Rangeland Grasshopper and Mormon Cricket Suppression Program

Final

Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman and Yakima Counties
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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 Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman or Yakima Counties. 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 loss of forage and habitat and benefits of treatments including the protection of rangeland and adjacent crops. The goal of the proposed suppression program analyzed in this EA is to reduce grasshopper populations below an economic infestation[1] level in order to protect rangeland ecosystems and/or cropland adjacent to rangeland.

This environmental assessment (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 April 15 to July 31.

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 levels of economic infestation 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 also needed to prevent grasshopper migration to cropland adjacent to rangeland.

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

APHIS conducts surveys for grasshopper populations on rangeland in the Western United States and provides technical assistance on grasshopper management to landowners/managers, and cooperatively suppresses 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) and deemed necessary. The need for rapid and effective suppression of grasshoppers 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).

In April 2014, 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 #14-8100-0573-MU, April 22, 2014). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper 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. The FS must also approve a Pesticide Use Proposal (Form FS-2100-2) for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and FS approves the Pesticide Use Proposal. Similar MOUs are also in place with the Bureau of Land Management (BLM) and the Bureau of Indian Affairs (BIA). On February 13 2009, APHIS and the BLM signed a revised MOU (Document #09-8100-0870-MU).

In October 2015, APHIS and Bureau of Land Management (BLM) signed a MOU detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on BLM managed lands, APHIS PPQ (Document #15-8100-0870-MU, October 15, 2015). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BLM. The MOU further states that the responsible BLM official will request, in writing, the inclusion of appropriate lands in the APHIS suppression project when treatment on BLM managed land is necessary. BLM will provide information on location of T&E species,

sensitive sites, and other resource issues. The BLM must also prepare a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BLM approves the Pesticide Use Proposal.

In June 2010, APHIS and Bureau of Indian Affairs (BIA) signed a MOU detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on BIA managed lands, APHIS PPQ MOU # 10-8100-0941-MU, June 14, 2010). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BIA.
The MOU further states that the responsible BIA and tribal officials will request, in writing, the inclusion of appropriate lands in the APHIS suppression project when treatment on BIA managed land is necessary. BIA will consult with affected tribes to include in any requests information on the location and dates of all tribal ceremonies and/or cultural events that will be in or near the proposed treatment area(s). In addition, request should include information on the location of any T&E species, the location and nature of any sensitive or "not to be treated" sites. The BIA will provide written concurrence with APHIS' suppression plan and identified mitigation measures. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and BIA concurs.

A Pesticide Use Proposal is the tracking mechanism by which pesticide use on federally managed land is reported to the Environmental Protection Agency (EPA). EPA's role is to track use under the Federal Insecticide Fungicide and Rodenticide Act as amended (Public Law (P.L.) 92-516). Responsibility for administering the act is vested in the EPA.

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. Fall and winter 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. There is considerable uncertainty, however, in the forecasts, so that framing specific proposals for analysis under NEPA would waste limited resources. 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. The following approach to NEPA compliance for anticipated requests to treat for grasshopper infestations will be followed: This EA will analyze aspects of environmental quality that could be affected by grasshopper treatment. This EA and an anticipatory finding of no significant impact (FONSI) will be made available to the public with a

comment period. When the program receives a treatment request and determines that treatment is necessary, the specific treatment site within the assessment area will be extensively examined to determine if environmental issues exist that were not covered in this EA. If no changes to the EA, FONSI, or APHIS' Guidelines for Treatment of Rangelands for Grasshopper and Mormon Crickets (treatment guidelines) (Appendix 1) are warranted, based on the comments received and examination of the treatment site, an addendum to the EA will be prepared stating this. If changes need to be made to the EA, FONSI, or treatment guidelines, the program will prepare a supplement to the EA describing the changes and/or additional site-specific issues that were not covered in the EA. Whether an addendum or supplement is prepared, these documents 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). Each of these 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 USDA, APHIS, 222 N. Havana, Spokane, WA, 99202. It is also available on the Rangeland Grasshopper and Mormon Cricket Program website, <http://www.aphis.usda.gov/plant_health/ea/grasshopper_cricket.shtml>.

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 infested area (total or blanket coverage) 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. Either 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.

III. Affected Environment

A. Description of Affected Environment

1. Geology, Topography and Climate

APHIS conducts adult grasshopper surveys in rangeland throughout the assessment area during the late summer of each year. The twenty county assessment area (Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman and Yakima Counties) located in Central and Eastern Washington, encompass approximately 41,828 square miles. This represents about 62.9 percent of the state's total area. The Federal Plant Protection Act of 2000 authorizes APHIS to treat rangeland.

The assessment area borders British Columbia, Canada to the North, Idaho to the East, Oregon to the South and the Cascade Range to the West. Portions of rangeland within the assessment area may be identified as having grasshopper populations that could indicate significant infestations in the following year. A 2012 Rangeland Grasshopper Hazard Map which incorporates the past year's survey is available on this web site, <http://hopper.aphis.usda.gov/>.

The Columbia Basin, also known as the Columbia Plateau, is the predominate area in eastern Washington. The physiographic province is characterized by incised rivers, extensive plateaus, and anticlinal ridges rising to 4,000 feet above sea level. The region is underlain by Miocene Columbia River Basalt Group rocks and interbedded Neogene terrestrial sediments. To the southeast of the Columbia Basin are the Blue Mountains. The Blue Mountains are characterized by a broad uplift, reaching elevations of more than 6,000 feet above sea level. Windows of Paleozoic or Mesozoic metamorphic rocks are exposed at four locations where streams and rivers have incised deep canyons through the overlying rocks of the Columbia River Basalt Group. The basement rocks consist of Jurassic-Triassic limestone lenses, amphibole-quartz schist, greenstone, graywacke, sandstones, cherty dark argillite, and diorite (Washington Department of Natural Resources, DNR, 2010).

The Okanogan Highlands province is situated east of the Cascade Range and north of the Columbia Basin. To the east and north, the highlands extend into northern Idaho and southern British Columbia, respectively. They are characterized by rounded mountains with elevations up to 8,000 feet above sea level and deep, narrow valleys. The Columbia River divides the Okanogan Highlands into two geographic regions: to the east of the river are the Selkirk, Chewelah, and Huckleberry Mountains; to the west are the Kettle, Sanpoil, and other mountains. The eastern portion of the Okanogan Highlands contains the oldest sedimentary and metamorphic rocks in the state. Precambrian Belt Supergroup, Windermere Group, and Deer Trail Group metasedimentary rocks extend from British Columbia south to the Columbia River. The nation's second largest magnesium operations are located near Addy, in Stevens County. Dolomite and magnesite are mined from the Stensgar Formation dolomite of the Deer Trail Group. Precambrian dikes and sills cut these ancient rocks. In the vicinity of Spokane, mountains such as Mica Peak consist of Precambrian high-grade metasedimentary rocks (DNR, 2010).

To the west of the Columbia Basin and the Okanogan Highlands is the Cascade Range. The Cascade Range is part of a vast mountain chain that extends from British Columbia to northern California. It separates the coastal Pacific lands from the interior of North America. The Cascades consist of an active volcanic arc superimposed upon bedrock of Paleozoic to Tertiary age. Pliocene to recent uplift has created high topographic relief. A major northwest-southeast structural break separates the Washington Cascades into northern and southern portions. In a general way, the structure follows the trace of Interstate 90 between Seattle and Ellensburg. The North Cascades consist of jagged mountains with numerous glaciers and are composed predominantly of Mesozoic crystalline and metamorphic rocks. The South Cascades contain mainly Tertiary to Holocene volcanic rocks. In the north, the structural fabric is extremely complex because of the unrelated "rock packages", called terranes, that have been brought in contact with each other by strike-slip and thrust faults. The North Cascades are also known for mylonite development, extensive areas of crushed and jumbled exotic rocks called melange, and plates of rock thrust over each other (DNR, 2010).

The assessment area has a highly varied climate ranging from near desert conditions in the south central Columbia basin (below 10 inches of precipitation a year) to over 40 inches in the mountainous areas found in both the northeastern and southeastern corners of the region. The area is part of the large inland basin between the Cascade and Rocky Mountains. In an easterly and northerly direction, the Rocky Mountains shield the inland basin from the winter season’s cold air masses traveling southward across Canada. In a westerly direction, the Cascade Range forms a barrier to the easterly movement of moist and comparatively mild air in winter and cool air in summer. Some of the air from each of these source regions reaches this section of the State and produces a climate which has some of the characteristics of both continental and marine types. Most of the air masses and weather systems crossing eastern Washington are traveling under the influence of the prevailing westerly winds. Infrequently, dry continental air masses enter the inland basin from the north or east. In the summer season this air from over the continent results in low relative humidity and high temperatures, while in winter clear, cold weather prevails. Extremes in both summer and winter temperatures generally occur when the inland basin is under the influence of air from over the continent. East of the Cascades, in the assessment area, summers are warmer, winters are colder and precipitation is less than in western Washington (Western Regional Climate Center, WRCC, 2010).

The average number of clear or only partly cloudy days each month varies from five to 10 in winter, 12 to 18 in spring and fall, and 20 to 28 in summer. The percent of possible sunshine received each month is from 20 to 30 percent in winter, 50 to 60 percent in spring and fall and 80 to 85 percent in summer. The number of hours of sunshine possible on a clear day ranges from approximately eight in December to 16 in June. In the driest areas, rainfall is recorded on 70 days each year and on 120 days or more in the higher elevations near the eastern border and along the eastern slope of the Cascades (WRCC, 2010).

Annual precipitation ranges from seven to nine inches near the confluence of the Snake and Columbia Rivers, 15 to 30 inches along the eastern border and 75 to 90 inches near the summit of the Cascade Mountains. During July and August, it is not unusual for four to eight weeks to pass with only a few scattered showers. Thunderstorms can be expected on one to three days each month from April through September. Most thunderstorms in the warmest months occur as isolated cells covering only a few square miles. A few damaging hailstorms are reported each summer. Maximum rainfall intensities to expect in one out of ten years are .6 of an inch in one hour; 1.0 inch in three hours; 1.0 to 1.5 inches in six hours; and 1.2 to 2.0 inches in 12 hours (WRCC, 2010).

During the coldest months, a loss of heat by radiation at night and moist air crossing the Cascades and mixing with the colder air in the inland basin results in cloudiness and occasional freezing drizzle. A “chinook” wind which produces a rapid rise in temperature occurs a few times each winter. Frost penetration in the soil depends to some extent on the vegetative cover, snow cover and the duration of low temperatures. In an average winter, frost in the soil can be expected to reach a depth of 10 to 20 inches. During a few of the colder winters with little or no snow cover, frost has reached a depth of 25 to 35 inches (WRCC, 2010).

During most of the year, the prevailing direction of the wind is from the southwest or west. The frequency of northeasterly winds is greatest in the fall and winter. Wind velocities ranging from four to 12 mph can be expected 60 to 70 percent of the time; 13 to 24 mph, 15 to 24 percent of the time; and 25 mph or higher, one to two percent of the time. The highest wind velocities are from the southwest or west and are frequently associated with rapidly moving weather systems. Extreme wind velocities at 30 feet above the ground can be expected to reach 50 mph at least once in two years; 60 to 70 mph once in 50 years and 80 mph once in 100 years (WRCC, 2010).

2. Soil

In the area to the west (Cascade Range) and to the north (Okanogan Highlands) of the assessment area the predominant soil type is a cool, stony soil developed in a mantle of volcanic ash over loess and glacial till with medial or ashy topsoils. While in the valleys and near the rivers there are soils derived from glacial outwash on river terraces; most soils are strongly loess-influenced in the upper part, gravelly or sandy in the lower part, and have low water-holding capacity; some are influenced by volcanic ash in the upper part. In the western portion of the Columbia Basin there is also an area of soils on unglaciated hills; loess-influenced, but primarily derived from weathered granitic rocks, andesite, sandstone or schist; soils have dark-colored, humus-rich topsoils; many have clay-enriched subsoils (Washington State University, WSU, 2010).

The portion in the east and south of the assessment area in the Columbia Basin is comprised of soil types ranging from fine-silty, somewhat cool loessial soils that have clay enriched subsoils in the center and east portions of the assessment area to dry, coarse-silty loessial soils that formed under shrub-steppe vegetation in the south and center portions. Dry, sandy soils on terraces and dunes that have formed under sparse dune vegetation and have low water-holding capacity comprise much of the center portion of the assessment area stretching to the south where most of the problems with Mormon crickets have occurred (WSU, 2010).

A large portion of the assessment area was shaped by a final cataclysmic event known as the Spokane Flood. Toward the end of the last ice age, a glacial ice dam at the site of Pend Oreille Lake backed up the Clark Fork River flooding mountain valleys of western Montana. When the ice dam broke, the water surged across eastern Washington scouring away soil and eroding channels into the basalt. This significantly different landscape, prevalent throughout much of the assessment area is found nowhere else in the world. It has become known as the channeled scablands. Much of the rangeland is confined to places like the channeled scablands where cultivation may not be practical due to the shallow soil deposits.

3. Water Resources

The Columbia River is the largest river in the area. A large portion of the Columbia River that flows through this assessment area is actually a reservoir known as Franklin D. Roosevelt Lake. Grand Coulee Dam created this reservoir which extends 151 miles to the Canadian border and includes 82,000 acres of surface area. There are numerous dams in the Columbia River, creating smaller reservoirs within the assessment area.

There are several other major rivers and numerous mountain streams within this assessment area. The major rivers include: Snake River, Yakima River, Tieton River, Natches River, White Salmon River, Cle Elum River, Klickitat River, Palouse River, Pend Oreille River, Asotin River, Touchet River, Tucannon River, Joseph River, Grande Ronde River, Spokane River, Colville River, Kettle River, Sanpoil River, Okanogan River, Methow River, and Wenatchee River. Wildlife, recreation, fishing, irrigation, power, and navigation are a few of the important ways in which these rivers are utilized. Many other smaller streams also flow through this area providing habitat and water resources.

In addition, the assessment area includes, Lake Chelan, the states largest natural lake. Another prominent natural lake is Moses Lake in Grant County. However, most of the surface water in the assessment area is associated with the Columbia River Project which began with the completion of Grand Coulee Dam in 1941. Water pumped from Lake Roosevelt, the 125 mile lake formed by Grand Coulee Dam, is used to fill the reservoir of Banks Lake. Banks Lake captures enough water to irrigate over one million acres of Columbia Basin plateau through a network of canals extending as far south as the Oregon border. There are more than 6,000 miles of south leading canals, laterals, and wasteways. Drainage and seepage from this canal system have caused the formation of literally hundreds of new lakes in this region. Primary irrigation facilities are the Feeder Canal, Banks Lake, the Main, West, East High, and East Low Canals, Potholes Reservoir, and Potholes Canal.

There are numerous less prominent natural lakes throughout the assessment area. Many of the lakes are located at a high elevation in the Okanogan Highlands and the Cascade Range. Several of the natural lakes occurring in the assessment area are associated with the channeled scablands. Abundant perennial and intermittent lakes exist in the eroded scabland channels. Most of these lakes can be found in south central Lincoln, southwestern Spokane, northeastern Adams, and northwestern Whitman Counties. Other prominent natural lakes associated with rangeland areas include Rock Lake (Whitman Co.), Sprague Lake (Lincoln Co. and Adams Co.), Jameson Lake (Douglas Co.), and Kahlotus Lake (Franklin Co.).

Less prominent areas that may be classified as wetlands will be identified through local contact with state and Federal wildlife agencies prior to any program. Standard operational procedures (See Appendix 1 – rangeland treatment guidelines for grasshoppers) will be followed relative to treatments in areas with rivers, creeks, lakes, ponds, potholes, wetlands, irrigation canals and drains and intermittent bodies of water.

4. Vegetation and Agricultural Resources

In terms of natural vegetative cover, the assessment area is predominantly classified as sagebrush steppe. Exceptions would be the northern portion (Okanogan Highlands), the western portion (Cascade Range) and the Blue Mountains in the Southeast portion consisting primarily of conifer forests. Grasses, including various types of wheatgrass and fescue, are an important component to rangeland throughout the area providing feed for livestock and wildlife.

Approximately 14 million acres of this assessment area has been classified as land in farms for the 2007 Agricultural Census which represents over 90 percent of the total land in farms in Washington State. Wheat is grown on over 2 million acres in the assessment area. Approximately 300,000 acres are planted in orchards, primarily apples, with some pear and sweet cherries. Other crops grown include hay, grapes, barley, oats, corn and potatoes. Washington is the leading producing state in the nation for some of the commodities grown in this assessment area including apples, pears, and sweet cherries (U.S. National Agricultural Statistics Service, NASS, 2010).

The total value of agricultural crops in Washington State for 2009 was nearly 7 billion dollars. A vast majority of this total value is produced in the 20 county assessment area. Fruit production ranked as the number one value of production among the principle agricultural commodities produced in Washington State at a value of over 2 billion dollars in 2009. Grain, hay, dairy products and cattle are also important to the economy of this assessment area (NASS, 2010).

5. Other Environmental Resources

There is a significant amount of protected federal land in the assessment area. Along the western edge of the assessment area there are several federally designated wilderness areas. They include the Goat Rocks Wilderness, Mount Adams Wilderness, William O. Douglass Wilderness, Norse Peak Wilderness, Alpine Lakes Wilderness, Henry M. Jackson

Wilderness, Glacier Peak Wilderness, Lake Chelan-Sawtooth Wilderness and the Pasayten Wilderness. In the Northwest portion of the assessment area there is a small segment of North Cascades National Park and Lake Chelan National Recreation Area. In the most northeast portion of the assessment area is the Salmo-priest Wilderness Area. The Southeast corner holds the Wenaha-Tucannon Wilderness Area. Juniper Dunes Wilderness and the Hanford Reach National Monument are located in the Columbia Basin. There are small areas of land managed by the Bureau of Land Management and the Bureau of Reclamation throughout the assessment area.

In addition, there are also six National Forests in the assessment area including the Umatilla, Gifford Pinchot, Mt. Baker-Snoqualmie, Wenatchee, Okanogan and the Colville. Also, there are seven National Wildlife Refuges located in the assessment area including Conboy Lake, Saddle Mountain, Columbia, McNary, Toppenish, Turnbull and Little Pend Oreille.

The State of Washington Department of Natural Resources also has designated several areas as Natural Area Preserves and Natural Resources Conservation Areas in the assessment area. Additionally, Washington State Parks has designated a number of parks throughout the region.

Four Indian Reservations in eastern Washington are located in this assessment area. The largest is the Yakama Indian Reservation located in the southwest corner of the assessment area in Yakima County and Klickitat County. Just slightly smaller is the Colville Reservation which includes the southeast quarter of Okanogan County and the southern one half of Ferry County. The Spokane Reservation is located in southern Stevens County and the Kalispel Reservation is located in south-central Pend Oreille County. Timber, leased grazing, and mining are important to the economy of these reservations. All land managers will be consulted to identify specific boundaries and sensitive areas prior to any suppression program.

B. Site-Specific Considerations

1. Human Health

Treatments would only occur in rangeland environs. See Operational Procedures, Appendix 1, relative to standard treatment procedures and treatments which may occur near human populations. No treatments are expected to occur near human populations within this assessment area. Detailed analyses of carbaryl, diflubenzuron, and malathion relative to human health may be found in the 2002 EIS (Environmental Consequences of Alternative 2: Insecticide Applications at Conventional Rates and Complete Area Coverage, pp. 38-48 and Environmental Consequences of Alternative 3: Reduced Agent Area Treatments (RAATs), pp. 49–57). A description of anticipated site-specific impacts from the proposed treatments may be found in Part IV of this document.

2. Non-target Species

a. Endangered or Threatened species

The following is a list of species listed as endangered or threatened by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in the assessment area. This list can also be found on the following two web sites
< http://www.fws.gov/endangered/>
<http://www.nwr.noaa.gov/ESA-Salmon-Listings/Index.cfm>.

FEDERALLY LISTED ENDANGERED SPECIES

Animals:
Pygmy rabbit (Brachylagus idahoensis) – Columbia Basin distinct population segment
Gray wolf (Canis lupus)
Woodland caribou (Rangifer tarandus caribou)
Sockeye Salmon (Oncorhynchus nerka), Snake River
Chinook Salmon (O. tshawytscha), Upper Columbia River Spring-run

Plants:
Hackelia venusta (Showy stickseed)
Sidalcea oregana var. calva (Wenatchee Mountains checker-mallow)

FEDERALLY LISTED THREATENED SPECIES

Animals:
Bull trout (Salvelinus confluentus) – Columbia River distinct population segment
Grizzly bear (Ursus arctos horribilis)
Canada lynx (Lynx Canadensis)
Northern Spotted owl (Strix occidentalis caurina)
Coho Salmon (O. kisutch), Lower Columbia River
Chinook Salmon (O. tshawytscha), Snake River Spring/Summer-run, Snake River Fall-run, Lower Columbia River
Chum Salmon (O. keta), Columbia River
Steelhead (O. mykiss), Upper Columbia River, Middle Columbia River, Lower Columbia River, Snake River Basin
Marbled murrelet (Brachyramphus marmoratus)
Oregon Spotted frog (Rana pretiosa)
Yellow-billed cuckoo (Coccyzus americanus)

Plants:
Spiranthes diluvialis (Ute ladies'-tresses)
Silene spaldingii (Spalding's catchfly)
Howellia aquatilis (Water howellia)
Lesquerella tuplashensis (White Bluffs bladderpod)
Eriogonum codium (Umtanum Desert buckwheat)

Critical habitat has been designated within the assessment area for the Bull trout (Columbia River distinct population segment), Marbled murrelet Northern Spotted owl, Coho Salmon (Lower Columbia River), Umtanum Desert buckwheat, White Bluffs bladderpod and the Wenatchee Mountains checker-mallow.

In addition, the U.S. Fish and Wildlife Service has listed four candidate species within the assessment area as follows:

FEDERALLY LISTED CANDIDATE SPECIES

Animals:

Washington ground squirrel (Spermophilus washingtoni)
Greater sage-grouse (Centrocercus urophasianus) – Columbia Basin distinct population segment

Plants:
Artemisia campestris ssp. borealis var. wormskioldii (Northern wormwood)
Pinus albicaulis (Whitebark pine)

Also, the Washington Department of Fish and Wildlife maintains a list of species of concern within Washington State and the assessment area on their web site < http://wdfw.wa.gov/conservation/endangered >.

A test was conducted in North Dakota relative to the effect of carbaryl bait on the nestling growth and survival of vesper sparrow. This study was designed to simulate the treatment of a small grasshopper infestation with carbaryl bait. There was no difference reported in any of the productivity parameters between nests on treated and untreated sites (Adams et al., 1994). Adult sparrows on treated sites had to forage farther from the nests to obtain food but did so successfully (McEwen et al., 1996). Any effects on non-target species due to bait treatments can be considered indirect; that is, the prey populations are affected, while no direct toxicity to the non-target species is likely to occur.

b. Bald and Golden Eagle Protection Act (BGEPA)

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb’’ means: "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the 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, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity. In addition, Category a (Agriculture) and Category D (Off Road Vehicle Use) both provide the same guidance for use of ATV's or trucks: No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 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.

Thus far, only Mormon cricket hatching bed treatments using carbaryl bran bait are anticipated. These treatments will be in dry rangeland areas where no federally listed endangered or threatened species occur at this time. Local consultation with Federal land managers, FWS, NMFS and State wildlife biologists will precede any type of treatment to discuss protective or mitigating measures for species of concern.

3. Game Species

The larger game animals found in the area includes Rocky Mountain elk, moose, mule deer, white-tailed deer, bighorn sheep, cougar and black bear. They are found most often in and around timbered areas and canyons associated with the larger rivers. Small game animals include the Nuttall's cottontail rabbits which are common in all shrub-steppe areas particularly in rocky coulee areas. Black-tailed jackrabbits are also common. Beaver are common and muskrats abundant in most interior waters that have emergent or riparian vegetation. Raccoon are common in wetland/riparian zones particularly in areas adjacent to rocky cliffs that provide denning sites. Bobcats can be found in timbered areas and in the major canyons and rocky coulees. Long-tailed weasels, mink, and striped skunks are common in wetlands, riparian, and agricultural areas. Coyotes and badgers are common throughout the area.

Game waterfowl in the assessment area include populations of ringnecked pheasants, Hungarian partridge and California quail which occur throughout most of the area. They commonly nest and forage in the shrub-steppe areas particularly adjacent to agricultural fields and wetlands. Mourning doves also breed throughout the area usually in the drier habitats, and common snipe are common breeders in the wetland areas. Other game birds include the chukar partridge, turkey, blue grouse, ruffed grouse and spruce grouse. Abundant numbers of several species of ducks, including mallards, widgeons, cinnamon teal, blue-winged teal, northern shovelers and red heads nest in almost all of the interior waters including the irrigation canals and ditches. Canada geese are abundant breeders along the rivers. Young broods of waterfowl depend heavily on aquatic insects.

As in earlier environmental assessments, the Washington Department of Wildlife has expressed concern for sage grouse, sharp-tailed grouse and game birds such as chukar and pheasant. The APHIS 2002 FEIS and the APHIS 1987 FEIS (Chapter 4) contains an analysis of chemical impacts upon representative wildlife (including insectivorous birds) both directly and indirectly.

A number of factors would tend to mitigate the impact on insectivorous species and their predators. Habitat loss from grasshopper outbreaks would likely be of more significance to these species than the suppression program. Further, the objective is to suppress the outbreak which means there would still be grasshoppers remaining for the insect predators to feed on. Grasshopper and other rangeland insect populations are by nature extremely variable in size. Birds and other predators likewise have adapted to this variability and, at least on a species population basis, have been able to survive and reproduce despite this unpredictability. In any given treatment season, only a fraction (less than 1 percent) of the total rangeland in a region would have a potential to be treated for grasshopper control.

4. Socioeconomic Issues

Agricultural producers, including livestock producers, tree fruit and cultivated crop growers, are a major social group that could be impacted by grasshopper infestations. Relative to cooperative rangeland grasshopper suppression programs on private land, livestock owners would not request assistance unless they were confident that the program was cost-effective and economically justified. The chief commercial use of U.S. rangeland (including the assessment area) is livestock grazing to produce food, fiber, and draft animals (National Research Council (NRC), 1994). The protection of rangeland near crop production areas would likewise provide a measure of protection for adjacent crops. The 2002 EIS, pp. 61-73, describes in detail the socioeconomic impacts expected for each of the alternatives.

5. Cultural Resources and Events

Treatments would not be expected to occur at cultural sites. A treatment is of short duration and generally would occur once in a program area during the season. However, to ensure that historical and cultural sites, monuments or buildings, or artifacts of special concern are not adversely affected by program treatments, APHIS will include these concerns, along with recommended protective measures, in the pretreatment planning and discussions with the land managing agencies. APHIS will also confer with tribal authorities and, as needed, with the BIA office to ensure that the timing and location of a planned program treatment does not coincide or conflict with cultural events or observances on tribal and other Federal lands.

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.

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).

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 non-target 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

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 that would blanket affected rangeland areas in an attempt to suppress grasshopper outbreak populations by a range of 35 to 98 percent, depending upon the insecticide used. Environmental impacts will be further minimized by the implementation of the 2012 Rangeland Treatment Guidelines (see Appendix 1).

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 are negligible if proper safety procedures are followed, including wearing the required protective clothing. Carbaryl has been used routinely in other programs with no reports of adverse health effects. 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. Malathion has been used routinely in other programs with no reports of adverse health effects. 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. EPA=s classification describes malathion as having Asuggestive 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 affects 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 be low presenting 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. Environmental impacts will be further minimized by the implementation of the Rangeland Treatment Guidelines (see 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.

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.

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. 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.

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. Malathion has been used routinely in other programs with no reports of adverse health effects. 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).

4. Hatching Bed Treatment Using Carbaryl Bran Bait

Recently, APHIS has employed a strategy of identifying and treating Mormon cricket hatching beds in the spring with carbaryl wheat bran bait. This seems to provide an acceptable level of suppression within traditional outbreak areas. The bait is applied using ATV mounted spreaders at a rate of 10 lbs/ac to hatching beds that are generally from 5 acres to less than an acre in size. This method of control is highly selective and has minimal impact on the environment. (See environmental effects related to carbaryl bait application under the RAATs treatment strategy above).

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. See the 2002 EIS Appendix B for pesticides that have synergistic effects with the three insecticides to be used by the grasshopper program. No insecticide applications are anticipated by other Federal or non-Federal land managers within the potential treatment areas.

Biological weed control may occur within a proposed treatment area. Bioagents that are present in a treatment area are not expected to be completely eliminated. Repopulation will occur from both within and outside the treatment area. See discussions in the 2002 EIS, Chapter V.E.2. Biological control programs will be identified and taken into consideration prior to treatment.

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

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

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

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 primarily conducted on open rangelands where children would not be expected to be present during treatment or 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 of Liquid Insecticides

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

- No treatments 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 Dry Insecticidal Bait

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

Ultra-Low-Volume Aerial Application of Liquid Insecticides

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

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

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

The most recent national biological opinion on the grasshopper program issued by FWS was for the 1996 program. APHIS prepared a biological assessment for the 1998 program, but no biological opinion was prepared because control programs were not anticipated that year. In following years, no biological assessment was prepared since control programs were not anticipated. A biological assessment for the Rangeland Grasshopper and Mormon Cricket Suppression Program is currently under way, but the process for its completion and consideration by FWS will not be concluded in time for the 2015 season. In order to comply with the Section 7 requirements, APHIS or the cooperating Federal land managing agency will conduct ongoing informal consultations with FWS, locally. The 1996 biological opinion and 1998 biological assessment will be used as a basis for these local consultations.

Thus far, the only programs anticipated are Mormon cricket hatching bed treatments. Carbaryl bran bait is applied at a rate of 10 pounds to the acre to hatching beds that generally consist of one acre, more or less, in size. These treatments will take place in the drier rangeland areas where Mormon cricket populations and subsequent migrations have become a serious problem. Generally, the total area that is treated is not more than 50 to 100 acres. Occasionally, more acreage would require treatment if the outbreak becomes especially severe. FWS, NMFS, BLM and the Washington Department of Fish and Wildlife (WDFW) have been contacted by APHIS relative to these specific programs. There are no federally listed species within the proposed treatment areas. Specific mitigation measures will be followed in an effort to avoid disturbing other species of concern.

A grasshopper infestation may develop to the point where aerial application of ULV chemicals or bait would be required to suppress the population. If an aerial treatment is being considered, APHIS will contact the local US Fish and Wildlife Service, National Marine Fisheries Service and the Washington Department of Fish and Wildlife to review the program prior to treatment. These agencies will be consulted to ensure that federally listed species will not be negatively impacted by the proposed suppression program. State-listed species will also be considered prior to any treatment in an effort to avoid and mitigate impact on these species of concern.

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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Appendix 1

APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program
FY-2016 Treatment Guidelines
Version 2/11/2016

The objectives of the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program are to 1) conduct surveys in 17 Western States; 2) provide technical assistance to land managers; and 3) when funds permit, suppress economically damaging grasshopper and Mormon cricket outbreaks on Federal, Tribal, State, and/or private rangeland. The Plant Protection Act of 2000 provides APHIS the authority to take these actions.

General Guidelines for Grasshopper / Mormon Cricket Treatments

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

2. Subject to the availability of funds, upon request of the administering agency or the agriculture department of an affected State, APHIS, to protect rangeland, shall

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

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

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

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

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

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

   NOTE: the insecticide being considered must be labeled for included crop as well as rangeland.

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

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

Operational Procedures

GENERAL PROCEDURES FOR ALL AERIAL AND GROUND APPLICATIONS

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

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

3. One of the following insecticides that are labeled for rangeland use can be used for a suppression treatment of grasshoppers and Mormon crickets:
    a) Carbaryl
        a. solid bait
        b. ultra low volume spray
    b) Diflubenzuron ultra low volume spay
    c) Malathion ultra low volume spray

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

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

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

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

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

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

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

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

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

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

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

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

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

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

4. Application aircraft, if used, will fly at a median altitude of 1 to 1.5 times the aircraft's wingspan.

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

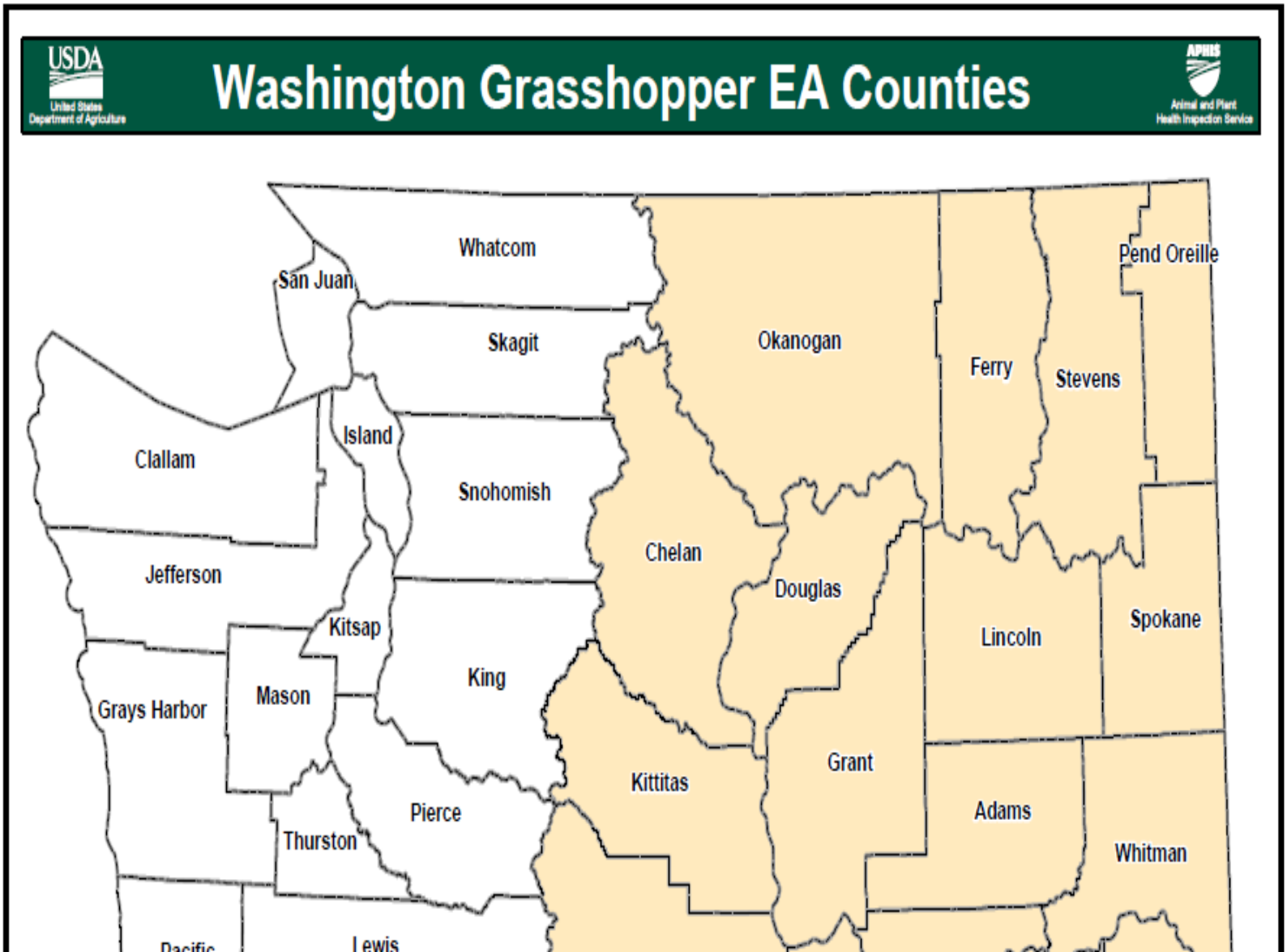
APPENDIX 2:

FWS/NMFS/BLM Correspondence

Letter from the USDI, US Fish & Wildlife Service, Upper Columbia Fish & Wildlife Office, Spokane, Washington. The letter responds to an APHIS request for listed threatened and endangered species occurring in the assessment area. The letter also includes proposed and candidate species and proposed critical habitat.

Telephone conversation with Dale Bambrick, Eastern Washington Team Leader, NMFS regarding listed anadromous fish species and critical habitat associated

with the assessment area. Given the location and nature of the proposed Mormon cricket hatching bed treatment programs, it was determined that there would be “no effect” on these listed species. No federally designated threatened or endangered species occur within the treatment areas at the present time.

Telephone conversation with Michelle Eames, Fish & Wildlife Biologist, U.S. Fish and Wildlife Service to discuss Environmental Conservation Online System (ECOS) and Section 7 consultation as required by the Endangered Species Act of 1973. Confirmed through ECOS and local consultation that no federally designated threatened or endangered species occur on BLM range land in SE Franklin County at the present time.

APPENDIX 3: