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submitted via email to:
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April 5, 2021

For Open Comment Period
on the Draft Environmental Assessments
Rangeland Grasshopper and Mormon Cricket Suppression Program

For Montana 2021
EA Numbers: MT-21-01, MT-21-02, and MT-21-03

Dear Mr. Esilva,

We appreciate the opportunity to comment on the APHIS EAs addressing grasshopper suppression in 2021 within the areas designated in the identified EAs in the State of Montana.

The Xerces Society for Invertebrate Conservation (Xerces Society) is an international nonprofit organization that protects the natural world through the conservation of invertebrates and their habitats. We work to raise awareness about the plight of invertebrates and to gain protection for the most vulnerable species before they decline to a level at which recovery is impossible. Pesticide use is one of the contributing factors to the loss of many invertebrate species. The use of pesticide can also hinder recovery efforts for imperiled species.

American Bird Conservancy is a 501(c)(3), non-profit membership organization whose mission is to conserve native birds and their habitats, working throughout the Americas to safeguard the rarest bird species, restore habitats, and reduce threats.

Western Watersheds Project is a nonprofit environmental conservation group with 12,000 members and supporters founded in 1993 and has field offices in Idaho, Montana, Wyoming, Arizona, Utah, Nevada and California. WWP works to influence and improve public lands management throughout the West.

Please accept the following comments on the subject documents.

1. **The EAs Fail to Disclose Treatment Request Locations and Do Not Adequately Describe the Affected Environment or Analyze Impacts to the Affected Environment**

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

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

In this age of information, when the entire world can be informed of a decision via the push of a button, such an explanation for failing to inform the public--in advance--of treatment locations, acres, and methods falls rather flat.

As APHIS explains in the EAs, APHIS only conducts treatments after receiving requests. APHIS only conducts treatments after receiving requests. It is our understanding that a state's treatment requests must be submitted for funding approval to headquarters in Washington D.C., and that this budget requesting work occurs during the winter. Therefore, the locations of areas where requests have been received must exist in APHIS files. We believe this information should be used to disclose maps of requested and higher probability treatment areas, together with an estimate of acres to be treated and likely method and chemical -- in the Draft EAs and certainly by the Final EAs. We find it hard to imagine a good reason for not disclosing more specific treatment maps, together with acreage estimates and proposed method and chemical – as soon as such information is available, certainly by the Final EAs or as an Addendum to the Final EAs. After all, treatments commonly occur within weeks after the Final EAs are published, so much planning would have occurred by the time the Draft and Final EAs are published.

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

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

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

Recommendation: We urge APHIS to delay the publication of a FONSI until after all treatment areas have been delineated and are identified to the public, using maps and providing acreage. Site-specific information related to the resources and values of these locations should then be included. This would provide the public with much better understanding of the justification for the treatment, the actual number of acres to be treated and their location, the method to be used, and the scale of potential effects to local resources. This specific information should be posted at the APHIS website as soon as it is available, sent to interested parties, and made available for public comment.

As soon as available, we request to receive a copy of maps and acreages of all final treatment areas for 2021, whether or not a supplemental determination is published. Should a supplemental determination be published, please send a copy to us.

In future years, we urge APHIS to delay release of the EAs until after treatment requests are received and all treatment areas have been delineated and are identified to the public.

2. **APHIS includes only a single action alternative and fails to analyze other reasonable alternatives, such as buying substitute forage for affected leaseholders. In addition, the single action alternative combines conventional and RAATs applications in one alternative, while the consequences do not fully explore and explain the relative impacts of these two methods.**

As described in the 2019 EIS, potential outcomes of forage loss on a leaseholder's plot of land, should it be untreated, could be the rancher seeking to buy alternative sources of forage, leasing alternative lands, or selling livestock. The EIS did not fully evaluate these options, so it is important that the EAs go further. For example, a reasonable alternative that could be examined would be for the federal government to subsidize, fully or partially, purchased hay. But in its current form, the EA includes no discussion of a reasonable alternative such as this.

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

Recommendation: APHIS should include a reasonable alternative to chemical suppression, such as buying alternate forage for affected landowners. Given the many other values of, and ecosystem services provided by, public lands, it only makes sense to consider such an alternative. Another reasonable alternative is not treating public lands. In addition, APHIS should separate the conventional from the RAATs method into two different alternatives, and analyze them accordingly.

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

APHIS liberally employs relative language to create an impression of low risk. For example, in numerous locations in the environmental consequences section of the EAs, APHIS described risk as "reduced." Reduced compared to what, exactly? The inexactness and lack of specificity of such statements make the EAs of little utility for a citizen trying to determine the actual predicted impacts of insecticide spray on large blocks of Western rangelands.

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

4. **APHIS has not demonstrated that treatments in Montana in 2021 meet the "economic infestation level." No site-specific data is presented in the EA that justifies the treatment based on the "economic infestation level."**

The APHIS grasshopper suppression program draws its authority from the Plant Protection Act of 2000 (7 U.S.C § 7717). The statute authorizes APHIS with the authority to exclude, eradicate, and control plant pests, including grasshoppers. Specifically, language in the PPA provides authority for APHIS to protect rangeland from "economic infestation" of grasshoppers. In its recent EIS updating the program (APHIS 2019), the Agency describes its determination of an economic infestation as follows:

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

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

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

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

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

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

Information from a summary of treatments conducted across Western states in 2017, 2018, and 2019 shows treatment costs for treatment costs for treated acres ranging from \$4.43-\$35.00 (2107); \$9.34-\$45.44 (2018), and \$2.70-\$35.60 (2019).

In determining whether a treatment is economically justified, one must ask what is the revenue expected to be received for the product? CARMA, the model used by APHIS to determine if a treatment should occur, shows that in Montana, it takes from 0-16 acres of rangeland to support one animal unit-month (AUM). Currently, on federal BLM and Forest Service lands, the US taxpayer receives \$1.35 per AUM. As a rough estimation, taking the median value within the carrying capacity range (8 acres per AUM), and calculating the value of the forage per acre as paid to the American taxpayer, the US taxpayer receives an estimated \$0.17 per acre for the forage value on BLM or USFS federal rangelands in 2021 in Montana.

Given that the direct costs of grasshopper treatments to the taxpayer appear to range from \$2.20 up to \$44.44/acre, it is clear that the economic threshold is nowhere near being met, at least on federal lands. The program makes no economic sense from the point of view of the taxpayer.

The ecological costs of treatment are not quantified in the EAs, but as we have pointed out in this EA, are numerous, and there is no evidence that they are not significant. It is unclear if the economic analysis that the PPA appears to require from APHIS is intended to include a quantitative assessment of ecological costs.

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

[1] The first figure applies to the cost for areas directly sprayed, the latter figure calculates a larger "protected acre" figure assuming that treatment effects radiate out into untreated swaths. This report was obtained through a FOIA request.

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

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

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

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

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

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

- The study authors make clear that reduced impact to non-target arthropods was "*presumably due to the wider swath spacing width* [which measured 30.5 and 60 m in the study]"**.** Obviously, these swath widths are on the high end of what could be used under the EAs.
- APHIS leaves out one of the key findings of the study: For carbaryl, the RAATs treatment showed *lower* abundance and biomass of non-targets after treatment compared to the blanket

treatments on one of the two ranches at the end of the sampling period (28 days). Also, on both ranches, abundance and biomass reached their lowest points at the end of the study after treatment with carbaryl, so we don't know how long it took for recovery to occur.

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

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

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

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

a) EPA (2018) in its most recent ecological risk assessment for diflubenzuron, included a low volume aerial drift analysis using the model AgDrift. EPA assumed a volume mean diameter (VMD) of 90 µm [note that this is approximately 2/3 of the VMD used in the APHIS analysis]. Under EPA's analysis, the drift fraction comprises 19% at 150 ft. However, this analysis is likely not helpful for most aerial APHIS grasshopper program applications, as the EPA analysis is based on a boom height of 10 feet while APHIS aerial release heights are typically much higher.

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

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

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

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

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

- The APHIS AgDISP analysis only analyzed deposition at the lower end of the application rate for diflubenzuron - corresponding to 0.75 oz/acre (0.012 lb/A) rather than the upper end of the application rate that corresponds to 1 oz/acre (0.016 lb/A) which is a rate often specified in contracts.
- The APHIS aerial AgDISP analysis was conducted with a VMD of 137.5, far larger than those predicted for other ULV analyses. APHIS never explains exactly why.

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

- The number of flight lines are not specified in the input, yet according to the AgDrift user guide, "*the application area (swath width multiplied by the number of flight lines) can potentially have a major impact*" on drift (Teske et al. 2003).
- APHIS Program operational guidelines (included as an appendix in the EAs) do not specify any minimum or maximum droplet size therefore it is unknown what nozzles are actually being used and what droplet sizes are actually being emitted.

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

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

6. **The EAs understate the risks of the insecticides diflubenzuron and carbaryl for exposed bees and other invertebrates.**

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

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

Diflubenzuron: Diflubenzuron is an insect growth regulator and functions by disrupting synthesis of chitin, a molecule necessary to the formation of an insect's cuticle or outer shell. An insect larva or nymph exposed to diflubenzuron is unable to successfully molt and thus dies. Chitin is not limited to insect cuticles, but is also, for example, a component of mollusk radula, fish scales and fungi cell walls.

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

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

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

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

Using these values, we conducted an assessment of the potential acute and chronic dietary risk to bee larvae. We utilized deposition values assuming no drift under both the full and reduced rates as specified in the EAs (0.75 or 1.0 fluid ounce per acre (0.012-0.016 lb a.i./ac). We also utilized deposition values using the point zero and point 500 feet[3] analyses presented in the APHIS drift analysis included in its BA to NMFS as mentioned above. Table 1 shows the outputs with Expected Environmental Concentrations and Risk Quotients, as calculated by the Bee Rex tool.[4]

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[3] Since we could not deduce an actual value for a 100-foot or 200-foot deposition rate, we used the deposition rate at 500 feet from the APHIS BA to NMFS. This would be a low end estimate since it's 2.5-5X further than the furthest edge of an unsprayed swath.

[4] APHIS presents no information in the EA that indicates the EECs would be any less than this, therefore these values are assumed to be the appropriate EECs at the specified deposition rates.

Table 1. DIFLUBENZURON Bee Risk Assessment

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

* In Bee Rex, EPA translates any mortality effect into an acute RQ value. In this case, the concentrations that resulted in mortality were reported as an 8-day LD50 (most acute studies are based on one-time or brief exposures).

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

Chronic risk to bees is evaluated with an LOC at RQ=1.0 (USEPA 2014). As indicated in Table 1, even at 500 feet from the application site, using APHIS predictions for deposition, chronic RQ is estimated at 16.6. At the release site, assuming drift, the chronic RQ is estimated to be 19.1, assuming no drift it would be 34 at the full rate. RQs are thus 17-34X the EPA LOC level.

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

APHIS appeared to acknowledge the risk to bees in many of the 2020 EAs by instituting a 4-mile buffer around any known managed leafcutter or alkali managed bees and by including notification to all apiarists before a treatment. However, APHIS in 2021 left this buffer out of the standardized treatment guidelines (although the treatment request does state that no treatments will occur within ¼ mile of "where bees remain") and shrugs off the risk of diflubenzuron to pollinators in the EAs as follows:

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

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

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

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

Moreover, APHIS points out that the alfalfa leafcutting bee (*Megachile rotundata*) and the alkali bee (*Nomia melanderi*) are both considered more susceptible than honey bees or *Bombus to* diflubenzuron. Additionally the EIS discloses that under some circumstances, Dimilin may be quite persistent; field dissipation studies in California citrus and Oregon apple orchards reported half-live values of 68.2 to 78 days. Rangeland persistence is unfortunately not available, but diflubenzuron applied to plants remains adsorbed to leaf surfaces for several weeks.

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

While studies of diflubenzuron effects to non-pest lepidopteran species can be hard to find, several studies of this chemical on pest species are identified in Eisler (1992). Eisler identified the following concerning results from published studies:

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

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

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

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

We conducted a similar analysis of risk to bees using the BeeRex tool, as described above. According to APHIS' HHERA (2019) for carbaryl, spray applications of the Sevin XLR Plus formulation applied at 16 or 8 fl. oz. per acre are equivalent to an application rate of 0.5 and 0.25 lb a.i./A , respectively. To assess drift, input values from the APHIS analysis presented in its 2010 BA to NFMS were inferred from the chart in that BA. Using an application rate of 0.375 lb ai/A, at point zero, deposition is predicted at 38 mg/m^2 (0.339 lb ai/A). At 500 feet, deposition is predicted at 21 mg/m^2 (0.187 lb ai/A).

Table 2. CARBARYL Bee Risk Assessment

				Adult RQs		Number of times LOC (Adult)	
Application Rate (lb ai/A)	**Scenario**	**Pollen/nectar EEC (mg/kg)**	**Pollen/nectar EEC (ppb)**	**Acute dietary**	**Acute contact**	**Acute dietary**	**Acute Contact**
0.5	Full	55	55,000	161	1.22	403	3
0.25	RAATS	27.5	27,500	80	0.61	200	2
0.339	pt. zero APHIS drift analysis in 2010 BA (applic rate=0.375 lb ai/A)	37.3	37,300	109	0.83	273	2
0.187	pt. 500 APHIS drift analysis in 2010 BA (applic rate=0.375 lb ai/A)	20.6	20,600	60	0.46	150	1

Note that even at the deposition rate APHIS expects at 500 feet away from the spray line with a lower nominal application rate of 0.375 lb ai/acre (we have already noted that these predicted deposition rates could be underestimates at that distance, based on empirical data), APHIS woud exceed the acute toxicity Level of Concern designated by EPA by 150X. All of the other deposition values have similarly disturbing exceedences of EPA's acute dietary LOC, while contact exposure also shows potential to exceed the LOC. **Nowhere within the EAs or the EIS is this made clear.**

[5] Honey bee toxicity values for technical-grade carbaryl are used here since the APHIS EA did not include information on the toxicity of the formulated product that it uses.

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

A study by Abivardi et al. (1999) looked at the effect of carbaryl contact toxicity to recently emerged adult codling moths (*Cydia pomonella*), finding that at 187.5 ng/cm^2 (which is equivalent to 0.016 lb/ac—the same as the highest application rate under the grasshopper program), more than 70% of exposed male moths died within 24 hours, while these rates killed 30% of the females within 24 hours.

Recommendation: Faced with significant and concerning pollinator declines, APHIS should take into account the risk to native bees and butterflies from these treatments. At a minimum, APHIS should be presenting a more thorough and accurate analysis on the impacts of selected pesticides to pollinators and other beneficial insects. Research findings do portend worrying results for native pollinators and other beneficial insects exposed in the treated areas, even for diflubenzuron. APHIS should constrain its treatments to take into account pollinator conservation needs—especially where species of greatest conservation need are located—and improve its monitoring capability to try to understand what non-target effects actually occur as a result of the different treatments.

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

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

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

Lockwood et al. (1996-2000) explored identified infested areas, their sizes and what happened to them in subsequent years. Data was presented for 15 untreated and 4 treated areas. Of these, only two untreated areas grew in size in their 2nd year, and most winked out by the 2nd year, not reappearing by the 3rd year. This is powerful evidence that not treating is a viable decision, or that treating is not warranted in the first year, at least for small infestations, and at least if the goal is to minimize the chance that an outbreak/hotspot would result in something worse in the following year.

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

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

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

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

Researchers even warned about the potential for treatments to worsen outbreaks in the Grasshopper IPM handbook. In Section IV.8 (Recognizing and Managing Potential Outbreak Conditions) Belovsky et al. cautioned:

> *"Pest managers need to consider more than the economic value of lost forage production or the outcry of individual ranchers. Grasshopper control might provide short-term relief but worsen future problems in these environments. From GHIPM findings (see VII.14), it appears that grasshopper populations in these environments have a high potential for being limited by natural enemies. Pesticide applications that reduce grasshopper numbers could also reduce natural enemy numbers directly by outright poisoning of the invertebrate natural enemies, or indirectly by lowering the numbers of vertebrate predators as their invertebrate prey are reduced. Therefore, the ultimate result of control efforts could be an increase in grasshopper numbers for*

[6] Note that applying during this developmental stage is a necessity with the use of chitin-inhibiting insect growth regulators such as diflubenzuron.

the future, as they are released from the control of natural enemies."

Recommendation: In its EAs, APHIS must address the role of natural enemies, their ability to regulate grasshopper populations, and the risk to these natural enemies posed by chemical treatments. APHIS must not stretch the science beyond where it is credible. APHIS should work with its research arm and research partners to conduct meaningful research exploring natural enemies, competition, and other natural processes that hold the potential of regulating grasshopper populations without the use of chemicals.

8. APHIS fails to meaningfully analyze the risk to grassland birds, many of which are declining.

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

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

Despite this strong linkage between grasshoppers and the health of rangeland bird communities, APHIS only analyzes in very general terms the direct and indirect toxic effects of insecticidal treatments to birds, and fails to analyze the specific effects to the many declining bird species.

The Montana EAs also include some information about sage grouse and some additional protective measures to protect sage grouse on BLM land. However, APHIS makes no mention of state level mandates, including Montana Executive Order 12-201, nor whether APHIS will comply with the Montana Sage-grouse Conservation Strategy. The EAs also do not specifically evaluate whether treatments would adversely affect sage grouse populations due to impacts to the prey base, and assume, without providing evidence, that flattening the fluctuations in grasshopper population will have no impact.

A recent study estimated a net loss of nearly 3 billion birds since 1970, or 29% of 1970 abundance in North America (Rosenberg et al. 2019). It is critical to recognize that grassland birds—an important group of species that extends well beyond the iconic safe grouse—have suffered the largest decline (53%) among habitat-based groups since 1970, while populations of six species of grassland birds have declined by 65-94%. This is never disclosed in the EA nor considered in the cumulative effects analysis. Habitat loss is a huge driver of declines, yet pesticides still play a role (Hill et al. 2013), especially if their prey is affected. Birds are themselves 'free' insect control as described above (also see Bock et al. 1992), hence negative effects for birds could actually increase insect pests.

Recommendation: APHIS must more thoroughly address the risk of direct and indirect impacts to rangeland birds, factoring in the noted declines documented for grassland birds, and looking closely at its assumptions for diflubenzuron treatment, including drift into untreated swaths.

9. **It is unrealistic to assume that APHIS can comply with mitigation measures designed to protect bees on pesticide labels.**

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

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

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

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

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

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

Recommendation*:* APHIS must explain how its treatments are in compliance with the pesticide labels, and if necessary, incorporate additional mitigations to ensure that it is not in violation of federal pesticide laws.

10. **Endangered Species Act Assessment**

The EAs included a Biological Assessment, with assessments of potential impacts, protective measures, and determinations for species and critical habitat protected under the Endangered Species Act. We thank APHIS for sharing this important information with the public. It is important that the public be aware of such determinations and the reasoning behind them.

In several cases, the depth of the reasoning is scant, and/or incomplete. We suggest that in future assessments, the food preferences for each species, and any interdependencies with other species or species groups likely to be vulnerable to the effects of the program insecticides, be specifically addressed.

The EAs also include a concurrence letter from US. Fish and Wildlife Service. The letter states that the Service bases its concurrence on the information provided in the BA by APHIS and information in their files. We do not know, for example, if the USFWS has information on drift predicted into untreated swaths and downwind untreated areas. This could have affected their concurrence, for example, their apparent agreement that a 150-foot buffer would be sufficient around known occupied maternity roost trees for the northern long-eared bat.

Some protective measure clauses are unclear. For example, for least tern, the EAs state:

> *"No aerial ULV application will be applied 2.5 miles up and down river to prevent abandonment of nesting least turn colonies due to aircraft flyovers and a possible decrease on the fishery forage base due to accidental aquatic application. A 0.25 mile no-aerial ULV application buffer on each side of the river and around other bodies of water containing least tern colonies will also be observed. This, in addition, would include a 500 foot no treatment zone around nesting colonies."*

It's not clear if the 2.5 mile buffer preventing aerial ULV treatment up and down river is to be applied around known nesting colony locations? Also, given that this species is no longer listed, will APHIS continue to abide by any protective measures to ensure continued recovery of this species?

Another area where lack of clarity is present is in the discussion of protective measures for Spalding's catchfly. The Protective Measures listed in the EAs seem to state two contradictory things: *"Mitigative measures will be similar to other insect pollinated plants: aerial applications of ULV pesticides will not be used within 3 miles of the occupied habitats to protect pollinators. The exception is the 2004 local concurrence with USFWS allowing aerial or ground applications of diflubenzuron or carbaryl bait within the Spalding's catchfly habitat."*

This lack of clarity makes it difficult to know what APHIS is committing to. Will diflubenzuron be allowed within Spalding's catchfly habitat areas? If so, APHIS has not discussed the potential for diflubenzuron to impact juvenile bees, and the long-term impact of this upon the persistence and viability of the Spalding's catchfly. If APHIS did not include this information in its BA, was USFWS apprised about the risks of diflubenzuron to the viability of this species, and thus is its concurrence adequately informed?

Other protective measures that are listed are not consistent with the description of the program elsewhere in the EA. For example, in its assessment of red knot, APHIS states: *"APHIS maintains a 500 foot buffer around all water bodies, which would exclude most riparian areas where the Red Knot is likely to occur."* But the operational guidelines for the program do not state that all water bodies would be protected by a 500-foot buffer. Instead, the following is stated:

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

APHIS then concludes that the activities under the grasshopper suppression program may affect but are not likely to adversely affect red knot. Is this conclusion based on the correct buffers?

Finally, many of the protective measures pertain to "occupied" habitat (not potential habitat). APHIS does not state how it determines whether land is occupied by a listed species or not. The request letter, for example, alludes to sensitive sites but does not specifically state APHIS' the need to know where listed species are known to exist. How then, especially given the potential for treating very large and very far-flung lands, does APHIS determine occupied habitat?

Recommendation: APHIS should clarify its protective measures in the Final EA. If USFWS was not aware of modeled or empirical drift calculations, APHIS should provide its information to USFWS in a revised request for consultation. All determinations must be supported by thorough, complete analysis and accurate disclosure of the scientific studies underlying their reasoning. Under the ESA there must be disclosure of potential impacts under the treatments, an analysis of whether the project would jeopardize the continued existence or modify or destroy the critical habitat for each adversely affected listed species, according to any active ingredients that may be selected. Pesticide specific conservation measures for each listed species (actions to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the proposed action), where appropriate, should be explicitly addressed and adopted.

APHIS should better explain its procedures for identifying and mapping occupied habitat for species protected under the ESA.

For each species to be protected within the project area, APHIS must provide to applicators a set of clear set of directions outlining protective measures for the listed and proposed species found within this project area. In addition to these measures, APHIS should adopt the following operational guideline across all site-specific EAs: *"Use Global Positioning System (GPS) coordinates for pilot guidance on the parameters of the spray block. Ground flagging or markers should accompany GPS coordinates in delineating the project area as well as areas to omit from treatment (e.g., boundaries and buffers for bodies of water, habitats of protected species, etc.)."*

11. **Within the last year, the monarch butterfly has been designated a candidate species under the Endangered Species Act, but the EAs contain no information about impacts to or consultation for this species.**

No information is available in the EAs about the potential for effects to the monarch butterfly On December 15, 2020, the U.S. Fish and Wildlife Service announced that listing the monarch butterfly under the Endangered Species Act is warranted, but precluded by other priorities, making the monarch a candidate species under the Endangered Species Act. US Fish and Wildlife Service normally does consult on candidate species and instructs project leads to consider candidates in its effects analysis.

Therefore it appears to be an oversight that monarchs have not been included. APHIS must address the oversight and analyze impact to the monarch under the alternatives prior to implementing the action alternative.

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

In 2016 and 2017, the U.S. Department of Agriculture National Resources Conservation Service's (NRCS) developed regional Monarch Butterfly Wildlife Habitat Evaluation Guides, and discouraged placement of monarch breeding habitat within 38 m (125 ft.) of crop fields treated with herbicides or insecticides (NRCS 2016).

The risk of carbaryl applications may be unacceptably high for lepidoptera, including the monarch, based on data from Abivardi et al. (1999) as explained earlier in this comment letter. In addition, lepidopteran species are often quite sensitive to diflubenzuron, as documented elsewhere in this comment letter, therefore, impacts to this highly diminished species from diflubenzuron should be specifically analyzed.

Recommendation: APHIS must not conduct any treatments prior analyzing effects to the monarch butterfly as has been routine under ESA consultation procedures. No grasshopper suppression work should proceed in 2021 until the USFWS office, with full awareness of the plight of the monarch and the sensitivity of lepidoptera to diflubenzuron, issues its concurrence, this is made public, and APHIS implements any required conservation measures. Given the NRCS guidelines about placement of habitat, any insecticide use in or near existing or potential habitat should be out of the question.

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

The EAs do not mention a recent nationwide consultation effort on carbaryl's effect to listed species. In its Biological Evaluation that it forwarded to the Services, EPA determined that carbaryl is likely to adversely affect nearly all listed species nationwide (see https://www.epa.gov/endangered-species/final-national-level-listed-species-biological-evaluation-carbaryl). In addition, the US Fish and Wildlife Service recently determined that malathion is likely to adversely affect the vast majority of listed species across the country. Species in Montana that are likely to be adversely affected by either of these chemicals, according to EPA's evaluation, are not mentioned in the APHIS EAs.

For example, we note that the concurrence letter references a three mile buffer around any occupied habitat – within which no aerial spray would be permitted - for the three listed plant species (Spalding's catchfly, water howellia, and Ute Ladies tresses) to protect the plants and their pollinators. However, carbaryl bran bait may be used within these buffer areas, presumably to be applied by ground equipment. Was USFWS aware of the EPA determinations? Again, is this an informed concurrence?

At a minimum, one would expect to find disclosure of these determinations and inclusion of mitigation for carbaryl's and malathion's harmful effects to listed species. Instead, no mention is made.

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

13. APHIS must integrate its protective measures and guidelines in one cohesive framework.

With to the involvement of Montana BLM in this year's decision process and EAs prior to publication, the EAs contain several location where protective measures are referenced (e.g. concurrence letter, BAs, general operating guidelines, BLM stipulations, sage grouse section, etc.).

Recommendations: These protective measures must be brought together in a cohesive framework, so that they are not confused or forgotten, and so that any maps created for applicators correctly reflect the most protective of any "overlapping" measures. For example, BLM will not allow the use of carbaryl or malathion on its lands while USFWS will not allow use of liquid sprays within 3 miles of occupied habitat for the three listed plants. The upshot is that no pesticide application will be allowed within three miles of any of the listed plants, where they occur on BLM lands. These and other similar exclusions and protections must be made plain and reflected accurately on maps.

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

The geographic area covered by this EA may be home to 200-700 species of native bees (McKnight et al. 2018, Figure 1). Perhaps this is not surprising since the majority of rangeland plants require insect-mediated pollination. Native, solitary bee species are important pollinators on western rangeland. Hence, pollinators are important not only for their own sake but for the overall diversity and productivity of native rangelands, including listed plant species. However, this essential role that pollinators play in the conservation of native plant communities is given very short shrift in the EAs.

Many of the pollinators that call Montana home are already considered at-risk. See lists of at risk pollinators found in our comment letter submitted in 2020 (these comments are attached for reference to our email submitting this 2021 comment letter).

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

Despite this very real crisis in biodiversity, the EAs do not disclose which, if any, invertebrates within the geographic area are listed as sensitive by federal land management agencies or as Species of Conservation Concern, or whether the state of Montana designates any invertebrates as species of greatest conservation need.

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

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

- the 2014 Presidential Memorandum -- Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators
- the National Strategy to Promote the Health of Honey Bees and Other Pollinators
- the Pollinator-Friendly BMPs for Federal Lands
- the Pollinator Research Action Plan

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

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

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

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

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

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

Recommendation: In the face of declining pollinator and insect populations and the existence of federal directives for agencies to support and conserve pollinators and their habitat, APHIS must not conduct business as usual. APHIS should identify the at-risk pollinator species potentially present in the geographic area of the EAs and map their ranges prior to approving any treatment requests. To assist APHIS in this analysis, we appended tables of at-risk bee and butterfly species potentially located within the project area in last year's comment letter. Prior to treatment, APHIS should ensure that it has identified specific, actionable measures it will take to protect the habitat of at-risk pollinator species from contamination that may occur as a result of exposure to treatment.

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

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

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

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

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

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

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

Recommendation: While the mitigations that are identified for aquatic habitats in the EAs are heartening, the diflubenzuron label indicates that the chemical is subject to runoff for months after application, and areas supporting listed mussels need greater protection. APHIS must disclose impacts to at-risk mussels where they are present. In addition, APHIS should use larger buffers to protect freshwater mussels, such as those designated for listed salmonids in other states. In addition, APHIS should include monitoring for the presence and health of mussels in streams that traverse or are adjacent to treatment areas as part of its monitoring strategy.

16. **The EAs are silent on buffers around stock tanks. These can be important reservoirs of biodiversity, even as they may be better known for being home to many non-native species.**

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

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

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

APHIS includes no information about whether an NPDES permit has been obtained, and what provisions it includes. As described on the Dimilin 2L label, diflubenzuron is susceptible to runoff, and could result in discharges to surface water. Under the Clean Water Act, discharges require permit coverage under the National Pollutant Discharge Elimination System. An NPDES permit may be required. Even if an NPDES isn't required for certain activities, APHIS still has a duty to comply with state water quality standards under the Clean Water Act. Further, an NPDES permit does not absolve the agency of its duty to disclose impacts to water quality under NEPA.

Aquatic impacts could occur weeks or months beyond the treatment period, given difluenzuron's persistence. It is not clear if environmental monitoring is conducted in such a way as to pick up delayed transfer of diflubenzuron to nearby waterways.

Recommendation: APHIS must disclose whether its program has obtained an NPDES permit, or whether this requirement has been waived (and if so, why). APHIS must comply with state water quality standards and disclose impacts to water quality in the EA. APHIS should also disclose its environmental monitoring reports at its website and conduct environmental monitoring in such a way as to test for runoff effects weeks or months after treatment, in addition to drift at the time of treatment.

18. **Special status lands**

Montana contains numerous areas of special status lands. However, the EAs contain no analysis of impacts to or any specific protections to be accorded to special status lands such as Wilderness areas, Wilderness study areas, National Monuments or National Parks, Research Natural Areas, National Wildlife Refuges, and/or designated or proposed Areas of Critical Environmental Concern within or near potential treatment areas. This is especially disheartening, since these areas are so associated with some of the last refugia for declining species, as is made evident in the BA, which identifies the areas where species are known to occur. In addition there is no mention of whether the program is in compliance with the 1977 Montana Wilderness Study Area Act.

Recommendation: These special status areas have been designated for specific purposes and generally discourage human intervention with the natural ecosystem. Grasshopper suppression should not be undertaken in such areas. APHIS must review its procedures and ensure that it is not in danger of violating any federal laws or policies pertaining to such special designations.

19. Avoidance of Lands Where Organic or Transitioning Production Occurs

The general treatment guidelines for 2021 state: "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."

Montana's questionnaire for landowners requesting treatment also includes a question about local organic producers.

We are concerned about the potential for drift and runoff to certified organic or transitioning lands. Certified organic farmers who receive drift, even if unintentional, would risk losing certification for three years. That would mean these producers would also lose any income from those acres, and they would then have to manage affected lands completely separately from other unaffected acres.

Organic producers place a large emphasis on improving biodiversity on their lands, per the National Organic Standard. Many organic farmers approach this by establishing or conserving permanent pollinator and native habitat – an effort that can take years.

Montana is the nation's largest producer of organic wheat and lentils. Depending on the location of treatments this could be a significant impact to the state.

The general guidelines, crafted for the program as a whole, and included in each state's EAs, leave a number of questions about notification and avoidance of impacts to organic or transitioning producers, including:

- It is unclear if each state maintains a complete registry of organic and transitioning producers, and if that registry is spatially referenced. Many producers farm land in disparate locations. There are a number of certifying organizations across the west, not just the states. It is unclear if these different organizations share information, and if APHIS would be accessing a complete list in any locality.
- It is unclear what the notification process to organic and transitioning producers is. A public meeting is likely to not be sufficient. Given the short time frames between final treatment decisions and the fact that treatments usually occur in the early, critical part of the growing season, it also seems likely that some organic producers could completely miss a notification.
- APHIS appears to make the establishment of buffers optional. Given the issues we've outlined with notification, optional buffers are not a sufficient protection.
- While it is helpful that landowners requesting treatment are asked to identify organic producers in their vicinity, landowners may not, and should not be expected to, know the exact agricultural processes and philosophers of all landowners in the vicinity. We are concerned that some organic, and especially transitioning, parcels could be missed if APHIS does not cast a wide net to identify all locations where organic or transitioning farms exist.

Recommendation: APHIS should more clearly explain its process for identifying and notifying organic producers in the EAs. The identification and notification process should include multiple sources beyond any state list, even if redundant, to ensure that any organic or transitioning producer is accounted for in the spatial footprint of the spray. APHIS should not just notify but also confirm notification for each organic and transitioning producer, to ensure that its communication has reached its recipient. Given the large drift potential and its previous protocol for native managed bees, APHIS should not leave buffers open-ended but should institute a minimum 4-mile buffer around each identified organic or transitioning parcel. The Montana Organic Association and sites such as driftwatch.org and other spatial locators should be used to the full extent of their availability.

20. Extent of treatment to private lands

We have concerns about grasshopper treatments on public lands, which have resource values above and beyond cattle forage that must be taken into account. The EA notes that APHIS will also take requests for treatment from private landowners. The Montana EAs even include stipulations for treatments on BLM lands when those treatments are requested by non-BLM parties. In addition to our public lands concerns, we are also concerned about impacts to resources and species that overlap with private lands and the scope of APHIS's program, which is not supposed to be geared toward private lands. For example, determining occupied habitat on private land for listed species may be difficult or tricky.

Recommendation: APHIS should clarify whether and how it decides to treat private lands and what the likely impacts of that would be. APHIS should ensure that it is not overlooking the potential conservation issues that may exist on private lands.

21. Cumulative effects analysis

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

In the EA, APHIS states that cumulative effects “are not expected to be significant” basing its reasoning on the assertion that the probability of an outbreak occurring in the same area as a previous outbreak is unlikely. Yet, APHIS does not disclose the scale of treatments in any previous years, nor the impact of those treatments.

Based on our independent review, Montana’s history of recent treatments does not support its statement that the probability of an outbreak occurring in the same area as a previous outbreak is slim. Montana in fact has treated large areas in close proximity, and even in overlapping areas in recent years, and it appears that large treatment areas have been the norm for quite some time. APHIS also places emphasis on the fact that its policy dictates that only one treatment a year is conducted, but does not address nearby impacts on private or state lands where more than one treatment may be conducted, which could contribute to cumulative impacts. In addition, ecological impacts can be severe even if a repeat treatment is unlikely if treatment results in adverse effects to a species confined to a small range, already in decline, or both.

In addition, impacts to migratory species from cumulative exposures (such as honeybees which, as the EA discloses, are in large part transported to California during the almond bloom) are not addressed.

Recommendation: To have an adequate understanding of cumulative impacts, APHIS must disclose where spraying has occurred in the past, and what impacts have resulted, as part of the current condition assessment. APHIS must also analyze cumulative impacts considering declining species, as these species will be more vulnerable to negative effects resulting from the treatments. APHIS must consider cumulative exposure to any migratory species, especially those that merit more intensive consideration due to their legal protections, ecological importance or economic importance.

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

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

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

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

Emphasizing cultural techniques through appropriate grazing management could help to reduce reliance on pesticide applications and allow abiotic and biotic factors to regulate grasshopper and Mormon cricket populations to the greatest extent possible. For example Onsager (2000) found that (compared to season-long grazing) rotational grazing resulted in significantly less adult *Melanoplus sanguinipe*s grasshoppers and significantly less damage to forage. Under rotational grazing, the nymphs developed significantly slower and their stage-specific survival rates were significantly lower and less variable. Consequently, significantly fewer adults were produced significantly later in the season under rotational grazing. Seasonal presence of all grasshopper species combined averaged 3.3X higher under season-long grazing than under rotational grazing. Local outbreaks that generated 18 and 27 adult grasshoppers per square meter under season-long grazing in 1997 and 1998, respectively, did not occur under rotational grazing. The outbreaks consumed 91% and 168%, respectively, as much forage as had been allocated for livestock, as opposed to 10% and 23%, respectively, under rotational grazing.

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

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

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

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

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

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

Longer-term strategic thinking should include:

- Prevent conditions that allow grasshopper and Mormon cricket populations to reach outbreak conditions by employing diverse management techniques (e.g., biological, physical, and cultural).
- Implement frequent and intense monitoring to identify populations that can be controlled with small ground-based pesticide application equipment.
- If pesticides are used, select active ingredients and application methods to minimize risks to nontarget organisms.
- Monitor sites before and after application of any insecticide to determine the efficacy of the pest management technique as well as if there is an impact on water quality or non-target species.

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

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

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

Recommendation: We recommend that, in the future, notice of open public comment periods for all site-specific EAs for grasshopper suppression be posted in the Federal Register, and documents made available for review at regulations.gov and at the APHIS grasshopper website. In addition, we make the following recommendations:

- Actual proposed treatment areas should be mapped and shared with the public when each state APHIS office submits its treatment budget request. Special status lands and sensitive designations should be disclosed on these maps.
- Later refinements to locations should be mapped and shared with the public prior to treatments.
- Nymphal survey results should be provided as soon as available and prior to treatments, in map and table form (counts by species at each survey point, not total counts by survey point).
- Economic threshold analysis needs to be conducted and disclosed especially for treatments on public lands.
- Consultation documents, including APHIS' transmittal to the Services describing the listed species, APHIS determinations, and APHIS rationale for those determinations, should be shared with the public in the draft EA, along with the concurrence letter if it has been transmitted to APHIS.
- Results of environmental monitoring associated with treatments (i.e. drift cards, water samples) should be disclosed.

Thank you for the opportunity to comment on these actions. We recognize that it is challenging to balance various uses of these rangelands. With mounting science showing concerning declines in pollinators and other insects, APHIS should use its influence with land management agencies to ensure lands are maintained in a manner that prevent spikes of pest grasshoppers to avoid use of harmful pesticides on native grasshopper populations and habitats. Such forward thinking would not only could avoid harmful pesticide uses, it also would allow our valuable rangelands to better support pollinators and healthy ecosystems.

Thank you for your efforts. Please feel free to contact us should you have questions on our comments.

Sincerely,

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The Xerces Society

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