UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

August 30, 2023

MEMORANDUM

SUBJECT: Environmental Risk Assessment for a FIFRA Section 3 Registration of the New Product GS2 Formulation (Calantha) Containing Ledprona (*Leptinotarsa decemlineata* (Colorado Potato Beetle CPB)-specific recombinant double-stranded interfering Oligonucleotide GS2) at 0.8%.

Submission No:	1058489 and 1069869
Parent Case:	00144420
Action Code Case:	00144422
EPA File Symbols:	94614-R and 94614-E
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TO: Matthew Weiner, Risk Manager
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I. Executive Summary

GreenLight has submitted an application for a Section 3 Registration under FIFRA for an end-use product GS2 Formulation (Calantha) (EPA File symbol 94614-E), containing the proposed new dsRNA active ingredient Ledprona, *Leptinotarsa decemlineata* (Colorado Potato Beetle (CPB))-specific recombinant double-stranded interfering Oligonucleotide GS2 (EPA File

Symbol 94614-R) at 0.8%. This risk assessment refers to the active ingredient as "Ledprona" and the end-use product as "Calantha."

No new data related to the ecological risk assessment have been submitted, and no information has been provided to EPA to raise any concerns for nontarget organisms related to this Section 3 registration application.

Based on scientific rationale and effects being limited to a subset of closely-related coleopteran (i.e., beetle) species observed in submitted studies in the EUP assessment (USAEPA 2023), EPA has determined that there is a reasonable expectation of no discernible effects to occur to any non-coleopteran nontarget organisms exposed to Ledprona as a result of the proposed FIFRA section 3 application.

EPA analysis also examined the 19 federally listed threatened and endangered ('listed') coleopteran species and determined that no exposure is expected for 15 of the 19 federally listed threatened and endangered ('listed') coleopteran species from a section 3 registration of Calantha containing Ledprona. Detailed analysis was conducted for the four listed species where there is the potential for exposure (i.e., where there is an overlap of the species' range and potato crop growing areas) with biological evaluations of the four species' specific habitat and life history indicating that there is no reasonable expectation of exposure of these four listed beetle species from the proposed uses of Calantha containing Ledprona. Therefore, EPA is making a "No Effect" determination under the Endangered Species Act (ESA) for all listed species and their designated critical habitats resulting from the proposed uses of Calantha containing Ledprona.

The conclusions conveyed in this assessment were developed in full compliance with *EPA Scientific Integrity Policy for Transparent and Objective Science*, and EPA Scientific Integrity Program's *Approaches for Expressing and Resolving Differing Scientific Opinions.* The full text of *EPA Scientific Integrity Policy for Transparent and Objective Science*, as updated and approved by the Scientific Integrity Committee and EPA Science Advisor can be found here: https://www.epa.gov/sites/default/files/2014-02/documents/scientific_integrity_policy_2012.pdf. The full text of the EPA Scientific Integrity Program's *Approaches for Expressing and Resolving Differing Scientific Opinions* can be found here: https://www.epa.gov/scientific-integrity/approaches-expressing-and-resolving-differing-scientific-opinions.

II. Introduction

A. Background

In May 2023, GreenLight Biosciences (hereafter "GreenLight") was issued an Experimental Use Permit (EUP) authorizing field testing studies only in the states of Idaho, Maine, Michigan, Minnesota, New York, North Dakota, Oregon, Virginia, Washington, and Wisconsin, using their end-use product GS2 Formulation (Calantha) (EPA File symbol 94625-EUP-1), containing the proposed new dsRNA active ingredient Ledprona (*Leptinotarsa decemlineata* (Colorado Potato Beetle (CPB))-specific recombinant double-stranded interfering Oligonucleotide GS2) at 0.8%. This active ingredient (a.i.) is meant to target Colorado Potato Beetle (CPB), a major pest species of potato crops in North America.

Several key factors played a role in the May 2023 determination that Ledprona would not result in discernible effects for non-coleopteran nontarget organisms as a result of the approved experimental use permit. Below are the key factors as outlined in the risk assessment for the May 2023 action, which can be found at https://www.regulations.gov/docket/EPA-HQ-OPP-2022-0932 (USEPA 2023):

- Risk quotient (RQ) values are below the level of concern for each taxa assessed (excluding pest coleopteran species).
- Bioinformatic analyses demonstrate a lack of similarity between Ledprona and genomes/transcriptomes of a range of nontarget organisms, except for several beetle species, indicating a lack of plausible biological pathway for effects to non-coleoptera.
- Toxicity studies indicate no effects upon any taxa tested with the exception of two pest beetles closely related to the target CPB.
- Application rates are low and there are data supporting rapid degradation times within the soil, aquatic sediment, larval CPB gut fluids and from microbial activity.
- Physiological barriers are present within vertebrate species that prevent the dsRNA such as Ledprona from reaching and penetrating the gut in vertebrate species.

Based on the above factors and analyses discussed in EPA's science assessment for the May 2023 EUP (USEPA 2023), EPA determined that there was a reasonable expectation of no discernible effects to occur to any non-coleopteran nontarget organisms exposed to Ledprona as a result of the experimental use permit for the Ledprona end-use product GS2 Formulation (Calantha) (EPA File symbol 94625-EUP-1). EPA analysis determined that no exposure was expected for either of the two federally listed threatened and endangered ('listed') coleopteran species that are present in the counties listed in the EUP (USAEPA 2023) and therefore effects to listed species and their designated critical habitats were not expected, resulting in a "No Effect" determination under the Endangered Species Act (ESA).

GreenLight has submitted an application for a Section 3 Registration under FIFRA for an end-use product GS2 Formulation (Calantha) (EPA File symbol 94614-E), containing the proposed new dsRNA active ingredient Ledprona, *Leptinotarsa decemlineata* (Colorado Potato Beetle (CPB))-specific recombinant double-stranded interfering Oligonucleotide GS2 (EPA File Symbol 94614-R) at 0.8%. This risk assessment refers to the active ingredient as "Ledprona" and the end-use product as "Calantha."

B. Product Description

The technical grade active ingredient (TGAI) is a liquid consisting of 1.4% of Ledprona. However, the end-use product, Calantha, contains only 0.8% of Ledprona. The end-use product is a foliar-applied RNAi-inducing pesticide, in which the double-stranded interfering RNA (dsRNA) active ingredient interferes with the transcription of messenger RNA (mRNA) encoding a specific CPB gene and through RNA interference (RNAi) down regulates the expression of that gene. The result of this action is cellular damage and eventual mortality to the Colorado Potato Beetle within days of ingestion of the product. This product's intended use site is to be sprayed on potatoes in the field.

1. Mode of Action

The active ingredient is a double stranded ribonucleic acid (dsRNA) that has been specifically engineered to target the Colorado Potato Beetle (CPB; *Leptinotarsa decemlineata*) by inducing mortality via RNAi upon consumption. Briefly, the exogenously supplied active ingredient dsRNA Ledprona leads to the inhibition (or silencing) of a CPB gene by interfering with messenger RNA (mRNA) produced from a specific CPB gene. Ledprona targets the proteasome subunit beta type-5 gene (PSMB5) in the Colorado Potato Beetle. This gene encodes a 1010 bp long mRNA (NCBI Accession XM_023158308) that translates into a key protein that regulates proper folding of other CPB cellular proteins. The Ledprona dsRNA must be consumed by the beetle, cross the beetle's gastrointestinal tract, and enter the beetle's cells, where intracellular CPB proteins such as Dicer (an RNase III endonuclease) then cleave the Ledprona dsRNA into small interfering RNAs (siRNAs). The resulting siRNAs are complimentary to sequences in the messenger RNA (mRNA) transcribed from the PSMB5 gene. The siRNA sequence, bound to a CPB RNA-induced protein complex, serves as a guide to target the PSMB5 mRNA which is then cleaved. Cleavage of the mRNA transcribed from the PSMB5 gene prevents that mRNA from being translated into proteins (Ivashuta et al., 2009; Rodrigues and Petrick, 2020). Loss of functional PSMB5 protein results in cell death in the Colorado Potato Beetle and mortality in the beetle.

2. Use and Usage

The intended use of Calantha is to control Colorado Potato Beetle on potato plants in the field. The product use patterns include ground spray, aerial spray (via airplane) and chemigation. The anticipated application rate is 12-16 fluid ounces per acre, which equates to 4 g a.i./acre (0.0088 lb a.i./acre). As per the draft label provided, there are use restrictions that include not applying the product more than 4 times per year and a total of no more than 64 fluid ounces per acre in one calendar year (with a minimum of 7 days application interval), and specific instructions for managing application considerations such as spray drift and the emergence of resistance to Ledprona in the CPB, i.e., resistance management.

III. Environmental Effects Assessment

A. Submitted Environmental Data

The applicant submitted laboratory toxicity studies and scientific rationale to fulfill non-target organism data requirements to support the request for the EUP approved in May 2023 (USEPA 2023). No new studies for data requirements beyond those submitted in support of the May 2023 EUP were required or submitted for the Section 3 registration. References that were included from the previous risk assessment and the open literature that pertained to specific topics discussed below were used in this assessment.

B. Summary of Environmental Fate

In evaluating the environmental fate of Ledprona, EPA considered the chemical and biological stability of dsRNA as well as whether the Ledprona dsRNA has been stabilized in some way in order to reduce the rate of abiotic and/or biotic degradation in the environment. The formulated end product, Calantha, contains Ledprona and EPA-approved inerts/formulants in the product to avoid the degradation of the dsRNA active ingredient in the container. Degradation studies involving the end-use product submitted to support the EUP application can be found in the EUP risk assessment (USEPA 2023).

Briefly, an aerobic soil degradation study was conducted using representative agricultural soils. Given that degradation was greater than 80% of the initial concentration for all soils tested, degradation is considered to be rapid under aerobic conditions, although residual soil concentrations of less than 90% of initial concentration at day 12 could present a potential exposure to nontarget organisms until all of the added product is fully degraded or otherwise biologically unavailable, e.g., by tightly binding to clay particles.

The potential for exposure to aquatic environments would be limited to washout and run-off circumstances. San Migual and Scott (2015) has shown that foliar-sprayed dsRNA is mostly retained on plant surfaces, thereby minimizing the amount of Ledprona expected to be in run-off. Additionally, Fischer et.al (2017), demonstrated that unformulated dsRNA generally degrades quickly once in aquatic systems due to microbial activity and hydrolysis. Within the aquatic study performed by Fischer et.al (2017) the authors note that the DT_{50} and DT_{90} values for aquatic system are less than three days and four days, respectively. The aerobic aquatic degradation study for Calantha calculated a DT_{90} of 6.18 and 4.2 days and DT_{50} values of 1.87 and 1.27 days for two representative aquatic environments.

To further evaluate the potential impact of the formulation on stability, GreenLight submitted microbial stability studies within MRID 52028806 (MRID reviewed as part of the Human Health May 2023 EUP Risk Assessment). This study compared degradation rates of the formulated and unformulated dsRNA in the presence of microbes and water at varying concentrations mimicking aerial (Ledprona 0.2 g/L) and ground (Ledprona 0.08 g/L) application rates. The formulants are intended to prevent the degradation of the dsRNA active ingredient in the container, but dilution reduces the ability of the formulants to prevent degradation. This is supported by the study that shows additional dilution reduces the stability that the formulants can provide. Specifically, the study found at higher concentrations, Calantha had some stabilizing effect on the dsRNA in the presence of microbes (degradation of 200 ng/L to 0 ng/L in just over 20 hours for Ledprona technical, compared to 200 ng/L to ~60 ng/L within ~70 hours for Calantha). However, that stabilizing effect was greatly reduced once the product was diluted to ground application concentrations (degradation of 80 ng/L to 0 ng/L in just under 5 hours for the Ledprona technical, compared to 80 ng/L to 0 ng/L within ~20 hours for Calantha). Therefore, the ingredients within the formulation are not expected to meaningfully increase Ledprona stability to microbial degradation in the environment where they are expected to be even further diluted.

In summary, analysis of the environmental fate information/data provided lead to the conclusion that Calantha is rapidly degraded under aerobic and aquatic conditions and is unlikely to persist in the environment, thus limiting the probability of exposure.

C. Nontarget Organism Exposure

As described in EPA's May 2023 risk assessment for the Ledprona EUP, Calantha is a foliar-applied insecticide using dsRNA to control the Colorado Potato Beetle (*Leptinotarsa decemlineata*). This product is to be applied to potato plants, and thus restricted to terrestrial usage. Spray drift advisories are listed on the label in order to protect nearby nontarget sites as well as spray-drift management for different application techniques. To reduce spray drift, application height restrictions (not to be applied more than 10 feet above canopy for aerial or 3 feet above canopy for ground boom) and wind restrictions (no application when wind speeds exceed 10 mph for aerial or 15 mph for ground boom) are included on the label. Given the increased potential for spray drift with aerial application, there are additional restrictions for aerial applications such as restricted boom length, restrictions on swath displacement, and restrictions on nozzle orientation. Given that the on-field application rate is very low, with the application rate equating to 0.0083 lb of Ledprona per acre per the label, the amount of active ingredient off-field resulting from spray drift is therefore expected to be minimal. This low application rate, coupled with label restrictions regarding applications, results in spray drift being considered to be negligible, and exposure analyses are therefore focused on on-field. The main routes of exposure to nontarget organisms would likely be through contact during application and contact with and ingestion of treated plants. Above ground terrestrial nontarget organisms are most likely to be exposed; however, soil dwelling organisms may be exposed via indirect contact with the product (e.g., treated plants and soil mixing with topsoil via tillage or drift onto the soil during application).

Regarding possible oral exposure to birds and mammals, the most likely routes are through consumption of treated food items. However, per the EPA's May 2023 Ledprona EUP risk assessment, exposure was estimated to be low to birds and mammals based on the low application rate and estimated environmental concentration (EEC).

The most likely route of exposure to Ledprona for nontarget plants would be exposure within the treated area, but any nontarget plants within the field would most likely be removed by common agricultural practice pre- or post-harvest and, therefore, any exposure of the product to these nontarget plants would be inconsequential. Exposure is also possible via spray drift and/or runoff outside of the treatment area; however as described above, exposure via spray drift is considered negligible due to the low application rate and label restrictions. Additionally, as described above, foliar-sprayed dsRNA is mostly retained on plant surfaces (San Migual and Scott 2015), thereby minimizing the amount of Ledprona expected to be in run-off.

The most likely routes of exposure to Ledprona for nontarget insects and honey bees are through contact during application or by touching treated surfaces. In addition, oral exposure may occur through consumption of treated plants or consumption of plants in adjacent areas that have been contacted by spray drift or runoff; however as described above, exposure via

spray drift is considered negligible due to the low application rate and label restrictions. Additionally, as described above, foliar-sprayed dsRNA is mostly retained on plant surfaces (San Migual and Scott 2015), thereby minimizing the amount of Ledprona expected to be in run-off. Therefore, exposure can occur for insects and honey bees on field, but levels are considered negligible off field.

The label states that the product is not to be applied directly to water or areas where surface water is present or intertidal areas below the mean high-water mark, therefore the most likely route of exposure to aquatic environments is through spray drift and/or runoff. However, as described above, exposure via spray drift is considered negligible due to the low application rate and label restrictions. Additionally, as described above, foliar-sprayed dsRNA is mostly retained on plant surfaces (San Migual and Scott 2015), thereby minimizing the amount of Ledprona expected to be in run-off. Therefore, as described in EPA's 2023 risk assessment, and further supported by the label language, the likelihood of exposure to aquatic systems is negligible.

As described in EPA's May 2023 risk assessment for the Ledprona EUP, EPA evaluated whether the formulation would increase environmental stability of the dsRNA and found this to be unlikely based on degradation studies. In addition to the potential effect on environmental stability, EPA also evaluated whether the formulation of dsRNA would increase stability of the molecule within the gut of an organism, potentially increasing exposure through this route. EPA also determined that, based on the data submitted for the EUP, there is no indication that the formulation will increase stability within the digestive tract across diverse taxa.

D. Summary of Nontarget Effects Data

No new studies were submitted for the Section 3 registration, but EPA previously evaluated for the May 2023 EUP request whether there was any risk to nontarget organisms from exposure to Ledprona as contained in Calantha, and EPA found that there is a reasonable expectation of no discernable effects for any nontarget organisms outside of the Order Coleoptera based on mode of action, bioinformatics analyses, and toxicity studies (USEPA 2023).

1. Direct Effects

As described in EPA's May 2023 risk assessment, the LC_{50}/LD_{50}/EC_{50} toxicity endpoints for all of the guideline nontarget organism studies (i.e., honeybee, earthworm, green lacewing, ladybird beetle, parasitic wasp, predatory mite, springtail, and daphnids) conducted for Ledprona, both as a technical grade active ingredient and in its formulated end-use product Calantha, were greater than the highest concentration or level tested within each test, indicating that Ledprona presents a narrow spectrum of activity. The scientific rationale provided sufficient information to determine that adverse effects to avians, freshwater fish, or plants were unlikely as a result of the proposed uses of the material, and also supported the conclusion that Ledprona presents a narrow spectrum of activity.

In the bioinformatics analysis of nontarget organism effects, 12 pest coleopteran species and 9 nontarget guideline species were analyzed (including non-coleopteran insects, birds, fish, aquatic invertebrates, and humans). Five of the 12 Coleopteran species analyzed (including the target species) had sequence matches to Ledprona sequences, indicating the potential for adverse effects from Ledprona. The evaluated species represented a range of beetles from those presumed to be closely related to CPB to those presumed to be more distantly related. Out of the 9 nontarget guideline organisms analyzed, two species (earthworm (*Eisenia fetida*) and seven-spotted ladybird beetle (*Coccinella septempunctata*) had sequence matches. However, the number of matches in earthworm and ladybird beetle were very low (a maximum of 3) when compared to the target organism sequence matches (417), and as noted above, guideline toxicity studies using both organisms found no evidence of effects from exposure to Ledprona.

To further explore the potential effects of Ledprona on the 4 coleopteran species that bioinformatics analyses suggest might be sensitive to Ledprona, bioassays were performed on Western corn rootworm (WCR); southern corn rootworm (SCR); red flour beetle (RFB); emerald ash borer (EAB) in order to further refine the spectrum of insecticidal activity of Ledprona. The spectrum of activity studies with RFB and SCR indicate statistically significant mortality in these organisms when exposed to Ledprona, but there was no statistically significant mortality in WCR and EAB. RFB and SCR are among the beetle species presumed taxonomically to be closely related to CPB. Moreover, there were no effects in the 9 nontarget organism studies (including the ladybird beetle study). Therefore, the data indicate that Ledprona appears to be specifically targeting Colorado potato beetles as well as a subset of beetles closely related to the CPB.

In summary, analysis of the toxicity testing, bioinformatics analysis, and scientific rationale lead to the conclusion that Ledprona dsRNA presents low or no toxicity to most nontarget organisms with the exception of beetles closely related to the target pest.

2. Indirect Effects

As described in EPA's May 2023 risk assessment, EPA evaluated the potential for indirect effects, which generally include negative effects to nontarget organisms from the reduction of a food source or habitat. Potential indirect effects from the proposed uses of Ledprona include a reduction of a food source, specifically Colorado Potato Beetle and other closely related beetles that are directly affected within the treatment area. As discussed in the section on nontarget organism exposure, due to the low application rate and label restrictions, spray drift is considered to be negligible, and exposure analyses are therefore focused on on-field. The Colorado Potato Beetle and other closely related beetles are available in areas outside of the treated field and, subsequently, organisms that consume beetles as a source of food will have opportunity off-field to encounter beetles. Indeed, beetles can be found in virtually all habitats that insects inhabit worldwide (Gressitt, J.L., 2023).

Therefore, indirect effects to nontarget organisms are not expected because any effects to beetles are expected to be limited to the treatment field, which is not a sole, or significant, source of feeding for nontarget organisms that consume beetles.

IV. Environmental Risk Conclusions

EPA considered possible routes of exposure to Ledprona as contained in the end-use product Calantha, including from contact with or the consumption of Calantha. EPA also considered whether Ledprona as contained in the end-use product Calantha could present a direct hazard to organisms exposed through contact and/or consumption, as well as the likelihood of a hazard from the possible reduction of CPB populations leading to a reduction in a nontarget organism's food source. EPA then evaluated risk by examining the possible hazards and possible routes of exposure in conjunction (i.e., Risk = Hazard x Exposure). Where exposure may be possible, but no hazard is identified, risk is concluded to be negligible.

With regard to the potential for nontarget organisms to be exposed to Ledprona as contained in the end-use product Calantha, EPA concludes that the potential of exposure of any nontarget organisms to Ledprona as contained in the end-use product Calantha is limited to on-field exposure and is negligible off-site.

With regard to any potential hazard that might be associated with Ledprona as contained in the end-use product Calantha, EPA concludes that the consumption of or contact with Ledprona as contained in the end-use product Calantha by nontarget organisms is not expected to pose a hazard to any non-coleopteran nontarget organisms based on 1) RQ values being below the level of concern for the range of tested representative nontarget organisms, 2) bioinformatics analyses demonstrating lack of similarity between Ledprona and genomes/transcriptomes of a range of nontarget organisms, 3) toxicity studies indicating no effects upon any taxa tested with the exception of two closely related beetles, 4) low application rates and rapid degradation times within soil, aquatic sediment, larval CPB gut fluids, and from microbial activity, and 5) physiological barriers to dsRNA such as Ledprona present within vertebrate species.

Therefore, although exposure may be possible (but is expected to be limited), and because no hazard was identified for any organisms outside beetles closely related to the target pest, there is a reasonable expectation of no discernible effect for non-coleopteran nontarget organisms as a result of the Section 3 registration for Calantha.

V. Risk to Federally Listed Threatened and Endangered Species

The combination of scientific rationale, bioinformatics analyses, and bioassay results indicate the specificity of Ledprona to beetles (Coleoptera). Ledprona is designed to be toxic to the Colorado Potato Beetle (Coleoptera Family Chrysomelidae). While no effects of Ledprona were observed in the coleopteran Ladybird Beetle, effects in two beetles closely related to CPB, Red Flour Beetle and the Southern Corn Rootworm, were noted. Therefore, the potential for Ledprona to adversely affect coleopteran nontarget organisms must be considered. Although the adverse effects appear limited to a subset of Coleoptera, EPA conservatively evaluated the potential for effects to all coleopteran species listed as threatened or endangered present in the United States.

There are 19 listed coleopteran species and/or their critical habitats in the United States. Based on information from the USFWS-IPaC (USFWS(a), 2023) and the USFWS-ECOS (USFWS(b), 2023) these species are identified in Table 1. Exposure to coleopteran species is expected to be limited to contact with or consumption of Ledprona that is intended to be used in potato growing agricultural settings, therefore the species range of all listed coleopterans were compared to the overlap of known production of potato crops from 2008 to 2022 (USDA NAAS, 2022). Most listed coleopteran species are habitat specialists and do not utilize agricultural fields as habitat and those listed coleopterans whose habitats are far from current and historical potato crop production are not expected to be exposed (Table 1; see Appendix A for individual species analysis).

Based on overlap analysis, fifteen of the 19 listed coleopteran species' ranges did not overlap with historical and current potato crop production, resulting in No Effect determinations for these species; however, four coleopteran species' ranges have been identified as overlapping with known agricultural potato production (USDA NASS 2022), requiring additional analyses.

Table 1. Threatened and Endangered Beetles in the United States.

Common Name	Scientific Name	ESA Listing Status	ESA Listing Date
Beetles With No Range Overlap with Potato Crop Production			
Coffin Cave mold beetle	*Batrisodes texanus*	Endangered	9/16/1988
Kretschmarr Cave mold beetle	*Texamaurops reddelli*	Endangered	9/16/1988
Tooth Cave ground beetle	*Rhadine persephone*	Endangered	9/16/1988
[no common name] Beetle	*Rhadine exilis*	Endangered	12/26/2000
[no common name] Beetle	*Rhadine infernalis*	Endangered	12/26/2000
Helotes mold beetle	*Batrisodes venyivi*	Endangered	12/26/2000
Casey's June Beetle	*Dinacoma caseyi*	Endangered	10/24/2011
Delta green ground beetle	*Elaphrus viridis*	Threatened	8/8/1980
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	Threatened	8/8/1980
Mount Hermon June beetle	*Polyphylla barbata*	Endangered	1/24/1997
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Endangered	12/18/1997
Comal Springs riffle beetle	*Heterelmis comalensis*	Endangered	12/18/1997
Ohlone tiger beetle	*Cicindela ohlone*	Endangered	10/3/2001
Salt Creek Tiger beetle	*Cicindela nevadica lincolniana*	Endangered	10/6/2005
Miami tiger beetle	*Cicindelidia floridana*	Endangered	11/4/2016
Beetles with Range Overlap with Potato Crop Production			
American burying beetle	*Nicrophorus americanus*	Threatened	7/13/1989
Hungerford's crawling water Beetle	*Brychius hungerfordi*	Endangered	3/7/1994
Northeastern beach tiger beetle	*Habroscelimorpha dorsalis dorsalis*	Threatened	8/7/1990
Puritan tiger beetle	*Ellipsoptera puritana*	Threatened	8/7/1990

Source: (USFWS(b), 2023)

The four coleopteran species with ranges that do overlap with known agricultural potato production are described in more detail in the sections below. A full detailed analysis of all of the 19 coleopteran species evaluated can be found in Appendix A.

Northeastern beach tiger beetle (*Habroscelimorpha dorsalis*)
While there is overlap of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) species range and potato crop farming, this beetle is a beach dweller and aquatic exposure of this beetle to Ledprona is expected to be negligible based on the EEC, the application rate, label language restricting spray-drift, and aquatic and terrestrial degradation data. Consistent with the May 2023 EUP risk assessment, EPA therefore determines that the use of Ledprona in this location will have no effect on the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) nor its critical habitat.

Puritan tiger beetle (*Ellipsoptera puritana*)
While there is overlap of Puritan tiger beetle (*Ellipsoptera puritana*) species range and potato crop farming, the specific type of habitat this beetle requires is not conducive to potato crop production. These beetles spend their entire life cycle on or near eroding cliffs and adjacent sandy beaches. Therefore, these beetles are not expected to be in potato fields, and the potential for aquatic exposure via spray drift or runoff to this beetle is expected to be negligible based on the EEC, the application rate, label language restricting spray-drift, and aquatic and terrestrial degradation data. EPA therefore determines that the use of Ledprona will have no effect on the Puritan tiger beetle (*Ellipsoptera puritana*) nor its critical habitat.

American burying beetle (*Nicrophorus americanus*)
While there is overlap of the American burying beetle (*Nicrophorus americanus*) species range and potato crop farming, exposure to this beetle is expected to be negligible based on the application timing (the beetle is nocturnal and burrows underground during the day when the product will be applied), the rapid terrestrial degradation time, and the negligible spray drift (due to the low application rate and label restrictions regarding applications) that could occur off field into the beetle's habitat. Additionally, the mode of action of Ledprona is only possible through ingestion of the product and the American burying beetle feeds on carrion buried underground, not fresh vegetation to which the product will be applied. Because the beetles feed on rotten flesh, if the dead animal had incidentally been exposed to the product during application, the beetle would not consume the animal until the decaying process had begun and is buried underground, and therefore, per degradation data previously reviewed, the product would also have degraded. EPA therefore determines that the use of Ledprona will have no effect on the American burying beetles (*Nicrophorus americanus*) nor its critical habitat.

Hungerford's crawling water beetle (*Brychius hungerford*)
Hungerford's crawling water beetle is an aquatic species that is found in streams downstream from culverts, beaver and natural debris dams, and human-made impoundments and therefore any exposure to Ledprona would be limited to aquatic exposure via spray drift/run-off. While there is overlap of Hungerford's crawling water beetle (*Brychius hungerford*) species range and potato crop farming, aquatic exposure to this beetle is expected to be negligible based on the EEC, the application rate, label language restricting spray-drift, and aquatic degradation data. EPA therefore determines that the use of Ledprona will have no effect on the Hungerford's

crawling water beetle nor its critical habitat. Additional information can be found in the risk assessment for the 2023 EUP.

Endangered Species Conclusions

EPA has determined that there is a reasonable expectation of no discernible effects to occur to any non-coleopteran nontarget organisms exposed to Ledprona as contained in Calantha as a result of the proposed labeled applications. EPA's analysis determined that negligible to no exposure is expected for the four federally listed threatened and endangered ('listed') coleopteran species that are present in the areas where there is overlap of the species' range and potato crop farming. While the overlap suggests there is a remote possibility of exposure, further biological evaluations of the four species specific habitat and life history indicates that there is negligible exposure to the listed beetles and no discernible effects are expected. Therefore, EPA is making a "No Effect" determination under the Endangered Species Act (ESA) for all listed species and their designated critical habitats resulting from the proposed uses of Calantha containing Ledprona and has concluded that consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service under ESA § 7(a)(2) is not required.

VI. References

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Appendix A: Evaluation of the Potential of Calantha to Affect Coleopteran Threatened or Endangered Species (TES)

[No common name] beetle (*Rhadine exilis*)
[No common name] beetle (*Rhadine infernalis*)
Helotes mold beetle (*Batrisodes venyivi*)
Status: Endangered
Listed: 12/26/2000
Critical habitat designated
In order to characterize the potential exposure of these species to Ledprona, critical habitat and updated species range information were evaluated for the three beetles, Helotes mold beetle (*Batrisodes venyivi*), *Rhadine exilis* and *Rhadine infernalis*, all of which inhabit the same critical habitat. The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(b), (c), (d), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The endangered species, the *Rhadine exilis* and *Rhadine infernalis* beetles and the Helotes mold beetle (*Batrisodes venyivi*), are obligate (capable of surviving in only one environment) karst or cave-dwelling species (troglobites) of local distribution in karst terrain in north and northwest Bexar County, Texas. "Karst" is a type of terrain in which the rock (limestone formations) is dissolved by water so that much of the drainage occurs into the subsurface rather than as runoff. The subsurface drainage leads to passages or other openings within the underground rock formations. Some of the features that develop in karst areas include cave openings, holes in rocks, cracks, fissures, and sinkholes.

Habitat required by these three invertebrate species consists of underground, honeycomb limestone that maintains high humidity and stable temperatures. The surface environment of karst areas is also an integral part of the habitat needed by the animals inhabiting the underground areas. Openings to the surface allow energy and nutrients, in the form of leaf litter, surface insects, other animals, and animal droppings to enter the underground ecosystem. Mammal feces provide a medium for the growth of fungi and, subsequently, localized population blooms of several species of tiny, hopping insects. These insects reproduce rapidly on rich food sources and may become prey for some predatory cave invertebrates (Service 1994). While the life habits are not well known, the species probably prey on the eggs, larvae, or adults of other cave invertebrates.

Batrisodes venyivi, the Helotes mold beetle, is known from only three caves in the vicinity of Helotes, Texas, northwest of San Antonio. Two of these caves are located in the Helotes karst region on private property. Reliable information on the collection from the third cave is not available. The collector of the specimen declined to give a specific site collection record, but it is believed to be located on private property.

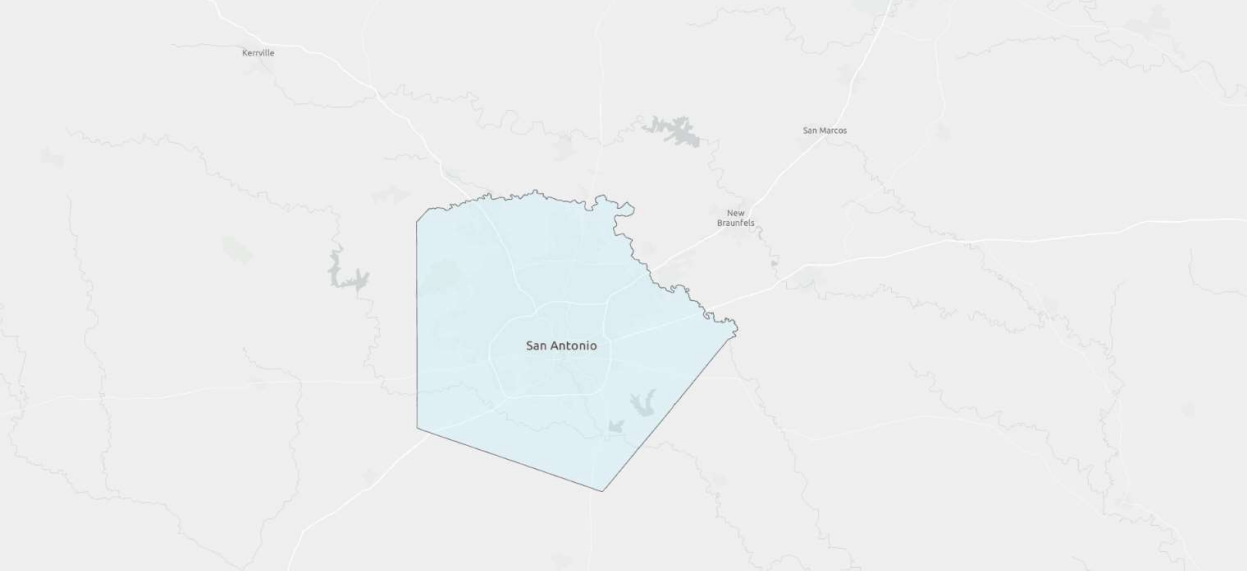
Rhadine exilis is known from 35 caves in north and northwest Bexar County. Twenty-one are located on Department of Defense (DOD) land in the Stone Oak karst region. The remainder are distributed among the Helotes, UTSA, and Stone Oak karst regions, while one location lies in the Government Canyon region. One of the non-DOD sites is located in a county road right-of-way,

one is located in a state-owned natural area, and the remainder are located on private property. Ongoing efforts by the DOD to locate and inventory karst features on Camp Bullis and to document the karst fauna communities in caves on Camp Bullis resulted in discovery of 18 of the 35 caves mentioned above (Veni 1994b; James Reddell, pers. comm. 1997).

Rhadine infernalis is known from 25 caves. This species occurs in five of the six karst regions—Helotes, UTSA, Stone Oak, Culebra Anticline, and Government Canyon. Scientists have delineated three subspecies (*Rhadine infernalis ewersi, Rhadine infernalis infernalis, Rhadine infernalis* ssp.), and described and named two of these in scientific literature (Barr 1960, Barr, and Lawrence 1960). In a recent report, scientists characterized the third subspecies as distinct, but not named (Reddell 1998). Only three caves, all on DOD land, contain the subspecies *Rhadine infernalis ewersi.* Sixteen caves contain the subspecies *Rhadine infernalis infernalis* and lie in the Government Canyon, Helotes, UTSA, and Stone Oak regions. Six caves in the Culebra Anticline region contain the unnamed subspecies.

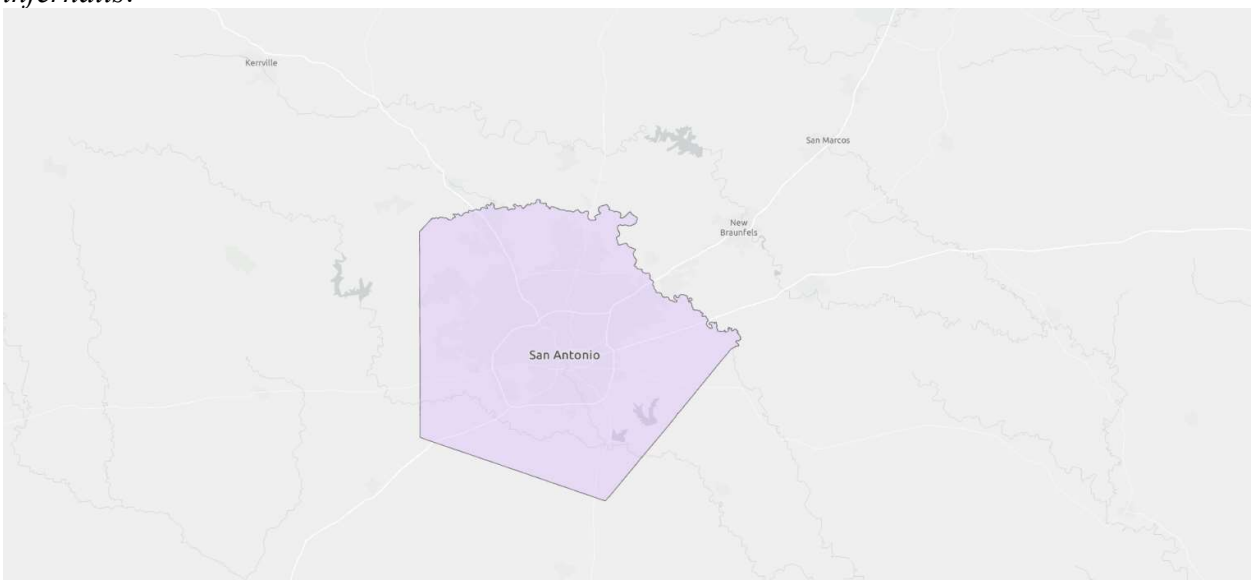
As shown in Figures 1, 2 and 3 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the three TES beetles, *Rhadine exilis* (Figure 1) and *Rhadine infernalis* (Figure 2), and Helotes mold beetle (*Batrisodes venyivi*) (Figure 3).

Figure 1. Potato crop planting (2008 to 2022) as it relates to the species range of *Rhadine exilis*.



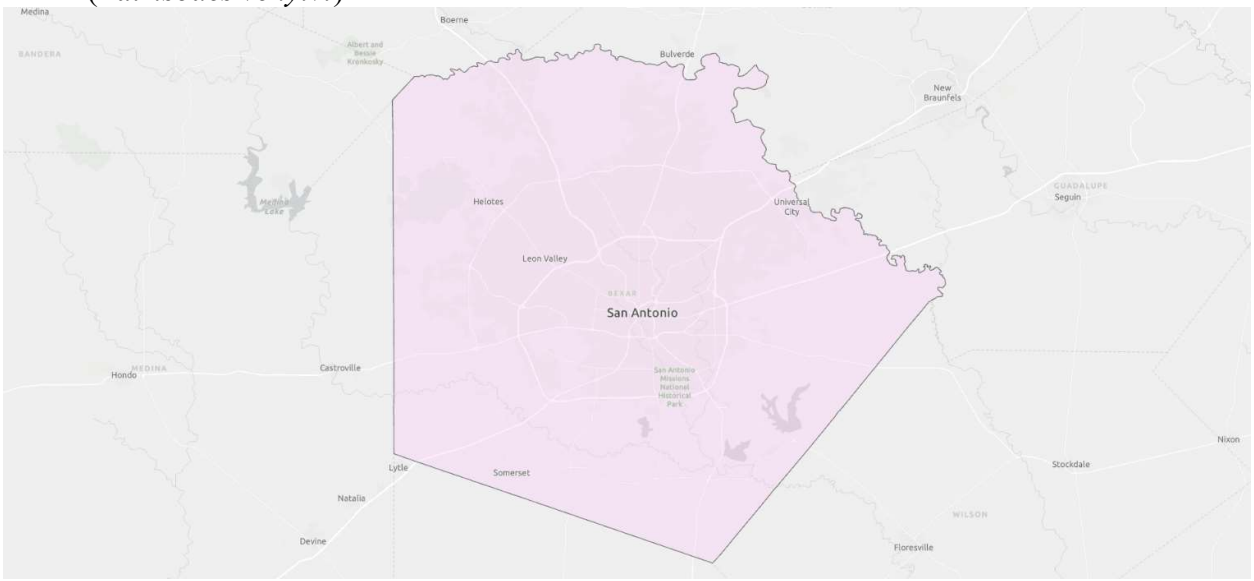
Current species range (indicated by the blue polygon (USFWS(b) 2023)) is overlayed with potato crop planting (USFWS(b) 2023), and there is no overlap of potato crop planting and the species range. This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 2. Potato crop planting (2008 to 2022) as it relates to the species range of *Rhadine infernalis*.



Current species range is indicated by the lavender polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(c) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 3. Potato crop planting (2008 to 2022) as it relates to the species range of Helotes mold beetle (*Batrisodes venyivi*).



Current species range is indicated by the pink polygon and potato crop planting overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(d) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:

There is no overlap of potato crop growing areas in relation to the species range of these three TES beetles (*Rhadine exilis* and *Rhadine infernalis* beetles and the Helotes mold beetle (*Batrisodes venyivi*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the *Rhadine exilis* and *Rhadine infernalis* beetles and the Helotes mold beetle (*Batrisodes venyivi*).

Casey's June beetle (*Dinacoma caseyi*)
Status: Endangered
Listed: 10/24/2011
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Casey's June beetle (*Dinacoma caseyi*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(e), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
Casey's June beetles are found in a limited area of alluvial sediments in Southern California. The beetles emerge from underground burrows sometime between late March and early June, with abundance peaks generally occurring in April and May (Duff 1990, p. 3; Barrows 1998, p. 1). Females are always observed on the ground and are considered flightless (Duff 1990, p. 4; Hovore 1995, p. 7; Hovore 2003, p. 3). It is unknown how far females can disperse, or if they may disperse by means other than terrestrial crawling (such as incidental movement by birds). Flightless adult June beetles are not likely to be dispersed by the wind or larger animals. It is likely adult or larval females are moved by water flow in wash areas, although it is unclear what their survival rate is under such circumstances. During the active flight season, males emerge from the ground and begin flying near dusk (Hovore 2003, p. 3). Males are reported to fly back and forth or crawl on the ground where a female beetle has been detected (Duff 1990, p. 3). After mating, females return to their burrows or dig a new burrow and deposit eggs. Excavations of adult emergence burrows revealed pupal exuviae (casings) at depths ranging from approximately 4 to 6 in (10 to 16 cm) (Hovore 1995, p. 6).

The larval cycle for the species is likely 1 year, based on the absence of larvae (grubs) in burrows during the adult flight season (La Rue 2004, p. 1). The food source for Casey's June beetle larvae while underground is unknown, but other species of June beetles are known to eat "plant roots or plant detritus and associated decay organisms" (La Rue 2004, p.1).

La Rue (2006, p.1) stated that all *Dinacoma* species populations are ecologically associated with alluvial sediments. Casey's June beetle habitat is typically associated with broad, gently sloping, depositional surfaces that form at the base of the Santa Rosa Mountains in the dry Coachella Valley region by the overlapping or converging of individual alluvial fans (bajada) (Bates and Jackson 1987, p. 52).

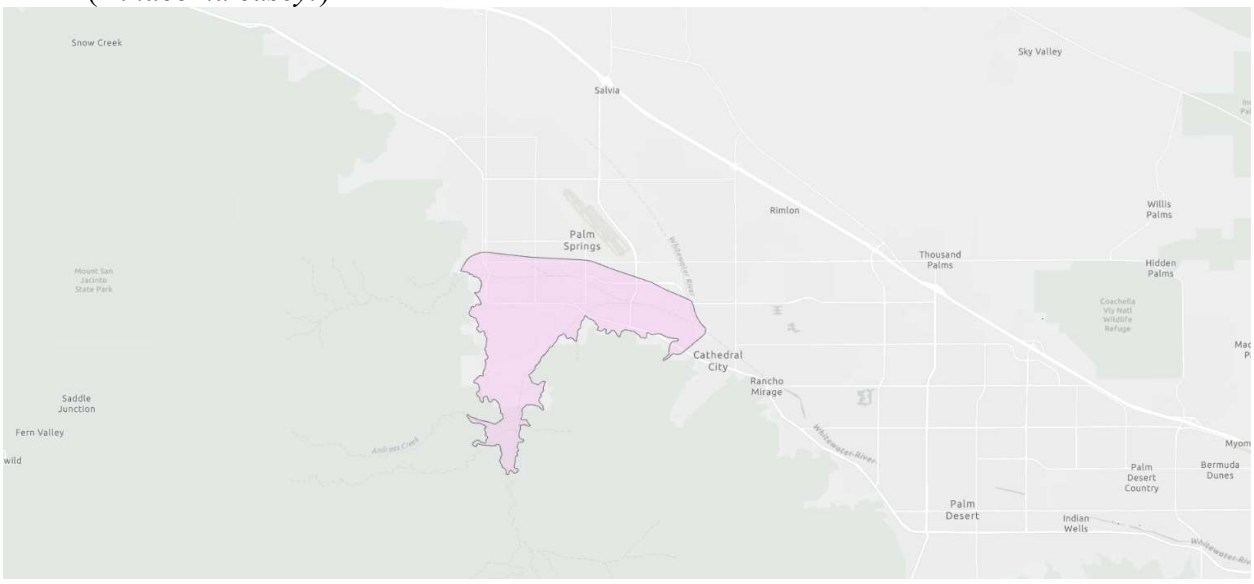
Casey's June beetle is most commonly associated with Carsitas gravelly sand series soil (CdC), described by the United States Department of Agriculture (USDA on-line Geographic Information System (GIS) database 2000; USDA 1980, pp. 11-12) as gravelly sand on 0 to 9 percent slopes. This soil series is associated with alluvial fans, rather than areas of aeolian or

windblown sand deposits. Hovore (2003, p. 2) described soils where Casey's June beetle occurs or occurred historically as, “almost entirely carsitas series, of a CdC type, typically gravelly sand, single grain, slightly effervescent, moderately alkaline (pH 8.4), loose, non-sticky, non-plastic, deposited on 0 to 9 percent slopes. On alluvial terraces and where they occur within washes, these soils show light braiding and some organic deposition, but [most years] do not receive scouring surface flows.” Although Casey's June beetles have primarily been found on CdC soils, the beetles are also associated with Riverwash (RA), and possibly Carsitas cobbly sand (ChC), soils in the Palm Canyon Wash area (Anderson and Love 2007, p. 1). Their burrowing habits would suggest that Casey's June beetles need soils that are not too rocky or compacted and not difficult to burrow into.

Casey's June beetle distribution is confined to an area of less than 800 acres (324 hectares (ha)) in southern Palm Springs, California. According to information reported in the 12-month finding (72 FR 36635: July 5, 2007), known occurrences of Casey's June beetles are restricted to locations within the Palm Canyon alluvial floodplain. Surveys conducted by Bruyea in 2006 discovered a total of 13 individual Casey's June beetles at a new location east and south of Palm Canyon Wash, adjacent to East Palm Canyon Drive. This location represents a slight eastern extension for the known range of the species (Bruyea 2006, p. 10).

As shown in Figure 4 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the TES Casey’s June beetle (*Dinacoma caseyi*) (Figure 4).

Figure 4. Potato crop planting (2008 to 2022) as it relates to the species range of Casey’s June beetle (*Dinacoma caseyi*).



Current species range is indicated by the pink polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(e) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:

There is no overlap of potato crop growing areas in relation to the species range of the TES, the Casey's June beetle (*Dinacoma caseyi*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Casey's June beetle (*Dinacoma caseyi*).

Coffin Cave mold beetle (*Batrisodes texanus*)
Kretschmarr Cave mold beetle (*Texamaurops reddelli*)
Tooth Cave beetle (*Rhadine persephone*)
Status: Endangered
Listed: 10/24/2011
Critical habitat designated
In order to characterize the potential exposure of these species to Ledprona, critical habitat and updated species range information were evaluated for the Coffin Cave mold beetle (*Batrisodes texanus*), the Kretschmarr Cave mold beetle (*Texamaurops reddelli*) and the Tooth Cave beetle (*Rhadine persephone*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(f), (g), (h), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The Kretschmarr Cave mold beetle (*Texamaurops reddelli*), Tooth Cave ground beetle (*Rhadine persephone*) and the Coffin Cave mold beetle (*Batrisodes texanus*) are known from only six or fewer small, shallow, dry caves near Austin in Travis and Williamson Counties, Texas.

The Tooth Cave ground beetle, *Rhadine persephone* (family Carabidae), was first described by Barr (1974) from specimens collected in the Tooth Cave by W.M. Andrews, R.W. Mitchell, and T.C. Barr in 1965. This species is a small (7-8 mm in length), reddish-brown beetle. It is troglobitic and has only rudimentary eyes. It probably feeds on cave cricket eggs, which have been determined to be a major food of another troglobite species of *Rhadine* (Mitchell 1968). The Tooth Cave ground beetle is known only from Tooth and Kretschmarr Caves, Travis County, Texas.

The Kretschmarr Cave mold beetle (*Texamaurops reddelli*) was first described by Barr and Steeves (1963) from a specimen collected in Kretschmarr Cave by James R. Reddell and David McKenzie in 1963. This species is a very small (less than 3 mm in length) dark-colored, short-winged, beetle with elongated legs. This member of the family Pselaphidae is an eyeless troglobite and is known only from Kretschmarr, Amber, Tooth, and Coffin Caves in Travis and Williamson Counties, Texas.

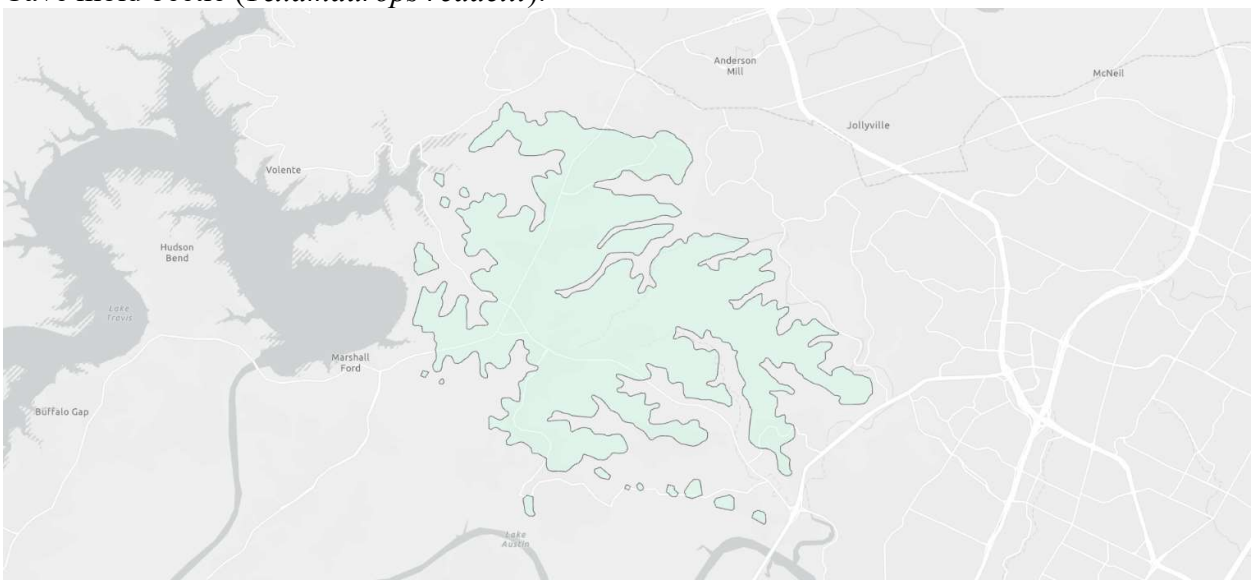
Previously, the Kretschmarr Cave mold beetle *[Texamaurops reddelli*) was known from Kretschmarr, Amber, Tooth, and Coffin caves in Travis and Williamson counties, Texas. Coffin Cave in Williamson County was the northern-most locality recognized for that species. The Coffin Cave population was subsequently placed in the newly described species Coffin Cave mold beetle (*Batrisodes texanus*), along with specimens from a few Williamson County localities to the south of Coffin Cave (Chandler 1992). The genera *Texamaurops* and *Batrisodes* are very similar, the key difference being a "pencil" of appressed setae present on the metatibiae in *Batrisodes* but absent in *Texamaurops.* Detection of this character requires magnification of the appropriate appendages. All known localities of *Texamaurops reddelli* and *Batrisodes texanus*

are within the recognized range of the Kretschmarr Cave mold beetle as it was originally listed, although additional localities have been discovered within that range. Both species continue to face the same general threats identified in the original listing. Because these two species together are equivalent to the originally listed Kretschmarr Cave mold beetle, both species will be included as endangered species in the next republication of the List of Endangered and Threatened Wildlife (50 CFR 17.11). *Texamaurops reddelli* will retain the common name of Kretschmarr Cave mold beetle, as in previous publications of the List, and the new entry for *Batrisodes texanus* will include the common name of "Coffin Cave mold beetle."

The caves inhabited by these species are relatively small. The largest, McDonald Cave, consists of less than 60 meters (m) (about 200 feet) of passage, and most of the others are considerably smaller. These caves occur in isolated "islands" of the Edwards Limestone formation that were separated from one another when stream channels cut through the overlying limestone to lower rock layers. This fragmentation of habitat has resulted in the isolation of groups of caves that have developed their own, highly localized faunas.

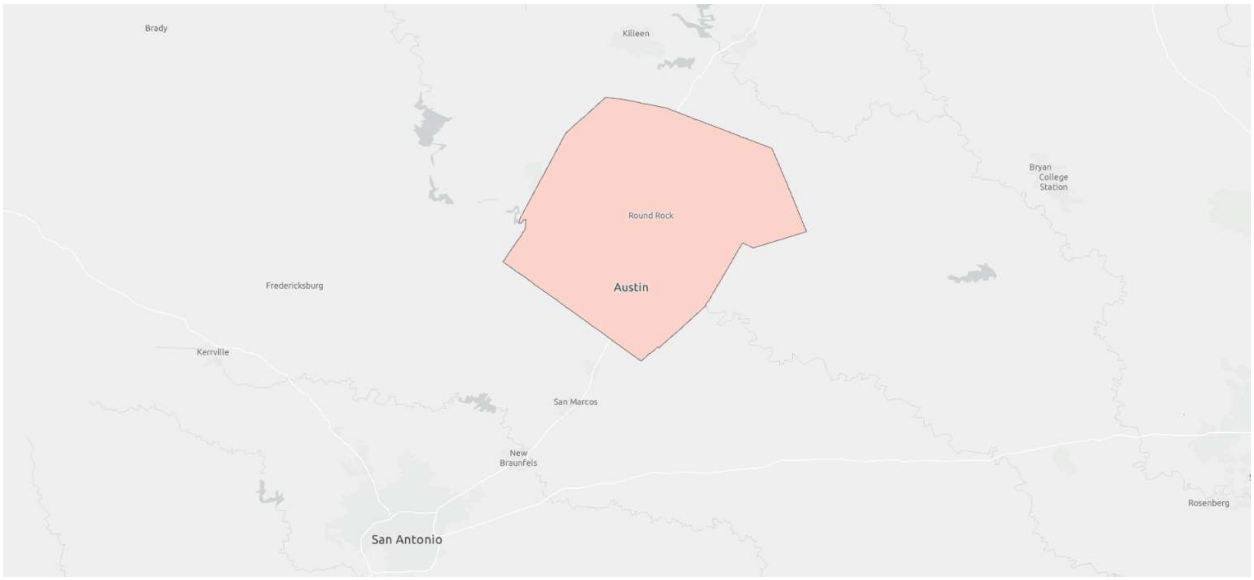
As shown in Figures 5, 6 and 7 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of these three TES beetles, the Kretschmarr Cave mold beetle (*Texamaurops reddelli*) (Figure 5), Tooth Cave ground beetle (*Rhadine persephone*) (Figure 6) and the Coffin Cave mold beetle (*Batrisodes texanus*) and (Figure 7).

Figure 5. Potato crop planting (2008 to 2022) as it relates to the species range of Kretschmarr Cave mold beetle (*Texamaurops reddelli*).



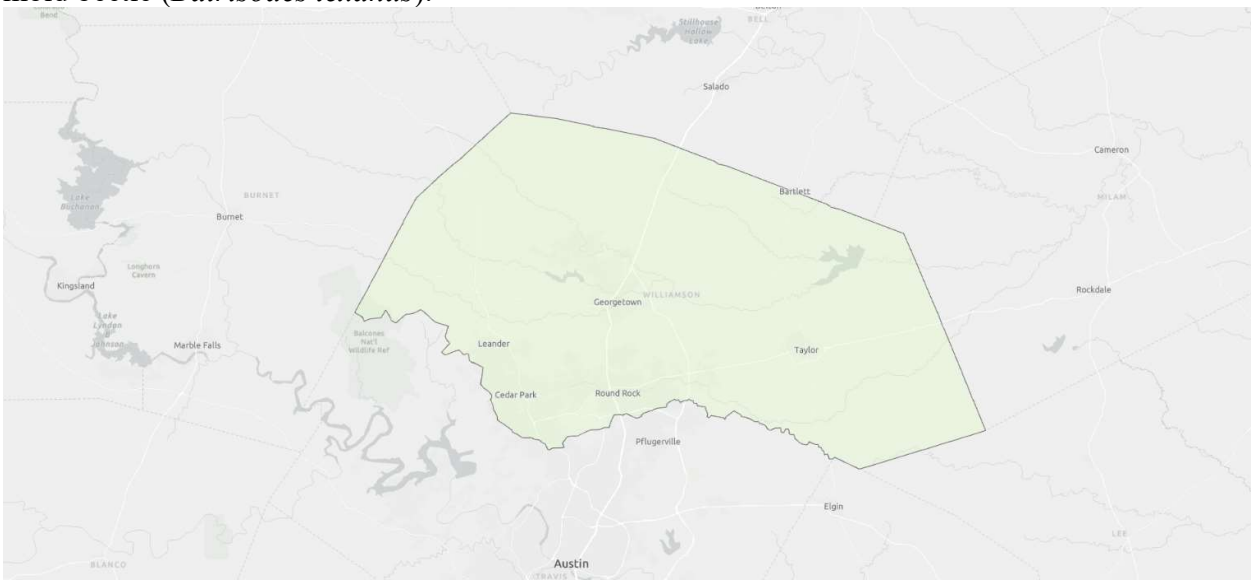
Current species range is indicated by the teal polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(f) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 6. Potato crop planting (2008 to 2022) as it relates to the species range of Tooth Cave ground beetle (*Rhadine persephone*).



Current species range is indicated by the salmon polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(g) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 7. Potato crop planting (2008 to 2022) as it relates to the species range of Coffin Cave mold beetle (*Batrisodes texanus*).



Current species range is indicated by the green polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(h) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, the Kretschmarr Cave mold beetle (*Texamaurops reddelli*), Tooth Cave ground beetle (*Rhadine*

persephone) and the Coffin Cave mold beetle (*Batrisodes texanus*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Kretschmarr Cave mold beetle (*Texamaurops reddelli*), Tooth Cave ground beetle (*Rhadine persephone*) and the Coffin Cave mold beetle (*Batrisodes texanus*).

Delta green ground beetle (*Elaphrus viridis*)
Status: Threatened
Listed: 8/8/1980
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Delta green ground beetle (*Elaphrus viridis*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(i), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The delta green ground beetle (*Elaphrus viridis*) is known to occur only in Solano County, California.

The Delta green ground beetle (*Elaphrus viridis*) is a predaceous beetle of the family Carabidae which is colored a striking metallic green intermixed with patches of gold (Andrews, 1978). It is limited in occurrence to the grassy edges of only two vernal pools south of Dixon, Solano County, California. Intensive search in similar habitats in other areas has failed to reveal the presence of this unique beetle (Andrews, 1978).

As shown in Figure 8 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Delta green ground beetle(*Elaphrus viridis*) (Figure 8).

Figure 8. Potato crop planting (2008 to 2022) as it relates to the species range of Delta green ground beetle(*Elaphrus viridis*).

Current species range is indicated by the lavender polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(i) 2023). This map was created using

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, Delta green ground beetle (*Elaphrus viridis*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Delta green ground beetle (*Elaphrus viridis*).

Valley Elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
Status: Threatened
Listed: 8/8/1980
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(j), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) occurs in a riparian environment. It is known only to occur in the Sacramento Valley from the American River near its confluence with the Sacramento River, and from Putah Creek, Sonoma County. The beetle can only be found in areas where the host plant, *Sambucus glauca*, occurs in good stands.

The valley elderberry longhorn beetle is a medium-sized, red, and dark green insect. It is approximately 0.8 inch (2 centimeters) long. Females are larger than males and resemble males except that the first pair of wings do not fully cover the abdomen when viewed from above. Males have longer, thicker antennae than females, as well as red-orange wing covers with four spots.

The valley elderberry longhorn beetle lives throughout California's Central Valley from Shasta County in the north through Madera County in the south. Destruction of riparian forests during the past 150 years fragmented the beetle's habitat, and it is likely less widespread than in the past.

The valley elderberry longhorn beetle is dependent on its host plant, the elderberry, a shrub that grows in riparian areas and foothill oak woodlands in California. Females lay their eggs on the bark of the elderberry shrub. Larvae hatch and burrow into the stems. Larvae take one to two years to emerge as adults. Adults only live from a few days to a few weeks after emerging and likely die within three months.

As shown in Figure 9 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (Figure 9).

Figure 9. Potato crop planting (2008 to 2022) as it relates to the species range of Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*).

Current species range is indicated by the yellow polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(j) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*).

Mount Hermon June beetle (*Polyphylla barbata*)
Status: Endangered
Listed: 1/24/1997
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Mount Hermon June beetle (*Polyphylla barbata*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(k), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The Mount Hermon June beetle (*Polyphylla barbata*) occurs in a riparian environment. This species is restricted to the Zayante sand hills ecosystem endemic to inland marine sand deposits in the Santa Cruz Mountains of Santa Cruz County, California. It is endemic to the unique Zayante sand hills ecosystem associated with isolated sandstone deposits in the Santa Cruz Mountains, Santa Cruz County, California.

The Mount Hermon June beetle was first described by Cazier (1938) from Mount Hermon, Santa Cruz County, California. The adult male is a cryptic small scarab beetle with a black head, dark blackish-brown elytra (thick leathery forewings) clothed with scattered long brown hair, and a

striped body. Elytral vittae (stripes) are broken, often reduced to discontinuous clumps of scales, but still form identifiable lines (Cazier 1938; Young 1988). Females are larger, with a black head, chestnut colored clypeus (plate on lower part of face) and elytra, and golden hairs on the head, thorax, and legs (Young 1988). The single adult female described was 22 by 11 millimeters (mm) (0.87 by 0.43 inches (in.)), while the holotype male was 20 by 9.7 mm (0.79 by 0.39 in.) (Young 1988).

Like other *Polyphylla* species, the Mount Hermon June beetle is believed to require about 2 to 3 years to mature from an egg through the adult form. However, the rate of growth of laboratory-reared larvae suggests that the Mount Hermon June beetle may complete its life cycle within 1 year (W. Hazeltine, in litt. 1994). Most of the life cycle is spent in larval stages. The larvae are subterranean and feed on plant roots. While *Polyphylla* larvae are generally considered to be grass and pine root feeders (F. Andrews, California Department of Food and Agriculture, pers. comm. 1993; A. Evans, Los Angeles Museum of Natural History, pers. comm. 1993), the Mount Hermon June beetle also may feed on the roots of monkeyflower, oak, fern, and other plants found in the Zayante sand hills ecosystem (W. Hazeltine, in litt. 1993).

During summer, Mount Hermon June beetles emerge as imagos (adult forms) to reproduce. Males are strong fliers, emerging from their burrows to fly low to the ground in search of females (W. Hazeltine, in litt. 1994). Females are thought to be fossorial, remaining just below the surface in burrows. Females may not fly due to their large body size (A. Evans, pers. comm. 1993; A. Hardy, California Department of Food and Agriculture, pers. comm. 1993). Like other *Polyphylla* species, males are believed to locate females by tracking female pheromone signals (Fowler and Whitford 1981; Hazeltine 1993); such a mechanism would ensure reproductive success within the limited time period for mating (Lilly and Shorthouse 1971). The flight season generally extends from mid-June to late July. The flight time of males appears restricted to evening, being observed only between 8:45 and 9:30 pm; flights may occur later during the latter part of the flight season (Hazeltine 1993).

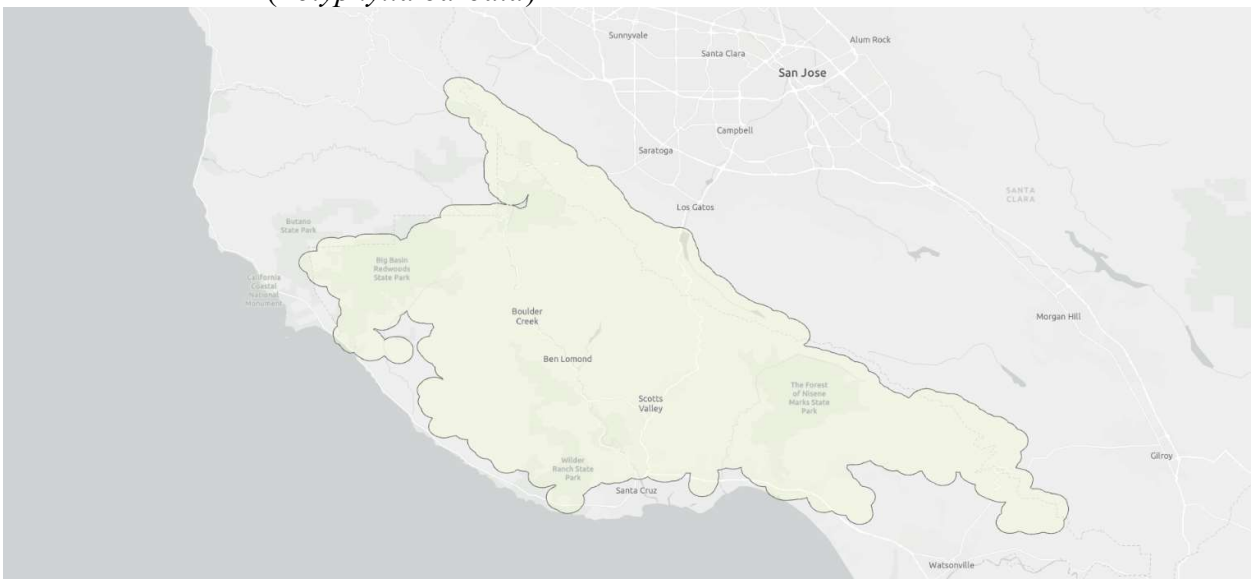
The small mouthparts and limited flight period of Mount Hermon June beetles suggest that adults of this species do not feed (W. Hazeltine, in litt. 1993). Adults of the related *Polyphylla* decemlineata are known to feed on the leaves of trees (Johnson 1954). At the end of the flight period each evening, males burrow back into the soil, emerging repeatedly on subsequent evenings to search for mates until their nutrient reserves expire (Hazeltine 1993). Females are believed to lay eggs at the bottom of their burrows and die a short time later. The life cycle continues as newly hatched larvae tunnel from the burrow in search of roots.

Habitat of the Mount Hermon June beetle is described as ponderosa pine-chaparral habitat with sandy soil and open, sparsely vegetated areas (Hazeltine 1993; W. Hazeltine, pers. comm. 1994; J. Hoekstra, U.S. Fish and Wildlife Service, pers. obs. 1994). Mount Hermon June beetles also may occur in more vegetated areas of chaparral (D. Russell, Miami University, Ohio, pers. comm. 1994). Common vegetation found in these open areas includes bracken fern (Pteridium aquilinum), monkeyflower (Diplacus sp.; Mimulus sp.), grasses, and small annual forbs (J. Hoekstra, pers. obs. 1994). While not always present, silver-leafed manzanita seems to be a good indicator of suitable habitat (Hazeltine 1993; J. Hoekstra, pers. obs. 1994). All of these descriptions are consistent with those of Zayante sand hills habitat.

The range of the Mount Hermon June beetle is restricted to the Zayante sand hills habitat of the Ben Lomond-Mount Hermon-Scotts Valley area. Historically, specimens were known only from ``sandhills'' at the type locality of Mount Hermon in Santa Cruz County, California (Cazier 1938, 1940; Young 1988). A single historic specimen collected in 1968 and labeled only ``Santa Cruz'' has been reported (S. McCabe, California Native Plant Society, in litt. 1991). This specimen was not helpful in the Service's range analysis because of its non-specific location label.

As shown in Figure 10 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Mount Hermon June beetle (*Polyphylla barbata*) (Figure 10).

Figure 10. Potato crop planting (2008 to 2022) as it relates to the species range of Mount Hermon June beetle (*Polyphylla barbata*).



Current species range is indicated by the yellow polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(k) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, Mount Hermon June beetle (*Polyphylla barbata*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Mount Hermon June beetle (*Polyphylla barbata*).

Comal Springs drypoid beetle (*Stygoparnus comalensis*)
Comal Springs riffle beetle (*Heterelmis comalensis*)
Status: Endangered
Listed: 12/18/1997
Critical habitat designated
In order to characterize the potential exposure of these species to Ledprona, critical habitat and updated species range information were evaluated for Comal Springs drypoid beetle

(*Stygoparnus comalensis*) and Comal Springs riffle beetle (*Heterelmis comalensis*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(l), (m), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The Comal Springs riffle beetle is an aquatic, surface-dwelling species in the family Elmidae. The Comal Springs dryopid beetle is the only known subterranean member of the beetle family Dryopidae. Elmid and dryopid beetles live primarily in flowing, uncontaminated waters.
The Comal Springs riffle beetle is known from Comal Springs and San Marcos Springs (Hays County). The Comal Springs dryopid beetle is known from Comal Springs and Fern Bank Springs (Hays County).

The water flowing out of each of these spring orifices comes from the Edwards Aquifer (Balcones Fault Zone San Antonio Region), which extends from Hays County west to Kinney County. Comal Springs are located in Landa Park, which is owned and operated by the City of New Braunfels, and on private property adjacent to Landa Park. Hueco Springs and Fern Bank Springs are located on private property. The San Marcos Springs are located on the property of Southwest Texas State University.

The Comal Springs riffle beetle is a small, aquatic beetle known from Comal Springs and San Marcos Springs. It was first collected by Bosse in 1976 and was described in 1988 by Bosse et al. The closest relative of *H. comalensis* appears to be *H. glabra*, a species that occurs farther to the west in the Big Bend region (Bosse et al. 1988).

Adult Comal Springs riffle beetles are about 2 millimeters (mm) long, with females slightly larger than males. The Comal Springs riffle beetle occurs in the gravel substrate and shallow riffles in spring runs. Some riffle beetle species can fly (Brown 1987), but the hind wings of *H. comalensis* are short and almost certainly non-functional, making the species incapable of this mode of dispersal (Bosse et al. 1988).

Larvae have been collected with adults in the gravel substrate of the spring headwaters and not on submerged wood as is typical of most *Heterelmis* species (Brown and Barr 1988). Usual water depth in occupied habitat is 2 to 10 centimeters (cm)(1 to 4 in) although the beetle may also occur in slightly deeper areas within the spring runs. Populations are reported to reach their greatest densities from February to April (Bosse et al. 1988). The Comal Springs riffle beetle has been collected from spring runs 1, 2, and 3 at Comal Springs in Landa Park (springs j, k, and l in Brune 1981) and a single specimen was collected from San Marcos Springs 32 km (20 mi) to the northeast.

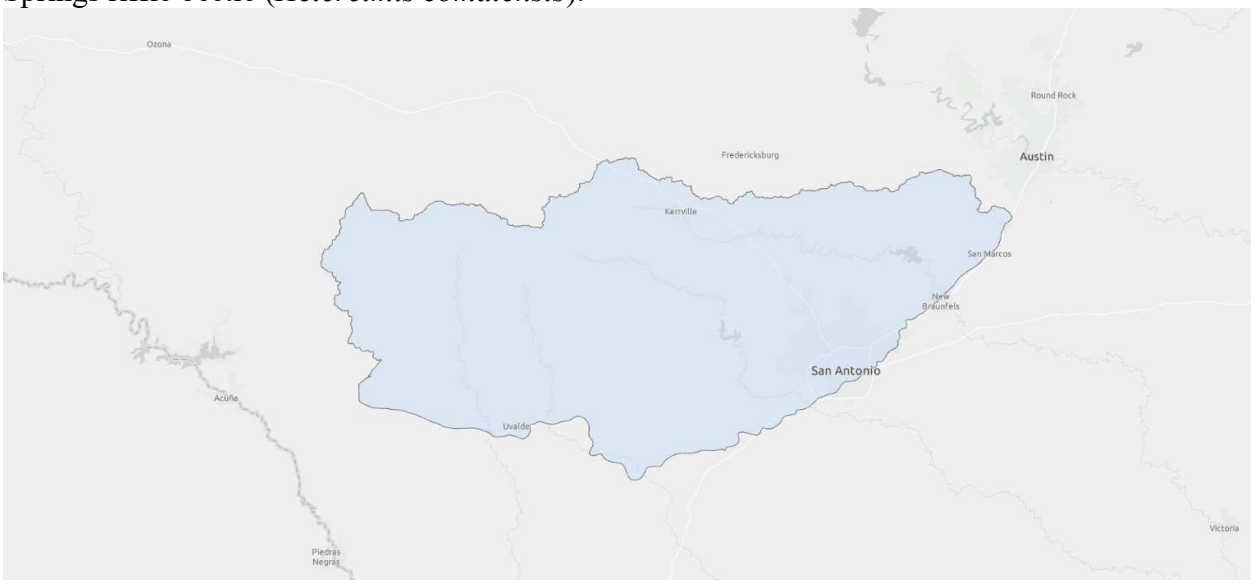
The Comal Springs dryopid beetle is a recently discovered species. It was first collected in 1987 and described as a new genus and species in 1992 by Barr (California State University) and Spangler (National Museum of Natural History, Smithsonian Institution). Adult Comal Springs dryopid beetles are about 3.0±3.7 mm long. They have vestigial (non-functional) eyes, are weakly pigmented, translucent, and thin-skinned. This species is the first subterranean aquatic member of its family to be discovered (Brown and Barr 1988; Barr, in litt. 1990; Barr and Spangler 1992).

As shown in Figures 11 and 12 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Comal Springs drypoid beetle (*Stygoparnus comalensis*) (Figure 11) and Comal Springs riffle beetle (*Heterelmis comalensis*) (Figure 12).

Figure 11. Potato crop planting (2008 to 2022) as it relates to the species range of Comal Springs drypoid beetle (*Stygoparnus comalensis*).

Current species range is indicated by the yellow polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(l) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 12. Potato crop planting (2008 to 2022) as it relates to the species range of Comal Springs riffle beetle (*Heterelmis comalensis*).



Current species range is indicated by the blue polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(m) 2023). This map was created using

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, Comal Springs drypoid beetle (*Stygoparnus comalensis*) and Comal Springs riffle beetle (*Heterelmis comalensis*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Comal Springs drypoid beetle (*Stygoparnus comalensis*) and Comal Springs riffle beetle (*Heterelmis comalensis*).

Ohlone tiger beetle (*Cicindela ohlone*)
Status: Endangered
Listed: 10/3/2001
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Ohlone tiger beetle (*Cicindela ohlone*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS (n), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The Ohlone tiger beetle (*Cicindela ohlone*) is a member of the Coleopteran family *Cicindelidae* (tiger beetles), which includes over 2,000 species worldwide and over 100 species in the United States (Pearson and Cassola 1992). Tiger beetles are day-active, predatory insects that prey on small arthropods. Because many tiger beetles often feed on insect species that are injurious to man and crops, they are regarded as beneficial (Pearson and Cassola 1992; Nagano 1982).

Tiger beetle larvae are also predatory. They live in small vertical or slanting burrows from which they lunge at and seize passing invertebrate prey (Essig 1926; Essig 1942; Pearson 1988). The larva grasps the prey with its strong mandibles (mouthparts) and pulls it into the burrow; once inside the burrow, the larva will feed on the captured prey (Essig 1942; Pearson 1988). Tiger beetles share similar larval body forms throughout the world (Pearson and Cassola 1992). The larvae, either white, yellowish, or dusky in coloration, are grub-like and fossorial (subterranean), with a hook-like appendage on the fifth abdominal segment that anchors the larvae inside their burrows.

Tiger beetle larvae undergo three instars (larval development stages). This period can take 1 to 4 years, but a 2-year period is the most common (Pearson 1988). After mating, the tiger beetle female excavates a hole in the soil and oviposits (lays) a single egg (Pearson 1988; Kaulbars and Freitag 1993; Grey Hayes, pers. comm. 1998). Females of many species of *Cicindela* are extremely specific in choice of soil type for oviposition (egg laying) (Pearson 1988). It is not known at this time how many eggs the Ohlone tiger beetle female lays, but other species of *Cicindela* are known to lay between 1 and 126 eggs per female (C. Barry Knisley, Randolph-Macon College, *in litt.* 2000). After the larva emerges from the egg and becomes hardened, it enlarges the chamber that contained the egg into a tunnel (Pearson 1988). Before pupation (transformation process from larva to adult), the third instar larva will plug the burrow entrance

and dig a chamber. After pupation in this chamber, the adult tiger beetle will dig out of the soil and emerge. Reproduction may either begin soon after emergence or be delayed (Pearson 1988).

Tiger beetle species occur in many different habitats, including riparian habitats, beaches, dunes, woodlands, grasslands, and other open areas (Pearson 1988; Knisley and Hill 1992). A common habitat component appears to be open sunny areas for hunting and thermoregulation (an adaptive behavior to use sunlight or shade to regulate body temperature) (Knisley *et al.* 1990; Knisley and Hill 1992). Individual species of tiger beetle are generally highly habitat-specific because of oviposition and larval sensitivity to soil moisture, composition, and temperature (Pearson 1988; Pearson and Cassola 1992; Kaulbars and Freitag 1993).

The Ohlone tiger beetle is endemic to Santa Cruz County, California, where it is known only from coastal terraces supporting remnant patches of native grassland habitat. Two principal distinguishing features of the Ohlone tiger beetle are its early seasonal adult activity period and its disjunct distribution. While other tiger beetle species, such as *Cicindela purpurea*, are active during spring, summer, or early fall (Nagano 1982; Freitag *et al.* 1993), the Ohlone tiger beetle is active from late January to early April (Freitag *et al.* 1993). The Ohlone tiger beetle is the southernmost of *purpurea* group species in the Pacific Coast region; its distribution is allopatric (geographically separated) to those of similar species (Freitag *et al.* 1993).

As shown in Figure 13 below, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Ohlone tiger beetle (*Cicindela ohlone*) (Figure 13).

Figure 13. Potato crop planting (2008 to 2022) as it relates to the species range of Ohlone tiger beetle (*Cicindela ohlone*).

Current species range is indicated by the yellow polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(n) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:

There is no overlap of potato crop growing areas in relation to the species range of the TES, Ohlone tiger beetle (*Cicindela ohlone*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Ohlone tiger beetle (*Cicindela ohlone*).

Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*)
Status: Threatened
Listed: 8/7/1990
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(o), 2023) and Federal Register Notices, unless otherwise cited.

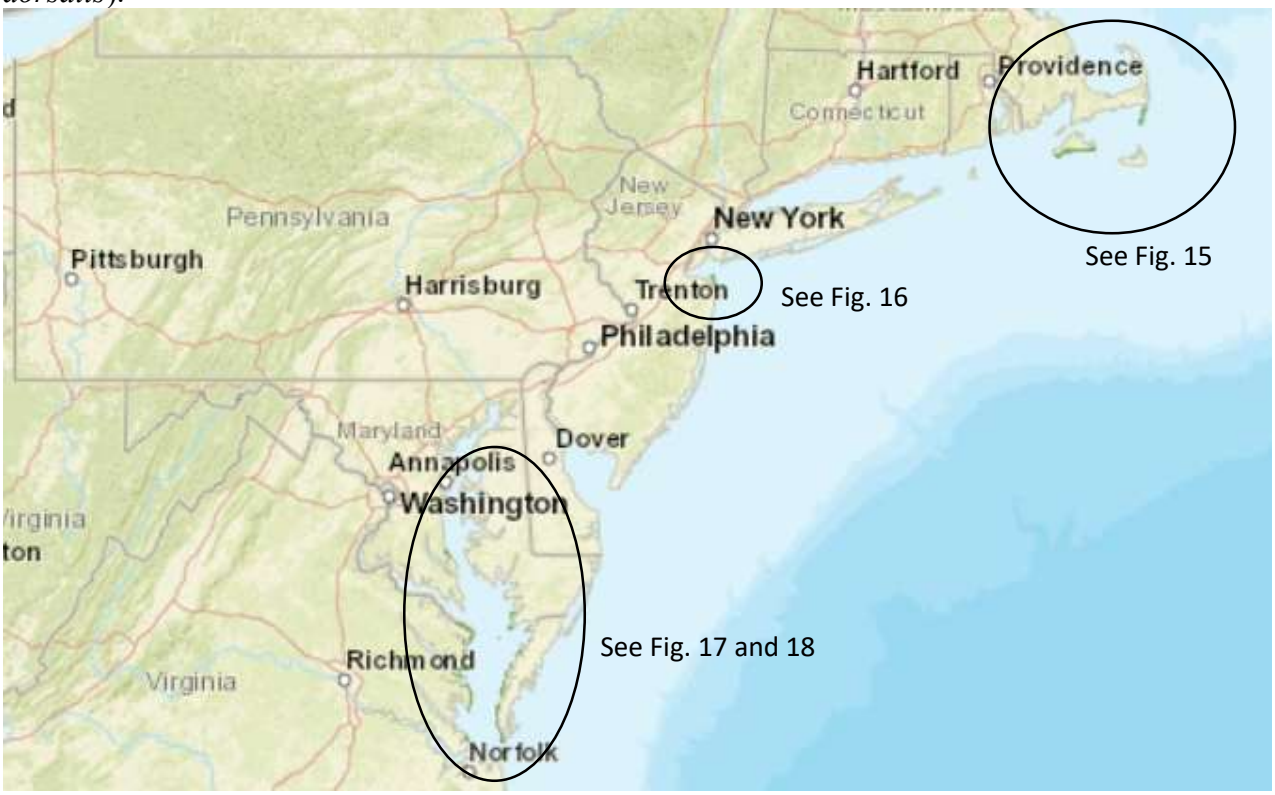
Biology and Habitat Requirements
The Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*), the largest (13-15 mm) of the recognized subspecies, is bronze to greenish with extensive maculations that run the length of the elytra. The maculations are wide, cream-colored, and frequently are expanded to cover much of the elytral surface. Abrasion by sand makes elytra of older individuals lighter. The underbelly is dark bronze to dark green with dense, white hair-like setae covering the sides of the abdomen. The last pair of legs is exceptionally long. The males and females are visibly different in the shape of the thorax (cylindrical in males, trapezoidal in females), and the shape of the elytral tip (rounded in males, broadly notched in females).

Habroscelimorpha d. dorsalis occurs at over 60 sites along both shorelines within the Chesapeake Bay on narrow, open sandy beaches and at only two sites in Massachusetts which have very wide, highly dynamic ocean beaches (Figure 14). Historically there were many populations along the ocean and beaches from central New Jersey to Massachusetts; however, all have been extirpated by anthropogenic impacts and recent surveys have indicated the extirpation of many Chesapeake Bay populations (Kazyak, D.C., et al., 2022).

Larvae live in vertical burrows located in the upper intertidal to high drift zone, where prey is most abundant. Larvae are regularly covered during high tide; sand moisture is important. Ideal habitat for the adult beetles and their larvae is wide, undisturbed, dynamic, fine sand beaches.

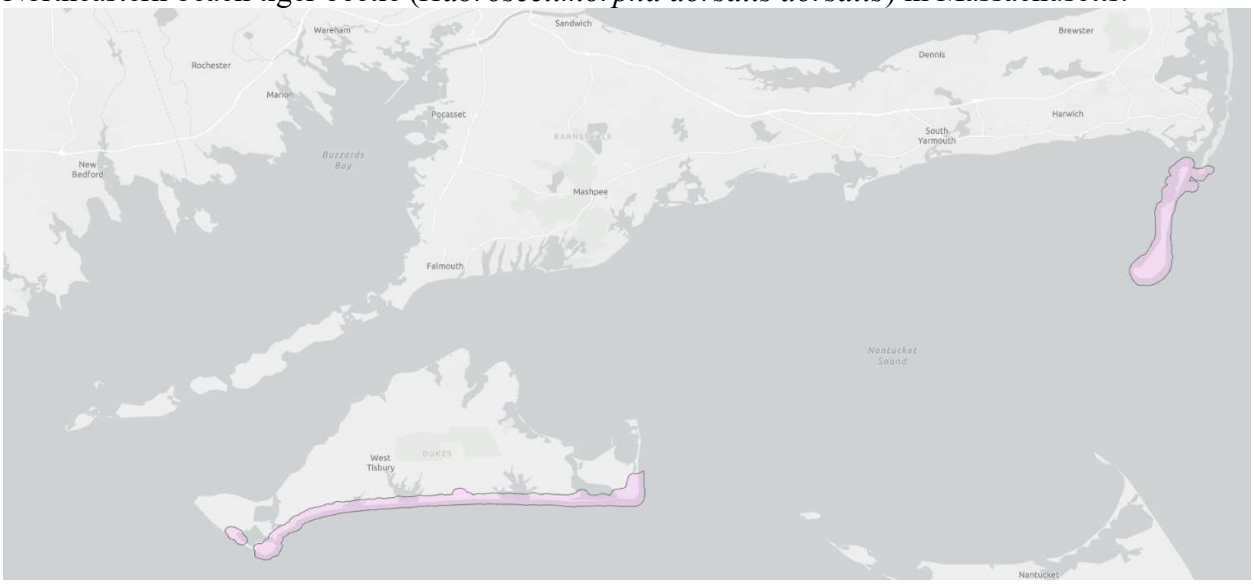
As shown in Figures 15 and 16, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) in Massachusetts or New York (Figures 15 and 16). However, as can be seen in Figures 17 and 18, there are a few potato plots that do overlap the TES range in Virginia on the Chesapeake Bay (Figures 17 and 18).

Figure 14. Current species range for Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*).



Current species range is indicated by the dark green polygons, outlined by black ovals. (USFWS(o) 2023).

Figure 15. Potato crop planting (2008 to 2022) as it relates to the species range of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) in Massachusetts.

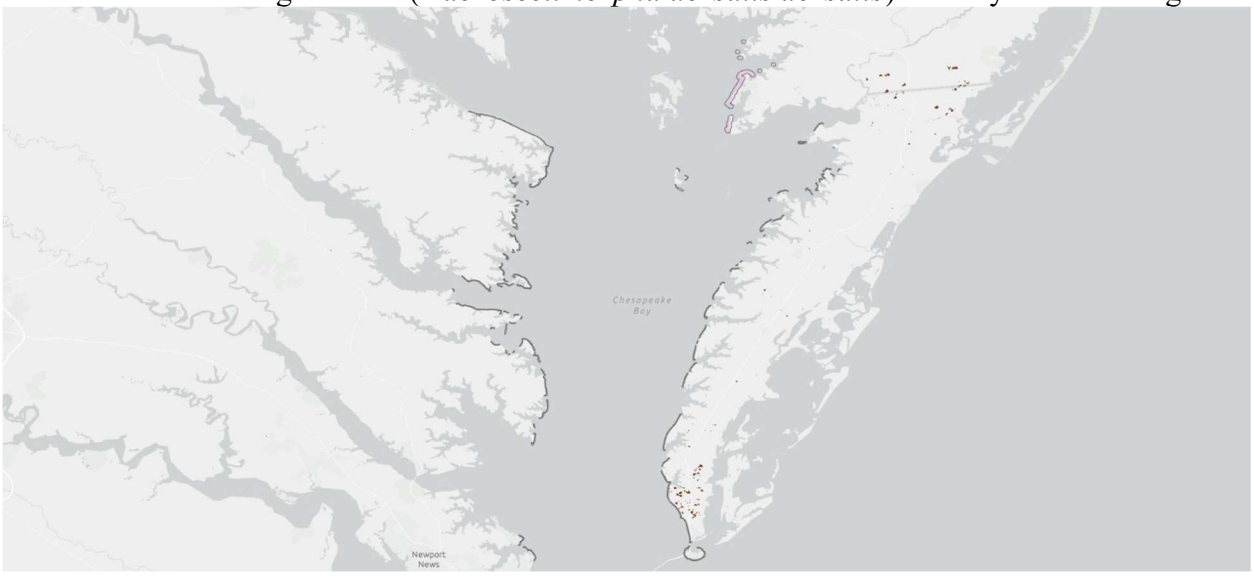


Current species range is indicated by the pink polygons and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(o) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 16. Potato crop planting (2008 to 2022) as it relates to the species range of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) in New Jersey.

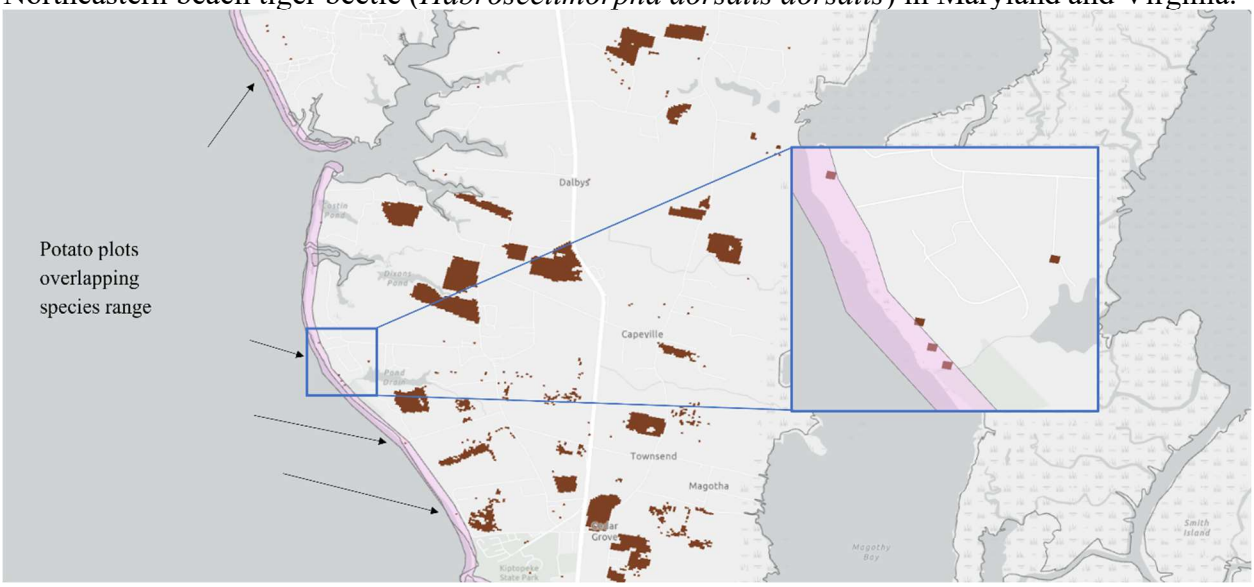
Current species range is indicated by the pink polygons and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(o) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 17. Potato crop planting (2008 to 2022) as it relates to the species range of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) in Maryland and Virginia.



Current species range is indicated by the pink polygons and potato crop planting is indicated by dark brown polygons. There is overlap of potato crop (USDA NASS 2022) and the species range (USFWS(o) 2023) in Virginia only (See Figure 6). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 18. Potato crop planting (2008 to 2022) as it relates to the species range of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) in Maryland and Virginia.



Current species range is indicated by the pink polygons and potato crop planting is indicated by dark brown polygons. There is overlap of potato crop (USDA NASS 2022) and the species range (USFWS(o) 2023) in Virginia. This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
While there is overlap of the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) species range and potato crop farming, this beetle dwells on beaches between the water's edge and the upper intertidal to high drift zone. As such, any exposure to the Northeastern beach tiger beetle would occur through spray-drift or runoff, which EPA has determined to be negligible routes of exposure based on the EEC, the application rate, label language restricting spray-drift, and aquatic and terrestrial degradation data. Therefore, exposure of this beetle to Ledprona is expected to be negligible. EPA therefore determines that the use of Ledprona in this location will have no effect on the Northeastern beach tiger beetle (*Habroscelimorpha dorsalis dorsalis*) nor its critical habitat.

Hungerford's crawling water beetle (*Brychius hungerford*)
Status: Endangered
Listed: 3/7/1994
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Hungerford's crawling water beetle (*Brychius hungerford*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(p), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The endangered species, the Hungerford's crawling water beetle (*Brychius hungerford*), is an aquatic species that is found in streams downstream from culverts, beaver and natural debris

dams, and human-made impoundments. It is found in areas of streams with good aeration, moderate to fast flow, inorganic substrate, and alkaline water conditions. The beetles (both larvae and adults) feed on algal species such as *Chara, Cladophora* and *Dichotomosiphon* (Huron Pines 2023).

As shown in Figure 19, there is overlap of potato crop farming from 2008 through 2022 and the species range of Hungerford's crawling water beetle (*Brychius hungerford*) in Michigan (Figure 19).

Figure 19. Potato crop planting (2008 to 2022) as it relates to the species range of Hungerford's crawling water beetle (*Brychius hungerford*)

Current species range is indicated by the green polygons and potato crop planting is indicated by dark brown polygons. There is overlap of potato crop (USDA NASS 2022) and the species range (USFWS(p) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
While there is overlap of Hungerford's crawling water beetle (*Brychius hungerford*) species range and potato crop farming, Hungerford's crawling water beetle is an aquatic beetle and therefore any exposure to Ledprona would be limited to aquatic exposure via spray drift/run-off. Aquatic exposure to this beetle is expected to be negligible based on the EEC, the application

rate, label language restricting spray-drift, and aquatic degradation data. EPA therefore determines that the use of Ledprona will have no effect on the Hungerford's crawling beetle nor its critical habitat.

Puritan tiger beetle (*Ellipsoptera puritana*)
Status: Threatened
Listed: 8/7/1990
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Puritan tiger beetle (*Ellipsoptera puritana*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(q), 2023), and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
The endangered species, the Puritan tiger beetle (*Ellipsoptera puritana*) inhabits eroding cliffs and nearby sandy beaches. The entire range of this species includes two small populations along the Connecticut River, one in Massachusetts (Figure 20) and another near Hartford, Connecticut (Figure 21), and two meta-populations in the Chesapeake Bay (Figures 22 and 23). The largest Maryland meta-population occurs on the western shore of the Chesapeake Bay in Calvert County (Figure 22), and the second and smaller metapopulation occurs along the eastern shore around the mouth of the Sassafras River in Cecil and Kent County (Figure 23).

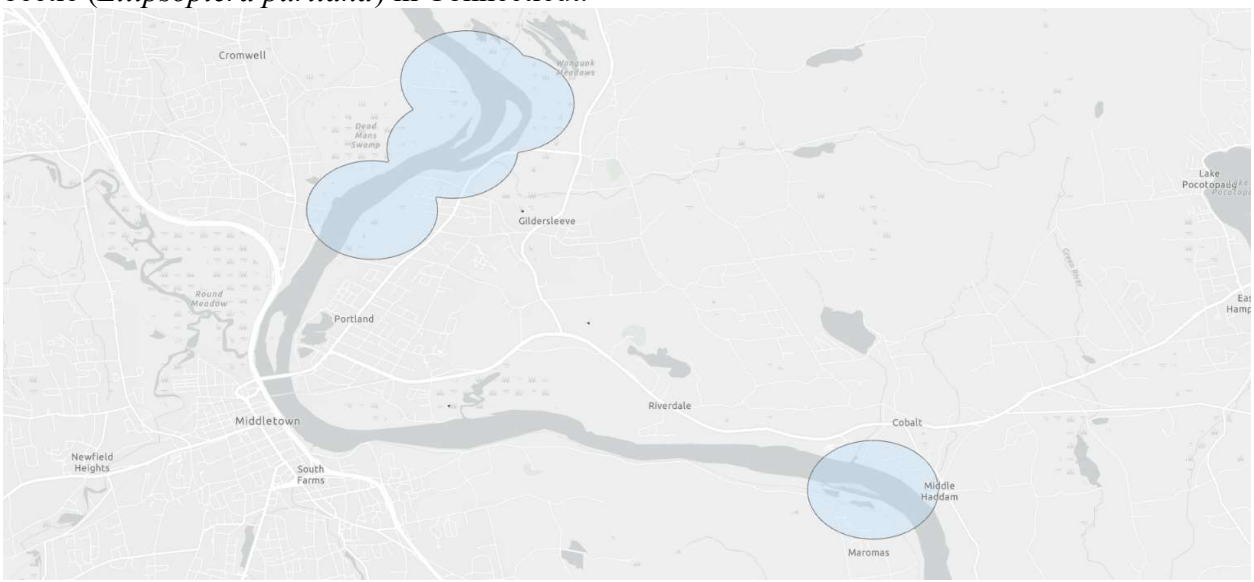
The species inhabits the dynamic shorelines of the Chesapeake Bay where there are tall eroding cliffs and adjacent sandy beaches. These beetles spend their entire life cycle on or near eroding cliffs and adjacent sandy beaches. Adults emerge in mid to late June and are active into early August. Adults forage and mate along the narrow beaches, retreating to the cliff face at high tide. Females move up the cliff face adjacent to the beach and lay their eggs in unvegetated surfaces of the cliff, in strata of moderately compacted and sandy soils. Larvae pass through three instars, or growth stages, in permanent burrows in the cliff face, typically over two winters. They then emerge as adults in June two years after eggs are laid. Bare, eroding cliff faces provide ideal habitat while stabilized cliffs with heavy vegetation cover are not suitable.

As shown in Figure 20, there is overlap of potato crop farming from 2008 through 2022 and the species range of the Puritan tiger beetle (*Ellipsoptera puritana*) in Massachusetts (Figure 20). However, as can be seen in Figures 21, 22 and 23, there is no overlap in the other regions within the Puritan tiger beetle range.

Figure 20. Potato crop planting (2008 to 2022) as it relates to the species range of Puritan tiger beetle (*Ellipsoptera puritana*) in Massachusetts.

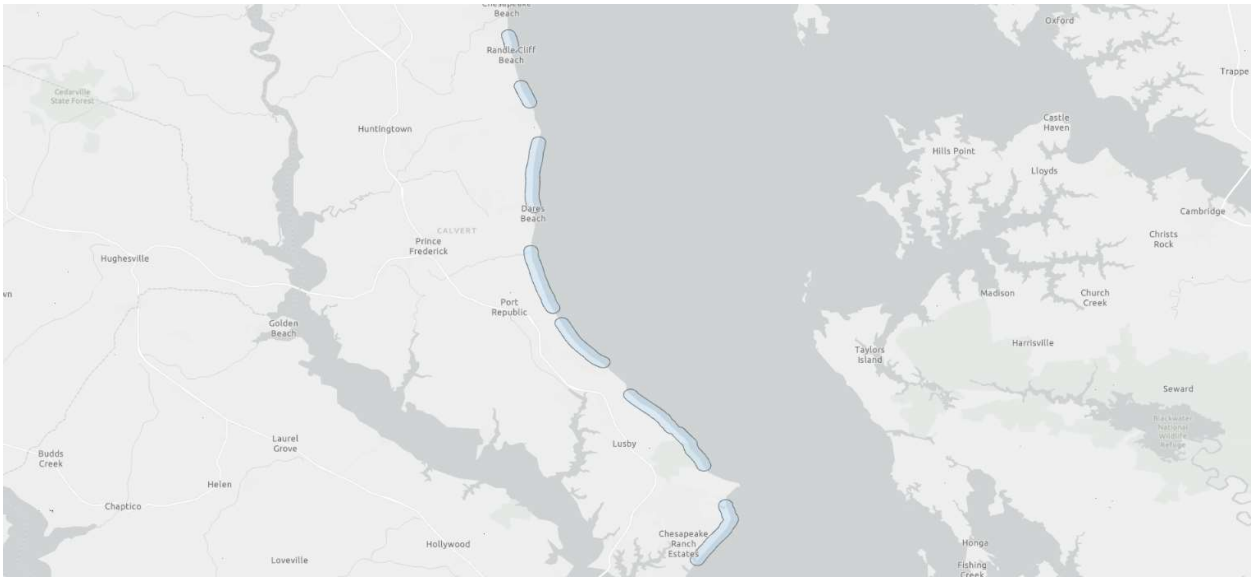
Current species range is indicated by the blue polygons and potato crop planting is indicated by dark brown polygons. There is overlap of potato crop (USDA NASS 2022) and the species range (USFWS(q) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 21. Potato crop planting (2008 to 2022) as it relates to the species range of Puritan tiger beetle (*Ellipsoptera puritana*) in Connecticut.



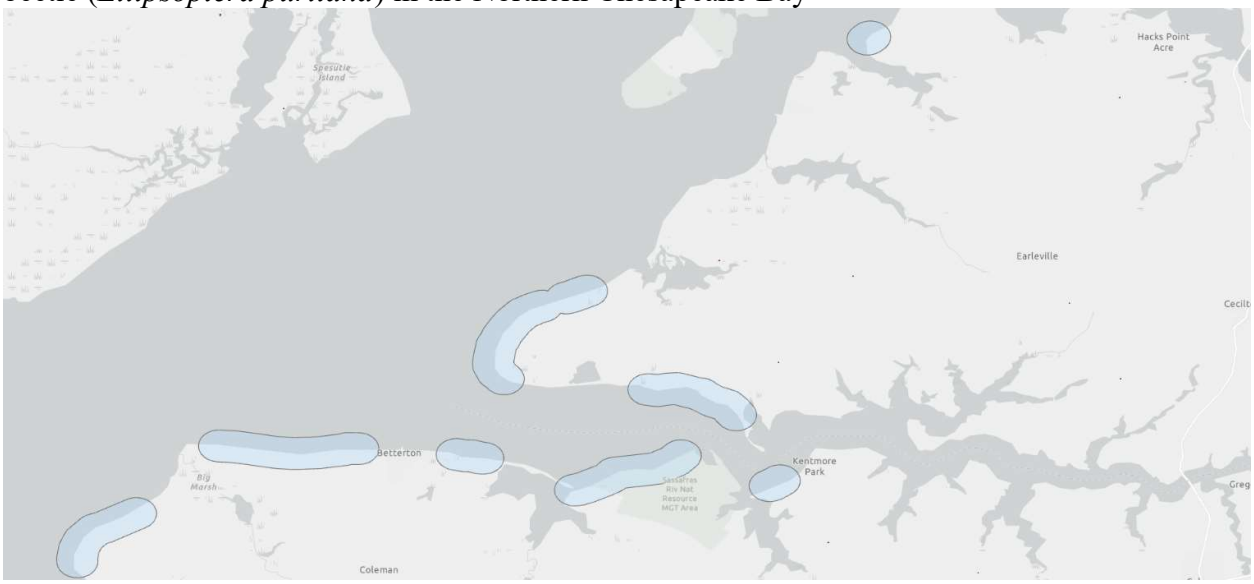
Current species range is indicated by the blue polygons and potato crop planting is indicated by dark brown polygons. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(q) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 22. Potato crop planting (2008 to 2022) as it relates to the species range of Puritan tiger beetle (*Ellipsoptera puritana*) in the Southern Chesapeake Bay



Current species range is indicated by the blue polygons and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(q) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 23. Potato crop planting (2008 to 2022) as it relates to the species range of Puritan tiger beetle (*Ellipsoptera puritana*) in the Northern Chesapeake Bay



Current species range is indicated by the blue polygons and potato crop planting is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(q) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
While there is overlap of Puritan tiger beetle (*Ellipsoptera puritana*) species range and potato crop farming along the Connecticut River in Massachusetts, this beetle dwells on or near eroding

cliffs and adjacent to sandy beaches. The specific type of habitat this beetle requires is not conducive to potato crop production. As such, any exposure to the Northeastern beach tiger beetle would occur through spray-drift or runoff. Therefore, exposure to this beetle is expected to be negligible based on the EEC, the application rate, label language restricting spray-drift, and aquatic and terrestrial degradation data. EPA therefore determines that the use of Ledprona will have no effect on the Puritan tiger beetle (*Ellipsoptera puritana*) nor its critical habitat.

American burying beetle (*Nicrophorus americanus*)
Status: Threatened
Listed: 7/13/1989
Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the American burying beetle (*Nicrophorus americanus*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(r), 2023), EPA's Vulnerable Species site (USEPA(b) 2023) and Federal Register Notices, unless otherwise cited.

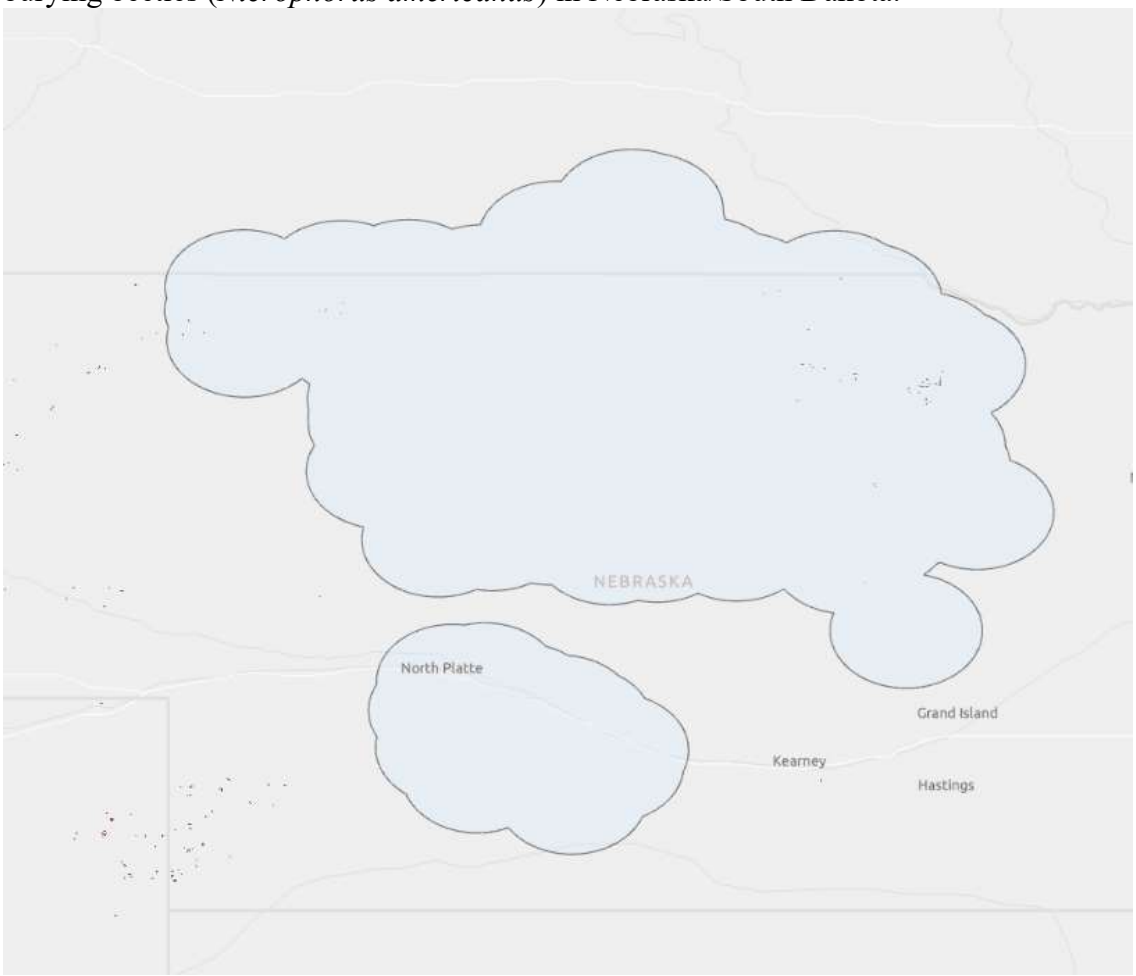
Biology and Habitat Requirements
American burying beetles (*Nicrophorus americanus*) can live in many areas but have a slight preference for grasslands and open understory oak hickory forests. The current range can be found in Figure 24. They are rarely found in row crops. When temperatures are below 15 °C (60 °F), American burying beetles will bury themselves in the soil. When temperatures rise above 15 °C (60 °F), they will leave their underground sanctuary to begin reproducing. Carrion (decayed or rotten flesh) availability is critical for this species to be able to reproduce. The beetles prefer to bury smaller carrion (dove/chipmunk sized) and lay their eggs near it underground. Newly hatched American burying beetles will spend 45-60 days consuming the carrion.

Figure 24 shows the current range of the American burying beetles. As can be seen in Figure 25, there is overlap of potato crop farming from 2008 through 2022 and the species range of the American burying beetles (*Nicrophorus americanus*) in Nebraska (Figure 25), but no overlap in the other regions within the American burying beetle range (Figures 26 and 27).

Figure 24. Species range of American burying beetles (*Nicrophorus americanus*)

Current species range is indicated by the dark green polygons, outlined by black ovals. (USFWS(r) 2023).

Figure 25. Potato crop planting (2008 to 2022) as it relates to the species range of American burying beetles (*Nicrophorus americanus*) in Nebraska/South Dakota.



Current species range is indicated by the blue polygons and potato crop planting is indicated by dark brown polygons. There is overlap of potato crop (USDA NASS 2022) and the species range (USFWS(r) 2023). This map

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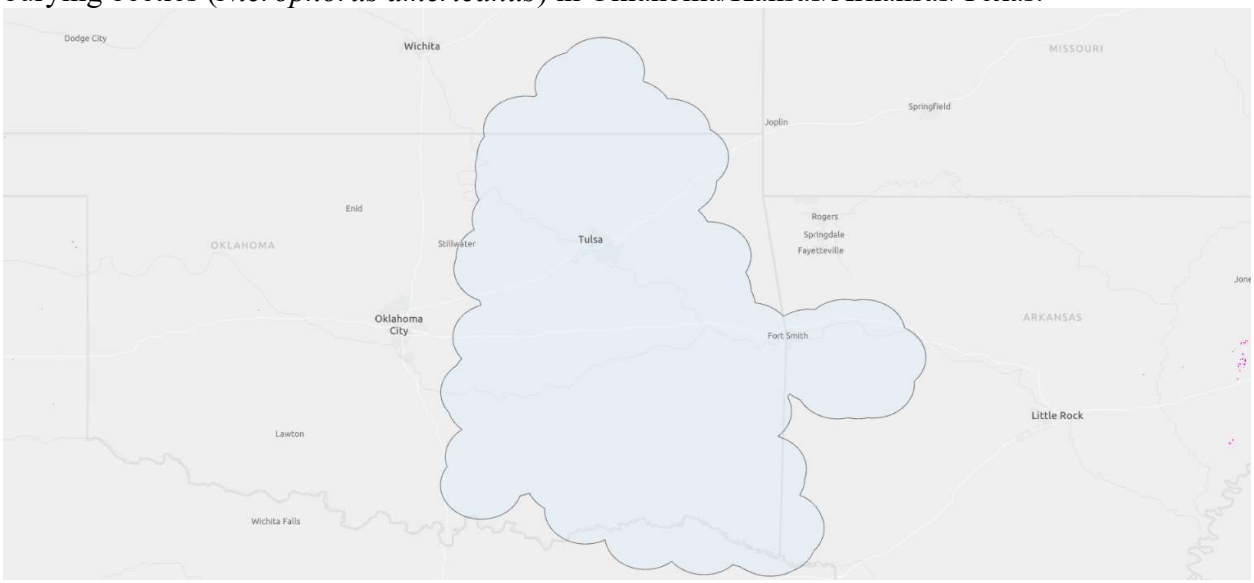
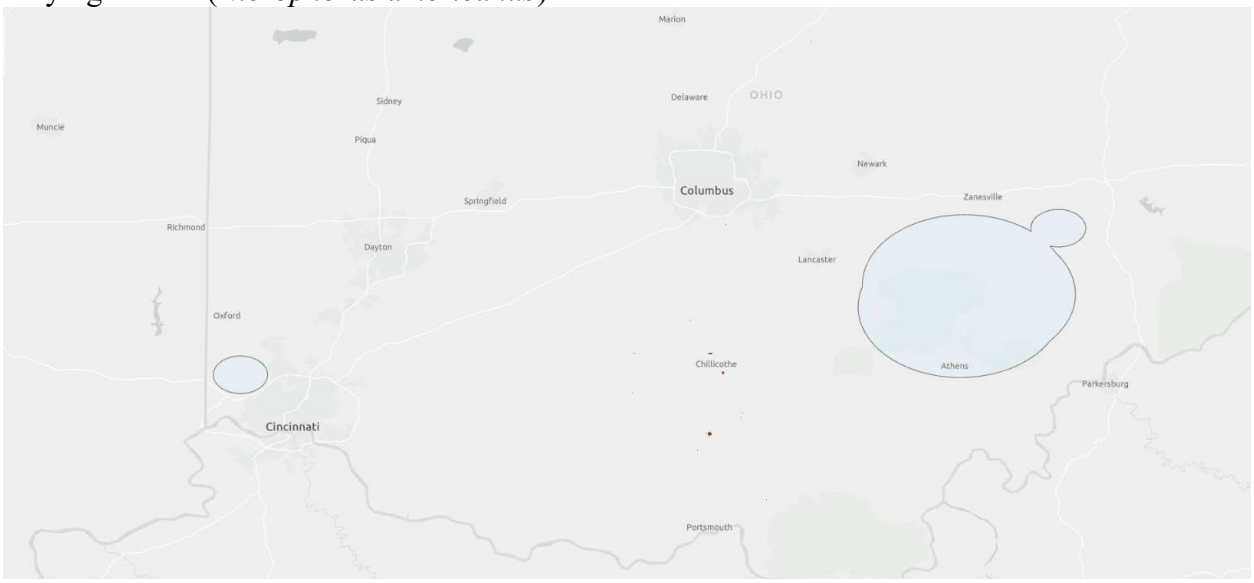
Figure 26. Potato crop planting (2008 to 2022) as it relates to the species range of American burying beetles (*Nicrophorus americanus*) in Oklahoma/Kansas/Arkansas/Texas.



Current species range is indicated by the blue polygons and potato crop planting is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(r) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Figure 26. Potato crop planting (2008 to 2022) as it relates to the species range of American burying beetles (*Nicrophorus americanus*) in Ohio.



Current species range is indicated by the blue polygons and potato crop planting is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(r) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are

Assessment:
While there is overlap of the American burying beetles (*Nicrophorus americanus*) species range and potato crop farming, exposure to this beetle is expected to be negligible based on the application timing (the beetle is nocturnal and burrows underground during the day when the product will be applied), the rapid terrestrial degradation time, the low application rate, and label restrictions regarding applications. Additionally, the mode of action of Ledprona is only possible through ingestion of the product and the American burying beetle feeds on carrion buried underground, not fresh vegetation to which the product will be applied.

Since the beetles feed on rotten flesh, and the beetles are not likely to be found in crop fields, the primary way they might be exposed is through spray drift falling on a dead carcass in a field adjacent to the potato field. Due to the spray drift mitigation found techniques listed on the label and the low application rate, exposure via drift is considered negligible. In the unlikely event that the dead animal had incidentally been exposed (before or after death) to the product during application, the beetle would not consume the animal until the decaying process had begun and is buried underground. Per the degradation data previously reviewed in the May 2023 EUP risk assessment, the product would also have degraded by the time of consumption. EPA therefore determines that the use of Ledprona will have no effect on the American burying beetles (*Nicrophorus americanus*) nor its critical habitat.

Salt Creek tiger beetle (*Cicindela nevadica lincolniana*)
Status: Endangered
Listed: 10/6/2005
Critical habitat designated
In order to characterize the potential exposure of these species to Ledprona, critical habitat and updated species range information were evaluated for the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(s), 2023) and Federal Register Notices, unless otherwise cited.

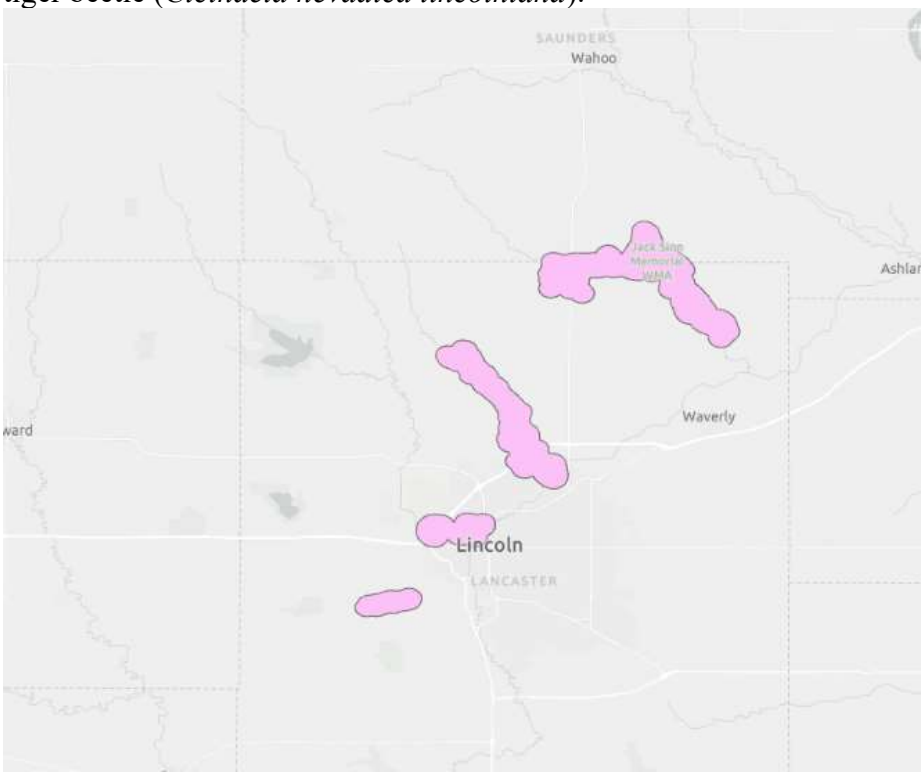
Biology and Habitat Requirements
The Salt Creek tiger beetle is an active, ground-dwelling, predatory insect that captures smaller or similar-sized arthropods in a “tiger-like” manner by grasping prey with its mandibles (mouthparts). Salt Creek tiger beetle larvae live in permanent burrows in the ground and are voracious predators, fastening themselves by means of abdominal hooks to the tops of their burrows and rapidly extending outward to seize passing prey. Eighty-five species and more than 200 subspecies of tiger beetles of the genus *Cicindela* are known from the United States (Boyd *et al.* 1982). The Salt Creek tiger beetle is 1 of 32 species and subspecies of tiger beetles that have been recorded in Nebraska.

Tiger beetle species occur in many different habitats, including riparian habitats, beaches, dunes, woodlands, grasslands, and other open areas (Pearson 1988; Knisley and Hill 1992). Individual tiger beetle species are generally highly habitat-specific because of oviposition and larval sensitivity to soil moisture, composition, and temperature (Pearson 1988; Pearson and Cassola

1992). A common component of tiger beetle habitat appears to be open sunny areas for hunting and thermoregulation (an adaptive behavior to use sunlight or shade to regulate body temperature) (Knisley *et al.* 1990; Knisley and Hill 1992). Although tiger beetles have been well studied as a taxonomic group, the Salt Creek tiger beetle, an inhabitant of an extremely limited habitat type (*i.e.*, barren salt flats and saline stream edges of the saline wetlands and associated streams of eastern Nebraska) has, until recently, received very little ecological study.

As shown in Figure 27, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*) (Figure 27).

Figure 27. Potato crop planting (2008 to 2022) as it relates to the species range of Salt Creek tiger beetle (*Cicindela nevadica lincolniana*).



Current species range is indicated by the yellow polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(s) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, Salt Creek tiger beetle (*Cicindela nevadica lincolniana*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*).

Miami tiger beetle (*Cicindelidia floridana*)
Status: Endangered
Listed: 11/4/2016

Critical habitat designated
In order to characterize the potential exposure of this species to Ledprona, critical habitat and updated species range information were evaluated for the Miami tiger beetle (*Cicindelidia floridana*). The following information is directly taken from or slightly modified from the USFWS ECOS (USFWS(t), 2023) and Federal Register Notices, unless otherwise cited.

Biology and Habitat Requirements
Adult Miami tiger beetles are active diurnal predators that use their keen vision to detect movement of small arthropods and run quickly to capture prey with their well-developed jaws (mandibles). Observations by various entomologists indicate small arthropods, especially ants, are the most common prey for tiger beetles. Choate (1996, p. 2) indicated ants were the most common prey of tiger beetles in Florida. Willis (1967, pp. 196-197) lists over 30 kinds of insects from many families as prey for tiger beetles, and scavenging is also common in some species (Knisley and Schultz 1997, pp. 39, 103).

Based on surveys to date, the Miami tiger beetle is found exclusively on the Miami Rock Ridge within the urbanized areas of Miami-Dade County and outside the boundaries of Everglades National Park (ENP) (Knisley 2015a, pp. 6-7). This area extends from the ENP boundary, near the Park entrance road, northeast approximately 72 km (45 miles (mi)) to its end near North Miami. The pine rocklands are a unique ecosystem found on limestone substrates in three areas in Florida: The Miami Rock Ridge, the Florida Keys, and the Big Cypress Swamp. The pine rocklands differ to some degree between and within these three areas with regard to substrate (*e.g.,* amount of exposed limestone, type of soil), elevation, hydrology, and species composition (both plant and animal).

The Miami tiger beetle is extremely rare and only known to occur in two separate locations within pine rockland habitat in Miami-Dade County. The Richmond population occurs on four contiguous parcels within the Richmond Pine Rocklands: Zoo Miami, Larry, and Penny Thompson Park, CSTARS, and USCG. The second location, which was recently identified, is within approximately 5.0 km (3.1 mi) of the Richmond population and separated by urban development (D. Cook, 2015, pers. comm.).

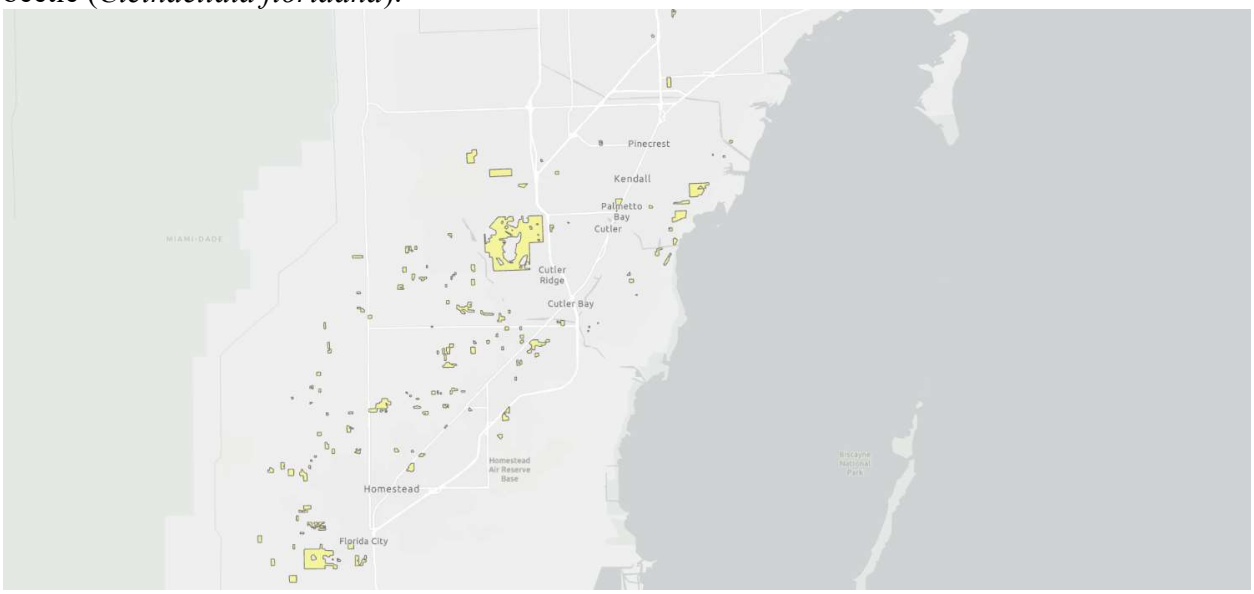
Miami tiger beetles within the four contiguous occupied parcels in the Richmond population are within close proximity to each other. There are apparent connecting patches of habitat and few or no barriers (contiguous and border each other on at least one side) between parcels. Given the contiguous habitat with few barriers to dispersal, frequent adult movement among individuals is likely, and the occupied Richmond parcels probably represent a single population (Knisley 2015a, p. 10). Information regarding Miami tiger beetles at the new location is very limited, but beetles here are within approximately 5.0 km (3.1 mi) of the Richmond population and separated by ample urban development, which likely represents a significant barrier to dispersal, and the Miami tiger beetles at the new location are currently considered a second population.

The Richmond population occurs within an approximate 2 square kilometer (km^2) (494 ac) block, but currently much of the habitat is overgrown with vegetation, leaving few remaining open patches for the beetle. Survey data documented a decline in the number of open habitat

patches, and Knisley (2015a, pp. 9-10) estimated that less than 10 percent of the mostly pine rockland habitat within this area supports the species in its current condition.

As shown in Figure 28, there is no overlap of potato crop farming from 2008 through 2022 and the species range of the Miami tiger beetle (*Cicindelidia floridana*) (Figure 28).

Figure 28. Potato crop planting (2008 to 2022) as it relates to the species range of Miami tiger beetle (*Cicindelidia floridana*).



Current species range is indicated by the yellow polygon and is overlayed with potato crop planting. There is no overlap of potato crop (USDA NASS 2022) and the species range (USFWS(t) 2023). This map was created using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved. For more information about Esri® software, please visit www.esri.com.

Assessment:
There is no overlap of potato crop growing areas in relation to the species range of the TES, Miami tiger beetle (*Cicindelidia floridana*). Therefore, since there is the expectation of no exposure, EPA determines that the use of Ledprona will have no effect on the Miami tiger beetle (*Cicindelidia floridana*).

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