

Summary of the Approach to the Analysis

In the species accounts below, we review the status of critical habitat (described further in Appendix C), the environmental baseline for the action area, cumulative effects, and the effects of the action. Unless otherwise indicated, critical habitat units are contained entirely within the species' range. As such, we expect the *Environmental Baseline* and *Cumulative Effects* for critical habitat will largely be identical to the species and can be found in more detail in the species integration and synthesis summaries (see Appendices B-1 and B-2), as well as in the overarching *Environmental Baseline* and *Cumulative Effects* sections in the body of the Opinion. We utilized our approach (outlined below) for each critical habitat in the consultation and address our assumptions regarding 1) the extent of exposure; 2) magnitude of effect on critical habitat PBFs if exposure occurs; and 3) an evaluation of predicted exposure scenarios to further contextualize the likelihood of adverse effects occurring. Please see the *Approach to the Effects Analysis* section of the main biological opinion for more details.

Extent of Exposure

On-field Exposure

We anticipate areas of critical habitat may overlap with Enlist herbicide use sites to various degrees. While we expect on-field areas most likely do not function as critical habitat for most species, there are some species that can still use areas degraded by agricultural practices and may still have designated critical habitat on agricultural fields. In cases where PBFs indicate critical habitat may still occur on agricultural areas, we anticipate that activities taken to convert land use and maintain agricultural practices (e.g., clearing of tree canopy, changes to surface water availability, fire suppression, tillage) would result in much greater impacts to critical habitat than the occasional use of Enlist herbicides. Thus, we do not anticipate use of Enlist herbicides will further affect PBF quality or function on-field and do not further analyze on-field effects to critical habitat.

Off-field Exposure

Existing product labels require applicators to use a 30-foot in-field spray buffer, which we expect will contain the majority of spray drift to on-field areas (see the *Approach to the Effects Analysis* in the Opinion for more details). While some amount of spray drift could leave the field and expose critical habitat in areas adjacent to use sites, EPA's spray drift deposition models indicate that only a very small fraction of applied pesticide is expected to move beyond the in-field buffer (i.e., only 0.167% of pesticide applied on-field is expected to drift beyond the 30-foot buffer). We do not expect this level of exposure will result in measurable impacts to critical habitat PBFs. Thus, we consider off-field exposure through spray drift as negligible and runoff as the only source of exposure occurring off-field.

We anticipate that runoff exposures will contain the highest off-field estimated environmental concentrations (EECs) in areas adjacent to agricultural fields. To estimate the extent of possible runoff exposure for critical habitats, we used the overlap between the critical habitat and application sites buffered out to 30 meters. We anticipate that the likelihood of runoff exposure will decrease with increasing distance from application sites, as runoff is likely to be intercepted

by vegetation, redirected through local topography, and lost through penetration into the soil column. Thus, we consider 30 meters a sufficient estimate of the extent of runoff exposure in field-adjacent areas. While it is possible for runoff to reach wetland habitats located further than 30 meters from agricultural sites through channelized flow, we expect this runoff will similarly dissipate, degrade, or dilute with distance from crop fields. Thus, we consider 30 meters a sufficient estimate of the extent of runoff exposure in field-adjacent areas.

Magnitude of Effect

We expect adverse effects to critical habitat will result from adverse effects to non-listed plant species that are necessary for PBF quality and function. We compared the 95th percentile runoff EEC, which we consider to be the highest EEC that is reasonably certain to occur within the duration of the action, to a plant growth species sensitivity distribution (SSD) to estimate the proportion of plant species that will experience reduced growth (i.e., at least 25% growth inhibition). We assumed that a proportion of sensitive plant species experiencing moderate growth effects will result in an equivalent effect to critical habitat PBFs (e.g., if 27% of plant species experience moderate growth effects, that represents a 27% effect to the PBF).

We consider EECs that result in moderate effects to 50% or more plant species a high magnitude of effect. While most plant species will likely only experience moderate growth effects at this exposure, more sensitive species may experience high levels of reduction in growth and may even experience some level of acute mortality, which could result in immediate impacts to the availability of plant-based resources. We consider EECs that result in moderate effects to 25-50% of plant species a moderate magnitude of effect to plant-based resources as we do not expect acute mortality of plant species is likely to occur at these exposure levels (even in the most sensitive plant species). However, growth effects may be severe enough to impact the long-term survival of exposed plants, which could reduce long-term availability of plant-based resources for listed animals. We consider EECs that result in moderate effects to less than 25% of plant species a low magnitude of effect as we expect no mortality is likely and only the most sensitive plant species are likely to experience measurable impacts to growth, suggesting only minimal effects to plant-based resources are likely to occur at these exposures.

Runoff Scenario Evaluations: We can further contextualize the risk of adverse effects expected to occur from runoff exposure by assessing individual runoff scenarios that are likely to occur within the area of overlap between critical habitat and the runoff zone. Given that most critical habitat units are too small to contain a sufficient sample size of runoff scenarios to be adequately predictive of future runoff events, we applied the runoff scenarios from the species' range to critical habitat. The EPA modeled location-specific runoff scenarios within each species' range to predict how often runoff EECs are likely to cause more than low levels of adverse effects (described in greater detail in USEPA 2022e). Each runoff scenario is associated with a specific location within the species' range and incorporates locally specific information, such as soil type, slope, and local climatic records, to generate a site-specific distribution of EECs. We assume runoff EECs within critical habitat will occur with the same frequencies as the species' range and that the proportion of scenarios not likely to cause more than low levels of adverse effects in critical habitat is the same as the species' range.

We compared the 95th percentile runoff EEC from each scenario (i.e., the 1 in 10-year runoff EEC for that location) to the plant growth SSD to determine how many locations within the areas of critical habitat that overlap with the runoff zone are not likely to experience runoff EECs that will cause more than low levels of adverse effects to critical habitat PBFs. We use this information to further contextualize the likelihood that runoff exposure will cause an adverse effect to critical habitat. For example, if 100% of modeled scenarios are likely to cause more than low levels of adverse effects, then we expect all areas of overlap between critical habitat and the runoff zone are at risk of adverse toxic effects. As the percent of scenarios likely to exceed toxic thresholds decreases, we reduce the expected risk of adverse effects to habitat in the Enlist runoff zone.

Critical Habitat Analysis: Crustaceans – Panama City crayfish

Scientific Name:	Common Name:	Entity ID:
<i>Procambarus econfinae</i>	Panama City crayfish	9386

Overview

In reviewing the status of the critical habitat, the environmental baseline for the action area, cumulative effects, and the effects of the action, the Service has determined that the risk of adverse effects to the critical habitat from the registration of Enlist One/Duo is low, as described in the following sections. Therefore, it is the Service's biological opinion that the proposed action is not likely to destroy or adversely modify critical habitat designated for the Panama City crayfish. We discuss our rationale in the sections below.

Designated Critical Habitat

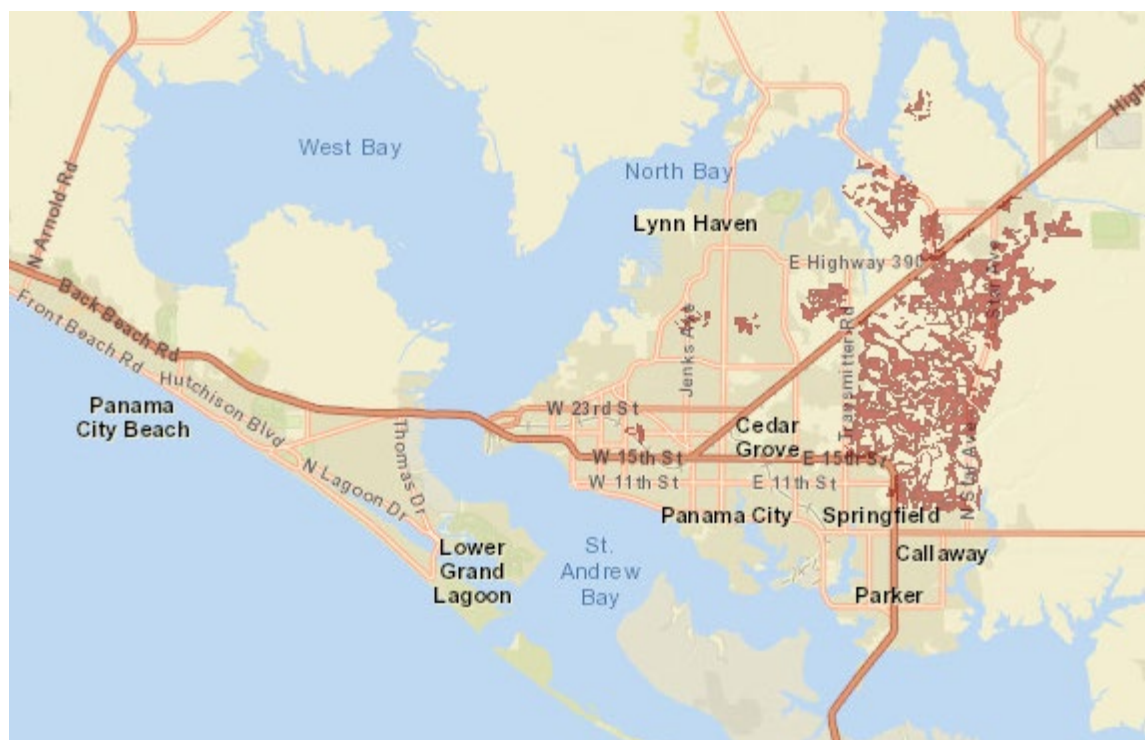


Figure 1. Location of critical habitat units (red polygons). Critical habitat map accessed on November 28, 2022, at <https://ecos.fws.gov/ecp/species/6039>.

Environmental Baseline

We expect the environmental baseline for critical habitat is the same as the environmental baseline of the species, which is written in more detail in the species Integration and Synthesis write-up (see Appendix B-1).

Physical and Biological Features

- Undeveloped lands, including cropland, utilities rights-of-way, timberlands, or grazing lands, that support open wet pine flatwoods and wet prairie habitats that contain appropriate herbaceous groundcover vegetation; permanent or temporary pools of shallow (usually less than 1 foot) freshwater locations; and gently sloped ground level swales with a 3:1 or shallower slope ratio along ecotonal or transitional areas.
- Soil types within undeveloped lands that provide sediment structure needed for burrow construction and that support some native herbaceous vegetation and the likelihood of native seed bank that with management will provide vegetation needed for additional food and cover, and where the ground water is always within 3 feet of the ground surface and surface waters occur on occasion.
- Undeveloped lands that contain surface and groundwater of sufficient quality to support all life stages of the Panama City crayfish and the herbaceous vegetation on which they rely. This includes surface waters with oxygen levels, pH levels and temperatures within specific ranges.

Additionally, special management concerns highlighted in the final critical habitat rule state that the release of pollutants into surface water could “alter water conditions to levels that are beyond the tolerances of the crayfish”.

Based on our evaluation of the PBFs and special management concern descriptions in the final critical habitat rule, we expect adverse effects to PBFs could occur through effects to habitat/physical structure, food availability, and habitat quality (i.e., water quality). The critical habitat designation does not mention any specific resources needed for reproduction or recruitment, and, therefore, this category or type of effect to PBFs is not relevant to our analysis.

Risk

We expect only a small portion of critical habitat will be exposed to Enlist herbicides. While we anticipate that runoff EECs will occasionally be high enough to adversely affect PBFs by causing up to a high magnitude of adverse effects to herbaceous vegetation that provide food and habitat/physical structure resources, spatially refined runoff exposure model results indicate that the majority of locations within the runoff zone are not likely to experience runoff EECs that will cause more than low levels of adverse effects to food and habitat availability. We expect runoff EECs will be far below levels where adverse effects to aquatic invertebrates have been previously observed. As such, we do not anticipate the presence of Enlist herbicide runoff in critical habitat will prevent individuals from occupying critical habitat. Thus, we do not anticipate any adverse effects to water quality will occur. Thus, the overall risk of adverse effects to critical habitat is low. We discuss our rationale in the sections below.

Table 1. Summary of physical and biological features (PBFs), the sensitivity of each PBF to Enlist herbicides, and the preliminary concern level for each PBF.

Physical/Biological Feature Category	Relevance to species	Sensitive to Enlist herbicides	Risk Level
Habitat/Physical structure	X	Yes – herbaceous groundcover	Low
Food	X	Yes – herbaceous plants	Low
Reproduction or recruitment resources	--	--	--
Habitat quality	X	No – runoff EECs not expected to affect crustaceans	Low

Extent of Overlap

While there is some overlap between designated critical habitat and on-field areas, (Table 2), we expect practices used to convert land and maintain agricultural uses (e.g., tillage, changes in ground cover, changes in surface water availability) would result in negative impacts to PBFs that would far outweigh the impact of occasional Enlist herbicide application. Thus, we do not expect the use of Enlist herbicides would further degrade critical habitat occurring on-field. Therefore, we do not further analyze effects to critical habitat that overlap directly with corn, cotton, or soybean fields. As such, we only analyze effects of exposure occurring from runoff. Up to 3.31% of the Panama City crayfish’s critical habitat overlaps with runoff areas directly adjacent to Enlist pesticide use sites (Table 2).

Table 2. Percent overlap between critical habitat and Enlist herbicide use sites (on-field) and runoff zones (off-field).

Crop	On-field (%)	Runoff zone (%)
Corn	0.2	0.54
Cotton	1.3	2.4
Soybean	0.33	0.91
Total ¹	1.63	3.31 ²

Magnitude of effect

We expect there will be at least some level of reduction in habitat and food availability resulting from on- and off-field exposure to Enlist herbicides. We expect practices used to convert land to agricultural uses and maintain agricultural land uses (such as removal of tree canopy cover, changes in ground cover vegetation, changes in surface water availability) would negatively impact PBFs on-field. We do not expect the use of Enlist herbicides would further degrade critical habitat occurring on-field.

We expect off-field runoff EECs will range from 0.02-0.05 lbs AI/acre (Table 3). These concentrations will likely result in low to high magnitudes of adverse effects to sensitive plant species within critical habitat, with 21-53% of sensitive plants experiencing at least moderate growth reductions. Given that the Panama City crayfish relies on herbaceous plants for both food and shelter, we anticipate this effect to plants could result in low to high magnitudes of adverse effects to the food and habitat availability.

In contrast, we do not anticipate this exposure will cause adverse effects to water quality as these concentrations are well below the level where previous studies have observed adverse effects occurring in other crustacean species. Thus, we do not expect the presence of Enlist herbicides at predicted levels will reduce habitat quality to a level that would prevent the species from using critical habitat.

¹ Total overlap uses either corn or soybean, whichever is higher, to avoid double counting overlap resulting from crop rotation practices.

² Runoff overlap is inclusive of on-field overlap and represents the total area overlapping both on-field areas and the runoff zone.

Table 3. Highest estimated environmental concentrations (EECs) of Enlist herbicides that are reasonably certain to occur and the percent of sensitive plant species expected to experience adverse effects from runoff exposure.

Crop	95th percentile EEC (lbs AI/acre)	Percent of plant community affected
Corn	0.05	53
Cotton	0.02	21
Soybean	0.02	21

However, while we expect runoff EECs will occasionally reach levels as high as those reported above in Table 3, these values represent high end estimates and we do not expect all areas in the runoff zone will experience such high concentrations. EPA’s Tier 3 geographic distribution models show that, within the range of the species (which encompasses critical habitat), 61% of corn, 95% of cotton, and 92% of soybean runoff scenarios are not likely to experience runoff EECs that cause adverse effects to more than a low proportion of plant species (Table 4), resulting in minimal impacts to habitat and food resources.

Table 4. Number of spatially refined runoff scenarios modeled, and the number and percent of scenarios not expected to cause more than low effects to critical habitat PBFs.

Crop	No. local runoff scenarios modeled	No. runoff scenarios resulting in low effects to plants	% scenarios resulting in low effects to plants
Corn	162	99	61
Cotton	196	186	94.9
Soybean	211	194	91.9

Given that we only expect a small portion of critical habitat will experience any exposure to Enlist herbicides) and that we expect the majority of locations within the small overlapping area with the runoff zone are not likely to experience more than low levels of adverse effects to habitat and food resources, we anticipate that, at most, only a very small area of critical habitat is likely to experience more than low levels of adverse effects.

Risk summary

We anticipate critical habitat PBFs may experience adverse effects from Enlist herbicides through effects to habitat/physical structure, food availability, and water quality. We expect only a small portion of critical habitat, and its PBFs, is likely to be exposed to Enlist herbicides off-

field. Runoff EECs will not be high enough to prevent crayfish from occupying critical habitat, indicating that the habitat quality (i.e., water quality) is not at risk of adverse effects. In contrast, we expect runoff EECs will occasionally cause up to a high level of adverse effects to the broader plant community, which may adversely affect habitat and food resource availability for the crayfish. However, spatially refined runoff model results indicate that the majority of runoff scenarios are not likely to cause more than low levels of adverse effects to sensitive plant species. Further inspection of the specific areas of critical habitat occurring in the action area did not indicate that any areas of disproportionate conservation value to the species are likely to experience runoff exposure. As only a small portion of critical habitat is likely to experience any exposure to Enlist herbicides (and only a very small portion of the overlapping area in the runoff zone is likely to experience more than low levels of adverse effects to PBFs, we expect the overall risk of adverse effects to critical habitat is low.

Conclusion for critical habitat

We expect critical habitat PBFs will experience low levels of adverse effects from Enlist herbicide use as a result of effects to habitat availability, food availability, and habitat quality. We expect only a small portion of critical habitat is likely to experience on-field exposure. While crayfish may still use agricultural areas as critical habitat, we do not expect the use of Enlist herbicides will further reduce PBF quality from baseline conditions as practices used to convert and maintain land use to agricultural areas have greater impact to PBFs than occasional herbicide applications. We anticipate runoff EECs will be high enough to cause adverse effects to herbaceous forbs that provide habitat and food resources but not high enough to cause toxic effects to crustaceans and prevent them from using critical habitat. Thus, runoff exposure has the potential to cause some adverse effects to habitat and food resource availability, but not to water quality. While we expect runoff EECs will occasionally cause high magnitudes of adverse effects to herbaceous plants, spatially refined runoff model results indicate that the vast majority of locations within the very small runoff zone are not likely to experience EECs that will cause more than low levels of adverse effects to plant species. Thus, we anticipate only minor effects to habitat and food resources in critical habitat overall.

In summary, while exposure and adverse effects to PBFs are likely to occur, we do not anticipate that the use of Enlist One and Enlist Duo will alter critical habitat to an extent that it will appreciably diminish the value of the critical habitat as a whole for the conservation of the species. Thus, it is the Service's biological opinion that the Action, as proposed, is not likely to destroy or adversely modify Panama City crayfish designated critical habitat.

References

U.S. Fish and Wildlife Service (USFWS). 2022. Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Panama City Crayfish and Designation of Critical Habitat. 87;3. 546-581

Critical Habitat Analysis: Flowering Plants – Pecos sunflower

Scientific Name:	Common Name:	Entity ID:
<i>Helianthus paradoxus</i>	Pecos (=puzzle =paradox) sunflower	558

Overview

In reviewing the status of the critical habitat, the environmental baseline for the action area, cumulative effects, and the effects of the action, the Service has determined that the risk of adverse effects to the critical habitat from the registration of Enlist One/Duo is low, as described in the following sections. Therefore, it is the Service’s biological opinion that the proposed action is not likely to destroy or adversely modify the continued existence of the critical habitat designated for the Pecos sunflower. We discuss our rationale in the sections below.

Designated Critical Habitat

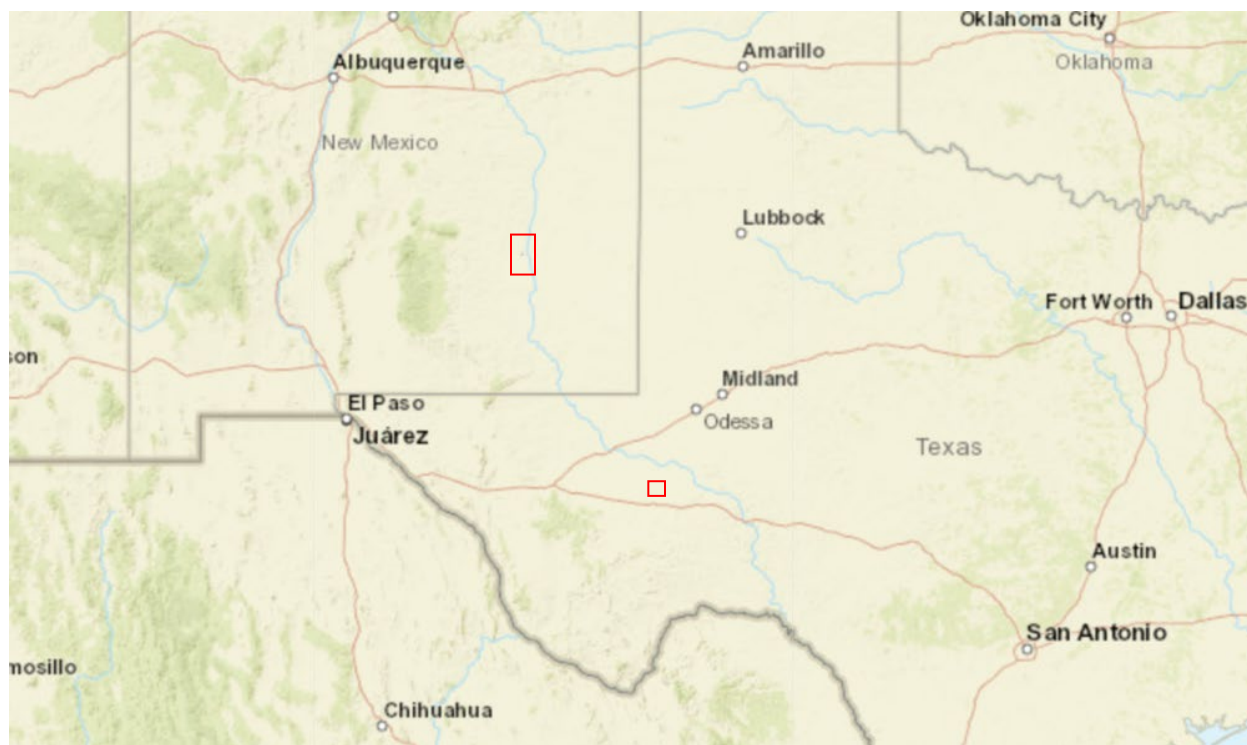


Figure 2. Location of critical habitat units. Units may not appear clearly on maps due to their small size and distribution across the landscape but are located within the red rectangles. Critical habitat map accessed on March 1, 2023, at <https://ecos.fws.gov/ecp/species/7211>.

Environmental Baseline

We expect the environmental baseline for critical habitat is the same as the environmental baseline of the species, which is written in more detail in the species Integration and Synthesis write-up (see Appendix B-2).

Physical and Biological Features

- Silty clay or fine sand soils that contain high organic content, are saline or alkaline, are permanently saturated within the root zone (top 50 cm of the soil profile), and have salinity levels ranging from 10 to 40 parts per thousand; and
- Low proportion (less than 10 percent) of woody shrub or canopy cover directly around the plant.

We do not anticipate Enlist herbicides have the potential to affect physical habitat characteristics, such as soil type and salinity levels. However, the Pecos sunflower relies on woody shrubs and trees for habitat resources, as they influence growing conditions within critical habitat (i.e., provide canopy), indicating that critical habitat PBFs may be adversely affected by effects to habitat/physical structure resources. The critical habitat designation does not include any mention of specific nutrient or reproductive/recruitment resources, nor any necessary metrics of habitat quality, are needed within critical habitat, indicating that effects to food resources, reproductive/recruitment resources, and habitat quality are not relevant to our analysis.

Risk

We expect only a small portion of critical habitat will experience exposure to Enlist herbicides. While we anticipate that runoff EECs will occasionally cause adverse effects to other plant species that provide habitat/physical structure resources, spatially refined runoff model results indicate that the majority of locations within the runoff zone are not likely to experience runoff EECs that will cause more than low levels of adverse effects to these plant species. Therefore, the overall risk of adverse effects to critical habitat is low. We discuss our rationale in the sections below.

Table 5. Summary of physical and biological feature (PBFs), the sensitivity of each PBF to Enlist herbicides, and the risk level for each relevant PBF.

Physical/Biological Feature Category	Relevant to species	Sensitive to Enlist herbicides	Risk Level
Habitat/Physical structure	X	No – woody plants likely tolerant to Enlist herbicides	Low
Food	--	--	--
Reproduction or recruitment resources	--	--	--
Habitat quality	--	--	--

Extent of Overlap

While there is some overlap between designated critical habitat and Enlist herbicide use sites (Table 6), we expect practices used to convert land and maintain agricultural uses (e.g., tillage, changes in ground and canopy cover, alterations to soil hydrology) would result in negative impacts to PBFs that would far outweigh the impact of occasional Enlist herbicide application. Thus, we do not expect the use of Enlist herbicides would not further degrade critical habitat occurring on-field. Therefore, we do not further analyze effects to critical habitat that overlap directly with corn, cotton, or soybean fields. As such, we only analyze effects of exposure occurring from runoff. Up to 3.76% of Pecos sunflower's critical habitat overlaps with corn, cotton, and soybean runoff areas (Table 6).

Table 6. Percent overlap between critical habitat and Enlist herbicide use sites (on-field) and runoff zones.

Crop	On-field (%)	Runoff zone (%)
Corn	0.79	2.68
Cotton	0.26	1.09
Soybean	0	0
Total ³	1.05	3.76 ⁴

Magnitude of effect

We expect adverse effects to habitat/physical structure resources (through effects to plants that provide canopy cover) are likely to occur from Enlist herbicide exposure. We expect runoff EECs will range between 0.01-0.03 lbs AI/acre (Table 7). We anticipate this level of exposure will cause moderate growth effects in 4-35% of sensitive plant species exposed. However, we do not expect this will result in more than low levels of effects to the habitat/physical structure resources as the species that provide canopy cover (i.e., woody shrubs and trees) are not sensitive to Enlist herbicides, and thus not likely to experience more than low levels of adverse effects from runoff (see the *Assumptions and Uncertainties* section of the main Opinion for more details).

³ Total overlap uses either corn or soybean, whichever is higher, to avoid double counting overlap resulting from crop rotation practices.

⁴ Runoff overlap is inclusive of on-field overlap and represents the total area overlapping both on-field areas and the runoff zone.

Table 7. Highest estimated environmental concentrations (EECs) of Enlist herbicides that are reasonably certain to occur and the expected percent of sensitive plant species expected to experience at least moderate growth effects from runoff exposure.

Crop	95th percentile EEC (lbs AI/acre)	Percent of plant community affected
Corn	0.01	4
Cotton	0.03	35
Soybean	NA	NA

Furthermore, while we expect runoff EECs will occasionally reach levels as high as those reported above in Table 7, these values represent high end estimates, and we do not expect all areas in the runoff zone will experience such high concentrations. EPA's Tier 3 geographic distribution models show that, within the range of the species (which encompasses critical habitat), 90.7% of corn and 93.8% of cotton runoff scenarios are not likely to experience runoff EECs that will cause adverse effects to more than a low proportion of plant species (Table 8), resulting in minimal impacts to the canopy structure of critical habitat.

Table 8. Number of spatially refined runoff scenarios modeled, and the number and percent of scenarios not expected to cause more than low effects to critical habitat PBFs.

Crop	# runoff scenarios modeled	No. runoff scenarios resulting in low effects to plants at most	% scenarios resulting in low effects to plants at most
Corn	75	75	100
Cotton	65	61	93.8
Soybean	NA	NA	NA

Therefore, given that we expect only a small portion of critical habitat will experience runoff exposure, that the majority of locations within the overlapping area are not likely to experience adverse effects to more than a low proportion of sensitive plant species, and that the plant species specifically required for the canopy cover are not likely to experience high magnitudes of effect from Enlist herbicide exposure, we anticipate only minimal adverse effects to the critical habitat PBFs in only a very small area of critical habitat are likely to occur. Thus, the overall risk of adverse effects to critical habitat is low.

Risk summary

We anticipate critical habitat PBFs will experience adverse effects resulting from effects to habitat/physical structure resources. We expect only a small portion of critical habitat is likely to be exposed to Enlist herbicides off-field. In areas that do experience runoff exposure, we do not expect more than low levels of adverse effects to woody shrubs and trees that provide habitat resources for the Pecos sunflower as they are not sensitive to Enlist herbicides. Additionally, spatially refined runoff exposure model results indicate that the majority of runoff scenarios are not likely to cause more than low levels of adverse effects to sensitive plant species, further reducing the likelihood of adverse effects to habitat resources occurring. Further inspection of areas of critical habitat occurring in the action area did not indicate that any areas likely to experience runoff exposure have more unique biological value than other, non-exposed areas of critical habitat. Therefore, as only a small portion of critical habitat is likely to experience any exposure to Enlist herbicides, only a very small portion of the overlapping area is likely to experience more than low levels of adverse effects plant species, and that the plant species needed to provide habitat/physical structure resources are not likely sensitive the Enlist herbicides, we expect a low overall risk of adverse effects to critical habitat.

Conclusion for critical habitat

Given that other agricultural activities will likely have a much greater negative impact to critical habitat PBFs than the occasional use of Enlist herbicides, we do not expect on-field exposure to Enlist One and Enlist Duo will further measurably affect PBFs in areas of critical habitat that occur on-field. We expect only a small portion of critical habitat and its habitat structure PBF is likely to experience runoff exposure. We do not anticipate runoff exposure will result in more than low levels of adverse effects to the woody shrubs and trees that provide habitat resources given the expected tolerance of these plant groups to Enlist herbicides. Spatially refined runoff model results indicate that the vast majority of locations within the very small runoff zone are not likely to experience runoff EECs that will cause more than low levels of adverse effects to non-listed plant species, further emphasizing that adverse effects to the habitat resource PBF are unlikely to occur. Thus, we anticipate only minor adverse effects to the habitat resource PBF will occur.

In summary, while exposure to critical habitat is likely to occur, we do not anticipate that the use of Enlist One and Enlist Duo will alter critical habitat to an extent that will appreciably diminish the value of the critical habitat as a whole for the conservation of the species. Thus, it is the Service's biological opinion that the Action, as proposed, is not likely to destroy or adversely modify Pecos sunflower designated critical habitat.

References

U.S. Fish and Wildlife Service (USFWS). 2008. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Helianthus Paradoxus* (Pecos Sunflower). 73;63. 17762-17807

Critical Habitat Analysis: Flowering Plants – Whorled sunflower

Scientific Name:	Common Name:	Entity ID:
<i>Helianthus verticillatus</i>	Whorled sunflower	1881

Overview

In reviewing the status of the critical habitat, the environmental baseline for the action area, cumulative effects, and the effects of the action, the Service has determined that the risk of adverse effects to the critical habitat from the registration of Enlist One/Duo is low, as described in the following sections. Therefore, it is the Service's biological opinion that the proposed action is not likely to destroy or adversely modify the critical habitat designated for the whorled sunflower. We discuss our rationale in the sections below.

Designated Critical Habitat



Figure 3. Location of critical habitat units. Units may not appear clearly on maps due to their small size and distribution across the landscape but are located within the red rectangles. Critical habitat map accessed on November 28, 2022, at <https://ecos.fws.gov/ecp/species/4122>.

Environmental Baseline

We expect the environmental baseline for critical habitat is the same as the environmental baseline of the species, which is written in more detail in the species Integration and Synthesis write-up (see Appendix B-2).

Physical and Biological Features

- Silt loam, silty clay loam, or fine sandy loam soils on land forms including broad uplands, depressions, stream terraces, and floodplains within the headwaters of the Coosa River in Alabama and Georgia and the East Fork Forked Deer and Tuscumbia rivers in Tennessee
- Sites in which forest canopy is absent, or where woody vegetation is present at sufficiently low densities to provide full or partial sunlight to whorled sunflower plants for most of the day, and which support vegetation characteristic of moist prairie

communities. Invasive, nonnative plants must be absent or present in sufficiently low numbers not to inhibit growth or reproduction of whorled sunflower

- Occupied sites in which a sufficient number of compatible mates are present for outcrossing and production of viable achenes to occur

Based on our evaluation of the PBF descriptions in the final critical habitat rule, we expect adverse effects to PBFs may occur through effects to habitat/physical structure (i.e., vegetative community) and reproductive resources (i.e., compatible mates). The critical habitat designation does not include any mention of food/nutrient resources or required metrics of habitat quality within critical habitat, indicating that these effects are not relevant to our analysis.

Risk

We expect a large portion of critical habitat is likely to experience exposure. Runoff EECs will occasionally result in moderate magnitudes of adverse effects to the vegetative community the sunflower grows in but will result in high magnitudes of adverse effects to the availability of compatible mates. However, we anticipate that the critical habitat-specific conservation measure to be implemented that restricts the use of Enlist pesticides within 60-meters of critical habitat for this species will be sufficiently protective and reduce the risk of adverse effects to a low level. We discuss our rationale in the sections below.

Table 9. Summary of physical and biological features (PBFs), the sensitivity of each PBF to Enlist herbicides, and the risk level for each relevant PBF.

Physical/Biological Feature Category	Relevance to species	Sensitive to Enlist herbicides	Risk Level
Habitat/Physical structure	X	No – minor effects to vegetative communities	Low
Food	--	--	--
Reproduction or recruitment resources	X	Yes – compatible mates sensitive to herbicides	Low
Habitat quality	--	--	--

Extent of Overlap

Up to 10.34% of the designated critical habitat occurs on agricultural areas. Up to 15.65% of designated critical habitat overlaps with corn, cotton, and soybean runoff areas (Table 10).

Table 10. Percent overlap between critical habitat and Enlist herbicide use sites (on-field) and runoff zones.

Crop	On-field	Runoff zone
Corn	2.67	5.22
Cotton	3.28	6.26
Soybean	7.05	9.39
Total ⁵	10.34	15.65 ⁶

Magnitude of effect

We expect the adverse effects to PBFs resulting from effects to habitat/physical structure and reproductive resources. We expect runoff EECs will range between 0.026-0.038 lbs AI/acre (Table 11). We anticipate this level of exposure to cause moderate levels of adverse effects to 30-44% of sensitive plant species that are exposed, which will result in low to moderate magnitudes of effect to the vegetative community that supports the whorled sunflower. Additionally, this level of exposure may result in high levels of adverse growth effects to compatible mates within critical habitat, reducing the function of critical habitat.

Table 11. Highest estimated environmental concentrations (EECs) of Enlist pesticide AIs that are reasonably certain to occur resulting from Enlist herbicide use, the expected percent of sensitive plant species expected to experience at least moderate growth effects from runoff exposure, and the expected reduction in growth of compatible mates.

Crop	95 th percentile EEC (lbs AI/acre)	Percent of plant community affected	Percent growth effect to compatible mates
Corn	0.038	44	74
Cotton	0.037	43	73
Soybean	0.026	30	55

While runoff EECs may occasionally reach levels as high as the values reported above, we do not expect all areas in the runoff zone will experience such high EECs. EPA's Tier 3 geographic distribution models show that, within the range of the species (which encompasses critical

⁵ Total overlap uses either corn or soybean, whichever is higher, to avoid double counting overlap resulting from crop rotation practices.

⁶ Runoff overlap is inclusive of on-field overlap and represents the total area overlapping both on-field areas and the runoff zone.

habitat), 33% of corn, 45% of cotton, and 58% of soybean runoff areas are not likely to cause adverse effects to more than a low proportion of sensitive plant species, resulting in minimal adverse impacts to the vegetative community and compatible mates in those instances (Table 12).

Table 12. Number of spatially refined runoff scenarios modeled, and the number and percent of scenarios not expected to cause more than low effects to critical habitat PBFs.

Crop	No. local runoff scenarios modeled	No. runoff scenarios resulting in low effects to plants	% scenarios resulting in low effects to plants
Corn	598	195	32.6
Cotton	364	165	45.3
Soybean	961	556	57.9

While not all areas of critical habitat will experience such high levels of runoff EECs, the level of overlap with on-field and runoff areas suggests the risk of adverse effects to PBFs is still high. As such, the EPA and technical registrants have proposed a critical habitat-specific conservation measure to further protect the whorled sunflower's critical habitat. A pesticide use limitation area (PULA) will establish a 60-meter buffer zone around designated critical habitat units where Enlist pesticides cannot be applied. We anticipate this buffer zone will be large enough to prevent Enlist pesticide runoff from entering critical habitat, reducing the likelihood of runoff exposure and minimizing adverse effects to critical habitat PBFs. With consideration of the proposed PULA, we anticipate that exposure to runoff is not likely to occur. Thus, we expect low overall risk of adverse effects to the critical habitat.

Risk summary

We anticipate critical habitat, without the implementation of additional conservation measures, will experience moderate to high levels of adverse effects, resulting from effects to habitat/physical structure and reproductive resources. However, we anticipate that the proposed critical habitat-specific conservation measure for this species will substantially reduce the likelihood of exposure and adverse effects occurring to critical habitat. Thus, we anticipate the overall risk of adverse effects to the critical habitat is low.

Conclusion for critical habitat

In the absence of additional conservation measures, we would expect a large portion of critical habitat will experience exposure to Enlist herbicides both on- and off-field. Although spatially refined runoff model results indicate that not all runoff scenarios are likely to cause more than low levels of effects, we anticipate runoff EECs would occasionally be high enough to cause up to moderate effects to the vegetative community where the sunflower grows and up to high

magnitudes of adverse effects to compatible mates. However, the EPA and technical registrants have proposed a critical habitat-specific conservation measure for this species, which will prohibit the use of Enlist herbicides within 60-meters of designated critical habitat units. We anticipate this buffer zone will significantly reduce the likelihood of runoff exposure and minimize adverse effects to habitat and reproductive resources. Thus, we expect low overall risk of exposure and adverse effects to the critical habitat.

In summary, with implementation of the conservation measure restricting use of Enlist herbicides within 60m of critical habitat for this species, we anticipate a very low likelihood of exposure and adverse effects to PBFs. Thus, we do not anticipate that the use of Enlist One or Enlist Duo will alter critical habitat to an extent that will appreciably diminish the value of the critical habitat as a whole for the conservation of the species. Thus, it is the Service's biological opinion that the Action, as proposed, is not likely to destroy or adversely modify the whorled sunflower's designated critical habitat.

References

U.S. Fish and Wildlife Service (USFWS). 2014. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Physaria globosa* (Short's bladderpod), *Helianthus verticillatus* (whorled sunflower), and *Leavenworthia crassa* (fleshy-fruit gladiolus). 79;165. 50990-51039

Critical Habitat Analysis: Insects – Dakota skipper

Scientific Name:	Common Name:	Entity ID:
<i>Hesperia dacotae</i>	Dakota skipper	3412

Overview

In reviewing the status of the critical habitat, the environmental baseline for the action area, cumulative effects, and the effects of the action, the Service has determined that the risk of adverse effects to the critical habitat from the registration of Enlist One/Duo is low, as described in the following sections. Therefore, it is the Service’s biological opinion that the proposed action is not likely to destroy or adversely modify the critical habitat designated for the Dakota skipper. We discuss our rationale in the sections below.

Designated Critical Habitat



Figure 4. Location of critical habitat units (red polygons). Units may not appear clearly on maps due to their small size and distribution across the landscape. Critical habitat map accessed on November 28, 2022, at <https://ecos.fws.gov/ecp/species/4122>.

Environmental Baseline

We expect the environmental baseline for critical habitat is the same as the environmental baseline of the species, which is written in more detail in the species Integration and Synthesis write-up (see Appendix B-1).

Physical and Biological Features

- Wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs on near-shore glacial lake soil deposits of high-quality dry-mesic remnant untilled prairie on rolling terrain consisting of gravelly glacial moraine soil deposits, containing:
 - A predominance of native grasses and native flowering forbs

- Glacial soils that provide the soil surface or near surface (between soil surface and 2cm depth) micro-climate conditions conducive to Dakota skipper larval survival and native prairie vegetation
- If present, trees or large shrub cover of less than 5 percent of area in dry prairies and less than 25 percent in wet-mesic prairies; and
- If present, nonnative invasive plant species occurring in less than 5 percent of area
- Native grasses and native flowering forbs for larval and adult food and shelter, specifically:
 - At least one of the following native grasses to provide larval food and shelter sources during Dakota skipper larval stages: prairie dropseed (*Sporobolus heterolepis*) or little bluestem (*Schizachyrium scoparium*); and
 - One or more of the following forbs in bloom to provide nectar and water sources during the Dakota skipper flight period: purple coneflower (*Echinacea angustifolia*), bluebell bellflower (*Campanula rotundifolia*), white prairie clover (*Dalea candida*), upright prairie coneflower (*Ratibida columnifera*), fleabane (*Erigeron* spp.), blanketflower (*Gaillardia* spp.), black-eyed Susan (*Rudbeckia hirta*), yellow sundrops (*Calylophus serrulatus*), prairie milkvetch (*Astragalus adsurgens*), or common gaillardia (*Gaillardia aristata*)
- Dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality remnant prairie (as defined in the above PBF) that connects high-quality wet-mesic to dry tallgrass prairies or moist meadow habitats. Dispersal grassland habitat consists of undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

Based on our evaluation of the PBF descriptions in the final critical habitat rule, we expect adverse effects to PBFs may occur through effects to habitat/physical structure (i.e., effects to the vegetative community) and food availability. The critical habitat designation does not mention specific reproduction/recruitment resources, nor any metrics of habitat quality required within critical habitat, and, therefore, effects to these resources are not relevant to our analyses.

Risk

We expect critical habitat is likely to experience exposure to runoff. However, anticipated runoff EECs will not likely be high enough to cause more than low levels of adverse effects to plant species, which will result in only low levels of adverse effects to habitat/physical structure resources for adult Dakota skippers. Additionally, native grasses, which provide habitat and food resources to larvae, are not sensitive to Enlist herbicides, indicating that, at most, only low levels of impacts to larval habitat and food resources are likely to occur. Similarly, while runoff may cause adverse growth effects to herbaceous forbs, we do not expect this will result in more than low levels of effects to flower yield, resulting in only minimal adverse effects to adult food resource availability. Thus, we anticipate the overall risk of adverse effects to critical habitat is low. We discuss our rationale in the sections below.

Table 13. Summary of physical and biological features (PBFs), the sensitivity of each PBF to Enlist herbicides, and the risk level for each PBF.

Physical/Biological Feature Category	Relevance to species	Sensitive to Enlist herbicides	Risk Level
Habitat/Physical structure	X	Yes – sensitive plants are PBF components	Low
Food	X	Yes – sensitive plants are PBF components	Low
Reproduction or recruitment resources	--	--	--
Habitat quality	--	--	--

Extent of overlap

While there is overlap between designated critical habitat and Enlist herbicide use sites (Table 14), we expect practices used to convert land and maintain agricultural uses (e.g., tillage, changes in ground and canopy cover, alterations to soil hydrology) would result in negative impacts to PBFs that would far outweigh the impact of occasional Enlist herbicide application. Thus, we do not expect the use of Enlist herbicides would further degrade critical habitat occurring on-field. Therefore, we do not further analyze effects to critical habitat that overlap directly with corn or soybean fields. As such, we only analyze effects of exposure from runoff. Up to 9.24% of the Dakota skipper's critical habitat overlaps with runoff areas (Table 14).

Table 14. Percent overlap between the species' critical habitat and the action area.

Crop	On-field	Runoff zone
Corn	2.73	7.06
Cotton	0	0
Soybean	3.77	9.24
Total ⁷	3.77	9.24

Magnitude of effect

We expect runoff EECs will range between 0.014-0.018 lbs AI/acre (Table 15). This level of exposure will likely cause moderate growth effects to 10-17% of sensitive plant species within critical habitat, which we consider a low magnitude of effect to the plant community. We expect this will result in no more than low levels of effects to habitat and food resources for the skipper.

⁷ Total overlap uses either corn or soybean, whichever is higher, to avoid double counting overlap resulting from crop rotation practices.

Table 15. Highest estimated environmental concentrations (EECs) of Enlist pesticide AIs that are reasonably certain to occur resulting from Enlist herbicide use and the expected percent of sensitive plant species expected to experience at least moderate growth effects from runoff exposure.

Crop	95th percentile EEC (lbs AI/acre)	Percent of plant community affected
Corn	0.014	10
Cotton	NA	NA
Soybean	0.018	17

Additionally, the EECs reported in Table 15 represent high end exposure estimates and we do not expect all areas within the runoff zone will experience these levels of EECs. EPA's Tier 3 geographic distribution models show that, within the species range (which encompasses critical habitat), 97.1% of corn and 89.7% of soybean runoff scenarios will not cause adverse effects to more than a low proportion of sensitive plant species, resulting in minimal impacts to habitat and food resources.

Table 16. Results from EPA's Tier 3 geographic distribution models, including the number of runoff scenarios modeled and the number and proportion of scenarios not expected to cause more than low effects to plants.

Crop	No. local runoff scenarios modeled	No. runoff scenarios resulting in low effects to plants	% scenarios resulting in low effects to plants
Corn	10593	10286	97.1
Cotton	NA	NA	NA
Soybean	273	245	89.7

Furthermore, even in areas that may experience higher levels of runoff EECs, we do not anticipate all plants that provide habitat and food resources will experience high levels of adverse effects. Monocot plants, such as the native grasses that provide habitat and food for larvae, are not sensitive to Enlist herbicide AIs and are not likely to experience more than low levels of adverse effects from runoff exposure (see the *Assumptions and Uncertainties* section of the main Opinion for more details). Additionally, while dicot plants that provide nectar for adult Dakota skippers are more susceptible to adverse effects from runoff exposure, previous studies show that reproductive effects are not as sensitive as growth effects (see the *Effects of the Action* section of the main Opinion for more details), indicating that while flowering forbs may experience

reduced growth, we do not expect this will result in more than a small reduction in flower availability. Thus, while a moderate proportion of critical habitat is likely to experience exposure to Enlist herbicide runoff, we expect only low levels of adverse effects are likely to occur from this exposure, resulting in no more than low levels of adverse effects to habitat and food resources. As such, we expect the overall risk of adverse effects to critical habitat is low.

Risk summary

We anticipate adverse effects to critical habitat PBFs will occur from effects to habitat and food resources. While we expect off-field exposure will occur through runoff, we do not expect more than low magnitudes of adverse effects to plant species is likely to occur from runoff exposure, which will result in no more than low levels of adverse effects to habitat and food resources. Even in areas that receive higher runoff EECs, we do not expect exposure will likely result in more than low levels of adverse effects to habitat and food resources as native grasses that support larvae are not sensitive to Enlist herbicides, and any adverse growth effects to herbaceous forbs are not likely to reduce the availability of flowers for adults to feed on. Further inspection of areas of critical habitat occurring in the action area did not indicate that any of the areas likely to experience runoff exposure have a more unique conservation value to the species than any other areas. Thus, we expect that only minimal impacts to plants needed to support the necessary habitat and food resources are likely to occur. As such, we anticipate that the overall risk of adverse effects to critical habitat is low.

Conclusion for critical habitat

Given that other agricultural activities will likely have a much greater negative impact to critical habitat PBFs than the occasional use of Enlist herbicides, we do not expect on-field exposure to Enlist One and Enlist Duo will further measurably affect PBFs in areas of critical habitat that occur on-field. While we expect more than a few locations within critical habitat will likely experience runoff exposure, we anticipate only minimal adverse effects to the habitat and food resources are likely to occur. Spatially refined runoff model results indicate that most areas that receive runoff exposure will not experience more than low levels of reduction to habitat and food resources. Additionally, we do not expect native grasses that provide habitat and food to Dakota skipper larvae are sensitive to Enlist herbicides, indicating that even areas that receive higher levels of runoff EECs are not likely to reduce larvae habitat and food resources. Similarly, only a very small portion of critical habitat will experience adverse growth effects from runoff exposure, and we do not expect this level of exposure will affect flowering or the availability of nectar for adults. Thus, while there is a moderate portion of critical habitat that will be exposed to Enlist herbicide runoff, we do not expect exposed areas will experience more than low levels of adverse effects to habitat and food resources.

In summary, we do not anticipate that the use of Enlist One and Enlist Duo will alter critical habitat to an extent that will appreciably diminish the value of the critical habitat as a whole for the conservation of the species. Thus, it is the Service's biological opinion that the Action, as proposed, is not likely to destroy or adversely modify Dakota skipper designated critical habitat.

References

U.S. Fish and Wildlife Service (USFWS). 2015. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Dakota Skipper and Poweshiek Skipperling. 80;190. 59248-59384

Critical Habitat Analysis: Insects – Poweshiek skipperling

Scientific Name:	Common Name:	Entity ID:
<i>Oarisma poweshiek</i>	Poweshiek skipperling	10147

Overview

In reviewing the status of the critical habitat, the environmental baseline for the action area, cumulative effects, and the effects of the action, the Service has determined that the risk of adverse effects to the critical habitat from the registration of Enlist One/Duo is low, as described in the following sections. Therefore, it is the Service’s biological opinion that the proposed action is not likely to destroy or adversely modify the critical habitat designated for the Poweshiek skipperling. We discuss our rationale in the sections below.

Designated Critical Habitat

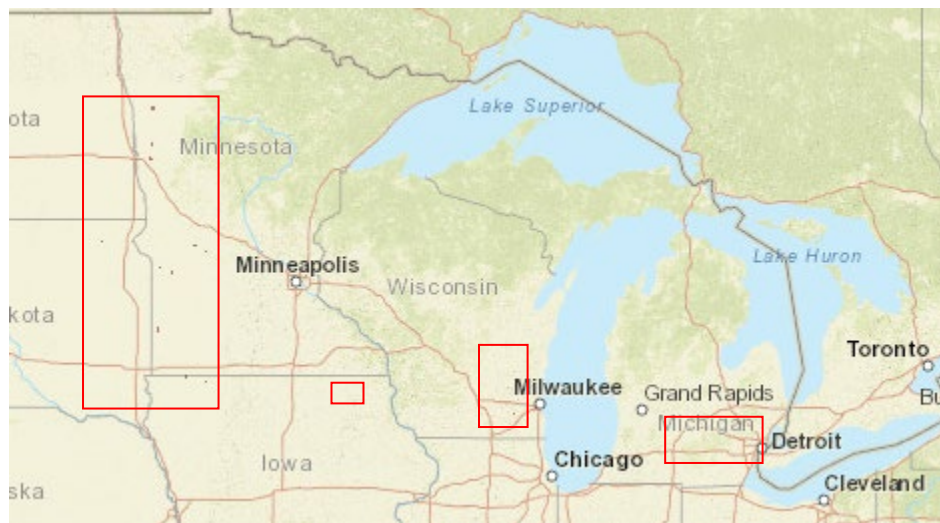


Figure 5. Location of critical habitat units. Units may not appear clearly on maps due to their small size and distribution across the landscape but are located within the red rectangles. Critical habitat map accessed on November 28, 2022, at <https://ecos.fws.gov/ecp/species/4122>.

Environmental Baseline

We expect the environmental baseline for critical habitat is the same as the environmental baseline of the species, which is written in more detail in the species Integration and Synthesis write-up (see Appendix B-1).

Physical and Biological Features

- Wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs on near-shore glacial lake soil deposits of high-quality dry-mesic remnant untilled prairie on rolling terrain consisting of gravelly glacial moraine soil deposits, containing:
 - A predominance of native grasses and native flowering forbs

- undisturbed (untilled) glacial soil types including, but not limited to, loam, sandy loam, loamy sand, gravel, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek skipperling larval survival and native prairie vegetation;
- if present, depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire;
- if present, trees or large shrub cover less than 5 percent of area in dry prairies and less than 25 percent in wet-mesic prairies and prairie fens; and
- if present, nonnative invasive plant species occurring in less than 5 percent of the area
- prairie fen habitats containing:
 - a predominance of native grasses and native flowering forbs;
 - undisturbed (untilled) glacial soil types including, but not limited to , organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek skipperling larval survival and native prairie vegetation;
 - depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire;
 - hydraulic features necessary to maintain prairie fen groundwater flow and prairie fen plant communities
 - if present, trees or large shrub cover less than 25 percent of the unit; and
 - if present, nonnative invasive plant species occurring in less than 5 percent of area
- native grasses and native flowering forbs for larval and adult food and shelter, specifically;
 - at least one of the following native grasses available to provide larval food and shelter sources during Poweshiek skipperling larval stages: prairie dropseed (*Sporobolus heterolepis*), little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), or mat muhly (*Muhlenbergia richardsonis*); and
 - at least one of the following forbs in bloom to provide nectar and water sources during the Poweshiek skipperling flight period: purple coneflower (*Echinacea angustifolia*), black-eyes Susan (*Rudbeckia hirta*), smooth ox-eye (*Heliopsis helianthoides*), stiff tickseed (*Coreopsis palmata*), palespike lobelia (*Lobelia spicata*, or shrubby cinquefoil (*Dasiphora fruticosa* spp. *floribunda*).
- Dispersal grassland habitat that is within 1 km (0.6 mi) of native high-quality remnant prairie (as defined above) that connects high quality wet-mesic to dry tallgrass prairies, moist meadows, or prairie fen habitats. Dispersal grassland habitat consists of the following physical characteristics appropriate for supporting Poweshiek skipperling dispersal: undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

Based on our evaluation of the PBF descriptions in the final critical habitat rule, we expect adverse effects to PBFs may occur through effects to habitat/physical structure (i.e., vegetative community) and food availability. The critical habitat designation does not mention specific

requirements for reproduction/recruitment resources, nor any specific metrics of habitat quality required within critical habitat, indicating that these types of effects are not relevant to our analyses.

Risk

While we anticipate most areas of critical habitat will experience exposure to Enlist herbicides, we anticipate most runoff scenarios are not likely to result in adverse effects to more than a low proportion of sensitive plant species. Additionally, native grasses, which provide habitat and food resources to larvae, are not sensitive to Enlist herbicides, indicating that, at most, only low levels of impacts to larval habitat and food resources are likely to occur. Similarly, while runoff may cause adverse growth effects to herbaceous forbs, we do not expect this will result in more than low levels of effect to flower yield, resulting in only minimal effects to adult food resource availability. Thus, we anticipate the overall risk of adverse effects to critical habitat is low. We discuss our rationale in the sections below.

Table 17. Summary of physical and biological features (PBFs), the sensitivity of each PBF to Enlist herbicides, and the risk level for each PBF.

Physical/Biological Feature Category	Relevance to species	Sensitive to Enlist AIs	Risk Level
Habitat/Physical structure	X	Yes – sensitive plant types are PBF components	Low
Food	X	Yes – sensitive plant types are PBF components	Low
Reproduction or recruitment resources	--	--	--
Habitat quality	--	--	--

Extent of overlap

While there is overlap between designated critical habitat and Enlist herbicide use sites (Table 18), we expect practices used to convert land and maintain agricultural uses (e.g., tillage, changes in ground and canopy cover, alterations to soil hydrology) would result in negative impacts to PBFs that would far outweigh the impact of occasional Enlist herbicide application. Thus, we do not expect the use of Enlist herbicides would not further degrade critical habitat occurring on-field. Therefore, we do not further analyze effects to critical habitat that overlap directly with corn, cotton, or soybean fields. As such, we only analyze effects of exposure from runoff. Up to 10.92% of the Poweshiek skipperling's critical habitat overlaps with runoff areas immediately adjacent to Enlist pesticide use sites (Table 18).

Table 18. Percent overlap between critical habitat and Enlist herbicide use sites (on-field) and runoff zones.

Crop	On-field	Runoff zone
Corn	3.73	9.58
Cotton	0	0
Soybean	4.28	10.92
Total ⁸	4.28	10.92

Magnitude of effect

We expect runoff EECs will range from 0.015-0.033 lbs AI/acre (Table 19), which may result in moderate growth effects in 12-39% of sensitive plant species (forbs) within critical habitat. This level of effect to the plant community will result in low to moderate levels of adverse effects to habitat or food resources.

Table 19. Highest estimated environmental concentrations (EECs) of Enlist pesticide AIs that are reasonably certain to occur resulting from application to corn and soybean fields and the expected percent of sensitive plant species expected to experience at least moderate growth effects from runoff exposure.

Crop	95th percentile EEC (lbs AI/acre)	Percent of plant community affected
Corn	0.015	12
Cotton	NA	NA
Soybean	0.033	39

However, while we expect runoff EECs will occasionally reach levels as high as those reported above in Table 19, these values represent high end estimates and we do not expect all areas within the runoff zone will experience such high concentrations. EPA's Tier 3 geographic distribution models show that, with the implementation of required runoff conservation measures, 95.6% of corn and 75.4% of soybean runoff scenarios are not likely to ever experience EECs that will cause adverse effects to more than a low proportion of sensitive plant species within the vegetative community that provides habitat and food resources to the Poweshiek skipperling (Table 20).

⁸ Total overlap uses either corn or soybean, whichever is higher, to avoid double counting overlap resulting from crop rotation practices.

Table 20. Results from EPA’s Tier 3 geographic distribution models, including the number of runoff scenarios modeled and the number and proportion of scenarios not expected to cause more than low effects to plants.

Crop	No. local runoff scenarios modeled	No. runoff scenarios resulting in low effects to plants	% scenarios resulting in low effects to plants
Corn	3327	3180	95.6
Cotton	NA	NA	NA
Soybean	65	49	75.4

Furthermore, even in areas that may experience higher levels of runoff EECs, we do not anticipate all exposed plant species will experience high levels of adverse effects. Monocot plants, such as the native grasses that provide habitat and food for larvae, are not sensitive to Enlist herbicide AIs and are not likely to experience more than low levels of adverse effects from runoff exposure (see the *Assumptions and Uncertainties* section of the main Opinion for more details). Additionally, while dicot plants that provide nectar for adult Poweshiek skipperling are more susceptible to adverse effects from runoff exposure, previous studies show that reproductive effects are less sensitive endpoints than growth effects (see the *Effects of the Action* section of the main Opinion for more details), indicating that while a moderate proportion of flowering forbs may experience growth effects, we do not expect this will result in more than a small reduction in flower availability. Thus, we expect only a small portion of critical habitat is likely to experience more than low levels of adverse effects to plant species. Further inspection of areas of critical habitat occurring in the action area did not indicate that any areas likely to experience runoff exposure have more unique biological value than other, non-exposed areas of critical habitat. As such, we expect more than low levels of adverse effects to habitat and food resources will occur. As such, we expect the overall risk of adverse effects to critical habitat is low.

Risk summary

Critical habitat PBFs will experience adverse effects resulting from impacts to habitat and food resources. Overlap data indicates that exposure is likely to occur in a substantial portion of critical habitat. However, while runoff EECs may occasionally be high enough to cause up to moderate levels of adverse effects to sensitive plant species (forbs) that provide habitat and food resources, spatially refined runoff exposure models indicate that the vast majority of runoff events are not likely to cause adverse effects to more than a low proportion of plant species, indicating a low magnitude of effect to habitat and food resources. Even in areas that receive higher runoff EECs, we do not expect exposure will likely result in more than low levels of adverse effects to habitat and food resources as native grasses that support larvae are not sensitive to Enlist herbicides and any growth effects to herbaceous forbs are not likely to reduce the availability of flowers for adults to feed on. Further inspection of areas of critical habitat

occurring in the action area did not indicate that any areas of unique conservation value to the species are likely to experience runoff exposure. Thus, we expect that only minimal impacts to plants needed to support the habitat and food resources are likely to occur. Therefore, we consider the overall risk of adverse effects to the critical habitat to be low.

Conclusion for critical habitat

Given that other agricultural activities will likely have a much greater negative impact to critical habitat PBFs than the occasional use of Enlist herbicides, we do not expect on-field exposure to Enlist One and Enlist Duo will further measurably affect PBFs in areas of critical habitat that occur on-field. While we expect a substantial portion of critical habitat will experience exposure, we anticipate only minimal adverse effects to the habitat and food resources are likely to occur. Spatially refined runoff model results indicate that most areas that receive runoff exposure will not experience more than low levels of reduction to habitat and food resources. Additionally, we do not expect native grasses that provide habitat and food to Poweshiek skipperling larvae are sensitive to Enlist herbicides, indicating that even areas that receive higher levels of runoff EECs are not likely to reduce larval habitat and food resources. Similarly, only a very small portion of critical habitat will experience growth effects from runoff exposure, and we do not expect this level of exposure will affect flowering or the availability of nectar for adults. Thus, we do not expect exposed areas will experience more than low levels of adverse effects to habitat and food resources.

In summary, we do not anticipate that the use of Enlist One and Enlist Duo will alter critical habitat to an extent that it will appreciably diminish the value of the critical habitat as a whole for the conservation of the species. Thus, it is the Service's biological opinion that the Action, as proposed, is not likely to destroy or adversely modify Poweshiek skipperling designated critical habitat.

References

U.S. Fish and Wildlife Service (USFWS). 2015. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Dakota Skipper and Poweshiek Skipperling. 80;190. 59248-59384