerns, includes misleading information about the potential for its chemicals to contaminate water, and includes no information about whether an NPDES permit has been obtained, and what provisions it includes.

Water is life in the arid West. The diflubenzuron Dimilin 2 label indicates that the chemical is subject to runoff for months after application, and could result in discharges to surface water. Despite this, APHIS suggests that diflubenzuron is unlikely to contaminate water, given its low solubility and affinity for organic material. But other pesticides with similar properties, such as pyrethroids, regularly make their way into aquatic systems (soil erosion is one key way) and these pesticides generally are found persisting in sediments, rather than the water column itself. Because so many aquatic invertebrates are benthic, and considering the fact that intermittent, ephemeral or seasonal streams enjoy no buffer protections, we have serious concerns about contamination of aquatic systems from the use of diflubenzuron, even with the buffers required for perennial streams.

Like diflubenzuron, chlorantraniliprole is persistent, but even more so, taking from 228 to 924 days for soil concentrations to be halved. In its 2018 ecological risk assessment, the EPA reported field dissipation half-lives up to 1130 days in studies on bare ground plots, meaning that if degradation is linear, it could take as long as fifteen years for the chemical to fully disappear from certain soils.

Unlike diflubenzuron, chlorantraniliprole is mobile, meaning it has higher potential to move through the soil, reaching ground water.

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

Both chemicals are toxic to mollusks and other aquatic invertebrates, raising concern about their potential impacts for important stream biota. Given their persistence, aquatic impacts from these chemicals could occur weeks or months beyond the treatment period. It is not clear if environmental monitoring is conducted in such a way as to pick up delayed transfer of APHIS chemicals to nearby waterways.

It is also unclear whether stock ponds are covered by the 500’ buffer from surface water (see our comments on the biodiversity benefits of stock ponds in our 2022 comment letter.

Recommendation: APHIS should include buffers not just around surface water present at the time of treatment but also around ephemeral, intermittent, and seasonal water bodies, and around stock ponds. APHIS must disclose whether its program has obtained an NPDES permit, or whether this requirement has been waived (and if so, why). APHIS must comply with state water quality standards and disclose impacts to water quality in the EA. APHIS should also disclose its environmental monitoring reports at its website and conduct environmental monitoring in such a way as to test for runoff effects weeks or months after treatment, in addition to drift at the time of treatment.

RESPONSE: The commenter made a similar comment in 2021 and 2022. Please see the response from 2021.

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

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

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

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

Recommendation: As discussed earlier, both diflubenzuron and chlorantraniliprole present a risk of runoff to aquatic systems months after application. APHIS must disclose impacts to at-risk mussels where they are present. In addition, APHIS should use larger buffers to protect freshwater mussels, such as those designated for listed salmonids in other states. In addition, APHIS should include monitoring for the presence and health of mussels in streams that traverse or are adjacent to treatment areas as part of its monitoring strategy.

Response: The commenter made the same comment in the 2020-2022 EAs. Please refer to those responses.

26. 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, National Parks, Research Natural Areas, National Wildlife Refuges, Important Bird Areas 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 frequently associated with some of the last refugia for declining species. In addition there is no mention of whether the program is in compliance with the 1977 Montana Wilderness Study Area Act.

Recommendation: These special status areas have been designated for specific purposes and generally discourage human intervention with the natural ecosystem. Grasshopper suppression should not be undertaken in such areas. APHIS must review its procedures and ensure that it is not in danger of violating any federal laws or policies pertaining to such special designations. Buffers should also be considered to prevent drift into specially designated areas.

Response: The commenter made the same comment in the 2020-2022 EAs. Please refer to those responses. APHIS does not make treatments on lands of special status without a request from that agency and an evaluation of the whether treatments are necessary. Additional protection measures for these types of lands are established by the agency requesting treatment and are followed by APHIS.

27. Avoidance of Lands Where Organic or Transitioning Production Occurs

The general treatment guidelines for 2023 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. The USDA Risk Management Agency does not include pesticide drift or contamination as an insurable event for transitioning or organic growers, meaning that unintentional pesticide exposure resulting from label-approved use is not insurable. 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.

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

Response: The commenter made the same comment in the 2020-2022 EAs. Please refer to those responses. APHIS continues to try to communicate with organic growers and associated organizations.

28. Extent of treatment to public and 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 Montana EAs even suggest that treatments on BLM lands will be considered when those treatments are requested by non-BLM parties.

The EAs note that APHIS will also take requests for treatment from private landowners to private land. 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 occupied by listed or candidate species on private land may be difficult or tricky.

Recommendation: APHIS should clarify whether and how it decides to treat private lands and what the likely impacts of that would be. APHIS should ensure that it is not overlooking the potential conservation issues that may exist on private lands, for example the presence of habitats for listed species or species of conservation interest should be specifically asked about on the treatment request form.

RESPONSE: See Appendix C for list of questions asked of all landowners. We will consider adjusting to include your recommended verbiage.

29. Cumulative effects analysis

There is insufficient analysis of cumulative impacts in the EAs. For example, the EAs do not adequately disclose the locations where spraying has occurred in the past, nor did the APHIS 2019 EIS.

In the EAs, APHIS states that cumulative effects associated with the Preferred Alternative "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. But without information provided about the location and scale of treatments in any previous years, and with the EAs' lack of attention to important studies that show impacts from grasshopper suppression chemicals to a wide variety of invertebrates (as we have already detailed), we believe an adequate analysis of cumulative effects is missing from the 2023 EAs.

Based on our independent review of contract solicitation maps (not easy to find), Montana's history of recent treatments does not support APHIS's statement that the probability of an outbreak occurring in the same area as a previous outbreak is not necessarily based on firm evidence. In fact, APHIS has treated large areas in close proximity, and even in overlapping areas in recent years, and it appears that large treatment areas concentrated in certain parts of Montana have been the norm for quite some time (Cigliano et al. 1995), suggesting that APHIS is stating the opposite of the truth in the EAs.

Shell and Lockwood (1997) examined decades-long patterns of outbreaks in Wyoming and were also able to map higher-probability outbreak areas. 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.

APHIS mentions the many products that may be used on private lands and states that the impact of these private lands uses could be worse if the APHIS program did not exist. This self-justification of the program is based on speculation, and does not consider another alternative – what the impacts might be if chemical control were not the primary solution considered by APHIS.

APHIS does not give serious consideration to the potential impact of its grasshopper insecticides co- occurring with other pesticides in the environment. Yet such environmental mixtures are the norm, not the exception, and should be considered and analyzed particularly with respect to focal non-target wildlife (Mullin et al. 2010; Cedergreen 2014). APHIS seems to believe that only other insecticide applications would be of concerns, stating "rangeland is unlikely to receive insecticide applications for any reason except for grasshopper/Mormon cricket treatment." However this ignores insecticide treatments on croplands (croplands can be treated by APHIS) and ignores the potential for additive and/or synergistic effects with fungicides and herbicides (Cedergreen 2014).

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

Finally, the EAs do not discuss in any meaningful way the cumulative effects flowing from APHIS's treatments and other pesticide treatments conducted by private, state, tribal, and federal actors. Some states have grasshopper programs that also operate at the state and local level. There is no mention of this or of their scale, if these in fact exist in Montana.

APHIS does not exist in a vacuum; pesticide use is widespread. Yet the EAs sweep potential cumulative effects under the rug by focusing only on treatments conducted in the precise same areas as APHIS's treatments. There is no discussion of how treatments conducted *nearby*—pesticides applied to crops by farmers, for instance—might interact with APHIS's treatments.

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

Response: The commenter made the same comment in the 2020-2022 EAs. Please refer to those responses.

30. 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 declining but not yet listed species, Resource Management Plan requirements, limitations on special status lands, etc. Due to the numerous sensitive species and the spatial specificity of such issues, the national MOUs simply cannot adequately address such concerns.

Unfortunately APHIS also makes no mention 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 (Onsager, 1996- 2000) 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 sanguinipe*s grasshoppers and significantly less damage to forage. Under rotational grazing, the nymphs developed significantly slower and their stage-specific survival rates were significantly lower and less variable.

Consequently, significantly fewer adults were produced significantly later in the season under 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. While we don't endorse any particular grazing strategy, this is an issue APHIS should have carefully considered. APHIS should also consider whether reducing the number of AUMs authorized, or eliminating grazing entirely, would be a reasonable alternative to repeated applications of toxic chemicals to large swaths of land.

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

As described above birds may consume 50% of grasshoppers on site. Ensuring healthy bird populations is critical for long-term grasshopper management.

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

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

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

APHIS must not take a limited view of its role and responsibilities, and should utilize any available mechanism to require land management agencies to diminish the severity, frequency and duration of grasshopper outbreaks by utilizing cultural management actions. For example, Memoranda of

Understanding (MOUs) should be examined and updated to ensure that land management agencies are accountable in utilizing cultural techniques to diminish the carrying capacity of pest species.

Longer-term strategic thinking should include:

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

Response: The commenter made the same comment in the 2020-2022 EAs. Please refer to those responses.

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

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

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

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

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

Response: The commenter made the same comment in the 2020-2022 EAs. Please refer to those responses.

Thank you for the opportunity to comment on these actions. We recognize that it is challenging to balance various uses of these rangelands. With mounting science showing concerning declines in pollinators and other insects, APHIS should use its influence with land management agencies to ensure lands are maintained in a manner that prevent spikes of pest grasshoppers to avoid use of harmful pesticides on native grasshopper populations and habitats. Such forward thinking would not only could avoid harmful pesticide uses, it also would allow our valuable rangelands to better support pollinators and healthy ecosystems.

Please feel free to contact us should you have questions on our comments.

VII. References Cited:

Abivardi, Cyrus, [and others]. 1999. "Effects of Carbaryl and Cyhexatin on Survival and Reproductive Behaviour of Cydia Pornonella (Lepidoptera: Tortricidae)." *Uppl. Bid* 134: 143–51.

Abo Elsoud, Mostafa M., and E. M. El Kady. 2019. "Current Trends in Fungal Biosynthesis of Chitin and Chitosan." *Bulletin of the National Research Centre* 43 (1): 1–12. https://doi.org/10.1186/s42269-019-0105-y

Adams, A., J. Gore, A. Catchot, F. Musser, D. Cook, N. Krishnan, and T. Irby. 2016. "Residual and Systemic Efficacy of Chlorantraniliprole and Flubendiamide Against Corn Earworm (Lepidoptera: Noctuidae) in Soybean." *Journal of Economic Entomology* 109 (6): 2411–17. https://doi.org/10.1093/jee/tow210.

Animal and Plant Health Inspection Service (2023). Draft Environmental Assessments Rangeland Grasshopper and Mormon Cricket Suppression Program [in the state of Montana] https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease- programs/ea/grasshopper-cricket-ea/grasshopper-cricket-by-state

Bell, C. and L.M. Tronstad. 2021. Distribution of declining bumble bees in central and eastern Wyoming. Report prepared by the Wyoming Natural Diversity Database for the Wyoming Office of the Bureau of Land Management.

Belovsky, G.E., J. A. Lockwood, and K. Winks. Spring 1996 - 2000. "Recognizing and Managing Potential Outbreak Conditions." In *Grasshopper Integrated Pest Management User Handbook*, edited by Technical Coordinators Gary L. Cuningham and Mike W. Sampson. Technical Bulletin No. 1809. Washington, DC: United States Department of Agriculture Animal and Plant Health Inspection Services. https://www.sidney.ars.usda.gov/grasshopper/Handbook/index.htm.

Berry, J.S., W.P. Kemp, and J.A. Onsager. Spring 1996 – 2000. "Hopper, Version 4.0, Users' Guide: Decision Support System for Rangeland Grasshopper Management." In Grasshopper Integrated Pest Management User Handbook, edited by Technical Coordinators Gary L. Cuningham and Mike W. Sampson. Technical Bulletin No. 1809. Washington, DC: United States Department of Agriculture Animal and Plant Health Inspection Services. https://www.sidney.ars.usda.gov/grasshopper/Handbook/index.htm

Branson, David H., Anthony Joern, and Gregory A. Sword. 2006. "Sustainable Management of Insect Herbivores in Grassland Ecosystems: New Perspectives in Grasshopper Control." *BioScience* 56 (9): 1–13.

Bock, C. E., Bock, J. H., & Grant, M. C. 1992. Effects of bird predation on grasshopper densities in an Arizona grassland. Ecology, 73(5), 1706-1717.

Cameron, Sydney A., Jeffrey D. Lozier, James P. Strange, Jonathan B. Koch, Nils Cordes, Leellen F. Solter, and Terry L. Griswold. 2011. "Patterns of Widespread Decline in North

American Bumble Bees." Proceedings of the National Academy of Sciences of the United States of America 108 (2): 662–

67. https://doi.org/10.1073/pnas.1014743108.

Camp, A. A.,A. Batres, W. C. Williams, and D. M. Lehmann. 2020. "Impact of Diflubenzuron on Bombus Impatiens (Hymenoptera: Apidae) Microcolony Development." *Environmental Entomology* 49

(1): 203–10. https://doi.org/10.1093/ee/nvz150.

Capinera, J. L., and T. S. Sechrist. 1982. "Grasshopper (Acrididae) — host plant associations: Response of grasshopper populations to cattle grazing intensity." *The Canadian Entomologist* 114 (11): 1055 - 1062.

Catangui, M.A, B.W. Fuller and A.W. Walz. Spring 1996 - 2000. "Impact of Dimilin on Nontarget Arthropods and Its Efficacy Against Rangeland Grasshoppers." In *Grasshopper Integrated Pest Management User Handbook*, edited by Technical Coordinators Gary L. Cuningham and Mike W. Sampson. Technical Bulletin No. 1809. Washington, DC: United States Department of Agriculture Animal and Plant Health Inspection Services. https://www.sidney.ars.usda.gov/grasshopper/Handbook/index.htm.

Cedergreen, Nina. 2014. "Quantifying Synergy: A Systematic Review of Mixture Toxicity Studies within Environmental Toxicology." *PloS One* 9 (5): e96580. https://doi.org/10.1371/journal.pone.0096580.

Cigliano, Maria Marta, William P. Kemp, and Thomas M. Kalaris. 1995. "Spatiotemporal Characteristics of Rangeland Grasshopper (Orthoptera: Acrididae) Regional Outbreaks in Montana." *Journal of Orthoptera Research*, no. 4: 111–26. https://doi.org/10.2307/3503466.

Coslor, Charles C., Christine Vandervoort, and John C. Wise. 2019. "Insecticide Dose and Seasonal Timing of Trunk Injection in Apples Influence Efficacy and Residues in Nectar and Plant Parts." *Pest Management Science* 75 (5): 1453–63. https://doi.org/10.1002/ps.5268.

DePalo, Laura, Alberto Lanzoni, Antonio Masetti, Edison Pasqualini, and Giovanni Burgio. 2017. "Lethal and Sub-Lethal Effects of Four Insecticides on the Aphidophagous Coccinellid Adalia Bipunctata (Coleoptera: Coccinellidae)." *Journal of Economic Entomology* 110 (6): 2662–71. https://doi.org/10.1093/jee/tox243.

Deneke, D. and J. Keyser. 2011. Integrated Pest Management Strategies for Grasshopper Management in South Dakota. South Dakota State University Extension.

Dilts, T.D., M. Steele, S. Black, E. Craver, J. Engler, S. Jepsen, A. Jones, S. McKnight, E. Pelton, A. Taylor, and M. Forister. 2018. "Western Monarch and Milkweed Habitat Suitability Modeling Project Version 2 – Maxent Model Outputs." Xerces Society/US Fish and Wildlife Service/University of Nevada Reno. Available at: www.monarchmilkweedmapper.org/.

Domingues, L. N., and J. Mendes. 2009. "Susceptibility of African Dung Beetle to Insect Growth Regulators." *Arquivo Brasileiro de Medicina Veterinaria E Zootecnia* 61 (5): 1077–84. https://www.researchgate.net/publication/262444993.

Eisler, Ronald. 1992. "Diflubenzuron Hazards to Fish, Wildlife and Invertebrates: A Synoptic Review." Contaminant Hazard Reviews 25. US Fish and Wildlife Service.

Fielding, D.J., and M.A. Brusven. 1995. "Grasshopper densities on grazed and ungrazed rangeland under drought conditions in southern Idaho." *Great Basin Naturalist* 55:352:358.

Fincher, G. T. 1991. "Sustained-Release Bolus for Horn Fly (Diptera: Muscidae) Control: Effects of Methoprene and Diflubenzuron on Some Nontarget Species." *Environmental Entomology* 20 (1): 77–82. https://doi.org/10.1093/ee/20.1.77.

Forister, M.L., E.M. Grames, C.A. Halsch, K.J. Burls, C.F. Carroll, K.L. Bell, J.P. Jahner, T. Brandford, J. Zhang, Q. Cong, N.V. Grishin. 2022. "Assessing Risk for Butterflies in the Context of Climate Change, Demographic Uncertainty, and Heterogenous Data Sources." bioRxiv. https://doi.org/10.1101/2022.05.22.492972.

Forister, Matthew L., Emma M. Pelton, and Scott H. Black. 2019. "Declines in Insect Abundance and Diversity: We Know Enough to Act Now." Conservation Science and Practice 1 (8). https://doi.org/10.1111/csp2.80.

Forister, Matthew L., Bruce Cousens, Joshua G. Harrison, Kayce Anderson, James H. Thorne, Dave Waetjen, Chris C. Nice, et al. 2016. "Increasing Neonicotinoid Use and the Declining Butterfly

Fauna of Lowland California." *Biology Letters* 12 (8): 20160475. https://doi.org/10.1098/rsbl.2016.0475.

FMC Corp. 2020. *FMC Launches Advanced, Low-Use-Rate Formulation of Rynaxypyr Active.* CropLife, Oct. 25, 2020. https://www.croplife.com/crop-inputs/insecticides/fmc-launches-advanced-low-use- rate-formulation-of-rynaxypyr-active/

George, T. et al (1992). "Effects of a carbaryl bait treatment on nontarget wildlife." *Environmental Entomology, 21*(6). https://doi.org/10.1093/ee/21.6.1239

Hale, Jessica R., Meryl C. Mims, Michael T. Bogan, and Julian D. Olden. 2015. "Links between Two Interacting Factors, Novel Habitats and Non-Native Predators, and Aquatic Invertebrate Communities in a Dryland Environment." Hydrobiologia 746 (1): 313–26. https://doi.org/10.1007/s10750-014-2024-0.

Hovland, Matthew, Ricardo Mata-González, R. Paul Schreiner, and Thomas J. Rodhouse. 2019. "Fungal Facilitation in Rangelands: Do Arbuscular Mycorrhizal Fungi Mediate Resilience and Resistance in Sagebrush Steppe?" *Rangeland Ecology & Management* 72 (4): 678–91. https://doi.org/10.1016/j.rama.2019.02.004Graves, Tabitha A., William M. Janousek, Sarah M. Gaulke, Amy C. Nicholas, Douglas A. Keinath, Christine M. Bell, Syd Cannings, et al. Western Bumble Bee: Declines in the Continental United States and Range-wide Information Gaps." *Ecosphere* 11 (6). https://doi.org/10.1002/ecs2.3141.

Haase, K.B. and R.J. Best. 2020. Hydroperiod effects on seasonal community assembly of aquatic macroinvertebrates in lentic systems of Northern Arizona. MS Thesis to be submitted May 2020, Northern Arizona University.

Hatfield, Richard G., Sheila R. Colla, Sarina Jepsen, Leif L. Richardson, Robbin W. Thorp, and Sarah Foltz- Jordan. 2014. "IUCN Assessments for North American Bombus Spp. for the North American IUCN Bumble Bee Specialist Group." Portland, OR: The Xerces Society for Invertebrate Conservation.

Hill, J. M., Egan, J. F., Stauffer, G. E., & Diefenbach, D. R. 2014. Habitat availability is a more plausible explanation than insecticide acute toxicity for US grassland bird species declines. PLoS One, 9(5), e98064.

Jiménez-Gómez, Carmen P., and Juan Antonio Cecilia. 2020. "Chitosan: A Natural Biopolymer with a Wide and Varied Range of Applications." *Molecules* 25 (17). https://doi.org/10.3390/molecules25173981.

Joern, A. 2000. "What Are the Consequences of Non-Linear Ecological Interactions for Grasshopper Control Strategies?" In *Grasshoppers and Grassland Health: Managing Grasshopper Outbreaks without Risking Environmental Disaster*, edited by Jeffrey A. Lockwood, Alexandre V. Latchininsky, and Michael G. Sergeev, 131–44. Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-011-4337-0_9.

Khanam, S. (2019). Behavior changes in broiler chicks exposed to Carbaryl. *American Journal of Biomedical Science &Research*. DOI: 10.34297/AJBSR.2019.03.000664

Krishnan, Niranjana, Yang Zhang, Melanie E. Aust, Richard L. Hellmich, JoelCoats, and Steven P. Bradbury. 2021. "Monarch Butterfly (Danaus Plexippus) Life Stage Risks from Foliar and Seed- Treatment Insecticides." Environmental Toxicology and Chemistry / SETAC, February. https://doi.org/10.1002/etc.5016.

Krishnan, N., Zhang, Y., Bidne, K. G., Hellmich, R. L., Coats, J. R., and Bradbury, S. P. (2020). "Assessing field-scale risks of foliar insecticide applications to monarch butterfly (*Danaus plexippus*) larvae." *Environ. Toxicol. Chem.* doi:10.1002/etc.4672.

Latchininsky, A., G. Sword, M. Sergeev, M. Cigiliano, and M. Lecoq. 2011. Locusts and grasshoppers: behavior, ecology, and biogeography. Psyche 2011:1-4

Litsey, Eliza M., Siwon Chung, and Julia D. Fine. 2021. "The Behavioral Toxicity of Insect Growth Disruptors on Apis Mellifera Queen Care." *Frontiers in Ecology and Evolution* 9. https://doi.org/10.3389/fevo.2021.729208.

Liu, Yongqiang, Yu Gao, Gemei Liang, and Yanhui Lu. 2017. "Chlorantraniliprole as a Candidate Pesticide Used in Combination with the Attracticides for Lepidopteran Moths." *PloS One* 12 (6): e0180255. https://doi.org/10.1371/journal.pone.0180255.

Lockwood, J.A., M.J. Brewer, and S.P. Schell. Spring 1996 - 2000. "Treating Localized Hot-Spots of Rangeland Grasshoppers: A Preventative Strategy with Promise." In *Grasshopper Integrated Pest Management User Handbook*, edited by Technical Coordinators Gary L. Cuningham and Mike W. Sampson. Technical Bulletin No. 1809. Washington, DC: United States Department of Agriculture Animal and Plant Health Inspection Services. https://www.sidney.ars.usda.gov/grasshopper/Handbook/index.htm.

Lockwood, J.A., S.P. Schell, R. Nelson-Foster, C. Reuter, and T. Rachadi. 2000. "Reduced Agent-Area Treatments (RAAT) for Management of Rangeland Grasshoppers: Efficacy and Economics under Operational Conditions." *International Journal of Pest Management* 46 (1): 29–42. https://doi.org/10.1080/096708700227552.

Lockwood, Jeffrey A., William P. Kemp, and Jerome A. Onsager. 1988. "Long-Term, Large-Scale Effects of Insecticidal Control on Rangeland Grasshopper Populations (Orthoptera: Acrididae)." *Journal of Economic Entomology* 81 (5): 1258–64. https://doi.org/10.1093/jee/81.5.1258.

McAtee, W.L, 1953. Economic entomology. In: Fifty years' progress in American ornithology. Lancaster, PA: American Ornithologists Union. 111-129.

McEwen, L.C., B.E. Petersen, and C.M. Althouse. 1996. Birds and Wildlife as Grasshopper Predators.

In *Grasshopper Integrated Pest Management User Handbook*, edited by Technical Coordinators Gary L. Cuningham and Mike W. Sampson. Technical Bulletin No. 1809. Washington, DC: United States Department of Agriculture Animal and Plant Health Inspection Services. https://www.sidney.ars.usda.gov/grasshopper/Handbook/index.htm

McEwen, L.C. 1987. Function of insectivorous birds in a shortgrass IPM system. In: Capinera, J.L., ed. Integrated pest management on rangeland: a shortgrass prairie perspective. Boulder, CO and London: Westview Press: 324-333.

McKnight, S., C. Fallon, E. Pelton, R. G. Hatfield, Aimee Code, Jennifer Hopwood, Sarina Jepsen, and S. H. Black. 2018. "Best Management Practices for Pollinators on Western Rangelands." 18-015_01. The Xerces Society for Invertebrate Conservation for the US Forest Service.

Moller, A. et al. (2021). Abundance of insects and aerial insectivorous birds in relation to pesticide and fertilizer use. *Avian Research, 12*. https://doi.org/10.1186/s40657-021-00278-1

Mommaerts, Veerle, Guido Sterk, and Guy Smagghe. 2006. "Hazards and Uptake of Chitin Synthesis Inhibitors in Bumblebees Bombus Terrestris." *Pest Management Science* 62 (8): 752–58. https://doi.org/10.1002/ps.1238.

Mullin, Christopher A., Maryann Frazier, James L. Frazier, Sara Ashcraft, Roger Simonds, Dennis Vanengelsdorp, and Jeffery S. Pettis. 2010. "High Levels of Miticides and Agrochemicals in North American Apiaries: Implications for Honey Bee Health." *PloS One* 5 (3): e9754. https://doi.org/10.1371/journal.pone.0009754.

National Research Council. 2007. Status of Pollinators in North America. Washington, DC: The National Academies Press. https://doi.org/10.17226/11761.

Natural Resources Conservation Service (NRCS). 2016. "Monarch Butterflies." https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/pollinate/?cid=nrcse prd402207.

Office of Protected Resources, National Marine Fisheries Service. 2023. Conference and Biological Opinion on the Environmental Protection Agency's Registration Review of Pesticide Products containing Carbaryl and Methomyl. National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 781 pp.

O'Neill, K. M., B. E. Olson, M. G, Rolston, R. Wallander, D. P. Larson, and C. E. Seibert. 2003. "Effects of livestock grazing on rangeland grasshopper (Orthoptera: Acrididae) abundance." *Agriculture, Ecosystems and Environment* 97: 51–64.

Onsager, J. A. 2000. "Suppression of Grasshoppers in the Great Plains through Grazing Management." *J. Range Manage.* 53: 592–602.

Pelton, E., S. McKnight, C. Fallon, A.Code, J. Hopwood,, S. Hoyle, S. Jepsen and S.H. Black. 2018. "Managing for Monarchs in the West: Best Management Practices for Conserving the Monarch Butterfly and Its Habitat." The Xerces Society. https://xerces.org/sites/default/files/2018-06/18- 009_01-Monarch_BMPs_Final_Web.pdf.

Quinn, Mark A., R. L. Kepner, D. D. Walgenbach, R. Nelson Foster, R. A. Bohls, P. D. Pooler, K. C. Reuter, and J. L. Swain. 1993. "Grasshopper Stages of Development as Indicators of Nontarget Arthropod Activity: Implications for Grasshopper Management Programs on Mixed-Grass Rangeland." *Environmental Entomology* 22 (3): 532–40. https://doi.org/10.1093/ee/22.3.532.

Quinn, Mark A., R. L. Kepner, D. D. Walgenbach, R. Nelson Foster, R. A. Bohls, P. D. Pooler, K. C. Reuter, and J. L. Swain. 1991. "Effect of Habitat Characteristics and Perturbation from Insecticides on the Community Dynamics of Ground Beetles (Coleoptera: Carabidae) on Mixed-Grass Rangeland." *Environmental Entomology* 20 (5): 1285–94. https://doi.org/10.1093/ee/20.5.1285.

Quinn, Mark A., R. L. Kepner, D. D. Walgenbach, R. Nelson Foster, R. A. Bohls, P. D. Pooler, K. C. Reuter, and J. L. Swain. 1990. "Effect of Habitat and Perturbation on Populations and Community Structure of Darkling Beetles (Coleoptera: Tenebrionidne) on Mixed-Grass Rangeland." *Environmental Entomology* 19 (6): 1746–55. https://doi.org/10.1093/ee/19.6.1746.

Ramos, Miguel A., Nadine R. Sousa, Albina R. Franco, Vítor Costa, Rui S. Oliveira, and Paula M. L. Castro. 2013. "Effect of Diflubenzuron on the Development of Pinus Pinaster Seedlings Inoculated with the Ectomycorrhizal Fungus Pisolithus Tinctorius." *Environmental Science and Pollution Research International* 20 (1): 582–90. https://doi.org/10.1007/s11356-012-1056-0.

Rendon-Salinas E., Martínez-Meza, F., M. A. Mendoza-Pérez, M. Cruz-Piña, and G. Mondragon- Contreras, G. and A. Martinez-Pacheco, A. 2020. "AREA OF FOREST OCCUPIED BY THE COLONIES OF MONARCH BUTTERFLIES IN MEXICO DURING THE HIBERNATION SEASON OF 2019-2020." *In*

Press.
Rosenberg, K. V., Dokter, A. M., Blancher, P. J., Sauer, J. R., Smith, A. C., Smith, P. A., & Marra, P. P.

2019. Decline of the North American avifauna. Science, 366(6461), 120-124.

Sample, Bradley E., Robert J. Cooper, and Robert C. Whitmore. 1993. "Dietary Shifts among Songbirds from a Diflubenzuron-Treated Forest." *The Condor* 95 (3): 616–24. https://doi.org/10.2307/1369605.

Schell, Scott P., and Jeffrey A. Lockwood. 1997. "Spatial Characteristics of Rangeland Grasshopper (Orthoptera: Acrididae) Population Dynamics in Wyoming: Implications for Pest

Management." *Environmental Entomology* 26 (5): 1056–65. https://doi.org/10.1093/ee/26.5.1056.

Schleier, Jerome J., 3rd, Robert K. D. Peterson, Kathryn M. Irvine, Lucy M. Marshall, David K. Weaver, and Collin J. Preftakes. 2012. "Environmental Fate Model for Ultra-Low-Volume Insecticide Applications Used for Adult Mosquito Management." *The Science of the Total Environment* 438 (November): 72–79. https://doi.org/10.1016/j.scitotenv.2012.07.059.

Smagghe, Guy, Janna Deknopper, Ivan Meeus, and Veerle Mommaerts. 2013. "Dietary Chlorantraniliprole Suppresses Reproduction in Worker Bumblebees." *Pest Management Science* 69 (7): 787–91. https://doi.org/10.1002/ps.3504.

Sprinkle, J and D. Bailey. 2004. How Many Animals Can I Graze on My Pasture? University of Arizona Cooperative Extension, AZ1352. 6 pp. https://cals.arizona.edu/forageandgrain/sites/cals.arizona.edu.forageandgrain/files/az1352.pdf

Tepedino, V.J. 2000. "The reproductive biology of rare rangeland plants and their vulnerability to insecticides." In *Grasshopper Integrated Pest Management User Handbook*, edited by Technical Coordinators Gary L. Cuningham and Mike W. Sampson. Technical Bulletin No. 1809.

Washington, DC: United States Department of Agriculture Animal and Plant Health Inspection Services. https://www.sidney.ars.usda.gov/grasshopper/Handbook/index.htm

Teske, M.E, S.L. Bird, D.M. Esterly, S.L. Ray, and S.G. Perry. 2003. "A User's Guide for AgDRIFT 2.0.07: A Tiered Approach for the Assessment of Spray Drift of Pesticides, Regulatory Version." C.D.I. Report No 01-02.

U.S.D.A. APHIS. 2019. Rangeland Grasshopper and Mormon Cricket Suppression Program. Final Environmental Impact Statement. November 2019. 149 pp.

U.S.D.A. APHIS. 2010. National Marine Fisheries Services Biological Assessment for the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program. May, 2010. 103 pp.

U.S. EPA. 2021. Final National Level Listed Species Biological Evaluation for Carbaryl. https://www.epa.gov/endangered-species/final-national-level-listed-species-biological- evaluation-carbaryl

U.S. EPA. 2020. Chlorantraniliprole: Problem Formulation for Registration Review. Available at regulations.gov.

U.S. EPA. 2018. "Preliminary Risk Assessment to Support the Registration Review of Diflubenzuron". United States Environmental Protection Agency, Office of Pesticide Programs, Washington, D.C.

U.S. EPA, 2017a. Models for Pesticide Risk Assessment. https://19january2017snapshot.epa.gov/pesticide-science-and-assessing-pesticide- risks/models-pesticide-risk-assessment_.html#beerex

U.S. EPA. 2017b. U.S. Environmental Protection Agency's Policy to Mitigate the Acute Risk to Bees from Pesticide Products. January 12, 2017. 35 pp.

U.S. EPA. 2014. Guidance for Assessing Pesticide Risks to Bees. June 19, 2014. 59 pp.

U.S. Fish and Wildlife Service. 2019. Species Status Assessment Report for the American Burying Beetle (*Nicrophorus americanus*). February 2019. 233 pp.

van der Steen, Josef, Cynthia D. Scott-Dupree, Ana R. Cabrera, G. Christopher Cutler, Dave Goulson, Olaf Klein, et al. 2019. "Comparison of Pesticide Exposure in Honey Bees (Hymenoptera: Apidae) and Bumble Bees (Hymenoptera: Apidae): Implications for Risk Assessments." *Environmental Entomology* 48 (1): 12–21. https://doi.org/10.1093/ee/nvy168.

Vermeire, L.T., R.B. Mitchell, S.D. Fuhlendorf, and D.B. Wester. 2004. Selective control of rangeland grasshoppers. *Journal of Range Management* 57:29-33.

Waterbury, Beth, Ann Potter, and Leona K. Svancara. 2019. "Monarch Butterfly Distribution and Breeding Ecology in Idaho and Washington." *Frontiers in Ecology and Evolution* 7: 172. https://doi.org/10.3389/fevo.2019.00172.

Welch, J. L., R. Redak, and B. C. Kondratieff. 1991. "Effect of Cattle Grazing on the Density and Species of Grasshoppers (Orthoptera: Acrididae) of the Central Plains Experimental Range, Colorado: A Reassessment after Two Decades." *Journal of the Kansas Entomological Society* 64 (3): 337-343.

Zhou, Ying, Yanxia Tang, Haiying Bao, and Others. 2017. "Effects of Diflubenzuron on the Growth of Four Fungal Mycelia." *Journal of Fungal Research* 15 (2): 137–39. https://www.cabdirect.org/cabdirect/abstract/20173243264.

RE: Draft Environmental Assessments Rangeland Grasshopper and Mormon Cricket Suppression Program, Montana
EA Numbers: MT-23-01, MT-23-02, MT-23-03

4/19/23

To Whom it May Concern:

Please accept the following comments on behalf of the Center for Biological Diversity (“Center”) in response to the Animal and Plant Health Inspection Service’s (“APHIS”) environmental assessment (“EAs”) evaluating the impacts of the agency’s proposed grasshopper and Mormon cricket suppression programs in Montana.

The Center is a non-profit environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has
1.7 million members and online activists dedicated to the protection and restoration of endangered species and wild places, including members and supporters in Montana. The Center has worked for over thirty years to protect imperiled plants and wildlife, habitat, air and water quality, and overall quality of life.

All comments from last year and the years before are equally applicable this year as the 2023 draft EAs suffer from the same or similar deficiencies as the 2022, 2021 and 2020 ones, and are incorporated by reference. Also, comments on these EAs by the Xerces Society for Invertebrate Conservation joined by the Center and others from 2023, 2022, 2021 and 2020 are equally applicable and incorporated by reference. All these documents have been submitted to your office.

In addition to the matters raised in those comments, we wanted to raise a few additional concerns. The first is noting that this winter and spring have been a wonderful break from drought conditions, leading to widespread speculation and early indications that we are in for a boom year for many species, including many species of butterflies, native bees, and birds.

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Periodic boom years are vital for the health of many species, especially given the droughts of recent years, and spraying insecticides during this vital time could result in significant population level impacts for species, including those listed under the Endangered Species Act (ESA), several that have been petitioned for under the ESA that exist in Montana and are currently under review by the U.S. Fish and Wildlife Service, and countless imperiled pollinator species. We implore APHIS to exercise extreme caution to ensure that species that have taken a hit in recent years can use this year to recover.

Also, just after you released these EAs, the U.S. Environmental Protection Agency (EPA) published a draft biological opinion issued by the National Marine Fisheries Service (NMFS) on carbaryl,[1] one of the chemicals authorized for use in these EAs. While Montana is not home to any of the species protected by NMFS, the draft biological opinion's findings of the extreme harm carbaryl poses to ESA listed species is troubling, and much of the analysis done by NMFS should be utilized to better understand the potential impacts of carbaryl on plants and animals in Montana, especially bull trout. Most disturbingly, NMFS found that carbaryl is likely to jeopardize the continued existence of 37 listed species, and adversely modify 36 designated critical habitats. These findings make plain that APHIS can not continue to claim that carbaryl can be lawfully used in this program without entering into formal consultation with the U.S. Fish and Wildlife Service, as the gravity of this single pesticide's harm and the likelihood that it will take or even jeopardize ESA listed species if used within their range is almost certain.

For the many reasons described, the draft EAs fail to comply with NEPA, the ESA and other laws. Thank you for considering and incorporating the contents of these comments. Please do not hesitate to contact me if you would like to discuss these matters.

Sincerely,

Lori Ann Burd

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APHIS RESPONSE to the Center for Biological Diversity:

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All Xerces and CBD comments have been received as indicated and responses incorporated here by reference.

The U.S. Environmental Protection Agency (EPA) draft biological opinion issued by the National Marine Fisheries Service (NMFS) on carbaryl relates to species not found in Montana.

Consultation with the U.S. Fish and Wildlife Service occurs annually, and no action will occur without concurrence.