Final - Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

ARIZONA
EA Number: AZ-24-01

Prepared by:

Animal and Plant Health Inspection Service
3640 East Wier Ave. Suite 1
Phoenix, Arizona 85040

Site-Specific

Gila and Graham County portion within the San Carlos Apache Reservation.

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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

[FINAL] Site-Specific Environmental Assessment

Rangeland Grasshopper and Mormon Cricket Suppression Program

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I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers or Mormon crickets may occur on rangeland in Graham and Gila County, San Carlos Apache Reservation. The Animal and Plant Health Inspection Service (APHIS) and may, upon request by land managers or State departments of agriculture, conduct treatments to suppress grasshopper infestations as part of the Rangeland Grasshopper and Mormon Cricket Suppression Program (program). The term "grasshopper" used in this environmental assessment (EA) refers to both grasshoppers and Mormon crickets, unless differentiation is necessary.

Populations of grasshoppers that trigger the need for a suppression program are normally considered on a case-by-case basis. Participation is based on potential damage such as grasshoppers which defoliate grasses by direct feeding on leaf and stem tissue and by cutting off leaves or stems and heads while feeding. High populations of grasshoppers on rangeland can damage plant crowns so severely that many grass plants will not recover. Some grasshopper species not only reduces grass forage by consuming it but also by cutting it down. The cut grass may become litter on the ground where it may also be used for food by grasshoppers or becomes wasted biomass. Potential areas where large populations may occur can be found in the 2024 Grasshopper Hazard Map in appendix B. The benefits of treatments include the suppressing of over abundant grasshopper populations to lower adverse impacts to range plants and adjacent crops. Treatment would also decrease the economic impact to local agricultural operations and permit normal range plant utilization by wildlife and livestock.

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 could take place within the timeframe of 04/01/24 to 09/30/24 on rangeland in Graham and Gila County, San Carlos Apache Reservation (Appendix D).

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 2024 Control Program for infested rangeland in Graham and Gila County, San Carlos Apache Reservation.

B. Background Discussion

Rangelands provide many goods and services, including food, fiber, recreational opportunities, and grazing land for cattle (Havstad et al., 2007; Follett and Reed, 2010). Grasshoppers and Mormon crickets are part of rangeland ecosystems, serving as food for wildlife and playing an important role in nutrient cycling. However, grasshoppers and Mormon crickets have the potential to occur at high population levels (Belovsky et al., 1996) that result in competition with livestock and other herbivores for rangeland forage and can result in damage to rangeland plant species.

In rangeland ecosystem areas of the United States, grasshopper populations can build up to economic infestation levels[1] despite even the best land management and other efforts to prevent outbreaks. At such a time, a rapid and effective response may be requested and needed to reduce the destruction of rangeland vegetation. In some cases, a response is needed to prevent grasshopper migration to cropland adjacent to rangeland. In most circumstances, APHIS is not able to accurately predict specific treatment areas and treatment strategies months or even weeks before grasshopper populations reach economic infestation levels. The need for rapid and effective response when an outbreak occurs limits the options available to APHIS to inform the public other than those stakeholders who could be directly affected by the actual application. The emergency response aspect is why site-specific treatment details cannot be known, analyzed, and published in advance.

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

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[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.

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

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

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

Section 417 of the PPA (7 U.S.C. § 7717) authorizes APHIS' efforts to minimize the economic impacts of grasshoppers. Section 417(a) states that subject to the availability of funds, the Secretary "shall carry out a program to control grasshoppers and Mormon crickets on all Federal lands to protect rangeland." Section 417(c) (1) states that "Subject to the availability of funds pursuant to this section, on request of the administering agency or the agriculture department of an affected State, the Secretary, to protect rangeland, shall immediately treat Federal, State, or private lands that are infested with grasshoppers or Mormon crickets at levels of economic infestation, unless the Secretary determines that delaying treatment will not cause greater economic damage to adjacent owners of rangeland." Section 417(c)(2) states, "In carrying out this section, the Secretary shall work in conjunction with other Federal, State, and private prevention, control, or suppression efforts to protect rangeland."

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

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

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

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

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

On November 6, 2019, APHIS and the Forest Service (FS) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers on FS managed lands (Document #19-8100-0573-MU, November 6, 2019). This MOU clarifies that APHIS will prepare and issue to the public, site-specific environmental documents that evaluate potential impacts associated with the proposed measures to suppress economically damaging grasshopper populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the FS.

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

On January 11, 2022, APHIS and the Bureau of Land Management (BLM) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two groups on suppression of grasshoppers on BLM managed lands (Document #22-8100-0870-MU, January 11, 2022). This MOU clarifies that APHIS will prepare and issue to the public, site-specific environmental documents that evaluate potential impacts associated with the proposed measures to suppress economically damaging grasshopper populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BLM. The MOU further states that the responsible BLM official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on BLM land is necessary. The BLM must also approve a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BLM approves the Pesticide Use Proposal.

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

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

C. About This Process

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

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

Public involvement under the CEQ Regulations for Implementing the Procedural Provisions of NEPA distinguishes federal actions with effects of national concern from those with effects primarily of local concern (40 CFR 1506.6). The grasshopper and Mormon cricket suppression program EIS were 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 also provide additional opportunities for local public involvement, such as public meetings. In addition, when an interested party asks to be informed APHIS ensures their contact information is added to the list of interested stakeholders.

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

The current EIS provides a solid analytical foundation; however, it may not be enough to satisfy NEPA completely for actual treatment proposals. The program typically prepares a Draft EA tiered to the current EIS for each of the 17 Western States, or portion of a state, that may receive a request for treatment. The Draft EA analyzes aspects of environmental quality that could be affected by treatments in the area where grasshopper outbreaks are anticipated. The Draft EA was made available to the public for a 30-day comment period. The comment period began January 3rd and ended February 2nd, 2024. Comments can be sent to USDA, APHIS, 3640 East Wier Ave. Suite 1, Phoenix, Arizona 85040, or contacting the local USDA, APHIS Arizona State Office (602)431-3200. Comments were accepted until February 2nd at 4pm MST. When the program receives treatment requests 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 USDA, APHIS, 3640 East Wier Ave. Suite 1, Phoenix, Arizona 85040**.** These documents are also available at the Rangeland Grasshopper and Mormon Cricket Program website, http://www.aphis.usda.gov/plant-health/grasshopper.

All insecticides used by APHIS for grasshopper suppression are used in accordance with applicable product label instructions and restrictions. Representative product specimen labels can be accessed at the Crop Data Management Systems, Incorporated web site at www.cdms.net/manuf/manuf.asp. Labels for actual products used in suppression programs will vary, depending on supply issues. All insecticide treatments conducted by APHIS will be implemented in accordance with APHIS' treatment guidelines and operational procedures, included as Appendix A to this 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 the rangeland in Arizona and therefore the environmental baseline should describe a no treatment scenario in those rangeland areas.

A. No Suppression Program Alternative

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

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

Under Alternative B, the Preferred Alternative, APHIS would manage a grasshopper treatment program using techniques and tools discussed hereafter to suppress outbreaks. The insecticides available for use by APHIS include the U.S. Environmental Protection Agency (USEPA) registered chemicals carbaryl, chlorantraniliprole, and diflubenzuron. These chemicals have varied modes of action. Carbaryl 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, because 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 and/or diflubenzuron would be considered under this alternative, typically at the following application rates:

- 10.0 pounds (0.20 lb a.i.) of 2 percent carbaryl bait per acre.
- 0.75 or 1.0 fluid ounce (0.012 lb a.i.) of diflubenzuron per acre; or
- 4.0 fluid ounces (0.013 lbs a.i./ac sprayed) of chlorantraniliprole.

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 applications where the swath width is between 20 and 45 feet depending on type of ground equipment used. 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.

Applicator's use of Trimble GPS Navigation equipment is used to navigate and capture shapefiles of the treatment areas. All sensitive sites are buffered out of the treatment area using flagging which is highly visible to the aerial applicator. All sensitive sites are reviewed in the daily briefing with APHIS personnel including the applicator working on the treatment site. Treatments are conducted to suppress large grasshopper populations to protect rangeland vegetation.

Treatments are conducted using the Reduced Agent Area Treatment (RAAT's) method. This method of skipping swaths (fig.1) decreases the amount of chemical and acreage treated still maintaining an effective kill rate. Swath widths usually range from 40-45 feet depending on ground equipment used. Aerial treatments may have a swath width of 100ft. Grasshoppers in untreated areas will tend to move to treated areas, thus becoming exposed to the insecticide. For example, if the area in *figure 1* was 100 acres, with 50% RAAT's the acreage actually treated would be 50 acres. Protection would include the entire 100 acres, only exposing half the area with half the chemical amount compared to a conventional blanket treatment covering the entire 100 acres and the label rate of application.

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

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 and diflubenzuron would cover all treatable sites within the designated treatment block per label directions.

The application rates under this alternative are typically at the following application rates:

- 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 (0.027 lbs a.i./ac sprayed) of chlorantraniliprole.

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

C. *Experimental Treatments Alternative*

APHIS-PPQ continues to refine its methods of grasshopper and Mormon cricket management in order to improve the abilities of the Rangeland Grasshopper and Mormon Cricket Suppression Program (herein referred to as the Program) to make it more economically feasible, and environmentally acceptable. These refinements can include reduced rates of currently used pesticides, improved formulations, development of more target-specific baits, development of biological pesticide suppression alternatives, and improvements to aerial (e.g., incorporating the use of Unmanned Aircraft Systems (UAS)) and ground application equipment. A division of APHIS-PPQ, Science and Technology's (S&T) Phoenix Lab is in Arizona and its Rangeland Grasshopper and Mormon Cricket Management Team (Rangeland Unit) conducts methods development and evaluations on behalf of the Program. The Rangeland Unit's primary mission is to comply with Section 7717 of the Plant Protection Act and protect the health of rangelands (wildlife habitats and where domestic livestock graze) against economically damaging cyclical outbreaks of grasshoppers and Mormon crickets. The Rangeland Unit tests and develops more effective, economical, and less environmentally harmful management methods for the Program and its federal, state, tribal, and private stakeholders.

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

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

Methods Development Studies

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

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

Pesticides and Biopesticides Used in Studies

Pesticides likely to be involved in studies currently include:

1) Liquids: diflubenzuron (Dimilin 2L and generics: currently Unforgiven and Cavalier 2L) and chlorantraniliprole (Prevathon). Program standard application rates are diflubenzuron - 1.0 fl. oz./acre in a total volume of 31 fl. oz./acre; chlorantraniliprole - 2.0 fl. oz./acre (RAATs) or 4.0 fl. oz./acre (conventional coverage), both in a total volume of 32 fl. oz./acre. Experimental rates often vary, but the doses are lower than standard Program rates unless otherwise noted.

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

Biopesticides likely to be involved in studies currently include:

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

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

At this time, we are unsure where in the 17 states we will be doing most of the following proposed experimental field studies. The final location decision is dependent upon grasshopper and/or Mormon cricket population densities, and availability of suitable sites, but we plan to most likely work in Arizona, Idaho, New Mexico, Oregon, Montana, or Washington.

Study 1: Evaluate persistence of the experimental biopesticide DWR2009 in bait form by coating wheat bran with the pathogen. A species of local abundance will be placed into replicated microplot cages and fed the baits by hand. Mortality and sporulation will then be observed for a duration of time to determine persistence in both the field and lab.

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

Study 3: Compare the efficacy of aerial applications of Vantacor, a newer, highly concentrated formulation of chlorantraniliprole against the previous formulation, Prevathon. This study plans to use two 640-acre blocks: 1 treated with 4.0 fl. oz./acre of Prevathon, the other treated with 0.35 fl. oz./acre of Vantacor. Additional control blocks where not treatment will occur will be chosen to compare to treated blocks. Aerial sprays will be conducted sometime in May/June but is contingent upon determining sites with populations of sufficient size and the availability of pilots for spraying. Mortality will then be observed for a duration of time to determine efficacy of both treatments..

Study 4: Evaluate efficacy of the experimental biopesticide DWR2009 in liquid and bait form (by coating wheat bran with the pathogen) using ultra-low volume RAATs (involves a timing device and ULV nozzles) and a 10-acre plot. ATV-mounted liquid and bait spreaders will be utilized to apply DWR2009. Specimens will be periodically collected to observe mortality and sporulation for a duration of time to determine efficacy.

Study 5: A study to evaluate the efficacy of sonic frequencies. Replicated plots will be treated with and without sonic frequencies using speakers. Specimens will be periodically collected to determine the effect on orthopteran distribution, plant/insect species diversity, and habitat quality. Periodic observations will also be made on what effects, if any, the frequencies are having on other arthropods, vertebrates, and plants around the study sites. Camera-traps, handheld cameras, and periodic visual surveys will be used to record sight observations.

III. Affected Environment

A. Description of Affected Environment

The Site-Specific Graham and Gila County portion within the San Carlos Apache Reservation proposed suppression program area in the EA encompasses 332,120 acres. This is the total estimated acres within the proposed action area (Appendix D map). Acres treated will be from somewhere within this total. Actual acres treated will be far less than this amount and fluctuate from season to season depending on infestation levels. For example, in the 2023 season only 2,577 actual acres were treated from within this proposed action area of 331,120 acres. In the 2022 season, 6,003 acres were treated within the proposed action area, and in 2021 season only 2,437 actual acres were treated from within this proposed action area. Thus, the number of actual acres treated will fluctuate from season to season depending on the grasshopper infestation within the proposed action area.

The vegetative communities (fig. 2) are semiarid grasslands; Plains & Great Basin Grasslands; Great Basin Conifer woodland; Interior Chaparral covered in this area. Soil types include basalt and basalt flows, weakly consolidated sandstone and siltstone, unconsolidated alluvial sand, silt, and some gravel. All rangeland covered in this EA is managed by the San Carlos Apache Tribe.

Figure 2. Typical rangeland ecosystem surveyed for economic species of grasshoppers in Arizona.

Elevations range from approximately 3,500 to over 6,000 feet. Potential treatment sites are within watersheds which drain into tributaries of the Bonita Creek, Hackberry Creek, Hackberry Draw, Cottonwood Canyon Salt Creek, and San Carlos River. There are stock tanks in the potential treatment area. All potential treatment areas fall within the Arizona Interior Chaparral biome (Brown, 1994), grassland representative species of this biome include:

Plants: Emory oak (*Quercus emoryi*), alligator bark juniper (*Juniperus deppeana*), pinyon pine (*Pinus edulis*), gray oak (*Quercus grisea*), canyon live oak (*Quercus chrysolepis*), Arizona oak (*Quercus arizonica*), western chokecherry (*Prunus virginiana*), shrub live-oak (*Quercus turbinella*), ceanothus (*Ceanothus greggii*), crucifixion thorn (*Canotia holocantha*), penstemon (*Penstemon spp.*), desert verbena (*Verbena wrightii*), Wright buckwheat (*Eriogonum wrightii*), narrowleaf yerbasanta (*Eriodictyon angustifolium*), sideoats grama (*Bouteloua curtipendula*), cane bluestem (*Bothriochloa barbinodis*), plains lovegrass (*Eragrostis intermedia*), Black grama (*Bouteloua eriopoda*), Blue grama, (*Bouteloua gracilis)* Hairy grama, (*Bouteloua hirsuta)* Rothrock's grama, *(Bouteloua rothrockii),* Fendler three-awn (*Aristida spp.*), agave (*Agave parryi*), beargrass (*Nolina microcarpa*), sotol (*Dasylirion wheeleri*), banana yucca (*Yucca baccata*), *,* squirreltail, *(Elymus elymoides),* Arizona cottontop, *(Digitaria californica),* Green sprangletop (*Leptochloa dubia*), *Junegrass, (Koeleria spp.),* Western wheatgrass (*Pascopyrum smithii),* Tobosagrass, (*Pleuraphis mutica),* Vine Mesquite, *(Panicum obtusum*), curly-mesquite (*Hilaria belangeri),* Cholla (*Opuntia spp.*), Prickly Pear (*Opuntia spp.)*,

Mammals: cliff chipmunk (*Eutamias dorsalis*), white-throated woodrat (*Neotoma albigula*), mule deer (*Odocoileus hemionus*), brush mouse (*Peromyscus boylei*), rock mouse (*P. difficilis*), white- footed mouse (*P. leucopus*), eastern cottontail (*Sylvilagus floridanus holzeri*), pronghorn antelope (*Antilocapra americana*), elk (*Cervus elaphus)* javalina **(***Pecari tajacu),* jackrabbit (*Lepus spp.*), coyote (*Canis latran),* White-tailed deer *(Odocoileus virginianus).*

Birds: rufous-crowned sparrow (*Aimophila ruficeps*), scrub jay (*Aphelocoma coerulescens*), canyon wren (*Catherpes mexicanus*), rufous-sided towhee (*Pipilo erythrophthalmus*), brown towhee (*P. fuscus*), bushtit (*Psaltriparus minimus*), black-chinned sparrow (*Spizella atrogularis*), crissal thrasher (*Toxostoma dorsale*), burrowing owl (*Athene cunicularia*).

Amphibians and reptiles: glossy snake (*Arizona elegans*), Arizona alligator lizard (*Gerrhonotus kingi*), night snake (*Hypsiglena torquata*), Sonoran mountain kingsnake (*Lampropeltis pyromelana*), southwestern blind snake (*Leptotyphlops humilis*), Sonora whipsnake (*Masticophis bilineatus*), desert striped whipsnake (*M. taeniatus*), western fence lizard (*Scleroporus occidentalis*), eastern fence lizard (*S. undulates*), western blackhead snake (*Tantilla planiceps*), Sonoran lyre snake (*Trimorphodon biscutatus lambda*), Texas lyre snake (*T. b. vilkinsoni*), side-blotched lizard (*Uta stansburiana*), Arizona night lizard (*Zantusia arizonae*), Western Diamond-backed Rattlesnake

(Crotalus atrox), Black-tailed Rattlesnake *(Crotalus molossus)*, Arizona Black Rattlesnake *(Crotalus cerberus).*

B. *Summary of Target Grasshopper Species*

There are over 600 species of grasshoppers in the United States. Of these 400 species of grasshoppers are in the 17 western states. Of these there are 238 species of grasshoppers and other orthoptera which have been recorded from localities in Arizona (Ball 1942). There are 35 species in Arizona known to reach outbreak status and threaten crops and/or valuable range resources. The most frequent complex of economic grasshopper species in Arizona have included the following damaging species:

Melanoplus sanguinipes	migratory grasshopper
Camnula pellucida	clear-winged grasshopper
Aulocara elliotti	big-headed grasshopper
Oedaleonotus enigma	valley grasshopper
Melanoplus bivittatus	two-striped grasshopper
Melanoplus femurrubrum	red-legged grasshopper
Ageneotettix deorum	white-whiskered grasshopper
Melanoplus packardii	Packard's grasshopper
Melanoplus foedus	striped sand grasshopper
Cordillacris occipitalis	spotted-wing grasshopper
Amphitornus coloradus	striped grasshopper
Melanoplus infantilis	small spur-throat grasshopper
Philibostroma quadrimaculatum	Four-spotted grasshopper
Phoetaliotes nebrascensis	Large-headed grasshopper
Hadrotettix trifasciatus	three-banded grasshopper

B. Site-Specific Considerations

1. Human Health

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

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

The suppression program would be conducted on federally managed rangelands. No treatments will occur over congested or residential areas, recreation areas, and schools. The nearest residential or populated area to potential treatment areas are at least 17 miles away. Refer to the Operational Procedures, Specific Procedures for Aerial and Ground Applications in Appendix A for further information.

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

2. Nontarget Species

Threatened & Endangered Species and Sensitive Species of Concern

APHIS has entered in Section 7 consultations with Fish & Wildlife Service regarding the T&E species which are covered in the 2024 Rangeland Grasshopper Suppression Program Biological Assessment. Effects determinations for T&E species covered in the proposed action areas are outlined in table 1. All protective measures to be implemented by APHIS, PPQ, Arizona Field Operations outlined in the 2024 BA document will be adhered to (table 2). APHIS also consulted with local agency officials to determine appropriate protective measures for sensitive species of concern not covered by the ESA and FWS does not issue concurrence determinations for.

The area assessed by this EA includes a variety of organisms i.e., terrestrial vertebrates and invertebrates, migratory birds, biocontrol agents, pollinators, aquatic organisms, plants (both native and introduced), etc. APHIS will employ measures, such as buffer zones, to protect these species and their habitat. In Arizona, all stock tanks/ponds will be buffered with a 500-foot buffer. APHIS will also consult with local agency officials to determine appropriate protective measures.

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

Under the No Action Alternative, destruction of grasses and forbs by grasshoppers could cause localized disruption of food and cover for several wildlife species. Under chemical control there is a possibility of indirect effects on local wildlife populations, particularly insectivorous birds that depend on a readily available supply of insects, including grasshoppers, for their own food supply and for their young. We have found no valid data which suggests that (absent a spill) any species other than certain mice would be subjected to a dosage in excess of 1/5 of the LD50 for Carbaryl (Pg. B-37 GH EIS.)

Therefore, it is not apparent that any fatalities would be likely to occur because of Carbaryl intoxication.
Malathion and Carbaryl have been shown to reduce brain cholinesterase (ChE) (an enzyme important in nerve cell transmissions) levels in birds. Effects of ChE inhibition are not fully understood but could cause inability to gather food, escape predation, or care for young.

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

The wildlife risk assessment in the APHIS FEIS 2019 estimated wildlife doses of Malathion and Carbaryl to representative rangeland species and compared them with toxicity reference levels. No dose of Malathion will approach or exceed the reference species LD50. Some individual animals may be at risk of fatality or behavioral alterations that make them more susceptible to predation resulting from ChE level changes in Malathion spraying for grasshopper control. However, most individual animals would not be seriously affected. Carbaryl also poses a low risk to wildlife, with few fatalities likely to occur and a low risk of behavioral anomalies caused by cholinesterase depression.

Some species of herbivorous mammals and birds may consume wheat bran bait after it has been applied to grasshopper-infested areas. Carbaryl is moderately toxic to mammals and slightly toxic to birds. We have found no valid data which suggests that (absent a spill) any species other than certain mice would be subjected to a dosage in excess of 1/5 of the LD50 for Carbaryl (Pg. B-37 GH EIS.) Therefore, it is not apparent that any fatalities would be likely to occur as a result of Carbaryl intoxication. Additionally, we note that Carbaryl 5% bait is labeled at three pounds per 1000 sq. ft. in poultry houses when poultry are present. (http://www.cdms.net/Label-Database.) Chitin or chitin-like substances are not as important to terrestrial mammals, birds, and other vertebrates as chitin is to insects; therefore, the chitin inhibiting properties of Diflubenzuron applications under the conditions of Alternative 2 such as reductions in the food base for insectivorous wildlife species, especially birds. As stated above, Diflubenzuron is practically nontoxic to birds, including those birds that ingest moribund grasshoppers resulting from Diflubenzuron applications, as described in Alternative 2.

While immature grasshoppers and other immature insects can be reduced up to 98 percent in area covered with Diflubenzuron, some grasshoppers and other insects remain in the treatment area. Although the density of grasshoppers and other insects may be low, it is most likely sufficient to sustain birds and other insectivores until insect populations recover. Those rangeland birds that feed primarily on grasshoppers may switch to other diet items. However, in some areas the reduced number of invertebrates necessary for bird survival and development may result in birds having less available food. In these cases, birds will either have less than optimal diets or travel to untreated areas for suitable prey items, causing a greater foraging effort and a possible increased susceptibility to predation. It also should be noted that suppressing grasshopper populations conserves rangeland vegetation that often is important habitat to rangeland wildlife. Habitat loss is frequently the most important factor leading to the decline of a species and reducing grasshopper densities can be an aid in reducing habitat loss.

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

APHIS is the lead agency in Arizona regarding biological control for invasive weeds. All biocontrol programs are coordinated between APHIS and Federal, Tribal, State agencies and Weed Management Districts and City Municipalities. APHIS has GIS data for all Biological Control programs throughout Arizona. There has been no overlap between biocontrol programs and grasshopper treatments. If this does become the case in the future, the grasshopper program would eliminate questionable acreage from the treatment area.

Bald and Golden Eagle Protection Act (BGEPA)

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

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

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

Table 1. 2024 Biological Assessment Effects Determination for T&E Species

Species	Status	Effects Determination
Mexican gray wolf, *Canis lupus baileyi*	Endangered	May affect- Not likely to adversely affect
California condor, *Gymnogyps californianus*	Endangered	May affect- Not likely to adversely affect
California Least Tern, *Sterna antillarum browni*	Endangered	May affect- Not likely to adversely affect
Mexican spotted owl, St*rix occidentalis lucida*	Threatened	May affect- Not likely to adversely affect
Southwestern willow flycatcher, *Empidonax traillii extimus*	Endangered	May affect- Not likely to adversely affect
Yellow-billed cuckoo, *Coccyzus americanus*	Threatened	May affect- Not likely to adversely affect
Chiricahua leopard frog, *Rana chiricahuensis*	Threatened	May affect- Not likely to adversely affect
Northern leopard frog, *Rana pipiens*	Arizona Game and Fish Department, Species of Greatest Conservation Need.	May affect- Not likely to adversely affect
Desert pupfish, *Cyprinodon macularius*	Endangered	May affect- Not likely to adversely affect
Gila chub, *Gila intermedia*	Endangered	May affect- Not likely to adversely affect
Gila topminnow, *Poeciliopsis occidentalis occidentalis*	Endangered	May affect- Not likely to adversely affect
Loach minnow, *Tiaroga cobitis*	Endangered	May affect- Not likely to adversely affect
Spikedace, *Meda fulgida*	Endangered	May affect- Not likely to adversely affect
Humpback chub, *Gila cypha*	Endangered	May affect- Not likely to adversely affect
Razorback sucker, *Xyrauchen texanus*	Endangered	May affect- Not likely to adversely affect
Woundfin, *Plagopterus argentissimus*	Endangered	May affect- Not likely to adversely affect
Arizona cliffrose, *Purshia subintegra*	Endangered	No Effect
Fickeisen plains cactus, *Pediocactus peeblesianus fickeiseniae*	Endangered	No Effect
Jones cycladenia, *Cycladenia jonesii*	Threatened	No Effect
Siler pincushion cactus, *Pediocactus sileri*	Threatened	No Effect
Welsh's milkweed, *Asclepias welshii*	Threatened	No Effect
Mohave Desert tortoise, *Gopherus agassizii*	Threatened	May affect- Not likely to adversely affect
Sonoran Desert tortoise, *Gopherus morafkai*	Candidate	May affect- Not likely to adversely affect
Northern Mexican gartersnake, *Thamnophis eques megalops*	Threatened	May affect- Not likely to adversely affect
Monarch Butterfly, *Danaus plexippus*	Candidate	May affect- Not likely to adversely affect

Table 2. Proposed application buffers to protect listed T&E species and habitat.

Species	Method of Application	Protective Measure Only RAAT's Methodology Used
Mexican gray wolf	Ground	500-foot buffer
California condor	Ground Aerial	.25-mile buffer 1.5-mile buffer
California Least Tern		No Treatments within 5 miles of known nesting habitat
Mexican spotted owl	Ground	RAAT's Only No Aerial treatments
Southwestern willow flycatcher		No Treatments within 5 miles of known nesting habitat
Yellow-billed cuckoo		No Treatments within 5 miles of known nesting habitat
Chiricahua leopard frog	Ground Aerial	500-foot buffer .25-mile buffer
Northern leopard frog	Ground Aerial	500-foot buffer .25-mile buffer
Desert pupfish		No Treatments within 1 mile of rivers and tributaries
Gila chub		No Treatments within 1 mile of rivers and tributaries
Gila topminnow		No Treatments within 1 mile of rivers and tributaries
Loach minnow		No Treatments within 1 mile of rivers and tributaries
Spikedace		No Treatments within 1 mile of rivers and tributaries
Humpback chub		No Treatments within 1 mile of rivers and tributaries
Razorback sucker		No Treatments within 1 mile of rivers and tributaries
Woundfin		No Treatments within 1 mile of rivers and tributaries
Arizona cliffrose	Aerial Ground	3-mile buffer occupied habitat .25-mile buffer from Cottonwood Canyon Gila/Graham County
Fickeisen plains cactus		All occupied habitat excluded from treatment area
Jones cycladenia		All occupied habitat excluded from treatment area
Siler pincushion cactus		All occupied habitat excluded from treatment area
Welsh's milkweed		All occupied habitat excluded from treatment area
Mohave Desert tortoise		All designated habitat excluded from treatment area
Sonoran Desert tortoise	Ground	Pre-application surveys will be conducted if treatments are within known habitat, only diflubenzuron will be used
Northern Mexican gartersnake	Ground	500-foot buffer
Monarch Butterfly		Any known milkweed stands on rangeland will be buffered by 50 feet. Riparian areas excluded from treatment areas

3. Socioeconomic Issues

Livestock grazing and hunting are the main uses of the potential treatment area. These grasslands provide forage for cattle and wildlife. Farming, forestry occupations, agriculture, fishing and hunting, and mining provide 10.6% of the employment on San Carlos Apache Reservation (U.S. Bureau of the Census, Census 2000).

Currently there is approximately 9,945-10,945 living on the Reservation according to the My Tribal Data. US Census. Retrieved 20 July 2020. In August 2014, the San Carlos Apache tribe had an enrollment of 15,393 tribal members.

The San Carlos Reservation's annual median household income of approximately $27,542, according to the US Census. About 49.2 percent of the people live under the poverty line, and 36.7 percent of the active labor force is unemployed. Replacement feed for damage rangeland would be almost impossible to afford under these circumstances. It is critical that APHIS provide the Rangeland Grasshopper Suppression Program to assist the Tribal Ranches management of resources.

The principal economic activities are tourism, cattle ranching, and arts and crafts. The San Carlos is rich in hunting, fishing. The tribe sells guided big-game hunting permits for desert bighorn sheep, trophy elk, antelope, and mountain lion.

The possible treatment areas are subject to reoccurring drought. A combination of drought and grasshopper damage causes economic stress to landowners and permittees. The control of grasshoppers in this area would have beneficial economic impacts to local landowners. The forage not utilized by grasshoppers will be available for livestock consumption and harvesting. This will allow greater livestock grazing, decreased needs for supplemental feed, and increased monetary returns.

4. Cultural Resources and Events

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

5. Special Considerations for Certain Populations

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

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

The San Carlos Reservation's annual median household income of approximately $31,696 according to the US Census and BUREAU OF WOMEN'S AND CHILDREN'S HEALTH, Arizona Department of Health Services. About 49.2 percent of the people live under the poverty line, and 36.7 percent of the active labor force is unemployed.

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).

According to the BUREAU OF WOMEN'S AND CHILDREN'S HEALTH, Arizona Department of Health Services, there are 3,235 children between the ages of 0-14. There is approximately 1,151 youth from the ages of 15-19 according to the Arizona Department of Health Services. The risk for children to be exposed to treatment pesticides is very low due to the remote nature of the Tribal Rangeland. The nearest communities are approximately 50 miles from the Tribal rangeland areas. There will be no aerial treatments conducted in Arizona only by ground-based equipment.

IV. Environmental Consequences

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

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

A. Environmental Consequences of the Alternatives

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

1. No Suppression Program Alternative

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

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

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

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

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

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

a) Carbaryl

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

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

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

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

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

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

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

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

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

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

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

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

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

b) Chlorantraniliprole

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

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

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

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

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

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

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

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

c) Diflubenzuron

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

USEPA considers diflubenzuron relatively non-persistent and immobile under normal use conditions and stable to hydrolysis and photolysis. The chemical is considered unlikely to contaminate ground water or surface water (USEPA, 1997). The vapor pressure of diflubenzuron is relatively low, as is the Henry's Law Constant value, suggesting the chemical will not volatilize readily into the atmosphere from soil, plants or water. Therefore, exposure from volatilization is expected to be minimal. Due to its low solubility (0.2 mg/L) and preferential binding to organic matter, diflubenzuron seldom persists more than a few days in water (Schaefer and Dupras, 1977; 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.

d) Reduced Area Agent Treatments (RAATs)

The use of RAATS is the most common application and the preferred 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.

B. Other Environmental Considerations

1. Cumulative Impacts

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

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

Potential cumulative impacts associated with the Preferred Alternative are not expected to be significant because the program applies an insecticide application once during a treatment. The program may treat an area with different insecticides but does not overlap the treatments. The program does not mix or combine insecticides. Based on historical outbreaks in the United States, the probability of an outbreak occurring in the same area where treatment occurred in the previous year is unlikely; however, given time, populations eventually will reach economically damaging thresholds and require treatment

The insecticide application reduces the insect population down to levels that cause an acceptable level of economic damage. The duration of treatment activity, which is relatively short since it is a one-time application, and the lack of repeated treatments in the same area in the same year reduce the possibility of significant cumulative impacts.

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

The insecticides proposed for use in the program have a variety of agricultural and non-agricultural uses. There may be an increased use of these insecticides in an area under suppression when private, State, or Federal entities make applications to control other pests. However, most 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.

Herbicide treatments for invasive species have been conducted on the San Carlos Reservation by Tribal management agencies. These areas are not located in the 2021 Action area for the rangeland grasshopper suppression program. Therefore, there would be no synergistic effect from an overlap of pesticide and herbicide treatments.

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

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

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

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

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

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

According to the BUREAU OF WOMEN'S AND CHILDREN'S HEALTH, Arizona Department of Health Services, there are 3,235 children between the ages of 0-14. There is approximately 1,151 youth from the ages of 15-19 according to the Arizona Department of Health Services. The risk for children to be exposed to treatment pesticides is very low due to the remote nature of the Tribal Rangeland. The nearest communities are approximately 50 miles from the Tribal rangeland areas. There will be no aerial treatments conducted in Arizona only by ground-based equipment.

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

4. Tribal Consultation

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

Prior to the treatment season, program personnel notify Tribal land managers of the potential for grasshopper and Mormon cricket outbreaks on their lands. Consultation with local Tribal representatives takes place prior to treatment programs to inform fully the Tribes of possible actions APHIS may take on Tribal lands. Treatments typically do not occur at cultural sites, and drift from a program treatment at such locations is not expected to adversely affect natural surfaces, such as rock formations and carvings. APHIS would also confer with the appropriate Tribal authority to ensure that the timing and location of a planned program treatment does not coincide or conflict with cultural events or observances on Tribal lands. APHIS has received a letter of request for services to suppress economic populations of rangeland grasshoppers, signed by the Tribal Administrator for the 2024 season. Suppression work will only occur within the proposed action areas of the San Carlos Apache Reservation. Any tribal lands outside of the proposed action area will be excluded from any treatment program.

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

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

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

6. Endangered Species Act

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

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

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

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

APHIS determined that with the implementation of these measures, the grasshopper suppression program may affect, but is not likely to adversely affect listed salmonids or designated critical habitat in the program area. NMFS concurred with this determination in a letter dated April 12, 2010. In Arizona, there are no salmonids or designated critical habitats. So, there is no need for local consultation with NMFS for species which to not occur.

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 received concurrence from USFWS on these determinations March 21, 2024. APHIS also conducted local consultations with USFWS field offices. The BA addresses the protective measures and use of chlorantraniliprole, diflubenzuron and carbaryl bait as it relates to species previously addressed in biological assessments with concurrences from State FWS office dated January 26, 2024, and Regional FWS office dated March 22, 2024. Concurrence to consultations from FWS offices are in Appendix E.

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. Correspondence from FWS is in appendix E of this EA. *There are no species in Arizona regulated by NMFS. No consultation or concurrence from NMFS is needed.*

In the 2024 biological assessment APHIS, PPQ Arizona Field Ops determined that the proposed action **will not effect**: the endangered Arizona cliffrose (*Purshia subintegra*); endangered Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*) with critical habitat; threatened Jones cycladenia, (*Cycladenia jonesii*); threatened Siler pincushion cactus (*Pediocactus sileri*); threatened Welsh's milkweed (*Asclepias welshii*) with critical habitat; threatened Mojave Desert tortoise (*Gopherus agassizii*) with critical habitat.

APHIS has determined that the proposed action **may affect but is not likely to adversely affect:** the endangered Mexican gray wolf (*Canis lupus baileyi*); endangered California Condor (*Gymnogyps californianus*); endangered California Least Tern, (*Sterna antillarum browni)*; endangered Southwestern willow flycatcher (*Empidonax traillii extimus*) with critical habitat; endangered Desert pupfish (*Cyprinodon macularius*); endangered Gila chub (*Gila intermedia*); endangered Razorback sucker (*Xyrauchen texanus*) with critical habitat; threatened Mexican spotted owl (*Strix occidentalis lucida*) with critical habitat; threatened Western yellow-billed cuckoo (*Coccyzus americanus*) with proposed critical habitat, threatened Chiricahua leopard frog (*Rana chiricahuensis*) with critical habitat; threatened Northern Mexican gartersnake (*Thamnophis eques megalops*).

APHIS is not required to develop mitigation buffer zones for candidate or other species of concern. The Monarch Butterfly, *Danaus plexippus*, Sonoran Desert tortoise, *Gopherus morafkai*, Northern leopard frog (*Rana pipiens*), (Arizona Game and Fish Department Species of Greatest Conservation Need) are species of concern and may or may not be located within our proposed treatment areas for 2024. However, species of concern receive no legal protection under the Act, but APHIS has considered these species and discussions with the local land managers prior to any treatments to assist in any conservation efforts. Agreed upon mitigation measures between USFWS, BLM, Tribal Nations, BIA, ADA, Arizona Game & Fish, BLM, and APHIS will be adhered too for species of concern (see table 2).

7. Bald and Golden Eagle Protection Act

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

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

8. Additional Species of Concern

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

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

Because grasshopper numbers are so high in an outbreak year, treatments would not likely reduce the number of grasshoppers below levels present in a normal year which would usually range from 3-7 gh/yd^2. 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.

However, extreme grasshopper outbreaks can cause massive defoliation and the loss of forbs, reducing nesting cover for the following spring and reducing another important food source for sage- grouse. An effective rangeland treatment program will balance these short- and long- term impacts. The goal is to reduce grasshopper numbers to what would be encountered in a normal year, leaving an ample food base while protecting rangeland resources.

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

9. Fires and Human Health Hazards

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

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

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

10. Cultural and Historical Resources

Federal actions must seek to avoid, minimize, and mitigate potential negative impacts to cultural and historic resources as part of compliance with the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act of 1979, and NEPA. Section 106 of the NHPA requires Federal agencies to provide the Advisory Council on Historic Preservation with an opportunity to comment on their findings. There are no known historic resources and National Trails within the proposed action area.

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VI. Listing of Agencies/Persons Consulted

John Nystedt, Fish and Wildlife Biologist,
U.S. Fish and Wildlife Service.
Flagstaff Suboffice
323 N. Leroux Street, Suite 201
Flagstaff, Arizona 86001

Brenda Smith, Fish and Wildlife Biologist,
U.S. Fish and Wildlife Service
Flagstaff Suboffice
323 N. Leroux Street, Suite 201
Flagstaff, Arizona 86001

Shaula Hedwall, Fish and Wildlife Biologist,
U.S. Fish and Wildlife Service
Flagstaff Suboffice
323 N. Leroux Street, Suite 201
Flagstaff, Arizona 86001

Brian J. Wooldridge, Fish and Wildlife Biologist,
U. S. Fish and Wildlife Service
Flagstaff Suboffice
323 N. Leroux St., Suite 201
Flagstaff, AZ 86001

Jessica Miller, Fish and Wildlife Biologist,
U. S. Fish and Wildlife Service
Flagstaff Suboffice
2500 South Pine Knoll Drive
Flagstaff, AZ 86001
(928) 556-2050

Terry Rambler, Tribal Chairman, San Carlos Apache Tribe
P.O. Box 0
#3 San Carlos Avenue
San Carlos, Arizona 85550

Clark Richins, Land Operation Coordinator, San Carlos Apache Tribe
#3 San Carlos Avenue
San Carlos, Arizona 85550

Teresa Goseyun, Rangeland Management Specialist, San Carlos Apache Tribe
#3 San Carlos Avenue
San Carlos, Arizona 85550

Daniel Juan, Biologist, San Carlos Apache Tribe
PO Box 97
San Carlos, Arizona 85550

Paul Buck, Soil Scientist, San Carlos Apache Tribe
PO Box 0
San Carlos, Arizona 85550

Arizona Strip District Manager, BLM
345 East Riverside Drive
St. George, Utah 84790

Brandon E. Boshell, Grand Canyon-Parashant National Monument Manager
Arizona Strip District, BLM
345 East Riverside Drive
St. George, Utah 84790

Lorraine M. Christian, Arizona Strip Field Manager
Arizona Strip District, BLM
345 East Riverside Drive
St. George, Utah 84790

Ben Ott, Rangeland Management Specialist,
Arizona Strip District, BLM
345 East Riverside Drive
St. George, Utah 84790

Justin Reeves, Rangeland Management Specialist
Arizona Strip District, BLM
345 East Riverside Drive
St. George, Utah 84790

Travis Largent, Wildlife Biologist
Kaibab National Forest, Williams and Tusayan Ranger Districts
742 S Clover Rd.
Williams, AZ 86046

Kelly Hetzler, Forester, Inventory and GIS, San Carlos Apache Tribe
PO Box 0
San Carlos, Arizona 85550

Victoria Wesley, San Carlos Apache Tribe, Forestry
PO Box 0
San Carlos, Arizona 85550

Daniel Juan, Wildlife Technician,
San Carlos Apache Tribe
PO Box 0
San Carlos, Arizona 85550

Jeff McFadden, Wildlife Technician,
San Carlos Apache Tribe
PO Box 0
San Carlos, Arizona 85550

Sabrina Tuttle, Ph.D., Assistant Extension Agent,
Gila County Cooperative Extension,
U of A,
San Carlos Apache Reservation
PO Box 850
San Carlos, Arizona 85550

Jennifer Cordova, Wildlife Specialist II,
Arizona Game and Fish Dept.
PO Box 397
Seligman, AZ 86337

Appendix A: APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program

FY-2024 Treatment Guidelines

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

General Guidelines for Grasshopper / Mormon Cricket Treatments

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

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

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

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

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

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

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

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

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

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

Operational Procedures

GENERAL PROCEDURES FOR ALL AERIAL AND GROUND APPLICATIONS

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

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

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

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

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

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

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

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

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

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

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

9. APHIS reporting requirements associated with grasshopper / Mormon cricket suppression treatments include:
    A. Completion of a post-treatment report (Part C of the Project Planning and Reporting Worksheet (PPQ Form 62)

B. Providing an entry for each treatment in the PPQ Grasshopper/Mormon Cricket treatment database
C. For aerial treatments, providing copies of forms and treatment/plane data for input into the Federal Aviation Interactive Reporting System (FAIRS) by PPQ's designee

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

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

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

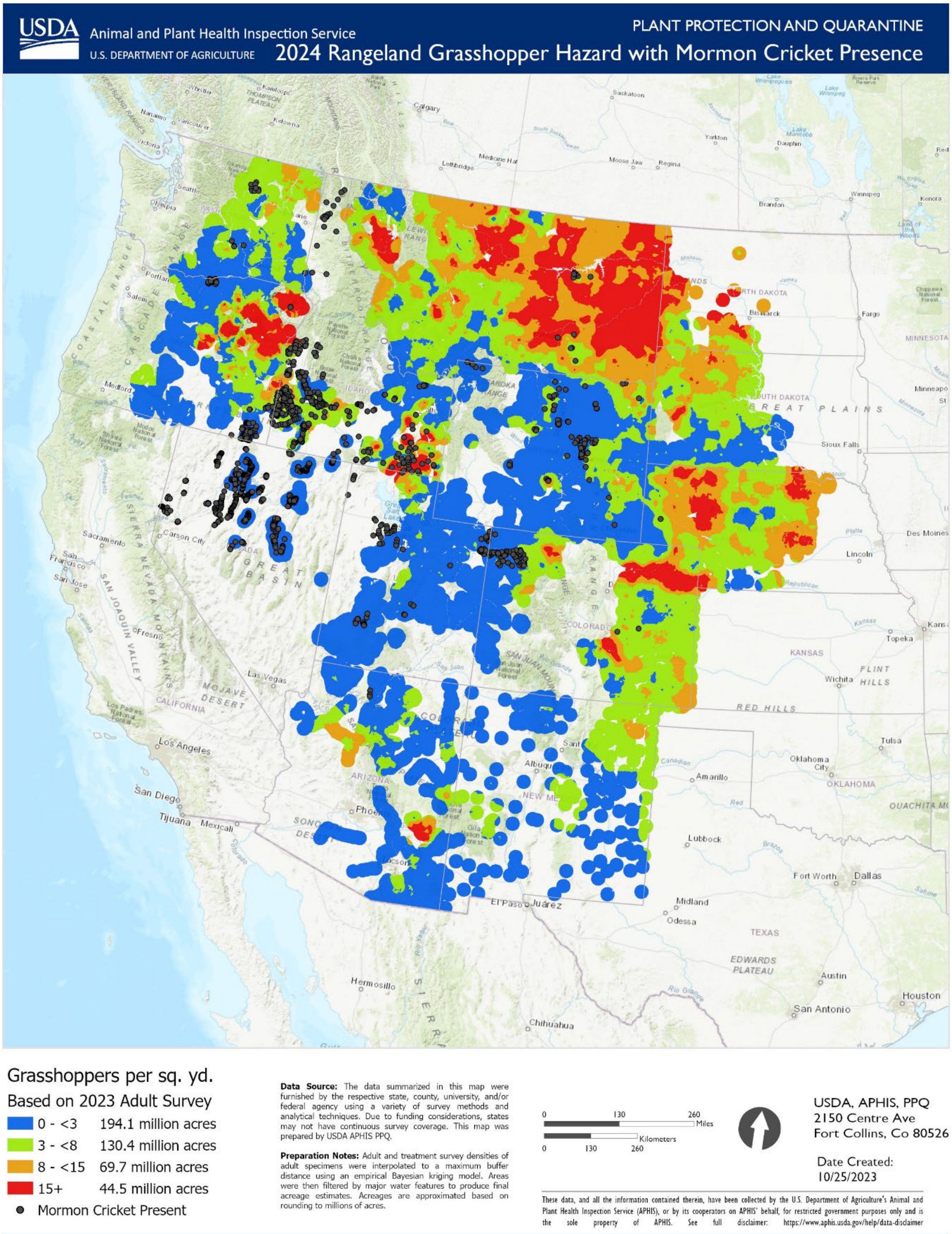
    a. Wind velocity exceeds 10 miles per hour (unless state law requires lower wind speed);
    b. Rain is falling or is imminent;
    c. Dew is present over large areas within the treatment block;
    d. There is air turbulence that could affect the spray deposition;
    e. Temperature inversions (ground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

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

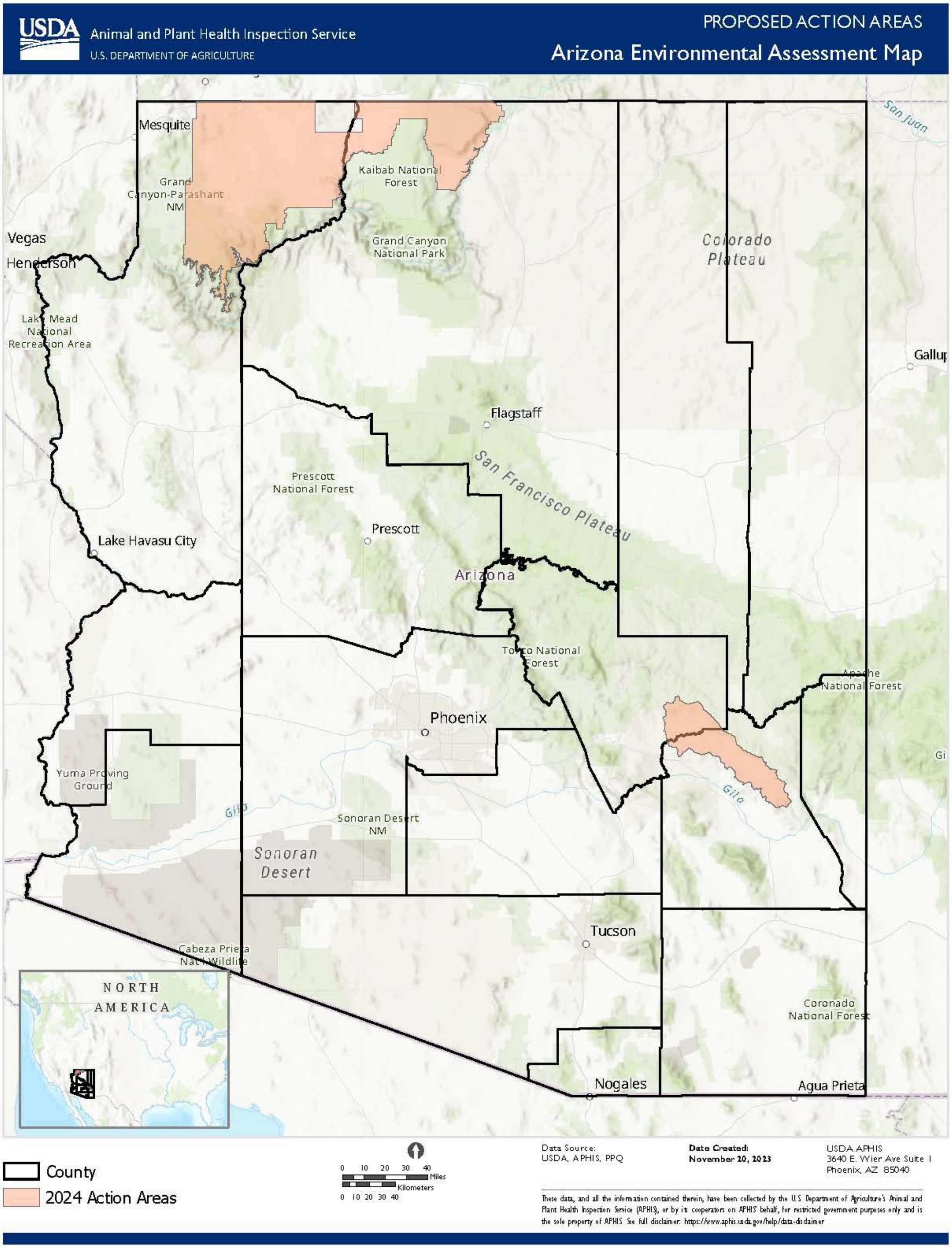
4. Application aircraft will fly at a median altitude of 1 to 1.5 times the wingspan of the aircraft whenever possible or as specified by the COR or the Treatment Manager.

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

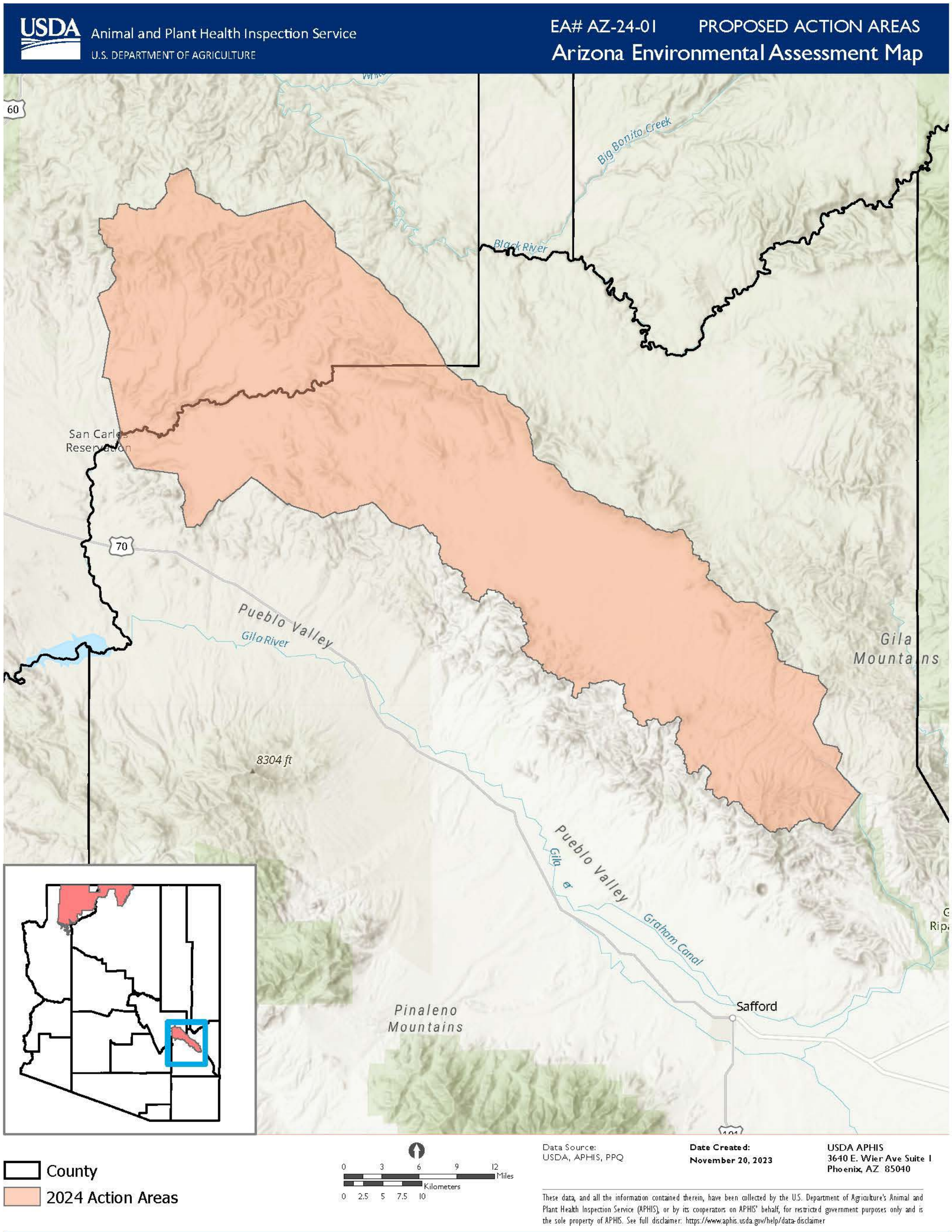
Appendix B: Grasshopper Hazard Map of the Affected Environment



Appendix C: Map of Proposed Action Areas



Appendix D: Map of the San Carlos Apache Tribal Proposed Action Area



Appendix E: FWS/NMFS Correspondence

United States Department of the Interior
Fish and Wildlife Service
Arizona Ecological Services Office
9828 North 31st Avenue, Suite C3
Phoenix, Arizona 85051
Telephone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer to:
AESO/SE
2024-0038525-S7-001

January 26, 2024

Mr. Dewey W. Murray
Domestic Program Coordinator
Plant Protection and Quarantine
Animal and Plant Health Inspection Service (APHIS)
U.S. Department of Agriculture
3640 East Wier Avenue, Suite 1
Phoenix, Arizona 85040

Dear Mr. Murray:

Thank you for your correspondence of December 5, 2023, which we received the same day via email. This letter documents our review of the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program, in compliance with section 7 of the Endangered Species Act of 1973 (Act) as amended (16 U.S.C. 1531 et seq.). Specifically, the project includes rangeland areas within the Bureau of Land Management (BLM) Arizona Strip District in Coconino and Mohave counties. Your letter concluded that the proposed project "may affect but is not likely to adversely affect" the experimental non-essential population of the endangered California condor (*Gymnogyps californianus*; condor). We concur with your determination and provide our rationale below.

For nonessential experimental populations, only two provisions of section 7 apply outside National Wildlife Refuge System and National Park System lands; section 7(a)(1), which requires all Federal agencies to use their authorities to conserve listed species, and section 7(a)(4), which requires Federal agencies to informally confer with the FWS on actions that are likely to jeopardize the continued existence of a proposed species. APHIS requested informal consultation for the condor because of agreements reached between APHIS and FWS (USDA APHIS 2023). Per the agreement, APHIS will treat all species listed prior to 1995 as fully protected under the Act. This agreement is in effect until APHIS and FWS complete a nationwide section 7 consultation for the entire Rangeland Grasshopper Cooperative Management Program. Therefore, this consultation treats the condor as an endangered species because we completed the 10(j) rule for the experimental non-essential population in 1996 (61 FR 54044) after the 1995 agreement.

APHIS also determined there would be "no effect" to the Arizona cliffrose (*Purshia subintegra*), Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*) and its critical habitat, Jones cycladenia (*Cycladenia jonesii*), Siler pincushion cactus (*Pediocactus sileri*), Welsh's milkweed (*Asclepias welshii*) and its critical habitat, and the Mojave desert tortoise (*Gopherus agassizii*) and its critical habitat. Species with no effect determinations do not require review from the Fish and Wildlife Service (FWS), and we will not address these species further.

DESCRIPTION OF THE PROPOSED ACTION

Your December 5, 2023, biological assessment (BA) includes a complete description of the proposed action, and we include it herein by reference.

The purpose of the proposed action is to suppress economically damaging grasshopper and Mormon cricket populations on rangelands using chemicals within the identified project areas. Section 7.0 of the BA (USDA APHIS 2023, Figure 7.3) includes maps of the treatment areas. The suppression action involves a single application of an insecticide early in the life cycle of the target grasshopper species, which include *Aulocara elliotti* and *Melanoplus sanguinipes*. APHIS will begin application March 15, 2024. The insecticides APHIS could use are diflubenzuron, chlorantraniliprole, carbaryl and Malathion. The chemical control methods are the use of ultra-low volume (ULV) sprays of both insecticides and carbaryl in bait formulation, using ground or aerial equipment. APHIS will apply the chemical insecticides using the Reduced Area Agent Treatment (RAATs) techniques (USDA APHIS 2023). RAATs treatments differ from traditional programs by applying less chemical agent to fewer acres while maintaining efficacy. On occasion, APHIS may use modified RAATs (less agent and/or treated area than conventional treatments, but more than RAATs).

Treatments may occur near Vermillion Cliffs on the Arizona Strip District of BLM, which is where most of the southwestern condor population nests, roosts, and forages.

Conservation Measures

- APHIS will employ buffer zones within which no pesticide applications will occur and will implement other conservation measures from the nine biological opinions issued by the FWS for the APHIS control program in seventeen western states, and subsequently consolidated in an October 3, 1995, biological opinion from the FWS – Mountain Prairie Region, to the Deputy Director, APHIS (USDA AHIS 2023) and in the analysis provided in the Rangeland Grasshopper and Mormon Cricket Suppression Program Final Environmental Impact Statement for APHIS Suppression Activities in 17 states (USDA APHIS 2019). APHIS will employ buffer zones and other conservation measures from "Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service" (USFWS 2007) for species not covered in the aforementioned consultations or whichever buffer is greater. APHIS will buffer all waters to prevent contamination.
- APHIS will use a 0.25-mile buffer from occupied condor nests, roosts, or the release site for ground applications, and a 1.5-mile buffer for aerial applications to avoid disturbance to condors.

- APHIS aerial applicators will maintain a minimum altitude of 3,000 feet near any condor nests and ensure that pesticide sprayers or spreaders are shut-off when they fly over nests to avoid disturbance to nesting condors and dropping pesticide on or near a nest.
- APHIS will confer with FWS five days before applications and implementation to determine if there is a need to implement any other protective measures to minimize effects to condors.

DETERMINATION OF EFFECTS

<u>California Condor</u>

We concur with your determination that the proposed action "may affect, but is not likely to adversely affect" the experimental non-essential population of the endangered condor for the following reasons:

- No treatments will occur near the release site or in any areas or terrain considered habitat for nesting or roosting by condors. APHIS will use a 0.25-mile buffer from occupied nests, roosts, or the release site for ground applications, and a 1.5-mile buffer for aerial applications. Therefore, there will be discountable noise effects to nesting or roosting condors.
- Aerial applicators will maintain a minimum altitude of 3,000 feet near any condor nests and ensure that pesticide sprayers or spreaders are shut-off; therefore, disturbance to nesting condor will be insignificant.
- The likelihood of any direct or indirect exposure of condors to insecticides is extremely low because APHIS will target applications on rangeland habitat, which is not condor nesting or foraging habitat. Therefore, the pesticide application effects are discountable.

In keeping with our trust responsibilities to American Indian Tribes, by copy of this letter we are notifying potentially affected Tribes of this proposed action and encourage you to invite the Bureau of Indian Affairs to participate in the review of your proposed action. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

Thank you for your continued coordination. No further section 7 consultation is required for this project at this time. Should project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, this determination may need to be reconsidered.

In all future correspondence on this project, please refer to consultation number 2024-0038525-S7-001. If you require further assistance or have any questions, please contact Shaula Hedwall (Shaula_Hedwall@fws.gov) or Mary Fugate (Mary_Fugate@fws.gov).

Sincerely,

MARY FUGATE Digitally signed by MARY FUGATE
Date: 2024.01.26 13:12:47 -07'00'

for Heather Whitlaw
Field Supervisor

Mr. Dewey W. Murray, Domestic Program Coordinator

cc (electronic):
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Kingman, AZ
Assistant Field Supervisor, Arizona Ecological Services Office, Phoenix AZ (Attn: B. Fogel, J. Miller, J. Nystedt)
Assistant Field Supervisor, Arizona Ecological Services Office, Tucson, AZ (Attn: J. Crawford)
District Manager, Arizona Strip District Office, St. George, UT
Director, Cultural Resource Center, Chemehuevi Tribe, Havasu, CA
Director, Hopi Cultural Preservation Office, Kykotsmovi, AZ
Honorable Chairperson, Kaibab Band of Paiute Indians, Fredonia, AZ
Cultural Resources Director, Kaibab Band of Paiute Indians, Fredonia, AZ
Director, Historic Preservation Department, Navajo Nation, Window Rock, AZ
Environmental Specialist, Environmental Services, Western Regional Office, Bureau of Indian Affairs, Phoenix, AZ

Literature Cited

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_____. 2019. Rangeland grasshopper and Mormon cricket suppression program; Final Environmental Statement; November 2019. 149 pp.

U.S. Fish and Wildlife Service (USFWS), Region 2, Environmental Contaminants Program. 2007. Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service. Albuquerque, NM. 205 pp.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Post Office Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
FWS/R2/ES-ER/080626

Dewey Murray, Domestic Program Coordinator - Arizona
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
3640 East Weir Avenue, Suite 1
Phoenix, Arizona 85040

Dear Mr. Murray:

Thank you for your correspondence of December 5, 2023, which we received via email the same day. This letter documents our review of your Animal and Plant Health Inspection Service (APHIS) 2024 Rangeland Grasshopper and Mormon Cricket Suppression Program, in compliance with section 7 of the Endangered Species Act of 1973 (Act) as amended (16 U.S.C. 1531 et seq.). The project under analysis in this letter is located on a portion of the San Carlos Reservation in Gila and Graham counties, Arizona.

Your letter concluded that the proposed project "may affect, but is not likely to adversely affect" the endangered desert pupfish (*Cyprinodon macularius*), Gila chub (*Gila intermedia*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), loach minnow (*Tiaroga cobitis*), Mexican wolf (*Canis lupus baileyi*), southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher), spikedace (*Meda fulgida*), the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*; frog), Mexican spotted owl (*Strix occidentalis lucida;* owl), and the western distinct population segment of the yellow-billed cuckoo (*Coccyzus americanus*; cuckoo). We concur with your determinations and provide our rationales below.

You determined there would be "no effect" to the Arizona cliffrose (*Purshia subintegra*). No effect determinations do not require review from the U.S. Fish and Wildlife Service (FWS), and we will not address this species further.

You also described conservation measures to minimize effects on bald eagles (*Haliaeetus leucocephalus*), anticipating our technical assistance with respect to Bald and Golden Eagle Protection Act compliance. Appendix A includes our documentation of APHIS's minimization measures to reduce the likelihood of take of bald eagles.

DESCRIPTION OF THE PROPOSED ACTION:

A complete description of the proposed action is included in your December 5, 2023, Biological Assessment (BA).

The Plant Protection Act of 2000 (PPA) authorizes APHIS's programs to suppress grasshoppers and Mormon crickets on rangelands to reduce vegetation losses. The PPA mandates APHIS control economic infestations of grasshoppers and Mormon crickets to protect Federal rangeland, when requested. The APHIS only considers conducting suppression upon request from a tribal government or land management agency.

The APHIS, in coordination with the San Carlos Apache Tribe, proposes to suppress grasshopper and Mormon cricket populations on the San Carlos Reservation using chemicals to protect rangelands from economic infestations. The BA, section 3.0, describes treatment areas, and map 7.2, "San Carlos Tribal Lands" delineates them. The APHIS plans to treat areas within Blue River Pasture and Rocky Gulch Valley in Gila County, and Antelope Flats and Ash Flats in Graham County. Within Antelope Flats, the APHIS will exclude Cottonwood Canyon with a 0.5-mile buffer along canyon rim. All treatment areas are in rangelands; APHIS will not treat grasslands associated with woodlands or forests.

The proposed action is Alternative 3, as the BA describes, involving a single application per year of one insecticide early in the target species' life cycle, applied using the Reduced Agent Area Treatment (RAAT) method, which alternates treated and untreated swaths, or modified RAAT. Target grasshoppers include *Aulocara elliotti* and *Melanoplus sanguinipes*. The APHIS will begin application in mid-March 2024. The insecticides are diflubenzuron, chlorantraniliprole, carbaryl and Malathion. Chemical control methods available to APHIS include Ultra-Low-Volume (ULV) sprays of all three insecticides, and carbaryl in bait formulation, using ground or aerial equipment. ULV application rates are 0.75 to 8.0 fluid ounces per acre. The application rate of carbaryl in bait formulation (five percent active ingredient) is 10 pounds per acre.

The APHIS will buffer all bodies of water to avoid contamination. To remove and/or minimize effects to listed species and habitat APHIS will use buffer zones around species locations and habitats where they will not apply pesticide. These buffer zones come from the nine FWS's biological opinions issued to the APHIS control program in 18 western states, and subsequently consolidated in an October 3, 1995, FWS - Mountain Prairie Region letter to the Deputy Director, APHIS and the FWS's 2007 "Recommended Protection Measures for Pesticide Applications in Region 2" (RPM) for species and the pesticide (diflubenzuron). The APHIS will use the larger buffer area if there are discrepancies in buffer size among the documents and will also other implement all other relevant conservation measures from the above documents.

The action may include experimental treatments. The APHIS continues to refine control methods to make the program more economically feasible and environmentally sound. Refinements may include reduced rates of currently used insecticides, improved formulations, more target-specific baits, and biological pesticide suppression alternatives or improvements to aerial and ground application equipment. The APHIS uses experimental plots for this work. The APHIS also monitors a no treatment area to determine the effect of no treatment. The APHIS monitors all plots for two additional years to gather insecticides effects information on non-target arthropods. The APHIS applies all buffers and other conservation measures to any experimental plot.

DETERMINATION OF EFFECTS:

We concur with your determination the proposal "may affect, but is not likely to adversely affect", the Chiricahua leopard frog, desert pupfish, Gila chub, Gila topminnow, loach minnow, Mexican gray wolf, Mexican spotted owl, southwestern willow flycatcher, spikedace, and western yellow-billed cuckoo for the reasons described below.

Chiricahua Leopard Frog:

- Potential habitat for the frog exists primarily in earthen stock tanks. The APHIS will apply buffers and other relevant conservation measures to stock tanks and any other body of water to minimize the likelihood of directly affecting aquatic habitats; therefore, effects to frog habitat from the proposed action are discountable.

- Other conservation measures include avoiding applying insecticides before, during or after precipitation, which will avoid the time when frogs may be foraging away from water; therefore, there will be no effects on foraging frogs.

- The likelihood of indirectly exposing frogs to insecticides is extremely low; the magnitude of any exposure would not be detectable due to water dilution and insecticide degradation. Therefore, any effects to this species from insecticide exposure would be insignificant.

Desert Pupfish, Gila Topminnow, Loach Minnow and Spikedace:

- The nearest suitable habitat for these species is the lower part of Bonita Creek, about eight miles downstream from the Ash Flat treatment area boundary, which overlaps an ephemeral part of Bonita Creek. Per the RPM, these species' maximum buffer zone, including upstream considerations, is 1.75 miles, which is sufficient to avoid directly affecting these species and their habitats; therefore, effects to these species and their habitats from the proposed action are discountable.

- The likelihood of indirectly exposing desert pupfish, Gila topminnow, loach minnow, and spikedace to insecticides is extremely low, and the magnitude of any exposure would not be detectable due to water dilution and insecticide degradation. Therefore, any effects to these species from insecticide exposure would be insignificant.

Gila Chub:

- This nearest Gila chub suitable habitat is in Bonita Creek, 2.5 miles from the Ash Flat treatment area boundary, which overlaps an ephemeral part of Bonita Creek. Per the RPM, the Gila chub maximum buffer zone, including upstream considerations, is 1.75 miles, which is sufficient to avoid directly affecting this species and its habitat; therefore, effects to Gila chub and its habitat from the proposed action are discountable.

- The likelihood of indirectly exposing Gila chub to insecticides is extremely low because the magnitude of any exposure would not be detectable due to water dilution and insecticide degradation. Therefore, any effects to this species from insecticide exposure would be insignificant.

Mexican Wolf:

- The Mexican wolf occurs on the San Carlos Apache Reservation, but for only brief periods of time and in very limited numbers; the reservation has no established wolf pack. Although wolves may occur infrequently near treatment areas, insecticide bioaccumulation is minimal for this species; therefore, any effects would be insignificant.

- The likelihood of exposing Mexican wolves directly or indirectly to the insecticides is extremely low; therefore, any project effects to this species from insecticide exposure are discountable.

Mexican Spotted Owl:

- Potential habitat for this owl may occur in higher elevations and canyons on the San Carlos Reservation. However, treatments will be restricted to rangeland at lower elevations, so there will be no disturbance to breeding owls. Owls may migrate or disperse through the treatment area before or after the breeding season but are not likely to be present in the proposed treatment area from March 1st to August 31st; therefore, the proposed action will not result in disturbance to non-breeding owls.

- The likelihood of exposing owls directly or indirectly to insecticides is extremely low; therefore, any effects to the species from insecticide exposure are discountable.

Southwestern Willow Flycatcher:

- The flycatcher occurs along the San Carlos River below Talkalai Lake, which is about one mile from the closest proposed treatment area, on Antelope Flats. Flycatchers may fly upstream along the San Carlos River, which APHIS buffered by a 0.25-mile no-treatment zone. Flycatchers may fly through part of a treatment area. However, treatment areas do not contain flycatcher nesting habitat; therefore, there will be no effect to nesting flycatchers from the proposed action.

- The likelihood of indirectly exposing this species to insecticides is extremely low, and the magnitude of any exposure would not be detectable due to dispersal over large distances, water dilution and insecticide degradation. Therefore, any effects to this species from insecticide exposure would be discountable and insignificant.

Western Yellow-billed Cuckoo:

- The cuckoo may occur along the San Carlos River, which APHIS buffered by a 0.25-mile no-treatment zone. However, treatment areas do not contain cuckoo nesting habitat. Therefore, there will be no effect to breeding cuckoos from the proposed action.

- The likelihood of indirectly exposing cuckoos to insecticides is extremely low, and the magnitude of any exposure would not be detectable due to dispersal over large distances, water dilution and insecticide degradation. Therefore, any effects to this species from insecticide exposure would be discountable and insignificant.

In keeping with our trust responsibility to American Indian Tribes, by copy of this letter we are notifying the San Carlos Apache Tribe of our concurrence with your determinations, and we encourage you to invite the Bureau of Indian Affairs to review your proposed action.

Thank you for your continued coordination. No further section 7 consultation is required for this project at this time. Should project plans change, or if new information on the distribution or abundance of listed species or critical habitat becomes available, we may need to reconsider your determination. In all future correspondence on this project, please refer to the consultation number 2024-0021239-S7-001.

Please contact Michelle Durflinger, Fish and Wildlife Biologist, Environmental Review Branch, Ecological Services, at 505-248-6664 or Michelle_Durflinger@fws.gov, if you have questions or need further assistance.

Sincerely,

MARTIN TUEGEL

Digitally signed by MARTIN TUEGEL
Date: 2024.03.22 11:40:55 -06'00'

Division Chief, Environmental Review

Enclosure: APPENDIX A – TECHNICAL ASSISTANCE

(Electronic Copy)
cc: Director, Recreation and Wildlife Department, San Carlos Apache Tribe, San Carlos, AZ
Director, Tribal Historic Preservation and Archaeology, San Carlos Apache Tribe, San Carlos, AZ
Attorney General, San Carlos Apache Tribe, San Carlos, AZ
Branch Chief, Environmental Quality Services, Western Regional Office, Bureau of Indian Affairs, Phoenix, AZ
Environmental Coordinator, San Carlos Agency, Western Regional Office, Bureau of Indian Affairs, San Carlos, AZ
Field Manager, Safford Field Office, Gila District, Bureau of Land Management, Safford, AZ
Native American Liaison, Southwest Region, Fish and Wildlife Service, Albuquerque, NM
Assistant Field Supervisor, Arizona Ecological Services Office, U.S. Fish and Wildlife Service, Flagstaff and Phoenix, AZ (Attn: G. Beatty, S. Hedwall, J. Miller, J. Morrow, R. Gordon)
Assistant Field Supervisor, Arizona Ecological Services, U.S. Fish and Wildlife Service, Tucson, AZ (Attn: M. Alanen, M. Conway, S. Richardson, E. Seavey, J. Servoss)

APPENDIX A – TECHNICAL ASSISTANCE

This appendix contains U. S. Fish and Wildlife Service (FWS) recommendations to the Animal and Plant Health Inspection Service (APHIS) to reduce the likelihood of taking bald eagles (*Haliaeetus leucocephalus*) when implementing the proposed 2024 Arizona Rangeland Grasshopper and Mormon Cricket Suppression Program.

The FWS published the final rule to remove the bald eagle from the Federal List of Threatened and Endangered Species in the *Federal Register* July 9, 2007, which took effect August 8, 2007. However, the Bald and Golden Eagle Protection Act (Eagle Act) continues to protect bald eagles. The Eagle Act prohibits anyone, without a permit issued by the Interior Secretary from taking eagles, including their parts, nests, or eggs. The Eagle Act defines "take" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" eagles. "Disturb," based upon the best scientific information available, means to agitate or bother an eagle to a degree that causes, or is likely to cause: 1) injury; 2) productivity decreases by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior (USDI 2007).

APHIS and FWS jointly developed the following conservation measures to minimize effects to bald eagle in the project area. These measures are consistent with the strategies in the "Conservation Assessment and Strategy for the Bald Eagle in Arizona" (Driscoll et al., 2006). The FWS agrees that implementing the following measures will reduce take likelihood.

Bald eagle

1. The APHIS will include a one-mile radius no fly-over and treatment-free buffer around occupied eagle nests.

2. To protect foraging areas, APHIS will not apply diflubenzuron within 2.5 miles upstream and downstream of a nesting site and within 0.25 mile of waters used as foraging areas.

LITERATURE CITED

Driscoll, J.T., K.V. Jacobsen, G.L. Beatty, J.S. Canaca, and J.G. Koloszar. Conservation assessment and strategy for the bald eagle in Arizona. Nongame and Endangered Wildlife Program Technical Report 173. Arizona Game and Fish Department, Phoenix, Arizona.

U.S. Department of the Interior (USDI), Fish and Wildlife Service. 2007. Protection of Eagles and Authorizations under the Bald and Golden Eagle Protection Act for Take of Eagles; Final Rule. Federal Register 72(107):31132-31140. June 5, 2007.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

5275 Leesburg Pike
MS-ES
Falls Church, Virginia 22041

In Reply Refer To:
FWS/AES/DER/BNC/080572
2024-0053674-S7

Tracy Willard
U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
4700 River Road, Unit 149
Riverdale, Maryland 20737

Dear Ms. Willard:

This letter is in response to the United States Department of Agriculture-Animal and Plant Health Inspection Services (APHIS) December 13, 2023, request for concurrence on determinations of "may affect, not likely to adversely affect," (NLAA) federally listed, proposed and candidate species and designated and proposed critical habitats related to APHIS' proposal to conduct chemical treatments to suppress grasshopper infestations as part of the Rangeland Grasshopper and Mormon Cricket Suppression Program (Program) in 17 Western States. In their accompanying Biological Assessment for the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program, December 2023, revised on January 23, 2024, APHIS uses a risk assessment approach to evaluate response data to characterize the potential hazard/risk of the use of three of four chemicals in the program to aquatic and terrestrial listed species and their habitat. APHIS is adopting the risk assessment and conservation measures from the 2022 U.S. Fish and Wildlife Service Biological Opinion for the reregistration of malathion, and thus, malathion is not considered further in their BA. The Service provides this response pursuant to section 7(a)(2) of the Endangered Species Act of 1973 (ESA), as amended.

APHIS has made a NLAA determination for their Proposed Action for 201 threatened and endangered species, 11 proposed species, 93 designated and 8 proposed critical habitats These species include 10 amphibians, 15 birds, 57 fishes, 31 invertebrates, 15 mammals, 78 plants, and 8 reptiles. A complete list of these species and critical habitats can be found in Enclosure A.

Description of the Proposed Action

The intent of APHIS' Program is to reduce populations of various species of grasshoppers and Mormon crickets on rangeland in Arizona, California (partial), Colorado, Idaho, Kansas, Montana, Nebraska, Nevada (partial), New Mexico, North Dakota, Oklahoma (partial), Oregon (partial), South Dakota, Texas (partial), Utah, Washington (partial), and Wyoming. Chemical treatments include a seasonal one-time treatment of diflubenzuron, carbaryl, malathion, or chlorantraniliprole which can be applied from the ground or air. All four chemicals are applied at substantially reduced rates, compared to their recommended label uses, and are applied over an entire treatment area/spray block, or in alternating swaths within a treatment area/spray block. Decisions to conduct grasshopper treatments are based on many factors including the number of grasshoppers present in the area, grasshopper and plant species composition, life-cycle stage of the grasshoppers, range condition, the economic significance of the infestation, and whether it is economically and logistically feasible to conduct an effective program.

Toxicity data related to potential direct and indirect effects to listed species were compared to exposure estimates for diflubenzuron, carbaryl, and chlorantraniliprole to characterize risk to listed species and any designated critical habitat. APHIS reviewed the ecology of the listed species, including their distribution throughout the program action area, to determine whether a listed entity is found within the program treatment areas and, thus, would likely be exposed to any of the program chemicals.

Based on this review, APHIS identified listed species that could potentially occur in the program area, and then used results from the risk characterization for the three chemicals to develop program application buffers and other mitigation measures to avoid and/or minimize the potential for adverse impacts to listed species and their critical habitat (See Appendix A-9 of the BA or Enclosure B).

Best Management Practices (BMPs)

Surveys

Prior to any insecticide applications, APHIS conducts immature grasshopper surveys (i.e., nymphal surveys) in the spring and early summer (USDA, 2024). The number of grasshopper nymphs present within a given area are counted (USDA, 2024). Data gathered includes the stage of grasshopper development; location of sensitive areas such as bee yards and aquatic resources; the condition of the rangeland in relation to grasshopper numbers; and the extent of the infestation (USDA, 2024). This data is used for planning large-scale treatment programs and fiscal tracking, and for local decisions on treatments within a State (USDA, 2024).

Adult surveys occur in late summer and early fall (USDA, 2024). This survey is timed to coincide with the peak populations (USDA, 2024). Adult survey data are useful in predicting if and where potential grasshopper problems are likely to occur in the spring and early summer of the next growing season (USDA, 2024).

The survey data collected by the program is used by the agency and land managers/owners to assess whether treatments are warranted. Treatments must be requested from a Federal land management agency or a State agriculture department (on behalf of a State or local government, or private group or individual) that has jurisdiction over the land before APHIS can begin a treatment (USDA, 2024). Upon request, APHIS personnel conduct a site visit to determine whether APHIS action is warranted (USDA, 2024). Relevant factors influencing this decision may include, but are not limited to, the pest species, timing of treatment relative to the biological stage of the pest species, costs and benefits of conducting the action, and ecological impacts

(USDA, 2024). Based on survey results conducted during the growing season, APHIS is better able to predict the potential for large grasshopper populations and to respond quickly before extensive loss occurs to rangeland (USDA, 2024). Thus, State and Federal officials may initiate early coordination of local programs and request APHIS' assistance in a timely and effective cooperative effort (USDA, 2024).

Insecticide Application

When land managers request direct intervention, APHIS' role in the suppression of grasshoppers is through a single application of an insecticide—carbaryl, diflubenzuron, malathion, or chlorantraniliprole (USDA, 2024). All four insecticides are labeled by the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA–OPP) for rangeland use in the control of grasshoppers, including Mormon crickets (USDA, 2024). APHIS may conduct insecticide treatments in the above mentioned 17 states. With the exception of chlorantraniliprole, the remaining three insecticides are registered for use in all states considered in this program (USDA 2015).

Program insecticide applications can be applied in two different forms: liquid ultra-low-volume (ULV) sprays, or solid-based baits (USDA, 2024). Both ULV sprays and baits can be distributed by aerial or ground applications (USDA, 2024). Aerial applications are typical for treatments over large areas (USDA, 2024). Some grasshopper outbreak locations are economically or logistically accessible only by aircraft, while other locations may be best treated by ground applications (USDA, 2024). Ground applications are most likely to be made when treating localized grasshopper outbreaks or for treatments where the most precise placement of insecticide is desired (USDA, 2024).

Buffers and Conservation Measures

A reduced agent area treatment (RAATs) rate can be used for all four insecticides (USDA, 2024). This strategy uses insecticides at low rates combined with a reduction in the area treated for grasshopper suppression (USDA, 2024). The RAATs strategy relies on the effects of an insecticide to suppress grasshoppers within treated swaths, and the conservation of grasshopper predators and parasites in swaths not directly treated (untreated).

The Program has also established treatment restriction buffers around waterbodies to protect those features from insecticide drift and runoff (USDA, 2024). APHIS maintains the following buffers for water bodies that are not designated critical habitat for listed aquatic species: 500-foot buffer for aerial sprays, 200-foot buffer for ground sprays, and a 50-foot buffer for bait applications (USDA, 2024).

Application buffers as well as additional mitigation measures to protect listed species and their critical habitat have also been established for all four pesticides. Parameters specific to the given pesticide are used for inputs into the modeling program, AgDrift, to establish additional mitigation measure buffer distances for those areas where Program activities and listed species and their designated critical habitat are present (USDA, 2024). Specific buffer distances were established based on the integration of available effects and exposure data to characterize direct and indirect risk to listed species and their critical habitat (USDA, 2024). In addition to the standard spray buffers, conservation measures include additional measures for critical habitat PCEs, larger buffers for lekking sites (e.g., Greater sage-grouse), larger buffers for species (e.g., birds) that rely primarily on insects as food, and additional upstream buffers for fish. These additional conservation measures are described in Enclosure B

In addition to the chemical-specific application buffers, additional label and other requirements have been incorporated into the Program to reduce the potential exposure of threatened and endangered species and designated critical habitat to Program insecticide treatments:

- Avoid applications when sustained winds speeds exceed 10 miles per hour (mph).
- Use RAATs adjacent to locations of listed species and designated critical habitats.
- Avoid applications under conditions where a temperature inversion is possible or when a storm event is imminent.

The use of RAATs will be required for 500 feet from a ground application or 1,000 feet from an aerial application (USDA, 2024). This distance will be used from the location of a listed species, or its critical habitat when no application buffer is required, or from the distance beyond the no application buffer (USDA, 2024). Beyond these distances the program can choose to continue RAATs applications or use full applications depending on site-specific conditions and the need for greater efficacy (USDA, 2024).

The avoidance of applications during storm events is required to reduce the probability of off-site transport of program insecticides via runoff (USDA, 2024). Variability in weather patterns, even within small geographic areas, requires a site-specific evaluation of conditions by program personnel prior to application to determine if a rainfall or storm event would result in conditions where runoff to sensitive habitats could occur given site conditions and the proposed application buffers (USDA, 2024).

Exposure

Observed Residue Values from Program Applications

Monitoring data from drift cards collected from 2003 to 2022 was reviewed and compared to modeled data to determine if the drift assumptions were representative of the drift expected from the Program applications. Drift card data provides a standardized unit of measurement (mg/m^2) to compare with the outputs of terrestrial deposition estimates in AgDrift. The drift card comparisons are made primarily with diflubenzuron as this is the preferred active ingredient to be used for the Program activities, and thus, there are data to address the drift assumptions. Aquatic residues from the monitoring data are also summarized but are not able to be compared to AgDrift outputs due to difficulties with quantifying the waterbody types, sizes, and flow regimes.

Modeling Estimates for all three pesticides using AgDrift

The aquatic residue values calculated using AgDrift were generated based on conservative assumptions and then compared to toxicity values. The parameters used in AgDrift are discussed in detail in the Drift Simulations section of the BA (p. 30). While drift card data residue values varied, generally the closer to the treatment site, the more residue was detected, but values ranged from < LOD (limit of detection) to 1.07 mg/m^2 overall. The average drift value estimated at 500 feet was 0.246 mg/m^2 which is greater than what is observed from most drift card data at 500 feet (drift card data from 2003 to 2022 at 500 feet ranged from < 0.015 – 0.29 mg/m^2 from both carbaryl and diflubenzuron applications; BA pp 26-30).

Run-off residues in waterbodies are considered minimal due to the reduced application rates and the large buffers in place as standard for all aquatic environments and are discussed in more detail in the Runoff Simulations section of the BA (p.32).

Residue Estimates for Terrestrial Non-Target Organisms

Estimated exposure levels on vegetation and other forage items for terrestrial species were calculated using the Terrestrial Residue Exposure Model (T-REX) developed by EPA (US EPA, 2012). More details on how this model was used and the parameters for the inputs are provided in the BA (p.34). Exposure concentrations for birds and mammals are based on mg/kg diet or mg/kg body weight. The resulting concentrations from the model estimates (for each insecticide) represent what would be expected from a direct application to the listed dietary item and are then used to determine residues for different mammals and birds based on their body size and food consumption. These values are then compared to the effects data toxicity endpoints.

AgDrift was then used to estimate the amount of drift reduction needed to arrive below the toxicity endpoint. The input parameters used for estimating the aquatic residues provided in Tables 2-1 and 2-2 of the BA were the same as those used for estimating drift reduction in terrestrial environments. APHIS developed the proposed buffers using these input parameters to determine removal of 99% of the off-site drift from the program applications that will be protective of listed species and their critical habitat as applicable.

Effects of the Action

Throughout this section we summarize or describe toxicity effects of the three chemicals used in the APHIS grasshopper/cricket suppression program. Toxicity is described for both aquatic and terrestrial species using U.S. EPA criteria based on concentrations of a particular chemical (practically non-toxic, slightly toxic, moderately toxic, highly toxic, very highly toxic; **Aquatic and Terrestrial Organism Criteria for Toxicity**). Where data were unavailable for certain taxonomic groups, surrogate species data are described with assumptions for use of those data where indicated.

For aquatic species, a range of toxicity values is provided for each taxa group to describe the potential effects observed from exposure to the three chemicals, carbaryl, chlorantraniliprole, and diflubenzuron. These values are then compared, in the risk section discussion, to the estimated concentrations from field monitoring data collected, as well as AgDrift modeled estimates.

For terrestrial species, toxicity is also described based on route of exposure (i.e., oral, contact, dermal) and either acute or chronic (i.e., reproductive or developmental). These values are then scaled based on the body weight of the test organism of focus and compared in the risk section discussion. APHIS uses a methodology used by the U.S. EPA (U.S. EPA Ecological Risk Assessment Methodology) to describe risk of exposure to different taxonomic groups of organisms from each of the three program chemicals. A Risk Quotient (RQ) is calculated by dividing a point estimate of exposure (residues on dietary items or thresholds for a given effect) by a point estimate of effect and compared to a level of concern (LOC). RQs <1 are not expected to result in adverse effects, while RQs >1 are expected to result in adverse effects.

For critical habitat, APHIS reviewed the primary constituent elements (PCEs) or physical and biological features (PBFs) to determine if the Program activities would cause destruction or adverse modification of these features.

In addition, the BA goes into detail to discuss the relevant toxicity of the metabolites that may be found in environmental matrices such as soil and water, for all three chemicals as well (see pages 20, 38, 49, 59 in the BA).

Carbaryl

The mode of action of carbamates occurs primarily through acetylcholinesterase (AChE) inhibition (Klaassen, Andur, & Doull, 1986), (Smith J. G., 1987). The AChE enzyme breaks down acetylcholine, a neurotransmitter that allows for the transfer of nerve impulses across nerve synapses. Carbamates have a reversible enzyme binding reaction in that the binding will decrease as the concentration decreases over time due to metabolism and excretion.

Aquatic Species

The 96-hour acute median lethal concentration for carbaryl for fish ranges from 0.14 mg/L for channel catfish (*Ictalurus punctatus*; (Brown, Anderson, Jones, Deuel, & Price, 1979) to 1,188 mg/L for the walking catfish (*Clarias batrachus*; (Chakrawarti & Chaurasia, 1981).

For chronic effects to fish, chronic NOEC concentrations for studies ranging from 32-35 day exposures, are 210, 650, and 445 µg/L for the fathead minnow, bonytail (a listed species considered for this consultation) and the Colorado pikeminnow (also a listed species considered in the consultation; (Beyers, Keefe, & Carlson, 1994), (Carlson, 1972), respectively.

For aquatic invertebrates, carbaryl is very highly toxic to all aquatic insects, and highly to very highly toxic to most aquatic crustaceans. The toxicity from 96-hour acute static tests ranged from 1.5 µg/L in the shrimp, *Paneaus aztecus*, to 22.7 mg/L in the mussel, *Mytilus edulis* (Mayer F. L., 1987), (US EPA, 2003). EC_{50}/LC_{50} values for crustaceans range from 5 to 9 µg/L (cladoceran, mysid), 8 to 25 µg/L (scud), and 500 to 2,500 µg/L (crayfish) (Peterson, et al., 1994). Aquatic insects have a similar range of sensitivity.

Chronic toxicity of carbaryl to aquatic invertebrates varies by taxa group. Reproductive and growth endpoints have been reported for cladocerans that range from 1.0 to 15 µg/L. A NOEC of 500 µg/L was reported for the chironomid midge (Hanazato, 1991), (USDA Forest Service, 2008), (US EPA, 2003).

For aquatic plants, a study testing the effects to the freshwater green algae, *Pseudokirchneriella subcapitata*, reported a EC_{50} and NOEC of 1.27 and 0.29 mg/L, respectively (USDA Forest Service, 2008). (Peterson, et al., 1994) found statistically significant effects at 3.7 mg/L on four algal species and the aquatic macrophyte, *Lemna minor* (duckweed). (Boonyawanich, et al., 2001) reported 96-hour EC_{50} values of 0.996, 0.785, and 0.334 g/L for three aquatic plants:

Ipomoea aquatica, *Pistia stratiotes*, and *Hydrocharis dubia* (water spinach, water lettuce, and frogbit), respectively.

Terrestrial Species

Carbaryl is moderate in toxicity when ingested by male and female rats. The oral LD_{50} in male and female rats is 302.6 mg/kg and 311.5 mg/kg, respectively (US EPA, 2003). Low doses can cause skin and eye irritation. The acute inhalation LD_{50} is 721 mg/kg. The acute dermal toxicity is low with an LD_{50} more than 4,000 mg/kg for rats and more than 5,000 mg/kg for rabbits (US EPA, 2003). For chronic data, USDA-APHIS provides a discussion on the 4-week dermal study, the two-generation reproduction study, and a prenatal developmental study in rats (and one in rabbits) on p. 49 in the BA, and also includes discussion on sub-lethal endpoints such as neurotoxicity, immunotoxicity, and carcinogenicity thereafter, which are standard toxicity testing endpoints for mammalian studies.

The acute oral LD_{50} of carbaryl to avian species ranges from 16 mg/kg to > 2,000 mg/kg for starlings (*Sturnis vulgaris*) and red-winged blackbirds (*Agelaius phoeniceus*) (Hudson, Tucker, & Haegele, 1984) and (Shafer, Bowles, & Hurlbut, 1983). Several toxicity studies evaluating sublethal effects have also been conducted. For a more in-depth discussion on these in the BA, see pages 52-53. Here we discuss the results from a standardized reproduction study in the Japanese quail (*Coturnis japonica*) and mallard duck (*Anas platyrhynchos*). A NOEC of > 3,000 ppm was determined for *C. japonica* and a NOEC of 300 ppm was determined for mallard (*A Platyrhynchos*) based on a decrease in the number of eggs produced.

There are no available studies for reptiles for carbaryl; thus, where reptile data is not available, the avian data is used as a surrogate to estimate sensitivity to reptiles.

For amphibians, the acute oral LD_{50} for carbaryl exposure in the bullfrog (*Rana catesbeiana*) was > 4,000 mg/kg (Hudson, Tucker, & Haegele, 1984). Acute toxicity studies in other species have demonstrated lower LC_{50} values for the tadpole developmental stage and the BA provides more detail on these on pages 53-55. (Kirby & Sih, 2015) found carbaryl to be more lethal to the threatened Foothill yellow-legged frog (*Rana boylii*) than to the Pacific tree frog (*Pseudacris regilla*). The estimated 72-hour LC_{50} value for *R. boylii* was 585 µg/L ± 229 and for *P. regilla* was 3,006 µg/L ± 955. In addition to mortality endpoints for this study, the authors also examined the effect of carbaryl on their competitive interactions with a non-native crayfish predator (*Pacifastacus leniusculus*). *R. boylii* was found to be more susceptible to pesticide exposure than *P. regilla* and exposure reduced their ability to compete with a 50% increase in mortality observed for *R. boylii* and no change to mortality observed (at 50 µg/L) for *P. regilla.* Several sublethal effect studies have also assessed a variety of endpoints related to direct and indirect effects on carbaryl to amphibians. The BA provides a discussion on these reductions in swimming behavior in more detail on page 55.

Carbaryl is very highly toxic to many terrestrial insects. It is very highly toxic to honey bees (*A. mellifera*) with an acute contact LD_{50} of 0.0011 mg/bee (US EPA, 2003), *A. erythronii* females (0.543 µg/bee), and *M. rotundata* females (0.592 µg/bee) as well as bumble bees (*B. terrestris*) where 24- and 72-hour oral LD_{50} values ranged from 3.92 to 3.84 µg/bee, respectively and *B. terricola* workers 41.16 µg/bee (Helson, Barber, & Kingsbury, 1994). It has also been measured in colonies at 111 µg/kg (Mullin, et al., 2010), so there is a potential for population level effects.

Toxicity to terrestrial plants has been evaluated for agronomic crops based on registrant submitted studies for US EPA FIFRA regulation requirements. These studies showed no effects to cabbage, cucumber, onion, ryegrass, soybean, and tomato (US EPA, 2003) at 0.803 lb a.i./ acre based on an application rate of 0.5 lb a.i. / acre, which is higher than that projected for carbaryl used for the grasshopper and Mormon cricket program (0.37 lb a.i. / acre). Plant incident reports have also been reported but at doses well above those proposed for the APHIS program activities (USDA-APHIS BA p. 56).

Chlorantraniliprole

Chlorantraniliprole (Ryanaxypyr™) is an insecticide in the anthranilic diamide insecticide class. The mode of action of chlorantraniliprole is the activation of insect ryanodine receptors, which causes an uncontrolled release of calcium from smooth and striated muscle, causing paralysis in insects (Health Canada, 2008) (US EPA, 2008). This insecticide is very selective to insect ryanodine receptors (Lahm, et al., 2007) and thus does not impact mammals or other vertebrate groups the same way, despite these groups also having these same receptors.

Aquatic Species:

Chlorantraniliprole toxicity in fish is considered low based on available toxicity data reporting mortality above the solubility limit (1 mg/L). Two early life-stage tests in the rainbow trout (*Onchorhynchus mykiss*) and sheepshead minnow (*Cyprinodon variegatus*) showed chlorantraniliprole may have effects at 0.11 and 1.28 mg/L, respectively.

Aquatic invertebrates are more sensitive to chlorantraniliprole in acute studies as compared to fish, with values ranging from 0.0098 mg/L for *D. magna* to 1.15 mg/L for the marine mysid shrimp (Barbee, McClain, Lanka, & Stout, 2010), (US EPA, 2012) and (Rodrigues, et al., 2016). For chronic life cycle studies, toxicity threshold values ranged from 0.0031 mg/L for the midge, *C. riparius* to 0.695 mg/L for the mysid shrimp, 0.695 mg/L.

The available aquatic plant toxicity data for chlorantraniliprole to freshwater and marine algae indicates low toxicity based on EC_{50} and NOEC values greater than the highest test concentrations tested, ranging from 1.78 to 15.1 mg/L (US EPA, 2008).

Terrestrial Species

Chlorantraniliprole is considered practically non-toxic to mammalian species via oral, dermal, and inhalation exposures and is not known to cause reproductive (NOAEL = 1,594 mg/kg/day) or developmental toxicity (1,000 mg/kg/day), respectively (US EPA, 2008). Chlorantraniliprole is also not known to be neurotoxic, carcinogenic, or immunotoxic (see BA Table 3-9).

Toxicity of chlorantraniliprole to avian species is considered low for acute and chronic exposures, where there were no acute or sublethal effects observed at all doses in the oral gavage or dietary studies or in a 22-week reproduction study. The lowest acute NOEL value of 2,250 mg/kg was used to estimate the range of sensitivities to birds based on different body weights and food consumption amounts if they were to forage on treated food items (see BA Tables 3-11 and 3-12).

There are no available studies for reptiles for chlorantraniliprole; thus where reptile data is not available, the avian data is used as a surrogate to estimate sensitivity to reptiles. Chlorantraniliprole would be expected to be practically nontoxic to reptiles based on the available avian toxicity data.

Several studies reviewed by USDA-APHIS indicate that chlorantraniliprole is practically non-toxic to honeybees, bumblebees, hover fly, ladybug beetle, lacewing, other Hymenoptera species, and a predatory mite (see BA p.62-63).

The lack of toxicity observed in these other insect groups is related to the activity of chlorantraniliprole which is primarily through ingestion such that the larval stages of Coleoptera and Lepidoptera would receive larger doses due to the heightened feeding on treated plant material during this stage of development: Two acute studies in the monarch butterfly (one dietary, the other cuticular) indicated toxicity based on the 96-hour LD_{50}s. The cuticular LD_{50} was 0.012, 0.95, and 0.19 µg/g for the first, third, and fifth instars (European Food Safety Authority, 2013), while the dietary study 96-hour LC_{50} values were 0.0083, 0.046, and 0.96 µg / g leaf for second, third, and fifth instars, respectively (Krishnan, et al., 2020).

Chlorantraniliprole has low toxicity to most soil borne invertebrates such as springtail, isopods, and earthworms as is discussed in the BA (p. 63).

Terrestrial plant seedling emergence and vegetative vigor studies (using various monocot and dicot agricultural crops plants) indicate low toxicity at concentrations > 300 g/ha, which is several times greater than grasshopper/cricket suppression program rates.

Diflubenzuron

Diflubenzuron is classified as an insect growth regulator. The mode of action for this insecticide is inhibition of chitin synthesis (or interference with the formation of the insect's exoskeleton that is comprised of a protein known as chitin). The likely mechanism is through blockage of chitin synthetase, the ultimate enzyme in the biosynthesis pathway to form chitin (Cohen, 1993), (US EPA, 1997). Diflubenzuron exposure can result in both larvicidal and ovicidal effects either from dermal or dietary exposure. Ovicidal effects can occur via direct contact of eggs or through exposure to a gravid (i.e., pregnant) female by ingestion or dermal routes. Inhibition of chitin synthesis can primarily affect immature insects but can also impact other arthropods and some fungi.

Aquatic species

Diflubenzuron toxicity in fish is considered low based on available data. The LC_{50} values range from 10 mg/L for smallmouth bass to 660 mg/L in bluegill sunfish (Julin & Sanders, 1978), (USDA Forest Service, 2004), (US EPA, 1997), (Willcox & Coffey, 1978). Chronic studies from 30-days to 10 months indicate NOEC values range from 29 – 300 µg/L when tested on various species such as fathead minnow, steelhead trout, guppy (*Poecilia reticulata*), and mummichog (*Fundulus heteroclitus;* (Hansen & Garton, 1982), (Julin & Sanders, 1978).

Aquatic invertebrate sensitivity to diflubenzuron varies among different taxonomic groups. For crustaceans the median lethal concentration varies from 0.75 µg/L in *D. magna* (USDA Forest Service, 2004) to 2.95 µg/L in grass shrimp (*Palaemonetes pugio,* (Wilson & Costlow, 1986). For aquatic insects, values range from 0.5 µg/L in the mosquito (*A. nigromaculatum*; (Miura & Takahashi, 1974) to 57 mg/L in the perloid stonefly *Skwala sp.*; (Mayer & Ellersieck, 1986). For aquatic snails, the median lethal concentration in *Physa sp.* is > 125 mg/L (Willcox & Coffey, 1978).

The NOEC and EC_{50} values for aquatic plants exposed to diflubenzuron are 190 µg/L for duckweed (*L. minor*; Thompson and Swigert 1993), and 200 µg/L (US EPA, 1997) for the green algae, *S. capricornutum*, respectively.

Terrestrial species

Diflubenzuron is not very toxic to mammals via the oral route. The BA discusses the threshold values in more detail (see BA p. 41), but the lowest value was the oral LD_{50} in rats of >4,640 mg/kg (Eisler, 2000). The BA also goes into more detail to discuss diflubenzuron effects on the hematopoietic system as well as neurotoxicity, carcinogenicity, and mutagenicity effects, all indicating diflubenzuron has no impact on these physiological systems in mammals (see BA p 41-42).

Several reproductive and developmental toxicity studies in rats and rabbits provided in the BA also indicate diflubenzuron has effects on maternal blood pathologies at a LOAEL of 25 mg/kg/day (US EPA, 2015) but does not affect other endpoints in these studies (e.g., decreased body weight in offspring, fetal abnormalities).

For birds, acute toxicity data show that diflubenzuron is practically non-toxic to birds, with acute oral LD_{50} values ranging from 2,000 mg/kg to 5,000 mg/kg (Eisler, 2000), (Willcox & Coffey, 1978), (US EPA, 1997) using a variety of species such as the red-winged blackbird, mallard duck, and bobwhite quail.

Several reproductive studies are also available that evaluated chronic effects to a variety of avian species such as mallard duck, bobwhite quail, and chickens (US EPA, 1997), (Kubena, 1982), (USDA Forest Service, 2004), (Smalley, 1976), and (Cecil, Miller, & Corely, 1981). The lowest, most sensitive endpoint value used is the LOEC of 1,000 ppm value for effects on eggshell thickness and egg production in both mallard and bobwhite quail (US EPA, 1997).

Little information is available for toxicity of diflubenzuron to reptiles but likely it is low, thus where reptile data is not available, the avian data is used as a surrogate to estimate sensitivity to reptiles. Diflubenzuron would be expected to be practically nontoxic to reptiles based on the available avian toxicity data.

For amphibians one acute toxicity data indicates low sensitivity to diflubenzuron with a 48-hour LC_{50} of 100 mg/L in *Rana brevipoda porosa* tadpoles (Fryday & Thompson, 2012). Where data are scarce for amphibians, a surrogate approach is to use data for fish for diflubenzuron thus the chronic endpoint for amphibians from a 30-d NOEC value of > 45 µg/L for rainbow trout (Hansen & Garton, 1982) is used to assess chronic effects of diflubenzuron to amphibians.

For terrestrial invertebrates, there are a large amount of data available for diflubenzuron, but toxicity can vary by taxonomic group depending on the Order of insect and the life stage being exposed. Available toxicity data for diflubenzuron exposed to adult honeybees indicates that it is practically non-toxic (Chandel & Gupta, 1992), (Mommaerts, Sterk, & Smagghe, 2006), (Nation, Robinson, Yu, & Bolten, 1986). However, diflubenzuron is moderately to highly toxic to developing bees based on residues reported in pollen but not on nectar or honey (Mullin, et al., 2010). Again, this makes sense considering the mode of action of diflubenzuron. The BA discusses other studies confirming similar results (see BA p.44). Other insect Orders such as grasshoppers, beetles, and Lepidoptera at the immature stages are more susceptible than other terrestrial invertebrates, including the bee species discussed above (Eisler, 2000), (Murphy, Jepson, & Croft, 1994), (USDA Forest Service, 2004). Within this group, grasshoppers appear to be the most sensitive; however, the rates used in the above studies based on label recommendations for Dimilin 2L® are still more than 48-50% more than the rates used in the APHIS program (0.75-1.0 fluid oz/acre; see Table 3-6 in the BA). Diflubenzuron is also moderately toxic to spiders and mites, but there are no listed arachnids in the program action area.

Diflubenzuron treated grasshoppers fed to darkling beetles showed significant mortality but at doses 2,000 times the rate of diflubenzuron applied in the grasshopper/cricket APHIS program (Smith & Lockwood, 2003).

For terrestrial plants, toxicity is low due to low absorption and translocation of diflubenzuron residues on plant surfaces (Eisler, R., 1992). (Hatzios & Penner, 1978) determined exposure to diflubenzuron had no effect on photosynthesis, respiration, and leaf structure of soybeans at doses of up to 0.269 kg a.i./ha.

Toxicity of metabolites of carbaryl, chlorantraniliprole, and diflubenzuron

For carbaryl and chlorantraniliprole, toxicity data indicate the parent compounds are more toxic or have comparable toxicity to the metabolites discussed (see BA page 49 and Table 3-2 and page 59 and Table 3-7). Diflubenzuron has several metabolites that are discussed in detail in the BA (see pages 20 and 39). Environmental degradation of diflubenzuron can result in four primary metabolites, including CO2. The other three are 4-chlorophenyl urea, 2-6, diflurobenzoic acid, and 4-chloroaniline. 4-chloroaniline is slightly more toxic than diflubenzuron to fish and aquatic invertebrates (see p. 39 and Table 3-4). Both 2-6, diflurobenzoic acid and 4-chlorophenyl urea are considered less toxic or comparable in toxicity to diflubenzuron based on available data for fish and aquatic invertebrates (see p. 39 in the BA). 4-chloroaniline has also been shown to be slightly carcinogenic in long-term mammalian studies (a NOEL for 4-chloroaniline was slightly higher than the NOEL for diflubenzuron) (USDA Forest Service, 2004).

Risk Assessment and Effects Determinations

Aquatic Species

The distribution of acute and sub-lethal chronic effects data for fish for carbaryl, chlorantraniliprole, and diflubenzuron are compared to the estimated concentrations in aquatic systems under different applications for the APHIS Program. These values are below the range of response data provided. In addition, where data are not available for any program insecticide for aquatic phase amphibians, fish toxicity data is used as discussed above and below in the "Terrestrial Species" section of this document. The residues estimated using AgDrift also suggests that direct acute and sublethal risk of exposure to fish in small, static waterbodies is not expected. Estimated expected residues would range from 0.09 – 1.14 µg/L for carbaryl, 0.009 – 0.4 µg/L for chlorantraniliprole, and 0.007 – 0.21 µg/L diflubenzuron, (see Figures 4-1, 4-2, and 4-3 and Table 2-3 of the BA) when different buffer sizes are applied for the different application types. Field data collected from monitoring of program applications also support these findings (see discussions in BA p. 66 and 75 for carbaryl and diflubenzuron, respectively). The BA also discusses actual run-off related residues from program applications for carbaryl and diflubenzuron from different years and different states (2003 – 2022; see p. 27-30 in the BA).

These values also indicate the measured environmental concentrations in waterbodies within the standard 500-foot buffer or several miles downstream from the application site are still well below the effect data thresholds for aquatic organisms.

For indirect effects, consumption of contaminated prey or loss or reduction in prey items is also not expected to adversely impact fish based on low residues and a low bioconcentration factor (BCF) value for carbaryl (15; values greater than 1,000 are considered to bioconcentrate whereas values lower than 20 are considered compounds with very little ability to bioconcentrate) (USDA Forest Service, 2008). Based on the distribution of available fish and aquatic invertebrate toxicity data for carbaryl, chlorantraniliprole, and diflubenzuron, and the estimated residues discussed above, the adverse risks of exposure to prey items for listed fish species such as other fish or aquatic invertebrates are not expected based on the different application scenarios modeled in the BA. For aquatic plants, risk is discussed with respect to providing habitat and food for other aquatic species. For carbaryl, chlorantraniliprole, and diflubenzuron, no adverse impacts to aquatic plants are anticipated, and residues in water are anticipated to be 400-1600 times below the NOEC value for carbaryl (see BA p. 65), four orders of magnitude below the lowest effect concentration (see BA p. 82) for chlorantraniliprole, and 2,000 times below the NOEC concentrations for diflubenzuron (see BA p. 74).Therefore, the proposed action is not likely to adversely affect listed aquatic species because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on aquatic species, such that the effects cannot be meaningfully measured, detected, or evaluated.

Terrestrial Species

For the terrestrial vertebrate risk characterization, insecticide exposure was considered based on the most significant route: ingestion through the diet. Exposure can also occur through dermal contact, ingestion from preening, and water consumption, but the extent of exposure through these means is expected to be minor in comparison to that of ingestion of pesticides through diet. Exposure levels on different types of vegetation or other terrestrial non-target invertebrates as dietary items were calculated using the Terrestrial Residue Exposure Model (T-REX) (US EPA, 2012). To assess the acute and chronic risk to mammals, the most sensitive acute and chronic endpoints were used and compared to the T-REX estimated residues on dietary items with consideration for the size of the bird or mammal. Indirect risk to mammals was evaluated by reviewing impacts on habitat or prey base. For carbaryl, direct effects to mammals of all class sizes that feed on grasses, RQ values exceeded 1 (i.e., likely to cause adverse effects). For chlorantraniliprole, RQs were below 1 (i.e., not likely to cause adverse effects) for all mammalian class sizes and for diflubenzuron, there is a slight risk to small mammals consuming short grass (see Table 4-8 in the BA). For indirect effects for all three pesticides, there is some concern for those mammals that rely on terrestrial invertebrate as prey items than for those consuming terrestrial or aquatic plants or other small mammals (see p. 69, 83, and 77 in the BA). However, the proposed action is not likely to adversely affect listed mammals because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on mammals, such that the effects cannot be meaningfully measured, detected, or evaluated.

To assess the acute and chronic risk to birds the most sensitive acute and chronic endpoints were used and compared to residue values on respective dietary items (based on the size of the bird), estimated using T-REX calculations discussed on pages 69, 78, and 84 to generate RQ values. RQs greater than 1 were reduced by implementing the proposed buffers to address impacts from program insecticides. For carbaryl, which shows a slight acute risk to birds that consume contaminated prey (see Table 4-5 p. 70 in the BA), additional buffers for carbaryl applications were applied for known locations of adults (see Appendix A–9).

Indirect risk to birds was evaluated by reviewing impacts on habitat or prey base. For carbaryl, direct effects to birds in the 20 and 100 g class sizes that feed on grasses, had RQ values exceeding 1 as mentioned above (see Table 4-5). For chlorantraniliprole and diflubenzuron, RQs were below 1 for all avian class sizes (see p. 69, 84, and 78 in the BA). For indirect effects for all three pesticides, RQ values discussed for small mammals which could be prey items for larger birds, are discussed above. For small birds as prey items for other avian species, RQ values are discussed above as well. For bird species that feed on insects, RQ values were >1 for 20 g and 100 g birds for carbaryl, but were well below 1 for chlorantraniliprole and diflubenzuron (see p. 69,70, 76, and 84). Indirect effects to bird species based on impacts to dietary items (insects) for insectivorous birds from exposure to diflubenzuron is also discussed. However, the rates used in the APHIS Program are such that they would not reach levels or concentrations that would significantly reduce the availability of prey items for these avian species.

Therefore, the proposed action is not likely to adversely affect listed birds because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on birds, such that the effects cannot be meaningfully measured, detected, or evaluated. There are no data for all three pesticides used in the APHIS program to assess risks of exposure to reptiles. Although there is uncertainty in making the assumption that the range of sensitivities for birds is representative for reptiles, we make this assumption in the absence of data. Based on the risk characterization and conclusions described above for birds, for both direct and indirect effects, we expect that all three pesticides will have insignificant effects on listed reptile species.

Therefore, the proposed action is not likely to adversely affect listed reptiles because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on reptiles, such that the effects cannot be meaningfully measured, detected, or evaluated.

For amphibians, direct risk of exposure was determined by using the highest aquatic concentration in water and comparing that to the acute and chronic values for each pesticide used in the APHIS program. For carbaryl, the highest value in water used was the value discussed above for bait considerations and compared to the toxicity threshold values discussed below for the carbaryl bait application exposures. For chlorantraniliprole, there are no data for amphibians. Instead, we rely on the fish toxicity data. This assumption is similar to using the toxicity data for birds to represent effects for reptiles. While this approach has uncertainty associated with whether the data capture the range of sensitivities to amphibians from chlorantraniliprole, we make this assumption based on the risk characterization described above for fish exposed to chlorantraniliprole. Chlorantraniliprole toxicity in fish is considered low based on available toxicity data reporting mortality above the solubility limit (1 mg/L). Two early life-stage tests in the rainbow trout (*Onchorhynchus mykiss*) and sheepshead minnow (*Cyprinodon variegatus*) showed chlorantraniliprole may have effects at 0.11 and 1.28 mg/L, respectively.

For diflubenzuron, using the fish data, the 30-d NOEC value of > 45 µg/L for rainbow trout (Hansen & Garton, 1982) is compared to the highest residue calculated (0.04 µg/L; described in Section II in the BA). Indirect effects to amphibians can include loss of habitat and dietary items. For habitat, effects to terrestrial and aquatic plants were considered. Carbaryl, chlorantraniliprole, and diflubenzuron at all program rates poses minimal risk to aquatic and terrestrial plants. This is discussed more in the BA on pages 65, 73, 74, 81, 82, and 85 for the program chemicals. For amphibians that feed on aquatic invertebrates or other aquatic vertebrates, risk of exposure from all three program insecticides is discussed above in the "Aquatic Species" section of this Risk Characterization. We anticipate that the effects to these species will be insignificant because pesticide residues for aquatic plants, aquatic invertebrates, or fish do not exceed any toxicity endpoint for these taxonomic groups. For the potential indirect terrestrial route of exposure to amphibians, terrestrial invertebrates could serve as a food source for amphibians (see below discussion). However, the selectivity of diflubenzuron to developing insects would not cause significant decreases in food availability for amphibians, nor does it bioconcentrate if an amphibian were to consume a contaminated insect. Similarly, for carbaryl or chlorantraniliprole, these insecticides do not bioconcentrate. Carbaryl is very highly toxic to insects at label rates (see discussion in BA), and chlorantraniliprole is most toxic to those developing insects such as Lepidoptera and Coleoptera larvae via ingestion and not as toxic via contact exposure (see BA p. 63). Thus, the reduced program application rates would not eliminate the insect prey base entirely and would not reduce the availability of prey items to amphibians in other insect Orders from exposure to carbaryl or chlorantraniliprole. In addition, chlorantraniliprole is not toxic to soil dwelling invertebrates such as isopods, or earthworms (see BA p. 63), which could also be considered for terrestrial based dietary items for amphibians.

Therefore, the proposed action is not likely to adversely affect listed amphibians because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on amphibians, such that the effects cannot be meaningfully measured, detected, or evaluated.

For terrestrial invertebrates, risk of exposure from all three program insecticides differs among various insect Orders. This is discussed in more detail on pages 72, 73, 79, and 85 in the BA. A variety of field studies under a variety of application setting, including monitoring from the APHIS program applications have been conducted and demonstrate minimal residues of diflubenzuron. Minimal to no impacts to non-target arthropods such as honey bees, moths, and other insect Orders such as Coleoptera, Diptera, Trichoptera, Heteroptera, Homoptera, Neuroptera, and Plecoptera were demonstrated from diflubenzuron exposure (Emmett & Archer, 1980), (Atkins, Anderson, Kellum, & Heuman, 1976), (Johansen, Mayer, Eves, & Kious, 1983), (Schroeder, Sutton, & Beavers, 1980), (Robinson A. F., 1979) (Deakle & Bradley, 1982), (Sample, Cooper, & Whitmore, 1993), (Catangui, Fuller, & Walz, 1993), (Weiland, Judge, Pels, & Grosscourt, 2002), (Tingle, 1996) (Graham, Brasher, & Close, 2008). In addition, the extensive buffers determined via AgDrift modeling and confirmed with field assessments indicates the proposed buffers from 250 ft for ground applications and up to 1 mile for some aerial applications (buffers of 1,320 ft reduce drift by approximately 89-98%; see BA p. 73) address the impacts to listed terrestrial invertebrates within the program action area. In addition, the program applications rates (0.75 fl. oz/ acre and 1.0 fl. oz/acre for ground and aerial applications, respectively) are well reduced from label rates recommended for Orthoptera, Coleoptera, Homoptera, and Lepidoptera (see Table 3-6 in the BA) and combined with the aforementioned extensive buffers indicates very minimal risk of adverse effects to listed terrestrial invertebrates within the action area.

Therefore, the proposed action is not likely to adversely affect listed terrestrial invertebrate species because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on terrestrial invertebrate species, such that the effects cannot be meaningfully measured, detected, or evaluated.

Risk of adverse effects to terrestrial plants from all three APHIS program insecticides is considered minimal. Based on the available toxicity data discussed above for carbaryl, chlorantraniliprole, and diflubenzuron, phytotoxic effects are not anticipated from program insecticide applications. However, potential indirect effects of carbaryl on pollinators is considered. As discussed above in the Effects of the Action section for carbaryl and terrestrial invertebrates, laboratory studies have indicated several species of honeybees and bumblebees are sensitive to carbaryl, but these are at rates above those used in the program, and effects have not been measured extensively in field studies. One study based on a carbaryl application rate of 0.80 lb a.i./acre in a fruit orchard indicated no effects on honeybee mortality or behavior 7 days post application. Any potential impacts to honey bees or bumble bees may also be mitigated by the reduced application rates for the program, the RAATs (alternating swaths where the insecticide is applied), as well as use of carbaryl bait as opposed to ground or aerial spray applications (Peach, Alston, & Tepedino, 1994), (Peach, Alston, & Tepedino, 1995).

Indirect risk to terrestrial plants from impacts to pollinators from chlorantraniliprole is not expected to be significant. Grasshopper nymphs appear to be the most impacted compared to other insect groups. Various laboratory and field data indicate low toxicity to other insect groups such as honeybees and bumblebees (i.e., those groups more likely to be pollinators to terrestrial plants), where no mortality or sublethal effects were observed (see Effects of the Action section for terrestrial invertebrates discussed above), and application rates 4 to 10 times higher than program rates are shown to have better efficacy in controlling Lepidoptera and other insect pests. Indirect risk to terrestrial plants is also not expected from impacts to pollinators from diflubenzuron. As discussed above in the Effects of the Action section for terrestrial invertebrates, a variety of field studies under a variety of application settings, including monitoring from the APHIS program applications, have been conducted and demonstrate minimal residues of diflubenzuron have minimal to no impacts to non-target arthropods such as honeybees, moths, and other insect Orders. Negative effects have been observed in honeybees in some studies, but this was observed at application levels and periods of time that exceed those expected to be used in the program. (Robinson & Johansen, 1978) found that diflubenzuron application rates as high as 0.125 to .25 lbs. a.i./acre (10 and 20 times the program rate for diflubenzuron) resulted in no effect on adult mortality and brood production in honeybees. As discussed above, the use of RAATS provide additional protection by limiting the area of treatment within the spray block to further reduce the potential risk of exposure to pollinators.

Therefore, the proposed action is not likely to adversely affect listed terrestrial plant species because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on terrestrial plant species, such that the effects cannot be meaningfully measured, detected, or evaluated.

Bait Applications of Carbaryl

Bait formulations of carbaryl are primarily composed of a grain such as wheat bran or rolled whole grain or a pellet mixed with the carbaryl. They are used mostly to control crickets as some species of grasshopper do not eat the bait, but some other advantages are that they primarily act through ingestion, affect fewer non target organisms, and generate very little drift (Foster, 1996), (Latchininsky & Van Dyke, 2006), (Peach, Alston, & Tepedino, 1994)

For bait applications of carbaryl, direct risk of exposure to mammals was calculated using the LD_{50}'s per square foot method described in the BA (Section IV A. Insecticide Risk Assessment Methodology). When the LD_{50} per square foot is greater than 1, there is an assumed risk as a conservative estimate that the mammal (or bird as the same approach is used for birds) will consume the entire bait. RQs were above 1 for all mammals except the 1,000 g group, when no application buffer is applied. With an adjusted buffer of 500 feet, the RQs are below 1.0 for all mammalian size classes (see Table 4-3 and p. 68 in the BA), and all estimated residues from bait applications are anticipated to be below the acute NOEL value (10mg/kg).

Therefore, the proposed action is not likely to adversely affect listed mammals because the proposed conservation measures are expected to lower the estimated environmental concentrations of carbaryl bait to levels that would have an insignificant effect on mammals, such that the effects cannot be meaningfully measured, detected, or evaluated.

For carbaryl bait applications, direct risk of exposure to birds was also assessed. The lowest acute avian LD_{50} value of 16 mg/kg (European starling; see Carbaryl toxicity section discussed above) was used. RQ values were greater than 1 for all size classes without an application buffer; however, drift reductions are observed when a 500-ft buffer is applied, and RQ values fall below 1 (see Table 4-6 in the BA). As previously discussed, we assume similar impacts from carbaryl bait applications to reptiles as to that of birds. Indirect effects from carbaryl bait to both mammals and birds are also not expected. We do not expect indirect effects to plants used as habitat or dietary items for birds and mammals; we also do not expect indirect effects to small mammals, small birds, or terrestrial invertebrates exposed to carbaryl bait used as dietary items for birds and mammals. This discussion is covered in more detail in the BA p 68-73.

Therefore, the proposed action is not likely to adversely affect listed birds because the proposed conservation measures are expected to lower the estimated environmental concentrations of carbaryl bait to levels that would have an insignificant effect on birds, such that the effects cannot be meaningfully measured, detected, or evaluated.

Direct risk of exposure to amphibians from carbaryl bait applications was assessed by taking the highest estimated concentration of carbaryl in an aquatic system (1.10 µg/L) and comparing that to the acute and chronic values for amphibians. Impacts of carbaryl bait applications on amphibians are minimal based on the LC_{50} values reported for tadpoles (1.73–22.02 mg/L) at approximately 1,572 to 20,018 times below the highest calculated carbaryl residue, suggesting minimal acute risk of bait applications (and ULV applications based on the same toxicity endpoint used for both application methods). Sublethal effects to amphibians are also not anticipated based on chronic studies with a NOEC for swimming behavior of 1.25 mg/L and a tadpole NOEC for mean age at metamorphosis (0.16 mg/L).

Therefore, the proposed action is not likely to adversely affect listed amphibians because the proposed conservation measures are expected to lower the estimated environmental concentrations of carbaryl bait to levels that would have an insignificant effect on amphibians, such that the effects cannot be meaningfully measured, detected, or evaluated.

Direct risk of exposure to terrestrial invertebrates from carbaryl bait applications is considered but is less likely to impact most Orders of terrestrial insects. Studies with carbaryl bran bait have found that no sublethal effects were observed on adult or larval alfalfa leaf cutting bees (Peach, Alston, & Tepedino, 1994), (Peach, Alston, & Tepedino, 1995) and see also p. 73 in the BA). Carbaryl bait also poses a low risk to most insect Orders as it is preferentially consumed by grasshoppers. There also is less exposure to Hymenoptera or Lepidoptera because the active ingredient is contained in the bait and not available for dietary or contact exposure (it is not sprayed) and would not be found on floral resources that would be visited by Lepidoptera or Hymenoptera during normal activities.

Therefore, the proposed action is not likely to adversely affect listed terrestrial invertebrate species because the proposed conservation measures are expected to lower the estimated environmental concentrations of carbaryl bait to levels that would have an insignificant effect on terrestrial invertebrate species, such that the effects cannot be meaningfully measured, detected, or evaluated.

Critical Habitat

For critical habitat, APHIS reviewed the primary constituent elements (PCEs) or physical and biological features (PBFs) to determine if the program activities would cause destruction or adverse modification of these features. For many species, designated critical habitat PCEs or PBFs are aspects of the physical landscape such as geomorphological features, soil types, hydrologic regimes, as well as the necessary vegetative features. None of the program insecticides are expected to impact geomorphological formations or hydrologic regimes. Other PCEs or PBFs for certain species involve an adequate source of invertebrate prey items (many listed bird species and fish), specified water quality parameters for certain aquatic species to support a healthy system (pH, adequate dissolved oxygen, low salinity, lack of pollutants, low turbidity, low ammonia, etc.), and the absence of predators or invasives.

As discussed earlier, there is minimal risk to designated critical habitat PCEs or PBFs involving any vegetative structures for habitat or other plants these species may rely on for feeding, breeding, or sheltering, because the program's proposed use of the insecticides is not expected to result in phytotoxic effects.

There is some risk that the program activities could affect designated critical habitats with PCEs or PBFs described as an adequate prey base of terrestrial invertebrates or aquatic invertebrates. However, the standard program mitigation involving 500 ft buffers for aerial applications, 200 ft buffers for ground applications, and 50 ft for bait applications to all water bodies will minimize the impacts to aquatic invertebrate prey items from drift. Table 5-2 in the BA provides a list of all proposed buffers to protect fish and designated critical habitats. Program designated buffers and reduced application rates along with RAAT applications will also minimize impacts to the terrestrial invertebrate prey base for designated critical habitats. For example, because nesting success and brood survival are directly linked to adequate invertebrate prey available to developing lesser prairie chicken chicks, and ultimately lesser prairie chicken success, adequate buffers protecting lesser prairie chicken are warranted. Adults rely on a variety of food items throughout the year but predominantly vegetation during the fall, winter, and early spring (US FWS, 2012). Additional buffer distances to protect leks and allow for adequate prey items for adults and developing chicks were applied for carbaryl, as it demonstrated some toxicity to terrestrial invertebrates as discussed above (see also p. 52-53 and 93 in the BA). Similar mitigations are also applied for other prairie birds, such as the Gunnison and greater sage grouse.

Therefore, the proposed action is not likely to adversely affect designated critical habitat PCEs or PBFs because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on designated critical habitat PCEs or PBFs, such that the effects cannot be meaningfully measured, detected, or evaluated.

Summary and Conclusion

APHIS evaluated their grasshopper and Mormon cricket suppression program application of three insecticides, carbaryl, chlorantraniliprole, and diflubenzuron to listed species and their designated critical habitat as applicable. They provide an overview of the exposure and response analyses for terrestrial and aquatic invertebrate and vertebrate groups, as well as plants, and considered all the relevant pathways of exposure for each. As such they established several avoidance and minimization measures to ensure that the use of these insecticides for their program activities is not likely to adversely impact listed species and their designated critical habitat as applicable. APHIS ensures that buffers established based on modeled estimates and program application data will be applied during all program activities. In addition to substantial buffers used within species' ranges and designated critical habitats, reduced program application rates and RAAT treatment methods will minimize direct and indirect risk of adverse effects from exposure of pesticides to listed mammals, birds, reptiles, amphibians, fish, terrestrial insects, aquatic invertebrates, and plants. Therefore, the proposed action is not likely to adversely affect listed species and designated critical habitat because the proposed conservation measures are expected to lower the estimated environmental concentrations of these pesticides to levels that would have an insignificant effect on these species and their designated critical habitats.

Aquatic Species

For all listed aquatic species within the program action area, the following buffers are applied for each pesticide (Table 1, adapted from Table 5-2 see also Appendix A-9 in the BA or Enclosure B):

Table 1. Proposed Application Buffers for Aquatic Species and designated Critical Habitat Based on Application Method

Insecticide	Application type	Application buffer (feet)
Carbaryl	Aerial (ULV*)	2640
	Aerial Bait	750
	Ground	300
	Ground Bait	100
Chlorantraniliprole	Aerial (ULV*)	500
	Ground	200
Diflubenzuron	Aerial (ULV*)	1320
	Ground	200

*ULV = ultra-low volume

The estimated residues from the application methods and application concentrations in Table 1 are the expected range of concentrations where adverse effects to fish or amphibians are expected to occur. These buffers are applied as such because they are protective of all aquatic species as well as their designated critical habitats, as applicable, and any indirect effects to listed fish species' prey items such as aquatic invertebrates, or terrestrial invertebrates (which are more sensitive; see Figures 2-2, 2-3, and Table 2-3 in the BA for how these buffer distances were determined) are also minimized.

Terrestrial Species

For all listed terrestrial species within the program action area, the following buffers are applied for each pesticide (Table 2, see also Appendix A-9 in the BA or Enclosure B). We provide a range of buffers to demonstrate the differences that exist among the taxonomic groups described in the BA in terms of direct sensitivities to the insecticides as well as the indirect effects to dietary items upon which a species may rely and that may be integral to their survival and overall population level success (see p. 88-89 and p. 93 in the BA).

Table 2. Proposed Ranges of Application Buffers for Terrestrial Species and Designated Critical Habitat

Insecticide	Application type	Application buffer range (feet)
Carbaryl	Aerial (ULV*)	500 - 5,280
	Aerial Bait	500 - 750
	Ground	100 - 5,280
	Ground Bait	50 - 5,280
Chlorantraniliprole	Aerial (ULV*)	500 - 5,280
	Ground	50 - 5,280
Diflubenzuron	Aerial (ULV*)	500 - 5,280
	Ground	50 - 5,280

*ULV = ultra-low volume

Bait Applications for Carbaryl

Run-off or drift from bait applications to water bodies is expected to be minimal as the active ingredient is contained within the bait/bran or grain mix and not susceptible to off-site transport via rain events or volatilization. Labels for carbaryl also do not allow the product to enter water bodies, and thus, to preclude the possibility of the bait moving into aquatic systems, there are standard buffers for water bodies used for all program activities, regardless of the presence of listed species or critical habitat. An example of such a scenario is described on p. 28 in the BA, where carbaryl was detected downstream from where bait applications were made when an area that was treated was irrigated. Residues were measured upstream and downstream of the discharge. Residue values upstream were 1.2 µg/L while residue values at 5.5 and 8.0 miles below the discharge were 2.0 and 1.6 µg/L, respectively. However, there is uncertainty regarding whether these values represent any contribution from APHIS applications.

APHIS also implements additional buffers for water bodies that are not designated as critical habitat for listed aquatic species: 500-foot buffer for aerial sprays, 200-foot buffer for ground sprays, and a 50-foot buffer for bait applications. Thus, the buffers for bait applications of carbaryl for aquatic species are uniformly applied for all species (see Appendix A-9 in the BA, Enclosure B, and Table 1 above) and are sufficiently protective to avoid the likelihood of any adverse effects.

Buffers for bait application of carbaryl vary by terrestrial species taxonomic group and habitat (see Appendix A-9 in the BA, Enclosure B, and Table 2 above). These buffers are generally less distance than for aerial or other ground application methods, except for what is applied for prairie birds or riparian mammals (see discussion below and on p. 93 in the BA, Appendix A-9 in the BA, or Enclosure B), as this application method results in less drift and therefore subsequently less exposure (see p. 6-7 in the BA). In addition, the nature of the bait is also such that because it is a solid and absorbed by the bran or other carrier (see p. 6 in the BA for bait preparation methods), it is less bioavailable, especially for potential dermal contact exposure for all terrestrial species. Drift reductions expected for all size classes of mammals and birds from the application of a 500-ft buffer are estimated at greater than 99% (see Tables 4-3 and 4-6 in the BA). For terrestrial invertebrates, program buffers for bait applications are similar to that of mammals and birds. Any indirect effects to listed species' prey items are discussed above for the different taxonomic groups, and effects to designated critical habitat for listed species from carbaryl bait applications is also expected to be insignificant.

As a result of the APHIS program conservation measures such as use of the buffer distances discussed above for all taxonomic groups and their designated critical habitats, as applicable, along with the reduced application rates as compared to label rates for each insecticide, and RAAT treatment procedures, any risk of exposure associated with the application of the three insecticides used under the APHIS grasshopper and Mormon cricket suppression program is expected to be minimal. Thus, any direct or indirect effects from the proposed action to listed species and their designated critical habitats are expected to be insignificant due to program conservation measures.

This concludes consultation. As stated in 50 CFR § 402.16, reinitiation of consultation is required and shall be requested by APHIS or the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) If new information reveals effects of the action that may affect listed species or critical habitat in a manner to an extent not previously considered; (2) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or (3) If a new species is listed or critical habitat designated that may be affected by the identified action.

We appreciate the collaboration your staff has provided. If you have any questions, please contact Sara Pollack at (703) 358-2371 or sara_pollack@fws.gov or Keith Paul at (703) 358-2675 or keith_paul@fws.gov in the Branch of National Consultations.

Sincerely,

JANE LEDWIN Digitally signed by JANE LEDWIN Date: 2024.03.21 19:47:50 -04'00'

Jane Ledwin
Chief, Branch of National Consultations
Ecological Services Program

Enclosures

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Appendix F: Public Comments and APHIS Response

APHIS response to public comments on the Arizona draft EA (EA Number: AZ-24-01).

APHIS suspended EA# AZ-24-02 due to lack of funding for BLM lands responses are only provided for comments specific to EA# AZ-24-01 for San Carlos Apache Reservation.

XERCES SOCIETY COMMENTS

There is no mention of protecting seasonal watercourses from sprays even if rain may be in the forecast, and the EAs include misleading information about the potential for its chemicals to contaminate water. The EAs include no information about whether an NPDES permit has been obtained, and what provisions it includes if so.

APHIS RESPONSE:

National Pollutant Discharge Elimination System (NPDES) permits for wastewater, industrial, and stormwater discharges, APHIS is not required to have a NPDES permit for treatments on rangeland in Arizona.

The commenter states that areas that could be treated Colorado, Virgin, and San Carlos Rivers. The commenter failed to review the proposed action area maps. The Colorado river and Virgin rivers were not within the EA#AZ-24-02 action area, which has been suspended due to a lack of treatment funding. The San Carlos River does not flow within the proposed action area for the San Carlos Apache Reservation. All water sources are protected by buffers which are described in the EA. The commenter mentions the risk of drift contaminating rivers and streams. This has been explained in previous responses to comments to EA's and is described in the current EA also. There is no drift for ground treatments for bait, there is little to no drift for liquid formulations due to the fact that the nozzles are no more than 48 inches off the ground eliminating the risk of drift from ground applications. Since the commenter mentions the risk of monsoon rains, this is not a factor to treatments because the monsoon rains in Arizona are later in the summer months and treatments are applied in early season to vegetation with an adjuvant which aids in helping the chemical to stick to the vegetation. The chemical does not move off plants once it dries on the plants. Treatments are not applied to bare soil.

The APHIS EAs ignore the significance of Arizona to native pollinators, which as a group are put at risk by the proposed action, despite widespread reports of insect decline and affirmative federal obligations for federal agencies put into place several years ago.

APHIS Response:
This is the same comment from the from the 2023 EA, see response to comment #10 from the 2023 EA, see also comment #4 from the 2022 EA's, see response to comment # 5,8, and 11 of the 2021 EA. Please see the APHIS responses to comments 10, 12, 14, 19, 20, 25, 28 and 37 in the 2020 EA's.

APHIS spray protocols are contrary to mandatory and advisory statements on pesticide labels to protect bees.

APHIS RESPONSE

The commenter refers to the label for Carbaryl XLR Plus which is a product not used by APHIS in Arizona. This has been explained in previous responses to comments. The label, which is used is from Wilbur Ellis 2% Sevin Bait has no such statements regarding protection of bees. APHIS adheres to the label of the product which is used in the treatment program. The commenter again refers to aerial treatments regarding Dimilin 2L. Arizona APHIS will not respond to comments which may be done in another State, comments should be specific to Arizona and the EA for the specific proposed action location in this case San Carlos Apache Reservation.

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

APHIS Response:
This a similar comment from the 2023 EA's, see response to comment #12 of the 2023 EA, see also comment #6 of the 2022 EA, see response to comment # 4 of the 2021 EA, and APHIS responses to comments 10, 12, 14, 19, 20, 25, 28 and 37 in the 2020 EA's.

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

APHIS Response:
This is the same comment as #13 in the 2023 EA's, see also comment #4 in the 2022 EA, see also response to comment # 5,8, and 11 of the 2021 EA. This is a similar comment from the 2021 EA's, see response to comment #8 of the 2021 EA. The commenter made similar comments addressed in the 2020 EA's. Please see the APHIS responses to comments 10, 12, 14, 19, 20, 25, 28 and 37 in the 2020 EA's.

APHIS fails to acknowledge the high risks of carbaryl to a wide variety of species (even when applied as baits). Carbaryl is also considered a likely human carcinogen by the EPA.

APHIS Response:
This is similiar comment as #14 in the 2023 EA's.

APHIS published in 2019 the Final Human Health and Ecological Risk Assessment for Carbaryl in Rangeland Grasshopper and Mormon Cricket Suppression Applications. The assessment analyzes risk of carbaryl in this program. The EPA published a review November 2022, for the label of carbaryl and the response to public comments regarding the use of carbaryl.
The EPA's response to comments regarding the use of carbaryl in APHIS grasshopper program are as follows. "The Agency's Biological and Economic Analysis Division (BEAD) has reviewed technical literature relevant to the USDA APHIS programs aimed at managing grasshoppers, crickets, as well as Forest Service and Park Service management programs aimed at wood-boring beetles in western US regions. The review concluded that for these uses carbaryl provides important pest control benefits and is one of a very limited set of effective control tactics available. For more information on the consideration of benefits, please see Assessment of Carbaryl (PC Code 056801) Usage, Benefits, and Risk Mitigation Impacts in Non-Crop Use Sites available in EPA's public docket (EPA-HQ-OPP-2010-0230). The Agency also discusses the resistance management role of carbaryl in its memorandum on agricultural uses; for that, please see Assessment of Carbaryl's (Chemical Code 056801) Benefits and Impacts of Potential Mitigation Measures in Agricultural Use Sites also available in EPA's public docket (EPA-HQ-OPP-2010-0230)."

The EAs rely too heavily on broad assertions that untreated swaths will mitigate risk. Untreated swaths are presented as mitigation for pollinators and refugia for beneficial insects, but expected drift from ULV treatments into untreated swaths is not analyzed, while studies are mischaracterized.

APHIS Response:
This is a similar comment to the 2023 EA's, see response to comment #15 of the 2023 EA. See also comment #7 of the 2022 EA's, see response to comment # 5 of the 2021 EA, and see APHIS responses to comments 10, 12, 14, 19, 20, 21, 23, 24, 25, 28, 37 of the 2020 EA. As stated in the EA's Arizona treatments are with ground equipment only, drift associated with aircraft treatments is beyond the scope of the Arizona EA and will not be addressed.

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

APHIS Response:
This is a similar comment from the 2023 EA's, see response to comment #25 see also #14 of the 2022 EA, see response to comment #12 of the 2021 EA. Please see the APHIS responses to comments #40 and 41 in the 2020 EA's.

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

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

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

APHIS Response:
This is a similar comment to the 2023 EA's, see response to comment #17 of the 2023 EA and see also comment #8 of the 2022 EA, see response to comment #6 of the 2021 EA, and see APHIS responses to comment #20 of the 2020 EA.

The EAs fail to meaningfully analyze the risk to grassland birds, many of which are declining.

APHIS Response:
This is a similar comment from the 2023 EA's, see response to #18 see also comment #9 comment from the 2022 EA's, see response to comment #7 of the 2021 EA.

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

APHIS Response:
This is a similar comment from the 2023 EA's, see response to comment #31 see also #18 of the 2022 EA's, see response to comment #16 of the 2021 EA. The commenter made the same comment in the 2020 EA's. Please refer to APHIS responses to comments #1, 2, 3, 51 and 55 of the 2020 EA's.

The Alternatives Are Not Clearly or Consistently Described

APHIS response:
The commenter describes a statement regarding chemicals to be used in New Mexico. It is unclear what is meant by the commenter since this EA is specific to the San Carlos Apache Reservation, which is in Arizona, not New Mexico. Arizona APHIS will not respond to comments intended for New Mexico.

The EAs includes only a single action alternative. APHIS fails to analyze other reasonable alternatives that could address any harm experienced by rangeland producers, such as buying substitute forage for affected leaseholders. In addition, the single action alternative combines conventional and RAATs applications in one alternative, while the consequences do not fully explore and explain the relative impacts of these two methods.

APHIS Response:
This is the same comment from the 2023 EA. See response to comment #8 of the 2023 EA. The commenter's suggested reasonable alternative for APHIS to purchase substitute forage for affected ranchers throughout the 17 Western grasshopper states is not an alternative that can be realistically considered. There would be public outcry regarding millions of dollars spent on hay for ranchers. The alternatives described in the EA's are presently the only viable alternatives available for APHIS to consider. The RAAT's treatment alternative is preferred over conventional treatments. The RAAT's treatment method has been explained in the EA's.

The EAs Fail to Adequately Involve the Public, and Do Not Adequately Describe the Affected Environment or Analyze Impacts to the Affected Environment

APHIS Response:
This is a similar comment from the 2023 EA's. See response to comment #4 see also #1 of the 2022 EA's. The commenter does not have an accurate understanding of program funding timelines and procedures. APHIS explained the reason why treatment maps cannot be provided in the draft Environmental Assessments in the 2020, 2021 and 2022 EA's. Please see APHIS response to comment # 2 in the 2021 EA and APHIS responses to comments 1, 2, 3, 4, 5, 6, 8, 55, 91,92, 96, 99 and 158 in the 2020 EA's.

Cumulative effects analysis is insufficient.

APHIS Response:
This is the same comment from the 2023 EA's, see response to comment #30.

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

APHIS Response:
This is a similar comment from the 2023 EA's see response to #5 see also comment See also responses to comment #11 and #26 of the 2023 EA's. See comment #2 from the 2022 EA's, see response to comment #

2 of the 2021 EA. Please see the APHIS responses to comments 1, 2, 3, 4, 5, 6, 8, 55, 91,92, 96, 99 and 158 in the 2020 EA's.

APHIS misleadingly claims that it uses insecticides that are not broad spectrum. APHIS claims in its EAs that it reduces the risk to native bees and pollinators through several measures including preference for insecticides that are not broad-spectrum.

APHIS Response:
This is similar comment from 2023 EA. See response to comment #7, 10, 12, 13, 15, 19, and 32.

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

APHIS Response:
This is the same comment from the 2023 EA. See comment #16 of the 2023 EA. All environmental monitoring is detailed in the 2024 Environmental Monitoring Plan for the 2024 Rangeland Grasshopper and Mormon Cricket Suppression Program. A final report is prepared by the Environmental Compliance Unit.

Statements on the effects of grasshopper damage are improperly supported.

APHIS Response:
Grasshopper damage to croplands and rangeland is widely reported in the literature and is documented back to the 1850's. So, there is no reason to go through an extensive discussion regarding the damage grasshoppers can cause. As to specific documentation other than the Latchininsky report in Hawaii, Nerney (1958) described 70% of rangeland forage being damaged by a population of 15gh/yd2. He also described nymphal populations of 90 gh/yd2 completely destroying grasslands in 1955 in this area. Nerney (1960, 1961) described the damaged which occurred on the San Carlos Apache rangeland with populations of 9-27 gh/yd2 as damaging 8-63% of rangeland forage and populations which damaged forage in subsequent years. Nerney and Hamilton (1969), reported that in 1954 in Arizona 99 percent of the vegetation was destroyed by Aulocara ellotti at a density of 50 to 77 grasshoppers per square meter. Hewitt (1977) reported that during outbreaks when there may be 36 to 72 grasshoppers per square meter, all the grass may be destroyed.

Populations were treated back in those days with chemicals that were much more harmful to the environment than what is presently proposed by APHIS. These locations are specific to some of the same locations in question today. No further discussion is needed regarding damage grasshoppers can cause, just these examples alone which are specific to the San Carlos which has a history going back over 50 years supports the need for suppression to rangeland grasshoppers when warranted on the San Carlos. APHIS program is a great support to Tribal minority ranchers to their rangeland management plans.

Bradshaw, Jenkins and Whipple (2018) reported that in Western Nebraska forage lost due to grasshopper damage resulted in the loss of $2 million/year. They also reported that 23% of forage is *lost in the Western US due to grasshopper damage per year. In this same study, they reported that the* ***control of grasshoppers had no negative impact to beneficial insects****.*

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

APHIS Response:
The commenter did not consider the described RAAT's rates of application which was explained in the 2024 EAs under the RAAT's alternative. For example, the rates of application of carbaryl bait as per EPA label rate is 20-40 pounds per acre compared to the RAAT's rate of 10 pounds per acre which is reduced from label rates. This is a 50% reduction in the rate of application which is 50% less chemical in the environment. The area of coverage in a conventional treatment would include 100% of all the area in a treatment block. The RAAT's coverage area is 50% less than a conventional treatment block thus the area is reduced by 50% along with a 50% decrease in the application rate. The RAAT's methodology is a 50% reduction in exposed environment compared to the EPA label rate and a 100% conventional treatment.

APHIS has not demonstrated that treatments in Arizona in 2024 will meet the "economic infestation level." No site-specific data or procedures are presented in the EAs to satisfy APHIS' own description of how it determines that the "economic infestation level" is exceeded. Nor are any procedures offered that would assure the public that such economic justification will be done and available for review prior to any treatments.

APHIS Response:
This is a similar comment from the 2022 EA's, see response to comment # 5 of the 2022 EA's, see response to comment # 2 of the 2021 EA. Please see the APHIS responses to comments 1, 2, 3, 4, 5, 6, 8, 55, 91,92, 96, 99 and 158 in the 2020 EA's. As stated previously, Tribal data will not be released to the public. Tribes in the US are still considered sovereign Nations. Data collected by APHIS on Tribal lands is still regarded as Tribal data and is not to be reviewed by the public unless the public makes the request to the proper Tribal Council and is approved by the Tribal Administrator. APHIS has a 5-year LOR/MOU with the San Carlos Apache Tribe regarding suppression activities within the proposed action areas. The Tribe does not regard outside public sentiment regarding the management of Tribal rangeland and ranches. They continue to exercise their sovereignty regarding management of rangeland and natural resources according to Federal and Tribal law. The process of surveying has been explained previously to the commenter. The process will not be changed due to the public wanting the process differently. APHIS has been surveying this way for decades and the process has been refined for the most expeditiously and cost effect way possible. This program can be traced back to the late 1850's with plagues of Rocky Mountain Locusts. There has been great effort put into the protection of rangeland. The fact that the public would need to review data and confirm economic justification for treatments is ludicrous. The fact that public private ranchers provide a cost share into the program should give an indication that the survey process is valid. Many public ranchers provide $100,000's of dollars of their own money into a program. They only do this when they see the economic benefits and

when the infestation level warrants it. So, this is in a way a checks and balance to survey program and how it is implemented. If it was not in a way justifiable public private ranchers that may be affected would never be a part of the program in other states.

Reasoning for Endangered Species Act Determinations are Not Available in the EAs, Applications May Harm Listed Plants if Surveys are Not Completed

APHIS Response:

The opinion of the commenter does not reflect the opinion of the FWS regarding consultations of the National Programmatic Biological Assessment and the local Biological Assessment regarding Section 7 consultations with FWS. Letters of concurrence to APHIS program protective measures were given on a State level, Regional Level and a National level dated as follows; State concurrence signed January 26, 2024, Regional concurrence signed March 22, 2024, and National consultation level signed March 21, 2024. In all cases, the FWS concurred with APHIS regarding assessments of the chemicals and protective measures to listed species.

The monarch butterfly is now a candidate species under the Endangered Species Act, but the preferred alternative provides only very limited protection for their host plant, milkweed, from pesticide exposure.

APHIS Response:
This is a similar comment from the 2023 EA's, see response to comment #21. See also comment #12 of 2022 EA's, see response to comment #1 of the 2021 EA. Please see the APHIS responses to comments #81 in the 2020 EA's. Current Tribal management practices are to remove any milkweed plants from Tribal rangeland pastures, this safeguards livestock from the toxicity of milkweed plants. Due to the lack of milkweed on Tribal rangeland the monarch butterfly exposure to pesticide treatments in Arizona is greatly reduced.

The commenter mentions the use of Western Monarch Milkweed Mapper as a reference source. This source is questionable on Tribal Lands since the dataset points do not reference who was the source or collector, who identified the plants and the permit number required by the Tribe to collect data on Tribal Lands. Without a permit the data collected is obtained illegally or is greatly questionable according to Tribal Trespass Laws. Data points referenced in the Mapper refer to data collected in areas which are in Tribal closed areas.

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

APHIS Response:

This is the same comment from the 2023 EA. See response to comment #22 and #3 of the 2023 EA. The opinion of the commenter and the citation used does not reflect the opinion of the FWS regarding consultations of the National Programmatic Biological Assessment and the local consultations with FWS. Letters of concurrence to APHIS program protective measures were given on a State level, Regional Level and a National level dated as follows; State concurrence signed January 26, 2024, Regional concurrence signed March 22, 2024, and National consultation level signed March 21, 2024. In all cases, the FWS concurred with APHIS regarding assessments of the chemicals and protective measures to listed species.

Avoidance of Lands Where Organic or Transitioning Production Occurs

APHIS Response:

This is the same comment from 2023 EA, see response to comment #27 of the 2023 EA. As stated before, there is no organic farming adjacent to the rangeland of the proposed Tribal action area.

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

APHIS Response:
This is the same comment from the 2023 EA's, see response to comment #30.

APHIS MUST PREPARE AN EIS

An Agency Must Prepare an EIS If There Are Questions as to Whether Impacts May Be Significant.

APHIS Response:
The Agency prepared an EIS in 2019 and the documentation is still valid. This EIS resulted in a Record of Decision published in October 2019.

Literature Cited:

1. Bradshaw JD, Jenkins KH, and Whipple SD. 2018. Impact of Grasshopper Control on Forage Quality and Availability in Western Nebraska. Rangelands, Volume 40, Issue 3, 2018, Pages 71-76.
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