Final Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program

Carson, Douglas, Lyon, Mineral, and Storey Counties, Nevada
EA Number: NV-03-20

Prepared by:

Animal and Plant Health Inspection Service
Plant Protection and Quarantine

8775 Technology Way
Reno, NV 89521

May 27, 2020

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I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers or Mormon crickets may occur in Nevada, specifically Carson, Douglas, Lyon, Mineral, and Storey counties. The Animal and Plant Health Inspection Service (APHIS) and Nevada Department of Agriculture (NDA) may, upon request by land managers or State departments of agriculture, conduct treatments to suppress grasshopper infestations as part of the Rangeland Grasshopper and Mormon Cricket Suppression Program (program). The term "grasshopper" used in this environmental assessment (EA) refers to both grasshoppers and Mormon crickets, unless differentiation is necessary.

Populations of grasshoppers that trigger the need for a suppression program are normally considered on a case-by-case basis. Participation is based on potential damage such as stressing and/or causing the mortality of native and planted range plants or adjacent crops due to the feeding habits of large numbers of grasshoppers. The benefits of treatments including the suppressing of over abundant grasshopper populations to lower adverse impacts to range plants and adjacent crops. Such would decrease the economic impact to local agricultural operations and permit normal range plant utilization by wildlife and livestock. Some populations that may not cause substantial damage to native rangeland may require treatment due to the secondary suppression benefits resulting from the high value of adjacent crops and damage to revegetation programs. The goal of the proposed suppression program analyzed in this EA is to reduce grasshopper populations to economically acceptable levels in order to protect rangeland ecosystems or cropland adjacent to rangeland.

This EA analyzes potential effects of the proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from April to September in Carson, Douglas, Lyon, Mineral, and Storey counties.

This EA is prepared in accordance with the requirements under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code § 4321 *et. seq.*) and the NEPA procedural requirements promulgated by the Council on Environmental Quality, United States Department of Agriculture (USDA), and APHIS. A decision will be made by APHIS based on the analysis presented in this EA, the results of public involvement, and consultation with other agencies and individuals. A selection of one of the program alternatives will be made by APHIS for the 2020 Control Program for Carson, Douglas, Lyon, Mineral, and Storey counties.

B. Background Discussion

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

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.

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

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

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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.

Nevada Revised Statutes 561.245 provides authority to cooperate with and enter into contracts or agreements with the Federal government. Nevada Revised Statutes 555.2605 – 555.470 are laws on the custom application of pesticides and restricted use pesticides. These contain the requirements for a license to apply pesticides and certification to use and sell restricted use pesticides.

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

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

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

The MOU further states that the responsible BIA official would request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on BIA land is necessary The BIA must also prepare 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 prepares and approves the Pesticide Use Proposal.

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

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

C. About This Process

The EA 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 take action with respect to those requests. Surveys help to determine general areas, among the scores of millions of acres that potentially could be affected, where grasshopper infestations may occur in the spring of the following year. Survey data provides the best estimate of future grasshopper populations, yet environmental factors lead to certain forecasts where the specific treatment areas will be. 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.

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(s) of a state, that may receive a request for treatment. The Draft EA analyzes aspects of environmental quality that could be affected by treatments in the area where grasshopper outbreaks are anticipated. The Draft EA will be made available to the public for a 30-day comment period. When the program receives a treatment request and determines that treatment is necessary, the specific site within the state will be evaluated to determine if environmental factors were thoroughly evaluated in the Draft EA. If all environmental issues were accounted for in the Draft EA, the program will prepare a Final EA and Finding of No Significant Impact (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 8775 Technology Way, Reno, NV 89521. These documents are also available at the Rangeland Grasshopper and Mormon Cricket Program web site, http://www.aphis.usda.gov/plant-health/grasshopper.

All insecticides used by APHIS for grasshopper suppression are used in accordance with applicable product label instructions and restrictions. Representative product specimen labels can be accessed at the Crop Data Management Systems, Inc. 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 Final EA.

APHIS technical guidance is part of each alternative proposed, and is not unique to any one alternative. An example of APHIS technical guidance is the agency's work on integrated pest management (IPM) for the grasshopper program. IPM for grasshoppers includes biological control, chemical control, rangeland and population dynamics, and decision support tools.

APHIS has funded the investigation of various integrated pest management (IPM) strategies for the grasshopper program. Congress established the Grasshopper Integrated Pest Management (GIPM) to study the feasibility of using IPM for managing grasshoppers.

The major objectives of the APHIS GIPM program were to: 1) manage grasshopper populations in study areas, 2) compare the effectiveness of an IPM program for rangeland grasshoppers with the effectiveness of a standard chemical control program on a regional scale, 3) determine the effectiveness of early sampling in detecting developing grasshopper infestations, 4) quantify short- and long-term responses of grasshopper populations to treatments, and 5) develop and evaluate new grasshopper suppression techniques that have minimal effects on non-target species (Quinn, 2000).

Federal and State land management agencies, State agriculture departments, and private groups or individuals may carry out a variety of preventative IPM strategies that may reduce the potential for grasshopper outbreaks. Some of these activities include grazing management practices, cultural and mechanical methods, and prescribe-burning of rangeland areas. These techniques have been tried with varying success in rangeland management, and some have been associated with the prevention, control, or suppression of harmful grasshopper populations on rangeland.

Regardless of the various IPM strategies taken, the primary focus of the risk analysis contained in this EA is on the potential impacts from chemical treatments needed during an outbreak of economic importance. While APHIS provides technical expertise regarding grasshopper management actions, the responsibility for implementing most land management practices lies with other Federal (i.e., BIA, BLM, and USDA's FS), State, and private land managers.

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 Carson, Douglas, Lyon, Mineral, and Storey counties, and therefore the environmental baseline should describe a no treatment scenario.

A. No Action Alternative

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

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

Under Alternative B, the Preferred Alternative, APHIS would manage a grasshopper treatment program using techniques and tools discussed hereafter to suppress outbreaks. The insecticides available for use by APHIS include the U.S. Environmental Protection Agency (USEPA) registered chemicals carbaryl, diflubenzuron, and malathion. These chemicals have varied modes of action: carbaryl and malathion work by inhibiting acetylcholinesterase (enzymes involved in nerve impulses)while diflubenzuron is a chitin inhibitor. 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). In years with unusually high outbreak populations, APHIS could make multiple applications in a given year, to the same treatment area, as long as it is permitted by the label and the cumulative sum of the applications does not exceed the maximum single application amount allowed in the EIS. 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.

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 can be incorporated simultaneously into RAATs. Based on the total percent coverage of a treatment area, either carbaryl, diflubenzuron, or malathion could be considered under this alternative at the following application rates:

- 8.0-16.0 fluid ounces (0.25-0.50 pound active ingredient (lb a.i.)) of carbaryl ULV spray per acre;
- 2.0-10.0 pounds (0.04-0.20 lb a.i.) of 2 percent carbaryl bait per acre;
- 2.0-10.0 pounds (0.10-0.50 lb a.i.) of 5 percent carbaryl bait per acre;
- 0.75 or 1.0 fluid ounce (0.012-0.016 lb a.i.) of diflubenzuron per acre; or
- 4.0-8.0 fluid ounces (0.31-0.62 lb a.i.) of malathion per acre.

The width of the area not directly treated (the untreated swath) under the RAATs approach is not standardized. The proportion of land treated in a RAATs approach is a complex function of the rate of grasshopper movement, which is a function of developmental stage, population density, and weather (Narisu et al., 1999, 2000), as well as the properties of the insecticide (insecticides with longer residuals allow wider spacing between treated swaths). Foster et al. (2000) left 20 to 50% of their study plots untreated, while Lockwood et al. (2000) left 20 to 67% of their treatment areas untreated. Currently the grasshopper program typically leaves 50% of a spray block untreated for ground applications where the swath width is between 20 and 45 feet. For aerial applications, the skipped swath width is typically no more than 20 feet for malathion, 100 feet for carbaryl and 200 feet for diflubenzuron. The selection of insecticide and the use of an associated swath widths is site dependent. Rather than suppress grasshopper populations to the greatest extent possible, the goal of this alternative is to suppress grasshopper populations to a desired level.

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

- 16.0 fluid ounces (0.50 lb a.i.) of carbaryl spray per acre;
- 10.0 pounds (0.20 lb a.i.) of 2 percent carbaryl bait per acre;
- 10.0 pounds (0.50 lb a.i.) of 5 percent carbaryl bait per acre;
- 1.0 fluid ounce (0.016 lb a.i.) of diflubenzuron per acre; or
- 8.0 fluid ounces (0.62 lb a.i.) of malathion per acre.

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

III. Affected Environment

A. Description of Affected Environment

The proposed suppression program area included in the EA encompasses 4,394,249 acres (6,866 sq. mi.) within north western Nevada. Approximately 70% of the land area is classified as Federal with the remainder State and private lands. Most of the area is high desert and mountain country. The lowest elevation is approximately 4,000 feet and 12,000 feet is approximately the highest. A map of the program suppression area is attached hereto as Appendix B. The actual program area that may be treated will be determined by surveys done in early spring.

The area is semi-arid and the majority of precipitation falls from October to June, as a result of Pacific storms. The precipitation varies from 4 inches a year in the valleys to over 20 inches a year in the mountains. Normally, the area is snow free from June to October, but snow can occur at any time. The soils are in climatic groups including desert, semi desert, upland mountain and high mountain with some irrigated soils. Agriculture areas include native and improved rangeland, pasture and cropland. Treatment guidelines in Appendix A would be followed to provide the least effect on soils.

Major waterways include, but are not limited to: Truckee River and its tributaries, Carson River and its tributaries, Walker River and its tributaries, Buckeye Creek, Pine Nut Creek, Desert Creek, Bodie Creek, and Cory Creek. In addition, there are other important smaller streams. Lakes, reservoirs and playas include: Lake Tahoe, Walker Lake, Lahontan Reservoir, Rhodes Salt marsh, Washoe Lake, and Topaz Lake.

Recreation activities vary considerably throughout the area. Primary activities include hunting, fishing, off-road vehicle use, hiking, backpacking, rockhounding and horseback riding. Related uses are camping, sightseeing, photography and nature study. Overall, primary use is low except in developed recreation sites and along major reservoirs. Major recreational areas in this Region include: Indian Creek Reservoir, Walker Lake, Mount Rose, Dayton State Park, Lahontan Reservoir, Fort Churchill State Park, David Creek Park, Topaz Lake, Bowers Mansion State Park, and Lake Tahoe. The water resources provide water for wildlife, wild horses/burros, and domestic livestock use as well as habitat for wildlife.

The Fernley and Mason Valley Wildlife Management areas are located in the assessment area. The Humboldt-Toiyabe National Forest is also within the area.

The principle rangeland vegetation in the area is: Bitterbrush, Big Sagebrush, Indian ricegrass, Winterfat, Greasewood, Horsebrush, Rabbitbrush, Paintbrush, Perennial bunchgrasses, and Blue grasses.

B. Site-Specific Considerations

1. Human Health

Population centers within the district include the towns of Steamboat, Carson City, Virginia City, Yerington, Wellington, Gardnerville, Luning, and Mina. No ULV aerial applications of malathion, carbaryl, or diflubenzuron would be conducted over these congested areas. The major schools are located within the city limits of these towns. The approximate population of the four counties is approximately 165,640 (U.S. Census Bureau, March 2018).

Three Indian Reservations exist within the boundaries of the district. They are the Washoe Indian Reservation, Walker River Indian Reservation, and Yerington Indian Reservation.

Potential exposures to the general public from traditional application rates are infrequent and of low magnitude. Program use of carbaryl, malathion and diflubenzuron has occurred routinely in many past programs, and there is a lack of any adverse health effects reported from these projects. Therefore, routine safety precautions as listed on chemical labels would continue to provide adequate protection of worker health. Immunotoxic effects from carbaryl and malathion exposure are generally expected at concentrations much higher than those from grasshopper applications, but individuals with allergic or hypersensitive reactions to the insecticides or other chemicals in the formulated product could be affected. These individuals would be advised to avoid treatment areas at the time of application until the insecticides has time to dry on the treated vegetation.

2. Non-target Species

Proposed treatment areas have been tentatively identified in Northern Nevada. There are species of concern in some of the treatment blocks. Should other areas warrant treatment, the local land managers will be consulted.

a) Migratory Birds

The U.S. Fish and Wildlife Service (USFWS) list of migratory bird species in Nevada is attached (Appendix C – Table 1). Migratory bird species of concern will be addressed through local consultation with land managers and USFWS.

b) Endangered Species

The U.S. Fish and Wildlife Service (USFWS) list of endangered, threatened, candidate and proposed species of concern in Nevada is attached (Appendix C – Table 1).

Species for Federal listing state-listed species, and/or other sensitive species identified by state or federal agencies within the area include: Columbia Spotted frog, Greater sage-grouse, Yellow-Billed Cuckoo, Bald Eagle, Desert dace, Lahontan and Paiute cutthroat trout, Warner sucker, cui-ui, Carson wandering skipper, Steamboat buckwheat and Weber Ivesia.

c) Bald and Golden Eagles

Bald and golden eagles are known to occur in the proposed treatment areas. Bald and golden eagle populations and their nesting sites will be identified prior to treatment through local consultation with land managers and USFWS.

d) Additional Species of Concern

Game species known to occur within the general areas proposed for spraying include Bighorn sheep, mule deer, pronghorn antelope, mountain lion, cottontail rabbit mourning dove, sage grouse, chucker, Hungarian partridge and several species of waterfowl. A number of cold and warm water game fish occur in the various lakes, streams and reservoirs in the area. Wild horses and burros are managed by the BLM on numerous herd management areas throughout the proposed suppression program area. It is anticipated that aerial control programs will not be in areas where populations of wild horses/burros are found.

A diversity of non-game wildlife occurs in the area (birds, reptiles, amphibians, and mammals) including wild horses. The greatest abundance and diversity of most species occurs in riparian and wetland habitat types.

3. Socioeconomic Issues

Recreation use is moderate over most of the affected area. There are several dispersed camping sites. Hunting seasons increase recreation use in the form of dispersed camping and general hunting activity. Hunting season occurs later in the year during a time when grasshopper populations have begun to dwindle, thus fewer are present. Hunters probably would not be affected. ATV use is fairly prevalent throughout. The presence of high densities of grasshoppers would result in fewer people engaging in recreational activities during the spring and summer within the affected areas. High grasshopper densities in the campsite detract considerably from the quality of the recreational experience. Grasshoppers tend to get into unsecured tents and food. The quality of the recreational experience for ATV users and horseback riders would also be indirectly impaired by high densities of grasshoppers. Large quantities of grasshoppers crossing roads and trails are killed by vehicle traffic, leaving windrows of dead grasshoppers in the travel way as well as providing a vehicular safety hazard by leaving slick residues on local roads. People who normally recreate in areas that are heavily infested would likely relocate them to areas that are not infested. Displacement of users would be more of an inconvenience to the public than an actual effect on the recreational values of the area. Displacement would also increase pressure on other public lands as people move to new locations to camp and to engage in other recreational activities. Social capacity tolerances would be impacted. The potential for user conflict would increase, in particular as motorized recreationists displace to other already heavily used areas. Such locations would experience more pressure and may experience site degradation. Areas currently not impacted or used by dispersed campers may become subject to use and development as people look for areas for recreation which are not infested with grasshoppers. Small towns near the affected areas receive limited business from recreationists who visit public lands. Many local gas stations/public stores rely fairly heavily on summer business to support their operations.

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

A substantial threat to the animal productivity of these rangeland areas is the proliferation of grasshopper populations. These insects have been serious pests in the Western States since early settlement. Weather conditions favoring the hatching and survival of large numbers of grasshoppers can cause outbreak populations, resulting in damage to vegetation. The consequences may reduce grazing for livestock and result in loss of food and habitat for wildlife. Livestock grazing on public lands contributes important cultural and social values to the area. Intertwined with the economic aspects of livestock operations are the lifestyles and culture that have co-evolved with Western ranching. Rural and social values and lifestyles, in conjunction with the long heritage of ranching and farming continue to this day, dating back to the earliest pioneers in Nevada, who shaped the communities and enterprises that make up much of Nevada. The rural Western lifestyle also contributes to tourism in the area, presenting to travelers a flavor of the west through tourist-oriented goods and services, photography of sheep bands or cattle in pastoral settings and scheduled events.

Ranchers displaced from public lands due to early loss of forage from grasshopper damage would be forced to search for other rangeland, to sell their livestock prematurely or to purchase feed hay. This would affect other ranchers (non-permittees) by increasing demand, and consequently, cost for hay and/or pasture in the area. This would have a beneficial effect on those providing the hay or range, and a negative impact on other ranchers who use these same resources throughout the area. In addition, grazing on private lands resulting from this impact would compound the effects to vegetation of recently drought conditions over the last four fears (e.g.., continual heavy utilization by grasshoppers, wildlife and wildfire), resulting in longer-term impacts (e.g., decline or loss of some preferred forage species) on grazing forage production on these lands. The lack of treatment would result in the eventual magnification of grasshopper problems resulting in increased suppression efforts, increased suppression costs and the expansion of suppression needs onto lands where such operations are limited. For example, control needs on crop lands where chemical options are restricted because of pesticide label restrictions. Under the no action alternative, farmers would experience economic losses. The suppression of grasshoppers in the affected area would have beneficial economic impacts to local landowners, farmers, and beekeepers. Crops near infested lands would be protected from devastating migrating hordes, resulting in higher crop production; hence, increased monetary returns.

4. Cultural Resources and Events

Federal and public lands that are part of the Region’s visual and cultural resources include the Humboldt-Toiyabe National Forest, Mason Valley and Fernley Wildlife Management Areas, Topaz Lake, Lahontan Reservoir, For Churchill, Mormon Station, Dayton, and Nevada Beach State parks. The Lahontan State Recreation Area is located within Lyon County. There are numerous wilderness study areas, administered by the BLM in the proposed suppression program area.

A broad variety and number of activities have occurred, are occurring or would occur throughout the area of concern that affects cultural resources. These activities and any cumulative impacts associated with them would occur regardless of whether or not grasshoppers are treated.

Use of motorized equipment off existing roads could impact surface artifacts by damaging them or displacing them in their overall juxtaposition with other artifacts. Maintaining the integrity of a historical site is important to understanding the significance of the site and the artifacts found therein. Non-treatment of infested land would likely later result in more intensive and extensive treatment of that infested land. Most of the non-public lands that would be affected have already been heavily disturbed and any artifacts on them likely impacted. Consequently, it is unlikely that additional carbaryl bait treatments would result in additional impacts on cultural properties.

With no treatment of grasshoppers on public lands, aerial application of insecticides off public lands would likely increase. However, most if not all of the areas likely to be treated have been heavily disturbed in the past, and any artifacts on them likely impacted. Consequently, it is unlikely that these aerial treatments would result in additional impacts on cultural properties.

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

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

To ensure that historical or cultural sites, monuments, buildings or artifacts of special concern are not adversely affected by program treatments, APHIS would confer with BLM, Forest Service or other appropriate land management agency or cultural resource specialists on a local level to protect these areas of special concern. APHIS also would confer with the appropriate tribal authority and with the BIA office at a local level to ensure that the timing and location of planned program treatments do not coincide or conflict with cultural events or observances, such as sundances, on tribal lands.

5. Special Considerations for Certain Populations

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

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

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

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

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

The increased scientific knowledge about the environmental health risks and safety risks associated with hazardous substance exposures to children and recognition of these issues in Congress and Federal agencies brought about legislation and other requirements to protect the health and safety of children. On April 21, 1997, President Clinton signed E.O. 13045, Protection of Children From Environmental Health Risks and Safety Risks (62 FR 19885). This E.O. requires each Federal agency, consistent with its mission, to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address those risks. APHIS has developed agency guidance for its programs to follow to ensure the protection of children (USDA, APHIS, 1999).

Treatments used for grasshopper programs are primarily conducted on open rangelands where children would not be expected to be present during treatment or enter during the restricted entry period after treatment. Based on the 2019 review of the four insecticides and their use in programs, the risk assessment concludes that the likelihood of children being exposed to insecticides from a grasshopper program is very slight and that no disproportionate adverse effects to children are anticipated over the negligible effects to the general population.

IV. Environmental Consequences

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

APHIS has written human health and ecological risk assessments (HHERAs) to assess the insecticides and use patterns that are specific to the program. The risk assessments provide an in-depth technical analysis of the potential impacts of each insecticide to human health; and non-target fish and wildlife along with its environmental fate in soil, air, and water. The assessments rely on data required by the USEPA for pesticide product registrations, as well as peer-reviewed and other published literature. The HHERAs are heavily referenced in this Final. 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 Action 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 general 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 seed production, and loss of important plant species, or seed production may lead to reduced diversity of 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 significantly high 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. Local communities could see adverse economic impacts to the entire area. Grasshoppers that infest rangeland could move to surrounding croplands. Farmers could incur economic losses from attempts to chemically control grasshopper populations or due to the loss of their crops. The general public could see an increase in the cost of meat, crops, and their byproducts.

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

Under Alternative 2, APHIS would participate in grasshopper programs with the option of using one of the insecticides carbaryl, diflubenzuron, or malathion, depending upon the various factors related to the grasshopper outbreak and the site-specific characteristics. The use of an insecticide would typically occur at half the conventional application rates following the RAATs strategy. APHIS would apply a single treatment to affected rangeland areas in an attempt to suppress grasshopper outbreak populations by a range of 35 to 98 percent, depending upon the insecticide used. However, in years with unusually high outbreak populations, APHIS could make multiple applications in a given year, to the same treatment area, as long as it is permitted by the label and the cumulative sum of the applications does not exceed the maximum single application amount allowed in the EIS.

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).

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

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

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

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

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

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

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

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

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

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

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

b) Diflubenzuron

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

USEPA considers diflubenzuron relatively non-persistent and immobile under normal use conditions and stable to hydrolysis and photolysis. The chemical is considered unlikely to contaminate ground water or surface water (USEPA, 1997). The vapor pressure of diflubenzuron is relatively low, as is the Henry's Law Constant value, suggesting the chemical will not volatilize readily into the atmosphere from soil, plants or water. Therefore, exposure from volatilization is expected to be minimal. Due to its low solubility (0.2 mg/L) and preferential binding to organic matter, diflubenzuron seldom persists more than a few days in water (Schaefer and Dupras, 1977; Schaefer et al., 1980). Mobility and leachability of diflubenzuron in soils is low, and residues are usually not detectable after seven days (Eisler, 2000). Aerobic aquatic half-life data in water and sediment was reported as 26.0 days (USEPA, 1997). Diflubenzuron applied to foliage remains adsorbed to leaf surfaces for several weeks with little or no absorption or translocation from plant surfaces (Eisler, 1992, 2000). 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).

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.

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

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

c) Malathion

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

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

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

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

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

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

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

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

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

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

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

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

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

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

d) Reduced Area Agent Treatments (RAATs)

The use of RAATS is the most common application method for all program insecticides and would continue to be so except 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 concentrations, or by alternating one or more treatment swaths. Usually RAATs applications use the latter strategy but often use both simultaneously. The RAATs strategy suppresses grasshoppers within treated swaths, while conserving grasshopper predators and parasites in swaths that are not treated. In years with unusually high outbreak populations, APHIS could make multiple applications in a given year, to the same treatment area, as long as it is permitted by the label and the cumulative sum of the applications does not exceed the maximum single application amount allowed in the EIS.

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 traditional blanket insecticide application) at a significantly lower cost and less insecticide, and with a markedly higher abundance of non-target organisms following application (Lockwood et al., 2000; Deneke and Keyser, 2011). 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 environment. Increased insecticide use from the lack of coordination and RAAT applications where suitable could increase the exposure risk to non-target species and the environment. In addition, land managers may not employ the extra program measures designed to reduce exposure to the public and the environment.

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

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

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

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

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

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

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

Federal agencies identify and address the disproportionately high and adverse human health or environmental effects of their proposed activities, as described in Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

The human population at most sites in grasshopper programs is diverse and lacks any special characteristics that implicate greater risks of adverse effects for any minority or low-income populations. A demographic review of the proposed project area revealed certain areas with large populations, Spanish-speaking populations and some with large

American Indian tribal populations. Low-income farmers and ranchers would comprise, by far, the largest group affected by APHIS program efforts in this area of concern.

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

APHIS intervention to locally suppress damaging grasshopper infestations would stand to greatly benefit, rather than harm, low-income farmers and ranchers by helping them to control grasshopper threats to their livelihood. Suppressing grasshopper infestations on adjacent public or private rangelands would increase inexpensive available forage for their livestock and would significantly decrease economic losses to their crop lands by invading grasshoppers. Such would obviate the need to perform additional expensive crop pesticide treatments or to provide supplemental feed to their livestock which would further impact low-income individuals.

In past grasshopper programs, the U.S. Department of the Interior's (USDI) Bureau of Land Management or Bureau of Indian Affairs have notified the appropriate APHIS State Plant Health Director when any new or potentially threatening grasshopper infestations is discovered on BLM lands or tribal lands held in trust and administered by BIA. Thus, APHIS has cooperated with BIA when grasshopper programs occur on Indian tribal lands. For local Indian populations, APHIS program managers would work with BIA and local tribal councils to communicate information to tribal organizations and representatives when programs have the potential to impact the environment of their communities, lands or cultural resources. In past grasshopper programs, APHIS has worked cooperatively with American Indian groups and would continue to do so in the future.

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 EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks." This EO 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.

The human health risk assessment for the 2019 EIS analyzed the efforts of exposure to children from the four insecticides. Based on review of the insecticides and their use in the grasshopper program, the risk assessment concluded that the likelihood of children being exposed to insecticides is very slight and that no disproportionate adverse effects to children are anticipated over the negligible effects to the general population. Treatments are conducted 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.

Impacts on children would be minimized by the implementation of the Treatment Guidelines:

Aerial Broadcast Applications of Liquid Insecticides

- Notify all residents in treatment areas, or their designated representatives, prior to proposed operations. Advise them of the control method to be used, the proposed method of application, and precautions to be taken (e.g., advise parents to keep children and pets indoors during ULV treatment). Refer to label recommendations related to restricted entry period.

- No treatments would occur over congested urban areas. For all flights over congested areas, the contractor must submit a plan to the appropriate FAA District Office and this office must approve of the plan; a letter of authorization signed by the city or town authorities must accompany each plan. Whenever possible, plan aerial ferrying and turnaround routes to avoid flights over congested areas, bodies of water, and other sensitive areas that are not to be treated.

Aerial Application of Dry Insecticidal Bait

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

Ultra-Low-Volume Aerial Application of Liquid Insecticides

- Do not spray while school buses are operating in the treatment area.

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

Based on the analysis in the protection measures, we have determined that there would be no significant impact within any potential treatment zone of the area of concern.

4. Tribal Consultation

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

Prior to the treatment season, program personnel notify Tribal land managers of the potential for grasshopper and Mormon cricket outbreaks on their lands. Consultation with local Tribal representatives takes place prior to treatment programs to inform fully the Tribes of possible actions APHIS may take on Tribal lands. Treatments typically do not occur at cultural sites, and drift from a program treatment at such locations is not expected to adversely affect natural surfaces, such as rock formations and carvings. APHIS would also confer with the appropriate Tribal authority to ensure that the timing and location of a planned program treatment does not coincide or conflict with cultural events or observances on Tribal lands.

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

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

Executive Order 13186 directs Federal agencies taking actions with a measurable negative effect on migratory bird populations to develop and implement a Memorandum of Understanding with the USFWS that promotes the conservation of migratory bird populations. On August 2, 2012, a Memorandum of Understanding between APHIS and the USFWS was signed to facilitate the implementation of this Executive Order.

In accordance with Executive Order 13186, MBTA, APHIS will support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions. Impacts 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 (listed) 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 3,500 foot buffer zones for carbaryl or malathion or in 1,500 foot buffer zones for diflubenzuron along stream corridors
- Insecticides will not be applied when wind speeds exceed 10 miles per hour. APHIS will attempt to avoid insecticide application if the wind is blowing towards salmonid habitat
- Insecticide applications are avoided when precipitation is likely or during temperature inversions

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

APHIS submitted a programmatic biological assessment and requested consultation with USFWS on March 9, 2015 for use of carbaryl, malathion, diflubenzuron, and chlorantraniliprole for grasshopper suppression in the 17-state program area. Chlorantraniliprole will not be considered for use in Nevada during the 2020 treatment season. With the incorporation and use of application buffers and other operational procedures APHIS anticipates that any impacts associated with the use and fate of program insecticides will be insignificant and discountable to listed species and their habitats. Based on an assessment of the potential exposure, response, and subsequent risk characterization of program operations, APHIS concludes the proposed action is not likely to adversely affect listed species or critical habitat in the program area. APHIS has requested concurrence from the USFWS on these determinations. Until this programmatic Section 7 consultation with USFWS is completed, APHIS will conduct consultations with USFWS field offices at the local level.

APHIS personnel has been conferring with the U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office to discuss section 7 consultations as required by the Endangered Species Act of 1973 annually since 2007. On June 25 2018, USFWS provided a letter of concurrence to APHIS personnel for the 2018, 2019, and 2020 treatment seasons. Included in Appendix C is the U.S. Fish and Wildlife Service listing of Nevada endangered, threatened, proposed, and candidate species (Table 1).

The 1995 biological opinion issued by USFWS lists the mitigations to be followed by APHIS when conducting a suppression program to control grasshoppers with insecticides other than diflubenzuron. This list is included in Appendix C (Table 2). Mitigation measures for use of malathion and carbaryl for new listings (since 1995) of threatened, endangered and proposed species that have not been included in formal Section 7 consultation are also included in Appendix C (Table 3). Mitigation measures as required by USFWS for threatened, endangered, and proposed species incorporating the use of diflubenzuron on grasshopper suppression programs are included in Table 3.

APHIS is not required to develop mitigation buffer zones for candidate or other species of concern. The Columbia spotted frog (Great Basin population) (*Rana luteiventris*) and Greater Sage Grouse are species of concern and located within our proposed treatment areas for 2020. However, species of concern receive no legal protection under the Act, but consideration of these species will be discusses with the local land managers prior to any treatments to assist in conservation efforts. Agreed upon mitigation measures between USFWS, NDOW, NDA, and APHIS will be followed. Yearly local program consultations with the requesting agency would determine if mitigation measures would allow a suppression program to be done.

7. Bald and Golden Eagle Protection Act

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

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

8. Additional Species of Concern

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

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

Because grasshopper numbers are so high in an outbreak year, treatments would not likely reduce the number of grasshoppers below levels present in a normal year. 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.

Through an agreement between Nevada Department of Agriculture (NDA), Nevada Department of Wildlife (NDOW), USDA Plant Protection and Quarantine (PPQ), the Bureau of Land Management (BLM), and the United Stated Fish and Wildlife Service (USFWS) all parties agree to limit the use of insecticides within sage-grouse habitat for grasshopper and Mormon cricket control during times that would have the greatest chance of disturbing sage-grouse during critical nesting and brooding periods. For aerial applications of Dimilin, no applications will occur within three miles of active and pending sage grouse leks during the intervals of one hour before sunrise to two hours after sunrise, and from two hours before sunset to one hour after sunset.

Ground applications will use specially formulated carbaryl baits to mitigate potential impacts to non-target species. No carbaryl bait will be applied within three miles of any active or pending sage grouse lek. Through consultation with NDOW and BLM, areas where crops, roads, or urban areas are to be protected, two track or other categories of roads may be utilized to distribute carbaryl bait within the sage grouse buffer zone, up to one mile from the area to be protected. If a lek is found within one mile from the protected area, further consultation will be had with NDOW and USFWS. Any ground baiting activity approved by NDOW and USFWS within the sage grouse buffer zone using carbaryl bait would also comply with the time frame constraints consistent with that of the aerial applications of Dimilin.

There are also biocontrol programs established by various land managers as well as county, state, and federal agencies. Nevada Department of Agriculture (NDA) works in conjunction with APHIS personnel through a cooperative agreement. NDA also maintains a healthy biocontrol program. All biocontrol sites are mapped and logged for relocation purposes. If a biocontrol site overlapped with a proposed treatment, APHIS and NDA would agree upon mitigation measures prior to beginning treatment. Biocontrol populations established by other land managers would be the responsibility of the land manager to identify to APHIS personnel during site specific consultation between APHIS and the land manager.

9. Fires and Human Health azards

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

10. Cultural and Historical Resources

Federal actions must seek to avoid, minimize, and mitigate potential negative impacts to cultural and historic resources as part of compliance with the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act of 1979, and NEPA. Section 106 of the NHPA requires Federal agencies to provide the Advisory Council on Historic Preservation with an opportunity to comment on their findings.

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

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VI. Listing of Agencies and Persons Consulted

Nevada Department of Agriculture
Jeff Knight (State Entomologist)
405 South 21st St.
Sparks, NV 89431

Nevada Department of Wildlife
Native Aquatic Species Coordinator*
1100 Valley Road
Reno, NV 89512

U.S. Fish and Wildlife Service
Nevada Fish and Wildlife Service
Lee Ann Carranza (Field Supervisor)
Andy Starostka (Fish Biologist)
Tara Vogel (Fish and Wildlife Biologist)
Edward Koch*
Todd Gilmore*
Kerensa King*
Chad Mellison*
Marcy Haworth*
1340 Financial Blvd. Suite 234
Reno, NV 89502

Bureau of Land Management
Mark Coca*
Vegetation Management Specialist
1340 Financial Blvd.
Reno, NV 89502

US Forest Service
Dirk Netz (Forest Botanist/Invasive Plant Program Supervisor)
Meagan Carter (Invasive Plant Program manager)
Randall Sharp*
Humboldt-Toiyabe National Forest
1200 Franklin Way
Sparks, NV 89431

USDA APHIS PPQ
Bill Wesela (National Grasshopper Program Manager)
Jim Warren (Environmental protection Specialist)
Kai Caraher (Biological Scientist)
Charles Brown*
4700 River Road
Riverdale, MD 20737

Nevada Natural Heritage Program
Dept. of Conservation and Natural Resources
Eric S. Miskow
Biologist III/ Data Manager
901 South Stewart St., Suite 5002
Carson City, NV 89706-5245

**Indicates past consultation*

Appendix A

APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program

FY-2020 Treatment Guidelines

Version 02/21/2020

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

General Guidelines for Grasshopper / Mormon Cricket Treatments

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

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

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

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

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

6) Land managers are responsible for the overall management of rangeland under their control to prevent or reduce the severity of grasshopper and Mormon cricket outbreaks. Land managers are encouraged to have implemented Integrated Pest Management

Systems prior to requesting a treatment. In the absence of available funding or in the place of APHIS funding, the Federal land management agency, Tribal authority or other party/ies may opt to reimburse APHIS for suppression treatments. Interagency agreements or reimbursement agreements must be completed prior to the start of treatments which will be charged thereto.

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

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

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

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

Operational Procedures

GENERAL PROCEDURES FOR ALL AERIAL AND GROUND APPLICATIONS

1) Follow all applicable Federal, Tribal, State and local laws and regulations in conducting grasshopper and Mormon cricket suppression treatments.
2) Notify residents within treatment areas, or their designated representatives, prior to proposed operations. Advise them of the control method to be used, proposed method of application, and precautions to be taken.
3) One of the following insecticides that are labeled for rangeland use can be used for a suppression treatment of grasshoppers and Mormon crickets:
   a) Carbaryl
      i) solid bait
      ii) ultra-low volume (ULV) spray
   b) Diflubenzuron ULV spray
   c) Malathion ULV spray

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

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

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

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

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

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

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

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

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

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

1) APHIS Aerial treatment contracts will adhere to the current year's Statement of Work (SOW)
2) Minimize the potential for drift and volatilization by not using ULV sprays when the following conditions exist in the spray area:

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

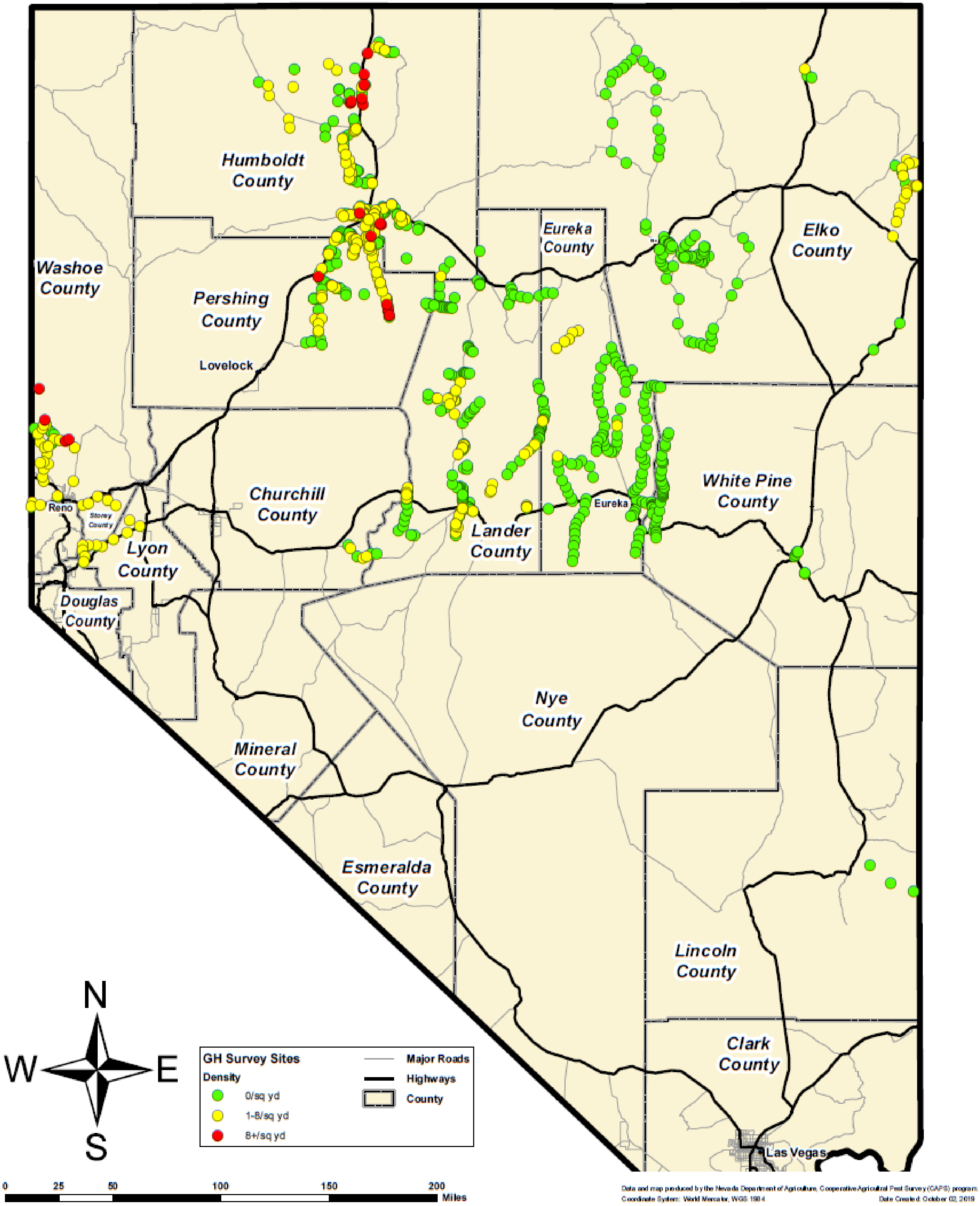
Appendix A

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.

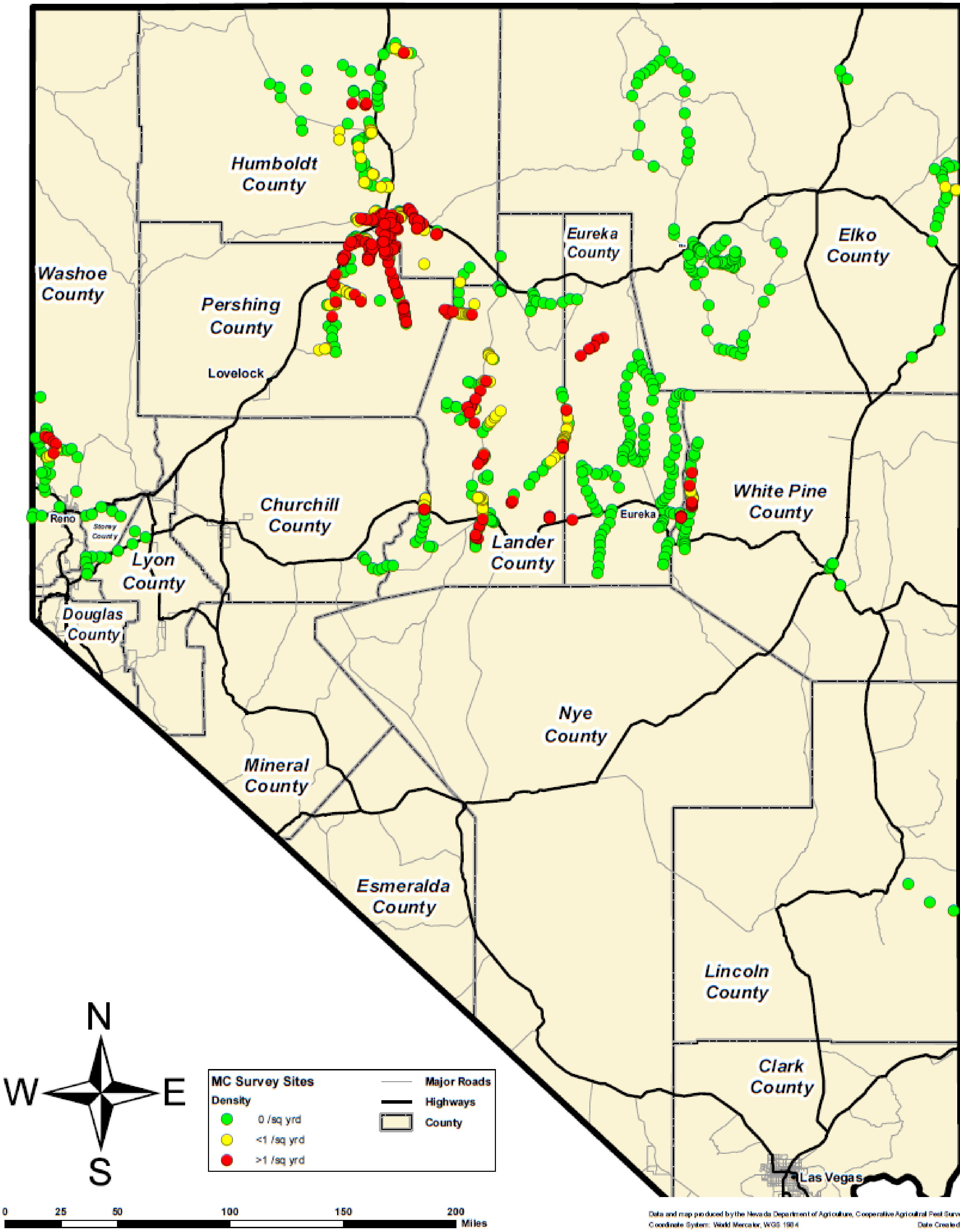
4) Application aircraft will fly at a median altitude of 1 to 1.5 times the wingspan of the aircraft whenever possible or as specified by the COR or the Treatment Manager.

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.

2019 Grasshopper Survey Cumulative



2019 Mormon Cricket Survey Cumulative



Data and map produced by the Nevada Department of Agriculture, Cooperative Agricultural Pest Survey (CAPS) program.
Coordinate System: World Mercator, WGS 1984
Date Created: October 02, 2019

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Table 1

United States Department of the Interior
FISH AND WILDLIFE SERVICE

Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
Phone: (775) 861-6300 Fax: (775) 861-6301
http://www.fws.gov/nevada/

In Reply Refer To: January 30, 2020

Consultation Code: 08ENVD00-2019-SLI-0164
Event Code: 08ENVD00-2020-E-00487
Project Name: NV-03-20

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

Official Species List

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

This species list is provided by:

Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
(775) 861-6300

Appendix C
Table 1
Project Summary

Consultation Code: 08ENVD00-2019-SLI-0164

Event Code: 08ENVD00-2020-E-00487

Project Name: NV-03-20

Project Type: INVASIVE SPECIES CONTROL

Project Description: Site Specific Environmental Assessment for Rangeland Grasshopper and Mormon Cricket Suppression Program in Churchill, Humboldt, Pershing, and Washoe countie s in Nevada.

Project Location:

Approximate location of the project can be viewed in Google Maps:
https:// www.google.com/maps/place/40.53689300772868N118.64599192532677W

Counties: Carson City, NV | Douglas, NV | Lyon, NV | Mineral, NV | Storey, NV

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Table 1

Endangered Species Act Species

There is a total of 10 threatened, endangered, or candidate species on this species list.

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

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

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

---

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

Mammals

NAME	STATUS
North American Wolverine *Gulo gulo luscus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Birds

NAME	STATUS
Greater Sage-grouse *Centrocercus urophasianus* Population: Bi-State There is proposed critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8159	Proposed Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is proposed critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

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Amphibians

NAME	STATUS
Sierra Nevada Yellow-legged Frog *Rana sierrae* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9529	Endangered

Fishes

NAME	STATUS
Cui-ui *Chasmistes cujus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/456	Endangered
Lahontan Cutthroat Trout *Oncorhynchus clarkia henshawi* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3964 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/233/office/14320.pdf	Threatened

Insects

NAME	STATUS
Carson Wandering Skipper *Pseudocopaeodes eunus obscurus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/674	Endangered

Flowering Plants

NAME	STATUS
Steamboat Buckwheat *Eriogonum ovalifolium var. williamsiae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/413	Endangered
Webber's Ivesia *Ivesia webberi* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4682	Threatened

Conifers and Cycads

NAME	STATUS
Whitebark Pine *Pinus albicaulis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1748	Candidate

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Table 1

Critical habitats

There are 2 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Webber's Ivesia *Ivesia webberi* https://ecos.fws.gov/ecp/species/4682#crithab	Final
Yellow-billed Cuckoo *Coccyzus americanus* https://ecos.fws.gov/ecp/species/3991#crithab	Proposed

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Table 1

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
Lahontan National Fish Hatchery	78.6

Lahontan National Fish Hatchery
710 Highway 395
Gardnerville, NV 89410-7813
(775) 265-2425

https://www.fws.gov/offices/Directory/OfficeDetail.cfm?OrgCode=84240

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Table 1

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
Brewer's Sparrow *Spizella breweri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	Breeds May 15 to Aug 10

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Table 1

NAME	BREEDING SEASON
California Spotted Owl *Strix occidentalis occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7266	Breeds Mar 10 to Jun 15
Cassin's Finch *Carpodacus cassinii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31
Golden Eagle *Aquila chrysaetos* This is a Bird of Conservation Concern (BCC) only in particularBird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Green-tailed Towhee *Pipilo chlorurus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9444	Breeds May 1 to Aug 10
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds everywhere

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Table 1

NAME	BREEDING SEASON
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Pinyon Jay *Gymnorhinus cyanocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15
Rufous Hummingbird *selasphorus rufus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Sage Thrasher *Oreoscoptes montanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9433	Breeds Apr 15 to Aug 10
Sagebrush Sparrow *Artemisiospiza nevadensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 15 to Jul 31
Tricolored Blackbird *Agelaius tricolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Virginia's Warbler *Vermivora virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31
White Headed Woodpecker *Picoides albolarvatus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9411	Breeds May 1 to Aug 15
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

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Table 1

NAME	BREEDING SEASON
Williamson's Sapsucker *Sphyrapicus thyroideus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8832	Breeds May 1 to Jul 31
Willow Flycatcher *Empidonax traillii* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8832	Breeds May 20 to Aug 31

Appendix C
Table 2

<table>
<tr><td colspan="4" align="center">Part I
Grasshopper and Mormon Cricket Control Program
Protection Measures Agreed to by APHIS to Protect
Threatened, Endangered, or Proposed Species</td></tr>
<tr><td colspan="4" align="center">Mammals</td></tr>
<tr><td>Common Name</td><td>Scientific Name</td><td>Listing Status</td><td>States</td></tr>
<tr><td>A. Black-footed ferret</td><td>Mustela nigripes</td><td>E, EXPN</td><td>CO, KS, MT, ND, NE, SD, UT, WY</td></tr>
<tr><td colspan="4">Program personnel will consult with applicable Federal and/or State agencies in regard to the presence of black-footed ferrets prior to beginning any control programs. Each documented and verified occurrence of interest to the program will be considered and plans for adequate protection adopted in consultation with the local Fish and Wildlife Service (Service) field offices.</td></tr>
<tr><td>B. Utah prairie dog</td><td>Cynomys parvidens</td><td>T</td><td>UT</td></tr>
<tr><td colspan="4">Malathion and acephate will not be used within ¼ mile of any Utah prairie dog town.</td></tr>
<tr><td>C. Hualapai Mexican vole</td><td>Microtus mexicanus hualpaiensis</td><td>E</td><td>AZ</td></tr>
<tr><td colspan="4">One-quarter mile no malathion or acephate treatment buffer around occupied areas. Contact the local Service office prior to program operations in Mohave County.</td></tr>
<tr><td>D. Mexican long-nosed bat</td><td>Leptonycteris nivalis</td><td>E</td><td>NM, TX</td></tr>
<tr><td>Sanborn's long-nosed bat</td><td>Leptonycteris sanborni</td><td>No Data</td><td>No Data. AZ, NM ????</td></tr>
<tr><td>Lesser long-nosed bat</td><td>Leptonycteris curasoae yerbabuenae</td><td>E</td><td>AZ, NM</td></tr>
<tr><td colspan="4">No jeopardy foreseen because of low risk from pesticides to be used and prey base not expected to be significantly effected. Unquantifiable anticipated incidental take as a result of off-road vehicles use for surveys and application of carbaryl bait. Reasonable and prudent measures and terms and conditions provided to reduce take of the species.</td></tr>
</table>

Appendix C
Table 2

<table>
<tr><th colspan="4">Birds</th></tr>
<tr><td>Common Name</td><td>Scientific Name</td><td>Listing Status</td><td>States</td></tr>
<tr><td>A. Whooping crane</td><td>Grus americana</td><td>E, EXPN</td><td>CO, ID, KS, MT, ND, NE, NM, OK, SD, TX, UT,WY</td></tr>
<tr><td colspan="4">APHIS shall ensure that no whooping cranes have wandered into a proposed spray treatment or bait treatment area.</td></tr>
<tr><td>B. Bald eagle</td><td>Haliaeetus leucocephalus</td><td>T</td><td>All 17 western States</td></tr>
<tr><td colspan="4">Maintain a 1-mile radius treatment-free zone (including <u>Nosema)</u> around active bald eagle eyries found on rivers or lakes with no flyovers of this area by contract pilots.

A 2.5 mile no-aerial ULV spray zone will be maintained upstream and downstream from the nest site as a forage area. This will include a 0.25 mile buffer along each side of the rivers.
Lakes will be protected by a 0.25 no-aerial ULV spray buffer if they are considered foraging areas of the bald eagle.</td></tr>
<tr><td>C. Peregrine falcon</td><td>Falco peregrinus anatum</td><td>DM</td><td>All 17 western States</td></tr>
<tr><td colspan="4">This species has been delisted but is being monitored for the first 5 years.</td></tr>
<tr><td>D. Northern aplomado falcon</td><td>Falco femoralis septentrionalis</td><td>E</td><td>TX</td></tr>
<tr><td colspan="4">APHIS will contact the local Service office at least 5 days prior to grasshopper program activities to determine if nesting sites are known and coordinate necessary measures to protect nests and foraging areas.</td></tr>
</table>

Appendix C
Table 2

E. Piping plover	*Charadrius melodus*	T	CO, KS, MT, ND, NE, OK, SD, TX
No aerial ULV pesticides will be used within 0.25 mile of water bodies where piping plovers are known to nest. Where carbaryl bran bait or Nosema is used, a 500-foot no-treatment zone around nesting areas of piping plovers should be maintained. Piping plover habitat will be determined in consultation with local Service field offices.			
F. Western snowy plover	*Charadrius alexandrinus nivosus*	T	CA, WA, OR
No aerial ULV pesticides should be applied within 0.25 mile of the edges of known snowy plover nesting areas. Carbaryl bran bait or Nosema may be used to within 500 feet of these areas. Within the 500 foot buffer, no treatments will be made.			
G. Interior least tern	*Sterna antillarum*	E	CO, KS, MT, ND, NE, NM, OK, SD, TX
No aerial ULV application should be applied 2.5 miles up and down river to prevent abandonment of nesting least tern colonies due to aircraft flyovers and a possible decrease of the fishery forage base due to accidental aquatic applications. A 0.25 mile no aerial ULV application buffer on each side of the river and around other bodies of water containing least tern colonies also should be observed. A 500 foot no treatment zone around nesting colonies also should be observed. Interior least tern habitat will be determined in consultation with the local Service field offices.			
H. Yuma clapper rail	*Rallus longirostris yumanensis*	E	AZ, CA
Maintain a 0.25 mile no aerial ULV application buffer and a 500 foot no application buffer for carbaryl bran bait and Nosema around nesting and foraging areas.			

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I. Black-capped vireo	*Vireo atricapillus*	E	KS, OK, TX
Before APHIS control programs are initiated in Oklahoma, a concerted effort should be made to identify nesting areas of this species. The Service recommends that APHIS personnel contact our Service field office in Tulsa, which can assist in identifying specific nesting habitat. The Department of Biology, Central State University, Edmond, OK also can provide further assistancein this effort. Contact the Austin, TX field office for actions near black-capped vireo habitat in Callahan and Taylor Counties, TX. Exclusion of aerial ULV spray application in habitat normally used for foraging and nesting by this species as identified above.			
J. California brown pelican	*Pelecanus occidentalis californicus*	E	CA, OR, TX, WA
Maintain a 0.25 mile no aerial application buffer around established nests or roost sites. A 500 foot buffer will apply for carbaryl bran bait or Nosema.			
K. Southwestern willow flycatcher	*Empidonax traillii extimus*	E	AZ, CA, CO, NM, TX, UT
No ULV application of insecticides should occur within 0.25 mile of the edge of occupied habitat. A buffer of 500 feet should be maintained where no application of carbaryl bran bait or Nosema is applied.			
L. Mexican spotted owl	*Strix occidentalis lucida*	T	AZ, CO, NM, TX, UT
APHIS will confer with the local Service office at least 5 days prior to grasshopper control activities in any of the counties known to contain Mexican spotted owls in northeastern Arizona, southwestern Colorado, and Utah to determine if protective measures are needed.			
M. Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E	AZ
APHIS will confer with the local Service office at least 5 days prior to any grasshopper program activities to determine if protective measures are needed. APHIS adopt the preprogram conference procedures. If it is determined during site specific conferences that the grasshopper control program may jeopardize the continued existence of this species or result in the adverse modification of the species' proposed critical habitat, the Service will offer advisory recommendations to avoid or minimize any adverse effects.			

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Table 2

Fish			
Group A			
Common Name	Scientific Name	Listing Status	States
Bonytail chub	*Gila elegans*	E	AZ, CA, CO, NV, UT
Colorado pikeminnow (=squawfish)	*Ptychocheilus lucius*	E, EXPN	E = AZ, CA, CO, UT, WY. EXPN = AZ
Cui-ui	*Chasmistes cujus*	E	NV
Gila trout	*Oncorhynchus gilae*	E	AZ, NM
Greenback cutthroat trout	*Oncorhynchus stomias*	T	CO
Humpback chub	*Gila cypha*	E	AZ, CO, UT
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*	T	CA, NV, OR, UT
Pallid sturgeon	*Scaphirhynchus albus*	E	KS, MT, ND, SD
Only carbaryl bran bait or Nosema (no aerial application of ULV pesticide) will be used within 0.25 mile of occupied habitats.			
Group B			
Apache trout	*Oncorhynchus apache*	T	AZ
Big Spring spinedace	*Lepidomeda mollispinis pratensis*	T	NV
Borax Lake-chub	*Gila boraxobius*	E	OR
Chihuahua chub	*Gila nigrescens*	T	NM
Desert dace	*Eremichthys acros*	T	NV
Foskett speckled dace	*Rhinichthys osculus ssp.*	T	OR
Gila topminnow (now includes Yaqui)	*Poeciliopsis occidentalis*	E	AZ, NM
Hiko White River springfish	*Crenichthys baileyi grandis*	E	NV
Hutton tui chub	*Gila bicolor spp.*	T	OR
June sucker	*Chasmistes liorus*	E	UT
Kendall Warm Springs dace	*Rhinichthys osculus thermalis*	T	WY
Little Colorado spinedace	*Lepidomeda vittata*	T	AZ
Modoc sucker	*Catostomus microps*	E	CA
Pahrump killifish (poolfish)	*Empetrichthys latos*	E	NV

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Table 2

Pahranagat roundtail chub	*Gila robusta jordani*	E	NV
Pecos bluntnose shiner	*Notropis simus pecosensis*	T	NM
Pecos gambusia	*Gambusia nobilis*	E	NM, TX
Spikedace	*Meda fulgida*	T	AZ, NM
Virgin River chub	*Gila robusta seminuda*	E	AZ, NV, UT
Virgin spinedace ? Also listed under C?	*Lepidomeda mollispinis pratensis*	T	NV
Warner sucker	*Catostomus warnerensis*	T	OR
White River springfish	*Crenichthys baileyi balleyi*	E	NV
Woundfin	*Plagopterus argentissimus*	E, EXPN	E = AZ, NM, NV, UT EXPN = AZ, NM
No aerial ULV application of malathion should be applied within 1 mile of occupied habitat. A 0.25 no-aerial ULV application of carbaryl and acephate also should be adhered to.			
Group C			
Arkansas River shiner	*Notropis girardi*	T	KS, NM, OK, TX
Ash Meadows Amargosa pupfish	*Cyprinodon nevadensis mionectes*	E	NV
Ash Meadows speckled dace	*Rhinichthys osculus nevadensis*	E	NV
Clover Valley speckled dace	*Rhinichthys osculus oligoporus*	E	NV
Delta smelt	*Hypomesus transpacificus*	T	CA
Desert pupfish	*Cyprinodon macularius*	E	AZ, CA
Devil's Hole pupfish	*Cyprinodon diabolis*	E	NV
Independence Valley speckled dace	*Rhinichthys osculus lethorporus*	E	NV
Leopard darter	*Percina pantherina* .	T	OK
Loach minnow	*Tiaroga cobitis*	T	AZ, NM
Lost River sucker	*Deltistes luxatus*	E	CA, OR
Railroad Valley springfish	*Crenichthys nevadae*	T	NV
Rio Grande silvery minnow	*Hybognathus amarus*	E	NM, TX
Shortnose sucker	*Chasmiste brevirostris*	E	CA, OR
Virgin spinedace ? Also listed under B?	*lepidomeda mollispinis pratensis*	T	NV

Warm Springs pupfish	*Cyprinodon nevadensis pectoralis*	E	NV
White sturgeon	*Acipenser transmontanus*	E	ID, MT
Yaqui topminnow (Now included with Gila topminnow)	*Poeciliopsis occidentalis sonoriensis*	E	AZ, NM
Buffers around areas of occurrence of 0.5 mile for the use of malathion and 0.25 mile for the use an aerially applied carbaryl and acephate. Within the buffers, only carbaryl bait or Nosema will be used.			
Group D			
Yaqui chub	*Gila purpurea*	E	AZ
Neosho madtom	*Noturus placidus*	T	KS, OK
Moapa dace	*Moapa coriacea*	E	NV
No aerial ULV application of malathion should be applied within 0.5 mile of the habitat. A 0.25 mile buffer should be applied for the use of acephate and carbaryl, and a 500 foot no-treatmentzone should be used for carbaryl bran bait.			
Group E			
Razorback sucker	*Xyrauchen texanus*	E	AZ, CA, CO, NM, NV, UT, WY
Maintain a 0.25 mile no-aerial application buffer around known habitats. Within buffer, carbaryl bran bait or Nosema may be used within 500 feet of the water.			
Group F			
Sacramento splittail	*Pogonichthys*	T	CA
No aerial applications of malathion within 0.5 mile, or aerial applications of acephate or carbaryl within 0.25 mile of Suisun Bay and the San Francisco Bay-Sacramento-San Joaquin River estuary in Sacramento and San Joaquin Counties. Within this buffer, carbaryl bran bait or Nosema may be used within 500 feet of the water.			

Appendix C
Table 2

<table>
<tr><td colspan="4" align="center"><h2>Reptiles</h2></td></tr>
<tr><td>Common Name</td><td>Scientific Name</td><td>Listing Status</td><td>States</td></tr>
<tr><td>A. Desert tortoise</td><td>Gopherus agassizii</td><td>T, SAT</td><td>AZ, CA, NV, UT</td></tr>
<tr><td colspan="4">Malathion and acephate should not be applied in the Beaver Dam Slope of Washington County, Utah (both inside and outside of the designated critical habitat).</td></tr>
<tr><td>B. Flat-tailed horned lizard</td><td>Phrynosoma mcallii</td><td>No Data</td><td>No Data</td></tr>
<tr><td colspan="4">APHIS will maintain a 0.25 mile buffer for ULV aerial applications and a 500 foot buffer for carbaryl bran bait around known habitats.</td></tr>
<tr><td>C. New Mexican ridge-nosed rattlesnake</td><td>Crotalus willardi obscurus</td><td>T</td><td>NM</td></tr>
<tr><td colspan="4">If required to treat for grasshoppers above 6,000 foot elevation, local consultation with the Service will be conducted at least 5 days prior to grasshopper program activities to determine protection measures and specific areas that should be protected.</td></tr>
<tr><td colspan="4" align="center"><h2>Amphibians</h2></td></tr>
<tr><td>Common Name</td><td>Scientific Name</td><td>Listing Status</td><td>States</td></tr>
<tr><td>A. Wyoming toad</td><td>Bufo hemiophrys baxteri</td><td>E</td><td>WY</td></tr>
<tr><td colspan="4">A 0.25 mile no-aerial ULV application buffer shall be maintained on each side of the Little Laramie River in Albany county, Wyoming.

To determine specific boundaries of the area, APHIS should contact the Helena, MT Endangered Species Field Office, as well as the Wyoming Game and Fish, prior to any control program within the historic range of the Wyoming toad.</td></tr>
</table>

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Table 2

B. Sonora tiger salamander	*Ambystoma tigrinum stebbinsi*	E	AZ
APHIS should not make aerial applications of malathion within 0.5 mile of occupied habitat of the salamander. Buffers of 0.25 mile for acephate and carbaryl aerial applications also should be maintained, and within the buffers only carbaryl bran bait or Nosema should be used.			
C. California red-legged frog	*Rana aurora draytonii*	T	CA
No pesticides (acephate, carbaryl, carbaryl bran bait, or malathion) or Nosema should be applied within 1 mile of occupied habitat of the species.			
Crustaceans			
Common Name	Scientific Name	Listing Status	States
Shasta crayfish	*Pacifastacus fortis*	E	CA
Socorro isopod	*Thermosphaeroma thermosphilus*	E	NM
Vernal pool fairy shrimp	*Branchinecta lynchi*	T	CA, OR
No aerial ULV application of malathion or carbaryl should be applied within 1 mile ofthe habitat. A 0.25 mile buffer should be applied for the use of acephate, and a 500 foot no-treatment zone should be used where carbaryl bran bait is used inside the no-spray buffer areas.			

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Table 2

<table>
<tr><th colspan="4">Snails</th></tr>
<tr><td>Common Name</td><td>Scientific Name</td><td>Listing Status</td><td>States</td></tr>
<tr><td>A. Bruneau Hot Springs snail</td><td>Pyrgulopsis bruneauensis</td><td>E</td><td>ID</td></tr>
<tr><td colspan="4">No pesticide should be broadcast aerially within 0.25 mile of Hot Creek in Owyhee County, Idaho. This is located at T. 8 S., R. 6 E, sections 2, 3, and 4; and T. 7 S., R. 6 E., sections, 33, 34, and 35.</td></tr>
<tr><td>B. Socorro springsnail</td><td>Pyrgulopsis neomexicana</td><td>E</td><td>NM</td></tr>
<tr><td>Alamosa springsnail</td><td>Tryonia alamosae</td><td>E</td><td>NM</td></tr>
<tr><td colspan="4">No pesticide shou1d be applied aerially within 0.25 mile of the habitat. A 500 foot buffer would apply to carbaryl bran bait and Nosema.</td></tr>
<tr><td>C. Ouachita rock pocketbook</td><td>Arkansia wheeleri</td><td>E</td><td>OK</td></tr>
<tr><td colspan="4">No aerial application of malathion or carbaryl within 0.25 mile of habitat or within 500 feet of water for aerial application of acephate.</td></tr>
<tr><td>D. Banbury Springs limpet or lanx</td><td>Lanx sp.</td><td>E</td><td>ID</td></tr>
<tr><td>Bliss Rapids snail</td><td>Taylorconcha serpenticola</td><td>T</td><td>ID</td></tr>
<tr><td>Idaho springsnail</td><td>Fontelicella idahoensis</td><td>E</td><td>ID</td></tr>
<tr><td>Kanab ambersnail</td><td>Oxyloma haydeni ssp. kanabensis</td><td>E</td><td>AZ, UT</td></tr>
<tr><td>Snake River physa snail</td><td>Physa natricina</td><td>E</td><td>ID</td></tr>
<tr><td>Utah valvata</td><td>Valvata utahensis</td><td>IE</td><td>ID</td></tr>
<tr><td colspan="4">Malathion should not be used within 0.5 mile of populations. A 0.25 mile buffer should be used for carbaryl and acephate, and a 500 foot buffer should be maintained for the use of carbaryl bran bait or Nosema.</td></tr>
</table>

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Table 2

Insects			
Common Name	Scientific Name	Listing Status	States
A. Pawnee montane skipper	*Hesperia leonardus montana*	T	CO
No aerial application of pesticides within 0.25 mile of habitat.			
B. American burying beetle	*Nicrophorus americanus*	E	NE, SD
Contact local office of the Service at least 5 days prior to program activities to determine specific habitat locations and develop adequate protection measures and treatment methods.			
C. Ash Meadows naucorid	*Ambrysus amargosus*	T	NV
No application within 0.25 mile of critical habitat.			

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Table 2

Plants			
Common Name	Scientific Name	Listing Status	States
Group A			
Arizona hedgehog cactus	*Echinocereus triglochidiatus var. arizonicus*	E	AZ
Aerial ULV application of pesticides will not be used within 0.25 of the occupied habitat.			
Group B			
Applegate's milk-vetch	*Astragalus applegatei*	E	OR
Arizona agave	*Agave arizonica*	E	AZ
Arizona cliffrose	*Purshia subintegra*	E	AZ
Arizona willow	*Salix arizonica*	No Data	No Data
Ash Meadows blazing-star	*Mentzelia leucophylla*	T	NV
Ash Meadows gumplant	*Grindelia fraxinopratensis*	T	CA, NV
Ash Meadows ivesia	*Ivesia kingii var. eremica*	T	NV
Ash Meadows milk-vetch	*Astragalus phoenix*	T	NV
Autumn buttercup	*Ranunculus acrifornis var.*	E	UT
Barneby reed-mustard	*Schoenocrambe barnebyi*	E	UT
Blowout penstemon	*Penstemon haydenii*	E	NE, WY
Brady pincushion cactus	*Pediocactus bradyi*	E	AZ
Clay-loving wild	*Eriogonum pelinophilum*	E	CO
Clay phacelia	*Phacelia argillacea*	T	UT
Clay reed-mustard	*Schoenocrambe argillacea*	T	UT
Cochise pincushion cactus	*Coryphantha robbinsorum*	T	AZ
Dudley Bluffs bladderpod	*Lesquerella congesta*	T	CO

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Dudley Bluffs twinpod	*Physaria obcordata*	T	CO
Dwarf bear-poppy	*Arctomecon humilis*	E	UT
Gypsum wild-buckwheat	*Eriogonum gypsophilum*	T	NM
Heliotrope milk-vetch	*Astragalus montii*	T	UT
Holy Ghost ipomopsis	*ipomopsis sancti-spiritus*	E	NM
Jones cycladenia	*Cycladenia humilis var. jonesii*	T	AZ, UT
Knowlton cactus	*Pediocactus knowltonii*	E	CO, NM
Kodachrome bladderpod	*Lesquerella tumulosa*	E	UT
Kuenzler hedgehog cactus	*Echinocereus fendleri var. kuenzleri*	E	NM
Last Chance townsendia	*Townsendia aprica*	T	UT
Lee pincushion cactus	*Coryphantha sneedii var. leei*	T	NM
Lloyd's hedgehog cactus	*Echinocereus lloydii*	DR (Delisted)	NM, TX
Maguire daisy	*Erigeron maguirei (var. maguirei)??*	T	UT
Malheur wire-lettuce	*Stephanomeria malheurensis*	E	OR
Mancos milk-vetch	*Astragalus humillimus*	E	CO, NM
Mead's milkweed	*Asclepias meadii*	T	KS
Mesa Verde cactus	*Sclerocactus mesa-verdae*	T	CO, NM
North Park phacelia	*Phacelia formosula*	E	CO
Oserhout milk-vetch	*Astragalus osterhoutii*	E	CO
Parish's alkali grass	*Puccinellia parishii*	No Data	No Data. CA, NM ?????
Peebles Navajo cactus	*Pediocactus peeblesianus var. peeblesianus*	E	AZ
Penland alpine fen mustard	*Eutrema penlandii*	T	CO
Penland beardtongue	*Penstemon penlandii*	T	CO
Rhizome (Zuni) fleabane	*Erigeron rhizomatus*	T	NM
Sacramento Mountains thistle	Cirsium vinaceum	T	NM
Sacramento prickly-poppy	*Argemone pleiacantha var. pinnatisecta*	E	NM

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Table 2

San Rafael cactus	*Pediocactus despainii*	E	UT
Siler pincushion cactus	*Pediocactus (=Echinocactus = Utahia) sileri*	T	AZ, UT
Slender orcutt grass	*Orcuttia tenuis*	T	CA
Sneed pincushion cactus	*Coryphantha sneedii var. sneedii*	E	NM, TX
Sodaville milk-vetch	*Astragalus lentiginosus var. sesquimetralis*	No Data	No Data. NV ????
Spring-loving/centaury	*Centaurium namophilum*	T	CA, NV
Steamboat buckwheat	*Eriogonum ovalifolium*	E	NV
Toad-flax cress	*Glaucocarpum suffrutescens*	No Data	No Data. UT ????
Uinta basin hookless cactus	*Sclerocactus glaucus*	T	CO, UT
Ute ladies'-tresses	*Spiranthes diluvialis*	T	CO, ID, MT, NE, UT, WA, WY
Water howellia	*Howellia aquatilis*	T	CA, ID, MT, OR, WA
Welsh's milkweed	*Asclepias welshii*	T	AZ, UT
Western prairie fringed orchid	*Platanthera praeclara*	T	KS, ND, NE, OK
Winkler cactus	*Pediocactus winkleri*	T	UT
Wright's fishhook cactus	*Sclerocactus wrightae*	E	UT
Aerial application of pesticides will not be used within 3 miles of these species occupied habitats. Within the 3 mile buffer, only carbaryl bran bait or Nosema will be used.			
Group C			
Navajo sedge	*Carex specuicola*	T	AZ, UT
No applications of carbaryl bran bait within 200 feet of springs and no aerial application of ULV pesticides within 500 feet of springs of occupied habitat.			
Group D			
Amargosa niterwort	*Nitrophila mohavensis*	E	CA, NV
Ash Meadows sunray	*Enceliopsis nudicaulis var. corrugata*	T	NV
No applications of ULV insecticides will be made within 3 miles designated critical habitat. Within the 3 mile buffer, only carbaryl bran bait or Nosema will be used.			

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Group E			
Canelo Hills ladies'-tresses	*Spiranthes delitescens*	E	AZ
Huachuca water umbel	*Lilaeopsis schaffneriana*	E	AZ
No applications of ULV insecticides will be made within 3 miles of known populations. Within the 3 mile buffer, only carbaryl bran bait or Nosema will he used. Carbaryl bran bait will not be used within 20 yards of known populations of these species.			

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Part II Species with "No Effect" or "No Jeopardy" Determinations Without Buffers or Other Measures			
Mammals			
Common Name	Scientific Name	Listing Status	States
Gray wolf	*Canis lupus*	E	CO, ID, MT, ND, SD, WA, WY
Grizzly bear	*Ursus arctos horribilis*	T	CO, ID, MT, WA, WY
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	E	AZ
Woodland caribou	*Rangifer tarandus caribou*	E	ID, WA
Birds			
Aleutian Canada goose	*Branta canadensis leucopareia*	DM (Delisted)	CA, OR, WA
California condor	*Gymnogyps califonianus*	E, EXPN	E = CA EXPN = AZ, UT
Marbled murrelet	*Brachyramphus marmoratus marmoratus*	T	CA, OR, WA
Northern spotted owl	*Strix occidentalis caurina*	T	CA, OR, WA
Red-cockaded woodpecker	*Picoides (=Dendrocopos) borealis*	E	OK, TX

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Table 2

Fish			
Common Name	Scientific Name	Listing Status	States
Beautiful shiner	*Cyprinella formosa*	T	AZ, NM
Yaqui catfish	*Ictalurus pricei*	T	AZ
Insects			
Uncompahgre fritillary	*Boloria acrocnema*	E	CO
Plants			
MacFarlane's four-o'clock	*Mirabilis macfarlanei*	T	ID, OR
Maguire primrose	*Primula maguirei*	T	UT
Marsh sandwort	*Arenaria paludicola*	E	CA, OR, WA
San Francisco Peaks groundsel	*Senecio franciscanus*	T	AZ
Sentry milk-vetch	*Astragalus cremnophylax var. cremnophylax*	E	AZ
Todsen's pennyroyal	*Hedeoma todsenii*	E	NM

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Table 3

Local Mitigation Measures Agreed to by USFWS
and APHIS PPQ in 2004

Table 2. General Direct md Indirect Effects of Proposed Insecticides and Proposed Avoidance/mitigation Measures for Non-target Listed Animal and Plant Species							
Non-Target Listed Species and Species Groups	Status	Toxicity Levels Direct Effects			Indirect Effects	Avoidance or Mitigation Measures	Counties[2]
		Malathion	Carbaryl	Dimilin			
BIRDS							
Southwestern willow flycatcher	E	N/A[3]	N/A[3]	Low	A,B,C	3,10	Clark, Lincoln, Nye
Bald Eagle	T	N/A[3]	N/A[3]	Low	No Indirect Effects	5	Carson City, Churchill, Clark, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, Storey, Washoe, White Pine
Yuma clapper rail[1]	E	Low	Low	Low	A,B,C	7	Clark
REPTILE							
Desert tortoise	T,CH	N/A[3]	N/A[3]	Slight	A,B,C	1	Clark, Esmeralda, Lincoln, Nye
FISH							
Warner sucker[1]	T, CH	Moderate to High	Moderate to High	Slight	A,B,C	2	Washoe
Cui-ui	E	N/A[3]	N/A[3]	Slight	A.B,C,F	8	Storey, Washoe
White River springfish	E, CH	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Lincoln
Hiko White River springfish	E, CH	N/A[3]	N/A[3]	Slight	A.B,C,F	8	Lincoln, Mineral
Railroad Valley springfish	T, CH	N/A[3]	N/A[3]	Slight	A,B,C	8	Mineral, Nye
Devils Hole pupfish	E	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark, Nye
Ash Meadows Amargosa pupfish	E, CH	N/A[3]	N/A[3]	Slight	A,B,C	8	Nye
Warm Springs pupfish	E	N/A[3]	N/A[3]	Slight	A,B,C	8	Nye
Pahrump poolfish	E	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark, White Pine
Desert dace	T, CH	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Humboldt
Humpback chub	E	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark
Bonytail chub	E, CH	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark
Pahranagat roundtail chub	E	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Lincoln
Virgin River chub	E, CH	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Clark
White River spinedace[1]	E, CH	Moderate to High	Very High	Slight	A,B,C	2	Nye, White Pine
Big Spring spinedace	T, CH	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Lincoln
Moapa dace	E	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark

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Table 3

Local Mitigation Measures Agreed to by USFWS and APHIS PPQ In 2004

Table 2. General Direct and Indirect Effects of Proposed Insecticides and Proposed Avoidance/mitigation Measures for Non-target Listed Animal and Plant Species

Non-Target Listed Species and Species Groups	Status	Toxicity Levels Direct Effects			Indirect Effects	Avoidance or Mitigation Measures	Counties[2]
		Malathion	Carbaryl	Dimilin			
Lahontan cutthroat	T	N/A[3]	N/A[3]	Slight	A,B,C	8	Carson City, Churchill, Clark, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Nye, Storey, Washoe
Woundfin	E, CH	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Clark
Colorado pikeminnow	E	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark
Independence Valley speckled dace	E	N/A[3]	N/A[3]	Slight	A,B,C,F	8	Elko
Ash Meadows speckled dace	E, CH	N/A[3]	N/A[3]	Slight	A,B,C	8	Nye
Clover Valley speckled dace	E	N/A[3]	N/A[3]	Slight	A,B,C,E	8	Elko
Bull trout[1]	T	Moderate to High	Very High	Slight	A,B,C	2	Elko
Razorback sucker	E, CH	N/A[3]	N/A[3]	Slight	A,B,C	8	Clark
INVERTEBRATES							
Ash Meadows	T, CH	N/A[3]	N/A[3]	Very high larval stages	B,C	4	Nye
Carson wandering skipper[1]	E	Very High	Very High	Very high larval stages	B,C	2	Carson City, Washoe
PLANTS							
Ash Meadows milkvetch	T, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Spring-loving centaury	T, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Ash Meadows sunray	T, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Steamboat buckwheat	E	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Washoe
Ash Meadows gumplant	T, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Ash Meadows ivesia	T, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Ash Meadows blazing star	T, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Amargosa niterwort	E, CH	N/A[3]	N/A[3]	Moderate to Low	D,E	6	Nye
Ute lady's tresses[1]	T	Very High	Very High	Moderate	D,E	9	Lincoln

Appendix C
Table 3

Local Mitigation measures Agreed to by USFWS and APHIS PPQ in 2004

Table 2. General Direct and Indirect Effects of Proposed Insecticides and Proposed Avoidance/mitigation Measures for Non-target Listed Animal and Plant Species

Non-Target Listed Species and Species Groups	Status	Toxicity Levels Direct Effects			Indirect Effects	Avoidance or Mitigation	Counties[2]
		Malathion	Carbaryl	Dimilin			

[1]Other listed/proposed species that occur in Nevada, but were not previously addressed in the 1987 BO for USDA-APHIS-PPQ's 1987 Rangeland Grasshopper Cooperative Management Program or its amendments.
[2]County(ies) where animal or plant species may be present.
[3]N/A = Not Applicable; applies to insecticides that were covered under the 1987 National programmatic BO or its amendments.
E = Endangered; T = Threatened; PT = Proposed Threatened; CH = Critical Habitat

Indirect Effects

A. General loss of prey.
B. Limited Mobility of young to move out of treated area during nesting season.
C. Ingestion of chemicals from vegetation and insects could affect survival or reproductive fitness.
D. Loss of important pollinators.
E. Loss of seed dispersal agents.
F. Exposure to chemicals from offsite transport via snow-melt or irrigation drainage.

Avoidance/Mitigation Measures

1. No aerial application of Dimilin®, malathion, or carbaryl within 1 mile of desert tortoise occupied habitat. In accordance with 1987 National programmatic BO for USDA-APHIS-PPQ's 1987 Rangeland Grasshopper Cooperative Management Program and its 1990 amendment, the USFWS's Southern Nevada Field Office will be given a 5 day notice prior to conducting aerial applications of insecticides in occupied desert tortoise habitat.
2. No aerial application of Dimilin®, within 1 mile or malathion or carbaryl within 0.25 mile of occupied habitat.
3. A buffer of 500 feet should be maintained where no application of carbaryl bran bait is applied.
4. No aerial application of Dimilin® within 1 mile of occupied habitat.
5. Maintain a 1 mile radius treatment-free zone around active bald eagle eyries found on rivers or lakes with no flyovers of this area by contact pilots. A 2.5 mile no-aerial spray zone will be maintained upstream and downstream from the nest site as a forage area. This will include a 0.25 mile buffer along each side of the rivers. Lakes will be protected by a 0.25 mile no aerial spray buffer if they are considered foraging areas of the bald eagle.
6. Aerial application of Dimilin® will not be used within 3 miles of species occupied habitat.
7. No aerial application of Dimilin® within 1 mile or malathion or carbaryl within 0.25 mile of the edge of nesting and foraging habitat.
8. No aerial application of Dimilin® within 1 mile of occupied habitat.
9. No aerial application of insecticides within 3 miles of the species occupied habitat. Within the 3 mile buffer only carbaryl bran bait will be used.
10. No aerial application of Dimilin® within 1 mile or malathion or carbaryl within 0.25 mile of the edges of occupied habitat.

PROPOSED MONITORING PLAN

Our environmental monitoring team has developed a draft environmental monitoring plan for the proposed 2020 rangeland grasshopper/cricket suppression program. USDA-APHIS-PPQ Directives 5640 .1 dated April 19, 2002, directs the agency to fulfill the mandates of NEPA, ESA, the Federal Insecticide, Fungicide and Rodenticide Act, and other statutes that require monitoring the effects of their actions on the environment.

Environmental monitoring is an integral component of the avoidance/mitigation measures outline in the *PROPOSED AVOIDANCE/MITIAGAION MEASURES* section. The primary goal of this environmental monitoring plan is to provide data which can be used to evaluate the effectiveness of the avoidance/mitigation measures proposed to protect the listed species outlined in the *LISTED SPECIES* section.

The monitoring methods proposed for the 2020 rangeland grasshopper/cricket suppression program include monitoring aerial applications of the liquid and bait forms of the insecticides used and for drift at selected sensitive sites primarily by collecting dye card, water and vegetation samples.

Amendment 1:
All mitigation measures agreed upon through local Sec 7 consultation shall apply, including but not limited to the 2018 Biological Assessment and subsequent concurrence.

Appendix D
APHIS response to public comments on the Nevada Draft EAs
(EA Number: NV-01-20; NV-02-20; NV-03-20; NV-04-20)

USDA APHIS received three public responses to the publication of the Draft EA. Public comments were received from the Xerces Society, the Center for Biological Diversity Center and an individual from the Bureau of Land Management. Comments similar in nature were grouped under one response. Comments that were editorial in nature or requested additional citations are not addressed in the appendix but were incorporated into the final EA, where appropriate. The Grasshopper Program has decided not to use chlorantraniliprole in Nevada during 2020, therefore comments related to chlorantraniliprole were not addressed and all references to this chemical was removed from the final EA.

Comment 1
USDA APHIS received one comment about the EAs providing little in the way of solid information about where, how, and when the treatments may actually occur within the counties covered under the EAs, during the year 2020, which makes it impossible to determine if effects would actually be significant or not.

APHIS described the purpose and need for grasshopper suppression treatments, potential treatment options, the affected environment within the state, and an analysis of the potential environmental consequences in the Draft EAs that were made available for public comment. These documents become programmatic because APHIS cannot precisely predict where an outbreak will occur each year; we only know that outbreaks will occur, and treatments in a timely manner will be absolutely necessary. The emergency response aspect is why site-specific treatment details cannot be known, analyzed, and published in advance. APHIS relies on its emergency provisions within its NEPA Implementing regulations (7 CFR 372.10) to address these situations.

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

Comment 2
USDA APHIS received one comment concerning the lack of transparency about the location of actual treatment areas, particularly on public lands, being a disservice to the public that prevents the public from reviewing sufficient information to be able to gauge justification for and the risks involved in the suppression effort.

APHIS did not withhold the location of actual treatment areas while preparing the Draft EA, but rather those facts were not known at the time because economically damaging grasshopper populations had not become apparent. See previous comment concerning the prevention of the commenter's ability to gauge the justification and risks of treatments within the proposed action areas.

Comment 3
APHIS received one comment urging APHIS to provide the public with maps of specific treatment areas and proposed treatment strategies (including proposed date of application and chemical and rate to be used), immediately after approving any treatment and at least 14 days prior to implementation of any treatment. This comment suggested that this specific information be posted at the APHIS website as soon as it is available, sent to interested parties, and made available for public comment.

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. APHIS typically does not have 14 days between planning a treatment and the actual application because of the rapid population growth and potential damage of grasshopper infestations.

Comment 4
APHIS received one comment that mentioned "APHIS' procedure to approve or disapprove treatments based on a cost-benefit analysis performed using the "Hopper" model" and that is site-specific data are not available or current, APHIS must use protective values as defaults in Hopper."

The "Hopper" model is an older model and southwestern states (including NV) were never included in the model.

In Nevada, general site specific data, which is used to determine treatments in real time and gathered at the time of actual surveys are used to make treatment decisions. The general site specific data include: grasshopper and/or Mormon cricket densities, species complex, dominant species, dominant life stage, terrain, soil types, range conditions, local weather patterns (wind, temp., precipitation), slope and aspect for hatching beds, grazing status and number of livestock grazing the site/allotment, and forage damage estimates. These are all factors taken into consideration during the survey season.

Comment 5
APHIS received one comment concerning how analysis of projected economic injury levels and ultimately, treatment decisions, might be determined in the absence of site-specific data (specifically rangeland productivity and composition, precipitation and soil moisture, accessibility and cost of alternative forage, effectiveness of treatment, cost of treatment, timing of treatment, and grasshopper population density, life stage, and species composition).

See comment 4 above. In Nevada, general site specific data, which is used to determine treatments in real time and gathered at time of actual surveys are used to make treatment decisions.

Comment 6
APHIS received one comment related to disclosing its analysis for each of the seven variables mentioned in comment 5.
The site specific data that is used to determine treatments in real-time is gathered at the time of actual surveys. This data is not available at the time that the environmental assessments are prepared. See comment 4 for an example of general site specific data used to determine treatments.

Comment 7
APHIS received one comment about providing the public with a more precise definition of when the threshold for spraying has been met**.**

Economic thresholds are variable based on the value of protected resources and management objectives. Baseline thresholds for Mormon crickets are 2 per sq. yd. and grasshoppers are 8 per sq. yd., though neither of those thresholds guarantees justification for treatment alone. All of the site-specific data mentioned in comment 4 above are also considered for Nevada.

Comment 8
APHIS received one comment urging APHIS to delay release of the EAs and the publication of a FONSI until after treatment requests are received and all treatment areas have been delineated and are identified to the public.

In Nevada, letters of request from were received in early April from the BLM districts for the 2020 treatment season. Treatment areas are delineated during the survey process. The grazing allotments, which meet the treatment criteria, are identified to the requesting land managers.

Comment 9
APHIS received one comment regarding the EAs list four insecticide options (diflubenzuron, carbaryl, malathion, and chlorantraniliprole), and states that the choice of which to use will be site-specific, without being clear about how that choice of insecticide is made.

In Nevada, diflubenzuron is the preferred insecticide for aerial treatments. Hot spot treatments are conducted using ground equipment primarily with carbaryl bait. The insecticides mentioned are options which could be used depending up the situation encountered at the time. The Grasshopper Program has decided not to use chlorantraniliprole in Nevada during 2020.

Letters of Request in previous years from land managers may be specific to use a particular insecticide and not treat during specific times of the day or on weekends. These requests are adhered to by APHIS.

The letters of request come from individual land managers. In the case of early instars, diflubenzuron, the preferred insecticide, can produce 90 to 97% mortality. If the window for the use of diflubenzuron closes, as a result of treatment delays, then the only other option would be the use of carbaryl 2% or 5% bait or malathion. Malathion would only be used in an extreme situation where immediate control was required to avoid an economic crisis or an immediate *threat to public safety. There are no plans to use malathion in Nevada in 2020. There are certain species which are susceptible to carbaryl bait. If the species complex present in the outbreak is not susceptible to bait and the diflubenzuron window is closed, then no treatments will occur. This is discussed with the requesting land managers.*

The final EA has been updated to reflect the changes in the program.

Comment 10
APHIS received one comment concerning BeeREX calculating the expected environmental concentration (EEC) of diflubenzuron in pollen and nectar from foliar overspray as 1.76 mg/kg, which is equivalent to 1760 ppb.

Nectar and pollen values in BeeREX are based on residues that would be expected to occur from direct pesticide applications to long grass which is a food source EPA estimates in its T-REX model. These assumptions may overestimate expected residues of diflubenzuron in pollen and nectar. Available data for diflubenzuron pollen residues in crops show a low frequency of occurrence and low concentrations. The concentration in pollen will depend on application rates and when applications are made relative to flower bloom. Program applications of diflubenzuron are at the lower end of labeled use rates for Dimilin due to the sensitivity of Orthoptera. In addition, the Program uses rates less than the current labeled rates for grasshoppers and other labeled crops and makes only one application.

Comment 11
APHIS received one comment regarding chitin synthesis and its important in the early life stages of insects, as they molt and form a new exoskeleton in various growth stages. The specific concern was that aquatic guideline tests, (or terrestrial invertebrate acute tests), which typically run for 48 hours, may not capture a molting stage, and thus underrepresent acute toxicity. Single doses may cause mortality, if received at a vulnerable time, and consequently, conclusions from RQs based on acute toxicity studies for invertebrates may not fully represent actual risk.

APHIS agrees that chitin synthesis is a critical function for terrestrial and aquatic invertebrates. APHIS in its risk assessments prepared for each Program insecticide summarized available acute and chronic toxicity data. This would include studies of short duration such as 48 to 96 hours as well as much longer term studies that would evaluate continuous exposures during critical life stages and development.

Comment 12
APHIS received the following comment, "For honey bees (the surrogate species for risk assessment in the absence of other data), USEPA (2018) reported a chronic 21-day ED50 and NOAEL of 0.012 and <0.0064 µg a.i./larva, respectively. Utilizing these values in BeeREX (EPA's model that calculates risk quotients for bees) and assuming an application rate of 0.016 lb. a.i./ac, BeeREX calculates an acute dietary risk quotient of 18.13 and a chronic dietary risk quotient of 33.99. (A threshold value is 1.0). Risk quotients this high above 1.0 indicate a high concern for exposed bees.

BeeREX is a tier one screening level model used by EPA to assess potential risk to pollinators. Estimates of risk quotients are used to determine if there is a presumption of risk that requires additional evaluation. APHIS also relies on available field data to further characterize the risks of Program insecticides to terrestrial and aquatic invertebrates, where available. A limitation of BeeREX is it does not account for pesticide degradation that would normally occur in Program treatments.

Nectar and pollen values in BeeREX are based on residues that would be expected to occur from direct pesticide applications to long grass which is a food source EPA estimates in its T-REX model. These assumptions may overestimate expected residues of diflubenzuron in pollen and nectar. Available data for diflubenzuron pollen residues in crops with higher use rates show a low frequency of occurrence and low concentrations. The concentration in pollen will depend on application rates and when applications are made relative to flower blooming. Diflubenzuron Program applications are at the lower end of labeled use rates for Dimilin due to the sensitivity of Orthoptera. In addition, the Program uses rates less than the current labeled rates and makes one application.

Comment 13

APHIS received one comment, regarding the EIS discloses that under some circumstances, Dimilin may be quite persistent; field dissipation studies in California citrus and Oregon apple orchards reported half-live values of 68.2 to 78 days. Rangeland persistence is unfortunately not available, but diflubenzuron applied to plants remains adsorbed to leaf surfaces for several weeks.

Diflubenzuron persistence varies depending on site conditions. Diflubenzuron degradation is microbially mediated with soil aerobic half-lives much less than dissipation half-lives. While dissipation half-lives may extend up to 78 days, they have also been shown to be much less under other use patterns.

Comment 14

APHIS received the following comment, “APHIS discounted the pollinator risk by claiming that studies finding significant effects to pollinators utilized doses far above levels that would be used in grasshopper control. Unfortunately, this does not appear to be true for all studies cited. Mommaerts et al. (2006) conducted dose-response assays and found that exposure to diflubenzuron resulted in reproductive effects in *Bombus terrestris*, with only the doses at 0.001 of maximum field recommended concentrations (MFRC) in pollen and 0.0001 in sugar water resulting in effects statistically similar to controls. The MFRC for diflubenzuron is listed in the study as 288 mg/L (equivalent to 288,000 ppb). At 1/10,000 of this level, diflubenzuron effects would be similar to controls only at levels at or below 28.8 ppb while at 1/1000 of this level, diflubenzuron “no effect” concentrations would be equivalent to 288 ppb. This analysis thus shows the opposite of what APHIS claims – that the effective dose for reproductive effects is actually far below the EEC expected for diflubenzuron at RAATS rates used in grasshopper suppression. This raises concern that the application of diflubenzuron at the specified RAATS rates may cause severe impacts to bee reproduction within treated areas.”

APHIS relied on available laboratory and field collected data for each Program insecticide to summarize risks to terrestrial invertebrates. In evaluating studies, APHIS also evaluated likely routes of exposure for Program treatments. Estimates of exposure using the EPA tier one screening model likely overestimate potential residues in pollen and nectar.

Comment 15
APHIS received six comments about chlorantraniliprole.

Chlorantraniliprole is not proposed for use in 2020. The final EA has been updated to reflect the changes in the program.

Comment 16
APHIS received one comment concerning malathion being found to cause jeopardy in 1,284 endangered species according to recent nationwide Biological Opinions

APHIS recognize that EPA and the Services are continuing to develop updated national level consultations. APHIS currently consults with the Services at the State level for the Grasshopper program to ensure program activities do not adversely affect protected species or their critical habitat.

Comment 17
APHIS received one comment regarding the EPA determined that carbaryl is likely to adversely affect 1,542 species.

The Endangered Species Act section 7 pesticide consultation process between the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (the Services, collectively) and the EPA specifically concerns FIFRA pesticide registration and reregistration in the United States, including all registered uses of a pesticide. The state-level Biological Assessments for APHIS invasive species programs are separate from any consultations conducted in association with pesticide registration and reregistration process. The Agricultural Improvement Act of 2018 (Farm Bill) created a partnership between USDA, EPA, the Services, and the Council on Environmental Quality to improve the consultation process for pesticide registration and reregistration. USDA is committed to working to ensure consultations are conducted in a timely, transparent manner and based on the best available science. The Revised Method for National Level Listed Species Biological Evaluations of Conventional Pesticides provides a directionally improved path to ensuring that pesticides can continue to be used safely for agricultural production with minimal impacts to threatened and endangered species.

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

Comment 18
APHIS received the following comment, "The jeopardy and LAA calls for malathion and carbaryl should be included in the EAs and should preclude the use of these chemicals."

APHIS consults directly with the U.S. Fish and Wildlife Service on treatments and methods. The U.S. Environmental Protection Agency's consultation on pesticide registration across all nationwide uses of program pesticides does not provide sufficiently detailed analysis or conclusions relevant to the Grasshopper Program consultations to comply with the Endangered Species Act.

Comment 19
APHIS received one comment that it should take into account the risk to native bees and butterflies from these treatments, especially those designated species of greatest conservation need. APHIS should constrain its treatments to take into account pollinator conservation needs, and improve its monitoring capability to try to understand what non-target effects actually occur as a result of the different treatments.

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

Comment 20
APHIS received the following comment, This EA and the EIS claim that the use of untreated swaths will mitigate impacts to natural enemies, bees, and other wildlife. However, the width of the skipped swaths is not designated in advance in the EA, and there is no minimum width specified.

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

Comment 21
APHIS received two comments/recommendations about minimum swath widths, "Without knowing minimum (rather than maximum) swath widths that will be applied under this EA, it is hard to compare results from this study (Lockwood et al. 2000) to the results on non-targets expected under RAATS in this EA. 2). APHIS should commit to science-based methodologies to assess actual risk from the proposed treatments and institute minimum untreated swath widths wide enough to meaningfully minimize exposure to bees and other beneficials."

Typically, APHIS employs 50% skip swaths when using RAATs. Swath widths and skips are determined by the type of plane doing the aerial application, the smallest being 75 feet, but the minimum skip swath is typically 100 feet because larger planes are often contracted.

The commenter references the work of Lockwood et al. 2000, this study looked at RAAT's increasing swath widths by in some instances double skipping the untreated area. They also used ATV's in their study which only have a minimum effect swath width of 30 feet. Using modifications presently being done in Arizona, with the UTV's ability to adjust hopper height, using the same ATV spreader, minimum effective swath width can be increased to 40 feet. APHIS uses science based methodologies to assess treatment related benefits or risks. APHIS has for decades funded the Science and Technology Research Lab in Phoenix, Arizona, which is specific to Rangeland Grasshopper and Mormon Cricket Program research and development. It is the only one of its kind in the U.S. The S&T Lab in cooperation with Arizona State University researchers have looked at nontarget studies in the past and have made recommendations to the Program side of APHIS.

Comment 22
APHIS received the following comment, "Although the EIS included a quantitative analysis of drift anticipated from ULV aerial applications to estimate deposition into aquatic areas, an analysis is not presented or available to back up the assumption that untreated areas (skipped swath widths) will act as refugia for natural enemies, bees, and other wildlife."

The EIS cites studies that demonstrate that the use of RAATs result in higher nontarget invertebrate populations compared to treatment blocks that did not use RAATs.

Comment 23
APHIS received three comments about the drift analysis described in the EA, 1) "The drift analysis described in the EA assumed a droplet spectra size of fine to very fine (median diameter = 137.5 µm). However, labels do not require a minimum droplet size for ULV applications over rangeland, and other uses of ULV technology for pest control assume much smaller droplet sizes. EPA's (2018) Ecological Risk Assessment for diflubenzuron uses AgDrift to estimate the drift fraction from aerial LV applications, although it is unclear whether AgDrift is validated for the purposes of predicting deposition of insecticides applied using ULV technology. EPA assumed a volume mean diameter (VMD) of 90 µm [note that this is approximately 2/3 of the VMD used in the APHIS analysis]. Under EPA's analysis, the drift fraction comprises 19% at 150 ft.", 2) "APHIS should disclose its quantitative analysis and the percent drift it expects--by distance-- into untreated swaths for each application method it proposes", and 3) "APHIS must

also specify in its operational procedures the use of nozzles that will result in droplet spectra that accord with its analysis".

The VMD used by APHIS for diflubenzuron is the preferred median diameter used by the Program. APHIS recognizes that the range of droplet sizes can vary under a ULV application.

Comment 24
APHIS received a comment that it is "unrealistic that APHIS can comply with mitigation measures designed to protect bees on pesticide labels "(e.g., bumble bees fly earlier and later in the day, diflubenzuron is toxic to developing forms, if plants are flowering, bees are active, etc.).

APHIS utilizes diflubenzuron at far-lower levels than allowed by the label, thereby minimizing risks to non-targets, such as bees. There have been several studies on diflubenzuron effects on bees, such as Schroeder et al., 1980 and insect growth regulator effects reviewed in Tasei, 2001, which support the idea that the diflubenzuron levels APHIS uses for grasshoppers and Mormon crickets are a minimal risk to bees. APHIS also complies with any label requirements designed to minimize impacts to pollinators.

Comment 25
APHIS received the following comment, "Except for untreated swath widths, the EA is silent on how it will avoid impact to pollinators. It has already been shown that within sprayed areas, risk quotients at expected application rates would be well above 1.0. Leaving skipped widths is also not a full solution at expected widths since, due to drift, untreated swaths are highly likely to be exposed to levels above risk quotients".

APHIS utilizes diflubenzuron at far-lower levels than allowed by the label, thereby minimizing risks to non-targets. Additionally, APHIS commonly incorporates untreated swaths into its treatment programs, which have consistently demonstrated reduced impacts on non-target arthropods (Lockwood et al., 1999, 2001; Norelius and Lockwood, 1999).

Comment 26
APHIS received one comment regarding that APHIS must not ignore requirements listed on pesticide labels, nor make assumptions about its compliance with these when RAATS measures that will actually be taken are vague and unspecified.

APHIS complies with all applicable Federal and State pesticide label language when making pesticide treatments.

Comment 27
APHIS received the following comment: "While flexibility with these may have been appropriate at the EIS stage, it is not appropriate at the EA stage. APHIS must fully disclose its RAATS plan for each treatment in the EA, including specifying application method, chemical to be used, rate, and width of untreated swaths."

RAATs are a dynamic treatment method based on size of the treatment area, species complex, and density of target species. Specific details regarding RAATs cannot be determined until site *specific data is collected during the 2020 survey season and an appropriate chemical is identified. Once a treatment is determined necessary, application method, untreated swath widths, chemical choice, and application rate are included in the bid for contracting.*

Comment 28

APHIS received one comment about to be consistent with the Pollinator-Friendly BMPs for Federal Lands (see Comment 7), APHIS must go beyond the general statements on the pesticide labels and specify more exactly how its spray plan will further reduce exposure and risk to bees.

APHIS 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.

Comment 29

APHIS received one comment, "For listed and proposed species under the purview of the US Fish and Wildlife Service, the EAs lists "Species for Federal listing state-listed species, and/or other sensitive species identified by or federal agencies within the area." These lists are not consistent with the list included in a letter to APHIS from USFWS listing endangered, threatened, proposed, and candidate species inhabiting the project area (Appendix C, Table 1). To include just one example, in NV-01-20, the desert tortoise is not included as a listed species in the main body of the document even though Appendix C- Table 2 lists this species as specifically occurring within counties located in the project area."

Appendix C, Table 1 will vary based on the area covered in the EA. The information in this table is pulled from iPAC, a USFWS resource that is used as planning tool to identify potential species that could occur in a given area.

USFWS provided a separate consultation listing the federally listed species covered by the northern Nevada office. Treatments in southern Nevada that overlapped with federally listed species would be addressed in a site specific consultation between both northern and southern Nevada USFWS offices. USFWS is aware that their consultation was supposed to include southern Nevada species but had not coordinated with the southern Nevada office. After communicating with USFWS, as long as we provide site specific maps, they can give us a site specific consultation to address any species that would be present in the treatment block and address any mitigation measures at that time. Future consultation will include both northern and southern USFWS offices.

Comment 30

APHIS received one comment, "In addition, the EA reports that "On June 25 2018, USFWS provided a letter of concurrence to APHIS personnel for the 2018, 2019, and 2020 treatment seasons." However, the letter of concurrence is not included in the EA, and it is unclear if the letter of concurrence provided any mitigations for the use of chlorantraniliprole or if the letter of concurrence adopted the mitigations for listed species provided in Appendix C."

These are documents used for interagency consultation between the Services and APHIS, as mandated by Section 7(a)(1) of the Endangered Species Act (ESA). There is no requirement under ESA or NEPA that requires consultation documents to be made available to the public for comment or review. The EA includes a section that discusses APHIS compliance with the ESA.

In Nevada, chlorantraniliprole is not proposed for use in 2020. The final EA has been updated to reflect the changes in the program.

Comment 31
APHIS received one comment, "Table 2 is described in the document as a list containing "the mitigations to be followed by APHIS when conducting a suppression program to control grasshoppers with insecticides other than diflubenzuron." Yet chlorantraniliprole consultation is not complete, so Table 2 does not actually cover uses of chlorantraniliprole or the use of any chemical "other than diflubenzuron." APHIS needs to be more precise in the way it presents and characterizes the mitigations that are prescribed and for which species and which chemicals."

Chlorantraniliprole is a viable chemical choice option for the APHIS grasshopper program, therefore it is included in the EA. Nevada will not be using chlorantraniliprole for the 2020 treatment season. USFWS is aware of the new chemical addition and it will be included in future consultations.

Comment 32
APHIS received one comment, "In addition, because the measures are covered in two tables and because Tables 2 and 3 include species from outside the project area, the applicable mitigations that pertain to this EA are difficult to find and understand. It would be quite difficult for any applicator to integrate the requirements in these tables without specific directions and maps.

For decades APHIS in Nevada has consulted with and received concurrence from the state office of the USFWS. APHIS and USFWS develop and maintain mitigation measures for all listed and proposed T&E species within the state. These measures, which are listed in Tables 2 and 3 of each EA, are employed in every treatment project wherein said species occur. Tables 2 and 3 are included in the EA to outline nationally agreed upon mitigation measures as well as locally agreed upon mitigation measures.

Species protected by the ESA are identified through earlier consultation with the land manager and USFWS and those habitats would be buffered out using our agreed upon mitigation measures before the final map would be provided to the applicator.

Comment 33
APHIS received one comment "In addition, the general operational guidelines make no mention of the enhanced buffers required by NMFS, or the buffers or other specific requirements from USFWS imposed to protect listed, proposed, or candidate species."

In Nevada, the general operational guidelines are provided in the EA's to address protective measures for bodies of water without T&E species. The buffers for T&E species are addressed during the USFWS Section 7 consultations.

The ArcGIS map layers of T&E species and the buffers are taken into the field when delimiting treatment areas, this is completed to ensure that the buffered areas near the treatment areas correspond to the GIS data. The datasets are ground truthed in the field to ensure accuracy. When T&E species are associated with stock tanks these buffers are physically measured using survey grade measuring devices and or rangefinders. The buffered areas are then flagged for visibility as no entry areas for applicators. Enhanced buffers are included in tables 2 and 3 of Appendix 3.

Comment 34
APHIS received one comment, "It appears that no consultation was completed for the use of chlorantraniliprole. APHIS must not utilize active ingredients for which consultation is incomplete."

Chlorantraniliprole is not proposed for use in 2020. The final EA has been updated to reflect the changes in the program.

Comment 35
APHIS received two comments concerning operationally, how will listed species' protected locations be identified for ground and aerial applicators? How will such locations, buffer widths listed in the protective measures, and any specific instructions (i.e. use of carbaryl bait only) for some species be mapped and communicated to applicators? APHIS must provide to applicators a set of clear set of directions outlining protective measures for the listed and proposed species found within this project area and not burden applicators with a confusing set of directions split between multiple tables.

Pilots are required to have GPS equipment capable of reading shapefiles which would include agreed upon buffers for any T&E species, critical habitat, or other sensitive sites. Pre-flight conversations prior to treatment would identify and make the applicator aware of any T&E species, sensitive sites, buffers, and species of conservation concern that warrant extra protection.

See additional information in comments 32 and 33.

Comment 36
APHIS received one comment about pesticide specific conservation measures for each listed species, where appropriate, should be explicitly addressed and adopted.

Agreed upon mitigation measures address specific chemicals when conservation measures are warranted.

Comment 37
APHIS received one comment that APHIS should adopt the following operational guideline across all site-specific EAs: "Use Global Positioning System (GPS) coordinates for pilot guidance on the parameters of the spray block. Ground flagging or markers should accompany GPS coordinates in delineating the project area as well as areas to omit from treatment (e.g., boundaries and buffers for bodies of water, habitats of protected species, etc.)."

Specific pilot guidance capabilities are outlined in the contract and statement of work. Within the contract put out for bid to the applicators, GPS with data logging software requirements are the minimal standard for applicators to have prior to treatments. The pilot must be able to view shapefiles in the plane during the treatment to navigate the spray block. All sensitive sites are reviewed in the daily briefing with APHIS personnel who may be an applicator working on the treatment in a TDY capacity.

Comment 38
APHIS received one comment that, "APHIS states that it has no legal obligation to manage for vulnerable species not on the Endangered Species List. The essential role that pollinators play in the conservation of listed plant species is not addressed in the EAs and makes no mention of the fact that there are affirmative obligations incumbent on federal agencies with regard to protection of pollinators, regardless of whether they are federally listed including the 2014 Presidential Memorandum, the National Strategy to Promote the Health or Honey Bees and Other Pollinators, the Pollinator Friendly BMPs for Federal Land, and the Pollinator Research Action Item."

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

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.

Comment 39
APHIS received one comment, "The EAs disclose species listed as sensitive but does not list Species of Conservation Concern, or whether the state of Nevada designates any invertebrates as Species of Greatest Conservation Need."

Species of Conservation Concern are discussed during site-specific consultation between APHIS personnel, Nevada Department of Agriculture, Nevada Department of Wildlife, USFWS, and the land manager. Any species of conservation concern will have agreed upon mitigation measures in place before treatment will begin.

Comment 40
APHIS received one comment regarding, the EAs, protections for at risk species, including the monarch butterfly which is currently being assessed for listing under the Endangered Species Act, are practically non-existent.

Under USFWS Section 7 Act, there is no requirement to consult on sensitive species. However, in Nevada when there is concern by land management agencies, federal, state, etc.; APHIS has implemented protective measures for species of concern. Some examples included in the 2018-2021 USFWS letter of concurrence are the Columbia spotted frog, Goose Creek milkvetch, and greater sage-grouse. This is a cooperative effort by APHIS between USFWS, Nevada Department of Wildlife, Nevada Department of Agriculture, or the requesting Land Management agency.

Comment 41
APHIS received one comment, "In the face of declining pollinator populations and the existence of federal directives for agencies to support and conserve pollinators and their habitat, APHIS must not conduct business as usual. APHIS should identify the at-risk pollinator species potentially present in the geographic area of the EAs and map their ranges prior to approving any treatment requests. Prior to treatment, APHIS should survey for presence of host plants and ensure that it has identified specific, actionable measures it will take to protect monarch habitat and the habitat of at-risk butterfly species from contamination that may occur as a result of exposure to treatment, such as designating a 125-ft buffer around identified habitat. Some ways to enact protections for at-risk species above and beyond those included in the EAs include:

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

APHIS includes many of the proposed measures to minimize risks to non-target organisms and human health. These are summarized in the recent EIS. For example no treatment buffers are applied to all water bodies and to areas where the public may potentially be exposed to Program applications. APHIS also minimizes aerial insecticide use, where possible, however site conditions may dictate the need for aerial treatments. APHIS minimizes use of liquid carbaryl and malathion which is reflected in the historical use for both insecticides. Diflubenzuron has been the preferred insecticide for making Program suppression treatments. In addition APHIS has incorporated the use of RAATS in the Program as a means to reduce insecticide use providing reduced risk while meeting the goal of suppression. APHIS continues to research and develop new techniques for management of grasshopper and Mormon cricket populations.

Comment 42
APHIS received the following comment, "While the mitigations that are identified for aquatic habitats in the EAs are heartening, APHIS should include monitoring for the presence and health of mussels in streams that traverse or are adjacent to treatment areas as part of its monitoring strategy."

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

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

Comment 43
APHIS received three comments about stock tanks, 1. "The EAs do not discuss water bodies of anthropogenic origin, such as stock tanks or stock ponds, "APHIS should recognize the potential for stock pond/tanks to contribute significantly to the diversity of aquatic invertebrates in rangelands", and 3. APHIS should identify and map all stock tanks/ponds and specify a buffer around stock ponds/tanks from chemical treatment at least equivalent to that specified for wetlands, in order to protect aquatic diversity."

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

In Nevada, APHIS personnel work with the land managing agency to identify locations of any sensitive sites including stock tanks/ponds. During delimiting survey, any unidentified stock tanks, stock ponds, or other bodies of water, natural and anthropogenic, are marked with their GPS coordinates and buffers created to avoid treatment of the sensitive sites.

Comment 44
APHIS received one comment, "APHIS' reactive strategy includes no mention of what is most sorely needed: cooperation and planning with land managers to take appropriate steps to prevent the types of grasshopper and cricket outbreaks that are now dealt with by chemical controls."

APHIS is not a land management agency, but encourages IPM through past and current research and will continue to do so.

APHIS supports the use of IPM in the management of grasshoppers and Mormon Crickets. APHIS provides technical assistance to Federal, Tribal, State and private land managers including the use of IPM. However, implementation of on-the-ground IPM activities is limited to land management agencies and Tribes, as well as private land owners. 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, which is discussed in more detail on page 21 of the EIS. 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.

Comment 45
APHIS received one comment: "Emphasizing cultural techniques through appropriate grazing management could help to minimize pesticide application and allow natural enemies to regulate grasshopper and Mormon cricket populations to the greatest extent possible. While more research is needed to develop species- and region-specific management treatments that use alternatives to pesticides (Vermeire et al. 2004), there is likely enough data to employ cultural techniques now."

APHIS supports the use of IPM in the management of grasshoppers and Mormon Crickets. APHIS provides technical assistance to Federal, Tribal, State and private land managers including the use of IPM, including cultural techniques. However, implementation of on-the-ground IPM activities is limited to land management agencies and Tribes, as well as private land owners. In addition, APHIS' authority under the Plant Protection Act is to treat Federal, State and private lands for grasshoppers and Mormon cricket populations.

Comment 46
APHIS received one comment that, "APHIS must elevate the expectation of preventative approaches in its cooperative agreements with other land management agencies. APHIS can collaborate with agencies (such as the Natural Resource Conservation Service (NRCS), the Farm Service Agency (FSA), and State Extension program) to facilitate discussion and disseminate information to ranchers about preventative measures that can be taken and alternatives to pesticide use."

APHIS supports the use of IPM in the management of grasshoppers and Mormon Crickets. APHIS provides technical assistance to Federal, Tribal, State and private land managers including the use of IPM, including cultural techniques. However, implementation of on-the-ground IPM activities is limited to land management agencies and Tribes, as well as private *land owners. In addition, APHIS' authority under the Plant Protection Act is to treat Federal, State and private lands for grasshoppers and Mormon cricket populations.*

APHIS has maintained cooperative relationships with state and federal land managers as well as private landowners and Indian tribes for decades. Those relationships have allowed APHIS to provide consistent and continual recommendations on land management practices which might help mitigate orthopteran infestations.

In Nevada, public meetings were held throughout the week of February 24th in the towns of Winnemucca, Battle Mountain, Elko, Ely, Austin, and Reno. One objective of holding public meetings is to disseminate information to ranchers, private landowners, state extension programs, and other government agencies. This allows the public to reach out to their local extension offices to find out more about managing Mormon crickets and grasshoppers or contacting the agency.

Comment 47

APHIS received on comment that, "APHIS and/or collaborating agencies should investigate and implement opportunities to incentivize healthy range management practices."

As part of its ongoing IPM strategy to manage grasshoppers and Mormon cricket outbreaks, APHIS collaborates with scientists and land managers focused on rangeland health.

Comment 48

APHIS received one comment that, "APHIS and its partners should be approaching the problem by keeping a focus on the potential to reduce grasshopper carrying capacity by making the rangeland environment less hospitable for the pests. APHIS must not take a limited view of its role and responsibilities, and should utilize any available mechanism to require land management agencies to diminish the severity, frequency and duration of grasshopper outbreaks by utilizing cultural management actions. Memoranda of Understanding (MOUs) should be examined and updated to ensure that land management agencies are accountable in utilizing cultural techniques to diminish the carrying capacity of pest species.

APHIS supports the use of IPM in the management of grasshoppers and Mormon Crickets. APHIS provides technical assistance to Federal, Tribal, State and private land managers including the use of IPM. However, implementation of on-the-ground IPM activities is limited to land management agencies and Tribes, as well as private land owners. In addition, APHIS' authority under the Plant Protection Act is to treat Federal, State and private lands for grasshoppers and Mormon cricket populations.

Comment 49

APHIS received a comment, "Longer-term strategic thinking should include:

- Prevent conditions that allow pest populations to survive and reproduce.
- Employ diverse management techniques (e.g., biological, physical, and cultural).
- Select pesticides to minimize risks to nontarget organisms.
- Implement frequent and intense monitoring to identify populations that can be controlled with small ground-based pesticide application equipment.

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

APHIS currently monitors for grasshopper and Mormon cricket populations. These measures are employed to allow APHIS to respond with treatment, where warranted, treating the smallest area possible and if practical using ground-based equipment. APHIS, due to its monitoring efforts, has been able to rely on diflubenzuron as the primary insecticide used in the Program. Diflubenzuron is a more selective insecticide compared to liquid carbaryl and malathion posing less risk to nontarget organisms. APHIS also uses environmental monitoring to assess application success and to determine if Program insecticides are reaching sensitive habitats, including aquatic habitats. APHIS supports the use of IPM in the management of grasshoppers and Mormon Crickets. APHIS provides technical assistance to Federal, Tribal, State and private land managers including the use of IPM. However, implementation of on-the-ground IPM activities is limited to land management agencies and Tribes, as well as private land owners. In addition, APHIS' authority under the Plant Protection Act is to treat Federal, State and private lands for grasshoppers and Mormon cricket populations. APHIS continues to research and develop new methods for assessing and controlling grasshopper and Mormon cricket populations that can be incorporated into IPM practices.

Comment 50
APHIS received one comment that, "The EAs do not make mention of any specific protections to be accorded to special status lands such as Wilderness areas, Wilderness study areas, Research Natural Areas, National Wildlife Refuges, and designated or proposed Areas of Critical Environmental Concern. These special status areas have been designated for specific purposes and generally discourage human intervention with the natural ecosystem. Grasshopper suppression should not be undertaken in such areas."

APHIS does not make treatments on lands of special status without a request from that agency and an evaluation of whether treatments are necessary. Additional protection measures for these types of lands are established by the agency requesting treatment and are followed by APHIS.

Comment 51
APHIS received the following comment regarding, "We appreciate that public notice of this site-specific EA and its comment period was posted at the APHIS website. It does not appear to have been the practice to post the Draft EAs in the last several years, but limiting public notice is contrary to the spirit of the NEPA process. Grasshopper suppression efforts are of more than local concern and as federal actions, should be noticed properly, i.e. beyond local stakeholder audiences, local newspapers, etc. We recommend that, in the future, notice of open public comment periods for all site-specific EAs for grasshopper suppression be posted in the Federal Register, and documents made available for review at regulations.gov and at the APHIS grasshopper website."

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). Our EIS process for the GMC program was published in the Federal Register (APHIS-2016-0045), and met all applicable notice and comment requirements for a federal action with effects of national concern. This process provided individuals and national groups the ability to participate in the development of alternatives and provide comment. Our subsequent state-based actions have the potential for effects of local concern, and we publish them according to the provisions that apply to federal actions with effects primarily of local concern. This includes the USDA APHIS NEPA Implementation Procedures, which allows for EAs and FONSIs where the effects of an action are primarily of regional or local concern to normally provide publication in a local or area newspaper of general circulation (7 CFR 372.7(b)(3)). These publications 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.*

Comment 52

APHIS received the following comments, "The Draft Environmental Assessments Frustrate Public Participation." "APHIS frustrated public participation by failing to inform interested parties of the existence of the EAs."

"Scoping" is the process APHIS uses through which the agency and the public 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 Environmental Assessments (EAs). The process can occur formally and informally through meetings, conversations, or written comments from individuals and groups.

Prior to the treatment season, APHIS conducted meetings or provided guidance for public participation in the decision making process. In addition, APHIS notified Federal, State and Tribal land managers and private landowners of the potential for grasshopper and Mormon cricket outbreaks on their lands.

In Nevada, prior to the treatment season, letters of request from land managers were received from land managers. Letters for the 2020 treatment season were received in early April. Public meetings were held across the state between February 24th and February 27th to discuss the Draft EA and local concerns. Notice of public comment was published in local newspapers and distributed to various state and county stakeholders for distribution to other interested parties. The comment period opened March 6th, 2020 and expired April 7th, 2020. A report of grasshopper survey season and if any treatments conducted annual report is provided to land managers and/or stakeholders on annual basis.

Public meetings in Nevada were held in Winnemucca, with about 80 members of the public in attendance, Battle Mountain, with a handful of state/county extension cooperators, Elko, with approximately 10 members of the public and cooperating agency members, Eureka, with 1 state/county cooperator, Austin, with approximately 3 people in attendance from county and state cooperators, and Reno, where we had 0 attendance.

Comment 53
APHIS received the following comment, "APHIS did not providing information for the submission of public comments including where and when to submit comments by."

APHIS works to inform all interested parties about draft EA's for comment. When an interested party asks to be informed, APHIS ensures contact information is added to the list of interested stakeholders. Each local office works to inform interested parties of the availability of an EA for comment. Any omission of an interested party is not intentional.

A notice of public comment was sent to all parties who expressed interest in the past or at public meetings in addition to the local newspapers, Tribal nations, and state, county, and extension cooperators. A letter of notice clearly defining the 30 day comment period and the contact information of local APHIS personnel responsible for drafting the state EAs was also sent out to the respective parties.

Comment 54
APHIS received the following comments, "APHIS limited public notice to local papers." "This local notice is insufficient as it excludes countless other interested parties."

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). Our EIS process for the GMC program was published in the Federal Register (APHIS-2016-0045), and met all applicable notice and comment requirements for a federal action with effects of national concern. This process provided individuals and national groups the ability to participate in the development of alternatives and provide comment. Our subsequent state-based actions have the potential for effects of local concern, and we publish them according to the provisions that apply to federal actions with effects primarily of local concern. This includes the USDA APHIS NEPA Implementation Procedures, which allows for EAs and FONSIs where the effects of an action are primarily of regional or local concern to normally provide publication in a local or area newspaper of general circulation (7 CFR 372.7(b)(3)). These publications 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.

A notice of public comment was sent to all parties who expressed interest in the past or at public meetings in addition to the local newspapers, tribal nations, and state, county, and extension cooperators. A letter of notice clearly defining the 30 day comment period and the contact information of local APHIS personnel responsible for drafting the state EAs was also sent out to the respective parties. In Nevada, public meetings were held on February 24th, 25th, 26th, and 27th, 2020.

Comment 55
APHIS received the following comments, "APHIS provided a short public comment period during this COVID-19 pandemic." "The 30 day comment deadline for the Draft EAs is wholly inappropriate during the current COVID-19 pandemic, where both staff and members of the

concerned public have limited capacity, given the challenges associated with a global pandemic including but not limited to increased childcare demands, illness, etc."

The comment period was in accordance with CEQ regulations, 40 C.F.R. § 1501.4(e)(2), In determining whether to prepare an environmental impact statement the Federal agency shall: (e) Prepare a finding of no significant impact, if the agency determines on the basis of the environmental assessment not to prepare a statement. (2) In certain limited circumstances, which the agency may cover in its procedures under § 1507.3, the agency shall make the finding of no significant impact available for public review (including State and area-wide clearinghouses) for 30 days before the agency makes its final determination whether to prepare an environmental impact statement and before the action may begin. CEQ guidance also notes: When preparing an EA, the agency has discretion as to the level of public involvement. The CEQ regulations state that the agency shall involve environmental agencies, applicants, and the public, to the extent practicable, in preparing EAs. Sometimes agencies will choose to mirror the scoping and public comment periods that are found in the EIS process. In other situations, agencies make the EA and a draft FONSI available to interested members of the public. APHIS would have considered extending the comment period if there had been a reason to believe that additional substantive issues remained, or that the pandemic itself created new issues.

In Nevada, public meetings were held on February 24^{th}, 25^{th}, 26^{th}, and 27^{th}, 2020. The World Health Organization did not declare COVID-19 a Pandemic until March 11, 2020. The CDC provided guidance for meetings of more than 50 people on March 15, 2020. Public interaction in Nevada was well before the National Concern and Governor Sisolak issuing a Stay at Home order on April 1, 2020. Comment period opened March 6^{th}, 2020 and expired April 7^{th}, 2020.

Comment 56

APHIS received the following comment, "the proposal in question is controversial and deals with issues of significant public interest."

The USDA became involved in grasshopper control on Federal rangeland in the 1930s. During that decade, grasshopper infestations covered millions of acres in 17 Western States. Unsuccessful efforts to control grasshopper outbreaks on a local basis proved that grasshoppers needed to be dealt with on a broader basis. In 1934, Congress charged USDA with controlling grasshopper infestations on Federal rangeland. Thereafter, USDA was the lead agency in cooperative efforts among Federal agencies, State agriculture agencies, and private ranchers to control grasshopper outbreaks.

APHIS is not aware of any controversy in the program. Every year APHIS works with local stakeholders to gather information and discuss the grasshopper program. The grasshopper program requires a written request to treat on any land and discussions with the land owner or manager determine the course of the final action. APHIS acts in partnership with stakeholders through agreements and Memorandum of Understanding on all activities in the program. APHIS offers to exclude persons who do not wish for their land to be treated to opt out and be buffered from the treatment area. In general there has been support for APHIS to manage grasshopper and Mormon cricket populations in Nevada.

Comment 57
APHIS received the following comment, "The Draft EAs also limit public participation by failing to provide contact information for the submission of written or electronic comments."

The local offices emailed public notices to a list of stakeholders that they have collected over the years and also announced the open comment period in the local media. Those notices have the link for the EA's for comment and the point of contact. In an attempt to be more transparent APHIS has placed Program EA's on to the website for people to access. When an interested party asks to be informed, APHIS ensures their contact information is added to the list of interested stakeholders. Each local office works to inform interested parties of the availability of an EA for comment. Any omission of an interested party is not intentional.

In Nevada, APHIS personnel identified any parties who expressed interest and delivered copies of the EA along with a notice for public comment. The EA and its notice of comment was delivered to local newspapers, Tribal nations, parties who expressed interest and state, county, and extension cooperators with a clearly defined 30 day comment period. Contact information of local APHIS personnel responsible for drafting the state EAs was included in the notice.

Comment 58
APHIS received the following comment, "Nowhere on the webpage for the Draft Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program is there any information on where to submit comments."

The local offices emailed public notices to a list of stakeholders that they have collected over the years and they also announced the open comment period in the local media. Those notices have the link for the EA's for comment and the point of contact. In an attempt to be more transparent, APHIS has placed Program EA's on to the website for people to access. When an interested party asks to be informed, APHIS ensures their contact information is added to the list of interested stakeholders. Each local office works to inform interested parties of the availability of an EA for comment. Any omission of an interested party is not intentional. For Nevada (See Previous Response).

Comment 59
APHIS received the following comment, "Staff for USDA-APHIS that have been involved with the environmental review for this program were unable to readily provide information for the submission of public comment."

The local offices emailed public notices to a list of stakeholders that they have collected over the years and they also announce the open comment period in the local media. Those notices have the link for the EA's for comment and the point of contact. In an attempt to be more transparent, we have put all of our EA's on to the website for people to access. When an interested party asks to be informed APHIS ensures there contact information is added to the list of interested stakeholders. Each local office works to inform interested parties of the availability of an EA for comment. Any omission of an interested party is not intentional. Contact information for Nevada's EA's is on the cover page of the Draft EA's. Also included with the distribution of *the EA's was a letter of notice clearly detailing the 30 day comment period extending from March 6th through April 7th.*

APHIS is not aware of the direct personnel communication cited by the commenter. APHIS personnel are engaged in a wide variety of activities to protect American agriculture and not every staff member is completely informed about the details of the Grasshopper Program NEPA compliance procedures.

Comment 60
APHIS received the following comment, "there is no information on when the comment period opened or closed on the EAs provided on the webpage."

The local offices emailed public notices to a list of stakeholders that they have collected over the years and they also announce the open comment period in the local media. Those notices have the link for the EA's for comment and the point of contact. In an attempt to be more transparent, we have put all of our EA's on to the website for people to access. When an interested party asks to be informed, APHIS ensures there contact information is added to the list of interested stakeholders. Each local office works to inform interested parties of the availability of an EA for comment. Any omission of an interested party is not intentional.

Contact information for the Nevada state office is on the cover page of the Draft EA. Included with the distribution of the EAs was a notice of public comment clearly stating the website and address for EA documents and where to send comments and the closing date of April 7th, 2020. Public meetings were held February 24th through the 27th to discuss Draft EA.

Comment 61
APHIS received the following comment, "the EAs are dated February 21, so that when we did see them we erroneously believed that we had missed the comment deadline. Had we not been persistent in following up to ascertain the actual posting date and comment period closing date, we could have easily missed the opportunity to comment."

See previous response.

Comment 62
APHIS received the following comment, "APHIS has failed to comport with NEPA's threshold requirements."

APHIS did not fail to perform NEPA's threshold requirements for public outreach and engagement, but rather exceeded them. See previous comments concerning how APHIS informed interested parties of the availability of EAs for public comment, including public meetings, where to send comments, and the closing date for the comment period.

Comment 63
APHIS received the following comment, "The Draft EAs further limit public participation by failing to post notices in the Federal Register or on regulations.gov, unlike earlier versions of the environmental review."

APHIS further involves the public in the scoping process by the publication of notices of availability for EAs and a Findings of No Significant Impact (FONSIs). When an individual State level EA is written, a notice is published in the legal section of the local newspaper, advertising the availability of the EA during an open comment period. The notices published in local newspapers was conducted in accordance with APHIS' NEPA Implementation Procedures, 372.7 (b)(3), Notification of the availability of environmental assessments and findings of no significant impact for proposed activities will be published in the FEDERAL REGISTER, unless it is determined that the effects of the action are primarily of regional or local concern. Where the effects of the action are primarily of regional or local concern, notice will normally be provided through publication in a local or area newspaper of general circulation and/or the procedures implementing Executive Order 12372, "Intergovernmental Review of Federal Programs."

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). Our EIS process for the GMC program was published in the Federal Register (APHIS-2016-0045), and met all applicable notice and comment requirements for a federal action with effects of national concern. This process provided individuals and national groups the ability to participate in the development of alternatives and provide comment. Our subsequent state-based actions have the potential for effects of local concern, and we publish them according to the provisions that apply to federal actions with effects primarily of local concern. This includes the USDA APHIS NEPA Implementation Procedures, which allows for EAs and FONSIs where the effects of an action are primarily of regional or local concern to normally provide publication in a local or area newspaper of general circulation (7 CFR 372.7(b)(3)). These publications 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 Nevada, Draft EA's are emailed upon request to the public, stakeholders, etc. Tribal stakeholders copies of EA's are delivered via mail annually.

Comment 64
APHIS received the following comment, "[The Center for Biological Diversity] have been informed that there was notice in local newspapers. This local notice is insufficient as it excludes countless other interested parties."

See previous response

Comment 65
APHIS received the following comment, "APHIS has failed to meet NEPAs requirements for public involvement in these EAs."

APHIS also notes CEQ guidance for public involvement in the NEPA process of agencies, "A Citizen's Guide to the NEPA" states: "When preparing an EA, the agency has discretion as *to the level of public involvement. The CEQ regulations state that the agency shall involve environmental agencies, applicants, and the public, to the extent practicable, in preparing EAs. Sometimes agencies will choose to mirror the scoping and public comment periods that are found in the EIS process. In other situations, agencies make the EA and a draft FONSI available to interested members of the public".*

Some agencies, such as the Army, require that interested parties be notified of the decision to prepare an EA, and the Army also makes the EA publicly available. Some agencies keep a notification list of parties interested in a particular kind of action or in all agency actions. Other agencies simply prepare the EA.

Contact information for the Nevada state office is on the cover page of the Draft EA's. The notice of public comment clearly stated the website and Address for EA documents and where to send comments and the closing date of April 7th, 2020.

Public meetings were held February 24th, 25th, 26th, and 27th to discuss Draft EA and local concerns. A notice of public comment was released with the Draft EA's outlining the comment period beginning March 6th, 2020 and expired April 7th, 2020.

Comment 66
APHIS received the following comment, "the range of alternatives offered by APHIS is woefully inadequate."

APHIS structured and analyzed the risk of the substantial program alternatives available to the agency.

Comment 67
APHIS received the following comment, "[The alternatives] are, "No Action," "Insecticide Applications at Conventional Rates or Reduced Agent Area Treatments with Adaptive Management Strategy" (preferred alternative). While the RAATs are an improvement over conventional approval rates, this alternative should actually be two, one, Insecticide Applications at Conventional Rates and two, Reduced Agent Area Treatments with Adaptive Management Strategy. Lumping the two together means that supporting this alternative could mean pesticide application at conventional rates without RAATs. APHIS must break these into different alternatives."

The EA states "Under Alternative A, the No Action alternative, APHIS would not conduct a program to suppress grasshopper infestations. 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."

Under Alternative B, the Preferred Alternative, APHIS would manage a grasshopper treatment program using potentially any of pesticides and application methods described in the EA Alternative B to suppress outbreaks. The grouping of conventional methods and pesticide rates *with the more commonly used RAATs procedures reflects the variety of approaches that the agency may need depending on treatment specific circumstances.*

Comment 68
APHIS received the following comment, "APHIS does not include an alternative that utilizes Integrated Pest Management."

APHIS technical guidance is part of each alternative proposed, and is not unique to any one alternative. An example of APHIS technical guidance is the agency's work on integrated pest management (IPM) for the grasshopper program. IPM for grasshoppers includes biological control, chemical control, rangeland and population dynamics, and decision support tools.

APHIS has funded the investigation of various integrated pest management (IPM) strategies for the grasshopper program. Congress established the Grasshopper Integrated Pest Management (GIPM) to study the feasibility of using IPM for managing grasshoppers.

The major objectives of the APHIS GIPM program were to: 1) manage grasshopper populations in study areas, 2) compare the effectiveness of an IPM program for rangeland grasshoppers with the effectiveness of a standard chemical control program on a regional scale, 3) determine the effectiveness of early sampling in detecting developing grasshopper infestations, 4) quantify short- and long-term responses of grasshopper populations to treatments, and 5) develop and evaluate new grasshopper suppression techniques that have minimal effects on non-target species (Quinn, 2000).

The results for the GIPM program have been provided to managers of public and private rangeland including ways to manage grasshopper populations in the long-term, such as livestock grazing methods and cultural control by farmers.

APHIS issued the GIPM User Handbook describing biological control, chemical control, environmental monitoring and evaluating, modeling and population dynamics, rangeland management, decision support tools, and future directions.

Federal and State land management agencies, State agriculture departments, and private groups or individuals may carry out a variety of preventative IPM strategies that may reduce the potential for grasshopper outbreaks. Some of these activities include grazing management practices, cultural and mechanical methods, and prescribe-burning of rangeland areas. These techniques have been tried with varying success in rangeland management, and some have been associated with the prevention, control, or suppression of harmful grasshopper populations on rangeland.

Regardless of the various IPM strategies taken, the primary focus of the risk analysis contained in the EAs is on the potential impacts from chemical treatments needed during an outbreak of economic importance. While APHIS provides technical expertise regarding grasshopper management actions, the responsibility for implementing most land management practices lies with other Federal (i.e., BIA, BLM, and USDA's FS), State, and private land managers.

The final EA will be updated to reflect APHIS support for IPM strategies in the grasshopper and Mormon cricket suppression program.

Comment 69
APHIS received the following comment, "Given that much of APHIS's work on grasshopper and Mormon cricket suppression is on federal public lands or adjacent to federal public lands in Nevada, it only makes sense that it would conform to their IPM mandates in these EAs."

See previous response. APHIS supports the use of IPM to prevent grasshopper outbreaks on or near Federal lands. These actions are and should continue to be considered by agencies as part of proper land management. APHIS treatments are a component of the IPM strategies that may be employed by Federal land management agencies. APHIS also adheres to any restrictions proposed by Federal land management agencies that may be part of their IPM strategies.

Comment 70
APHIS received the following comment, "APHIS must adopt an alternative that harmonizes its mandates in regard to grasshoppers and Mormon crickets with the IPM mandates of the federal lands that it operates on."

See previous response. A Memorandum of Understanding between land management agencies, i.e., the Department of Interior's Bureau of Indian Affairs and Bureau of Land Management, and USDA's Forest Service, indicates that while APHIS provides technical expertise, namely advice, regarding grasshopper management actions, the responsibility for implementing most land management practices, including IPM measures, lies with other Federal (i.e., BIA, BLM, and USDA's FS), State, and private land managers (page 32 of the 2019 EIS).

Comment 71
APHIS received the following comment, "APHIS must enlist IPM experts to craft an alternative that is land-use and pest-specific, using the minimum level of pest suppression necessary, relying on prevention, avoidance, monitoring, and suppression techniques in order to decrease pest pressure with the least harmful controls possible."

See comment 67

Comment 72
APHIS received the following comment, "APHIS does not provide a single citation or any other evidence to support its assertions that the pesticides proposed to be used 'pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity.'"

The quote referenced in the comment has been removed from the final EA. The risk analysis in the EA is tiered to the two Environmental Impact Statements (2002 and 2019) and the four Human Health and Ecological Risk Assessments as described in sections I.C. About this Process, II.A. Alternatives (where an internet link to the more in-depth risk analysis documents is provided on page 7), in the second paragraph of section IV. Environmental Consequences (a link is also provided there), and many other locations in the EA.

Comment 73
APHIS received the following comment, "Perhaps APHIS is attempting to claim that because 'there is a lack of any adverse health effects reported from these projects.'"

Discussions regarding risk to human health in the EA is based on available data that was summarized in the human health and ecological risk assessments that were prepared to support the updated EIS published in 2020. APHIS would take into account any adverse effects noted during program use of a pesticide however a lack of effects on its own would not be used to make a conclusion that there are no adverse health effects.

Comment 74
APHIS received the following comment, "APHIS must conduct an adequate analysis of human health effects."

APHIS prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the Grasshopper Programs (November 2019).

Adherence to label requirements and additional Program measures designed to reduce exposure to workers (e.g., PPE requirements include long-sleeved shirt and long pants and shoes plus socks) 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.

Comment 75
APHIS received the following comment, "there is no description of how APHIS plans to identify or contact these individuals in order to advise them to avoid treatment areas."

In areas considered for treatment, State-registered beekeepers and organic producers shall be notified in advance of proposed treatments. APHIS will notify residents within treatment areas, or their designated representatives, prior to proposed operations, and advise them of the control method to be used, proposed method of application, and precautions to be taken.

Comment 76
APHIS received the following comment, "APHIS's failure conduct any analysis of their impacts to human health is a far cry from the level of analysis demanded by NEPA and basic due care for public health."

See responses to comment 73. APHIS prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the Grasshopper Programs (November 2019). These documents were incorporated by reference into the draft EA.

Comment 77
APHIS received the following comment, "APHIS fails to look at the effects of the proposed action on migratory birds."

Executive Order 13186 directs Federal agencies taking actions with a measurable negative effect on migratory bird populations to develop and implement a Memorandum of Understanding with the USFWS that promotes the conservation of migratory bird populations. On August 2, 2012, a Memorandum of Understanding between APHIS and the USFWS was signed to facilitate the implementation of this Executive Order.

Specifically to the grasshopper and Mormon cricket program, APHIS evaluated potential impacts to birds in the final EIS and associated human health and ecological risk assessments. These documents are incorporated by reference into the final EA.

For Nevada, APHIS includes information on migratory birds in their EA in Appendix 3 Table 1. Effects on migratory birds are discussed during site specific consultation between USFWS and the land managers.

Comment 78
APHIS received the following comment, "APHIS needs to take a hard look at the impacts of the proposed action, including direct and indirect effects."

The EA incorporated the analysis from the EIS and associated human health and ecological risk assessments into the analysis. The EIS, and in particular, the risk assessments evaluated potential indirect effects to non-target organisms, relying on available toxicity data and estimates of risk.

Comment 79
APHIS received the following comment, "A direct effect of not spraying insecticides is abundant food for migratory birds. Conversely, a direct effect of spraying is reduced abundance of food for insectivorous migratory birds. Another potential direct effect of insecticide spraying is poisoning. An example of an indirect effect is the cumulative effect of continuous low level pesticide exposure from numerous sites over many years. APHIS must take a hard look at all these impacts".

APHIS prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the Grasshopper Programs (November 2019). The risk assessments discuss the risk to birds for each program insecticide. Available laboratory and field effects data were used to evaluate risks to birds through direct exposure as well as indirect effects that could result from the loss of prey items such as terrestrial arthropods.

Comment 80
APHIS received the following comment, "APHIS's handling of impacts to non-target species and species of concern wholly fails to meet NEPA's requirement that the agency take a hard look at the impacts of its proposed action."

APHIS prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the grasshopper and Mormon cricket suppression program (November 2019). The EIS and risk assessments evaluated available effects data and risk to non-

target species. These documents are incorporated by reference into the final EA. The risk assessments provided the basis for summary statements in the EA that is tiered to the EIS.

The U.S. FWS defines "Species of concern" is an informal term that refers to those species which may require some conservation actions but which are not threatened with extinction. The conservation actions needed will vary depending on the health of the populations and types and degree of threats. At one extreme, there may only need to be periodic monitoring of populations and threats to the species and its habitat. At the other extreme, a species eventually may require listing as a Federal threatened or endangered species and become the subject of a Federal recovery program. Species of concern are not provided legal protection under the Endangered Species Act, and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species. The USFWS and APHIS also addresses species of concern during broader ESA consultations and that may result in specific protections measures observed by the Grasshopper Program. As an example, USDA APHIS PPQ has an MOU with BLM, NDOW, NDA, APHIS, and USFWS with regards to insecticide use in and around sage grouse habitat.

Comment 81
APHIS received the following comment, the EA cannot be finalized until APHIS actually takes a hard look at the impacts on non-target and species of concern.

See previous response. Under USFWS Section 7 Act there is no requirement to consult on sensitive species. However, in Nevada when there is concern by land management agencies, federal, state, etc.; APHIS has implemented protective measures for species of concern which may be closely related to a T&E species. This is a cooperative effort by APHIS between USFWS, Tribal Nations, Nevada Department of Wildlife and/or the Requesting Land Management agency.

Comment 82
APHIS received the following comment, "APHIS doesn't even consider many sensitive or culturally important species. For example, monarch butterflies fly through Nevada."

APHIS prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the Grasshopper Programs (November 2019). The risk assessments and EIS considered available field and laboratory data regarding impacts to Lepidoptera, including moths and butterflies.

Comment 83
APHIS received the following comment, "APHIS also doesn't consider the impacts of spraying on the hundreds of native bee species that reside in Nevada, including many that are exceedingly rare."

APHIS works with Tribal, Federal and State land managers and their local biologists, natural resource specialists, and range conservationists to implement measures that reduce risks of Program treatments to native bees. These measures may include reduced insecticide applications associated with RAATS, avoidance measures and use of carbaryl bait, where applicable. APHIS *also prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the Grasshopper Programs (November 2019). The risk assessments summarized available effects data for nontarget species including pollinators.*

Comment 84
APHIS received the following comment, "The EAs have not adequately analyzed the cumulative impacts of the program with other governmental or private entity actions."

APHIS discussed the potential of overlapping chemical treatments in the areas where outbreaks of grasshoppers have occurred or could occur in the future in the cumulative impacts section of the draft EIS, from page 79 to 83. It is unlikely there would be significant overlap between APHIS programs and the grasshopper program and coordinated treatments would mitigate impacts if there is ever overlap; current label and mitigations minimize significant exposure of soil, water, and air to Program insecticides; grasshopper chemical treatments are not expected to persist or bioaccumulate in the environment; and, there is a lack of significant routes of exposure (page 82 to 83 of draft EIS).

We are unaware of any retreatment that would occur in an area that we have done a treatment. Generally, the land we treat is a hybrid of BLM rangeland and absentee landowners leasing land for grazing. Private landowners do not actively manage that land and, therefore, are not expected to be making any other types of chemical treatments. Although APHIS is unaware of any, BLM could potentially do herbicide treatments in areas we treat, but they would not treat for Grasshopper or Mormon cricket. The cumulative impacts section was updated in the final EA to reflect the potential for other land management activities.

Comment 85
APHIS received the following comment, "The EA does not take into account the background level of exposure to humans and animals from pesticides and other pollutant sources that exist in the environment from other actions or the synergistic effects of the enhanced toxicity that many mixtures exhibit."

The commenter assumes that the rangeland in Nevada which is covered by the Draft EA's has been exposed to pesticides and pollutants and that there is a synergistic effect which enhances toxicity to the environment. The land managers that manage the areas covered in the EAs, document all pesticide applications. If these remote areas were at risk, the land manager would not request APHIS's services. The activities, or lack thereof, are discussed in the cumulative impacts section of the final EA.

Comment 86
APHIS received the following comment, "[the EA] does not account for the range of cumulative exposures that would be anticipated. There was no mention of widespread mosquito spraying that takes place in many areas."

Any areas considered for treatment in Nevada would not overlap with any mosquito treatments. Mosquito treatments in Nevada are not wide spread and are restricted to riparian areas which are avoided and buffered in Mormon cricket and grasshopper treatment programs.

Comment 87
APHIS received the following comment, "as cattle are grazing these pesticides will be washed off their bodies or excreted through waste and contaminate surrounding land and water bodies."

The labels for Dimilin 2L and Carbaryl 2% bait specify that there is no grazing restrictions. Any pesticide residues that may be present on forage in treated areas after treatment is typically metabolized and excreted as metabolites that have lower toxicity than the parent compound. In addition, the low application rates employed by APHIS relative to the current maximum labelled rates for each Program insecticide would result in very low residues in livestock waste.

Comment 88
APHIS received the following comment, "A lot of rangeland is adjacent to lands used for plant agriculture, and the EAs state that they also aim to protect these agricultural lands. These areas generally have a high potential for crossover contamination through drift or runoff of pesticides. Large quantities of pesticides, including insecticides and fungicides that may be synergistic with the insecticides included in the EAs, may be used on these lands. In addition, herbicide use on crops already significantly impacts insects by destroying habitat and food sources in agricultural lands".

Nevada has never included agriculture land in previous spray programs in the past and does not have plans to include agriculture land in the future. While we may focus on rangeland surrounding agriculture land, there is often untreated areas between the two due to land ownership patterns common in Nevada.

The pesticide labels which APHIS uses prohibits their use on specific crops, agricultural lands etc. The labels and use rates are specific to rangeland or pasture land use.

Comment 89
APHIS received the following comment, "None of these issues were disclosed or analyzed in the Draft EIS and add to the already large cumulative exposures from pesticides used in 1) the boll weevil eradication program, 2) fruit fly cooperative eradication program, 3) the gypsy moth cooperative eradication program, and 4) invasive plant control".

The commenter refers to the Draft EIS. The EIS has been finalized and the ROD has been signed. The final EIS does address the cumulative exposures from other APHIS programs on a programmatic level. The documents in question are the Draft EA's. The programs mentioned by the commenter are not relevant to the Rangeland Grasshopper and Mormon Cricket Suppression Program.

There is no geographical overlap in Nevada now or in the foreseeable future between pesticide applications of the Grasshopper Program and the pest control programs mentioned by the commenter.

Comment 90
APHIS received the following comment, "These cumulative exposures can not only adversely affect human and environmental health but can also negatively impact biological control programs that try to manage insect and weed pests with natural predators".

The Grasshopper Program personnel are also the lead biocontrol program personnel in Nevada. They are very much aware of the locations of biocontrol programs in the state of Nevada. Furthermore, Nevada Department of Agriculture works hand in hand with APHIS personnel on the grasshopper program. NDA takes GPS coordinates and maps all biocontrol areas they work to establish. The state entomologist is aware of all biocontrol locations that would overlap with any proposed treatments and modifications to the block would be made. All grasshopper treatments are coordinated with the land managers and other non-grasshopper programs are discussed if the land managers are concerned about an overlap with other programs. In Nevada, there never has been an overlap of grasshopper treatments and any biocontrol program areas. The final EA was updated to reflect the lack of overlap between biocontrol activities and Program treatments.

Comment 91
APHIS received the following comment, "How these pesticides act in conjunction with one another to additively or synergistically increase toxicity is not discussed and no mitigation measures were proposed. Therefore, APHIS must fully analyze the impacts from cumulative exposures and identify ways in which risk can be mitigated or prohibited".

The Grasshopper Program does not apply treatments more than once per year to any rangeland area. Therefore, synergistic or additive toxicity between program applied insecticides is not possible. Cumulative exposures from pesticides applied by external parties are not expected in most cases due to coordination between APHIS, land managers and other cooperators. This coordination typically would eliminate the possibility of multiple pesticide applications per year. The EA details many procedures APHIS employs to mitigate risk.

Comment 92
APHIS received the following comment, "The project is vague and ill-defined, it improperly precludes the disclosure of environmental effects because the information on the project and its impacts is incomplete".

The proposed Grasshopper treatment program described in the EA could occur within a specific area, using a limited number of insecticides and application methods. The environmental consequences of suppressing or not suppressing grasshopper infestations on multiple ecological parameters of the treatment areas are thoroughly described in the EA and other programmatic risk analysis documents.

Comment 93
APHIS received the following comment, "APHIS's explanation of a "level of economic infestation," which is the trigger for insecticide spraying, does not give the public any sense whatsoever of when that threshold is met. The definition is too vague and ill-defined to meet NEPA's purposes and mandates. The agency could spray with minimal infestation levels if it

saw fit whenever it decided to do so. There must be a more concrete definition that identifies specific thresholds that must be met for the agency to determine an economic level of infestation has been met”.

APHIS utilizes and provides links to extensive resources for determining when a grasshopper outbreak is exceeding IPM thresholds including, “a level of economic infestation”. The Purpose and Needs section of the EA and supporting documents adequately define the multiple factors that must be evaluated before APHIS decides a treatment is necessary.

The following footnote is in the Draft EAs page 6.

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.

Comment 94
APHIS received the following comment, “The EA’s description of the preferred alternative that includes “reduced agent area treatments” (“RAATs”) is similarly vague and ill defined”.

RAATs has long been in use, is public knowledge, and one of APHIS’s preferred IPM strategies, supported by decades of research. Skipping swaths are the most common RAATs choice, leaving 50% of the suppression area untreated to maximize refugia for non-target arthropods while simultaneously inducing target Orthoptera mortality at desired levels. RAATs are also described in detail in the final EIS that is incorporated by reference in the EA.

Comment 95
APHIS received the following comment, “It is unclear whether RAATs will even be used and how they will be used in the site specific area”.

APHIS’ preferred method of treatment is to use RAATs as a means to reduce program costs and potential environmental effects. However the program could decide to apply insecticides at conventional rates and total area coverage if a damaging grasshopper infestation warrants that level of suppression. An explanation of the uncertainties involved with predicting grasshopper populations before they emerge is provided in section I.C. about this process.

Comment 96
APHIS received the following comment, "APHIS could use the pesticide at 95% of the labelled rate and still call the application a RAAT."

RAAT's is defined as Reduced Agent and/or Area Treatments. The current pesticide labels for use in the Program do not allow applications at 95% of the labeled rate to be called RAATs. This information was also summarized in the final EIS. The commenter will find that EPA has approved the verbiage for the pesticide labels. The labels clearly state which rates are allowed to meet a RAAT rate. In the case of Dimilin 2L label, which clearly states the application rates for RAAT's is 0.75 - 1 ounce per acre. "Use on rangeland only, in a RAAT's application on early instars. A RAAT's application is an IPM strategy that takes advantage of grasshopper movement and conservation biological control to allow Dimilin 2L to be applied on rangeland on a reduced treated area and at reduced rates, while sustaining acceptable control."

The applicator can only use the RAAT's rate of .75 or 1 ounce per acre. The label rate, if not using RAAT's is 2 ounces/acre. The RAAT's rate would be 50% of the label rate not 95% of labeled rate. In addition, the practice of skipping spray swaths further reduces the pesticide per acre rate.

In the case of using Carbaryl 5% bait the label rate is 20-40 lbs. per acre. APHIS uses the RAAT's rate of 10lbs/acre. In the case of Carbaryl 2% bait, the label clearly states for ground applications 25 pounds/acre. It clearly states for U.S. Federal Government and State affiliated Grasshopper/Mormon Cricket Suppression Programs using aerial applications the rate of application is 10 pounds/acre. So clearly the RAAT's applications are 50% or less than the labeled rates.

The RAAT procedures used by the program are flexible to allow for a reduction of pesticide use. Typically the RAAT procedures will result in half the amount of pesticide being applied to a treatment block than conventional rates and total coverage. Program managers may reduce the rate at which the pesticide is sprayed from the aircraft or increase the distance between swaths that are sprayed based on factors specific to grasshopper populations being suppressed. It should be noted that APHIS average RAAT rates are lower than the labeled RAAT rates further reducing pesticide loading into the environment.

Comment 97
APHIS received the following comment, "The agency must give the public a more precise definition of when the threshold for spraying has been met (i.e. number of grasshoppers or crickets/acre and a full description of the economic interests at stake)."

The commenter is asking for survey data to be submitted to the public, this data is accumulated during the nymphal survey season and is not available when compiling the EA's. APHIS utilizes and provides links to extensive resources for determining when a grasshopper outbreak is exceeding IPM thresholds including, "a level of economic infestation". The Purpose and Needs section of the EA and supporting documents adequately define the multiple factors that must be evaluated before APHIS decides a treatment is necessary. Establishing a treatment threshold based on the number of grasshoppers ignores a variety of factors that must be *considered by program managers before treatments. Some examples include how voracious the individual species are that compose a grasshopper infestation and the hardiness of rangeland vegetation within a proposed treatment block. These factors are also discussed in the recently published final EIS and are incorporated by reference in the final EA.*

See previous responses for economic thresholds.

Comment 98
APHIS received the following comment, "APHIS must also convey what metrics will be used to determine the area that will be sprayed in any given outbreak".

The size and exact configuration of a treatment block cannot be forecast prior to the emergence of the grasshoppers, requests from land managers and other cooperators, and other environmental considerations such as buffers from water and sensitive species. The program procedures and mitigation measures are adequately described in the EA and supporting documents.

APHIS is unable to predict exactly what areas will be treated before conducting surveys and completing the EA. For ground applications, the terrain is key to be able to treat safely. If the terrain is too rough to safely drive a UTV, then the area is not treated even though other factors warrant a treatment. There are many variables taken into account before an area is treated. Another factor that must be considered is the movement of populations. If for any number of reasons, a treatment can be delayed there is a risk that, depending on species, the boundaries will have to be readjusted to account for the movement of populations.

For example, it is documented that Melanoplus sanguinipes, the Migratory Grasshopper can swarm and fly up to 5-10 miles normally. The longest migrations recorded in 1938 were made by swarms that traveled from northeastern South Dakota to the southwestern corner of Saskatchewan, a distance of 575 miles (Pfadt 1994). This is why it is critical to have a rapid response to outbreaks. The planning and logistics is critical and cannot be documented and accounted for in the NEPA process. Population dynamics of grasshoppers and Mormon crickets are fluid and responses have to be adaptable to the most current assessments to ensure successful suppression treatments while minimizing environmental impacts.

Comment 99
APHIS received the following comment, "The agency must accurately and comprehensively disclose and analyze the range of rare, sensitive, threatened, and endangered species, ecological areas, communities, Native American gathering grounds and sensitive receptors that could potentially be significantly affected by the proposed project" Without this baseline data the EA cannot disclose the environmental effects of the project".

These sensitive sites are not publicized by the land manger or Tribal nations. In the request for treatment letters and in site specific consultation with the land owners/managers, APHIS is made aware of and adheres to protective measures agreed upon. T&E species are analyzed during the USFWS Section 7 consultations. APHIS adheres to protective measures which have been agreed upon with USFWS and addressed in the letters of concurrence. APHIS also works with

Federal and State land managing agencies to protect other sensitive resources managed on their lands.

APHIS adequately summarized available data for current baseline conditions in the draft EA. This includes cultural resources as well as the potential for any overlap of federally listed species with the proposed areas of treatment.

Comment 100
APHIS received the following comment, "APHIS's description of the environmental effects of the pesticides at issue failed to properly capture many of their environmental effects".

APHIS prepared and published separate Final Human Health and Ecological Risk Assessments for all the pesticides used by the Grasshopper Programs (November 2019). These documents and the associated final EIS are incorporated by reference.

Comment 101
APHIS received the following comment, "Long-term exposure to carbaryl is associated with decreased egg production and fertility in birds".

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). Carbaryl has a reported half-life on vegetation of three to ten days, therefore long-term exposure to birds is not anticipated. Carbaryl is practically nontoxic to birds on both an acute oral exposure (LD50 >2,000 mg/kg) and subacute dietary exposure basis (LC50 >5,000 mg/kg of diet). In addition, no chronic effects were observed at a dietary exposure of 300 mg/kg of diet.

Comment 102
APHIS received the following comment, "Carbaryl is considered moderately toxic to mammals with decreased pup survival being the most sensitive effect".

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). Carbaryl has a reported half-life on vegetation of three to ten days, therefore the chronic exposure to mammals that resulted in decreased pup survival is not anticipated.

Comment 103
APHIS received the following comment, "EPA has designated carbaryl as "highly toxic" to bees on a short-term exposure basis and ranged from moderately to highly toxic to other insects, mites and spiders".

Although the Grasshopper Program has used the liquid formulation of carbaryl in the past, nearly all carbaryl applications this year and for the foreseeable future are likely to be a bait. The potential exposures of bees and other pollinators to carbaryl bait are minimal. The risks of carbaryl to bees and other non-target organisms are summarized in the human health and *ecological risk assessment that was prepared to support the final EIS. This analysis is incorporated by reference into the final EA.*

Comment 104
APHIS received the following comment, "Carbaryl is considered "highly toxic" to certain species of fish when exposed to short-term bursts and can reduce the number of eggs spawned when fish are exposed to lower levels over a longer period of time".

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Carbaryl Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. Comparison of the distribution of acute, sublethal and chronic effects data for fish to the residues estimated using ground and aerial ultra-low volume spray and bait applications show that the range of residues do not overlap with acute toxicity values, suggesting there is no acute risk to fish species. APHIS determined there is some overlap with chronic and sublethal effect values and estimated residues. However, carbaryl half-lives in water are typically short and with the proposed one time application chronic exposure and risk to fish is not anticipated. Effects from consumption of contaminated prey are also not expected to be a significant pathway of exposure, based on the low residues and low bioconcentration factor values reported for carbaryl.
APHIS guidelines to buffer bodies of water, streams and rivers were addressed in appendix 1 of Draft EA's. The USFWS Section 7 consultations and USFWS letters of concurrence all reduce the exposure to fish species.

Comment 105
APHIS received the following comments, "Carbaryl has been designated "very highly toxic" to aquatic invertebrates on an acute exposure basis by the EPA and mesocosm studies that analyze how the pesticide affects aquatic community structure have found significant negative effects at low levels".

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Carbaryl Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. The risk assessment summarizes the available laboratory and field effects data for aquatic invertebrates and carbaryl. The risk assessment also summarized the potential exposure and risk to aquatic invertebrates. The EIS and carbaryl risk assessment are incorporated by reference into the EAs.

Comment 106
APHIS received the following comment, "The EPA identified potential interactions between carbaryl and the androgen pathway in fish, indicating that carbaryl is an endocrine disruptor in male aquatic vertebrates".

Carbaryl half-lives in water are typically short and with the proposed one time application chronic exposure and endocrine disruption risk to fish is not anticipated. Effects from consumption of contaminated prey are also not expected to be a significant pathway of exposure, based on the low residues and low bioconcentration factor values reported for carbaryl. Chronic risk is also a conservative estimate because chronic toxicity data is based on long-term *exposures that what would not be expected to occur from a single application, based on the environmental fate of carbaryl in aquatic environments.*

Comment 107
APHIS received the following comment, "On March 12, 2020, the EPA released a draft biological opinion finding that carbaryl is likely to adversely affect 1542 out of 1745, or 86% percent of all listed species in the U.S. and 713 out of 776 designated critical species' habitats across the U.S.".

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

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

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

Comment 108
APHIS received the following comment, "EPA found many Nevada species were likely to be adversely affected. This is a chemical far too toxic for APHIS to consider using across wide swaths of land in Nevada".

Carbaryl is presently approved by the EPA and registered in Nevada. The APHIS proposed use for carbaryl in Nevada is not proposed for use across wide swaths of land in Nevada but in limited areas of rangeland that require a suppression treatment, most likely as a bait treatment. It should be noted that the current labeled uses for carbaryl grasshopper treatments are at much higher labels and can be applied with more frequency than what APHIS is proposing for use in Nevada. In addition carbaryl use by the Program is minor compared to the preferred alternative diflubenzuron. APHIS has evaluated the risk of carbaryl use in the

Program and in general the conclusions are consistent with other risk assessments demonstrating low risk when adhering to label requirements. Additional mitigation measures used by APHIS further reduces the risk to human health and the environment.

The NMFS consultation does not apply to species in Nevada since there are no federally listed species under NMFS jurisdiction however the information was provided in response to comments regarding the final EIS. APHIS submitted a programmatic biological assessment to the USFWS in 2015. APHIS is currently working with the USFWS to update and complete the biological assessment and receive concurrence. The intent of the programmatic biological assessment is to provide consistent mitigation measures for listed species that may co-occur with Program treatments. Consultation with the USFWS is still being completed at the local level prior to any treatments. No APHIS treatments are made in States without prior concurrence from the USFWS or NMFS regarding federally-listed species. This information is also summarized in the final EIS.

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

Comment 109

APHIS received the following comment, "The European Union banned carbaryl in 2007 due to, among other things, "…a high long-term risk for insectivorous birds and a high acute risk to herbivorous mammals, a high acute and long-term risk to aquatic organisms and a high risk for beneficial arthropods".

APHIS summarizes the risk of carbaryl to non-target organisms in final human health and ecological risk assessment that was part of the recently published final EIS. Available effects data and the exposures that would be expected from proposed use in the grasshopper and Mormon cricket program are reduced based on mitigation measures (ex. RAATS, aquatic buffers) and application methods and formulation types which further reduce risk.

Comment 110

APHIS received the following comments, "Carbaryl is classified as "likely to be carcinogenic to humans" based on treatment-related hemangiosarcoma development in mice".

The levels of carbaryl that caused the above-mentioned effects to mice are above exposure concentrations that would be expected to occur for the public as well as workers and applicators in the APHIS grasshopper and Mormon cricket suppression program. The risk to human health from carbaryl use, including the proposed APHIS use, have been evaluated by APHIS and are discussed in the final human health and ecological risk assessment for carbaryl. It should be noted that other agencies have evaluated the risk to carbaryl at much higher application rates than those used in the grasshopper and Mormon cricket program.

Comment 111
APHIS received the following comments, "EPA has determined that humans can be exposed to more than 4 times the amount of carbaryl known to cause neurotoxicity from some legal uses of the pesticide. EPA also found that the current labelled uses of carbaryl may result in neurotoxic harms to mixers, loaders and applicators."

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Carbaryl Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. APHIS evaluated the potential human health risks from the proposed use of carbaryl ULV sprays and carbaryl bait applications and determined that the risks to human health are low. The lack of risk to human health is based on the low probability of human exposure and the favorable environmental fate and effects data.

APHIS treatments are conducted in rural rangeland areas where agriculture is a primary economic factor. Rural rangeland areas consist of widely scattered, single dwellings in ranching communities with low population density. Risk to the general public from carbaryl ground or aerial applications is also expected to be minimal due to the low-population areas proposed for treatment, adherence to label requirements, and additional Program measures designed to reduce exposure to the public.

APHIS is not obligated to analyze the risk posed by all legal uses of carbaryl, but rather the Grasshopper Program formulations and application rates.

The proposed use of carbaryl as a ULV spray or a bait and adherence to label requirements substantially reduces the potential for exposure to humans. APHIS does not expect adverse health risks to workers because of the low potential for exposure to carbaryl when applied according to label directions and the use of personal protective equipment. APHIS quantified the potential risks associated with accidental exposure of carbaryl for workers during mixing, loading, and application. The quantitative risk evaluation results indicate no concerns for adverse health risk for Program workers from carbaryl applications in accordance with program standard operating procedures for safety.

Comment 112
APHIS received the following comment, "EPA has found that all use scenarios of chlorantraniliprole can result in direct or indirect effects to all listed species".

The EPA risk assessment is a screening level ecological risk assessment that evaluated risk under a variety of application rates with most being well above use rates proposed in the APHIS Grasshopper Program. APHIS prepared a final human health and ecological risk assessment that assesses the risk of APHIS Program treatments. The state-level Biological Assessments for APHIS invasive species programs are separate from any consultations conducted in association with pesticide registration and reregistration process.

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore, any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 113
APHIS received the following comment, “Chlorantraniliprole is considered “very highly toxic” to freshwater invertebrates and EPA found that many uses of it can result in acute and chronic harms to aquatic invertebrates. This was the case for both aerial and ground spray applications. Sublethal doses can impair locomotion in bees more than seven days post exposure. A 2013 European Food Safety Authority analysis of chlorantraniliprople found that the use of the pesticide poses a high risk to soil macro-organisms, aquatic invertebrates and sediment dwelling organisms.” and “APHIS must consider chlorantraniliprole substantial environmental impacts, including population level effects”.

The EA provided links to APHIS’ Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Chlorantraniliprole Rangeland Grasshopper and Mormon Cricket Suppression Applications is published. The document summarizes available effects data and characterizes risk to human health and non-target organisms based on the use pattern proposed by the Program. Results from the risk assessment suggest low risk of chlorantraniliprole to non-target aquatic organisms and most terrestrial invertebrates.

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore, any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 114
APHIS received the following comments, “Diflubenzuron is considered “highly” to “very highly toxic” to aquatic invertebrates. In a 2018 analysis, EPA found that the registered, labeled uses of diflubenzuron may result in freshwater invertebrate exposure at up to 550 times the level known to cause harm. Diflubenzuron exposure to honeybees and other pollinators at the larval stage was estimated to be more than 500 times the level known to cause harm. Although arthropods are not a part of EPA’s ecological risk assessment, the European Food Safety Authority found that “Juvenile non-target arthropods were very sensitive to diflubenzuron. Very large in-field no-spray buffer zones would be needed to protect nontarget arthropods. There is no reason for APHIS to exclude consideration of impacts to arthropods in its analysis of this pesticide.” and “APHIS also acknowledges the pollinator impacts but attempts to diminish them without providing evidence on how or why they are not significant”.

The EA provided links to APHIS’ Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Diflubenzuron Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. The EPA risk assessment evaluated risk to aquatic organisms and pollinators based on application rates, methods of application and use patterns that would result in greater exposure and risk to aquatic and terrestrial invertebrates. APHIS evaluated risks to these groups of non-target organisms based on methods of application consistent with Program applications and other mitigation measures for diflubenzuron. The exposure potential is reduced compared to label uses due to many factors. This includes but is not limited to reduced application rates, one application per season, use of RAATs and buffers from aquatic habitats. APHIS relied on laboratory and field collected data *regarding diflubenzuron effects to aquatic and terrestrial invertebrates to show that risk is low for most non-target invertebrates.*

Characterization of risk to aquatic species from Program-specific diflubenzuron applications was made by comparing the residue values in the exposure analysis from ground and aerial applications to the distribution of available acute and chronic fish toxicity data. Residue values were below the distribution of acute and chronic response data, suggesting that direct risk to aquatic species is not expected from diflubenzuron applications. More specifically, the distribution of aquatic invertebrate toxicity data is above the residues estimated from spray drift models for Grasshopper Program ground and aerial applications of diflubenzuron.
The Endangered Species Act section 7 pesticide consultation process between the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (the Services, collectively) and the EPA specifically concerns FIFRA pesticide registration and reregistration in the United States, including all registered uses of a pesticide. The Grasshopper Program treatments employ methods and diflubenzuron application rates that result in substantially lower freshwater invertebrate exposures than the rate cited by the EPA and the commenter.

The EPA Preliminary Risk Assessment to Support Re-registration Review examines all legal uses of diflubenzuron, of which the Grasshopper Program constitutes a small fraction. APHIS is not obligated to examine all legal uses of the pesticide, but rather those contemplated by the program. The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Diflubenzuron Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. Characterization of risk to aquatic species from diflubenzuron applications was made by comparing the residue values in the exposure analysis from ground and aerial applications to the distribution of available acute and chronic fish toxicity data. Residue values were below the distribution of acute and chronic response data, suggesting that direct risk to aquatic species is not expected from diflubenzuron applications. More specifically, the distribution of aquatic invertebrate toxicity data is above the residues estimated from spray drift models for Grasshopper Program ground and aerial applications of diflubenzuron.

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Diflubenzuron Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. The APHIS analysis noted Diflubenzuron has low toxicity and risk to some nontarget terrestrial invertebrates, including pollinators such as honey bees.

Comment 115
APHIS received the following comment, "APHIS also acknowledges the pollinator impacts but attempts to diminish them without providing evidence on how or why they are not significant. It does not mention that Nevada is home to an amazing abundance of native bees and pollinators, and improperly uses honeybees as a surrogate for pollinators, when native pollinators are far more sensitive due to the lack of hive buffering effects. This is not a pesticide that should be applied to broad swaths of land. It is highly toxic to far too many species of importance in Nevada."

Grasshopper 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 7 to 76 days after treatment. Although ant populations exhibited declines of up to 50%, these reductions were temporary, and population recovery was described as immediate (Catangui et al., 1996). No significant reductions in flying non-target arthropods, including honey bees, were reported. Within one year of diflubenzuron applications in a rangeland environment, no significant reductions of bee predators, parasites, or pollinators were observed for any level of diflubenzuron treatment (Catangui et al., 1996).

Comment 116
APHIS received the following comment, "Diflubenzuron is present in the excreted manure and urine of cattle where they range and the cumulative exposure must be considered in accordance with the ESA and NEPA's mandate that an action agency take into account the environmental baseline".

APHIS recognizes that some diflubenzuron resides may be present in urine and feces from cattle that feed on forage immediately after diflubenzuron treatment; however this pathway of exposure is expected to be minor based on the proposed use pattern of diflubenzuron in the Program. Low application rates applied only once per season will reduce the amount of diflubenzuron present in manure and urine. In addition some metabolism of diflubenzuron occurs in animals and there will be further environmental degradation once excreted.

Comment 117
APHIS received the following comment, "Malathion is considered "very highly toxic" to all aquatic and terrestrial invertebrates, as well as aquatic vertebrates such as fish. In addition indirect effects to taxa should be considered.'

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Malathion Rangeland Grasshopper and Mormon Cricket Suppression Applications are published. The risk assessment summarizes available laboratory and field collected aquatic and terrestrial effects data for malathion and then estimated risk based on conservative estimates of exposure. APHIS recognizes in the risk assessment that malathion can be toxic to sensitive non-target species however the effects have to be considered in relation to the potential for exposure to estimate risk as well as historical use in the Program which is negligible.

Comment 118
APHIS received the following comment, "When exposed to malathion for longer periods of time, female birds displayed regressed ovaries, reduced number of hatched eggs and enlarged gizzards".

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Malathion Rangeland Grasshopper and Mormon Cricket Suppression Applications are published.

Several reproductive and developmental studies have been conducted with birds. The lowest median lethal dose to chicken embryos (eggs) was 3.99 mg per egg for 4-day embryos (Greenberg and LaHam, 1969). The median lethal concentration for field applications of malathion to mallard duck eggs was found to be 4.7 lbs. a.i./acre (Hoffman and Eastin, 1981). This is approximately five times greater than the maximum rate for rangeland grasshopper (0.928 lbs. a.i./acre), 7.6 times greater than the maximum APHIS application rate (0.619 lbs. a.i./acre), and nearly 19 times greater than the average RAATs rate applied by APHIS. No effect on reproductive capacity of chickens was found at dietary concentrations as high as 500 ppm in feed (Lillie, 1973). Based on the results from chronic reproduction studies using the bobwhite quail and mallard duck, the NOEC values were 110 and 1,200 ppm, respectively. The most sensitive endpoint in the quail study was regressed ovaries and reduced egg hatch at the next highest test concentration (350 ppm). The effect endpoint in the mallard study was growth and egg viability at the 2,400 ppm level Lowest Observed Effect Concentration (LOEC).

APHIS expects that direct avian chronic effects would be minimal for most species. The preferred use of RAATs during application reduces these risks by reducing residues on treated food items and reducing the probability that they will only feed on contaminated food items. In addition, malathion degrades quickly in the environment and residues on food items are not expected to persist.

Comment 119

APHIS received the following comments, "Malathion degrades into maloxon, which has been shown to be at least 22 times more toxic than the parent molecule".

Similar to other organophosphate pesticides, malathion inhibits the enzyme AChE in the central and/or peripheral nervous system. Malathion is metabolized to malaoxon, which is the active AChE inhibiting metabolite. AChE inhibition is through phosphorylation of the serine residue at the active site of the enzyme, and leads to accumulation of acetylcholine and ultimately neurotoxicity. Malaoxon goes through detoxification with subsequent metabolism. Absorption and distribution of malathion and malaoxon are rapid with extensive metabolism and no accumulation in tissues.

Carboxylesterase detoxifies malathion and malaoxon to polar and water-soluble compounds for excretion. A rat metabolism study showed 80 to 90% of malathion excretion in the urine in the first 24 hours of exposure. Mammals are less sensitive to the effects of malathion than insects due to greater carboxylesterase activity resulting in less accumulation of malaoxon. Available aquatic toxicity data show that malaoxon is approximately 1.5 to 6 times more toxic to fish and 1.8 to 93 times more toxic to amphibians. FMC (2019) reports that malaoxon is 0.80 to 2.58 times more toxic to fish than malathion based on data that were determined to meet their criteria for acceptability. The conversion of malathion to malaoxon in aquatic environments can range from approximately 1.8 to 10% (CDPR, 1993; Bavcon et al., 2005; USEPA, 2012a). The estimated 24-hour EC50 malaoxon value for C. tentans is 5.4 µg/L.

While APHIS assumed that malaoxon is most likely more toxic to aquatic invertebrates than the parent; however, due to its low percentage of occurrence in aquatic systems and its rapid *breakdown, malaoxon is not anticipated to pose a greater aquatic risk when compared to malathion.*

Comment 120
APHIS received the following comment, "A 2017 EPA biological evaluation also found that the use of malathion is likely to adversely affect 1778 out of 1835 listed species in the U.S. and 784 out of 794 critical species' habitats across the U.S. These findings were based on methodology recommended by the National Academy of Sciences. EPA found many Nevada species were likely to be adversely affected, such as the yellow billed cuckoo, Bull trout and Steamboat buckwheat, among others. The U.S. Fish and Wildlife Service later drafted a biological opinion finding that malathion is likely to jeopardize the continued existence of 1284 threatened and endangered species. This is an astounding number of jeopardy calls for a single pesticide, and makes it even more astounding that APHIS would continue to consider using it for grasshopper and cricket control."

The Endangered Species Act section 7 pesticide consultation process between EPA and the Services specifically concerns FIFRA pesticide registration and reregistration in the United States, including all registered uses of the pesticide. The Grasshopper Program use of malathion comprised nearly none of the percent crop treated for rangeland in the past, and this remains APHIS' expectation for the foreseeable future. Further, the Grasshopper Program consults directly with the Services to ensure program activities do not adversely affect protected species or their critical habitat.

Comment 121
APHIS received the following comment, "California's Proposition 65 list of chemicals known to cause cancer and has been designated as having suggestive evidence of carcinogenicity by the EPA for instances of liver, oral palate mucosa and nasal respiratory epithelium tumor formation in mice."

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and Final Human Health and Ecological Risk Assessment for Malathion Rangeland Grasshopper and Mormon Cricket Suppression Applications are published.

Comment 122
APHIS received a comment that, "EPA has determined that humans can be exposed to more than 6 times the amount of malathion known to cause neurotoxicity from some legal uses of the pesticide. EPA also found that the current labelled uses of malathion may result in neurotoxic harms to those exposed to pesticide drift from aerial applications at labelled rates". The commenter also pointed out that occupational applicators, mixers and loaders can be exposed to malathion through inhalation and dermal absorption at levels above what the EPA considers safe – even when using required personal protective equipment"

APHIS evaluated the risk to human health, including neurotoxicity data in its finale human health and ecological risk assessment. The risk assessment was prepared based on APHIS use patterns and Program mitigations that reduce risk to human health. APHIS is not obligated to *ensure the EA and supporting documents analyze the risk posed by all legal uses of malathion, but rather the Grasshopper Program methods and application rates.*

Malathion exposure to the general public is not expected from the program use based on label requirements and program standard operating procedures that prevent potential exposure. Only protected handlers may be in the area during application, and entry of the general public into the treated area is not allowed during the re-entry interval period. APHIS treatments are conducted on rural rangelands, where agriculture is a primary economic factor and widely scattered dwellings in low population density ranching communities are found. The program requires pilots avoiding flights over congested areas, water bodies, and other sensitive areas. Aerial applications are not allowed while school buses are operating in the treatment area; within 500 feet of schools or recreational facilities; when wind velocity exceeds 10 miles per hour (mph) (unless a lower wind speed is required under State law); when air turbulence could seriously affect the normal spray pattern; and/or temperature inversions could lead to off-site movement of spray. The Grasshopper Program also notifies residents within treatment areas, or their designated representatives, prior to application to reduce the potential for incidental exposure.

APHIS acknowledges workers in the program are the most likely human population segment to be exposed to malathion during grasshopper treatments. Occupational exposure to malathion may occur through inhalation and dermal contact during ground and aerial applications. Direct contact exposure from the application of a malathion ULV spray will be minimal with adherence to label requirements, the use of personal protective equipment (PPE), general safety hygiene practices, and restricted entry intervals into treated areas after application. EPA estimates of risk to workers is based on use patterns and rates that result in greater exposure to malathion than would occur in the APHIS program. APHIS evaluated the risk from program specific uses of malathion and demonstrated low risk to applicators. It should also be noted that historical malathion use in the Program is negligible further reducing the potential for any types of human health risk.

Comment 123
APHIS received the following comment, "APHIS touts EPA-approval as an indication that the pesticides that the agency proposes to use are safe. However, under our nation's pesticide laws, EPA-approval is an indication that use of the pesticide won the agency's cost-benefit analysis, and should not be misconstrued as a finding of safety."

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and human health and ecological risk assessments for pesticides used by the Grasshopper Program are published. APHIS does not assert the FIFRA registration of the pesticides by the EPA demonstrates that the Grasshopper Program uses are safe. Instead the extensive risk analysis published by APHIS considered whether the suppression of grasshopper population will have significant environmental impacts, in accordance with NEPA.

Comment 124
APHIS received the following comment, "APHIS does not discuss or account for how pesticides impact overall soil health or the health of any organisms that reside in soil."

The EA provided links to APHIS' Grasshopper Program webpage where the 2019 EIS and HHERA for pesticides used by the Grasshopper Program are published. The HHERA contain extensive analysis of pesticide effects on terrestrial vertebrates, many of which reside in soil.

Comment 125

APHIS received the following comment, "Impacts on soil health can impact listed and non-listed plants by impacting nutrient cycling, soil oxygenation and soil water retention, as well as listed and non-listed animals that rely on plants or soil organisms for their survival."

The Grasshopper Program applies pesticides in accordance with current label restrictions and program operational procedures that are mitigations to minimize significant exposure of soil, water, and air to insecticides; grasshopper chemical treatments are not expected to persist or bioaccumulate in the environment. APHIS evaluated these effects in human health and ecological risk assessments that were prepared along with the final EIS for the grasshopper and Mormon cricket suppression program.

Comment 126

APHIS received the following comment, "Carbaryl was ranked as extremely toxic to earthworms in a lab test rating pesticide toxicity from relatively nontoxic, moderately toxic, very toxic, extremely toxic, and super toxic."

The study was a comparison of the toxicology of 45 pesticide to determine the LC50. These studies exposed earthworms to varying concentrations of carbaryl to determine toxicological endpoints. Based on the extremely high doses, the impact to the survival of earthworms was not only unsurprising, but the object of the studies. APHIS would like to note this laboratory dosing procedure is not comparable to any exposure levels resulting from the use of carbaryl ultra-low volume sprays by the Grasshopper Program.

Comment 127

APHIS received the following comment, "A single application of carbaryl in a field study caused a 38% reduction in survival of total *Lumbricidae*, and a 78% reduction in total earthworms for at least 5 weeks."

APHIS would like to note the "single application" involved applying carbaryl 6 times on a weekly interval to the assigned plots at the highest recommended dose (i.e. Sevin at 9.12 mg/m2), a rate that is greater than 16 times the Grasshopper ultra-low volume liquid rate (0.56 mg/m2). The Grasshopper program only makes one application per year, rather than six weekly treatments. Also, the field study found carbaryl significantly inhibited earthworm feeding activity for at least three weeks without leading to any earthworm death.

In addition, the 78% reduction in earthworm casts noted in the comment resulted from an application of a combination of clothianidin and bifenthrin pesticides.

Comment 128
APHIS received the following comment, "Carbaryl significantly impacted the survival or population abundance of E. fetida, E. Andrei, Lumbricus terrestris, and Lumbricus rubellus, Aporrectodea caliginosa, and Allolobophora chlorotica."

These studies exposed earthworms to varying concentrations of carbaryl to determine toxicological endpoints (NOEC, LC50). Based on the extremely high doses, the impact to the survival of earthworms was not only unsurprising, but the object of the studies. For example in Lima et. al. 2011, ten adult worms with individual fresh weight between 300 and 600 mg, were exposed to different carbaryl concentrations (20, 40, 60, 80, 100 mg/kg). APHIS would like to clarify the Grasshopper Program applies carbaryl ultra-low volume spray at a rate of half a pound active ingredient per acre.

Comparison of the results of paper contact test with those obtained in soils clearly demonstrates that the contact test has no predictive values for the toxicity of an insecticide in soils, though it is important for the initial screening of the environmental chemicals. The differences between lowest and highest LC50 values of insecticides for M. posthuma and E. fetida in paper contact method were only 6.9 and 2.5-fold respectively while in soil they were over 38 and 26-fold. These data demonstrated that worms could tolerate higher concentrations in soil than on moist filter paper. This difference in the behavior of the insecticide may probably due to the rate of diffusion/uptake of insecticide from the medium into the body of the earthworm. It is well reported in the literature that insecticides are adsorbed on soil medium through strong binding by organic matter contents in soils (Davis, 1971, Van Gestel and Van Dis, 1988). Hence, the availability of insecticide for diffusion will be less from the soil than the impregnated filter paper. Contact filter paper test can be used as an initial screening technique to assess the relative toxicity of chemicals; however it fails to represent the situation in the soil ecosystem. Artificial soil test is more representative of the natural environment of earthworms and acute toxicity data on several insecticides can be used in the ecological risk assessment on soil ecosystems.

Comment 129
APHIS received the following comment, "In another study, carbaryl induced an avoidance response in *E. fetida*. Soil structure changes were observed between the control and carbaryl treated sites, with higher treatments of carbaryl causing significantly more lumps in the soil due to earthworm inactivity."

The commenter cited a study where worms were rinsed in tap water and transferred to the flasks containing 2 ml solution per worm. The flasks were gently tilted every 5 min and the exposure was terminated after 30 min. The worms were removed, rinsed in cold tap water and transferred to Petri dishes (five worms in each) containing soil but no pesticide. The worms were inspected at intervals during 80 days or until all the worms were dead or had recovered. The structure of the soil in the Petri dishes was observed in order to get an idea about the ability to work the soil after pesticide treatment. APHIS would like to note this laboratory dosing procedure is not comparable to any exposure scenario resulting from the use of carbaryl ultra-low volume sprays by the Grasshopper Program.

Noteably, E. foetida could tolerate high concentrations of carbaryl without dying, although low concentrations severely affected its ability to work the soil or to disappear from the soil surface. The researchers believe the solutions were equivalent to 64, 32, 16, 8 and 4 mg/kg of pesticide, and found that carbaryl did not kill E. foetida in concentrations up to 64 mg/kg, from the 800 mg/l solution.

The avoidance test is a behavioral test with several advantages (simple, quick and cheap) but one drawback: this is not a measure of toxicity but rather a measure of repellence (Capowiez and Bérard, 2006), and thus is termed 'measure of habitat modification'. As there is not always a direct relationship between avoidance and toxicity, an improvement of this test was recently proposed by Sanchez-Hernandez (2006).

APHIS would like to clarify the Grasshopper Program applies carbaryl ultra-low volume spray at a rate of half a pound active ingredient per acre. If a cubic foot of rangeland soil weighs 75 pounds, 1 acre (43,560 ft.2) of soil two inches deep would weigh 544,500 pounds, or 246,981 kilograms. The maximum rate used by the Grasshopper Program to apply carbaryl as an ultra-low volume spray is half a pound (226796 mg) active ingredient per acre. Therefore, the maximum concentration of 0.92 mg carbaryl spray per kg of soil could result from program applications. However, this analysis assumes none of the foliar spray settled on vegetation, and all of the carbaryl is instantaneously absorbed into the top two inches of soil. In addition, this maximum concentration was less than the lowest concentration which the researchers determined has significant effects on the reduction of the P. excavatus hatching rate (1.51 mg carbaryl per kg of soil).

Comment 130
APHIS received the following comment, "Carbaryl negatively affected the biomass of *E. Andrei*, Perionyx excavates, total earthworms, and *Lumbricus terrestris* at a tenth of the recommended dose."

The carbaryl concentrations used for each test species was chosen based on the LC50/EC50 previously carried out and reported by Lima et al. (2011). This was also a toxicological endpoint study where the acute toxicity was determined by exposing the worms to a nominal concentration range of 20 to 100 mg/kg of technical grade carbaryl. The application rate was 850 grams per hectare of Sevin L85 which is equal to 1.12 pounds active ingredient carbaryl per acre, compared with Sevin XLR which is 44.1 % applied at half a pound active ingredient per acre by the Grasshopper Program.

This study was primarily designed to validate the production of casts by earthworms as a biomarker for behavioral effects. While the significant effects in earthworm weight observed at low concentrations of carbaryl are concerning, Grasshopper program applications of foliar sprays are unlikely to result in the subsurface soil becoming saturated at the concentrations created in the laboratory.

Comment 131
APHIS received the following comment, "A 60-99% reduction in earthworm biomass and density due to carbaryl treatment lasted 20 weeks. Burial of organic matter was also negatively

affected. Casting activity of earthworms was reduced by 90%, and 71% and 81% after 3 and 5 weeks, respectively."

The researchers made two applications of carbaryl at a rate of 8 lbs. a.i./acre, 16 times greater than the maximum spray rate employed by the Grasshopper Program. The Grasshopper Program only makes one application per year. In addition, the foliar spray of ultra-low volume carbaryl over rangeland is unlikely to result in subsurface soil concentrations comparable to the direct turfgrass application made in this study.

Comment 132
APHIS received the following comment, "Carbaryl negatively affected growth in *E. fetida*, and the feeding rate of *Diplocardia* spp. Total cast production of *L. terrestris* was significantly impacted at one-tenth of the recommended field rate."

The lowest test concentration that effected E. fetida resulted from saturation of the test media with 25 mg/kg of carbaryl. Another field study found a single application of carbaryl significantly inhibited earthworm (Diplocardia spp.) feeding activity for at least three weeks without leading to any earthworm death. APHIS would like to note the "single application" involved applying carbaryl 6 times on a weekly interval to its assigned plots at the highest recommended dose (i.e. Sevin at 9.12 mg/m2), a rate that is greater than 16 times the Grasshopper ultra-low volume liquid rate (0.5 lbs a.i./acre). The Grasshopper program only makes one application per year, rather than six weekly treatments.

Comment 133
APHIS received the following comment, "Reproduction of *E. fetida*,
and *Perionyx excavatus* was negatively affected, with the hatching rate of *P. excavatus* reduced by 87% at sublethal concentrations lower than the recommended field rate. A total loss of burrowing was observed at 4 and 8 mg/kg after 40 minutes and at 1 and 2 mg/kg after 80 minutes."

The lowest test concentration that effected E. fetida resulted from saturation of the test media with 25 mg/kg of carbaryl. In another study the reduction of the P. excavatus hatching rate was observed at a concentration of 1.51 mg carbaryl per kg of soil.

APHIS would like to clarify the Grasshopper Program applies carbaryl ultra-low volume spray at a rate of half a pound active ingredient per acre. If a cubic foot of rangeland soil weighs 75 pounds, 1 acre (43,560 ft.2) of soil two inches deep would weigh 544,500 pounds, or 246,981 kilograms. The maximum rate used by the Grasshopper Program to apply carbaryl as an ultra-low volume spray is half a pound (226796 mg) active ingredient per acre. Therefore, the maximum concentration of 0.92 mg carbaryl spray per kg of soil could result from program applications (0.92 mg/kg). However, this analysis assumes none of the foliar spray settled on vegetation, and the carbaryl instantly absorbed into the top two inches of soil, thus mirroring the laboratory conditions. In addition, this maximum concentration was less than the lowest concentration which the researchers determined has significant effects on the reduction of the P. excavatus hatching rate (1.51 mg/kg).

Comment 134
APHIS received the following comment, "Morphological abnormalities and histological changes in *E. andrei* and *M. posthuma* were observed at very low, sublethal doses ranging from 0.24-1.20 mg/kg and 0.5-1.20 mg/kg, respectively."

The cited study did not test E. andrei but rather E. fetida a closely related species. The sublethal doses were derived from anecdotal observations during filter paper tests where concentrations were measured in µg/cm2 not mg/kg. APHIS would also like to note the researcher's skepticism about toxicity tests where the worms are dosed on saturate filter paper. They wrote: Comparison of the results of paper contact test with those obtained in soils clearly demonstrates that the contact test has no predictive values for the toxicity of an insecticide in soils, though it is important for the initial screening of the environmental chemicals. The differences between lowest and highest LC50 values of insecticides for M. posthuma and E. fetida in paper contact method were only 6.9 and 2.5-fold respectively while in soil they were over 38 and 26-fold. These data demonstrated that worms could tolerate higher concentrations in soil than on moist filter paper. This difference in the behavior of the insecticide may probably due to the rate of diffusion/uptake of insecticide from the medium into the body of the earthworm. It is well reported in the literature that insecticides are adsorbed on soil medium through strong binding by organic matter contents in soils (Davis, 1971, Van Gestel and Van Dis, 1988). Hence, the availability of insecticide for diffusion will be less from the soil than the impregnated filter paper. Contact filter paper test can be used as an initial screening technique to assess the relative toxicity of chemicals; however it fails to represent the situation in the soil ecosystem. Artificial soil test is more representative of natural environment of earthworms and acute toxicity data on several insecticides can be used in the ecological risk assessment on soil ecosystem.

Comment 135
APHIS received the following comment, "Carbaryl impacted multiple biochemical biomarkers in *E. andrei*, including Acetylcholinesterase (AChE), methoxyresorufin-O-deethylase (MROD), and NADH and NADPH red cytochrome reductase."

This study exposed earthworms to carbaryl in artificial soil at concentrations of 12, 25 and 50 mg/kg. The research showed that carbaryl inhibited biotransformation enzyme activities but did not induce oxidative stress. Since carbaryl is a cholinesterases inhibitor changes detected in acetylcholinesterase activities were not surprising. The acetylcholinesterase activity reduction was not complete and the residual activity was stable whatever the dose or the exposure duration because of the presence in E. andrei of a non-inhibited, non-specific cholinesterases.

APHIS would like to note the lowest tested soil concentration of carbaryl that caused these effects (12 mg/kg) is approximately 12 times greater than the hypothetical concentrations that could result from Grasshopper Program treatments where none of the foliar ultra-low volume spray settles on vegetation, and the chemical is instantly and uniformly mixed into the top two inches of soil.

Comment 136
APHIS received the following comment, "AChE activity was inhibited in *E. fetida* in two studies, one of which resulted in muscular paralysis that directly impacted earthworm burrowing capabilities."

In the first study, carbaryl stock solution was prepared in acetone and water to yield final concentrations of 1, 2, 4 and 8 parts per million. Five earthworms were individually exposed for 5, 10, 20, 40 and 80 minute intervals in a 50ml beaker containing 2.0ml of various concentrations of test solution. The researchers asserted the test concentrations used in the study were close to expected residues in the soil without any evidence or analysis as proof. They also used higher concentrations to exert significant inhibition of AChE activity and loss of burrowing in earthworms for establishing a dose effect "correlationship". These higher exposures occurred after the individual worms were rinsed in tap water, their borrowing rate was measured, they were rinsed again, then placed back into the solution. Needless to say this systematic dosing in a pesticide solution does not match any exposure levels that could result from the application of ultra-low volume sprays.

While the significant reduction in the ability of worms to burrow in soil was clearly evident at the lowest test concentration (1 ppm) and the earliest period of exposure (5 min), all worms were alive and fully recovered to normal behavior (no tremors, efficient burrowing) 18 hrs. post-exposure to 1 ppm carbaryl.

The second study cited by the commenter measured AChE responses in earthworms exposed to carbaryl on filter paper and in a soil media. APHIS has previously noted the difficultly extrapolating between filter paper toxicological tests to actual exposure scenarios relevant to the Grasshopper Program treatments. While the AChE inhibition reached significance after one day of exposure to 0.48 mg/kg carbaryl, the researchers did not conclude there was a reduction of burrowing capacity. Pure carbaryl was used as a liquid solution, while Zoril 5 was applied as a powder spread on the soil. Zoril 5 was thus more abundant on the superficial soil fraction, and was immediately in contact with the animals, whereas pure carbaryl penetrated into the soil and probably became bioavailable later. APHIS would also like to note the tested application rate of 17.8 pounds per acre carbaryl 5% powder formulation (Zoril 5), that was estimated to result in a concentration of 4.29 mg/kg was nearly twice the maximum Grasshopper Program carbaryl bait rate and had no effect on earthworm AChE activity or the lysosomal membrane stability of E. andrei.

Comment 137
APHIS received the following comment, "In addition to earthworms, carbaryl negatively affected collembola population abundance and reproduction."

The first and second studies cited by the commenter did not investigate carbaryl or collembola (Panda and Sahu, 2004, and Stepić, et al., 2013). The third paper cited used carbaryl as a toxic standard for comparison of the effects of other pesticides (Larson et al., 2012). The researchers applied carbaryl at a rate of 8.17 lbs. a.i./acre. Researchers conducting the fourth study cited by the commenters (Potter et al., 1990) made two applications of carbaryl at the same rate of 8.17 lbs. a.i./acre, 16 times the maximum rate used by the Grasshopper Program in ultra-low volume *sprays. The Grasshopper Program only makes one application per year. Therefore this study used 32 times the carbaryl rate as the program. In addition, the foliar spray of ultra-low volume carbaryl over rangeland is unlikely to result in subsurface soil concentrations comparable to the direct turfgrass application made in this study.*

The next study cited by the commenters (Joy and Chakravorty, 1991) investigated carbaryl toxicity to collembola. Adult specimens of Cyphoderus sp. and Xenylla sp. and Lancetoppia sp. were exposed to soils saturated with solutions ranging from 0.5 to 10 ml/l. Although they noted the standard agricultural doses of carbaryl 50 WP was 6.25 ml/l, the researchers did not provide a sufficient description of their methods for APHIS to make a valuable comparison of the exposure rates of the collembola in the experiment to potential exposure levels resulting from Grasshopper Program treatments.

The commenters cited another study to suggest carbaryl effected collembola reproduction. Three nominal concentrations of carbaryl (1, 4 and 7 mg/kg) in soil chemical behavior and toxicity were investigated at different temperatures. After 15 days from soil spiking, it was observed that carbaryl concentration in soil decreased to 30% and 33% of the initial concentration at the temperature extremes of 8 °C and 28 °C, respectively, and 22.8% of the initial concentration under a 20 °C temperature regime. The collembola survival and reproduction were significantly affected at 4 and 7 mg/kg concentrations, approximately 4 and 7 times greater than hypothetical soil concentrations resulting from Grasshopper Program ultra-low volume sprays (see previous comments for estimations parameters).

Comment 138
APHIS received the following comments, "Carbaryl also negatively impacted Prostigmata mites, and *Tiphia vernalis*, a wasp that feeds on scarab beetle larvae in the soil."

In the first study cited carbaryl applied at a rate of 8.18 lbs ai/acre, greater than 16 times the Grasshopper Program's maximum rate, as a toxic standard for comparison of various pesticide control efficacy. The effects on oribatid and mesostigmatid mites was not surprising or comparable to exposure levels resulting from applications of carbaryl ultra-low volume sprays.

The commenters are mistaken, in that the research cited did not find effects on Tiphia vernalis (Helson et al., 1994).

Comment 139
APHIS received the following comment, "Carbaryl can be particularly toxic to ground-nesting bees, like *Andrena erythronii*, *Bombus terrestris*, and *Bombus terricola*."

The commenters cited a toxicology study where carbaryl was applied topically to the thorax of the bees to investigate lethal doses and determine the concentration values in units of µg ai/g body weight and of µg ai/bee. This dosing method is not comparable to any exposure scenario resulting from the Grasshopper Program treatments using ultra-low volume sprays. APHIS would like to note that of the six insecticides tested, carbaryl had the second lowest relative toxicity, rather than as the commenter characterized being particularly toxic to ground-nesting bees. The researchers noted their study does not suggest an inherent, physiological relationship *between size and pesticide susceptibility, and they further suggested that bumble bees may be at relatively little risk from carbaryl, contrary to the commenter's suggestion of particular toxicity to Bombus terricola. The researchers elaborated carbaryl previously was not found to have significant effects on bumble bees, citing Hansen and Osgood (1984).*

The acute effects of carbaryl on B. terrestris were investigated for ingestion and topical contact in another cited study. The researchers found the calculated hazard ratio for oral exposures of carbaryl (309) was below the mean (1399) and the median (381) of the 14 pesticides tested and reported. Carbaryl was not found to be toxic through topical exposure at the "highest dose advised on the label." The hazard ratio values permit only a comparative evaluation between the different active compounds tested.

Comment 140
APHIS received the following comment, "Carbaryl caused 100% mortality in Nomia melanderi when exposed to field-rate pesticide residues 3 hours post-application, 97% mortality with 8 hours post-application, and 78% mortality 2 days post application. Carbaryl was more toxic than DDT."

APHIS does not use DDT during Grasshopper Program treatments and does not agree the relative toxicity to carbaryl is a concern. The study cited by the commenter did not test carbaryl toxicity on bees, but rather included data from earlier studies. The application rate of carbaryl emulated in the earlier studies was 1.0 lbs 80% wettable powder per acre, approximately twice the maximum ultra-low volume rate used by the Grasshopper Program. APHIS found the literature did not provide sufficient details for a reasonable comparison of the carbaryl application methods and rates for additional effects analysis.

Comment 141
APHIS received the following comment, "*Bombus impatiens* colony vitality (as measured by colony weight, worker weight) and the number of workers, honey pots, and brood chambers was reduced following carbaryl exposure."

The researchers noted the confinement of the bee colonies within cages represent a worst case scenario in that the workers were caged on the sprayed plots for two or four weeks. Whole-colony consequences of a smaller proportion of the workers foraging on insecticide-contaminated weeds in an open system likely would be less severe. In addition, the researchers explained the extent to which an insecticide is hazardous to pollinators is determined by its inherent toxicity as well as the formulation and manner in which it is applied (Stark et al. 1995). For example, pollen contamination, which can decimate honey bee colonies, may be exacerbated by wettable powder or microencapsulated formulations that have high affinity for binding to pollen (Johansen et al. 1983).

APHIS would also like to note the direct application of carbaryl to turfgrass at rates ten times greater (5.44 lbs ai/acre) than the maximum rate used by the Grasshopper Program (0.5 lbs ai/acre) is not comparable to ultra-low volume foliar spray treatments.

Comment 142
APHIS received the following comment, “In a laboratory study, chlorantraniliprole negatively inhibited the enzymes acetylcholinesterase and glutathione-S-transferase in *Eisenia fetida*.”

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore, any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 143
APHIS received the following comment, “Chlorantraniliprole negatively affected *Folsomia candida* (collembola) reproduction.”

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 144
APHIS received the following comment, “Microscopic examination in an avoidance test revealed that the collembola were paralyzed from the chlorantraniliprole treatment and couldn't migrate, clarifying an observed avoidance at 1 mg/kg, but no avoidance at any higher concentrations. The authors note that chlorantraniliprole may be more toxic to non-target arthropods closely related to insects than to other soil invertebrates.”

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 145
APHIS received the following comment, “In the field, ground-nesting bumble bees (*Bombus impatiens*) treated with chlorantraniliprole consumed less pollen than control bees.”

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 146
APHIS received the following comment, “*Staphylinidae* (Coleoptera) population abundance was slightly but significantly suppressed.”

As previously stated, the Grasshopper Program will not be using chlorantraniliprole in Nevada during 2020. Therefore any chlorantraniliprole exposure scenarios which the commenter is concerned about are not relevant at this time.

Comment 147
APHIS received the following comment, “After one application of diflubenzuron, myriapoda populations were nearly eradicated (73% reduction), gamasina mites

were reduced by 40%, and uropodina mites were reduced by 57%. Diflubenzuron treatment reduced the populations of oribatid mites, prostigmata mites, and soil arthropod larvae, mostly comprised of coleoptera and diptera, by nearly 15%."

The cited research does not suggest Grasshopper Program applications of diflubenzuron will result in significant impacts to soil microfauna. The researchers applied diflubenzuron to plots and investigated the effects on Collembola, Insecta, Myriapoda, and 4 groups of mites for 6 months. The observed taxa abundance fluctuated seasonally, but for a majority of taxa no significant differences were noticed between the control and exposed plots. The total number of microarthropods was insignificantly lower in exposed groups. While myriapods were the only taxon that was close to extinction after a single exposure to diflubenzuron the pesticide was applied directly to the soil at a rate four times greater than the maximum conventional application rate used by the program. The researchers noted their data proved that soil has some buffering capacity, and this fact should always be taken into consideration when estimating the risk for the environment.

Comment 148

APHIS received the following comment, "In a field study, collembola populations were negatively affected by diflubenzuron and did not recover for one and a half years. The earthworms, *Dendrobaena rubidus* and *Lumbricus rubellus* were reduced in plots treated with concentrations of diflubenzuron at half the recommended field rate. Gamasid and oribatid mite populations were additionally reduced, and oribatida were observed migrating into deeper soil layers to avoid the pesticide."

The commenters have cited a study where the researchers applied two treatments of diflubenzuron wettable powder directly to the forest floor at a rate 37% higher than the maximum rate used by the Grasshopper Program. Contrary to the characterization of the research findings presented by the commenter, the mean population size of earthworms did not differ significantly during the potential effect phase between control and the 137% the Grasshopper Program rate treatment plot. The populations of the enchytraeid species E. buchholzi, E. minutus, E. norvegicus and M. clavata did not respond to this 137% treatment of diflubenzuron applied twice per growing season. While the number of oribatids decreased after the application of the insecticides in all experimental plots including the control, these differences were only significant in the plot were diflubenzuron was applied directly to the forest floor at a rate nearly 14 times greater than the maximum Grasshopper Program rate. Where Brachychthoniid populations declined significantly in the diflubenzuron treated plots, the reductions were in part compensated by changes in numbers of the dominant genus Oppiella. The researchers explained the half-life of diflubenzuron in soil is reported to range from 1 to 27 days, which was borne out by their data. Therefore, residue accumulations in the organic layer is unlikely if diflubenzuron is only applied once per year.

The researchers acknowledged there could be several potential reasons for differences in populations of soil invertebrates between the study plots. First, the plots could differ independent of any treatment. APHIS agrees this is a reasonable interpretation because of the small sample sizes during the pre-application, potential effect and early recovery data recording phases (I.e. four plots including the control, five sample dates, two replicates, n=10). The testing of natural *variation during the 9 month pre-application phase may not have been sufficient. They decided to interpret deviations as a response to a treatment, if numbers in the potential effect phase were different to those in the other phases in the same plot and to the control in the same phase.*

Comment 149
APHIS received the following comment, "Diflubenzuron treatment resulted in a total loss in brood production of male *Bombus terrestris*, and 100% inhibition of egg hatching success and larval growth. Transovarial transport and accumulation of the pesticide in deposited eggs explained the total loss of reproduction. Abnormal cuticle formation, which can lead to mechanical weakness and death, was observed in dead larvae that worker bees were observed removing from treated nests."

The commenters have cited a study where the B. terrestris was directly dosed with diflubenzuron to test acute toxicity. Adult worker bees were exposed via contact by topical application and orally via drinking sugarwater and by eating pollen. For contact application, 50 µL of the aqueous concentration was topically applied to the dorsal thorax of each worker with a micropipette. The worker bumblebees were also provided diflubenzuron treated sugar-water for drinking for 11 weeks. Bumblebees can also be exposed orally to pollen sprayed until saturation with a diflubenzuron concentration. Both the sugar water and pollen were supplied for unlimited oral consumption.

While APHIS acknowledges the effects of acute diflubenzuron exposures on the egg hatching and larval stages of bumble bees is a concern, the direct dosing conducted by the researchers is not comparable to any exposure levels that could result from the Grasshopper Program diflubenzuron ultra-low volume spray treatments.

In addition, APHIS would like to note, no acute mortality was observed after topical application, nor after oral exposure to treated sugar-water or treated pollen. In all cases, the number of dead worker bees in the treated nests over a period of 11 weeks was not above that of the control groups using water (0–10%).

Comment 150
APHIS received the following comment, "Multiple studies have observed AChE inhibition in earthworms when malathion was applied. Malathion effected the sperm count and viability and testicular histology of male *E. fetida* at sublethal concentrations, potentially impairing population abundance."

APHIS agrees with the commenter that the main acute poisonous effect of malathion is the inhibition of the enzyme acetylcholinesterase, and acute poisoning such as was carried out by the researchers with direct exposures to high concentrations of the pesticide could occur in many types of organisms including earthworms. The direct dosing of earthworms to validate their use as toxicological test organisms does not mimic any exposure scenario resulting from the Grasshopper Program use of ultra-low volume sprays of malathion.

To further illustrate the disparity between exposures resulting from laboratory toxicity tests and grasshopper suppression treatments, APHIS would like to note the lowest tested concentration *was 80 mg/kg of soil. The Grasshopper Program applies malathion ultra-low volume spray at a rate of 0.62 pounds active ingredient per acre. If a cubic foot of rangeland soil weighs 75 pounds, 1 acre (43,560 ft.2) of soil two inches deep would weigh 544,500 pounds, or 246,981 kilograms. The maximum rate used by the Grasshopper Program to apply malathion as an ultra-low volume spray is 0.62 pounds (281227 mg) active ingredient per acre. Therefore, the maximum concentration of 1.14 mg malathion spray per kg of soil could result from program applications. However, this analysis assumes none of the foliar spray settled on vegetation, and the malathion instantly absorbed into the top two inches of soil. This hypothetical soil concentration resulting from ultra-low volume sprays should not be compared in a risk analysis with the 80 mg/kg tested for sub-lethal effects in the laboratory.*

Comment 151
APHIS received the following comment, "In addition to AChE, the biochemical biomarkers glutathione-S-transferase, and catalase were also inhibited by malathion in studies with *Eisenia Andrei*. Malathion has also been observed to negatively affect the reproduction of *E. andrei*."

The commenters have cited research that confirms malathion inhibits AChE in earthworms. While APHIS does not dispute this effect, the agency doubts such effects could result in significant impacts. Notably the researchers found the inhibition period suggests lengthening of retreatment intervals to 45 days is the appropriate conclusion from the study. APHIS only makes one suppression treatment per year to grasshopper infested rangeland.

Comment 152
APHIS received the following comment, "Malathion had a severe effect on AChE activity in *Drawida willsi*. Growth, casting activity, and respiration of *D. willsi* was negatively affected by malathion treatment and did not recover for 75, 60, and 30 days, respectively."

The commenters have cited research that confirms malathion inhibits AChE in earthworms. While APHIS does not dispute this effect, the agency doubts these biomarker effects could result in significant impacts.

The study cited by the commenters described malathion's recommended agricultural dose as 2.7 to 4.0 kg ai/ha and calculated the equivalent 1.5 to 2.22 mg ai/kg soil, which APHIS would like to note are comparable to the concentration estimation provided above. However the toxicity results for a single dose of malathion were reported for a concentration of 2.2 mg ai/kg which is equivalent to double the dose of 4.0 kg ai/acre, nearly six times the application rate used by the Grasshopper Program.

Comment 153
APHIS received the following comment, "In addition to AChE, the biochemical biomarkers glutathione-S-transferase, and catalase were also inhibited by malathion in studies with E. andrei. Malathion has also been observed to negatively affect the reproduction of E. andrei."

The commenters have cited two toxicology studies where earthworms were placed in test tubes lined with malathion saturated filter paper to determine acute effect concentrations, extrapolated from the biomarker, AChE reduction. The dosing methods and units of ug ai/cm2 are not *comparable to any exposure levels that could result from the application of malathion ultra-low sprays by the Grasshopper Program. The study cited by the commenter did not make any conclusions regarding malathion affecting reproduction of E. andrei.*

Comment 154
APHIS received the following comment, "In a lab test rating the toxicity of 45 pesticides to *E. fetida*, malathion was ranked moderately toxic with an LC50 of 114.4 ug/cm."

The study cited by the commenter was a comparison of the toxicology of 45 pesticide to determine the LC50. These studies exposed earthworms to varying concentrations of carbaryl to determine toxicological endpoints. Based on the extremely high doses, the impact to the survival of earthworms was not only unsurprising, but the object of the studies. APHIS would like to note this laboratory dosing procedure is not comparable to any exposure scenario resulting from the use of malathion ultra-low volume sprays by the Grasshopper Program.

Comment 155
APHIS received the following comment, "Malathion caused a 40% decrease in survival of the ground-nesting bee, *Nomia melanderi*."

The study cited by the commenter did not test malathion toxicity on bees, but rather included data from earlier studies. The application rate of malathion emulated in the earlier studies was I.0 lb of emulsifiable concentrate per acre, significantly greater than the maximum ultra-low volume rate used by the Grasshopper Program. APHIS found the literature did not provide sufficient details for a reasonable comparison of the malathion application methods and rates for additional effects analysis.

Comment 156
APHIS received the following comment, "The EAs an agency action subject to this consultation requirement, must be prepared "concurrently with and integrated with environmental impact analyses . . . required by . . . the Endangered Species Act of 1973."

The commenter has confused the EAs prepared by APHIS for the Grasshopper Program in Nevada with other environmental risk analysis documents. See the response to comment 156, below.

Comment 157
APHIS received the following comment, "In order to properly provide information to the public for commenting on the EIS and the EAs, the section 7 process should be completed prior to the completion of NEPA. APHIS must ensure that consultation addresses all species and critical habitat that could be directly and indirectly affected by the proposed project."
The commenter also states that APHIS has not complied with its responsibilities under Section 7 of the ESA. Concerns were raised about specific species in Nevada such as the yellow-billed cuckoo, Caron wondering skipper, southwestern willow flycatcher, and other listed and sensitive species.

As stated in the final EIS APHIS has completed programmatic consultation with the National Marine Fisheries Service (NMFS). The NMFS consultation does not apply to species in Nevada since there are no federally listed species under NMFS jurisdiction however the information was provided in response to comments regarding the final EIS. APHIS submitted a programmatic biological assessment to the USFWS in 2015. APHIS is currently working with the USFWS to update and complete the biological assessment and receive concurrence. The intent of the programmatic biological assessment is to provide consistent mitigation measures for listed species that may co-occur with Program treatments. Consultation with the USFWS is still being completed at the local level prior to any treatments. No APHIS treatments are made in States without prior concurrence from the USFWS or NMFS regarding federally-listed species. This information is also summarized in the final EIS.

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

Comment 158
APHIS received the comment, "The letter of concurrence relied on by APHIS here does not cover 8 out of 16 counties at issue, including Esmeralda, Lincoln, Nye, Carson, Douglas, Lyon, Mineral and Storey counties. And, even for the counties covered, the letter of concurrence is only for carbaryl, diflubenzuron and malathion, thus the letter of concurrence does not cover the activities outlined in the EAs even where it applies to those EAs. APHIS has plainly failed to comply with the basic obligations of Section 7 of the ESA for these projects."

USFWS is aware of this and will remedy it during future concurrences. Proposed treatments are exclusively in northern Nevada where our concurrence is covered. Any treatment in Nevada would have a site specific consultation with USFWS prior to treatment to ensure there is no oversight in consultation.

See comment 29

Comment 159
APHIS received the following comment, "Because the site specific project is vague and fails to describe the breadth of cumulative effects it cannot comply with the ESA or NEPA. Any discrepancy between the project described in the EAs and the documents provided to the U.S. Fish and Wildlife Service must be rectified."

APHIS believes that the site specific information described in the draft EA is adequate to allow completion of Section 7 compliance with the USFWS. Information discussed in the draft EA is also shared with the USFWS during consultation so there is no discrepancy between actions described in the EA and other documents.

Comment 160
APHIS received the following comment, "APHIS would unlawfully be making an irreversible or irretrievable commitment of resources if it allows insecticide application on rangeland grasshoppers and/or Mormon crickets to occur prior to receipt of a final biological opinion from USFWS. APHIS will run afoul of its Section 7 ESA requirements if it chooses to move forward, and it will also likely violate the ESA's prohibition against the take of endangered species as described by Section 9 of the statute if it moves forward with this project prior to properly completing its Section 7 duties. Even where there is a letter of concurrence, APHIS would still fail to comply with the ESA because informal consultation does not authorize the incidental take of federally-listed species nor does it authorize the adverse modification or destruction of critical habitat."

APHIS has been able to complete informal consultation with the USFWS regarding the Program at the State level. Formal consultation has not been required since the USFWS has concurred with the APHIS determinations of not likely to adversely affects, including any associated critical habitat. Since APHIS has complied with Section 7 through informal consultation, APHIS has not violated Section 9 of the ESA, nor has formal consultation been required resulting in a biological opinion.

Comment 161
APHIS received the following comment, "Even where the letter of concurrence applies, it does not apply to all the pesticides APHIS is considering using in the EAs, and as USFWS notes in the letter of concurrence." The commenter goes on to state that any actions taken in counties not covered, using pesticides not cover, or that may take listed species will be in violation of the ESA.

The APHIS Grasshopper Program does not use any pesticides not covered under USFWS concurrence. If it is not listed in the concurrence letter it is not used in the field. APHIS does not treat in counties not covered in the action areas proposed to the USFWS during Section 7 consultation.

Comment 162
APHIS has received the following comment, "Grasshopper spraying in or near riparian areas can decrease prey populations for these species as well as produce chronic sub-lethal effects as a result of drift or ingesting pesticide through the insects they consume."

During the lengthy Local USFWS Section 7 consultations regarding each of the 37 species listed as T&E and with critical habitat and all species of concern within those site specific areas, each species was discussed point by point. APHIS protective measures were determined using the USFWS Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service" (USFWS 2007). The USFWS letters of concurrence agree with our determinations. In Nevada, the use of ground equipment for localized treatments reduces the risk of drift.

Comment 163
APHIS received the following comment, "The Nevada EAs states that this species will be covered under mitigation 3 and 10. This mitigation may protect prey for these species, but there is no published study on the effects of Dimilin on riparian species or at what distance it can be considered to have no effect."

All mitigation measures are mutually agreed upon during Section 7 consultation with USFWS.

Comment 164
APHIS received the following comment, "Given that these fish all live in stream systems which rely to some degree on runoff or snowmelt for water supply, they may be particularly vulnerable to aerial applications of insecticides covering a large area which are then washed into occupied streams and lakes."

All treatments buffer all bodies of water to mitigate non target effects. Weather patterns are monitored closely during proposed treatments and will not occur if rain is imminent to reduce risk of run off.

Comment 165
APHIS received the following comment, "While strong buffers are extremely important, it is also important to note that occupied habitat is not always precisely known, and in many circumstances, ever changing, especially with climate chaos."

APHIS is responsible for being the lead agency on the management of grasshoppers and Mormon crickets on rangeland. APHIS works with the land manager, county and state officials, and USFWS to identify areas where T&E and sensitive species have critical habitat. All treatments have a site specific consultation prior to treatment to identify any areas that may contain these species.

Comment 166
APHIS received the following comment, "The Warm Springs Amargosa pupfish, Ash Meadows Amargosa pupfish, and Ash Meadows speckled dace each occupy spring systems within Ash Meadows National Wildlife Refuge managed by the US Fish and Wildlife Service, with the Devils Hole pupfish occupying a spring in an exclave of Death Valley National Park managed by the National Park Service. These springs are fed from a deep carbonate aquifer, and the flow system which feeds these springs has been traced for dozens of miles to the north and east of Ash Meadows. Each fish is highly sensitive to perturbations in the aquatic conditions which it is adapted to."

All treatments are sent to USFWS for concurrence prior to treatment. If the managing agency of these locations has concerns regarding run off and the proximity of treatment to sensitive areas, mitigations measures would be discussed and agreed upon prior to treatment during pretreatment consultation with USFWS.

Comment 167
APHIS received the following comment, "Both locations are near public rangeland that could be sprayed in the event of a grasshopper population boom. Mormon cricket and grasshopper population booms and the accompanying pesticide spraying are noted as a threat to this species in the 2014 conservation strategy for the Carson wandering skipper. Aerial spraying of Dimilin will harm adult and larvae of this species if spray drifts into a populated area."

APHIS has no proposed treatments in national parks or national wildlife refuges. APHIS would require each land managing agency to provide a request for treatment letter before any treatments would occur. APHIS does not treat land that is not specifically requested by the land manager to be treated.

Comment 168
APHIS received the following comment, "An aerial spray buffer of 1 mile for Dimilin (mitigation 2) would be within important potential habitat area for the Carson wandering skipper, and thus is insufficient for the protection of this species. An aerial spray buffer of 3 miles would (mitigation 6) would remove potentially deadly insecticide from nectar and saltgrass locations within the vicinity of extant populations. APHIS must be extremely careful with this incredibly narrow endemic species (Ash Meadows naucorid) to ensure that no pesticide can enter the groundwater or in any way impact its habitat."

Mitigation measures are outlined in Appendix C table 3 of the Draft EAs. These mitigation measures are agreed upon by USFWS during Section 7 consultation.

Comment 169
APHIS received the following comment, "There is no data on how carbaryl, dimilin, or malathion affects reptiles182 with APHIS attempting to use bird toxicity data to assess reptiles. This is a badly flawed extrapolation. Because there is no data on the effects on reptiles, and because the desert tortoise is significantly imperiled across its range, precautionary principle would dictate that no application of these insecticides occur within desert tortoise habitat."

APHIS agrees that there is uncertainty in the use of avian toxicity data as a surrogate for reptile sensitivity. However in cases where no reptile toxicity data is present avian data can be used to approximate potential hazards. APHIS notes this uncertainty in its pesticide human health and ecological risk assessments that were completed to support the final EIS. This is also consistent with other agencies that have used this avian toxicity data as a surrogate for assessing hazards to chemicals.

In Nevada, the critical habitat for the Desert tortoise was addressed during the local USFWS Section 7 consultations. In order to protect this T&E species and critical habitat, APHIS agreed with USFWS to exclude a one mile radius of all known occupied habitat from APHIS proposed action areas in Nevada. APHIS must also give 5 day notice prior to conducting aerial applications of insecticides in occupied desert tortoise habitat to the USFWS Southern Nevada Field Office. Thus, APHIS actions would be not likely to adversely affect this T&E species in Nevada. The range for this species is primarily in southern Nevada where treatments are not expected to occur.

Comment 170
APHIS received the following comment, "There are no current mitigation practices for Webber's ivesia, which is a significant issue for a plant with such a narrow distribution."

Webber's ivesia is currently listed on the USFWS T&E species list as a threatened species. In the event that Webber's ivesia occurred in or around the treatment area, site specific consultation with USFWS would result in agreed upon mitigation measures prior to treatment. No treatment would occur without prior consultation with USFWS.

Comment 171
APHIS received the following comment, "These mitigation measures can only work if APHIS is entirely confident that it knows the entire scope of occupied habitat for these plant species and that no changes have occurred."

As previously mentioned, APHIS is the lead agency responsible for managing Mormon crickets and grasshoppers on rangelands. Site specific consultation with USFWS and the land manager would be done to identify any areas that have occupied habitat of T&E species or species of conservation concern.

Comment 172
APHIS received the following comment, "While carbaryl is expected to pose minimal risk to aquatic and terrestrial plants, application to wet foliage or periods of high humidity may cause damage to tender foliage."

The comment may be referring to the use of liquid formulations of carbaryl. As stated in previous responses, Nevada is not proposing the use of liquid formulations of carbaryl. There is a very low risk to have enough wet foliage or high humidity to produce enough dew in Nevada.

In addition available toxicity data suggests that effects to terrestrial plants would not occur at the proposed use rates

Comment 173
APHIS received the following comment, "[The commenter] would like to see burrowing owl addressed more directly in these documents since they are a sensitive species and rely heavily on grasshoppers/crickets for prey.

Burrowing owls are addressed as a species of conservation concern under the Migratory Bird Treaty Act. The grasshopper populations burrowing owl's prey on are reduced but not eliminated. The owls will shift their diet to other insects that are not affected by grasshopper treatments either because of biology or the use of RAATs. Program effects on burrowing owls would be no more severe than piping plovers or lesser prairie chickens.

Comment 174
APHIS received the following comment, "It's also a bit confusing to see species that don't exist in NV addressed in EAs specific to NV."

See comment 29