Environmental Assessment

Rangeland Grasshopper and Mormon Cricket Suppression Program

Western South Dakota
EA Number: SD-14-1

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Site-Specific Environmental Assessment
Rangeland Grasshopper and Mormon Cricket Suppression Program
Western South Dakota

I. Need for Proposed Action

A. Purpose and Need Statement

An infestation of grasshoppers and/or Mormon crickets (hereafter referred to collectively as grasshoppers) may occur in western and portions of central South Dakota. The Animal and Plant Health Inspection Service (APHIS) may, upon request by land managers or State departments of agriculture, conduct treatments to suppress grasshopper infestations.

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 severe destruction of forage base for livestock and wildlife, reduction of wildlife habitat, soil erosion and the threat of crop damage and yield loss resulting from migrating grasshoppers. Benefits of treatments include rapid suppression of population resulting in protection of forage and crop yields. The goal of the proposed suppression program analyzed in this environmental assessment (EA) is to reduce grasshopper populations to acceptable levels in order to protect rangeland ecosystems and/or cropland adjacent to rangeland.

This EA analyzes potential environmental consequences of the proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from March 2014 to November 2014 in western South Dakota.

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.

B. Background Discussion

In rangeland ecosystem areas of the United States, grasshopper populations can build up to outbreak levels 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 conducts surveys for grasshopper populations on rangeland in the Western United States, provides technical assistance on grasshopper management to land owners/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 (but not eradicate) 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 destruction caused by grasshopper populations in 17 States (Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming).

APHIS' authority for cooperation in this suppression program is based on Section 417 of the Plant Protection Act of 2000 (7 U.S.C. § 7717).

The South Dakota legislature has passed South Dakota Codified Laws 38-24A-3 and 38-24A-4 to support control activities. SDCL-3 gives authority to the secretary of agriculture to independently or in cooperation with other individuals and agencies to carry out operations or measures to locate, suppress, control, prevent, or retard the spread of pests. In addition SDCL-4 allows for the expenditure of funds to support grasshopper suppression, control, prevention or spread.

A Memorandum of Understanding (MOU) with the Bureau of Indian Affairs detailing cooperative efforts for the suppression of grasshopper and Mormon crickets was finalized and signed June 14, 2010. The agreement outlines the responsibility of BIA to request in writing the inclusion of BIA lands when treatment is necessary on BIA managed lands. If control programs occur on reservation lands, APHIS will comply with all relevant tribal laws which may include appropriate licenses and taxes. In additional APHIS will prepare all NEPA documents.

In January 2009 APHIS and the Bureau of Land Management (BLM) signed a Memorandum of Understanding (MOU) that identifies the relationships and responsibilities between the two agencies that will address the management of grasshoppers and Mormon crickets on BLM land. The MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BLM.

Furthermore, the MOU further states that the responsible BLM official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on national BLM land is necessary. Upon request, BLM will support suppression projects on BLM land by providing land use information, sensitive sites, T&E species and other resource information. BLM may provide personnel, equipment and infrastructure support as available.

Finally BLM will prepare a Pesticide Use Proposal (Form FS-2100-2) for APHIS to treat infestations. This document will be prepared and approved prior to program implementation. The BLM MOU expired on February 13, 2014. Both BLM and APHIS-PPQ are in consultation on the draft version of the proceeding document. This agreement will be valid for five years from the signature date.

Similarly, in September 2008, APHIS and the Forest Service (FS) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on national forest system lands (Document #08-8100-0573-MU). The FS MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the FS.

The MOU further states that the responsible FS official will request in writing the inclusion of appropriate lands in the APHIS suppression project when treatment on national forest land is necessary. This MOU expired in September of 2013. A new MOU has been developed and reviewed by both agencies. It is anticipated that final signatures will be obtained in the very near future.

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. There is considerable uncertainty, however, in the forecasts, so that framing specific proposals for analysis under NEPA is 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 2002 EIS provides a solid analytical and regulatory foundation; however, it may not be enough to satisfy NEPA completely for actual treatment proposals, and the "conventional" EA process will seldom, if ever, meet the program's timeframe of need. Thus, a two-stage NEPA process has been designed to accommodate such situations. For the first stage, this EA will analyze aspects of environmental quality that could be affected by grasshopper treatment in western South Dakota. This EA and finding of no significant impact (FONSI) will be made available to the public for a 30-day comment period. If comments are received during the comment period, they will be addressed in stage 2 of the process. For stage 2, when the program receives a treatment request and determines that treatment is necessary, the specific site within western South Dakota will be extensively examined to determine if environmental issues exist that were not covered in this EA. This stage is intended mainly to insure that significant impacts in the specific treatment are will not be experienced. A supplemental determination will be prepared to document this finding and would also address any comments received on this EA. Supplemental determinations prepared for specific treatment sites will be provided to all parties who comment on this EA.

II. Alternatives

The alternatives presented in the 2002 EIS and considered for the proposed action in this EA are: (A) no action; (B) insecticide applications at conventional rates and complete area coverage; and (C) reduced agent area treatments (RAATS); (D) experimental treatments alternative. Each of the first three alternatives, their control methods, and their potential impacts were described and analyzed in detail in the 2002 EIS. Copies of the complete 2002 EIS document are available for review at 314 S. Henry, Suite 200, Pierre, SD 5750l. It is also available at the Rangeland Grasshopper and Mormon Cricket Program web site, http://www.aphis.usda.gov/ppd/es/ppqdocs.html.

The 2002 EIS is intended to explore and explain potential environmental effects associated with grasshopper suppression programs that could occur in 17 Western States (Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming). The 2002 EIS outlines the importance of grasshoppers as a natural part of the rangeland ecosystem. However, grasshopper outbreaks can compete with livestock for rangeland forage and cause devastating damage to crops and rangeland ecosystems. Rather than opting for a specific proposed action from the alternatives presented, the 2002 EIS analyzes in detail the environmental impacts associated with each programmatic action alternative related to grasshopper suppression based on new information and technologies.

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, included as Appendix 1 to this EA.

A. No Action Alternative

Under Alternative A, the no action alternative, APHIS would not fund or participate in any 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.

B. Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative

Alternative B, insecticide applications at conventional rates and complete area coverage, is generally the approach that APHIS has used for many years. Under this alternative, carbaryl, diflubenzuron (Dimilin®), or Malathion will be employed. Carbaryl and Malathion are insecticides that have traditionally been used by APHIS. The insect growth regulator, diflubenzuron, is also included in this alternative. Applications 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 pound active ingredient (lb a.i.)) of carbaryl spray per acre;
- 10.0 pounds (0.50 lb a.i.) of 5 percent carbaryl bait per acre;
- 1.0 fluid ounce (0.016 lb a.i.) of diflubenzuron per acre; or
- 8.0 fluid ounces (0.62 lb a.i.) of Malathion per acre.

In accordance with EPA regulations, these insecticides may be applied at lower rates than those listed above. Additionally, coverage may be reduced to less than the full area coverage, resulting in lesser effects to nontarget organisms.

The potential generalized environmental effects of the application of carbaryl, diflubenzuron, and Malathion, under this alternative are discussed in detail in the 2002 EIS (Environmental Consequences of Alternative 2: Insecticide Applications at Conventional Rates and Complete Area Coverage, pp. 38–48). A description of anticipated site-specific impacts from this alternative may be found in Part IV of this document.

C. Reduced Agent Area Treatments (RAATs) Alternative

Alternative C, RAATs, is a recently developed grasshopper suppression method in which the rate of insecticide is reduced from conventional levels, and treated swaths are alternated with swaths that are not directly treated. The RAATs strategy relies on the effects of an insecticide to suppress grasshoppers within treated swaths while conserving grasshopper predators and parasites in swaths not directly treated. Carbaryl, diflubenzuron, or malathion would be considered under this alternative at the following application rates:

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

The area not directly treated (the untreated swath) under the RAATs approach is not standardized. In the past, the area infested with grasshoppers that remains untreated has ranged from 20 to 67 percent. The 2002 EIS analyzed the reduced pesticide application rates associated with the RAATs approach but assumed pesticide coverage on 100 percent of the area as a worst-case assumption. The reason for this is there is no way to predict how much area will actually be left untreated as a result of the specific action requiring this EA. Rather than suppress grasshopper populations to the greatest extent possible, the goal of this alternative is to suppress grasshopper populations to a desired level.

The potential environmental effects of application of carbaryl, diflubenzuron, and malathion under this alternative are discussed in detail in the 2002 EIS (Environmental Consequences of Alternative 3: Reduced Agent Area Treatments (RAATs), pp. 49–57). A description of anticipated site-specific impacts from this proposed treatment may be found in Part IV of this document.

D. Experimental Treatments Alternative

APHIS continues to refine its methods of grasshopper control(applied using air and/or ground equipment) in order to make the program more economically feasible and environmentally acceptable. These refinements can include reduced rates of currently used pesticides, improved formulations, development of more target specific baits and development of biological pesticide suppression alternatives or improvements to aerial and ground application equipment. A division of APHIS, the Center for Plant Health Science and Technology (CPHST) located in Phoenix, AZ conducts methods development and evaluations for our agency.

To accomplish this work, experimental plots are used to refine equipment and methods or develop formulations that will possibly be used in future rangeland grasshopper programs. The experimental plot investigations are typically located throughout the western United States, including South Dakota.

Research that may occur in South Dakota in 2014 may involve un-replicated small, 10 acres or less, plots of a new bait toxicant; bifenthrin, a pyrethroid. Another new product to be tested is DoubleTake, a mixture of Dimilin 67% and lambda-cyhalothrin 22%, will be tested on 10 acres or less. Another trial will compare the standard malathion with a new material that includes a synthetic pyrethroid. These tests will require two blocks of 10 acres along with untreated controls in close proximity. Materials will be applied at recommended rates or less. When new materials or formulations not registered, are investigated or applied on areas larger than 10 acres. The necessary experiments may then be carried out under the guidelines or the limitations outlined in the EUP if required.

A replicated study will be started to determine effects of treatments on grasshoppers and/or Mormon crickets and associated non-target arthropods. The treatments will be replicated three times on 640 acre plots for 1920 acres total. Plots comparing application methods and timing of a registered insecticide, Dimilin 2L, no treatment and Prevathon on plots that will be monitored for at least 2 years to gather information on the effects of Prevathon on insects other than grasshoppers. Operational scale trial will test doses of Prevathon using blanket, 4 fl. oz. per acre and RAATs application, 2 fl. oz. per acre to determine the effects on control of grasshoppers and Mormon crickets on rangeland. The test will require at least twelve 640 acre blocks in close proximity.

Evaluations of aerially applied insecticides currently registered on rangeland but not a current option in APHIS sponsored programs may be evaluated in 40 acre plots (replicated 4 times) or in unreplicated 640 acre (section) plots. In studies requiring 640 acre plots, additional plots may be used for RAATs (Reduced Agent Area Treatments, where alternating swaths are not directly treated) applications of the same insecticide.

Additionally, ten acre plots may be ground or aerially applied with non-domestic isolates (from Australia and/or Africa) of the Orthopteran specific fungus Metarhizium acridum. Any application of these foreign pathogens will only occur with the approval of the USDA, APHIS Permit Unit under a specific approved permit that has been issued after a thorough evaluation including a specific Environmental Assessment for the non-persistent, rapidly degrading, biologically based insecticide. Note: These trial studies have been completed in Sidney, MT. USDA, ARS.

When new materials or formulations not registered, are investigated or applied on areas larger than ten acres, Experimental Use Permits (EUP) are required and issued by the Environmental Protection Agency (EPA) to the company developing the product. The necessary experiments may then be carried out under the guidelines or the limitations outlined in the EUP.

During the local informal field level consultation with the appropriate agencies, locations of experimental trials will be made available in order to ensure these activities are not conducted near sensitive species or habitats. Due to the small size of experimental plots, location of plots away from sites with ESA conflicts, EPA approval and informal field level consultations, no adverse effects to the environment or its components are expected from these research activities.

III. Affected Environment

APHIS has routinely conducted adult and nymphal grasshopper surveys throughout western South Dakota and is usually limited to the seven counties that are east of the Missouri River. Due to reduced funding, USDA-APHIS did not conduct a statewide grasshopper survey in 1997. In 1998 and 1999 the SD Department of Agriculture conducted statewide surveys. In 2000 APHIS resumed those activities which will continue in 2014. These surveys are used to assess grasshopper populations during the current year as well as provide indications of future trends.

Appendix 1 identifies operational procedures which serve as guidelines for program implementation. Appendix 2 shows the coverage area of this environmental assessment and Appendix 3 is the 2013 Western South Dakota Adult Survey map.

A. Description of Affected Environment

1. Location and size

The western portion of the affected environment is comprised of 22 counties west of the Missouri River. This area takes in approximately 26,422,272 acres, of which approximately 21% is cropland, 67% is pasture or rangeland and less that 1% is woodland. (U.S. Department of Commerce, 1997). In addition there are four counties that border the east side of the Missouri River that are also considered under the affected environment. The land use percentages of these four counties represent an increase in cropland with approximately 50% of the acres crop and 50% pastureland. Brule, Buffalo, Charles Mix and Hughes counties encompass approximately 1,527,558 acres.

The complete affected environment includes the counties of: Bennett, Brule, Buffalo, Butte, Charles Mix, Corson, Custer, Dewey, Fall River, Gregory, Haakon, Harding, Hughes, Jackson, Jones, Lawrence, Lyman, Meade, Mellette, Pennington, Perkins, Shannon, Stanley, Todd, Tripp and Ziebach.

2. Topography, soils and vegetation

Land and resource management can be broken down accordingly:

Federal/Public lands-Non Indian Lands (approximately 3,451,164 acres)

U. S. Forest Service	Bureau of Land Management
U. S. Corps of Engineers	National Park Service
U. S. Fish and Wildlife Service	Bureau of Reclamation

Indian Reservation (approximately 4,934,294 acres)
(personal communication, Pat Keatts, 2005)
Lower Brule (138,916), Crow Creek (134,039), Standing Rock (569,299 in SD), Pine Ridge (1,773,716), Cheyenne River (1,397,752), Rosebud (883,691), Pierre School (140), Yankton (36,741)

State Lands (approximately 171,022 acres)
School and Public Lands (674,025 acres; personal communication; Jennings)
Game, Fish and Parks land (129,538 acres; personal communication; Coughlin and Nedved)

Private (approximately 16,091,372 acres; Skinner)

Topography and soils in western South Dakota can be broken down into five soil zones; (Westin and Malo, 1978).

1) Cool, Moist Forest (Typic Boralfs)
These soils have developed under a humid climate (an annual precipitation of 20 to 25 inches and an average annual air temperature between 40 to 45 F); soil composite includes limestone, sandstone, and local alluvium from igneous, sedimentary, and metamorphic rocks and a topography which is undulating to mountainous.

2) Cool, Very Dry Plain (Ardic Borolls)
These soils have developed under a cool, semi-arid climate (an annual precipitation of 12 to 16 inches and an average annual air temperature between 42 to 45 F); soil composite includes sandstones, sandy shales, shales, silty shales and siltstones; and a topography which is undulating to strongly sloping with buttes and mesas.

3) Warm, Very Dry Plain (Aridic Ustols)
These soils have developed under a warm, semi-arid climate (an annual precipitation of 14 to 17 inches and an average annual air temperature between 44 to 47 F); soil composite includes shales, siltstones and sandstones; and a topography which is gently undulating to rolling in the shale areas, and undulating to strongly sloping with buttes and plateaus in the siltstone and sandstone areas; badlands are common in areas occupying the bluffs of the large river valleys and the sides of the larger buttes.

4) Cool, Dry Plain (Typic Borolls)
These soils have developed under a cool sub humid climate (an annual precipitation of 15 to 19 inches and an average annual air temperature between 42 to 45 F); soil composite includes sandy shales, shales, sandstones and siltstones; and topography which is gently undulating to rolling with buttes and mesas; areas adjacent to the Missouri River typically have steep hilly slopes and shale breaks where the native vegetation is sparse and is primarily composed of mid to short grasses.

5) Warm, Dry Plain (Typic Ustolls)
These soils have developed under warm, dry, sub humid climate (an annual precipitation of 17 to 24 inches and an average annual air temperature between 44 to 49 F); soil composite includes sands, sandstone, siltstone, silts, shale and clays; and a topography which is gently undulating to rolling; areas adjacent to the

Missouri River are steep, hilly and shale breaks where native vegetation is sparse and is composed of mid to short grasses.

Exclusive of the Black Hills, the western portion of South Dakota can be characterized as a mixed grass prairie, in which shorter grasses have tended to displace midgrasses due to decreased rainfall. Predominate short grasses include: blue grama, needle and thread, western wheat grass, prairie June grass and little blue stem (Johnson and Nichols, 1982; Westin and Malo, 1978). Wooded draws are found throughout western South Dakota in addition to the large forest component of the Black Hills and smaller forested areas in the north and southern counties.

3. Climate

The climate of western South Dakota is a semi arid and comprised of long, cold winters and short hot summers. The average summer temperature is 80 degrees and average January winter temp is 24 degrees decreasing to less than 10 degrees. The areas first frost occurs around the early part of October and the last frost date falls in late April or early May. Precipitation is sporadic and low ranging from 13-20 inches per year with 25% of that precipitation falling as snow. Extensive drought and shorter dry spells contribute to the grasshopper problems and are quite common**.**

4. Grasshopper populations

APHIS has routinely conducted adult and nymphal grasshopper surveys throughout western South Dakota, specifically the counties that are west of the Missouri River. Due to reduced funding, USDA-APHIS did not conduct grasshopper survey in 1997. In 1998 and 1999 the SD Department of Agriculture conducted statewide surveys. In 2000 APHIS resumed those activities and they will continue in 2014. Based on 2013 grasshopper surveys, the attached map (Appendix 3) illustrates an estimate of acres infested during the current year. The adult survey map identifies areas where grasshopper populations are considered economic (generally more than eight grasshoppers per square yard) as well as populations that are sub economic.

5. Human population

The largest city in western South Dakota is Rapid City with a population of approximately 61,000 people. Several other cities ranging in population from 3,000-14,000 do occur as well as some that are substantially smaller, isolated and average 500 to 3,000. Outside these communities these counties are comprised of primarily rural areas with many families reside on ranches. These communities are largely dependent on a thriving agriculture economy for their survival.

6. Surface Waters

South Dakota's landscape is essential divided east and west in half by the Missouri River. The river has a dam system incorporating three dams at Pierre, Ft. Thompson and Pickstown. Western South Dakota's primary water sources are smaller tributary rivers such as the White, Morreau, Grand, Cheyenne and several reservoirs such as Shadehill, Angostura, Belle Fourche and Pactola. This area is dotted with miscellaneous small stock dams, intermittent creeks, ponds and wetlands however this area is considered to be in general an arid area.

7. Agriculture practices

Western South Dakota is primarily rangeland with some crop production of wheat, sunflowers, and millet/sorghum. Cattle and sheep production in western South Dakota comprises nearly 40% and 50% respectively of the overall livestock produced in the state. The effects of economic grasshopper populations on pasture and range can potentially impact a major industry in South Dakota (Cerney, 1993). Tourism also plays a major role in the economy of the area surrounding the Black Hills.

8. Forest lands

The wooded component for western South Dakota includes two National Forests (Black Hills and Custer), wooded draws and shelterbelts that cover approximately 194,890 acres (Castonguay, 1982). Forest vegetation in the Black Hills ranges from xerophytic Bur Oak *(Quercus macrocarpa)* dominated vegetation at the warmer, drier, lower elevations to the mesophytic Black Hills Spruce *(Picea glauca)* dominated vegetation at the cooler, moister, higher elevations (Hoffman and Alexander, 1987). Other forested lands include miscellaneous woody draws, shelterbelts, state parks and forested reservation lands.

9. Wildlife refuges and recreation areas

One Federal wildlife refuge and several state wildlife production areas are found throughout the assessment area. These areas are critical for the production and migration of wildlife throughout the area. State wildlife refuges can be located at http://www.sdgfp.info/Wildlife/index.htm. The eight Federal refuges in South Dakota can be found at http://www.fws.gov/refuges/.

Recreation areas and public access areas to public federal and state lands are widely distributed throughout the assessment area.

B. Site-Specific Considerations

1. Human Health

The 2002 FEIS addresses the human health risk associated with the suppression of grasshoppers. The risk assessment of each insecticide consists of identification of the hazards associated with each agent, assessment of potential human exposure to the agent, an assessment of the dose-response relationship of the agent and a characterization of the risks associated with exposure to the agent. Impacts to workers and the general public were analyzed for all possible modes of exposure (dermal, oral, inhalation).

In general western South Dakota is considered to be sparsely populated. Traditional grasshopper suppression areas are several miles away from populated areas. No cities or towns will be treated in addition sensitive areas such as rural schools, culturally sensitive sites and other sensitive groups will be avoided or buffers will be established to prevent exposure.

Appendix 1 identifies operational procedures that will be followed to insure all precautions are taken to prevent exposure to workers or the general public during suppression activities.

Criteria pollutants, pollutants for which maximum allowable emission levels and concentrations are enforced by the state air control agencies. Pollutants will be produced by fuel combustion in airplanes, vehicles, and machinery used in grasshopper control activities. The amounts of these pollutants should have a negligible temporary effect on air quality.

Increases in ozone concentrations from the volatilization of pesticides and carriers are also expected to be negligible. Malathion, carbaryl and dimilin have a very low vapor pressure and are essentially nonvolatile.

2. Nontarget Species

Under the no action alternative, destruction of grasses and forbs by grasshoppers could cause localized disruption of food and cover for a number of wildlife species.

Chemicals act quickly to reduce grasshopper infestations; thus, damage to vegetation from grasshopper foraging that would occur under the no action alternative would be minimized. Malathion, carbaryl, and dimilin are nontoxic to most plants when applied at label rates. Under chemical control there is a possibility of indirect effects on local wildlife populations, particularly insectivorous birds that depend on a readily available supply of insects, including grasshoppers, for their own food supply and for their young. To the extent that grasshopper spraying may cause a severe reduction in target and nontarget insects, it may jeopardize the survival of local populations of these wildlife species. Research from the Grasshopper IPM Program showed that although direct mortality of birds does not occur, insectivorous birds may temporarily move to untreated areas where insects are more readily available.

Malathion and carbaryl have been shown to reduce brain cholinesterase (ChE) (an enzyme important in nerve cell transmissions) levels in birds. Effects of ChE inhibition are not fully understood but could cause inability to gather food, escape predation, or care for young. Because dimilin is a growth regulating insecticide the higher organisms (birds and mammals) that contain chitin or polysaccharides similar to chitin seem unaffected (Eisler 2000).

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

The wildlife risk assessment in APHIS FEIS 2002 estimated wildlife doses of malathion, carbaryl, and dimilin to representative rangeland species and compared them with toxicity reference levels.

No dose of Malathion will approach or exceed the reference species LD^{50}. Some individual animals may be at risk of fatality or behavioral alterations that make them more susceptible to predation resulting from ChE level changes in Malathion spraying for grasshopper control. However, most individual animals would not be seriously affected.

Carbaryl also poses a low risk to wildlife, with few fatalities likely to occur and a low risk of behavioral anomalies caused by cholinesterase depression.

There is some chance of adverse effects on bird reproduction through the use of any of these chemicals or diesel oil through direct toxicity to developing embryos in birds' eggs.

Some species of granivorous mammals and birds may consume wheat bran bait after it has been applied to grasshopper-infested areas. Carbaryl is moderately toxic to mammals and slightly toxic to birds. There is a clear possibility of cholinesterase depression for any animals feeding on carbaryl bait.

a. Wildlife Resources

According to annual surveys completed by the South Dakota Department of Game, Fish and Parks (GF&P), western South Dakota supports moderate to some of the highest game productions in South Dakota for selected species. In particular, gallinaceous game birds such as ringed-necked pheasant *(Phasianus colchicus)*, wild turkey (*Meleagris gallopavo)*, greater prairie chicken *(Tympanuchus cupido)*, sharp-tailed grouse *(Tympanuchus phasianellus)*, and Northern Bobwhite Quail *(Colinus virginianus)*reach some of the highest concentrations for counties bordering the Missouri River. Big game species such as white-tailed deer *(Odocoileus virginianus)*, mule deer *(Odocoileus hemionus)*, elk *(Cervus elaphus nelsoni)*, and pronghorn *(Antilocapra americana)* have relatively high population concentrations in western South

Dakota. Both elk and pronghorn have large populations in the Black Hills and northwestern part of the state, respectively (Sharps and Benzon, 1984; Trautman, 1982).

Most game species reach their highest densities in the breaks and riparian zones along the Belle Fourche, Cheyenne, Grand, Moreau and White Rivers.

Resident waterfowl populations are low when compared to the remainder of South Dakota, although there are scattered pockets of relatively high concentrations of breeding pairs. Due to the lack of natural wetlands, most waterfowl reproduction occurs in conjunction with stock ponds or small dams.

Fish populations in western South Dakota are located mainly in the Missouri and Cheyenne Rivers, their tributaries, streams and lakes in the Black Hills, and select, isolated stock dams. Selected stock dams provide excellent fishing for largemouth bass *(Micropterus salmoides)*. Many of the streams and lakes throughout the Black Hills are noted for their trout *(Salmo spp.)*. The Cheyenne River does provide a fishery for catfishes *(Ictalurus spp.)*. Fish populations tend to achieve their greatest diversity and population density in the Missouri River. The tail waters and lakes below the three dams are very productive for walleye *(Stizostedion vitreum)*, sauger *(Stizostedion canadense)*, white bass *(Morone chrysops)*, salmon *(Onocorhynchus spp.)* and recently introduced smallmouth bass *(Micropterus dolomieui)*. Populations of sturgeons *(Scaphirhynchus spp.)* and paddlefish *(Polyodon spathula)* also occur in the Missouri River. As of January 1991, both the pallid sturgeon *(Scaphirhynchus albus)* and shovelnose sturgeon *(Scaphirhynchus platorynchus)* became protected species.

On August 8, 2007, the bald eagle was removed from the List of Endangered and Threatened Wildlife (*Federal Register* 72: 37346-37372). The bald eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. On July 12, 1995, the U.S. Fish and Wildlife Service reclassified the bald eagle from endangered to threatened throughout the 48 conterminous States (*Federal Register* 60:35999-36110). Previously, the eagle was protected under the Bald Eagle Protection Act of 1940 and the Endangered Species Act in 1978 (*Federal Register* 43:6230-6233). Delisting was proposed in 1999 because recovery goals were reached around 1990 and the bald eagle was been determined to be recovered by the bald eagle recovery team (*Federal Register* 64: 36453-36464).

The bald eagle is one of the largest eagles, with adults measuring 30 to 35 inches (76 to 89 cm) long from bill to tip of tail, having a wingspan of 7 feet (2 m), and weighing from 8 to 13 pounds (3.6 to 6 kg). Wings are long and broad, adapted or soaring. Bald eagles live from 20 to 30 years in the wild but may live in excess of 50 years in captivity.

Bald eagles generally mate for life unless one of the pair dies. Females normally breed in the fourth year. The eagles are relatively shy and prefer to live in regions that are relatively unpopulated by man. Nests or eyres of sticks or fresh leaves are built near water in the tops of large trees or on rock outcroppings on the sides of mountains and may be used year after year. A pair of eagles may defend a territory of up to 40 square miles (100 square km) but have been known to nest within 1 mile (1.6 Km) of another pair.

Bald eagles normally hunt near water snatching up fish while flying low. Fish are a primary food source; however food may also consist of prey taken from other birds of prey, especially osprey. Rodents or small birds may supplement the normal food sources, depending on the locale.

The historic breeding range included at least 45 of the contiguous states in 1981; however, occupied nests were known in only 30 states.

A recovery plan for the northern states has been prepared. The primary objectives of the northern bald eagle plan are to reestablish self-sustaining populations in the Northern States region.

The Biological Assessment prepared by APHIS in January 1987 and the June 1, 1987, FWS Biological Opinion determined the need for protective measures to be used around bald eagle nesting sites and APHIS has adopted these protective measures. The measures include a one-mile radius no fly-over and treatment-free buffer around occupied nests. To protect foraging areas, chemical sprays would not be used within 2.5 miles upstream and downstream of a nesting site and within 0.25 miles of waters considered to be foraging areas. Specific nesting sites and foraging areas would be identified through contacts with local FWS field offices at least five days prior to treatments.

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

As listed in the National Bald Eagle Management Guidelines (USFWS, May 2007) the following mitigation measures will be followed when practical. Category G helicopters and fixed-wing aircraft; except for authorized biologists trained in survey techniques, operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity will be avoided. In addition, Category A (Agriculture) and Category D (Off Road Vehicle Use) both provide the same guidance for use of ATV's or trucks: No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.

APHIS believes the use of the buffer zones to protect bald eagle nests and foraging areas would adequately protect the eagle and its habitat. Thus, grasshopper control operations would have no effect on the bald eagle or its habitat.

In addition to game species, western South Dakota supports large populations of nongame species. The prairie habitat, combined with the major rivers, support a variety of different bird species.

b. Water Resources and Aquatic Species

Under no action, increased sedimentation of water resources could occur because of loss of vegetative cover (USDA, APHIS 2002).

The hazards of malathion and carbaryl estimated exposures and risks to representative species are analyzed in detail in APHIS FEIS 2002.

Current operational procedures Appendix 1 state that all label recommendations will be followed. Guidelines state no direct application to water is allowed. Reservoirs, lakes, ponds (including livestock and recreational ponds), pools left by seasonal streams, springs, wetlands (i.e., swamps, bogs, marshes, and potholes), perennial streams, and rivers are included in this definition. The no-treatment buffers will be expanded as necessary to respond to on-site (site specific) conditions.

Spraying is not allowed when rain is imminent or when winds exceed 10 miles per hour or less if state law or cooperator agreement specifies. These procedures should protect aquatic species and habitats that are not endangered or threatened from drift or runoff.

In general, malathion is moderately toxic, carbaryl is much less toxic. Malathion and carbaryl have been found to exhibit a high biodegradability in soil and water and no bioaccumulation in food chains, but some pickup by aquatic organisms may occur during direct exposure. Acetyl cholinesterase (a chemical involved in carrying nerve impulses) depression could occur but is not considered significant. Some changes in fish feeding behavior have been observed in field studies. Aquatic insects are very sensitive to these chemicals, and reductions in populations could occur if water bodies receive chemicals by direct spray, spills, or runoff. Based on field studies, these population reductions are likely to be temporary, with recovery occurring in several weeks. Although migrations of terrestrial insects in avoidance of the treatment zone often result in an added food source for predators of insects, consideration should be given to this potential loss in the food chain.

Current operational procedures include a 500-foot buffer zone for chemical spray treatments around water bodies and a 200-foot buffer zone for carbaryl bait. Reservoirs, lakes, ponds (including livestock and recreational ponds), pools left by seasonal streams, springs, wetlands (i.e., swamps, bogs, marshes, and potholes), perennial streams, and rivers are included in the buffer zones. Spraying is not allowed when winds exceed 10 miles per hour or when rain is imminent. These procedures should protect non-endangered or non-threatened aquatic species from drift or runoff.

Malathion degrades rapidly in water by hydrolysis and microbial breakdown. The half-life is 36 hours at pH 8. The potential for bioaccumulation is low and the chemical is quickly excreted from fish.

Carbaryl degrades rapidly in water in one to five days. The bioaccumulation potential is low and the chemical is quickly excreted by fish.

Dimilin directly entering the water on foliage in the fall (cold water temperatures) is more persistent and can result in chronic toxicity to aquatic invertebrates. Diflubenzuron is slightly too practically nontoxic to fish, aquatic snails and most bivalve species. It is very highly toxic to most aquatic insects, crustaceans, horseshoe crabs and barnacles.

c. Threatened or Endangered Species

Risks to wildlife are assumed to be the same as those analyzed in the FEIS and the biological assessments that were used for consultation with U. S. Fish and Wildlife Service (FWS). The following assessments were prepared for the listed species that may be present in a potential control block to assist in determining if the species or its habitat would be affected by program actions.

1) Black-footed ferret *(Mussel nigripes)*

Status: The black-footed ferret was determined to be an endangered species as early as 1967 (32 FR 4001, March 11, 1967; 35 FR 8491-8498, June 2, 1970).

Pertinent species information: The black-footed ferret is larger than most weasels. They are closely associated with prairie dog towns, are considered nocturnal and spend much of their time below the surface in prairie dog burrows. Food consists primarily of prairie dogs, with other small mammals making up the remainder of the diet (Chapman and Feldhamer, 1982).

The most successful reintroduction program is found in Pennington County, the Conata Basin of South Dakota. Other populations can be found in Dewey, Todd, Ziebach and southeast Lyman counties. Ferrets have also been re introduced to Wind Cave National Park in Custer County. All these populations, except the Lower Brule reintroduction effort in Lyman County and the Wind Cave population, are considered as nonessential experimental populations. In addition populations can be found in Canada, Mexico and U.S States of Arizona, Colorado, Kansas, Wyoming, Montana, New Mexico and Utah. The FWS reports that the black-footed ferret may also be found in Adams, Hettinger and Stark Counties of North Dakota.

Reintroduction of the black-footed ferret into the black-tailed prairie dog (*Cynomys ludovicianus*) ecosystem in the Conata Basin/Badlands area of South Dakota occurred from 1994 through 2000. A self sustaining ferret population was established from these reintroduction efforts. A multi-agency committee guides the reintroduction plan. Currently approximately 100 ferrets exist on Buffalo Gap National Grasslands, reduced from 300 due to a recent plague outbreak. This population is considered a nonessential experimental population established according to section 10(j) of the Endangered Species Act. The last reared introduction of kits occurred in 2000. The population is currently surviving and reproducing without reared introductions and also serves as a nursery for other populations.

The immediate one year goals were met by realizing sufficient survivorship in the breeding population to lead to recruitment of wild-born young into the population

Assessment: The black-footed ferret was analyzed in the January 1987 APHIS Biological Assessment (USDA, APHIS, 1987) for possible effects resulting from the Rangeland Grasshopper Cooperative Management Program. The APHIS/FWS ESA formal consultations concluded that the species continued existence would not be jeopardized by the proposed program if program personnel consulted with local FWS prior to any control programs. APHIS will adopt these measures and will consult at least five days prior to any treatments in South Dakota to develop adequate protection measures for documented and verified occurrences of the ferret. Based on these measures program activities will result in no effects to the ferrets or their habitats.

2) Whooping crane *(Grus americana)*

Status: The whooping crane has been determined to be an endangered species (32FR; 48; March 11, 1967: p. 4001; 35 FR 8491-8498, June 2, 1970).

Pertinent species information: The whooping crane is one of the rarest birds in North America. Whooping cranes generally mate for life. Delayed sexual maturity may prevent breeding until cranes are four to six years old. Nesting usually occurs in potholes around bulrush *(Scirpus validus)*, cattail *(Typha sp.)*, sedge *(Carex aquatilis)*, and other plant species.

The wild breeding population of whooping cranes annually migrates between breeding grounds at Wood Buffalo National Park, Northwest Territories, Canada and primary wintering areas at Aransas National Wildlife Refuge and Matagorda Island, Texas. The southward migration from Wood Buffalo generally begins from mid to late September, and all cranes have generally arrived in the Aransas area by mid November. Spring departure from the Aransas area generally begins around early April and may extend over a period as long as 44 days, with first arrivals at Wood Buffalo occurring in late April. Rarely, a few cranes may spend the summer at the Aransas area. The Aransas/Wood Buffalo wild breeding population is the only self sustaining population of whooping cranes remaining.

A non migratory population of whooping cranes currently exists in Florida and an eastern migratory population has been established that moves between Wisconsin and Florida. Whooping cranes have also been recently reintroduced in Louisiana in an effort to establish a non-migratory population there.

Marshes, river bottoms, potholes, prairies and occasionally cropland are the habitats of the whooping crane. Depending upon seasonal availability, the whooping crane subsists on a diet of blue crabs, clams, frogs or fish. During migration, they will utilize cropland.

Assessment: Although there are reported occurrences, critical habitat has not been designated in South Dakota (50 FR; 17.95 (b). The whooping crane may occur statewide with preferred stopovers in shallow wetlands or streams with sparse vegetation and good horizontal visibility (Lewis, 1995). However, most of the Aransas/Wood Buffalo National Park population will have likely migrated to more northern latitudes in Canada during the proposed program period of mid May or later.

Based on the timing of the proposed action, label compliance and the historical information stating most of the cranes from the Wood Buffalo National Park/Aransas National Wildlife Refuge will have already reached their wintering or nesting destinations prior to any proposed treatment there will be no effect on the species from the treatment of grasshoppers in South Dakota.

3) Least tern *(Sterna antillarum)*

Status: The interior population of the least tern was determined to be endangered May 25, 1985. (50 FR, 21784-21792, May 28, 1985).

Pertinent species information: The adult least tern is one of the smaller terns, highly adapted to life on the wing. The birds forage while in flight, snatching fish, crustaceans and insects from the surface of the water. The terns annually migrate with breeding occurring in central South Dakota, typically along the Missouri River and a few may nest on the Cheyenne River.

Nesting colonies occupy sandy sites that are relatively free of vegetation. Eggs are laid in shallow scrapes. Although nests are generally on sandbars or on beaches or spits in coastal areas, alkali flats have been used as nest sites in New Mexico. The species also nests on barren flats of saline lakes and ponds (50 FR 21784-21792, May 28, 1985). Nesting occurs from early May into early August.

The least tern exhibits a localized pattern of distribution and its breeding biology centers around three ecological factors. These include (1) the presence of bare of nearly bare alluvia islands or sandbars, (2) the existence of favorable water levels during the nesting season and (3) the availability of food (50 FR 21784-21792, May 28, 1985)

Assessment: In South Dakota the least terns begin to arrive on the breeding ground in mid April and would be expected to be present when treatments are needed.

In concurrence with the June 1, 1987, FWS Biological Opinion, a 0.25 mile aerial buffer will be maintained for 2.5 miles upstream and downstream of nesting tern colonies on each side of the rivers or other bodies of water less than 1,000 surface acres where nesting colonies are located. To further protect the tern from applications of carbaryl bait a 500 foot buffer (ground or aerial) will be used from known nesting sites. Prior to any treatment, program personnel would contact the local office of FWS at least five days prior to program treatments to determine areas to be protected.

These protection measures are in compliance with the June 1, 1987, FWS Biological Opinion. APHIS believes these measures will adequately protect the least tern and its breeding habitat from program activities and no effects will occur.

4) Piping plover *(Charadrius melodus)*

Status: The piping plover has been determined to be an endangered species in the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio and Pennsylvania, and a threatened species in other states (50 FR 50726-50733, December 11, 1985). Critical habitat has been designated for this species (67 FR 57637-57717, September 11, 2002)

Pertinent species information: The piping plover is a shorebird associated with sandy flats and river banks. Devegetative, sandy areas are generally preferred for breeding habitat. Grassy dunes that may be as small as 200 to 300 feet long may be used. The interior population favors the open shorelines of shallow lakes, especially salt-encrusted shorelines with gravel, sand or pebbly mud.

Although their food habits are not well studied, piping plover are known to prefer aquatic worms, fly larvae, beetles, crustaceans and mollusks. The birds tend to forage singly, but may arrive and depart feeding areas in flocks.

Birds arrive in nesting areas around late March and spread out over nesting beaches. The birds tend to be territorial, sometimes not allowing other birds within 100 feet of their nest. In South Dakota, piping plovers nest mainly in suitable habitat found along the Missouri River, including barren areas of the reservoirs. There are a few locations where piping plovers have nested in northeast South Dakota along saline wetlands but theses areas are inconsistent nesting areas and outside the boundaries where this APHIS action may occur. Critical habitat has been formally designated along portions of the Missouri River in South Dakota.

Assessment: This species was addressed in the 1987 APHIS/FWS, Section 7 Consultation in which FWS determined that to avoid the potential for food contamination, it would be necessary to establish buffers around nesting areas and designated critical habitat. A 0.25 mile no-chemical spray buffer would be maintained around known nesting areas for a distance of 2.5 miles upstream and downstream. Also, where carbaryl bran bait is to be used, a 500 foot no-treatment buffer would be maintained around nesting birds. To determine specific nesting areas, program personnel would contact the local office of FWS five days prior to program activities to determine nesting areas. However, based on the buffer areas which will prevent contamination of food sources and impacts to nesting areas no effect will occur to critical habitat or the specie.

5) Pallid Sturgeon *(Scaphirhynchus albus)*

Status: The pallid sturgeon was determined to be endangered October 9, 1990. (55 FR 36641-36647, September 6, 1990)

Pertinent species information: The pallid sturgeon is a large fish known only to occur in the Missouri River, the Mississippi River downstream of the Missouri River and the lower Yellowstone River. Pallid sturgeons require large, turbid free-flowing riverline habitat with rocky or sandy substrate. They are well adapted to life on the river bottom and inhabit areas of swifter water more so than the related but smaller shovelnose sturgeon. Critical habitat has not been designated at this time. The decline of pallid sturgeons is apparently through habitat modification, lack of natural reproduction, commercial harvest and hybridization with the shovelnose sturgeon in parts of its range. In South Dakota, this fish is known to occur primarily in the Missouri River.

Assessment: In concurrence with the April 16, 1990, FWS Biological Opinion, a 0.25 mile no-aerial ULV buffer would be implemented from known habitats. Within the 0.25 mile, only carbaryl bran bait will be used. These measures are in conformance with previous FWS Biological Opinions for listed fish occurring in large rivers and should result in no effect for the Pallid Sturgeon.

6) American burying beetle *(Nicrophorus americanus)*

Status: The American burying beetle was proposed for listing as an endangered species, October 11, 1988 and listed as endangered June 12, 1989 (FR 54:29652-29655).

Pertinent species information: The American burying beetle (ABB) known also as the giant carrion beetle falls within the family Silphidae. This carrion beetle is the largest of its genus in North America and its biology is similar to other species of *Nicrophorus*. Adult American burying beetles are strongly nocturnal. It has been observed that when exposed to daylight, the adults quickly retreat underground and bury themselves under the rangeland plant litter and soil (Backlund, 2010). The adult beetles feed on carrion by smell where adults will fight other adults for the carcass (World Wildlife Fund, 1990). The carcass is then buried and a brood chamber is constructed for the eggs. Both parents remain with the eggs and tend the larvae, which do not survive without parental care. The young beetles have been observed emerging in July and August.

Prior to 1995, only four populations of the beetle were known to exist, one in eastern Oklahoma, one on a New England island, one near Valentine, Nebraska and one in Arkansas.

A population of ABB was discovered in south central South Dakota in 1995. This population has been monitored annually and has remained stable in abundance and distribution. The population center is in southern Tripp County and extends into southwestern Gregory County and eastern Todd County with one additional find on the southeastern corner of Bennett County in 2007. A single ABB find is not indicative of an established population (Backlund, 2010). A population estimate completed in 2005 for 100 square miles of the distribution area revealed 442 beetles in June and 901 in August. It is estimated there are 800 square miles of occupied habitat in South Dakota and the actual population is large (Backlund, 2008). In August of 2008 additional surveys were conducted in Bennett County and no additional beetles were trapped. Based on surveys from 1995-present it is believed that population estimates are conservative (Backlund, 2009). The general survey conducted in the known populated areas of Tripp and Gregory County during 2009 yielded expected results with nothing significant discovered (personal communication, Backlund, 2010). The population estimate on *N. americanus* in South Dakota exceeds the minimal population size required by the American Burying Beetle Recovery Plan (Raithel, 1991).

Decline of the ABB may be the result of an interplay of several complex factors that include: artificial lighting that decreases populations of nocturnally active insects, changing sources of carrion because of habitat alterations, isolation of preferred habitat because of land use changes, increased edge effect harboring more vertebrate competitors for carrion and the possibility of reduced reproduction because of some genetic characteristic of the species. (Nebraska Game and Parks Commission, 1995)

Assessment: To date, the American burying beetle has been found in Gregory, Todd and Tripp Counties and one location in Bennett County of South Dakota. Maps provided by Doug Backlund, SD Game Fish and Parks indicate the beetle has only been found in areas of those counties that are south of Highway 18.

Malathion and carbaryl are broad spectrum insecticides which can be expected to exhibit little, if any, selective toxicity against target or nontarget insects. One study, where applications of 12 and 16 ounce applications of malathion were conducted over a four year period, revealed immediate adverse effects on ladybird beetles, sycmnus beetles, hooded beetles and soft-winged flower beetles. Malathion is also registered for use against various crops.

Carbaryl is known to have adverse effects on ladybird beetles (USDA, 1987) and is registered for use against the Japanese beetle in rangeland (Union Carbide, 1987). Direct toxic effects from the use of carbaryl bait are not expected.

Dimilin is also a treatment option for program activities. Dimilin is a chitin inhibitor or growth regulator that has allows for negligible impact on the adult burying beetles as dimilin only impacts immature life stages. In this case where the immature stages of ABB spend their life underground and emerge only as adults.   The impacts from dimilin would be minimal.

In all cases RAATs will be the preferred option except in crop protection programs were 100% coverage in the ¼ to ½ mile buffer is necessary to prevent the migration of grasshoppers from federal rangeland to the private agricultural ground.

Most developmental stages of the ABB beetle occur below ground. When the overwintering adults emerge in late May to early June they maintain a strong nocturnal behavior as they search out a mate and a food source for rearing their young. Once a suitable food source has been located the beetles bury the food and move underground tending their young and feeding until they emerge as adults in late July or early August. The nocturnal activity of beetles searching for carrion peaks three hours after sunset and concludes by sunrise (Bedick et al., 1999).

The majority of grasshopper control programs that protect forage occur in late June to mid July when adult beetles are not typically found above ground. When above ground and exposed to daylight they quickly bury themselves under plant litter and soil (Backlund, 2010). Their nocturnal activity and underground life stages will serve as a natural protection measure if areas inhabited by ABB are inadvertently treated by program insecticides during daylight hours.

However due to the potential effects of program treatments to beetle populations, the historical trapping of beetles in Bennett, Gregory, Tripp and Todd Counties, APHIS agrees not to conduct grasshopper control treatments in areas south of Highway 18 in Gregory and Tripp Counties. Furthermore APHIS agrees to a two mile buffer around known beetle finds in Todd and Bennett Counties. Program personnel will contact the local office of FWS five days prior to program activities for consultation. When the protection measures are implemented grasshopper program activities are not likely to adversely affect the American burying beetle populations.

7) Western prairie fringed orchid *(Platanthera praeclara)*

Status: The western prairie fringed orchid was proposed for listing October 11, 1988 and listed as threatened September 28, 1989. (54 FR 187:39857-39863).

Pertinent species information: This member of the family *Orchidaceae* exists in approximately four populations in eight states west of the Mississippi River and one Canadian Province. These states include Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma and South Dakota (FWS, 1988). FWS indicated the possible occurrence of the western prairie fringed orchid in Bennett, Brookings, Clay, Hutchinson, Lake, Lincoln, McCook, Miner, Minnehaha, Moody, Roberts, Shannon, Todd, Turner, Union and Yankton in South Dakota.

The fringed orchid is a perennial herb usually found in tall grass prairies, full sunlight and calcareous silt loam or sub irrigated sand. Flowering normally begins by late June to early July and pollination by night-flying hawkmoths is required for seed production. The fringed orchid shows an adaptation to prairie fires which includes regeneration from tuber rootstock. Critical habitat has not been designated at this time.

Assessment: In response to APHIS' request for species for the 1989 Rangeland Grasshopper Program, FWS indicates that potential habitat for the plant may occur in Bennett, Shannon and Todd Counties, South Dakota of this EA's coverage area. Suitable habitat for the orchid per FWS, still exists in these and other South Dakota counties despite the fact no specimens have been found in recent years.

There could be a potential effect on the pollination of this orchid through a reduction in hawkmoths resulting from the use of program pesticides. Ten hawk moths that have been identified as being potential pollinators of *P. praeclara* based on eye width and proboscis (Phillips 2003). Only four occur in South Dakota. Of the four occurring in South Dakota only one has been confirmed to be a *P. praeclara* pollen vector. *Eumorpha achemon* is a confirmed pollinator but is only documented to occur in one county within the coverage area of this EA, Fall River County, South Dakota. (Cuthrell,1994 and G. Fauske, personal communication 1993). *E.achemon* caterpillar hosts include grape (*Vitis spp.)* and *Ampelopsis spp*. (Opler et al., Butterflies and Moths of North America, 2010) These species, should they be found within the control area would be localized to drainages and higher moisture environments, such as draws, intermittent streams or drainages. Because of their proximity to water those areas would be included in an untreated buffer area that would protect the larval stages of this moth from non target impacts.

Dimilin is our preferred product choice. Dimilin does not impact adult Lepidoptera spp. When this product is applied at labeled rates for grasshopper control, the rate is substantially lower than labeled rates for control of Lepidopteran pests.

APHIS would contact the local office of FWS five days prior to conducting treatments in the above listed counties to determine specific habitat locations. No chemical spray applications of pesticides would be made within three miles of known occupied orchid habitat. Within the three mile buffer, only carbaryl bran bait would be used.

These measures confirm with the FWS' Biological Opinion for the 1989 APHIS Rangeland Grasshopper Program and there should be no effect to the prairie fringed orchid from APHIS activities based on the protective measures described.

d. Proposed Species

Currently there are four proposed species in South Dakota with a final action to list or not list due around October 2014. The formal process of publishing a proposed specie in the Federal Register establishes a comment period for public input into the decision-making process. Plants and animals must be proposed for listing as threatened or endangered species, and the resulting public comments must be analyzed, before the FWS can make a final decision.

1) Dakota Skipper, (*Hesperia dacotae)*

Status: The Dakota Skipper was proposed for listing as threatened on October 24, 2013. (USDOI, FWS, 2013).

Pertinent Species Information: Dakota skipper is a small to medium-sized butterfly with a wingspan of 0.9 - 1.3 inches and hooked antennae. It has a thick body and a faster, more powerful flight than most butterflies. The upper side of the male's wings range from tawny-orange to brown with a prominent mark on the forewing; the lower surface is dusty yellow-orange. The upper side of the female's wing is darker brown with tawny-orange spots and a few white spots on the forewing margin; the lower side is gray-brown with a faint white spot band across the middle. Like other Hesperiidae species, Dakota skippers have a faster and more powerful flight than most butterflies because of a thick, well-muscled thorax.

The annual, single generation of adult Dakota skippers emerges from mid-June to early July, depending on the weather, with flights starting earlier farther west in the range. Males emerge as adults about five days earlier than females. The flight period in a locality lasts two to four weeks and mating occurs throughout this period. Dakota skippers lay approximately 250 eggs on broadleaf plants and grasses although larvae feed only grasses. Females lay eggs daily in diminishing numbers as they age. Dakota skipper eggs hatch after incubating for 7–20 days; therefore, hatching is likely completed before the end of July. Dakota skippers overwinter as larvae. Potential adult life span at three weeks and average life span (or residence on site before death or emigration) at three to 10 days on one Minnesota prairie. Dakota skipper are not known to disperse widely; the dispersal of Dakota skipper is very limited due in part to its short adult life span and single annual flight.

Soil types typical of Dakota skipper sites were described as sandy loams, loamy sand, or loams. Additional soil features, such as soil moisture, compaction, surface temperature, pH, and humidity, may be contributing factors in larval survival and, thus, important limiting factors for Dakota skipper populations.

Dakota skippers are obligate residents of remnant (untilled) high-quality prairie—habitats that are dominated by native grasses and that contain a high diversity of native forbs (flowering herbaceous plants). Dakota skipper habitat has been categorized into two main types: Type A habitat is described as high-quality, low (wet-mesic) prairie with little topographic relief that occurs on near-shore glacial lake deposits, dominated by little bluestem grass (*Schizachyrium scoparium*), with the likely presence of wood lily (*Lilium philadelphicum*), bluebell bellflower (*Campanula rotundifolia*), and mountain deathcamas (smooth camas; *Zigadenus elegans*). Type B habitat is described as rolling native-prairie terrain over gravelly glacial moraine deposits and is dominated by bluestems and needlegrasses (*e.g., Hesperostipa spartea*) with the likely presence of bluebell bellflower, wood lily, purple coneflower (*Echinacea angustifolia*), upright prairie coneflower (*Ratibida columnifera*), and common gaillardia (*Gaillardia aristata*). Therefore, based on the information above, we identify high-quality Type A or Type B native remnant (untilled) prairie, as described above, containing a mosaic of native grasses and flowering forbs and sparse shrub and tree cover to be a physical or biological feature essential to the conservation of the Dakota skipper.

Assessment:
The Dakota skipper is proposed for listing as threatened based on habitat loss and degradation of native prairies and prairie fens, resulting from conversion to agriculture or other development; ecological succession and encroachment of invasive species and woody vegetation primarily due to lack of management; past and present fire, haying, or grazing management that degrades or eliminates native prairie grasses and flowering forbs; flooding; and groundwater depletion, alteration, and contamination. Other natural or manmade factors, including loss of genetic diversity, small size and isolation of sites, indiscriminate use of herbicides such that it reduces or eliminates nectar sources, climate conditions such as drought, and other unknown stressors. Finally existing regulatory mechanisms are inadequate to mitigate this species.

This EA coverage area includes the counties of western South Dakota and the four southern counties that border the Missouri River. Grasshopper control rarely occurs east of the Missouri river due to the percentage of cropland and lack of rangeland habitat. Critical habitat has been declared for the Dakota Skipper in the far eastern counties of Brookings, Day, Deuel, Grant, Marshall, and Roberts of South Dakota where APHIS does not conduct grasshopper control. Based on the location of critical habitat in regards to grasshopper control areas identified in this EA it is determined that program activities will have no effect on the Dakota skipper.

2) **Poweshiek skipperling** (*Oarisma poweshiek*)

Status: The Poweshiek skipperling was proposed for listing as endangered in October 24, 2013. (USDOI, FWS, 2013).

Pertinent Species Information: Poweshiek skipperlings are small and slender-bodied, with a wingspan generally ranging from 0.9 to 1.2 in. It is dark brown above with some light orange along the wing margins and a lighter orange head. The underside of the wings, which can be seen when it's at rest, are dark to light brown with very prominent white veins that may make the wing look striped

Poweshiek skipperling larvae hibernate over winter on the ground; they emerge in spring and early summer to continue developing until they pupate and emerge as adult butterflies. Adults have a short lifespan of only one to two weeks and can be seen between mid-June and mid-July. During that time they mate and lay eggs. Larvae hatch during late summer; they feed and develop through early fall and then overwinter to continue development the following spring.

Adult butterflies feed on nectar from prairie flowers such as purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*), and palespike lobelia (*Lobelia spicata*). They select native, finestemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and slender spike rush (*Eleocharis elliptica*).

Poweshiek skipperlings live in tallgrass prairie in both high, dry areas as well as low, moist areas. Poweshiek skipperlings are also not known to disperse widely; the species, however, will not likely disperse across habitat that is not structurally similar to native prairies, such as certain types of row crops or anywhere not dominated by grasses

Assessment:
The Poweshiek skipperling is proposed for listing as endangered based on habitat loss and degradation of native prairies and prairie fens, resulting from conversion to agriculture or other development; ecological succession and encroachment of invasive species and woody vegetation primarily due to lack of management; past and present fire, haying, or grazing management that degrades or eliminates native prairie grasses and flowering forbs; flooding; and groundwater depletion, alteration, and contamination. Other natural or manmade factors, including loss of genetic diversity, small size and isolation of sites, indiscriminate use of herbicides such that it reduces or eliminates nectar sources, climate conditions such as drought, and other unknown stressors. Finally existing regulatory mechanisms are inadequate to mitigate this species.

This EA coverage area includes the counties of western South Dakota and the four southern counties that border the Missouri River. Critical habitat has been declared for the Poweshiek skipperling in the far eastern counties of Brookings, Day, Deuel, Grant, Marshall, Moody, and Roberts of South Dakota. Based on the location of critical habitat in regards to grasshopper control areas identified in this EA it is determined that program activities will have no effect on the Poweshiek skipperling.

3) ***Rufa Red Knot (****Calidris canutus rufa)*

Status: The rufa red knot was proposed for listing as threatened on September 30, 2013 (USDOI, FWS, 2013).

Pertinent Species Information: (From USDOI, FWS 2013) The rufa red knot is a medium-sized shorebird about 9 to 11 inches (in) (23 to 28 centimeters (cm)) in length.

The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the spring and fall migrations, red knots use key staging and stopover areas to rest and feed.

Wintering areas for the red knot include the Atlantic coasts of Argentina and Chile, the north coast of Brazil, the Northwest Gulf of Mexico from the Mexican State of Tamaulipas through Texas to Louisiana, and the Southeast United States from Florida to North Carolina.

Habitats used by red knots in migration and wintering areas are similar in character, generally coastal marine and estuarine (partially enclosed tidal area where fresh and salt water mixes) habitats with large areas of exposed intertidal sediments. In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks. In many wintering and stopover areas, quality high-tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited. The supra-tidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated.

The primary prey of the rufa red knot in non-breeding habitats include blue mussel (*Mytilus edulis*) spat (juveniles); *Donax* and *Darina* clams; snails (*Littorina* spp.), and other mollusks, with polycheate worms, insect larvae, and crustaceans also eaten in some locations. A prominent departure from typical prey items occurs each spring when red knots feed on the eggs of horseshoe crabs, particularly during the key migration stopover within the Delaware Bay of New Jersey and Delaware. Delaware Bay serves as the principal spring migration staging area for the red knot because of the availability of horseshoe crab eggs.

Assessment: A primary threat to the red knot is destruction and modification of its habitat and forage, particularly the decline of key food resources resulting from reductions in horseshoe crabs. Competition with other species for limited food resources, coastal wind turbine farms, and climate change are also threats.

Based on the biology of the species, specifically its migration patterns, prey diet and habitat requirements there is a low probability that a rufa red knot would be found in South Dakota or in program areas. In addition because diflubenzuron, our preferred treatment choice, is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by diflubenzuron. Subsequently this leads to a no effect determination for the rufa red knot.

4) Northern long-eared bat, (*Myotis septentrionalis)*

Status: The northern long-eared bat was proposed as an endangered species on October 2, 2013 (USDOI, FWS, 2013).

Pertinent Species Information:
A medium-sized bat species, the northern long-eared bat adult body weight averages five to eight grams (0.2 to 0.3 ounces), with females tending to be slightly larger than males (Caceres and Pybus, 1997). Average body length ranges from 77 to 95 millimeters (mm) (3.0 to 3.7 inches (in)), tail length between 35 and 42 mm (1.3 to 1.6 in), forearm length between 34 and 38 mm (1.3 to 1.5 in), and wingspread between 228 and 258 mm (8.9 to 10.2 in) (Caceres and Barclay, 2000; Barbour and Davis, 1969). Pelage colors include medium to dark brown on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham, 1993; Whitaker and Mumford, 2009). As indicated by its common name, the northern long-eared bat is distinguished from other *Myotis* species by its long ears (average 0.7 in).

The northern long-eared bat ranges reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to the Florida panhandle (Whitaker and Hamilton, 1998; Caceres and Barclay, 2000; Amelon and Burhans, 2006).

However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans, 2006).

In the Midwest, the northern long-eared bat is commonly encountered in summer mist-net surveys throughout the majority of the Midwest and is considered fairly common throughout much of the region.

Northern long-eared bats predominantly overwinter in hibernacula that include caves and abandoned mines. Hibernacula used by northern long-eared bats are typically large, with large passages and entrances (Raesly and Gates, 1987), relatively constant, cooler temperatures (0 to 9 °C (32 to 48 °F) (Raesly and Gates, 1987; Caceres and Pybus, 1997; Brack, 2007), and with high humidity and no air currents (Fitch and Shump, 1979; Van Zyll de Jong, 1985; Raesly and Gates, 1987; Caceres and Pybus, 1997).

During the summer, northern long-eared bats typically roost singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Males and non-reproductive females' summer roost sites may also include cooler locations, including caves and mines (Barbour and Davis, 1969; Amelon and Burhans, 2006). Northern long-eared bats have also been observed roosting in colonies in human made structures, such as buildings, barns, a park pavilion, sheds, cabins, under eaves of buildings, behind window shutters, and in bat houses (Mumford and Cope, 1964; Barbour and Davis, 1969; Cope and Humphrey, 1972; Amelon and Burhans, 2006; Whitaker and Mumford, 2009; Timpone et al., 2010; Joe Kath, 2013, pers. comm.).

The northern long-eared bat appears to be somewhat opportunistic in tree roost selection, selecting varying roost tree species and types of roosts throughout its range, including tree species such as black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), silver maple (*Acer saccharinum*), black locust (*Robinia pseudoacacia*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), sourwood (*Oxydendrum arboreum*), and shortleaf pine (*Pinus echinata*) (e.g., Mumford and Cope, 1964; Clark et al., 1987; Sasse and Perkins, 1996; Foster and Kurta, 1999; Lacki and Schwierjohann, 2001; Owen et al., 2002; Carter and Feldhamer, 2005; Perry and Thill, 2007; Timpone et al., 2010). Northern long-eared bats most likely are not dependent on a certain species of trees for roosts throughout their range; rather, certain tree species will form suitable cavities or retain bark and the bats will use them opportunistically (Foster and Kurta, 1999). Carter and Felhamer (2005) speculated that structural complexity of habitat or available roosting resources are more important factors than the actual tree species. Many studies have documented the northern long-eared bat's selection of live trees and snags, with a range of 10 to 53 percent selection of live roosts found (Sasse and Perkins, 1996; Foster and Kurta, 1999; Lacki and Schwierjohann, 2001; Menzel et al., 2002; Carter and Feldhamer, 2005; Perry and Thill, 2007; Timpone et al., 2010).

In tree roosts, northern long-eared bats are typically found beneath loose bark or within cavities and have been found to use both exfoliating bark and crevices to a similar degree for summer roosting habitat (Foster and Kurta

1999; Lacki and Schwierjohann, 2001; Menzel et al., 2002; Owen et al., 2002; Perry and Thill, 2007; Timpone et al., 2010).

Females tend to roost in more open areas than males, likely due to the increased solar radiation, which aids pup development (Perry and Thill, 2007). Fewer trees surrounding maternity roosts may also benefit juvenile bats that are starting to learn to fly (Perry and Thill, 2007)

Northern long-eared bats hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources. In general, northern long-eared bats arrive at hibernacula in August or September, enter hibernation in October and November, and leave the hibernacula in March or April (Caire et al., 1979; Whitaker and Hamilton, 1998; Amelon and Burhans, 2006). However, hibernation may begin as early as August (Whitaker and Rissler, 1992).

While the northern long-eared bat is not considered a long-distance migratory species, short migratory movements between summer roost and winter hibernacula between 35 miles 55 miles have been documented (Nagorsen and Brigham,1993; Griffin, 1945).

Northern long-eared bats switch summer roosts often (Sasse and Perkins, 1996), typically every two to three days (Foster and Kurta, 1999; Owen et al., 2002; Carter and Feldhamer, 2005; Timpone et al., 2010). Bats switch roosts for a variety of reasons, including, temperature, precipitation, predation, parasitism, and ephemeral roost sites (Carter and Feldhamer, 2005).

Breeding begins in late summer or early fall when males begin swarming near hibernacula. After copulation, females store sperm during hibernation until spring, when they emerge from their hibernacula, ovulate, and the stored sperm fertilizes an egg. This strategy is called delayed fertilization. After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies, with young, generally have 30 to 60 bats, although larger maternity colonies have been observed. Most females within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth.

Most mortality for northern long-eared and many other species of bats occurs during the juvenile stage (Caceres and Pybus, 1997). Adult northern long-eared bats can live up to 19 years.

The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Nagorsen and Brigham, 1993; Brack and Whitaker, 2001; Griffith and Gates, 1985), with diet composition differing geographically and seasonally. The most common insects found in the diets of northern long-eared bats are lepidopterans (moths) and coleopterans (beetles) (Feldhamer et al., 2009; (Brack and Whitaker, 2001)) with arachnids (spiders) also being a common prey item (Feldhamer et al., 2009).

Foraging techniques include catching insects in flight and gleaning in conjunction with passive acoustic cues (Nagorsen and Brigham, 1993; Ratcliffe and Dawson, 2003). Observations of northern long-eared bats foraging on arachnids (Feldhamer et al., 2009), presence of green plant material in their feces (Griffith and Gates, 1985), and non-flying prey in their stomach contents (Brack and Whitaker, 2001) suggest considerable gleaning behavior. Northern long-eared bats have the highest frequency call of any bat species in the Great Lakes area (Kurta, 1995). Gleaning allows this species to gain a foraging advantage for preying upon moths because moths are less able to detect these high frequency echolocation calls (Faure et al., 1993). Emerging at dusk, most hunting occurs above the understory, 3 to 10 feet above the ground, but under the canopy (Nagorsen and Brigham, 1993) on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker, 2001; LaVal et al., 1977). This coincides with data indicating that mature forests are an important habitat type for foraging northern long-eared bats (Caceres and Pybus, 1997). Occasional foraging also takes place over forest clearings and water, and along roads (van Zyll de Jong, 1985). Foraging patterns indicate a peak activity period within 5 hours after sunset followed by a secondary peak within 8 hours after sunset (Kunz, 1973).

No other threat is as severe and immediate to the northern long-eared bat's persistence as the disease, white-nose syndrome. Some habitat has been lost, degraded, or fragmented, primarily through the disturbance of hibernacula and land development. Mortality caused by wind turbines is expected to increase.

Assessment:
During our summer program months, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. These areas are primarily found in the Black Hills of South Dakota. Because of the minimal rangeland component associated with the Black Hills, program activities in this area are unlikely and have not occurred to date.

The Northern long eared bat has been also been recorded in northwest South Dakota as well as along the Missouri River. All program activities require a .25 mile buffer along the Missouri River. Again, program activities in these areas are unlikely to do the increase in cropland and reduction of rangeland.

Dimilin is always our preferred choice. Because diflubenzuron, dimilin, is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by diflubenzuron.

Program personnel will contact the local office of FWS five days prior to program activities for consultation. When the protection measures are implemented grasshopper program activities are not likely to adversely affect the Northern Long Eared bat.

e. Candidate Species:

After a thorough analysis FWS has concluded the greater sage-grouse and the Sprague's pipit warrants protection under the ESA. However the FWS has determined that proposing the species for protection is precluded by the need to take action on other species facing more immediate and severe extinction threats. As a result, the sage grouse and the Sprague's pipit will be place on the list of species that are candidates for ESA protection.

1. **Sprague's Pipit** *(Anthus sptagueii)*

The U.S. Fish and Wildlife Service in South Dakota have indicated concern regarding the impacts of a grasshopper suppression program on the Sprague's pipit. The Sprague's Pipit is a small passerine of the family Motacillidae, endemic to the Northern Great Plains and strongly tied to native prairie throughout its lifecycle. Native grasslands are disturbance dependent without it; the vegetative specie mix is altered and overgrown with wood vegetation unsuitable for pipit habitat. In addition many of the historical disturbances such as wildfires and buffalo grazing no longer are applicable.

The breeding range for the Sprague's pipit in South Dakota includes its most northern portions. They require large patches of rangeland with specific grass height requirements for their ground nesting. Migration occurs to the southern and southeastern United States. Sprague's pipits primarily feed on arthropods and have been sighted in sunflower fields although their use of crop fields is rare.

Due to its cryptic coloring and secretive nature the Sprague's pipit has been described as "one of the least known birds in North America" and wide range surveys have not been conducted. The population was estimated to be 870,000 in 1995 and it is estimated to decline at a rate 3.9% annually. It is estimated the population would have declined to approximately 479,000 in 2010. FWS has determined that habitat conversion, fragmentation development and associated facilities are all contributing factors to the decline of the pipit.

2. Greater Sage Grouse (*Centrocercus urophasianus*)

The U.S. Fish and Wildlife Service in South Dakota have also indicated concern regarding the impacts of a grasshopper suppression program on greater sage-grouse.

The FWS analyzed potential factors that may affect the habitat or range of the greater sage grouse and determined that habitat loss and fragmentation resulting from wildfire, energy development, urbanization, agricultural conversion, and infrastructure development are the primary threats to the species.

Greater sage-grouse are members of the Phasianidae family. Greater sage-grouse require large, interconnected expanses of sagebrush with healthy, native understories. They depend on a variety of shrub-steppe habitats throughout their life cycle, and are considered obligate users of several species of sagebrush. Thus, sage-grouse distribution is strongly correlated with the distribution of sagebrush habitats. Sagebrush is the most widespread vegetation in the intermountain lowlands in the western United States and is considered one of the most imperiled ecosystems in North America.

Sage-grouse exhibit strong site loyalty, even when the area is no longer of value, to seasonal habitats, which includes breeding, nesting, brood rearing, and wintering areas. Adult sage-grouse rarely switch between these habitats once they have been selected, limiting their adaptability to changes.

During the spring breeding season, Productive nesting areas are typically characterized by sagebrush with an understory of native grasses and forbs that provides an insect prey base, herbaceous forage for nesting hens, and cover for the hen while she is incubating.

After hatching the sage grouse eats insects for the first few weeks but soon Move on to weeds, grasses and sagebrush. As vegetation continues to desiccate through the late summer and fall, sage grouse shift their diet entirely to sagebrush. Sage-grouse depend entirely on sagebrush throughout the winter for both food and cover.

Many populations of sage-grouse migrate between seasonal ranges in response to habitat distribution. Almost no information is available regarding the distribution and characteristics of migration corridors for sage-grouse.

There is little information available regarding minimum sagebrush patch sizes required to support populations of sage-grouse. Currently, greater sage-grouse occur in 11 States (Washington, Oregon, California, Nevada, Idaho, Montana, Wyoming, Colorado, Utah, South Dakota, and North Dakota), and two Canadian provinces (Alberta and Saskatchewan), occupying approximately 56 percent of their historical range.

Federal agencies manage almost two thirds of the sagebrush habitats. The Bureau of Land Management (BLM) manages just over half of sage grouse habitats, while the U.S. Forest Service (USFS) is responsible for management of approximately 8 percent of sage-grouse habitat.

d. Domestic Bees

Nationally, South Dakota ranks third in the nation for honey production with approximately 17,820,000 pounds being produced. The state is noted for its light colored, high quality clover honey (Reiners, 2013). Honey flow begins to increase in late June as the colonies increase and strengthen, and peaks during July when as much as two-thirds of the annual production will be realized. This flow is especially large during years when climatic conditions favor yellow sweet clover *(Melilotus officinalis)* growth and development. Yellow sweet clover blooms from late May through August, with peak bloom occurring from late June through mid-July.

The apiary industry in South Dakota is regulated by South Dakota Codified Law 38-18. The statute requires that all apiarists register locations of their bee yards with the South Dakota Department of Agriculture. It also provides that apiaries must not be located any closer than three miles to another registered location.

In the event of a control program, all registered beekeepers in the concerned area will be alerted by the South Dakota Department of Agriculture. Beekeepers will be advised to move their bees at least two miles from the spray block boundaries. Notification will be through the U. S. mail of the possibility of a treatment and the proposed acres to be treated. Beekeepers will receive a second notification when project plans are finalized. Project maps and projected treatment dates will be included with the second notice. In all cases a two mile buffer zone will be observed around a bee yard.

e. Biological Control Insectaries

Availability of biological control alternatives to weed and insect management has greatly increased throughout South Dakota and the Western States in recent years. Biological control insectaries have become a consideration in conducting grasshopper treatment projects that use a chemical alternative.

Throughout South Dakota, APHIS, county weed control agencies, and Federal, State, and private land managers have and continue to establish leafy spurge *Euphorbia esula* biocontrol insectaries as well as insectaries for species of insects which help control spotted knapweed *Centaurea maculosa*, purple loosestrife *Lythrum salicaria*, Canada thistle *Cirsium arvense*, salt cedar *Tamarix spp*. and Dalmatian toadflax *Linaria genistifolia ssp. dalmatica*. These groups will continue to establish insectaries throughout the assessment area. The exact number of insectaries is unknown. It will be assumed by APHIS that insectaries could occur in any treatment block.

Research conducted by APHIS Methods Development concluded that *Aphthona spp*. is susceptible to the chemical treatment alternatives including carbaryl bait. Treatments could greatly lower the current season's harvest potential depending on treatment timing. One study has been conducted to determine the effects of program insecticides on the flea beetles, *Aphthona nigriscutis and A. lacertosa.* They are used to control leafy spurge, an invasive weed that is spreading on rangeland and other ecosystems in the Western States. Because leafy spurge infestations can occur on rangeland where damaging grasshopper populations may require treatment, *Aphthona* beetles could be exposed to insecticides.

Foster *et. al*. (2001) determined the effect of grasshopper suppression programs on flea beetles addressing issues such as how much flea beetle mortality grasshopper program insecticides cause and how long it takes for flea beetles to return to pretreatment levels. In laboratory tests diflubenzuron produced no substantial flea beetle mortality; malathion spray produced moderate (25 to 41 percent) mortality; and carbaryl spray produced 86 to 96 percent mortality. Field evaluations showed that diflubenzuron resulted in 18 percent mortality at 1-week post treatment and a full recovery to pretreatment levels 2 weeks after treatment. Carbaryl bait resulted in 17 percent mortality, carbaryl spray resulted in 60 to 82 percent mortality, and malathion resulted in 21 to 44 percent mortality. In these field evaluations at 1 year after treatment, adult *Aphthona* populations in 23 of 24 plots had surpassed pretreatment levels.

Site specific conditions or views of cooperators may warrant protection measures such as no treatment buffer zones or augmentation releases of biocontrol agents. Modifications to application patterns would be made only after informal field level consultations with cooperators. RAATs application techniques would also reduce impacts because untreated areas would act as refugee for nontarget species.

All necessary program personnel will be notified of the known insectary locations via maps with sites identified by latitude/longitude and when necessary flagging and radio communications.

As per operational procedures (Appendix 1), APHIS will hold public meetings well in advance of any grasshopper treatment program to alert the public and learn the whereabouts of any insectaries that may be in the proposed treatment area. Land managers will also be informed about using the available alternatives and the various protection measures at these meetings. APHIS concludes that a grasshopper treatment program should have no adverse effects on the biological control insectaries.

3. Other Environmental Components

a. Soil

Under no action, plant removal by grasshoppers could leave the soil exposed and subject to erosion. Loss of plants that hold soil in place and increased sunlight on the soil surface could lead to soil erosion by wind and water and a steady decline in the amount of organic matter in the soil.

The half-life of malathion and carbaryl is 0.5 and 3 to 8 days respectively in soil. There would be no bioaccumulation or concentration in food chain levels of parent compounds and their metabolites. While some soil microorganism populations decrease after chemical treatments, recovery should be rapid and no long-term significant changes in population density would likely be found. Positive effects on the soil would accrue reducing vegetation lost to grasshoppers, thereby protecting soils and the watershed.

Diflubenzuron seldom persists more that a few days in soil and water, so the toxic effects from direct exposure anticipated in these locations all would be acute.

b. Vegetation

Under no action, heavy infestations would result in damage or destruction to virtually all vegetation, and plant growth could be retarded for several years. Malathion and carbaryl are nontoxic to most plants when applied at label rates. Chemicals act quickly to reduce grasshopper infestations; thus, damage to vegetation from grasshopper foraging that would occur under the no action alternative would be minimized. A 500-foot buffer zone will be maintained around all crops for which the insecticide being applied is not registered. Thus, no adverse effects to nonregistered crops should occur.

Diflubenzuron applied to foliage tends to remain adhered to leaf surfaces for several weeks with little or no absorption or translocation from plant surfaces (Eisler, 2000). Loss from foliage occurs mainly by wind, rain and shedding of leaves in the fall.

4. Socioeconomic Issues

The control of grasshoppers in this area would have beneficial economic impacts to local landowners or permittee. The forage not utilized by grasshoppers will be available for livestock consumption and harvesting. This will mean greater livestock grazing, decreased needs for supplemental feed and increased monetary returns. Now with the availability of the RAAT's technology less chemical is being applied to fewer acres reducing programs costs and creating an affordable method of grasshopper control.

The local economics in the assessment area are driven primarily by agriculture production and tourism.

Livestock enterprises include rangeland grazing by cattle and sheep and minimal crop production. High grasshopper densities left untreated would have severe impact on the individual producer that relies on rangeland grass supplies for their livelihood. Indirectly small towns throughout the assessment area suffer economically when the individual producer is impacted.

Tourism is primarily focused in the Black Hills and Badlands National Park however the impact of those tourism dollars are felt throughout western South Dakota. Esthetic values of the natural environment in the assessment area include the views, diversity of flora and fauna and the opportunity to interact with nature in an isolated setting. Esthetics of an area will be affected by economic grasshopper populations.

5. Cultural Resources and Events

No negative impacts, directly or indirectly, should occur to any public facilities within likely treatment areas. Quality of grasslands for grazing and wildlife habitat should improve as a result of control programs because available forage and cover will be protected. Local treatment buffer zones and other mitigation measures would be developed by informal field level conferences with managing agencies.

a. Historic Sites

APHIS will adopt mitigative measures developed through informal consultation with the South Dakota Historical Society pertaining to any registered historical sites that occur in a treatment area. When historic site occur in the treatment area, maps of the proposed area will be sent for consultation to the South

Dakota Historical Society Director well in advance of any project. No adverse effect would be expected to historical sites due to APHIS programs.

b. State Parks

Informal consultation with the director of the South Dakota Game, Fish and Parks Department will provide guidelines for APHIS pertaining to any proposed treatment area adjoining a state park. APHIS will adopt mitigative measures developed in consultation with the South Dakota Game, Fish and Parks Department to protect parks from adverse effects.

c. Indian Reservations

Seven Indian Reservations exist within the boundaries of the assessment area. They are the Standing Rock Indian Reservation, Cheyenne River Indian Reservation, Lower Brule Indian Reservation, Crow Creek Indian Reservation, Rosebud Indian Reservation, Yankton Indian Reservation and the Pine Ridge Indian Reservation. Prior to any grasshopper treatment program near the reservations, APHIS will alert the Bureau of Indian Affairs and the Tribal Government as to the precise location of a prospective spray block and adopt any mitigative measures developed through informal consultations. APHIS will ensure that all steps have been taken to protect cultural activities (i.e. sun dances) during a suppression program.

If treatments are requested by any Indian Agency, the land operations departments of the agency and tribal government will be included in site-specific informal consultations. The land operations departments and tribal governments must concur with each other as to locations of sensitive areas and mitigative measures required prior to control operations.

d. Recreation

Recreation is a common and growing practice throughout the assessment area. Hiking, fishing, horseback riding, mountain biking, camping, hunting, and plant and wildlife viewing are some of the recreation activities occurring in the assessment area. Disturbance to these activities could occur by aircraft flyovers but would be of short duration or temporary. Measures to minimize disturbances to areas frequented by recreationists would be developed during consultations with the land managing agency.

6. 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.

Minority populations of Native Americans live within the assessment area. Letters of request for treatments must be on file from the tribal government and Bureau of Indian Affairs before grasshopper control activities can begin on reservation land or areas managed for traditional Native American activities. Additionally, any protection measures for sensitive people or areas must be agreed upon before operations can begin.

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 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).

The percentage of children found within the suppression area will be minimal. Control programs focus on areas of rangeland with minimal populations.

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 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). Assessments of the relative risk of each insecticide option are discussed in detail in the 2002 EIS document.

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 fund or participate in any program to suppress grasshoppers. If APHIS does not participate in any grasshopper suppression program, Federal land management agencies, State agriculture departments, local governments, or private groups or individuals, may not effectively combat outbreaks in a coordinated effort. In these situations, grasshopper outbreaks could develop and spread unimpeded.

Grasshoppers in unsuppressed outbreaks would consume agricultural and nonagricultural plants. The damage caused by grasshopper outbreaks could also pose a risk to rare, threatened, or endangered plants that often have a low number of individuals and limited distribution. Habitat loss for birds and other wildlife and rangeland susceptibility to invasion by nonnative plants are among the consequences that would likely occur should existing vegetation be removed by grasshoppers. Loss of plant cover due to grasshopper consumption will occur. Plant cover may protect the soil from the drying effects of the sun, and plant root systems hold the soil in place that may otherwise be eroded.

Another potential scenario, if APHIS does not participate in any grasshopper suppression programs, is that some Federal land management agencies, State agriculture departments, local governments, or private groups or individuals may attempt to conduct widespread grasshopper programs. Without the technical assistance and program coordination that APHIS can provide to grasshopper programs, it is possible that a large amount of insecticides, including those APHIS considers too environmentally harsh but labeled for rangeland use, could be applied, reapplied, and perhaps misapplied in an effort to suppress or even locally eradicate grasshopper populations. 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.

2. Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative

An important aspect of protecting humans, non target organisms, sensitive sites and events is that all landowners involved in the program have requested APHIS to conduct the treatment. Consequently any human health, non target organism, cultural resources/events or sensitive sites can be identified and protected prior to program initiation. All operation procedures will be followed to ensure that complete area coverage and conventional rate applications are applied according to APHIS guidelines and label requirements to ensure negligible impact to the environment.

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 occur at the conventional rates. With only rare exceptions, APHIS would apply a single treatment in an outbreak year 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.

Carbaryl

Carbaryl is of moderate acute oral toxicity to humans. The mode of toxic action of carbaryl occurs through inhibition of acetylcholinesterase (AChE) function in the nervous system. This inhibition is reversible over time if exposure to carbaryl ceases. The Environmental Protection Agency (EPA) has classified carbaryl as a possible human carcinogen≅ (EPA, 1993). However, it is not considered to pose any mutagenic or genotoxic risk.

Potential exposures to the general public from conventional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Therefore, routine safety precautions are expected to provide adequate worker health protection.

Carbaryl is of moderate acute oral toxicity to mammals (McEwen *et al*., 1996a). Carbaryl applied at Alternative 2 rates is unlikely to be directly toxic to upland birds, mammals, or reptiles. Field studies have shown that carbaryl applied as either ultra-low-volume (ULV) spray or bait at Alternative 2 rates posed little risk to killdeer (McEwen *et al*., 1996a), vesper sparrows (McEwen *et al*., 1996a; Adam *et al*., 1994), or golden eagles (McEwen *et al*., 1996b) in the treatment areas. AChE inhibition at 40 to 60 percent can affect coordination, behavior, and foraging ability in vertebrates. Multi-year studies conducted at several grasshopper treatment areas have shown AChE inhibition at levels of no more that 40 percent with most at less than 20 percent (McEwen *et al*., 1996a).

Carbaryl is not subject to significant bioaccumulation due to its low water solubility and low octanol-water partition coefficient (Dobroski *et al*., 1985).

Carbaryl will most likely affect nontarget insects that are exposed to ULV carbaryl spray or that consume carbaryl bait within the grasshopper treatment area. Field studies have shown that affected insect populations can recover rapidly and generally have suffered no long-term effects, including some insects that are particularly sensitive to carbaryl, such as bees (Catangui *et al*., 1996). The use of carbaryl in bait form generally has considerable environmental advantages over liquid insecticide applications: bait is easier than liquid spray applications to direct toward the target area, bait is more specific to grasshoppers, and bait affects fewer nontarget organisms than sprays (Quinn, 1996).

Should carbaryl enter water, there is the potential to affect the aquatic invertebrate assemblage, especially amphipods. Field studies with carbaryl concluded that there was no biologically significant effect on aquatic resources, although invertebrate downstream drift increased for a short period after treatment due to toxic effects (Beyers *et al*., 1995). Carbaryl is moderately toxic to most fish (Mayer and Ellersieck, 1986).

Diflubenzuron

The acute oral toxicity of diflubenzuron formulations to humans ranges from very slight to slight. The most sensitive indicator of exposure and effects of diflubenzuron in humans is the formation of methemoglobin (a compound in blood responsible for the transport of oxygen) in blood.

Potential exposures to the general public from Alternative 2 rates are infrequent and of low magnitude. These low exposures to the public pose no risk of methemoglobinemia (a condition where the heme iron in blood is chemically oxidized and lacks the ability to properly transport oxygen), direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures are higher than the general public but are not expected to pose any risk of adverse health effects.

Because diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by diflubenzuron. In addition, adult insects, including wild and cultivated bees, would be mostly unaffected by diflubenzuron applications (Schroeder *et al*., 1980; Emmett and Archer, 1980). Among birds, nestling growth rates, behavior data, and survival of wild American kestrels in diflubenzuron treated areas showed no significant differences among kestrels in treated areas and untreated areas (McEwen *et al*., 1996b). The acute oral toxicity of diflubenzuron to mammals ranges from very slight to slight. Little, if any, bioaccumulation of diflubenzuron would be expected (Opdycke *et al*., 1982).

Diflubenzuron is most likely to affect immature terrestrial insects and early life stages of aquatic invertebrates (Eisler, 2000). While this would reduce the prey base within the treatment area for organisms that feed on insects, adult insects, including grasshoppers, would remain available as prey items. Many of the aquatic organisms most susceptible to diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to diflubenzuron, but these decreases would be expected to be temporary given the rapid regeneration time of many aquatic invertebrates.

Malathion

Malathion is of slight acute oral toxicity to humans. The mode of toxic action of malathion occurs through inhibition of AChE function in the nervous system. Unlike carbaryl, AChE inhibition from malathion is not readily reversible over time if exposure ceases. However, strong inhibition of AChE from malathion occurs only when chemical oxidation results in formation of the metabolite malaoxon. Human metabolism of malathion favors hydroxylation and seldom produces much malaoxon.

Potential exposures to the general public from conventional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures are higher, but still have little potential for adverse health effects except under accidental scenarios. Therefore, routine safety precautions are expected to continue to provide adequate protection of worker health.

EPA has recently reviewed the potential for carcinogenic effects from malathion. EPAs classification describes malathion as having a suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential≅ (EPA, 2000). This indicates that any carcinogenic potential of malathion cannot be quantified based upon EPA=s weight of evidence determination in this classification. The low exposures to malathion from program applications would not be expected to pose carcinogenic risks to workers or the general public.

Malathion is of slight acute oral toxicity to mammals. There is little possibility of toxicity-induced mortality of upland birds, mammals, or reptiles, and no direct toxic effects have been observed in field studies. Malathion is not directly toxic to vertebrates at the concentrations used for grasshopper suppression, but it may be possible that sublethal effects to nervous system functions caused by AChE inhibition may lead directly to decreased survival. AChE inhibition at 40 to 60 percent can affect coordination, behavior, and foraging ability in vertebrates. Multi-year studies at several grasshopper treatment areas have shown AChE inhibition at levels of no more than 40 percent with most at less than 20 percent (McEwen *et al*., 1996a). Field studies of birds within malathion treatment areas showed that, in general, the total number of birds and bird reproduction were not different from untreated areas (McEwen *et al*., 1996a). Malathion does not bioaccumulate (HSDB, 1990; Tsuda *et al*., 1989).

Malathion will most likely affect nontarget insects within a treatment area. Large reductions in some insect populations would be expected after a malathion treatment under Alternative 2. While the number of insects would be diminished, there would be some insects remaining. The remaining insects would be available prey items for insectivorous organisms, and those insects with short generation times may soon increase.

Malathion is highly toxic to some fish and aquatic invertebrates; however, malathion concentrations in water, as a result of grasshopper treatments, are expected to present a low risk to aquatic organisms, especially those organisms with short generation times.

The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the program use of insecticides (see Appendix 1 treatment guidelines).

3. Reduced Area Agent Treatments (RAATs) Alternative

Under Alternative 3, the insecticide carbaryl, diflubenzuron, or malathion would be used at a reduced rate and over reduced areas of coverage. Rarely would APHIS apply more than a single treatment to an area per year. The maximum insecticide application rate under the RAATs strategy is reduced 50 percent from the conventional rates for carbaryl and malathion and 25 percent from the Alternative 2 rate for diflubenzuron. Although this strategy involves leaving variable amounts of land not directly treated, the risk assessment conducted for the 2002 EIS assumed 100 percent area coverage because not all possible scenarios could be analyzed. However, when utilized in grasshopper suppression, the amount of untreated area in RAATs often ranges from 20 to 67 percent of the total infested area but can be adjusted to meet site-specific needs.

The RAATs strategy has two components: insect suppression and conservation biological control, first, treatments made under RAATs rely on grasshopper suppression using insecticides. Grasshoppers in the treated area are directly exposed to insecticides and suffer mortality. Grasshoppers in the areas not directly treated (untreated) may also be exposed to insecticides if drift occurs from the treated areas or if individuals move from the untreated area into the treated area and thus become exposed to the insecticide. Second, RAATs strategy relies on conservation biological control. This means that naturally occurring predators and parasites of grasshoppers are retained in the untreated areas. These predators and parasites remain after treatments and are available to suppress grasshoppers in both the treated and untreated areas.

The goal of grasshopper suppression under the RAATs alternative is to economically and environmentally suppress grasshopper populations to a desired level rather than reduce those populations to the greatest possible extent. The efficacy of the RAATs alternative in reducing grasshoppers is therefore less than conventional treatments. The RAATs efficacy is also variable. Foster *et al.* (2000) reported that grasshopper treatment mortality using RAATs was reduced 2 to 15 percent from conventional treatments while Lockwood *et al.* (2000) reported 0 to 26 percent difference in mortality between the conventional and RAATs alternatives. During grasshopper outbreaks when grasshopper densities can be 60 or more per square meter (Norelius and Lockwood, 1999), grasshopper treatments that have 90 to 95 percent mortality still leave a number of grasshoppers (3 to 6) that is generally greater than the average number found on rangeland, such as in Wyoming, in a normal year (Schell and Lockwood, 1997).

Potential exposure to the general public, environment, non target organisms and cultural events and sites as well as sensitive sites from RAATS application rates are lower that those from conventional applications and adverse effects decrease commensurately with decreased magnitude of exposure.

Refer to the 2002 EIS Chapter V. Environmental Consequences. The impacts identified for this alternative will be reduced compared to Alternative 2. The impacts to these resources will be minimized by the implementation of the program guidelines described in Appendix 1.

Carbaryl

Potential exposures to the general public and workers from RAATs application rates are lower than those from conventional application rates, and adverse effects decrease commensurately with decreased magnitude of exposure. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Routine safety precautions are expected to provide adequate protection of worker health at the lower application rates under RAATs.

Direct toxicity of carbaryl to birds, mammals, and reptiles is unlikely in swaths treated with carbaryl under a RAATs approach. Carbaryl bait also has minimal potential for direct effects on birds and mammals. Field studies indicated that bee populations did not decline after carbaryl bait treatments, and American kestrels were unaffected by bait applications made at a RAATs rate (George *et al.*, 1992). Using alternating swaths will furthermore reduce adverse effects because organisms that are in untreated swaths will be mostly unexposed to carbaryl.

Carbaryl applied at a RAATs rate has the potential to affect invertebrates in aquatic ecosystems. However, these affects would be less than effects expected under Alternative 2. Fish are not likely to be affected at any concentrations that could be expected under Alternative 3.

Carbaryl will most likely affect nontarget insects that are exposed to liquid carbaryl or that consume carbaryl bait. While carbaryl applied at a RAATs rate will reduce susceptible insect populations, the decrease will be less than under Alternative 2 rates. Carbaryl ULV applications applied in alternate swaths have been shown to affect terrestrial arthropods less than malathion applied in a similar fashion.

Diflubenzuron

Potential exposures and adverse effects to the general public and workers from RAATs application rates are commensurately less than conventional application rates. These low exposures to the public pose no risk of methemoglobinemia, direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures pose negligible risk of adverse health effects.

Because diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by diflubenzuron. Diflubenzuron exposures at Alternative 3 rates are not hazardous to terrestrial mammals, birds, and other vertebrates. Insects in untreated swaths would have little to no exposure, and adult insects in the treated swaths are not susceptible to diflubenzuron=s mode of action. The indirect effects to insectivores would be negligible as not all insects in the treatment area will be affected by diflubenzuron.

Diflubenzuron is most likely to affect immature terrestrial insects and, if it enters water, will affect early life stages of aquatic invertebrates. While diflubenzuron would reduce insects within the treatment area, insects in untreated swaths would have little to no exposure. Many of the aquatic organisms most susceptible to diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to diflubenzuron, but these decreases may be temporary given the rapid regeneration time of many aquatic invertebrates.

Malathion

Potential exposures to the general public and workers from RAATs application rates are of a commensurately lower magnitude than conventional rates. These low exposures to the public pose no risk of direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity.

Potential risks to workers are negligible if proper safety procedures are adhered to, including the use of required protective clothing. The low exposures to malathion from program applications are not expected to pose any carcinogenic risks to workers or the general public.

Malathion applied at a RAATs rate will cause mortalities to susceptible insects. Organisms in untreated areas will be mostly unaffected. Field applications of malathion at a RAATs rate and applied in alternate swaths resulted in less reduction in nontarget organisms than would occur in blanket treatments. Birds in RAATs areas were not substantially affected. Should malathion applied at RAATs rates enter water, it is most likely to affect aquatic invertebrates. However, these effects would soon be compensated for by the surviving organisms, given the rapid generation time of most aquatic invertebrates and the rapid degradation of malathion in most water bodies.

The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the program use of insecticides (see Appendix 1 treatment guidelines).

B. Other Environmental Considerations

1. Cumulative Impacts

Cumulative impact, as defined in the 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."

There is potential for individual landowners within a treatment area to conduct suppression programs within and area previously treated by APHIS however these treatments would most likely be small in scope and occur in areas such as garden plots, fence rows and crop borders. These are areas that in many cases may have been considered sensitive sites or sites that were buffered and no initial application occurred.

No other Federal or large scale non Federal actions would occur within the same treatment year in an area already controlled. Treatments are made at the request of the landowner. Once APHIS determines that an area requires treatment, specific pesticide history of that area will be researched and addressed accordingly.

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

APHIS has evaluated the potential grasshopper program area and has determined that there would be no disproportionate high and adverse human health or environmental effects on minority populations or low income populations.

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

There would be no disproportionate impacts of the alternatives on children within the suppression program area. APHIS has evaluated the potential grasshopper program area and has determined that there would be no disproportionate high and adverse human health or environmental effects on children within the suppression area.

The human health risk assessment for the 2002 EIS analyzed the effects of exposure to children from the three 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 will be minimized by the implementation of the treatment guidelines:

Aerial Broadcast Applications (Liquid Chemical Methods)

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

- No treatments will occur over congested urban areas. For all flights over congested areas, the contractor must submit a plan to the appropriate Federal Aviation Administration District Office and this office must approve of the plan; a letter of authorization signed by city or town authorities must accompany each plan. Whenever possible, 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 Baits (Dry Chemical Methods)

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

Ultra-Low-Volume Aerial Application (Liquid Chemical Methods)

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

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

In accordance with various environmental statutes, APHIS routinely conducts programs in a manner that minimizes impact to the environment, including any impact to migratory birds. In January 2001, President Clinton signed E.O. 13186 to ensure that all government programs protect migratory birds to the extent practicable. To further its purposes, the E.O. requires each agency with a potential to impact migratory birds to enter into a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service (FWS). In compliance with the E.O., APHIS is currently working with FWS to develop such an MOU.

5. Endangered Species Act

Formal Section 7 consultations have been conducted between APHIS and the Fish and Wildlife Service (FWS). All mitigating measures outlined in the Biological Opinions for the program from FWS have been adopted.

Informal field level consultations will be requested between the land managing agency, APHIS, and the Fish and Wildlife Service. Information on location of sensitive species or areas will be used to implement protection measures. Any additional protection measures developed at those meetings will be implemented by the program.

Consultation was held in March of 2013 with the local FWS office to discuss the potential grasshopper control activities for 2013 and potential impact(s) to listed species. APHIS forwarded the completed application to the local FWS and concurrence was received and can be found in Appendix 4. It was agreed that APHIS will provide at least five days notice prior to any control program to address emerging issues or concerns not addressed in this EA.

6. Monitoring

Monitoring involves the evaluation of various aspects of the grasshopper suppression programs. There are three aspects of the programs that may be monitored. The first is the efficacy of the treatment. APHIS will determine how effective the application of an insecticide has been in suppressing the grasshopper population within a treatment area and will report the results in a Work Achievement Report to the Western Region.

The second area included in monitoring is safety. This includes ensuring the safety of the program personnel through medical monitoring conducted specifically to determine risks of a hazardous material. (See APHIS Safety and Health Manual (USDA, APHIS, 1998) available online at: www.aphis.usda.gov/mb/aseu/shes/shes-manual.html).

The third area of monitoring is environmental monitoring. APHIS Directive 5640.1 commits APHIS to a policy of monitoring the effects of Federal programs on the environment. Environmental monitoring includes such activities as checking to make sure the insecticides are applied in accordance with the labels, and that sensitive sites and organisms are protected. The environmental monitoring recommended for grasshopper suppression programs involves monitoring sensitive sites such as bodies of water used for human consumption or recreation or which have wildlife value, habitats of endangered and threatened species, habitats of other sensitive wildlife species, edible crops, and any sites for which the public has expressed concern or where humans might congregate (e.g., schools, parks, hospitals).

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VI. Listing of Agencies and Persons Consulted

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