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Final Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

Box Elder, Davis, Tooele & Utah Counties, Utah
EA Number: UT-21-5

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May 28, 2021

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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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Final Site-Specific Environmental Assessment

Rangeland Grasshopper and Mormon Cricket Suppression Program
Box Elder, Davis, Tooele & Utah Counties, Utah

I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers or Mormon crickets may occur in Box Elder, Davis, Tooele &/or Utah Counties, Utah. The Animal and Plant Health Inspection Service (APHIS) and any cooperating agency, based on location of infestation may, upon request by land managers or state departments of agriculture, conduct treatments to suppress grasshopper infestations as part of the Rangeland Grasshopper and Mormon Cricket Suppression Program (program). The term "grasshopper" used in this environmental assessment (EA) refers to both grasshoppers and Mormon crickets, unless differentiation is necessary.

Populations of grasshoppers that trigger the need for a suppression program are normally considered on a case-by-case basis. Participation is based on potential damage such as wildlife and livestock forage destruction and benefits of treatments including crop protection or protection of sensitive species from grasshopper depredation. The goal of the proposed suppression program analyzed in this EA is to reduce grasshopper populations below economical infestation levels in order to protect rangeland ecosystems or cropland adjacent to rangeland.

This EA analyzes potential effects of the proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from May 1st to September 30th in Box Elder, Davis, Tooele &/or Utah Counties.

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 2021 Control Program for Box Elder, Davis, Tooele &/or Utah Counties.

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.

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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 land owners and managers, and may cooperatively suppress grasshoppers when direct intervention is requested by a Federal land management agency or a State agriculture department (on behalf of a State or local government, or a private group or individual). APHIS' enabling legislation provides, in relevant part, that 'on request of the administering agency or the agriculture department of an affected State, the Secretary, to protect rangeland, shall immediately treat Federal, State, or private lands that are infested with grasshoppers or Mormon crickets'… (7 U.S.C. § 7717(c)(1)). The need for rapid and effective response when an outbreak occurs limits the options available to APHIS. The application of an insecticide within all or part of the outbreak area is the response available to APHIS to rapidly suppress or reduce grasshopper populations and effectively protect rangeland.

[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.

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

APHIS' authority for cooperation in this suppression program is based on Section 417 of the Protection Act otL.000 (7 U.S.C. § 7717).

The Utah Agricultural Code, Section 4-35, provides for certain actions authorized by this "Insect Infestation Emergency Control Act." It authorizes the Utah Commissioner of Agriculture to appoint members to a Decision and Action Committee who are directly affected and involved in the current insect infestation emergency. The committee establishes a system of priorities for any insect infestation emergency, and members of USDA, APHIS, PPQ in Utah have served on the committee and have been asked to help address the grasshopper/Mormon cricket problem which this document analyzes. The Commissioner of Agriculture, with the consent of the governor, has declared that this infestation jeopardizes property and recourses and has designated, with the help of APHIS surveys, the areas affected. He has initiated operations to control the problem in those designated areas and has request APHIS to enter into a cooperative agreement with the Utah Department of Agriculture and Food (UDAF) in order to cooperatively attack the infestations and mitigate consequences related thereto.

In October 2015, APHIS and the Bureau of Land Management (BLM) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers and Mormon crickets on BLM lands (Document #15-8100-0870-MU, October 15, 2015). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BLM.

The MOU further states that the responsible BLM official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on BLM land is necessary. The BLM must also prepare a Pesticide Use Proposal (Form FS-2100-2) for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BLM prepares and approves the Pesticide Use Proposal.

In November 2019, APHIS and the Forest Service (FS) signed an MOU detailing cooperative efforts between the two groups on the suppression of grasshoppers on FS system lands (Document # 19-8100-0573-MU, November 06, 2019). This MOU clarifies that APHIS would prepare and issue to the public site-specific environmental documentations that evaluate potential impacts associated with the proposed measures to suppress economically damaging grasshopper populations. The MOU also states that these documents would be prepared under the APHIS NEPA implementation procedures with cooperation and input from the FS.

The MOU further states that the responsible FS official would request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on FS land is necessary The FS must also prepare a Pesticide Use Proposal (Form: FS-2100-2) for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and FS prepares and approves the Pesticide Use Proposal.

In September 2016, APHIS and the Bureau of Indian Affairs (BIA) signed an MOU detailing cooperative efforts to suppress grasshoppers on Tribal lands. This MOU clarifies that APHIS would prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with the proposed measures to suppress economically-damaging grasshopper populations. The MOU also states that these documents would be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BIA.

The MOU further states that the responsible BIA official would request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on BIA land is necessary. The BIA must also approve a pesticide use proposal for APHIS to treat infestations of grasshoppers or Mormon crickets. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and the BIA approves the pesticide use proposal.

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

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

C. About This Process

The NEPA process for grasshopper management is complicated by the fact that there is very little time between requests for treatment and the need for APHIS to act swiftly with respect to those requests. Surveys help to determine general areas, among the millions of acres where harmful grasshopper infestations may occur in the spring of the following year. Survey data provides the best estimate of future grasshopper populations, while short-term climate or environmental factors change where the specific treatments will be needed. Therefore, examining specific treatment areas for environmental risk analysis under NEPA is typically not possible. At the same time, the program strives to alert the public in a timely manner to its more concrete treatment plans and avoid or minimize harm to the environment in implementing those plans.

When treatments occur on Tribal lands the following caveat may explain the program's reticence to share site-specific treatment details in the Draft EA. 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 Utah, also provide additional opportunities for local public involvement, such as public meetings. In addition, when an interested party asks to be informed APHIS ensures their contact information is added to the list of interested stakeholders.

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

The current EIS provides a solid analytical foundation; however, it may not be enough to satisfy NEPA completely for actual treatment proposals. The program typically prepares a Draft EA tiered to the current EIS for each of the 17 Western States, or portion of a state, that may receive a request for treatment. The Draft EA analyzes aspects of environmental quality that could be affected by treatments in the area where grasshopper outbreaks are

anticipated. The Draft EA will be made available to the public for a 30-day comment period.

When the program receives a treatment request and determines that treatment is necessary, the specific site within the state will be evaluated to determine if environmental factors were thoroughly evaluated in the Draft EA. If all environmental issues were accounted for in the Draft EA, the program will prepare a Final EA and FONSI. Once the FONSI has been finalized copies of those documents will be sent to any parties that submitted comments on the Draft EA, and to other appropriate stakeholders. To allow the program to respond to comments in a timely manner, the Final EA and FONSI will be posted to the APHIS website. The program will also publish a notice of availability in the same manner used to advertise the availability of the Draft EA.

II. Alternatives

To engage in comprehensive NEPA risk analysis APHIS must frame potential agency decisions into distinct alternative actions. These program alternatives are then evaluated to determine the significance of environmental effects. The 2002 EIS presented three alternatives: (A) No Action; (B) Insecticide Applications at Conventional Rates and Complete Area Coverage; and (C) Reduced Agent Area Treatments (RAATs), and their potential impacts were described and analyzed in detail. The 2019 EIS was tiered to and updated the 2002 EIS. Therefore the 2019 EIS considered the environmental background or 'No Action' alternative of maintaining the program that was described in the 2002 EIS and Record of Decision. The 2019 EIS also considered an alternative where APHIS would not fund or participate in grasshopper suppression programs. The preferred alternative of the 2019 EIS allowed APHIS to update the program with new information and technologies that not were analyzed in the 2002 EIS. Copies of the complete 2002 and 2019 EIS documents are available for review at 1860 W. Alexander St., Suite B, West Valley City, UT 84119. 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 Final EA.

This Final 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 Box Elder, Davis, Tooele & Utah Counties, Utah, 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 Box Elder, Davis, Tooele &/or Utah Counties,

Utah. Under this alternative, APHIS may opt to provide limited technical assistance, but any suppression program would be implemented by a Federal land management agency, a State agriculture department, a local government, or a private group or individual.

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

Under Alternative B, the Preferred Alternative, APHIS would manage a grasshopper treatment program using techniques and tools discussed hereafter to suppress outbreaks. The insecticides available for use by APHIS include the U.S. Environmental Protection Agency (USEPA) registered chemicals carbaryl, diflubenzuron, and malathion. These chemicals have varied modes of action. Carbaryl and malathion work by inhibiting acetylcholinesterase (enzymes involved in nerve impulses) and diflubenzuron inhibits the formation of chitin by insects. APHIS would make a single application per year to a treatment area and could apply insecticide at an APHIS rate conventionally used for grasshopper suppression treatments, or more typically as reduced agent area treatments (RAATs). APHIS selects which insecticides and rates are appropriate for suppression of a grasshopper outbreak based on several biological, logistical, environmental, and economical criteria. The identification of grasshopper species and their life stage largely determines the choice of insecticides used among those available to the program. RAATs are the most common application method for all program insecticides, and only rarely do rangeland pest conditions warrant full coverage and higher rates.

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

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

- 8.0 fluid ounces (0.25 lb a.i.) of carbaryl ULV spray per acre;
- 10.0 pounds (0.20 lb a.i.) of 2 or 5percent carbaryl bait per acre;
- 0.75 or 1.0 fluid ounce (0.012 lb a.i.) of diflubenzuron per acre; or
- 4.0 fluid ounces (0.31 lb a.i.) of malathion per acre.

The width of the area not directly treated (the untreated swath) under the RAATs approach is not standardized. The proportion of land treated in a RAATs approach is a complex function of the rate of grasshopper movement, which is a function of developmental stage,

population density, and weather (Narisu et al., 1999, 2000), as well as the properties of the insecticide (insecticides with longer residuals allow wider spacing between treated swaths). Foster et al. (2000) left 20 to 50% of their study plots untreated, while Lockwood et al. (2000) left 20 to 67% of their treatment areas untreated. Currently the grasshopper program typically leaves 50% of a spray block untreated for ground applications where the swath width is between 20 and 45 feet. For aerial applications, the skipped swath width is typically no more than 20 feet for malathion, 100 feet for carbaryl and 200 feet for diflubenzuron. The selection of insecticide and the use of an associated swath widths is site dependent. Rather than suppress grasshopper populations to the greatest extent possible, the goal of this method is to suppress grasshopper populations to less than the economic infestation level.

Applicators ensure that pesticides are sprayed only in the treatment blocks. For example: Contractors' use of Trimble GPS Navigation equipment (e.g., Sat-loc or Ag-Nav) is used to navigate and capture shapefiles of the treatment areas. All sensitive sites are buffered out of the treatment area using the navigation equipment or flagging, which is highly visible to the applicator. In addition, APHIS personnel monitor all project activities to help contractors maintain treatment integrity. All sensitive sites are reviewed in the daily briefing with APHIS personnel and the applicator working on the treatment site.

Typical treatment decisions result from consultations between APHIS personnel and land managers to determine the best economically and biologically-sound strategy to protect impacted range and wildlife resources. Treatment designs attempt to include as much of the grasshopper or Mormon cricket infestation as possible in order to minimize re-infestation potential. RAATs is always implemented in Utah in order to reduce treatment costs and environmental exposure.

For example, an aerial spray project took place in Millard and Beaver Counties, Utah to suppress an infestation of Mormon crickets which threatened private agricultural areas and BLM-managed and state range forage. The total project area included nearly 21,000 acres and took place in early June of 2012. APHIS and BLM range specialists determined to apply Dimilin (diflubenzuron) at 1 ounce per acre at 50% RAATs coverage to suppress the cricket infestation of 2 or more per square yard. Due to the implementation of the RAATs method, more than 10,000 acres within the block remained untreated.

Utah recognizes no minimum treatment area to suppress grasshoppers or Mormon crickets so long as the objective to protect range forage and sensitive species is achieved. Normally larger blocks are needed to encompass entire infestations, but small incipient populations which threaten sensitive resources may be treated.

The typical suppression treatment design will be 1.0 ounce of diflubenzuron per acre applied at 50% coverage.

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

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

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

PPQ S&T at times will be conducting experimental grasshopper treatments not categorically excluded from NEPA analysis and within the suppression program area covered under this EA. However, there are currently none planned for 2021.

III. Affected Environment

A. Description of Affected Environment

The proposed suppression program area included in the EA encompasses 10,745,192 acres (16,789 sq. miles) within northwestern Utah. This represents 20% of the land in Utah. Approximately 54.4% of the land within the four- county area is classified as federal; 5.4% of the acreage is state and the remaining 40.1% of the land is private. The four-county area consists of foothills, higher elevation mountain ranges, lowland areas of native and improved rangeland, arid desert lowlands, short isolated mountain ranges, irrigated pastures, croplands and orchards.

Almost all of Box Elder County lies within the Great Basin. The area is semi- arid with an average precipitation of 8 to 12 inches per year at lower elevations and 16-30 inches at mountain elevations. The length of the growing season is related to elevation, averaging 100-130 days. The climate is characterized by low relative humidity and precipitation, rapid evaporation, generally clear skies and daily and annual fluctuations in temperatures, i.e. cold winters, hot summers and days generally at least twenty degrees warmer than nights.

Elevation within Box Elder County ranges from 4,212 ft. at the surface of the Great Salt Lake to 9,046 ft. at Ingham Peak in the northwestern portion of Box Elder County. Soils are clay and generally fine textured with poor drainage near the Great Salt Lake. Extreme aridity and sparse vegetation permit critical, natural wind erosion. Higher elevation soils contain more sand and silt and are more susceptible to water erosion. The soils range from non-saline to very strongly saline, and some are moderately to strongly alkaline.

Native vegetation types within Box Elder County are cold, desert shrub to woodland communities, including saltbush and greasewood. Greasewood, rabbit brush and sagebrush dominate the lower elevations, and pinyon-juniper are common on the intermediate slopes. The moister canyons and northern exposures contain stands of intermediate slopes. The moister canyons and northern exposures contain stands of cottonwood, box elder, and mountain maple. Higher elevation, moist sites contain some

aspen, Douglas fir and spruce. Gambel oak is common on higher elevations. Salt grass, cheat grass, mixed native grass and forb communities are common throughout the county; however, there is a decided lack of vegetation in the black sage type.

Most of Davis County is also in the Great Basin Physiograph Province. Davis County consists largely of lake terraces that were formed by prehistoric Lake Bonneville and alluvial fans adjacent to the Wasatch Mountains. Elevations range from 4,220 to 5,220 ft., with some as high as 9,700 ft. Antelope Island is a large remnant of a block-faulted mountain in the Great Salt Lake.

The climate of Davis County ranges from dry sub-humid to moist sub-humid. Average annual rainfall is 12 to 20 inches in the valleys and averages 30 to 50 inches in the higher elevations. Most of the precipitation occurs from November through April in the form of snow and spring rains. The climate is warm and dry in the summer and cold, but not severe, in the winter. The growing season is long enough for most crops, especially orchard fruits.

Davis County soils near the Great Salt Lake are on undrained flats in a closed basin. They have a high salt content and consist of very alkaline sediments. These clay areas are subject to extreme wind erosion. Thick, dark, relatively fertile mollisols occur in the lake terraces and foothills. These well-drained upland soils are able to support agriculture, rangeland, recreation, and wildlife habitat. Antelope Island is characterized by thin, light-colored, alkaline aridisols suitable for limited grazing, recreation and wildlife habitat.

Native vegetation in Davis County ranges from perennial grasses and shrubs in the sagebrush association, through a transitional shadscale association between the saline desert area and the sagebrush zone of the foothill-lake terrace area. Forested stands of aspen, maple and conifers occurs at the highest elevations. Rangelands are used to graze cattle, sheep, and horses. Sagebrush association occurs on the western side of Antelope Island. Saline desert covers the remaining portion of the island. Seventy percent of the island is considered suitable for grazing. Native bunch grasses are being reseeded to improve the range for wildlife and a state-managed buffalo herd.

Tooele and Utah Counties also lie within the Great Basin, an area devoid of external drainage. The soils of the area are mainly mollisols and aridisols, with smaller pockets of playa and entisols. The mollisols are at higher elevations and are relatively fertile. Aridisols, occurring at lower elevations, are thin soils that can be strongly alkaline and may have cropping potential if irrigated. Native vegetation ranges from desert shrubs including greasewood, salt bushes and shad scale, with a dominance of sagebrush steep vegetation mixed with pinyon-juniper as the elevation increases. The wet, north slopes of the mountains contain stands of conifers, mountain shrubs, aspen and Douglas fir. In addition, there are various noxious weeds which may at times be treated by landowner/manager(s).

Agricultural areas within Box Elder, Davis, Tooele and Utah Counties include native rangeland, improved pasture, dryland wheat, barley and irrigated cropland (i.e. alfalfa, onions, hay, potatoes, tomatoes and fruit orchards).

Within Box Elder, Davis, Tooele and Utah Counties, surface water resources consist of the Great Salt Lake, Willard Bay, Bear River, Raft River, Weber River, Davis-Weber Canal, Utah Lake, Mona Reservoir, Jordan River, some intermittent live streams, ponds, stock tanks and troughs, seeps and springs. Stream habitat is generally fair to good condition, while the reservoirs and other water resources provide adequate water for wildlife, livestock, irrigation and domestic use. These and all other waters are protected with buffer zones for water outlined in the operations procedures.

(See Appendix B for relevant maps.)

IV. Site-Specific Considerations

1. Human Health

Box Elder is a county in northwestern Utah with a human population of about 54,950. The county seat is Brigham City with a population of around 19,200. Brigham City contains 4 kindergartens, 2 middle schools, a high school, an alternative school - grades 5-12 and a community college. Brigham City Community Hospital is located there.

Davis County has a human population of about 352,000. Its county seat is Farmington, and its largest city is Layton with a population of over 77,000.

Davis County Hospital & Medical Center & Layton Hospital are located within the area as well as 8 high schools, several elementary and middle schools and a technical college.

Tooele County has a human population of about 70,000, and its county seat is Tooele, with the towns of Grantsville and Stansbury nearby. The western half of the county is covered by the Great Salt Lake Desert and the town of Wendover, and the eastern portion supports several small towns and the Dugway Proving Grounds, a military facility. Mountain West Medical Center is also located in Tooele. There are 7 high schools and several elementary, middle schools and kindergarten facilities in Tooele County as well.

Utah County has a human population of about 624,000, and its county seat is Provo. Combined with Orem City, it is part of the Provo-Orem Metropolitan Statistical Area, and Saratoga Springs is considered the “center” of Utah population. There are many medical facilities, including hospitals, scattered throughout Utah County as well as 101 elementary schools, 21 junior highs, 19 high schools and 3 universities.

The 2002 EIS and 2019 EIS contains detailed hazard, exposure, and risk analyses for the chemicals available to APHIS. Impacts to workers and the general public were analyzed for all possible routes of exposure (dermal, oral, inhalation) under a range of conditions designed to overestimate risk. The operational procedures and spraying conditions examined in those analyses conform to those expected for operations. The following discussion summarizes the hazards, potential exposure, and risk to workers and the general public for operations in Utah. Operational procedures identified in Appendix A would be required in all cases and further mitigation measures are identified in this section, as appropriate.

No treatment will occur over congested areas, recreation areas, or schools and if appropriate, a buffer zone will be enacted and enforced.

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

Malathion and carbaryl are cholinesterase inhibitors. Cholinesterases (including AChE) are enzymes that function at the nerve synapse. The nerve synapse is the point where information in the form of electrical impulses is relayed or transmitted by chemical messengers (called transmitters) from one nerve cell to another. Cholinesterase then inactivates or destroys the transmitter chemical (like acetylcholine) after it completes its job, otherwise the transmitter would continue indefinitely and precise control of the enervated tissue (muscle or organ) would be lost. Refer to the 2015 guidelines (Appendix A) for further information on mitigating exposure to cholinesterase inhibitors.

No human health effects are likely from exposure to diflubenzuron if it is used according to label instructions. A human exposure assessment was done in detail for diflubenzuron and can be found in APHIS's "Chemical Risk Assessment for Diflubenzuron Use in Grasshopper Cooperative Control Program".

2. Nontarget Species

Several wildlife species within Box Elder, Davis, Tooele and Utah Counties, as well as statewide, that are of concern to the Utah Division of Wildlife Resources are: white-faced ibis, long-billed curlew, western snowy plover, mountain plover, snowy plover, American white pelican, double-crested cormorant, Caspian tern, purple martin, Williamson's sapsucker, grasshopper sparrow, osprey, Lewis' woodpecker, western bluebird, ferruginous hawk, Swainson's hawk and burrowing owl. These species' populations are either declining or are limited in their distribution.

Upland game birds which occur in the area include: sage grouse, ring-necked pheasant, ruffed and blue grouse, chukar and Hungarian partridge, sharp-tailed grouse, mourning dove and quail. Shorebirds, seagulls, waders and other waterfowl occur in wetland and mash habitats. Salt marshes around the Great Salt Lake serve as magnet for waterfowl migrating over the region's vast areas of mountain and desert country. State waterfowl management areas in Farmington bay, Howard Slough and Ogden Bay provide excellent food and cover.

Mule deer, black bear, cougar, bobcat, coyote, elk, bighorn sheep, wild horses, antelope and deer occupy portions of the combined four-county area as well. Plans are underway to introduce antelope, elk and bighorn sheep to Antelope Island State Park in Davis County. A unique genetic strain of buffalo is also intensively managed at Antelope Island State Park.

3. Socioeconomic Issues

Recreation use is moderate over most of the affected area. There are several dispersed camping sites. Hunting seasons increase recreation use in the form of dispersed camping and general hunting activity. Hunting season occurs later in the year during a time when grasshopper and cricket populations have begun to dwindle such that fewer insects are present. Hunters probably will not be affected. ATV use is fairly prevalent throughout.

The presence of high densities of grasshoppers or Mormon crickets will result in fewer people engaging in recreational activities during the spring and summer within the affected areas. High insect densities in a campsite detract considerably from the quality of the recreational experience. Crickets tend to get into unsecured tents and food.

The quality of the recreational experience for ATV users and horseback riders also will be indirectly impaired by high densities of grasshoppers and/or crickets. Such numbers crossing roads and trails are killed by vehicle traffic, leaving windrows of dead insects in the travel way as well as providing a vehicular safety hazard by leaving slick residues on local roads.

People who normally recreate in areas that are heavily infested will likely relocate to areas that are not infested. Displacement of users will be more of an inconvenience to the public than an actual effect on the recreational values of the area. Displacement will also increase pressure on other public lands as people move to new locations to camp and to engage in other recreational activities. Social capacity tolerances will be impacted. The potential for user

conflict will increase, in particular as motorized recreationists displace to other already heavily used areas. Such locations will experience more pressure and may experience site degradation. Areas currently not impacted or used by dispersed campers may become subjected to use and development as people look for areas for recreation which are not infested with insects.

Small towns near the affected areas receive limited business from recreationists who visit public lands. Many local gas stations/public stores rely fairly heavily on summer business to support their operations.

Livestock grazing is one of the main uses of most of the affected area, which provides summer range for ranching operations. Permittees may run cattle, sheep and/or horses for a season that runs generally from the first of June to the end of September, weather and vegetation conditions permitting.

A substantial threat to the animal productivity of these rangeland areas is the proliferation of grasshopper/Mormon cricket populations. These insects have been serious pests in the Western States since early settlement. Weather conditions favoring the hatching and survival of large numbers of insects can cause outbreak populations, resulting in damage to vegetation. The consequences may reduce grazing for livestock and result in loss of food and habitat for wildlife.

Livestock grazing on public lands contributes important cultural and social values to the area. Intertwined with the economic aspects of livestock operations are the lifestyles and culture that have co-evolved with Western ranching. Rural social values

and lifestyles, in conjunction with the long heritage of ranching and farming continue to this day, dating back to the earliest pioneers in Utah, who shaped the communities and enterprises that make up much of the state. The rural Western lifestyle also contributes to tourism in the area, presenting to travelers a flavor of the West through tourist-oriented goods and services, photography of sheep bands or cattle in pastoral settings and scheduled events. .

Ranchers displaced from public lands due to early loss of forage from insect damage will be forced to search for other rangeland, to sell their livestock prematurely or to purchase feed hay. This will affect other ranchers (non- permittees) 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 private lands resulting from this impact will compound the effects to vegetation of recent drought conditions over the last six 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/Mormon cricket 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 and/Mormon crickets in the affected area would have beneficial economic impacts to local landowner, farmers and beekeepers. Crops near infested lands would be protected from devastating migrating hordes, resulting in higher crop production; hence, increased monetary returns.

4. Cultural Resources and Events

Federal and state lands that are part of the region's visual and cultural resources include the Caribou, Manti-La Sal, Sawtooth, Uinta, and Wasatch National forests; Skull Valley and Washakie Indian Reservations ; Bear River National Migratory Bird Refuge and Fish Springs National Wildlife Refuge; Timpanogos Cave National Monument; Mt. Nebo, Mt. Timpanogos, Lone Peak and Desert Peak Wilderness areas, and Timpi Springs, Locomotive Springs, Salt Creek Public Shooting Grounds, Harold S. Crane, Howard Slough and Farmington Bay Waterfowl Management Areas.

A variety of activities have occurred throughout the area of concern that affect cultural resources. These activities and any cumulative impacts associated with them will occur regardless of whether or not grasshoppers/Mormon crickets are treated.

Use of motorized equipment off existing roads could impact surface artifacts by damaging them or displacing them in their overall juxtaposition with other artifacts. Maintaining the integrity of a historical site is important to understanding the significance of the site and the artifacts found therein. Non-treatment of infested land

will likely later result in more intensive and extensive treatment of that infested land. Most of the non-public lands that will be affected have already been heavily disturbed and any artifacts on them likely impacted. Consequently, it is unlikely that additional treatments will result in additional impacts on cultural properties.

With no treatment of grasshoppers or crickets on public lands, aerial application of insecticides off public lands will likely increase. Though this should not disturb or displace cultural artifacts, carrying agents in the spray could damage artifacts (USDA, APHIS EIS, 2002, p. 71). However, most if not all the areas likely to be treated have been heavily disturbed in the past, and any artifacts on them likely impacted. Consequently, it is unlikely that these aerial treatments will result in additional impacts on cultural properties.

Motorized vehicles (pick-up trucks and/or ATV's) may be used to treat portions of the affected areas. This will create a risk of impacting cultural properties. The risk is small given that the off-road use of vehicles will create only minor soil disturbance, and the areas involved are not likely to contain significant sites of which public officials are not already aware. Known sites will be avoided to mitigate impacts. Any sites located during treatment activities will be reported, then avoided during continuing operations. Past similar grasshopper/cricket treatments throughout the state have not resulted in any known impacts to cultural properties.

In addition to the treatments proposed under this alternative, a broad variety and number of activities throughout the project area could affect, or have affected, cultural resources. These activities and any cumulative impacts associated with them will occur, regardless of whether or not grasshoppers/crickets are treated. No direct, indirect or change in cumulative impacts on cultural resources in the area will occur due to implementation of the treatment alternative.

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, Forest Service or other appropriate land management agency on a local level to protect these areas of special concern. APHIS also will 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, such as sun dances, on tribal 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 around 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, Spanish-speaking populations and some with large American Indian tribal populations. Low-income farmers and ranchers would comprise, by far, the largest group affected by APHIS program efforts in this area of concern.

When planning a site-specific action related to grasshopper/Mormon cricket 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 or Mormon cricket infestations on adjacent public or private rangelands will increase inexpensive available forage for their livestock and will significantly decrease economic losses to their crop lands by invading insects. Such would obviate 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 (BIA) have notified the appropriate APHIS State Plant Health Director when any new or potentially threatening grasshopper infestation is discovered on BLM lands or tribal lands held in trust and administered by BIA. Thus, APHIS has cooperated with BIA when grasshopper programs occur on Indian tribal lands. For local Indian populations, APHIS program managers will work with BIA and local tribal councils to communicate information to tribal organizations and representatives when programs have the potential to impact the environment of their communities, lands or cultural resources.

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

The increased scientific knowledge about the environmental health risks and safety risks associated with hazardous substance exposures to children and recognition of these issues in Congress and Federal agencies brought about legislation and other requirements to protect the health and safety of children. On April 21, 1997, President Clinton signed E.O. 13045, Protection of Children From Environmental Health Risks and Safety Risks (62 FR 19885). This E.O. requires each Federal agency, consistent with its mission, to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address those

risks. APHIS has developed agency guidance for its programs to follow to ensure the protection of children (USDA, APHIS, 1999).

Treatments used for 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 or Mormon cricket program is very slight and that no disproportionate adverse effects to children are anticipated over the negligible effects to the general population.

APHIS also institutes program measures (i.e., 500-foot buffers around homes, schools and occupied buildings and campgrounds) and notification of residents that mitigates the potential for exposure of program insecticides to children.

V. Environmental Consequences

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

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

A. Environmental Consequences of the Alternatives

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

1. No Suppression Program Alternative

Under this alternative, APHIS would not conduct a program to suppress grasshoppers. If APHIS does not participate in any grasshopper suppression program, Federal land management agencies, State agriculture departments, local governments, private groups or individuals, may not effectively combat outbreaks in a coordinated effort. Without the technical assistance and coordination that APHIS provides during grasshopper outbreaks, the uncoordinated programs could use insecticides that APHIS considers too environmentally harsh. Multiple treatments and excessive amount of insecticide could be applied in efforts to suppress or even locally eradicate grasshopper populations. There are approximately 100 pesticide products registered by USEPA for use on rangelands and against grasshoppers (Purdue University, 2018). It is not possible to accurately predict the

environmental consequences of the No Action alternative because the type and amount of insecticides that could be used in this scenario are unknown. However, the environmental impacts could be much greater than under the APHIS led suppression program alternative due to lack of treatment knowledge or coordination among the groups.

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

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

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

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

Under Alternative 2, APHIS would participate in grasshopper programs with the option of using one of the insecticides carbaryl, diflubenzuron or malathion, depending upon the various factors related to the grasshopper outbreak and the site-specific characteristics. The use of an insecticide would typically occur at half the conventional application rates

following the RAATs strategy. APHIS would apply a single treatment to affected rangeland areas to suppress grasshopper outbreak populations by a range of 35 to 98 percent, depending upon the insecticide used.

a) Carbaryl

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

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

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

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

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

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

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

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

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

spray applications on rangeland are limited to half a pound active ingredient per acre per year (USEPA, 2012c). The grasshopper program would treat at or below use rates that appear on the label, as well as follow all appropriate label mitigations, which would ensure residues are below the tolerance levels.

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

The Sevin® XLR Plus formulation, which contains a lower percent of the active ingredient than the technical grade formulation, is less toxic via the oral route, but is a mild irritant to eyes and skin. The proposed use of carbaryl as a ULV spray or a bait, use of RAATs, and adherence to label requirements, substantially reduces the potential for exposure to humans. Program workers are the most likely human population to be exposed. APHIS does not expect adverse health risks to workers based on low potential for exposure to carbaryl when applied according to label directions and use of personal protective equipment (PPE) (e.g., long-sleeved shirt and long pants, shoes plus socks, chemical-resistant gloves, and chemical-resistant apron) (USEPA, 2012c) during loading and applications. APHIS quantified the potential health risks associated with accidental worker exposure to carbaryl during mixing, loading, and applications. The quantitative risk evaluation results indicate no concerns for adverse health risk for program workers (http://www.aphis.usda.gov/plant-health/grasshopper).

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

b) Diflubenzuron

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

USEPA considers diflubenzuron relatively non-persistent and immobile under normal use conditions and stable to hydrolysis and photolysis. The chemical is considered unlikely to contaminate ground water or surface water (USEPA, 1997). The vapor pressure of diflubenzuron is relatively low, as is the Henry's Law Constant value, suggesting the chemical will not volatilize readily into the atmosphere from soil, plants or water.

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

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

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

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

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

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

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

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

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

Due to its mode of action, diflubenzuron has greater activity on immature stages of terrestrial invertebrates. Based on standardized laboratory testing diflubenzuron is considered practically non-toxic to adult honeybees. The contact LD50 value for the honeybee, *Apis mellifera*, is reported at greater than 114.8 µg a.i./bee while the oral LD50 value was reported at greater than 30 µg a.i./bee. USEPA (2018) reports diflubenzuron toxicity values to adult honeybees are typically greater than the highest test concentration using the end-use product or technical active ingredient. The lack of toxicity to honeybees, as well as other bees, in laboratory studies has been confirmed in additional studies (Nation

et al., 1986; Chandel and Gupta, 1992; Mommaerts et al., 2006). Mommaerts et al. (2006) and Thompson et al. (2005) documented sublethal effects on reproduction-related endpoints for the bumble bee, *Bombus terrestris* and *A. mellifera*, respectively, testing a formulation of diflubenzuron. However, these effects were observed at much higher use rates relative to those used in the program.

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

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

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

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

c) Malathion

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

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

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

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

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

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

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

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

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

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

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

Risks to terrestrial invertebrate populations are anticipated based on the available toxicity data for invertebrates and the broad spectrum activity of malathion (Swain, 1986; Quinn et al., 1991). The risk to terrestrial invertebrates can be reduced by the implementation of application buffers and the use of RAATs, which would reduce exposure and create refuge areas where malathion impacts would be reduced or eliminated. Smith et al. (2006)

conducted field studies to evaluate the impacts of grasshopper treatments to non-target terrestrial invertebrates and found minimal impacts when making reduced rate applications with a reduced coverage area (i.e. RAATs) for a ULV end-use product of malathion. Impacts to pollinators have the potential to be significant, based on available toxicity data for honeybees that demonstrate high contact toxicity from malathion exposures (USDA APHIS, 2018d). However, risk to pollinators is reduced because of the short residual toxicity of malathion. In addition, the incorporation of other mitigation measures in the program, such as the use of RAATs and wind speed and direction mitigations that are designed to minimize exposure, reduce the potential for population-level impacts to terrestrial invertebrates.

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

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

d) Reduced Area Agent Treatments (RAATs)

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

The concept of reducing the treatment area of insecticides while also applying less insecticide per treated acre was developed in 1995, with the first field tests of RAATs in Wyoming (Lockwood and Schell, 1997). Applications can be made either aerially or with ground-based equipment (Deneke and Keyser, 2011). Studies using the RAATs strategy have shown good control (up to 85% of that achieved with a total area insecticide application) at a significantly lower cost and less insecticide, and with a markedly higher abundance of non-target organisms following application (Lockwood et al., 2000; Deneke and Keyser, 2011). Levels of control may also depend on variables such as body size of

targeted grasshoppers, growth rate of forage, and the amount of coverage obtained by the spray applications (Deneke and Keyser, 2011). Control rates may also be augmented by the necrophilic and necrophagic behavior of grasshoppers, in which grasshoppers are attracted to volatile fatty acids emanating from cadavers of dead grasshoppers and move into treated swaths to cannibalize cadavers (Lockwood et al., 2002; Smith and Lockwood, 2003). Under optimal conditions, RAATs decrease control costs, as well as host plant losses and environmental effects (Lockwood et al., 2000; Lockwood et al., 2002).

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

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

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

No APHIS experimental treatments are planned for 2021. Other Environmental Considerations

3. Cumulative Impacts

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

Potential cumulative impacts associated with the No Action alternative where APHIS would not take part in any grasshopper suppression program include the continued increase in grasshopper populations and potential expansion of populations into neighboring range

and cropland. In addition, State and private land managers could apply insecticides to manage grasshopper populations however, land managers may opt not to use RAATs, which would increase insecticides applied to the rangeland. Increased insecticide applications from the lack of coordination or foregoing RAATs methods could increase the exposure risk to non-target species. In addition, land managers may not employ the extra program measures designed to reduce exposure to the public and the environment to insecticides.

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

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

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

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

APHIS does not anticipate that any federal or non-federal pest control actions to coincide with any grasshopper or Mormon cricket treatments which might occur within the project areas. Such would preclude any negative issues that would arise due to cumulative pesticide application impacts.

4. 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."

When planning a site-specific action related to grasshopper or Mormon cricket infestations, APHIS will consider the potential for disproportionately high and adverse human health or environmental impacts of its actions on minority and low-income communities in a program area. APHIS has evaluated the proposed grasshopper program and has determined that there are no disproportionately high and adverse human health or environmental effects on minority populations or low-income populations.

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

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

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

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

6. 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.

7. 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.

8. Endangered Species Act

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

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

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

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

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

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

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

APHIS completed informal consultation with the FWS regarding the Program at the State level years ago after having developed agreed-upon mitigation measures for all T&E and Proposed T&E species relative to GH/MC suppression projects in Utah. The USFWS has concurred with APHIS's assessment that the Utah GH/MC suppression program is not likely to adversely affect species of concern. That consultation/concurrence has continued throughout the years as the T&E list has evolved.

9. Bald and Golden Eagle Protection Act

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

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

10. 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 Grasshopper densities in excess of 8 per square yard could initiate treatment project planning. Should grasshoppers be unavailable in small, localized areas, sage grouse chicks may consume other insects, which sage grouse chicks likely do in years when grasshopper numbers are naturally low. By suppressing grasshoppers, rangeland vegetation is available for use by other species, including sage grouse, and rangeland areas are less susceptible to invasive plants that may be undesirable for sage grouse habitat.

APHIS will work with BLM, the state of Utah and any other appropriate agencies when grasshopper treatments are proposed in areas where sage grouse are present, or any other species that is known to be of special interest or concern to federal or state agencies or the public.

11. Fires and Human Health Hazards

Various compounds are released in smoke during wildland fires, including carbon monoxide (CO), carbon dioxide, nitrous oxides, sulfur dioxide, hydrogen chloride, aerosols, polynuclear aromatic hydrocarbons contained within fine particulate matter (a byproduct of the combustion of organic matter such as wood), aldehydes, and most notably

formaldehyde produced from the incomplete combustion of burning biomass (Reisen and Brown, 2009; Burling et al., 2010; Broyles, 2013). Particulate matter, CO, benzene, acrolein, and formaldehyde have been identified as compounds of particular concern in wildland fire smoke (Reinhardt and Ottmar, 2004).

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

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

12. 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.

APHIS, prior to any treatment project, will consult with the appropriate landowner, the State Historic Preservation Office, any affected National Trail's administrative office or other appropriate agencies, to ensure minimal impacts to cultural and historical resources.

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VII. Listing of Agencies and Persons Consulted

A. Bureau of Land Management

Nebeker, Glenn, Field Manager, Fillmore, UT Field Office

Riding, Trevor, Range Specialist, Fillmore, UT Field Office

Robbins, Josh, State Weed Coordinator, State Office

B. Utah Department of Agriculture and Food

Hougaard, Robert, Director of Plant Industry

Watson, Kristopher, State Entomologist, Plant Industry

C. USDA, APHIS, PPQ

Caraher, Kai, Biological Scientist – Staff Officer

Sullivan, Melinda, GH/MC National Operations Manager

Warren, Jim, Environmental Protection Specialist/Environmental Toxicologist

Wild, Alana, Utah/Nevada State Plant Health Director

D. USDA, Forest Service

E. USDA, Fish and Wildlife Service

Novak, Kate, T&E Specialist, Utah

Romin, Laura, Acting Field Supervisor, Utah

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F. Utah Division of Wildlife Resources

Mumford, Vance, Southern Region Biologist

G. Utah State University Extension Service

Nelson, Mark, Beaver

Dallin, Josh, Box Elder

Cooper, Troy, Duchesne

Taylor, Kalen, Millard

Gale, Jody, Sevier County Agriculture Agent

Greenhalgh, Linden, Tooele

Hadfield, Jacob, Cache

Kitchen, Boyd, Uintah

Wilde, Trent, Piute & Wayne

H. Utah County Commissioners

Brown, Ralph, Sevier County

Draper, Dean, Millard

I. Utah State Legislators

J. Federal Legislators

Appendix A - APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program
FY-2021 Treatment Guidelines
Version 02/05/2021

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

General Guidelines for Grasshopper / Mormon Cricket Treatments

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

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

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

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

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

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

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

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

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

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

Operational Procedures

GENERAL PROCEDURES FOR ALL AERIAL AND GROUND APPLICATIONS

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

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

3. One of the following insecticides that are labeled for rangeland use can be used for a suppression treatment of grasshoppers and Mormon crickets:
   A. Carbaryl

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

B. Diflubenzuron ULV spray
C. Malathion ULV spray

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

   Furthermore, provide the following buffers for water bodies:
   - 500-foot buffer with aerial liquid insecticide.
   - 200-foot buffer with ground liquid insecticide.
   - 200-foot buffer with aerial bait.
   - 50-foot buffer with ground bait.

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

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

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

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

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

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

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

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

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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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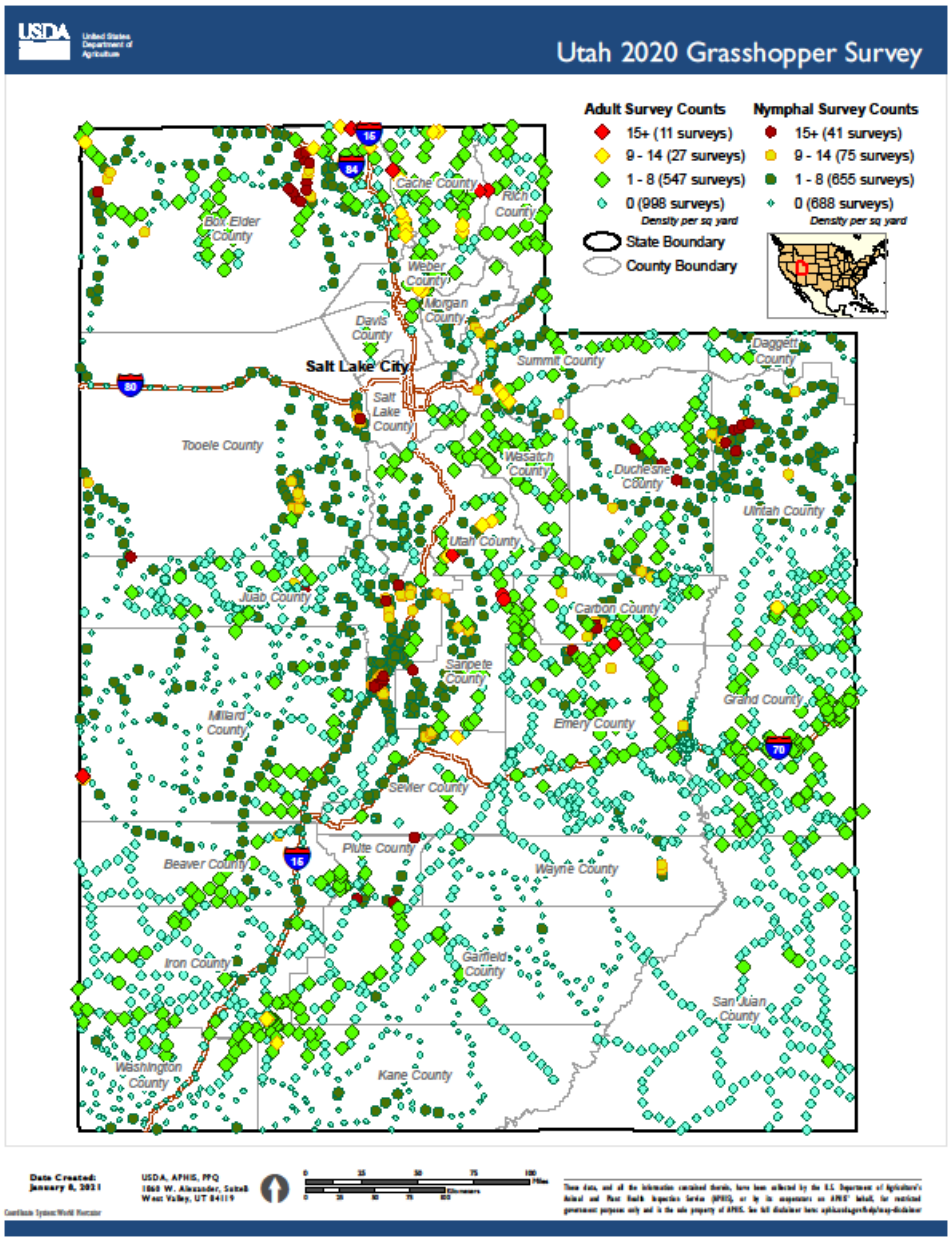
Appendix B: Map of the Affected Environment



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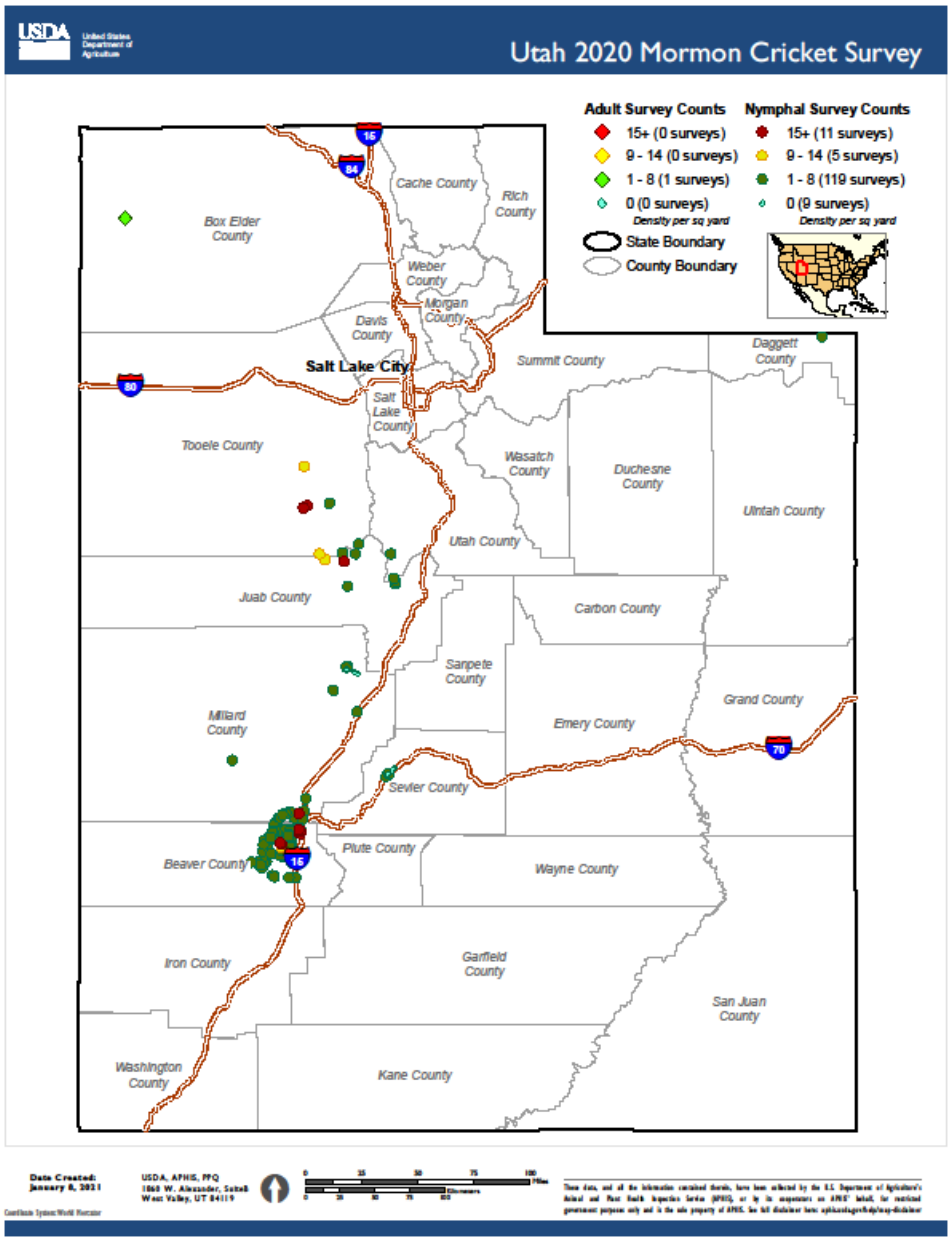
USDA
United States Department of Agriculture
Utah 2020 Mormon Cricket Survey
Adult Survey Counts
15+ (0 surveys)
9 - 14 (0 surveys)
1 - 8 (1 surveys)
0 (0 surveys)
Density per sq yard
Nymphal Survey Counts
15+ (11 surveys)
9 - 14 (5 surveys)
1 - 8 (119 surveys)
0 (9 surveys)
Density per sq yard
State Boundary
County Boundary
Box Elder County
Cache County
Rich County
Weber County
Morgan County
Davis County
Salt Lake City
Salt Lake County
Summit County
Daggett County
Tooele County
Wasatch County
Duchesne County
Uintah County
Utah County
Juab County
Carbon County
Sanpete County
Millard County
Emery County
Grand County
Sevier County
Beaver County
Piute County
Wayne County
Iron County
Garfield County
San Juan County
Washington County
Kane County
Date Created:
January 6, 2021
USDA, APHIS, PPQ
1868 W. Alexander, Suite8
West Valley, UT 84119

Appendix C: FWS Correspondence

THREATENED & ENDANGERED SPECIES DETERMINATIONS FOR UTAH APHIS 2021 GRASSHOPPER/MORMON CRICKET SUPPRESSION PROJECTS

1. Canada lynx (*Lynx canadensis*) (Threatened): The preferred habitat of the Canada lynx is montane coniferous forest. The proposed APHIS suppression program will have no effect on or cause no jeopardy to any population of Canada lynx since projects will avoid known or historic species habitat areas.

2. Black-footed ferret (*Mustela nigripes*) (Threatened): Possibly found in Carbon, Daggett, Duchesne, Emery, Grand, Rich, San Juan, Summit and Uintah Counties. Black-footed ferrets live in underground prairie dog burrows and eat prairie dogs as their primary food source. The black-footed ferret is, therefore, closely associated with prairie dog towns. For this reason, the major threat to the species is the decimation of prairie dog colonies through plague, poisoning and habitat loss. The only known population occurs in Coyote Basin, Uintah County. Direct toxic effects from carbary bait are low since plant-based baits are not sought-after food items for ferrets. Indirect effects by consumption of contaminated insects or prairie dogs might occur. Though prairie dogs may ingest carbaryl bait, and therefore, transfer that consumed carbaryl to a predator like the ferret, the potential for adverse effects remains low due to the unlikelihood of encountering significant quantities. Ten pounds of 2 percent active ingredient per acre maximum application rates preclude ingestion of sufficient toxin by insects or prairie dogs, themselves, to cause undesirable effects to ferrets. Direct toxic effects from Dimilin are low since diflubenzuron is slightly to very slightly toxic to mammals (Maas *et al.*, (1981). There would be few if any indirect effects from the use of Dimilin. The proposed APHIS suppression program is not likely to adversely affect this species. PROTECTIVE MEASURES: No aerial application of Dimilin within 1 mile and no ground applications within 0.25 mile of the edge of identified habitat.

3. Utah prairie dog (*Cynomys parvidens*) (Threatened): Found in Beaver, Garfield, Iron, Kane, Millard, Piute, Sanpete, Sevier and Wayne Counties. Direct toxic effects from carbaryl bait are moderate since prairie dogs may ingest it. However, 10 pounds per acre maximum application rates preclude ingestion of sufficient toxin to create behavioral anomalies, let alone mortality, due to the unlikelihood of encountering significant quantities. Since prairie dogs may consume insects, indirect effects from carbaryl bait are possible, but large quantities of contaminated insects would have to be consumed for such to occur. Rapid decomposition rates of dead insects, quickly making them unpalatable as food items, coupled with low application rates, minimize the risk of adverse effects on prairie dogs from carbaryl bait treatments. Direct toxic effects from Dimilin are low since diflubenzuron is slightly to very slightly toxic to mammals (Maas *et al.,* (1981). There would be no indirect effects from the use of Dimilin. The proposed APHIS suppression program would not likely adversely affect this species. PROTECTIVE MEASURES: Avoid using any pesticide within 1 mile of occupied habitat.

4. California condor (*Gymnogyps californianus*) (Endangered): California condors were released as part of Recovery Program efforts in northern Arizona beginning in the late 1990's. Sightings of the birds that were released have since been made almost statewide. Condors prefer mountainous country at low and moderate elevations, especially rocky and brushy areas near cliffs. California condors eat carrion, usually feeding on large items such as dead sheep, cattle and deer. Due to their foraging habits and preferences, the proposed APHIS grasshopper/Mormon cricket suppression program is unlikely to affect California condors. In addition, condors to date are occasional and temporary visitors to the state and are unlikely to contact suppression activities.

5. Gunnison Sage-Grouse (*Centrocercus minimus*) (Threatened): Found in Grand and San Juan Counties. Male Gunnison sage-grouse conduct an elaborate display when trying to attract females on breeding grounds, or leks in the spring. Nesting begins in mid-April and continues into July. Gunnison sage-grouse require a variety of habitats such as large expanses of sagebrush with a diversity of grasses and forbs and healthy wetland and riparian ecosystems. It requires sagebrush for cover and fall and winter food. Direct toxic effects from carbaryl bait are low (Peach *et al.,* 1994), but there may be minimal indirect effects since the young of this species depend upon arthropod groups for food. The use of carbaryl baits temporarily may lower the insect food base in the immediate area, though certainly not sufficiently to create adverse consequences to immature sage-grouse. Direct toxic effects from Dimilin are low since diflubenzuron is slightly to very slightly toxic to birds, but there may be minimal indirect effects such as a slight reduction in available prey items. The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No ground/aerial application will occur within 1 mile of known leks between March and July. Otherwise, no ground/aerial applications within 100/500 ft. of the edge of occupied habitat.

6. Mexican spotted owl (*Strix occidentalis lucida*) (Threatened): Possibly found in Carbon, Emery, Grand, Garfield, Iron, Kane, San Juan, Washington and Wayne Counties. In Utah spotted owls occupy and nest in rocky canyon habitats. Nests are located on cliffs and in caves. Mexican spotted owls feed mainly on small rodents, but also consume rabbits and other small vertebrates, including birds, reptiles and insects. Direct toxic effects from carbaryl bait are low since owls do not directly ingest it and since they do not depend on arthropod groups for food or seed dispersal. (George *et al*., 1992). Indirect toxic effects from carbaryl bait are low due to low application rates (10 pounds per acre or less) and small bait particle sizes, which preclude birds and small mammals from encountering sufficient quantities of toxin to cause adverse consequences to them or to owls which might consume them. APHIS only applies baits to areas of high grasshopper or Mormon cricket densities (8 or more per square yard), so any bait treatment is quickly and nearly totally consumed by the insects. Any remaining bait rapidly degrades from exposure to the elements (dew and higher soil pH's). Birds and rodents may prey upon debilitated insects, but rapid decomposition rates quickly make dead insects unpalatable. That, coupled with low application rates, makes it unlikely that spotted owls would be adversely affected by eating birds or small mammals that may prey upon insects

debilitated by carbaryl bait treatments. APHIS ground baiting protocol excludes treatment near the canyon habitats that spotted owls use for nesting. Direct and indirect toxic effects from Dimilin are also low since diflubenzuron is slightly to very slightly toxic to birds (Wilcox and Coffey, 1978). The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial application will occur within 1 mile of suitable nesting habitat, and ground applications will be no closer than 0.25 mile to nesting habitat.

7. Southwestern willow flycatcher (*Empidonax traillii extimus*) (Endangered): Possibly found in Kane, San Juan and Washington Counties. The southwestern willow flycatcher utilizes dense riparian habitats. Forage items include insects, seeds and berries. Direct toxic effects from carbaryl bait are low (Peach *et al.,* 1994), but there may be minimal indirect effects since this species depends on arthropod groups for food. The use of carbaryl baits may temporarily lower the insect food base in the immediate area, though certainly not sufficiently to create adverse consequences to flycatchers. Direct toxic effects from Dimilin are low since diflubenzuron is slightly to very slightly toxic to birds, but there may be minimal indirect effects such as a slight reduction in available prey items. The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial application will occur within 1 mile of suitable nesting habitat, and ground applications will be no closer than 0.25 mile to nesting habitat.

8. Yellow-billed Cuckoo (*Coccyzus americanus*) (Threatened): Found throughout Utah. The yellow-billed cuckoo uses wooded habitat with dense cover and water nearby. Its nests in the West are often placed in willows along streams and rivers, with nearby cottonwoods serving as foraging sites. They sometimes lay their eggs in other birds' nests. Cuckoos feed on insects (especially caterpillars), spiders, frogs, lizards, fruits and seeds. Direct toxic effects from carbaryl bait are low (Peach *et al.,* 1994), but there may be minimal indirect effects since this species depends upon arthropod groups for food. The use of carbaryl baits may temporarily lower the insect food base in the immediate area, though certainly not sufficiently to create adverse consequences to cuckoos. Direct toxic effects from Dimilin are low since diflubenzuron is slightly to very slightly toxic to birds, but there may be minimal indirect effects such as a slight reduction in available prey items. The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial application will occur within 1000 ft. and no ground application will occur within 500 ft. of the edge of known locations of yellow-billed cuckoos or their critical habitat.

9. Bonytail (*Gila elegans*) (Endangered): Found in Carbon, Emery, Garfield, Grand, Kane, San Juan, Tooele, Uintah, Wayne and possibly Duchesne and formerly Daggett Counties. Bonytail are opportunistic feeders, eating insects, zooplankton, algae and higher plant matter. Although bonytail spawning in the wild is now rare, spawning occurs in the spring and summer over gravel substrate. Most bonytail are now produced in hatcheries and released into the wild as adults. Direct toxic effects from carbaryl bait are low since APHIS ground applicators remain at least 50 feet from water which precludes any bait from entering a water body, even during and after heavy rains. Carbaryl rapidly

decomposes in the presence of water and soils with higher pH's. Indirect effects from carbaryl bait are also low. Insects that ingest the bait are incapacitated by it within a matter of a minute or so; therefore, few could hop or fly into water bodies after bait consumption (APHIS personal experience). The use of bait near streams would not likely create an unnatural influx of contaminated grasshoppers or crickets into the water, so that fish might prey on them. Direct toxic effects from diflubenzuron are also low since it is only slightly toxic to fish (Willcox and Coffey, 1978; Julin and Sanders, 1978). Indirect effects from either carbaryl bait or Dimilin are minimal due to APHIS's standard practice of maintaining 50 foot buffers with ground applications of bait and 500 foot buffers with aerial sprays around water. The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial applications within 1 mile of habitat or no ground treatments within 500 feet of habitat.

10. Colorado pikeminnow (*Ptychocheilus lucius*) (Endangered): Found in Carbon, Daggett, Emery, Garfield, Grand, San Juan, Uintah, Wayne and possibly Duchesne and formerly Kane Counties. Colorado pikeminnows are primarily piscivorous (they eat fish), but smaller individuals also eat insects and other invertebrates. The species spawns during the spring and summer over riffle areas with gravel or cobble substrate. Eggs are randomly broadcast onto the bottom, and usually hatch in less than one week. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

11. Greenback cutthroat trout (*Oncorhynchus clarki stomias*) (Threatened): Found in San Juan County. The greenback cutthroat trout is a member of the Salmonidae family and is a subspecies of *O. clarki*. The subspecies feeds on aquatic insects as well as terrestrial invertebrates. It spawns in the spring in riffle areas when water temperatures reach 5-8 degrees C. It requires clear, swift-flowing mountain streams with cover such as low, overhanging banks and vegetation. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

12. Humpback chub (*Gila cypha*) (Endangered): Found in Carbon, Daggett, Emery, Garfield, Grand, San Juan, Uintah, Wayne and possibly Duchesne and formerly Kane Counties. Humpback chub primarily eat insects and other invertebrates, but algae and fishes are occasionally consumed. The species spawns during the spring and summer in shallow, backwater areas with cobble substrate. Young humpback chub remain in these slow, shallow, turbid habitats until they are large enough to move into white-water areas. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

13. Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*) (Threatened): The Lahontan cutthroat trout is a race of the cutthroat trout native to the Lahontan Basin of Oregon, California, and western Nevada. It has been introduced and become established in the Pilot Peak Range of western Box Elder County, Utah. Like other cutthroat races, the Lahontan cutthroat is an opportunistic feeder, with the diet of small individuals dominated by invertebrates, and the diet larger individuals composed primarily of fish.

The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

14. June sucker (*Chasmistes liorus*) (Endangered): Found in Box Elder, Salt Lake, Utah and Weber Counties. June suckers are members of the sucker family, but they are not bottom feeders. The jaw structure of the June sucker allows the species to feed on zooplankton in the middle of the water column. June sucker adults leave Utah Lake and swim up the Provo River to spawn in June of each year. Spawning occurs in shallow riffles over gravel or rock substrate. Fertilized eggs sink to the stream bottom, where they hatch in about four days. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

15. Razorback sucker (*Xyrauchen texanus*) (Endangered): Found in Carbon, Daggett, Emery, Garfield, Grand, San Juan, Uintah, Wayne and possibly Duchesne and formerly Kane Counties. The razorback sucker eats mainly algae, zooplankton and other aquatic invertebrates. The species spawns from February to June, and each female may deposit over 100,000 eggs during spawning. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

16. Virgin chub (*Gila seminuda*) (Endangered): Found in Washington County. Virgin chub are opportunistic feeders, consuming zooplankton, aquatic insect larvae, other invertebrates, debris and algae. Interestingly, the diet of many adults is composed primarily of algae, whereas the diets of younger fish contain more animal matter. The species spawns during late spring and early summer over gravel or rock substrate. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

17. Woundfin (*Plagopterus argentissimus*) Endangered): Found in Washington County, the species is now restricted to the Virgin River system. Woundfin diets are quite varied, consisting of insects, insect larvae, other invertebrates, algae, and detritus. The species spawns during the spring in swift shallow water over gravel substrate. The proposed APHIS suppression program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 9.

18. Desert tortoise (*Gopherus agassizii*) (Threatened): Found in Washington County. Within its range, the desert tortoise can be found near water in deserts, semi-arid grasslands, canyon bottoms and rocky hillsides. Desert tortoises often construct burrows in compacted sandy or gravelly soil. Females nest under a large shrub or at the mouth of a burrow and lay one to three clutches of two to fourteen eggs from May to July; eggs hatch in late summer or fall. Burrows, which may contain many tortoises at once, are used for hibernation during cold winter months. The typical diet of the desert tortoise consists of perennial grasses, cacti, shrubs and other plant material. Historically APHIS has never received a request to treat in areas inhabited by desert tortoises, but if asked to

do so, there would exist the threat of direct take by running over small tortoises with ground equipment. Direct toxic effects from the use of carbaryl bait are unknown, but the tortoises would not likely consume the bait at low application rates (10 pounds per acre) and given the small size and consistency of bait particles. Indirect effects are low since they do not depend on insects for food. No information was located about diflubenzuron's toxicity to reptiles, but it is likely that it is low, based on the selective nature of its toxic mode of action (i.e., it interferes with the synthesis of chitin in those organisms that produce exoskeletons). The relative toxicity of diflubenzuron to reptiles is expected to be similar to that of mammals and birds (APHIS EIS, 2002). Indirect effects are also expected to be low since desert tortoises do not depend on insects for food. It is unlikely that grasshoppers or Mormon cricket populations would ever reach outbreak levels and require APHIS treatments in desert tortoise habitat. The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial or ground applications will occur in the Beaver Dam Slope, the Tortoise Preserve or other occupied habitats of Washington County. If APHIS does receive a request to treat using ground equipment, then APHIS would re-consult with the USFWS.

19. Kanab ambersnail (*Oxyloma kanabense*) (Endangered): Found in Kane County. Pilsbry (1948), in the type description of this taxon, noted that it was found "on a wet ledge among rocks and cypripediums." Clarke (1991) reported the habitat of the Three Lakes population as a marsh dominated by *Typha* in its wettest portion. Grasses, *Carex*, violets, plantains and alders were also present. The densest snail aggregations were found under fallen *Typha* stalks, at the edges of thick *Typha* stands. The snails were also frequently observed just within the mouths of vole burrows. The presence of standing water appeared to be important to their local distribution. Clarke (1991) found that the habitat of the small population that existed along Kanab Creek also included *Mimulus guttatus*, *Dodocatheon pauciflorum*, *Aquilegia micrantha*, a tall grass species and *Juncus*. Direct toxic effects of carbaryl bait are high, but mitigation measures would insure that this species would not come in contact with the toxin. Indirect effects are low since the susceptible insects are not likely food items. Direct toxic effects from Dimilin are none to slight - the median lethal concentration of diflubenzuron in water to the snail is greater than 125 mg/L (Willcox and Coffey, 1978) - especially given the low application rates and the self-imposed water/spring buffers of APHIS programs. Indirect effects are also expected to be low since susceptible insects are not likely food items. The proposed APHIS suppression program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial applications within 1 mile of occupied habitat, and no ground treatments within 500 feet of occupied habitat.

20. Autumn buttercup (*Ranunculus aestivalis*) (Endangered): Found in Garfield County. Autumn buttercup produces abundant yellow flowers that can be seen from late-July to early October. It is found in low, herbaceous, wet meadow communities on islands of drier peaty hummocks, and sometimes in open areas, at elevations ranging from 1940 to 1965 meters. There are no direct toxic effects from carbaryl bait to this species. Indirect effects to plant pollinators from the use of carbaryl bait are low since insects must consume the bait in order to succumb to it. Target insects are unlikely pollinators of this

species. There are no direct toxic effects from Dimilin, and the indirect effects to pollinators from the use of diflubenzuron are low since it is not toxic to adult insects. APHIS's low application rate of one ounce per acre, coupled with the practice of treating not more than every other swath, preclude significant adverse impacts to larval insects as well. Only insect nymphs that undergo incomplete metamorphosis (i.e., grasshoppers/crickets) manifest significant adverse effects at the low doses of APHIS projects. The proposed APHIS program will not likely adversely affect this species. PROTECTIVE MEASURES: No aerial applications within 3 miles of occupied habitat, and no ground treatments within 300 feet of occupied habitat.

21. Barneby reed-mustard (*Schoenocrambe barnebyi*) (Endangered): Found in Emery and Wayne Counties. Specimens have a branched woody base that gives rise to purple veined, white, or lilac flowers from late April to early June. Barneby reed-mustard grows in xeric, fine textured soils on steep eroding slopes of the Moenkopi and Chinle formations. It grows in sparsely-vegetated sites in mixed desert shrub and pinyon-juniper communities, at elevations ranging from 1460 to 1985 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 20.

22. Barneby ridge-cress (*Lepidium barnebyanum*) (Endangered): Found in Duchesne County. This species grows in cushion-shaped tufts, has a thickened, branched woody base and produces abundant white to cream colored flowers that bloom in May and June. It grows along semi-barren ridges in pinyon-juniper woodlands, at elevations ranging from 1860 to 1965 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 20.

23. Clay phacelia (*Phacelia argillacea*) (Endangered): Found in Utah County. It is a narrow endemic to Spanish Fork Canyon, Utah County, Utah. A member of the waterleaf family, it has a scorpion tale-like inflorescence that continues, as it unrolls, to produce blue to violet flowers from June to August. This species is a winter annual and is found in fine textured soil and fragmented shale derived from the Green River Formation. It grows on barren, precipitous hillsides in sparse pinyon-juniper and mountain brush communities, at elevations ranging from 1840 to 1881 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect toxic effects and PROTECTIVE MEASURES same as # 20.

24. Clay reed-mustard (*Schoenocrambe argillacea*) (Threatened): Found in Uintah County. It is a plant that occurs in the Uinta Basin, Uintah County, Utah. A member of the mustard family, this species is a hairless perennial with a stout, woody base. It produces lilac to white, purple-veined flowers that bloom from mid-April through mid-May. Shrubby reed-mustard grows on the Evacuation Creek Member of the Green River Formation, where it is on substrates consisting of at-the-surface bedrock, scree, and fine-textured soils. It occurs on precipitous slopes in mixed desert shrub communities, at elevations ranging from 1439 to 1765 meters. The proposed APHIS program will not

likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

25. Deseret milkvetch (*Astragalus desereticus*) (Threatened): Found in Utah County. This plant occurs at a single site in Utah County, Utah. A member of the bean family, this species is a perennial herb with gray-silvery leaves four to five cm long and white to pinkish petals with evident lilac-colored keel-tips. It blooms from late April to early June. Deseret milkvetch grows exclusively on sandy-gravelly soils weathered from conglomerate outcrops of the Moroni Formation. It likes steep south and west (rarely north) facing slopes and does well on larger, west-facing road-cuts. It is grows in an open pinyon-juniper-sagebrush community, at elevations ranging from 1645 to 1740 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

26. Dwarf bear-poppy (*Arctomecon humilis*) (Endangered): Found in Washington County. This plant is a narrow endemic to (occurs only in) Washington County, Utah. A member of the poppy family, this species is a perennial herb that produces abundant white flowers. The flowers bloom from mid-April through May, and are quite showy next to the red soils in which the plant grows. Dwarf bearclaw-poppy is found on gypsiferous clay soils derived from the Moenkopi Formation. It occurs on rolling low hills and ridge tops, often on barren, open sites in warm desert shrub communities, at elevations ranging from 700 to 1402 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

27. Gierisch mallow (*Sphaeralcea gierischii*) (Endangered): Found in Washington County. A member of the mallow family, this species is a flowering perennial which is only found on gypsum outcrops associated with the Harrisburg Member of the Kaibab Formation in northern Mojave County, AZ and Washington County, UT. It has a woody base and dies back to the ground during the winter and re-sprouts from the base during late winter and spring depending on daytime temperatures and rainfall. How its flowers are pollinated, seed-dispersal mechanisms and the conditions under which seeds germinate are not yet known. Young plants have been observed on reclaimed portions within gypsum mining areas. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

28. Graham beardtongue (*Penstemon grahamii*): Found in Carbon, Duchesne and Uintah Counties. It is endemic to (occurs only in) the Uinta Basin in Carbon County, Duchesne County and Uintah County, Utah, and in immediately adjacent Rio Blanco County, Colorado. A member of the figwort family, this species is a perennial herb that is 5 to 20 cm tall, with thick leathery leaves, and large, tubular, light to deep lavender flowers that bloom from late May to early June. Graham beardtongue grows on semi-barren knolls, ridges and steep slopes in a mix of fragmented shale and silty clay soils closely associated with the Mahogany zone (oil shale bearing) of the Green River Formation. It grows in sparsely vegetated communities of pinyon-juniper, desert shrub and Salina wildrye, at elevations ranging from 1430 to 2060 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

29. Heliotrope milkvetch (*Astragalus montii*) (Threatened): Found in Sanpete and Sevier Counties. This is a plant that occurs on the southern Wasatch Plateau in Sanpete County and Sevier County, Utah. A member of the bean family, this species is a dwarf tufted perennial herb with pink purple petals that have white wing-tips. It blooms from June to August. Heliotrope milkvetch grows in barren areas on shallow and very rocky soils derived from Flagstaff Limestone, at elevations ranging from about 3230 to 3322 meters. It grows in subalpine communities of cushion plants and other low-growing species that are scattered within more extensive conifer, tall-forb, and grass communities. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

30. Holmgren milkvetch (*Astragalus holmgreniorum*) (Endangered): Found in Washington County. It occurs in Washington County, Utah, and in immediately adjacent Mohave County, Arizona. A member of the bean family, this species is a dwarf, tufted, stemless perennial herb. It has pinkish-purple flowers with unique white-tipped wings; it blooms in April and May. Holmgren milkvetch grows in topographic sites where water runoff occurs and where the soil surface is covered by a stony or gravelly erosional pavement. The soils are derived from the Moenkopi Formation. Holmgren milkvetch grows in warm desert shrub communities, at elevations ranging from 805 to 914 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

31. Jones cycladenia (*Cycladenia humilis var. jonesii*) (Threatened): Found in Emery, Garfield, Grand and Kane Counties. This plant is restricted to the canyonlands of the Colorado Plateau in Emery County, Garfield County, Grand County, and Kane County, Utah, as well as in immediately adjacent Coconino County, Arizona. A member of the dogbane family, this species is a rhizomatous herb with round, somewhat succulent leaves, and small rose-pink hairy flowers that bloom from mid-April to early June. Jones' cycladenia grows in gypsiferous soils that are derived from the Summerville, Cutler, and Chinle formations; they are shallow, fine textured, and intermixed with rock fragments. The species can be found in Eriogonum-ephedra, mixed desert shrub, and scattered pinyon-juniper communities, at elevations ranging from 1219 to 2075 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

32. Kodachrome bladderpod (*Lesquerella tumulosa*) (Endangered): Found in Kane County. It is a plant that is a narrow endemic to (it occurs only in) Kane County, Utah. A member of the mustard family, this species is a perennial herb that forms densely matted and depressed mounds. It has a many-branched woody base with persistent leaf bases, has star-shaped hairs, and produces yellow flowers that bloom in May and early June. Kodachrome bladderpod is found on shallow soils that are fine textured, intermixed with shale fragments, and derived from the Winsor Member of the Carmel Formation. Kodachrome bladderpod grows on bare shale knolls and slopes in scattered pinyon-juniper communities, at elevations ranging from 1719 to 1845 meters. The proposed

APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

33. Last Chance townsendia (*Townsendia aprica*) (Threatened): Found in Emery, Sevier and Wayne Counties. This plant is a member of the sunflower family, and is a stemless perennial herb with flower heads submersed in its ground-level leaves. The flowers bloom in late April and May, and have yellow to golden petals. Last Chance townsendia is found in clay, clay-silt, or gravelly clay soils derived from the Mancos Formation; these soils are often densely covered with biological soil crusts. The species grows in salt desert shrub and pinyon-juniper communities, at elevations ranging from 1686 to 2560 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

34. Maguire primrose (*Primula maguirei*) Threatened): Found in Cache County. plant that is a narrow endemic to (it occurs only in) Logan Canyon, Cache County, Utah. A member of the primula family, this species is a perennial herb with broad, spatula-shaped leaves. Stems are approximately four to fifteen cm tall, with each bearing one to three showy rose to lavender-colored flowers that bloom in late April and May. Maguire primrose is found on either north-facing or well shaded south-facing moss covered sites on damp ledges, in crevices, and on over-hanging rocks along the walls near the bottom of the canyon. It grows at elevations ranging from 1550 to 2012 meters. The propose APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

35. Navajo sedge (*Carex specuicola*) (Threatened): Found in San Juan County, Utah, and in immediately adjacent Coconino County, Arizona. A member of the sedge family, this species is a loosely tufted perennial, 25 to 40 cm tall, with grass-like leaves that droop downward. Its flowers, seen in late June and July, are arranged in spikes, two to four spikes per stem. Navajo sedge is restricted to seep, spring, and hanging garden habitats in Navajo Sandstone, at elevations ranging from 1150 to 1823 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects of treatment are the same as # 20. PROTECTIVE MEASURES: No aerial applications within 3 miles of occupied habitat and no ground applications within 300 feet of springs, seeps and hanging gardens.

36. Pariette cactus (*Sclerocactus brevispinus*) (Threatened): Found in Duchesne and Uintah Counties. A member of the cactus family, this taxon is a Uinta Basin endemic in northeast Utah, Duchesne County. It is known from "a series of small scattered populations…near Myton (Heil and Porter (1994)." It inhabits "stoney, gravelly, low hilly terrain, growing with desert grasses or low vegetation (Hochstätter 1993)"; the soils on which it grows are derived from the Uinta Formation (Specht, pers. comm. 2005). The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

37. San Rafael cactus (*Pediocactus despainii*) (Endangered): Found in Emery and Wayne Counties. A member of the cactus family, this species is a small, subglobose to ovoid cactus with usually solitary stems; the crown of the stem is at or very near ground level.

Its flowers are born near the tip of the stem, are yellow bronze to peach bronze, rarely pink in color, and bloom during April and May. San Rafael cactus is found in fine textured soils rich in calcium derived from the Carmel Formation and the Sinbad Member of the Moenkopi Formation. It occurs on benches, hill tops, and gentle slopes in pinyon-juniper and mixed desert shrub-grassland communities, at elevations ranging from 1450 to 2080 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

38. Shivwitz or Shem milkvetch (*Astragalus ampullarioides*) (Endangered): Found in Washington County. It occurs in only Washington County, Utah. A member of the bean family, Shivwits milkvetch is a perennial herb. Specimens are 20 to 45 cm tall, each with an underground, branching woody base and an erect flower stalk bearing yellow-white flowers that bloom from late April to early June. Shivwits milkvetch grows on the unstable clay soil of Chinle Shale in warm desert shrub and pinyon-juniper communities, at elevations ranging from 872 to 1116 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

39. Shrubby reed-mustard (*Schoenocrambe suffrutescens*) (Endangered): Found in Duchesne and Uintah Counties. A member of the mustard family, this species is a perennial clump-forming herb that produces yellow flowers that bloom from May through June. Shrubby reed-mustard grows along semi-barren, white-shale layers of the Green River Formation (Evacuation Creek Member), where it is found in xeric, shallow, fine textured soils intermixed with shale fragments. It grows in mixed desert shrub and pinyon-juniper communities, at elevations ranging from 1554 to 2042 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

40. Siler pincushion cactus (*Pediocactus sileri*) (Threatened): Found in Kane and Washington Counties. It is a plant that occurs in adjacent Coconino and Mohave counties, Arizona; the center of its distribution is in Mohave County. A member of the cactus family, this species is a small, globose cactus with solitary, occasionally clustered, stems typically 10 cm tall (as great as 45 cm), and spines that become white with age. Its flowers are yellow with purple veins, and bloom during March and April. Siler pincushion cactus is found on the white, occasionally red, gypsiferous and calcareous sandy or clay soils derived from the various members of the Moenkopi Formation. It is sometimes found, however, on the nearly identical Kaibab Formation. Siler pincushion cactus occurs on rolling hills, often with a badlands appearance, in warm desert shrub, sagebrush-grass, and, at its upper limits, pinyon-juniper communities, at elevations ranging from 805 to 1650 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

41. Uintah basin hookless cactus (*Sclerocactus wetlandicus*) (Threatened): Found in Carbon, Duchesne and Uintah Counties, Utah and in Delta, Garfield, Mesa, and Montrose counties, Colorado. A member of the cactus family, this species is a perennial herb with a

commonly solitary, egg-shaped, three to twelve cm long stem that produces pink flowers late from April to late May. Uinta Basin hookless cactus is found on river benches, valley slopes, and rolling hills of the Duchesne River, Green River, and Mancos formations. It is found in xeric, fine textured soils overlain with cobbles and pebbles, growing in salt desert shrub and pinyon-juniper communities, at elevations ranging from 1360 to 2000 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

42. Ute ladies'-tresses (*Spiranthes diluvialis*) (Threatened): Found in Daggett, Duchesne, Garfield, Juab, Salt Lake, Tooele, Uintah, Utah, Wasatch, Wayne and formerly Weber County. It also occurs in the states of Colorado, Idaho, Montana, Nebraska, Nevada, Washington, and Wyoming. A member of the orchid family, this species is a perennial herb with a flowering stem, 20-50 cm tall that arises from a basal rosette of grass-like leaves. The flowers are ivory-colored, arranged in a spike at the top of the stem, and bloom mainly from late July through August. Ute ladies'-tresses is found in moist to very wet meadows, along streams, in abandoned stream meanders, and near springs, seeps, and lake shores. It grows in sandy or loamy soils that are typically mixed with gravels. In Utah, it ranges in elevation from 1311 to 2134 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

43. Welsh's milkweed (*Asclepias welshii*) (Threatened): Found in Kane County, Utah as well as in immediately adjacent Coconino County, Arizona. A member of the milkweed family, this species is a stout, rhizomatous perennial herb with large oval leaves and spherical clusters of flowers that are cream-colored with pink-tinged centers. It blooms from June to August. Welsh's milkweed grows on dunes derived from Navajo Sandstone. It is found in sagebrush, juniper, and ponderosa pine communities, at elevations ranging from 1542 to 1993 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

44. Winkler cactus (*Pediocactus winkleri*) (Threatened): Found in Emery and Wayne Counties. A member of the cactus family, this species is a small, subglobose cactus with solitary or clumped stems; the crown of the stem is at or very near ground level. Its flowers are born near the tip of the stem, are peach to pink in color, and bloom late March to May. Winkler pincushion cactus is found in fine textured soils derived from the Dakota Formation and the Brushy Basin Member of the Morrison Formation. It occurs on benches, hill tops, and gentle slopes on barren, open sites in salt desert shrub communities, at elevations ranging from 1490 to 2010 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

45. Wright fishhook cactus (*Sclerocactus wrightiae*) (Endangered): Found in Emery, Sevier and Wayne Counties. A member of the cactus family, this species is a perennial herb with a solitary, hemispheric, ribbed, 6 to 12 cm tall stem that produces nearly-white to pink flowers from late April through May. Wright fishhook cactus is found in soils that range from clays to sandy silts to fine sands, typically in areas with well-developed

biological soil crusts. Wright fishhook cactus grows in salt desert shrub and widely scattered pinyon-juniper communities, at elevations ranging from 1305 to 1963 meters. The proposed APHIS program will not likely adversely affect this species. Direct and indirect effects and PROTECTIVE MEASURES same as # 20.

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Appendix D: APHIS Response to Public Comments on the Utah Draft EA's (EA Numbers: UT-21-1, UT-21-2, UT-21-3, UT-21-4, UT-21-5, & UT-21-6)

USDA APHIS received two public responses to the publication of the 2021 Draft EA. Public comments were received from the Center for Biological Diversity and the Xerces Society.

Responses to Center for Biological Diversity Comments 2021

Comment 1
All comments from last year are equally applicable this year as the 2021 draft EAs suffer from the same or similar deficiencies as the 2020 ones, and are hereby incorporated by reference and attached as Appendix A. Also, comments on these EAs by the Xerces Society for Invertebrate Conservation from 2021 and 2020 are equally applicable, and are hereby incorporated by reference and attached as Appendix B and C respectively.

The responses for comments 1 through 161 are found in the 2020 EA's. These responses are equally applicable for the 2021 draft EA's.

Responses to Xerces Comments 2021

Comment 1
USDA-APHIS received one comment about that the EA's failing to disclose treatment request locations and not adequately describing the affected environment or analyze impacts to the affected environment.

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

> *"The need for rapid and effective response when an outbreak occurs limits the options available to APHIS to inform the public other than those stakeholders who could be directly affected by the actual application. The emergency response aspect is why site-specific treatment details cannot be known, analyzed, and published in advance."*

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

occur within weeks after the Final EA is published, so APHIS doesn't start planning for these after the Final EA.

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

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

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

Recommendation: Our recommendation is the same as last year since this set of EAs possesses the same inadequacies in terms of specific information. We urge APHIS to delay the publication of a FONSI until after all treatment areas have been delineated and are identified to the public, using maps and providing acreage. Site-specific information related to the resources and values of these locations should then be included. This would provide the public with much better understanding of the justification for the treatment, the actual number of acres to be treated and their location, the method to be used, and the scale of potential effects to local resources. This specific information should be 3

posted at the APHIS website as soon as it is available, sent to interested parties, and made available for public comment.

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 identified to the public.

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

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

APHIS described the purpose and need for grasshopper suppression treatments, potential treatment options, the affected environment within the state and an analysis of the potential environmental consequences in the Draft EAs that were made available for public comment. These documents become programmatic because APHIS cannot precisely predict where an outbreak will occur each year; we only know that outbreaks will occur, and treatments in a timely manner will be absolutely necessary. "To delay the publication of a FONSI until after all treatment areas have been identified to the public, using maps and providing acreage" would preclude APHIS from treating in a timely manner. Orthopteran insects grow quickly (The life cycle of the nymphal stages can develop every 5-12 days depending on the temperature), and such would delay projects to the point of having to forego them due to the insects having grown too large for effective suppression. Delaying timely treatments risks losing valuable forage for wildlife and livestock, endangering sensitive seedings of native vegetation and orthopteran depredation of plants of concern. The emergency response aspect is why site-specific treatment details cannot be known, analyzed and published in advance.

The commenter had similar comments in the 2020 EA's. Please see the APHIS responses to comments 1, 2, 3, 4, 5, 6, 8, 55, 91 & 96 in the 2020 EA's.

Please be aware that local agreements with Tribal Nations may preclude disclosure of Tribal information to the public or outside of APHIS without the consent of the Tribal Administrator. Individuals may request information on the specific treatment areas on Tribal Lands from the individual Tribal Nations.

Comment 2

USDA-APHIS received one comment about APHIS including only a single action alternative and not analyzing other reasonable alternatives such as buying substitute forage for affected leaseholders. Also that APHIS does not fully explore the relative impacts of conventional coverage versus RAAT's coverage.

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.

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

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

Response:
APHIS does not have authorization to provide "substitute forage," etc. to affected land-managers, but it is required by law (Plant Protection Act of 2000) to help them suppress grasshopper and Mormon cricket infestations. APHIS, in addition, supports the use of Integrated Pest Management (IPM) 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, which includes cultural techniques. 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 has maintained cooperative relationships with state and federal land managers as well as private landowners and Indian tribes for decades. Those relationships have allowed APHIS to provide consistent and continual recommendations on land management practices which might help mitigate orthopteran infestations.

All the analyses in the EA's are done at conventional rates of full coverage. Any reduction in rate of application or acreage treated is a "reduction" in active ingredient deposited on any given project area.

Comment 3
APHIS received a comment about impacts being described as "reduced" in many portions of the environmental consequences section but 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? And how much reduced? The

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inexactness and lack of specificity of such statements make the EAs of little utility for a citizen trying to determine the actual predicted impacts of insecticide spray on large blocks of Western rangelands.

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

Response:

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

All the analyses in the EA's are done at conventional rates of full coverage. Any reduction in rate of application or acreage treated (i.e., RAATs) is, by definition, a "reduction" in active ingredient deposited on any given project area when compared to full coverage treatment.

Comment 4
APHIS received a comment claiming that it has not demonstrated that treatments in Utah in 2021 meet the "economic infestation level." No site-specific data is presented in the EA that justifies the treatment based on the "economic infestation level."

The APHIS grasshopper suppression program draws its authority from the Plant Protection Act of 2000 (7 U.S.C § 7717). The statute authorizes APHIS 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.*

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

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

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

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

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

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 Utah, it takes from 1-30 acres of rangeland to support one animal unit- month (AUM). Currently, on federal BLM and Forest Service lands, the US taxpayer receives $1.35 per AUM. As a rough estimation, taking the average within the carrying capacity range (10 acres per AUM), and calculating the value of the forage per acre as paid to the American taxpayer, the US taxpayer receives an estimated $0.09 per acre for the forage value on BLM or USFS federal rangelands in Utah.

Given that the direct costs of grasshopper treatments to the taxpayer appear to range from $3.99 up to
$14.61/acre, it is clear that the economic threshold is nowhere near being met. The program makes no economic sense from the point of view of the taxpayer.

Recommendation: Available data suggest that APHIS does not have adequate support to demonstrate that it treats only after lands reach an "economic infestation" according to its own

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

Response:
Please see Comment 2 above.

This comment is similar in nature to comments in the 2020 EA, please see the APHIS responses to comments 3, 4, 5, 6, 7, 8 from the 2020 EA's.

This comment questions the worth of grasshopper suppression on rangeland and it is difficult to parse out which of the demands it places on APHIS are possibly grounded in actual law. The commenter makes a primarily fiscal argument against social or political decisions that APHIS is not empowered to make. NEPA requires environmental risk analysis, and it is not clear that APHIS has to demonstrate economic analysis in an Environmental Assessment. This is a political argument and could certainly proceed in other venues; however, in the interest of explaining the purpose and need for grasshopper suppression APHIS will provide the following clarification.

The analysis provided by the commenter assumes that all lands treated by APHIS in Utah are public. This is not the case. The value of the forage is not based only on the grazing fees assessed by BLM or FS. There are a range of additional costs associated with replacement feed, the cost of hay, the cost to ship the hay, the cost and labor to move the hay to the rangeland, the cost of moving the cattle from the grazing allotments, the cost to provide or build a hay barn to store the hay, etc. The replacement feed costs in Utah greatly outweigh any treatment costs accrued by the agency. The Plant Protection Act of 2000 does not give authority to APHIS to purchase replacement feed for ranchers - it only provides funding, when available, to suppress outbreak populations of grasshoppers to save forage.

Rain and snowfall are the most critical variables in determining range plant production; hence, forage production varies significantly from year to year and from place to place and cannot be predicted prior to the growing season. It must be measured on a case-by-case basis when Orthopteran infestations threaten it. Only then, after pest population levels are counted and forage value assigned, can any treatment decision be determined. Any decision is made after consultation with APHIS entomologists and land manager range specialists to predict levels of forage and sensitive plant loss to grasshopper or Mormon cricket infestations.

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Grazing allocations are assigned by the BLM and US Forest Service based on available range forage. Many wildlife species, including sensitive animals, also inhabit and feed upon that available forage. Sensitive plants make up a portion of that range. The US taxpayers receive much more benefit from the range than $1.35 per AUM from livestock grazing.

Comment 5
APHIS received one comment that it relies too heavily on broad assertions that untreated swaths will mitigate risks. Untreated swaths are presented as mitigation for pollinators and refugia for beneficial insects, but drift from ULV treatments into untreated swaths at typical aircraft heights is not fully disclosed, while studies are mischaracterized.

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

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

However, the width of the skipped swaths is not designated in advance in the EAs, and there is no minimum width specified.

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

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

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

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

- This study only investigated RAATs effects to non-targets for carbaryl, malathion, and fipronil, not on diflubenzuron.
- In addition, the study measured highest wind speeds at 6.0 mph, well below the maximum rate allowed under the operating guidelines indicated in the 2021 Treatment Guidelines (10 mph for aerial applications, no maximum wind speed specified for ground applications).
- The experimental treatment areas in the study (243 ha or 600 acres) were quite small compared to aerial treatment sizes that occur in reality (minimum 10,000 acres for aerial treatments). This could have allowed for recolonization from around the edges that would result in more rapid recovery, compared to a real-world treatment, some of which measure tens of thousands of acres.

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

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

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

program applications, as the EPA analysis is based on a boom height of 10 feet while APHIS aerial release heights are typically much higher.

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

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

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

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

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

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

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

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

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

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

Response:

The commenter is correct that APHIS believes the use of RAATs mitigates the risk to non-target insects including pollinators. However, APHIS does not solely rely on the reduced deposition of pesticides in the untreated swaths to determine the potential harm of grasshopper treatments. The environmental consequences risk analysis of carbaryl and diflubenzuron treatments using conventional methods (total area coverage and higher application rates) is provided on pages 20 -24 of the 2021 EAs. Additional descriptions of APHIS' analysis methods and discussion of the toxicology can be found in the 2019 EIS.

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Diflubenzuron is the insecticide of choice for any grasshopper or Mormon cricket suppression project in Utah. Program applications of diflubenzuron are at the lower end of labeled use rates for Dimilin due to the sensitivity of Orthoptera. In addition, the Program uses rates less than the current labeled rates for grasshoppers and other labeled crops and makes only one application.

APHIS used RAATs to treat approximately 99% of the acres historically treated by the Program. APHIS also uses rates that are typically below the labeled RAAT rates further reducing the amount of insecticide used by the program and thereby minimizing risks to non-target organisms. The swath width can vary based on site specific conditions; however, the end result is reduced pesticide exposure over a treatment area. The EIS cites studies that demonstrate that the use of RAATs result in higher non-target invertebrate populations compared to treatment blocks that did not use RAATs. APHIS may use carbaryl bait, where applicable, as a means to suppress pest populations while protecting native bees and pollinators. These methods of applications have been shown to be protective of non-target invertebrates. These studies are referenced and summarized in the EIS

There have been several studies on diflubenzuron effects on bees, such as Schroeder et al., 1980 and insect growth regulator effects reviewed in Tasei, 2001, which support the idea that the diflubenzuron levels which APHIS uses for grasshoppers and Mormon crickets are a minimal risk to bees and other non-target arthropods (Lockwood et al., 1999, 2001; Norelius and Lockwood, 1999).

APHIS also complies with any label requirements designed to minimize impacts to pollinators.

Comment 6
APHIS received one comment that the EA's understate the risks of the insecticides, diflubenzuron and carbaryl, for exposed bees and other invertebrates.

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

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

Diflubenzuron: Diflubenzuron is an insect growth regulator and functions by disrupting synthesis of chitin, a molecule necessary to the formation of an insect's cuticle or outer

shell. An insect larva or nymph exposed to diflubenzuron is unable to successfully molt and thus dies. Chitin is not limited to insect cuticles, but is also, for example, a component of mollusk radula, fish scales and fungi cell walls.

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

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

Given its toxicity to juveniles, rather than adults, the relevant laboratory toxicity data that should be reported by APHIS in the EAs for its analysis of effects is **larval** toxicity data. Native bee larvae develop in direct contact with pollen, so there is both contact and dietary exposure if the pollen is contaminated. However, while the EAs disclose that diflubenzuron would result in greater activity on immatures, APHIS leaves out key information, such as the expected environmental concentration (EEC) from application, and how those concentrations compare to toxicity levels for immatures. After all, for bees, pollen collected by adults during breeding season (which coincides, for many species, with grasshopper spray windows) will mean exposur
ay consume contaminated pollen placed in the nest by adults.

We could not find such an analysis in the APHIS EA or EIS, so we turned elsewhere to figure out this relevant information. There is a standard tool, known as Bee Rex, that calculates EECs from deposition to pollen and/or nectar, based on application rate (USEPA 2017). Bee Rex also allows for a comparison between the estimated environmental concentration and the acute or sublethal toxic endpoint for honey bee adults and/or larvae. For honey bees (the surrogate species for invertebrate risk assessment in the absence of other data), USEPA (2018) reported a chronic 8-day larval LD50 of 0.044 ug ai/larvae and NOAEL of 0.0064 µg a.i./larva.

Using these values, we conducted an assessment of the potential acute and chronic dietary risk to bee larvae. We utilized deposition values assuming no drift under both the full and reduced rates as specified in the EAs (0.75 or 1.0 fluid ounce per acre (0.012-0.016 lb a.i./ac)). We also utilized deposition values using the point zero and point 500 feet[3] analyses presented in the APHIS drift analysis included in its BA to NMFS as mentioned

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

Table 1. DIFLUBENZURON Bee Risk Assessment

				Larval RQs		Number of times LOC (Larval)	
Application Rate (lb ai/A)	**Scenario**	**Pollen/nectar EEC (mg/kg)**	**Pollen/nectar EEC (ppb)**	**Acute dietary***	**Chronic dietary**	**Acute dietary**	**Chronic dietary**
0.16	Full	1.76	1760	4.9	34.0	12	34
0.12	RAATS	1.32	1320	3.7	25.5	9	25
0.009	pt. zero APHIS drift analysis in 2010 BA	0.981	981	2.8	19.1	7	19
0.0078	pt. 500 APHIS drift analysis in 2010 BA	0.858	858	2.4	16.6	6	17

* EPA classifies any mortality effect as acute. In this case, the concentrations that resulted in mortality were reported as an 8- day LD50.

An acute risk quotient (RQ) of 1.0 (or higher) indicates that the estimated environmental concentration is sufficient to kill 50% (or more) of exposed bees. The Level of Concern (LOC) is an interpretation of the RQ. Normally the LOC is established at RQ=1.0. However for acute risk to bees, because of bees' great ecological and agricultural importance, combined with concern about the risks posed to them by pesticides, EPA sets the LOC value at RQ=0.4. Using the deposition estimates above, larval acute RQs range from 2.4 – 4.9 (6-12X the EPA LOC threshold).

Chronic risk to bees is evaluated with an LOC at RQ=1.0 (USEPA 2014). As indicated in Table 1, even at 500 feet from the application site, using APHIS predictions for deposition, chronic RQs range from 16.6 to 34 (17-34X the EPA LOC level).

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

APHIS appeared to acknowledge the risk to bees in many of the 2020 EAs by instituting a 4-mile buffer around any known managed leafcutter or alkali managed bees and by including notification to all apiarists before a treatment. However, APHIS in 2021 shrugs off the risk of diflubenzuron to pollinators in the EAs as follows:

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

Due to the infeasibility of testing every known species for sensitivity to pesticides, EPA recognizes honey bees as the surrogates for the hundreds of native bees that may be present in the treated areas.
However, using surrogates requires a recognition of the limitations of this approach. Most native bees lead a solitary lifestyle and their larvae consume unprocessed pollen and thus native bees may be more at risk than honey bees from equivalent levels of contamination in the environment.

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

[3] Since we could not deduce an actual value for a 100-foot or 200-foot deposition rate, we used the deposition rate at 500 feet from the APHIS BA to NMFS. This would be a low end estimate since it's 2.5-5X further than the furthest edge of an unsprayed swath.
[4] APHIS presents no information in the EA that indicates the EECs would be any less than this, therefore these values are assumed to be the correct EECs within treated swaths at these two rates.

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

Moreover, APHIS points out that the alfalfa leafcutting bee (*Megachile rotundata*) and the alkali bee (*Nomia melanderi*) are both considered more susceptible than honey bees or *Bombus to* diflubenzuron. Additionally the EIS discloses that under some circumstances,

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Dimilin may be quite persistent; field dissipation studies in California citrus and Oregon apple orchards reported half-live values of 68.2 to 78
days. Rangeland persistence is unfortunately not available, but diflubenzuron applied to plants remains adsorbed to leaf surfaces for several weeks.

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

While studies of diflubenzuron effects to lepidoptera can be hard to find, several studies are identified in Eisler (1992). Eisler identified the following concerning results from published studies:

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

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

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

Carbaryl: According to EPA (2017b), carbaryl is considered highly toxic by contact means to the honey bee, with an acute adult contact LD50 of 1.1 ug/bee. The APHIS 2019 EA describes the oral LC50 value as
0.1 ug/bee.[5] Larval bee toxicity was not available from the APHIS 2019 EA.

We conducted a similar analysis of risk to bees using the BeeRex tool, as described above. According to APHIS' HHERA (2019) for carbaryl, spray applications of the Sevin XLR Plus formulation applied at 16 or 32 fl. oz. per acre are equivalent to an application rate of 0.5 and 0.25 lb a.i./A [sic], respectively. Note that there appears to be an error in the HHERA, the correct rates

should be 0.5 and 1.0 lb ai/A, respectively. To assess drift, input values from the APHIS analysis presented in its 2010 BA to NFMS were inferred from the chart in that BA. At point zero, deposition is predicted at 38 mg/m^2 (0.339 lb ai/A). At 500 feet, deposition is predicted at 21 mg/m^2 (0.187 lb ai/A).

Table 2. Liquid CARBARYL Bee Risk Assessment

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

Note that even at the deposition rate APHIS expects at 500 feet away from the spray line (we have already noted that these predicted deposition rates could be underestimates at that distance, based on empirical data), APHIS would exceed the contact toxicity Level of Concern designated by EPA by 1000X. All of the other deposition values have similarly horrendous exceedences of EPA's LOC. **Nowhere within the EA or the EIS is this made clear.**

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

While lepidopteran studies are often difficult to find in the literature, 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/cm^2 (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. Note that these rates are well below those expected in carbaryl sprayed swaths using the APHIS drift data contained in the 2010 BA (see Table 2) and even above those expected 500 feet downwind of sprayed swaths, using the same drift analysis.

It is our understanding that baits as used in the grasshopper suppression program do not represent an exposure risk to bees since bees generally do not pick it up deliberately. Therefore, carbaryl bait, while highly toxic to those insects that would ingest it, at least avoids some of the exposure concerns of carbaryl spray.

Recommendation: Faced with significant and concerning pollinator declines, APHIS should take into account the risk to native bees and butterflies from these treatments. At a minimum, APHIS should be presenting a more thorough and accurate analysis on the impacts of selected pesticides to pollinators and other beneficial insects. Research findings

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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-

et effects actually occur as a result of the different treatments.

Response:

Please see the APHIS responses to comments 10, 12, 14, 19, 20, 24, 25, and 37 in the 2020 EA's.

The commenter asserts that the EA's do not provide information on the possible effects of diflubenzuron and carbaryl sprays on bees and pollinators. That information is provided on pages 18 and 21. The Draft EA is tiered to more extensive analysis in the 2019 EIS (pages 45-46 and 55-57) and HHERAs for carbaryl (page 21 and 44) and diflubenzuron (pages 13-14, 29-30) that addresses risk to pollinators including bees and their larval stages.

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

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

APHIS's review of the study did not identify findings of effects caused by diflubenzuron at the concentrations represented above by the commenter. "Mommaerts et al. (2006) conducted dose-response assays and found that exposure to diflubenzuron resulted in reproductive effects in <u>Bombus terrestris</u> with only the doses at 0.001 (one thousandth) of maximum field recommended concentrations (MFRC) in pollen and 0.0001 (one ten thousandth) in sugar water, resulting in

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effects statistically similar to controls." The researchers instead estimated mean LC_{50} concentrations based on the chronic exposure routes described above. These were 25 mg a.i./L dermal contact, 0.32 mg a.i./L ingested sugar water, and 0.95 mg a.i./L pollen. The researchers noted, "In practice, bumblebees will rarely be exposed to such high concentrations, but these experiments have been undertaken to evaluate with certainty the safety and compatibility of compounds with bumblebees." They elaborated, "the present authors agree that, before making final conclusions, it is necessary that the laboratory-based results are validated with risk assessments for these insecticides in field related conditions."

APHIS believes that conversion and comparison of program-applied foliar spray rates to the concentrations of the solutions applied in this study would rely on unrealistic exposure scenarios. An exposure scenario where pollinators are exposed continuously for 11 weeks is not expected to occur in the APHIS grasshopper and Mormon cricket suppression program.

The diflubenzuron levels of field applications would decline over the 11-week exposure period due to degradation. Flowering plants that have diflubenzuron residues would no longer be available for foraging by pollinators, as flowers naturally die and do not provide pollen and nectar. Other plants would bloom after application without residues of diflubenzuron.

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

Comment 7

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

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

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

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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 untreated areas. Of these, only two untreated areas grew in size in their 2nd year, and most winked out by the 2nd year, not reappearing by the 3rd year. This is powerful evidence that not treating is a viable decision, or that treating is not warranted in the first year, at least for small infestations, and at least if the goal is to minimize the chance that an outbreak/hotspot would result in something worse in the following year.

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

Quinn et al. (1993) examined the co-occurrence of nontarget arthropods with specific grasshopper nymphal and adult stages and densities. The study reported that nymphs of most dominant grasshopper species were associated with Carabidae, Lycosidae, Sphecidae and Asilidae, all groups known to prey on
grasshoppers. The authors state that "*the results suggest that insecticides applied to rangeland when*15
most grasshoppers are middle to late instars[6] will have a ***maximum impact on nontarget arthropods****."*
[Emphasis added]

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

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

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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."*

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 states that "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." APHIS agrees with the assertion. In fact, that "competition with other grasshoppers" is caused by the destruction of their food sources by over-foraging due to overpopulation of the grasshoppers themselves. In this day and age of range management and conservation to benefit wildlife, sensitive species and livestock, APHIS consults with range managers to determine if grasshopper/Mormon cricket suppression is necessary to preserve range plant continuity. That way, overabundant orthopteran populations can be reduced without the danger of losing the range forage which is necessary to feed other species. Such is the very reason that Congress mandated that APHIS help range managers and landowners suppress "competing" grasshoppers in order to preserve range plant resources.

The commenter asserts that "grasshoppers were regulated primarily by natural processes, including natural enemies such as birds." Comment #8 (with which APHIS does not necessarily agree) contends that rangeland birds are declining. All the more reason to intervene with safe chemical suppression to help save valuable forage and cover for birds and other wildlife species, especially sensitive ones.

Another assertion states 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)."

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APHIS in Utah has surveyed grasshoppers and Mormon crickets in Utah since the 1930's. There has been no "large scale chemical control" undertaken since 1985 when 1,350,000 acres were treated to suppress grasshoppers alone. Surveys over time have revealed that certain areas naturally produce frequent grasshopper or cricket infestations whether or not treatments are performed. The underlying reason that some areas have a history of chemical control is that these environs have a natural history of chronic large grasshopper densities in close proximity to agricultural production or to sensitive areas which need protecting from herbivore insects.

The commenter attempted to downplay the results of a Cantangui study of non-target arthropods in Dimilin treatments of 40-acre plots. Most species of ants, spiders and scavenger beetles travel very short distances throughout their lifetimes, so 40-acre plots are more than sufficient to determine impacts on non-target arthropods without the threat of recruitment from adjacent untreated areas.

APHIS in Utah has no "ten thousand acres" minimum block size required to initiate a grasshopper suppression project. The cited research proves Dimilin to "be of no concern" to non-target arthropods and is not due to an error in research project design. Rather the low Dimilin rates used in APHIS orthopteran treatments select for insects which undergo incomplete metamorphosis, unlike non-targets which are characterized by complete metamorphosis development. It typically takes 4 times the rate of Dimilin to kill flies, ants, beetles, etc. than to kill grasshoppers and crickets. It is much like a doctor's prescription of a low dose of a toxic substance to cure an infection or disease without killing the human host – dose is everything.

Private landowners cannot treat public lands where grasshoppers and Mormon crickets commonly hatch prior to migrating into suburban areas and the surrounding rangelands. Localized egg bed treatments by APHIS on public rangeland where the insects commonly hatch could prevent increased treatments from private landowners using higher chemical application rates and chemicals which are more toxic to non-target species than those which APHIS utilizes. The commenter assumes that without APHIS' involvement in treating outbreak populations, no treatments will occur. In reality, lack of APHIS involvement can result in more and harsher chemicals being applied to private lands coupled without APHIS' water buffers and deference to the needs of sensitive species.

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

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

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The quote taken from the ARS publication, which APHIS frequently provides to cooperators for IPM reference, is given out of context and does not apply to the proposed work in the way that is implied, for the following reasons:

- *There is a strong distinction between low-productivity land which: Can be damaged by low densities of grasshoppers; but is generally controlled by trophic means (pests, predators and disease); and may want to be treated by land manager but is often not advisable for various reasons (including the specific long-term effects Xerceis references), and is usually discouraged by APHIS.*
- *Mid-productivity, a hybrid of the two extremes. APHIS does not typically control grasshopper infestations on mid-productivity rangeland, unless they are part of a larger strategy.*
- *Finally, high productivity sites where in essence, grasshoppers are never controlled by trophic webs, except for them not having enough food to eat, or weather conditions making them very vulnerable. The generally available amount of food makes control by trophic means not scalable even under poor conditions. These are the situation that warrant control in Utah, where high productivity meets grasshopper population booms and natural enemies do not respond in scale, regardless of land management decisions or treatment history.*

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

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

**Here is a fuller discussion of the above ecological questions described in the publication cited (https://www.ars.usda.gov/ARSUserFiles/30320505/grasshopper/Extras/PDFs/IPM%20Handbook/IV8.pdf):*

Comment 8

APHIS received one comment that it fails to meaningfully analyze the risk to grassland birds, many of which are declining.

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

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

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

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

Response:
In this day and age of range management and conservation to benefit wildlife, sensitive species and livestock, APHIS consults with range managers to determine if grasshopper/Mormon cricket suppression is necessary to preserve range plant continuity. That way, overabundant orthopteran populations can be reduced without the danger of losing the range forage which is necessary to feed other species. Such is the very reason that Congress mandated that APHIS help range managers and landowners suppress "competing" grasshoppers in order to preserve range plant resources.

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

The commenter contends (with which APHIS does not necessarily agree) that rangeland birds are declining. All the more reason to intervene with safe chemical suppression to help save valuable forage and cover for birds and other wildlife species, especially sensitive ones.

The commenter also references Lowell McEwen's studies on rangeland birds' relationships with grasshoppers. The assertion is made that "APHIS only analyzes the direct toxic effect of insecticidal treatments to birds and fails to analyze the indirect effects from loss of forage to these declining bird species." McEwen's statement that "bird predation commonly reduces grasshopper densities on rangeland by 30-50%" dealt with non-outbreak grasshopper populations. APHIS grasshopper/Mormon cricket treatments occur only when infestation numbers reach 8 – 10 times the quantities of "non-outbreak" densities. Therefore, orthopteran suppression projects only reduce pest numbers back to normal levels, which leaves ample prey for all insectivorous bird species.

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Under FWS Section 7 Act there is no requirement to consult on sensitive species. However, in Utah when there is concern by land management agencies (federal, state, etc.) for certain species, APHIS implements protective measures for those species of concern when warranted.

Comment 9
APHIS received one comment that it is unrealistic to assume that it can comply with mitigation measures designed to protect bees on pesticide labels.

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

It should be remembered that bumble bees fly earlier and later in the day than honey bees and limiting application times to within 2 hours of sunrise or sunset may not be protective. In addition, while diflubenzuron is toxic to larval and developing forms of numerous insects, it appears that Lepidoptera (butterflies and moths, many of which are at-risk as emphasized in Xerces' comment letter from 2020) are more sensitive to diflubenzuron, as a group, than most other taxa (Eisler 1992).

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

However, if treated habitat is flowering and bees are active (as would be anticipated during any of the proposed treatment months), it is not clear how applications for grasshopper/Mormon cricket control can avoid blooming plants in the treated areas or minimize exposure to bees.

Except for reduced rates and/or untreated swath widths, the EAs are silent on how it will avoid impact to pollinators. It has already been shown that within sprayed areas, risk quotients at expected application rates would be well above 1.0. Leaving skipped widths is also not a full solution at expected widths since, due to drift, untreated swaths are highly likely to be exposed to levels above risk quotients (see above comment).

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

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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:

Please see the APHIS responses to comments 10, 12, 14, 19, 20, 24, 25, and 37 in the 2020 EA's.

The commenter is correct that APHIS believes the use of RAATs mitigates the risk to non-target insects including pollinators and bees. APHIS does not believe the adherence to product use restrictions mitigates all harm to these species. Instead APHIS has analyzed the benefits of relatively small grasshopper treatments against the potential for significant impacts to bee populations within the large area covered by the EAs. The environmental consequences risk analysis of carbaryl and diflubenzuron treatments is provided on pages 18-22 of the 2021 EAs. Additional descriptions of APHIS' analysis methods and discussion of the toxicology can be found in the 2019 EIS.

Comment 10
APHIS received one comment that the EA lacks information to justify its determination of No Effect and Not Likely to Adversely Effect to species listed under the Endangered Species Act.

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

The EAs include a list of the species for which APHIS has initiated consultation and APHIS' determinations (i.e. No Effect, Not Likely to Adversely Affect). However, the facts and reasoning supporting the APHIS determinations are scant at best. For the many listed plants, the justifications do not seem to recognize that larval effects can result in population level effects which can ultimately affect the listed plant. The EAS do not contain information on critical habitat or these calls either.

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

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

Recommendation: APHIS should include its consultation submittal to the services in the Draft EA, even (and especially) if a letter of concurrence is not yet available. In the Final EA, the letters of concurrence should be attached. Under the ESA there must be disclosure of potential impacts under the treatments, an analysis of whether the project would jeopardize the continued

existence or modify or destroy the critical habitat for each adversely affected listed species, according to any active ingredients that may be selected. Pesticide specific conservation measures for each listed species (actions to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the proposed action), where appropriate, should be explicitly addressed and adopted.

For each species to be protected within the project area, APHIS must provide to applicators a set of clear set of directions outlining protective measures for the listed and proposed species found within this
project area. In addition to these measures, APHIS should adopt the following operational guidelines
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 f om treatment (e.g., boundaries and buffers for bodies of water, habitats of protected species, etc.)."*

Response:

Please see the APHIS responses to comments 29, 36, 97, 98, 107, 156,157, 159 & 160 in the 2020 EA's.

Consultation with the Utah USFWS was ongoing at the time that the Draft EA was submitted for comment. Concurrence was received in 2020, and since there have been no further listings for 2021, APHIS anticipates concurrence for its 2021 EA's.

Comment 11

APHIS received one comment stating that within the last year, the monarch butterfly has been designated a candidate species under the Endangered Species Act, but the EAs contain no information about impacts to or consultation for this species.

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

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

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

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The risk of carbaryl applications may be unacceptably high for lepidoptera, including the monarch, based on data from Abivardi et al. (1999) as explained earlier in this comment letter.

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

Response:

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

The commenter cited a blog post as a reference. APHIS does not consult blog posts or social media as credible sources for consultation purposes. The effects analysis is required by ESA for species listed as threatened and endangered for USFWS Section 7 consultations. The commenter is mistaken that APHIS has made a No Effect determination for the Monarch butterfly. Such a determination, or a Not Likely to Adversely Affect finding could result from informal consultation with USFWS, which has not occurred for the Monarch butterfly.

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

On August 26, 2014, a petition to protect the Monarch Butterfly under the ESA was submitted on behalf of the Center for Biological Diversity, Xerces Society, Center for Food Safety, and Dr. Lincoln Brower. In this petition under the factors and the justification listed ," The ESA states that a species shall be determined to be endangered or threatened based on any one of five factors (16 U.S.C. § 1533 (a)(1)): 1) the present or threatened destruction, modification, or

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curtailment of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its continued existence." The monarch is threatened by all five of these factors and thus warrants protection under the Act. The petition failed to describe in any manner, under the factors listed in the petition if any decline of milkweed populations occurred in rangeland habitats. All descriptions under the factors described delt with population declines in cropland settings due to the heavy use of chemicals to control crop pests. One cannot assume that chemical-use levels in cropland settings are equal to chemical amounts used in open rangeland settings, if they are used at all. No data or justification for any monarch decline, milkweed population increases or milkweed presence on rangelands was given.

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

Under FWS Section 7 Act there is no requirement to consult on sensitive species. However, in Utah when there is concern by land management agencies (federal, state, etc.) for certain species, APHIS implements protective measures for those species of concern when warranted.

Comment 12
APHIS received one comment stating that Carbaryl has been analyzed on listed species nationwide with widespread "likely to adversely affect" determinations –but no mention of this or mitigation for its harmful effects is found in the EAs.

The EAs do not mention a recent nationwide consultation effort on carbaryl's effect to listed species. In its Biological Evaluation that it forwarded to the Services, EPA determined that carbaryl is likely to adversely affect 1,542 species (see https://www.epa.gov/endangered-species/draft-national-level-listed-species-biological-evaluation-carbaryl).

Such a determination by EPA is cause for a high level of concern. At a minimum, one would expect to find disclosure of these determinations and inclusion of mitigation for carbaryl's harmful effects to listed species. Instead, no mention is made.

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

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Response:

The Endangered Species Act section 7 pesticide consultation process between the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (the Services, collectively) and the EPA specifically concerns FIFRA pesticide registration and reregistration in the United States, including all registered uses of a pesticide. The state-level Biological Assessments for APHIS invasive species programs are separate from any consultations conducted in association with pesticide registration and reregistration process.

The Agricultural Improvement Act of 2018 (Farm Bill) created a partnership between USDA, EPA, the Services and the Council on Environmental Quality to improve the consultation process for pesticide registration and reregistration. USDA is committed to working to ensure consultations are conducted in a timely, transparent manner and based on the best available science. The Revised Method for National Level Listed Species Biological Evaluations of Conventional Pesticides provides a directionally improved path to ensuring that pesticides can continue to be used safely for agricultural production with minimal impacts to threatened and endangered species.

APHIS provided information about use of carbaryl to EPA for the FIFRA consultation for carbaryl. The Grasshopper Program use of carbaryl has in the past comprised substantially less than 1% of the percent crop treated (PCT) for rangeland use of carbaryl. This is the case for the reasonably foreseeable future. For rangeland, in the EPA BE, the Grasshopper Program's very low usage was rounded up to <1% PCT, which gives an overestimate of rangeland acres treated and thus endangered species risk. APHIS use of carbaryl is even smaller compared to all uses of carbaryl nationwide. Further, the Grasshopper Program consults directly with the Services to ensure program activities do not adversely affect protected species or their critical habitat.

Carbaryl is presently approved by the EPA and registered in Utah. The APHIS proposed use for carbaryl in Utah is not for treatment across wide expanses of the state but in small grazing allotments that require a suppression treatment, and where ground bait applications are the most logical choice. It should be noted that the current labeled uses for carbaryl grasshopper treatments are at much higher rates and can be applied with more frequency than what APHIS is proposing for use in Utah. In addition, carbaryl use by the Program is minor compared to the preferred alternative diflubenzuron. APHIS has evaluated the risk of carbaryl use in the Program and in general the conclusions are consistent with other risk assessments demonstrating low risk when adhering to label requirements. Additional mitigation measures used by APHIS further reduce the risk to human health and the environment.

APHIS submitted a programmatic biological assessment to the FWS in 2015. APHIS is currently working with the FWS to update and complete the biological assessment and receive concurrence. The intent of the programmatic biological assessment is to provide consistent mitigation measures for listed species that may co-occur with Program treatments. Consultation with the FWS is still being completed at the local level prior to any treatments. <u>No APHIS treatments are made in states without prior concurrence from the FWS or NMFS regarding federally-listed species.</u> This information is also summarized in the final EIS.

Local FWS Section 7 consultations were entered into prior to the DRAFT EAs. APHIS consulted with the FWS on federally listed species that may occur within the county or areas where grasshopper and Mormon cricket treatments may be required. APHIS works closely with the FWS to determine the application of protection measures and where those measures should be applied prior to any treatments. APHIS also evaluated the potential direct and indirect impacts to non-target species which is summarized in the final human health and ecological risk assessments for each insecticide.

Comment 13

APHIS received one comment that vulnerable pollinators and arthropods as a group are put at risk by the proposed action, despite widespread reports of insect decline and affirmative federal obligations for federal agencies put into place several years ago.

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

Many of the pollinators that call Utah home are already considered at-risk. See lists of at-risk pollinators found in our comment letter submitted in 2020, (these comments are also attached to our 20201 email submitting this comment letter).

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

Despite this very real crisis in biodiversity, the EAs do not disclose which, if any, invertebrates within the geographic area are listed as sensitive by federal land management agencies or as Species of Conservation Concern, or whether the state of Utah designates any invertebrates as species of greatest conservation need (the document refers to a table of state designations, but it could not be found.)

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

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

- the 2014 Presidential Memorandum -- Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators

- the National Strategy to Promote the Health of Honey Bees and Other Pollinators
- the Pollinator-Friendly BMPs for Federal Lands
- the Pollinator Research Action Plan

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

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

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

- Determine the types of pollinators in the project area and their vulnerability to pesticides, taking into consideration pesticide chemistry, toxicity, and mode of action. Consult local Cooperative Extension or state departments of agriculture for more information.
- Minimize the direct contact that pollinators might have with pesticides that can cause harm and the contact that they might have with vegetation sprayed with pesticides that are toxic to pollinators. Try to keep portions of pollinator habitat free of pesticide use.
- Plan timing and location of pesticide applications to avoid adverse effects on pollinator populations. Apply pesticides that are harmful to pollinators when pollinators are not active or when flowers are not present.

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

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

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. To assist APHIS in this analysis, we appended tables of at-risk bee and butterfly species potentially located within the project area in last year's comment letter. Prior to treatment, APHIS should ensure that it has identified specific, actionable measures it will take to protect the habitat of at-risk pollinator species from contamination that may occur as a result of exposure to treatment.

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

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

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

Response:

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

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

APHIS appreciates having these extensive protective measures provided by the commenter in one place. The commenter should instead look at the protective measures that are currently proposed in this EA and note specifically where they might possibly be deficient. APHIS would argue that they are sufficient to not have a significant impact on any species other than the grasshopper outbreak target in the limited area where treatment is considered warranted. Additionally of note in regards to some sections of this comment that recommend management strategies: APHIS is not a land management agency, so it cannot actively manage for anything other than its role in limiting damaging insects as described by the PPA, including economic grasshopper infestations.

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APHIS reduces the risk to native bees and pollinators through monitoring grasshopper and Mormon cricket populations and making pesticide applications in a manner that reduces the risk to this group of nontarget invertebrates. Monitoring grasshopper and Mormon cricket populations allows APHIS to determine if populations require treatment and to make treatments in a timely manner reducing pesticide use and emphasizing the use of Program insecticides that are not broad spectrum. Historical use of Program insecticides demonstrate that diflubenzuron is the preferred insecticide for use. Over 90% of the acreage treated by the Program has been with diflubenzuron. APHIS, in addition, used RAATs to treat approximately 99% of the acres historically treated by the Program. APHIS also uses RAATs that are typically below the labeled RAAT rates further reducing the amount of insecticide used by the program. APHIS also emphasizes the use of carbaryl bait, where applicable, as a means to suppress pest populations while protecting native bees and pollinators. These methods of applications have been shown to be protective of non-target invertebrates. These studies are referenced and summarized in the EIS.

APHIS believes that the reduced amount of pesticide that would occur using untreated swaths over a given treatment block will result in reduced risk to non-target organisms by reducing exposure. The swath width can vary based on site specific conditions; however, the end result is reduced pesticide exposure over a treatment area. The EIS cites studies that demonstrate that the use of RAATs result in higher non-target invertebrate populations compared to treatment blocks that did not use RAATs.

Please refer to the response for comment number 37 in the 2020 EAs as well as comments 5, 6, 8, 9, 10 and 11 above.

Comment 14

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

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

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

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

Recommendation: While the mitigations that are identified for aquatic habitats in the EAs are heartening, the diflubenzuron label indicates that the chemical is subject to runoff for months after application, and areas supporting listed mussels need greater protection. APHIS must disclose impacts to at-risk mussels where they are present. In addition, APHIS should use

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larger buffers to protect freshwater mussels, such as those designated for listed salmonids in other states. In addition, APHIS should include monitoring for the presence and health of mussels in streams that traverse or are
adjacent to treatment areas as part of its monitoring strategy.

Response:

APHIS agrees that freshwater mussels should be protected, as well as other aquatic organisms, and uses ground and aerial application no-treatment buffers adjacent to all aquatic habitats. APHIS, in addition, uses reduced rates of Program insecticides compared to current labeled rates. These mitigation measures are beyond label requirements for protection of aquatic habitats. The intent of these buffers is to reduce off-site drift and runoff of Program insecticides into aquatic habitats.

APHIS conducts environmental monitoring related to Program treatments. Monitoring is typically done adjacent to any sensitive areas, including aquatic habitats, to determine pesticide residues. These data can be used to determine risk to non-target organisms based on available toxicity data.

Comment 15

APHIS received one comment that the EAs are silent on buffers around stock tanks. These can be important reservoirs of biodiversity, even as they may be better known for being home to many non-native species.

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

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

Response:

All bodies of water are buffered according to the APHIS Guidelines in Appendix 1 of Draft EA. Stock tanks, stock ponds and other anthropogenic sources of water are buffered in the same manner as any other natural source of water in or around the treatment area. All anthropogenic sources of water, if they cannot be drained, covered or removed, will be buffered in concurrence with our standard water buffer mitigations. Any sensitive species or species of conservation concern would be addressed with the land manager and mitigation measures agreed upon prior to treatment.

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Comment 16

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

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

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

Response:

APHIS complies with the Clean Water Act as administered by the Utah Division of Environmental Quality. An NPDES permit is required if pollutants are discharged from a point source into waters of the United States. The Utah Department of Water Quality, the issuing body of NPEDS permits in Utah, concurs that an NPEDS permit is not required based on the scope of the grasshopper/Mormon cricket suppression program. Water runoff is not considered a "point source" discharge, and in addition, APHIS's self-imposed mitigation measures preclude pesticide-contaminated runoff into water bodies adjacent to spray areas. APHIS uses the following buffers for water bodies:

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

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

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

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

Comment 17

APHIS received one comment concerning special status lands

The EAs do not analyze impacts to or any specific protections to be accorded to special status lands such as Wilderness areas, Wilderness study areas, National Monuments, Research Natural Areas, National Wildlife Refuges, and designated or proposed Areas of Critical Environmental Concern within potential treatment areas.

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

Response:

Because APHIS relies on treatment requests from land managers, it is taken for granted that the areas suggested by the commenter are not likely to have grasshopper suppression programs. If there is somewhere in particular in the counties covered by this EA in Utah, where the commenter feels this is a likely concern, that would be constructive information to help with this EA. There is no information available to APHIS to expect that this is a reasonable concern.

The commenter gave the same comment in the 2020 EA's. Please refer to APHIS responses to comments 50 of the 2020 EA's.

Comment 18

APHIS has received one comment concerning cumulative effects analysis.

The EA does not adequately disclose the locations where spraying has occurred in the past, nor did the APHIS 2019 EIS.

In the EA, APHIS states that cumulative effects "are not significant" partly because the probability of an outbreak occurring in the same area as a previous outbreak is unlikely. But APHIS does not disclose the scale of treatments in any previous years, nor the impact of those treatments. APHIS places emphasis on the fact that its policy dictates that only one treatment a year is conducted but does not address nearby impacts on private or state lands where more than one treatment may be conducted, which could contribute to cumulative impacts. In addition, ecological impacts can be severe even if a repeat treatment is unlikely if treatment results in adverse effects to a species confined to a small range, already in decline, or both.

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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.

Response:

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

Please refer to APHIS responses to comments 82, 83, 84, 85, 86, 87, 88, 89 and 90 in the 2020 EA's.

Comment 19

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

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

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

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

Emphasizing cultural techniques through appropriate grazing management could help to reduce reliance on pesticide applications and allow abiotic and biotic factors to regulate

grasshopper and Mormon cricket populations to the greatest extent possible. For example Onsager (2000) found that (compared to season-long grazing) rotational grazing resulted in significantly less adult *Melanoplus 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.

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

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

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

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

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

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

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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 non-target organisms.
    - Monitor sites before and after application of any insecticide to determine the efficacy of the management technique as well as if there is an impact on water quality or non-target species.

Response:

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

The comments comparing rotational grazing to season long grazing are valid concerns. APHIS supports such management practices. However, the rotational grazing practices in Utah by the ranchers are not under the control of the APHIS grasshopper program. Some ranchers practice rotational grazing in Utah - APHIS only responds to the large outbreaks associated with the rangeland forage damage. Grazing practices are not under the control of APHIS. The research the commenter referenced concerning fire management, biological control and other non-chemical methods are not valid control practices presently. Fire Management of rangeland is not controlled by APHIS. This method would have to be implemented by the land management agencies.

APHIS is not expert in land-management practices – the respective land managers are. APHIS does make integrated pest management (IPM) recommendations, with respect to practices that help impede grasshopper and Mormon cricket outbreaks. But APHIS is mandated by law (Plant Protection Act), when these outbreaks reach infestation levels, to help land managers treat damaging populations of orthopterans when IPM/cultural practices are not sufficient.

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These outbreaks are inevitable and have been an integral part of the Western rangeland ecosystems for millennia. Human populations and agriculture, in this day and age, have also become an integral component of those Western ecosystems. In order to co-exist, range resources must be managed to maintain continuity and integrity so that humans and wildlife might share those resources without undue impacts on sensitive species which struggle to compete.

APHIS, for the above reasons, encourages range managers to "prevent conditions that allow grasshopper and Mormon cricket populations to reach outbreak conditions by employing diverse management techniques (e.g., biological, physical, and cultural)." APHIS "Implement(s) frequent and intense monitoring," through its seasonal statewide surveys, "to identify populations that can be controlled with small ground-based pesticide application equipment."

Comment 20

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

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

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

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

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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.

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- 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:

Please see APHIS responses to comment 1 above and to comments 1, 2, 3, 4, 50, 53 and 54 of the 2020 EA's.