Integration and Synthesis Summary for Birds

This Integration and Synthesis Summary includes our jeopardy analysis for bird species that we or EPA determined would "likely be adversely affected" by the proposed action. Our jeopardy analysis of the proposed action's impacts to listed species is split into three major factors: vulnerability, exposure, and toxicity. The tables below contain summaries of vulnerability, exposure, and toxicity. Data and information used for each species include environmental baselines, cumulative effects, exposure information, and expected toxic effects for all species, and a template worksheet to show how species were assessed are in Appendix E. Status of the Species for each species can be found in Appendix B.

Most of these species have low exposure to simazine due to the factors described in the tables or individual rationales below, in combination with reductions in simazine spray drift and runoff resulting from implementation of conservation measures added to the product label (including those developed during this consultation through the Herbicide Strategy [1]; see Conservation Measures section below).

Vulnerability

For the bird species that we or EPA determined are "likely to be adversely affected" by the proposed action, we considered several factors for each listed bird to determine the current vulnerability of that species to additional stressors. This effort allows us to consider whether a species' current condition is stable, moving toward recovery, or moving toward further decline. In general, we expect the species' vulnerability to additional stressors to be higher if they are near extinction, far from recovery, or moving toward further decline than if their condition is stable or improving. We also identify which species are most (and least) susceptible to additional stressors in general based on information from species listing and recovery documents, or other sources as cited and considered in the Status of the Species and Critical Habitat section of this Opinion (Appendix B).

Our assessment of vulnerability focuses on six factors (as currently understood and available): (1) the species listing status and recent 5-year status review recommendation (if available), (2) distribution, (3) number of populations [2], (4) species population trends, (5) if pesticides have been noted as a threat, , and (6) current and projected future impacts from activities associated with environmental baseline and cumulative effects. We obtained the information to create the vulnerability summary from the Status of the Species accounts (Appendix B), overarching Environmental Baseline section of this Opinion, five-year species status reviews, species

[1] https://www.regulations.gov/docket/EPA-HQ-OPP-2023-0365

[2] The number will vary in value and importance by species and in some cases is unknown. In general, species with a greater number of populations have greater representation, will be more resilient, and when distributed geographically, will have greater redundancy. Conversely, species with fewer populations, in general, have less representation, are less resilient, and have less redundancy.

recovery plans, species status assessments, range and critical habitat information from our ECOS [3] repository, and other sources containing the best available scientific information for the species.

We scored each of the six vulnerability components with high, medium, or low scores. We assigned a high vulnerability ranking to a species if all vulnerability components were scored as high, a mixture of medium and high, or if a threatened species was recommended for uplisting to endangered status in the most recent 5-year status review or proposed rule. We assigned a medium vulnerability ranking if a species' scores were all medium, a mix of high, medium, and low, or a mix of high and low (unless the species has been recommended for uplisting or delisting). We assigned a low vulnerability ranking to species with only low scores, a mixture of low and medium scores, or if the species was recommended for delisting. Considerations regarding specific aspects of the species' vulnerability or beyond what was included in the vulnerability ranking were applicable in our jeopardy analyses for some species depending on unique aspects of their vulnerability factors, recovery needs, or life history. This information is reflected in the rationales for conclusion below.

Exposure

We anticipate that the main route of exposure for birds is dietary, through consumption of contaminated food items either as the result of exposure to pesticide applications on-field or through off-field transport via spray drift or runoff. Simazine is moderately mobile in water and is relatively persistent in the environment relative to other pesticides, indicating that off-site transport, particularly through runoff, may result in exposure to listed species in areas far from use sites.

Exposure to Agricultural Uses

Simazine has several registered agricultural uses (see Appendix 1-4 of EPA's Biological Evaluation). We characterize the expected level of exposure using overlaps between the species' ranges and agricultural land uses where simazine is registered for use (i.e., overlap data; including a 305-m off-site transport area adjacent to use sites), past simazine usage data (when available; the amount and location where simazine has been used in the past), any species-specific considerations such as life history information (e.g., habitat preferences, dietary needs, dispersal behavior)), and existing protections or conservation actions (e.g., existing label measures, conservation measures from the action agency). Species with greater than 10% overlap between their range and simazine use sites are assigned a high overlap score, species with 5-10% overlap are assigned a medium overlap score, and species with less than 5% total overlap are assigned a low overlap score. In addition to range overlaps, we considered past usage data within a species' range to determine how much of a species' range we expect to be treated with simazine each year of the proposed action. Except where otherwise noted, usage data is provided

[3] https://ecos.fws.gov/ecp/

by EPA applying data from their National and State Summary Use and Usage Matrix, as described in the Usage Analysis section of this Opinion. Species with usage data that indicate a large portion of their range (>10%) is treated with simazine each year are assigned a high usage score. Species that have a medium portion of their range (5-10%) treated with simazine each year are assigned a medium usage score, and species where data indicate a low portion of their range (<5%) is treated with simazine each year are assigned a low usage score.

We determine the overall exposure ranking by qualitatively considering both the total overlap and total usage, as well as any additional exposure considerations that might modify the level of exposure likely to occur. When overlap and usage scores are the same, we assign the overall exposure ranking the same score (e.g., if both overlap and usage is high, the overall exposure ranking is high). In cases where overlap is high and usage is medium or when overlap is medium and usage is low, we use the overlap score as the overall exposure ranking to maintain conservative exposure assumptions. As usage is a subset of overlap, the overlap score will always be greater than the usage score. In cases where overlap is high, but usage is low, we anticipate a moderate portion of the range may be treated over the duration of the proposed action even if only a small portion of the range is treated in any given year (particularly if the areas treated occur in different locations each year), leading to an overall exposure ranking of medium. For species where there are additional exposure considerations, we adjust the overall exposure ranking to reflect this additional information, as appropriate.

Agricultural uses of simazine include labeled uses for corn, vegetables and ground fruit, other crops, citrus, grapes, Christmas trees, and other orchards only within the coterminous United States.

Exposure to Non-Agricultural Uses

Simazine has several registered non-agricultural uses, including nurseries (only ornamental conifers, deciduous trees and woody ornamental species), ornamental ponds (1,000 gallons or less), lawns, golf courses and other turf. In many cases, data provided by EPA indicate low to high levels of overlap between species' ranges and non-agricultural UDLs. Overall, nurseries (including ornamental plant uses) represent a very small footprint across the action area; across all species in this consultation, the Nurseries UDL overlaps between 0%-0.2% of species' ranges and 0%-5.6% of species' ranges plus a 305-m buffer. For species known to occur near nurseries, we assess nurseries specifically in our assessment. UDLs for non-agricultural uses sites that represent turf tend to be less defined than those for agricultural UDLs and are less likely to accurately represent the actual footprint of these use sites on the landscape. As such, we assess exposure of species to all non-agricultural uses of simazine in a qualitative manner, considering the life history of species, methods of application, simazine usage, and any existing conservation measures to reduce drift and runoff or otherwise limit exposure to species. To facilitate this analysis, for every species in this Appendix, we reviewed species' documents (e.g., Status of the Species (Appendix B), 5-year reviews, Species Status Assessments, recovery plans, listing rules) to determine if the species could occur on or near non-agricultural simazine use sites (i.e., residential areas where lawns are likely present, golf courses, and nurseries) and the manner in which they may rely on these sites.

Depending on region, cool-season, warm-season, or a combination of turf grass species are managed on golf courses and lawns. Cool-season grasses grow best in cooler conditions, and warm-season grasses thrive in hot, dry weather (USDA, 2004); there is a transition zone across the U.S. where either category of turf grasses may be planted based on microclimate conditions. Exposure to triazines will kill cool-season grasses, but warm-season grasses can tolerate exposure to simazine. As such, EPA estimated where in the U.S. only cool-season grasses are exclusively used in turf based on the U.S. Department of Agriculture's plant hardiness zone map as simazine use is not expected in these areas (USDA, 2023). Because hardiness zones will change over time with environmental conditions, EPA created a static map based on the hardiness zones where they expect warm- and cool-season grasses are grown based on the most recent data mapped (i.e., 1991-2020). EPA determined zones 1a-6a represent cool-season grasses (i.e., white areas) and zones 6b-13b may include warm-season grasses (i.e., black areas) (**Figure *1***). We expect the cool- and warm-season grass assessment to apply to all turf, including residential, commercial, and golf course turf. We refer to EPA's cool-season map in species assessments where relevant, particularly if a species occurs exclusively in the cool-season zone where we expect simazine will not be used on turf and no exposure will occur from this use.

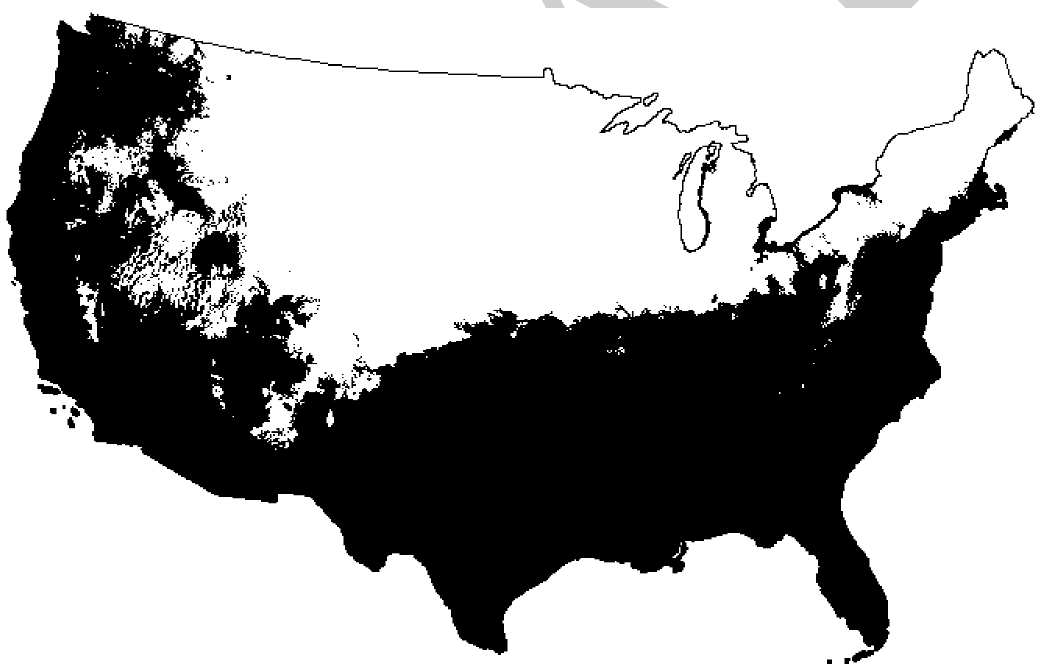

Figure 1. Map showing where cool-season grasses (white areas) and warm-season grasses (black areas) are used on turf across the continental U.S.

Particularly for residential and commercial turf uses, qualitative usage information obtained by EPA from the National Association of Landscape Professionals (NALP) indicate that simazine is no longer commonly used on residential or commercial turf as potential consequences to turf areas related to timing of application has led to preferential use of other herbicides that can be applied more broadly. If simazine were used on residential or commercial turf, it would be applied during the fall and spring as a pre-emergent. In addition, commercial and residential applicators typically apply herbicides with hand-held equipment that release course droplets, limiting the potential for spray drift.

Particularly for golf course turf uses, we obtained qualitative usage information directly from the Golf Course Superintendents Association of America (GCSAA) and an academic turf scientist that indicate that simazine is used to control winter annual broadleaf and annual bluegrass weeds on golf courses. They are applied as a pre-emergent in early fall and early winter to fairways and roughs, which make up approximately 30% of a golf course's acreage. Triazines are not applied to tee boxes or greens, which make up an additional 6% of golf course acreage. Most applications are made at rates lower than what is on the label (i.e., 1-1.5 lbs a.i./acre). These applications are made only once or twice a year, 45-60 days apart. In general, golf courses typically apply herbicides using dedicated ground equipment with a low boom height (as per the label), and golf course superintendents make use of several tools to monitor soil moisture before any applications are made to help ensure turf and soil conditions do not lead to off-target movement of herbicides. In addition, riparian buffer zones are often used on golf courses between all water features to reduce off target movement (Golf Course Superintendents Association of America [GCSAA], pers. comm., 2025). The no-till methodology and continuous cover of a turf grass area inherent in managing golf course turf are equivalent to additional runoff mitigations (i.e., equivalent to six points on EPA's mitigation menu), and we considered them in our assessment.

For most species in this Appendix, we anticipate that non-agricultural uses will not meaningfully add to the overall level of anticipated exposure considered in our analysis of agricultural uses. Due to runoff and spray drift considerations described above, off-site exposure is not expected to result in effects to most species in this Appendix. In addition, we expect most listed species' habitat requirements precludes them from occupying non-agricultural use sites where simazine may be used. For species whose habitat is known or presumed to occur in non-agricultural use sites of simazine, we consider, individually and qualitatively, the extent and manner of non-agricultural simazine usage within the species' range to generally determine whether a small, moderate, or large number of individuals are likely to be exposed and the expected level of adverse effects from non-agricultural exposure of simazine.

References:

GCSAA (Golf Course Superintendents Association of America). 2025. Personal communication with USFWS HQ staff.

USDA. 2004. Comparing warm-season and cool-season grasses for erosion control, water quality, and wildlife habitat. Natural Resources Conservation Service, U.S. Department of Agriculture. 5 pp.

USDA. 2023. Plant Hardiness Zone Map. Agricultural Research Service, U.S. Department of Agriculture. Accessed from https://planthardiness.ars.usda.gov/ on August 20, 2025.

Toxicity

We characterize the expected toxic effect to species based on the anticipated level of direct and indirect[4] adverse effects to individuals. Our analysis of toxicity assumes individuals are exposed to simazine at levels estimated by EPA's environmental exposure modeling and is focused on determining the level of adverse effect expected to occur once exposure has taken place. Direct effects are based on the anticipated level of mortality and sublethal effects (e.g., reduced growth, reproduction, impaired motor activity or behavior) likely to occur in exposed individuals. Indirect effects are based on the impact a listed species is likely to experience when the organisms they rely on, such as those that act as food or habitat resources, are exposed to simazine and experience adverse effects.

We consider estimated concentrations of simazine on the landscape or within the environment and effects reported in available toxicity studies to determine the level of direct and indirect adverse effects to listed species or critical habitat. Concentrations of simazine on food items can vary greatly depending on the particular item and where exposure takes place. For instance, exposures on or near use sites are at higher levels than exposures that occur in areas far away from use sites. We anticipate birds that primarily forage on simazine use sites will accumulate higher levels of simazine than individuals that forage solely in off-site areas or those that forage between on- and off-site areas. Based on available toxicity data in birds, we anticipate individuals exposed directly on use sites will not die but may experience sublethal adverse effects to growth or reproduction, but only at high exposure concentrations. For instance, a study using bobwhite quail observed a statistically significant reduction in in number of eggs laid (up to 20% reduction), viable 3-week embryos (33% reduction), hatchling survival (33% reduction), and 14-day old chick survival (32% reduction) when parents were exposed at 500 mg simazine/kg-diet. While this and other reproductive studies are based on chronic exposures up to 20 weeks, it is often difficult to tease out which aspect of the reproductive process was compromised and the length of exposure required to elicit the effect, as explained in more detail in our Biological Opinion (General Effects to Terrestrial Species). As such, we assess the risk of reproductive effects using EECs associated with acute exposure but consider the uncertainty associated with that analysis in our weight of evidence for each species. In contrast, we do not anticipate individuals that are only exposed off-site (i.e., in areas only exposed to simazine

[4] While our Opinion considers all consequences of the proposed action (per the definition of effects of the action at 50 CFR Part 402.02), the terms "direct" and "indirect" effects were used in EPA's BE, and are used in environmental risk assessment terminology in general, and do not have the same meaning as used in ESA regulations. As used in the effects analysis section, direct effects to species are those caused by the pesticide itself through dietary, dermal, or inhalation routes of exposure. Indirect effects occur when the pesticide acts on elements of the ecosystem that are required by the species, such as alterations to prey or shelter. Thus, in the effects analysis section, we may sometimes continue to use these terms to link back to the analysis in EPA's BE.

through spray drift of runoff) will accumulate levels of simazine that would result in any direct adverse effects.

We anticipate species that only rely on plant-based resources, such as seeds or leaves for food or vegetation as habitat, are likely to experience indirect adverse effects from simazine exposure. In contrast, species that rely on animal prey for food resources will experience lower levels of indirect adverse effects (if any) as we expect simazine exposure will result in sublethal adverse effects (i.e., reduced growth and reproduction) to some animal prey species at high exposure concentrations, but will not likely impact the abundance and availability of animal prey. Animal prey, particularly mammalian prey species, will experience sublethal adverse effects if they only forage directly in simazine use sites, but we do not anticipate this sublethal effect to prey species will result in significant changes to the overall availability of prey for listed bird species to forage on. Thus, we anticipate listed bird species that can rely on animal prey instead of or in addition to plant food resources are less likely to experience indirect adverse effects from simazine use.

Similarly, while many listed bird species require vegetative structures or plant communities as components of their habitat, we do not anticipate simazine exposure will result in complete mortality of the entire plant community. While we anticipate impacts to growth and survival of sensitive plant species, given that most listed birds can rely on a wide variety of species for food or shelter, we expect there will still be sufficient vegetative food resources or complex vegetative structures that provide habitat for individuals with simazine exposure as these general plant resources are likely more robust to changes in plant composition and can endure impacts to sensitive plant species.

We determine the overall toxicity ranking for birds by qualitatively assessing both the expected levels of direct adverse effects (e.g., sublethal effects to growth and reproduction) and indirect adverse effects (e.g., prey and vegetation loss).

Experimental populations, non-essential

We considered the following experimental, non-essential populations for bird species in this section of the consultation: Northern aplomado falcon (Entity ID 9122) and whooping crane (Entity IDs 4679, 7342, 10124). We do not provide separate analyses and jeopardy determinations for these populations. Rather, we treat all populations of the species (including populations designated as experimental) as a single listed entity when making jeopardy determinations or for other analyses in a section 7 consultation. An "essential experimental population" is a reintroduced population whose loss would be likely to appreciably reduce the likelihood of the survival of the species in the wild. However, there are no “essential experimental populations” in this consultation. A "nonessential experimental population" is a reintroduced population whose loss would not be likely to appreciably reduce the likelihood of survival of the species in the wild. By definition, a "nonessential experimental population" is not essential to the continued existence of the species. Therefore, no proposed action impacting a population so designated could lead to a jeopardy determination for the entire species. In cases where our assessment of the listed entity (i.e., the non-experimental population(s) of the species) leads to a "not likely to jeopardize" determination, we generally assume any added effects to the nonessential experimental population will not change these determinations. However, we consider the role of the experimental population in the survival and recovery of the species and consider this information in our jeopardy analyses as appropriate.

Conservation Measures

Herbicide Strategy Conservation Measures

As part of the simazine ESA consultation with the Service, EPA is implementing the final Herbicide Strategy to inform and identify any necessary conservation measures where EPA's analysis indicated there was a risk of population level effects to listed species. The measures identified by EPA, and committed to by the technical registrants, include a standard 15-foot spray drift buffer and a minimum of three runoff mitigation points [5] necessary in all areas where simazine is used, as well as additional runoff mitigation points for certain simazine uses limited to specific geographic areas when required to protect specific listed species.

The spray drift buffer will be placed on the general label and will apply to all uses of simazine. EPA's Herbicide Strategy provides applicators with options to reduce the distance of this buffer by using other spray drift reduction strategies that we anticipate will result in an equivalent reduction in spray drift entering non-target habitats as stated buffers. These measures and the degree to which applicators can reduce buffers by employing them are described in EPA's Herbicide Strategy and EPA's Ecological Mitigation Support Document to Support Endangered Species Strategies. These documents are provided in Appendix A-1.

This buffer is in addition to spray drift mitigations that are already on the label, including:

- Restricting use to a maximum windspeed of 10 miles per hour,
- Prohibiting applications during temperature inversions,
- Applying with a release height of no more than 4 feet above the ground or crop canopy for ground applications,
- Selecting nozzles and pressures that deliver coarse or coarser droplets for all applications,
- and ground application only

Based on EPA's analyses, the required spray drift conservation measures described above (from the current label and implemented through the Herbicide Strategy) will reduce spray drift from entering species' habitats by >95%. The Service anticipates that this reduction will minimize off-

[5] Ecological Mitigation Support Document to Support Endangered Species Strategies

site transport of simazine from spray drift to a level where no more than low levels of effects are likely to occur to birds that rely on plant species through this exposure route.

Additionally, all agricultural labels will include a requirement for applicators to achieve 3 points of runoff mitigation, as described in the Herbicide Strategy, for all agricultural uses. EPA's Herbicide Strategy provides applicators with various options to reduce runoff and erosion and assigns points to each option based on its effectiveness. Applicators must implement sufficient mitigation points to meet the label requirement. Applicators can achieve the required points using the mitigation measures identified on EPA's Mitigation Menu website[6]. The menu provides a suite of options, including relief points for certain field characteristics and likelihood for pesticide transport.

These runoff mitigation points are in addition to runoff mitigations that are already on the label, including:

- Product must not be mixed or loaded within 50 feet of intermittent streams and rivers, natural or impounded lakes and reservoirs.
- Product must not be applied within 66 feet of points where agricultural field (nurseries, Christmas tree plantings, and turf grasses for sod farms) surface water runoff enters perennial or intermittent streams and rivers or within 200 feet of natural or impounded lakes and reservoirs. If this product is applied to highly erodible land, the 66-foot buffer or setback from runoff entry points must be planted to crop or seeded with grass or other suitable crop.
- Do not apply within 66 feet of standpipes in tile-outletted terraced fields.
- Apply this product to the entire tile-outletted terraced field under a no-till practice only when a high crop residue management practice is practiced. High crop residue management is described as a crop management practice where little or no crop residue is removed from the field during and after crop harvest.

We expect implementation of the runoff and erosion reduction measures as required, to minimize off-site transport of simazine to habitats of listed species. EPA's analyses indicated that the general label requirement of 3 runoff mitigation points will reduce estimated environmental concentrations of simazine in runoff by up to an order of magnitude (i.e., up to 90% reduction, in other words reduce pesticide loading to one-tenth of pre-runoff mitigation levels).

In cases where EPA has identified additional runoff measures are needed, additional points (up to three, i.e., up to 99% reduction) will be required. EPA will communicate where additional runoff mitigation points are needed and for what specific simazine uses through their Bulletins Live! Two online platform, which all applicators are required to check before making pesticide applications. In areas requiring up to six runoff mitigation points total, EPA expects estimated

[6] Mitigation Menu website: https://www.epa.gov/pesticides/mitigation-menu

environmental concentrations of simazine will decrease by up to two orders of magnitude (i.e., reduce pesticide loading to one-one hundredth of pre runoff mitigation levels).

For all the species in this document, we expect that the runoff and mitigation measures will reduce exposure concentrations to within one order of magnitude of the exposure level where 95% of plant species are not likely to experience measurable adverse effects, as well as reduce exposure concentrations to levels at which we do not expect direct adverse effects to birds exposed from off-site transport.

Summary of Conclusions for Bird Species

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the registration of simazine, as proposed, is not likely to jeopardize the continued existence of 17 of the 18 bird species in this Appendix. For the remaining one bird in this appendix, we plan to continue coordination with EPA and the technical registrants to further assess this species.

In our analysis below, some species that had the same or very similar rationales for their conclusions were grouped together, to increase efficiency and avoid repetition. Relevant information and data unique to each individual species was considered when assigning species to groups and incorporated into the rationales as appropriate. Species-specific information (e.g., environmental baseline, cumulative effects, status of the species, exposure, and toxicity) was considered for all species, including those species in the grouped analyses, and are presented in full in Appendices B and E. Species with rationales that did not fit in a group, or warranted a separate rationale because of their life history, conservation status, or other information indicating that effects could be different, have an individual discussion to provide additional explanation. This approach allowed us to streamline our discussion in this Opinion by avoiding repeating our findings when species in the respective groupings would be expected to be affected similarly. The use of these groupings, therefore, does not mean that our evaluation failed to evaluate each individual species. On the contrary, our process and analysis for each species remained the same, regardless of the format of the discussion presented below.

Species with low exposure informed by low past usage from the California Department of Pesticide Regulation's Pesticide Use Reporting data

The species in occurs completely within California and very little of its range has been treated with simazine in the past according to California Department of Pesticide Regulation's Pesticide Use Reporting data (CalPUR). Our concern for adverse effects is low. While we present some specific information about the species below, we provide additional information on vulnerability (including environmental baseline and cumulative effects), exposure, and toxicity in Appendix E. The status of the species account can be found in Appendix B.

Table 1. Species with low exposure informed by low past simazine usage from the California Department of Pesticide Regulation's Pesticide Use Reporting data and low likelihood of non-agricultural exposure.

Common Name	Scientific Name	Vulnerability Ranking	Agricultural Exposure Ranking	Toxicity Ranking	% Range Treated (CalPUR)	Determination
Least Bell's vireo	*Vireo bellii pusillus*	High	Low	Medium	0.1	No Jeopardy

In our review of the current status of the species and the environmental baseline and cumulative effects for the action area, we determined that the vulnerability ranking of the least Bell's vireo is high. The species may use some agricultural areas (i.e., orchards or vineyards) that occur near the species' riparian habitat and has a medium toxicity ranking because sublethal effects and/or loss of prey items are likely when exposure occurs. We anticipate adverse effects are most likely to occur for individuals that primarily forage on prey items that have recently been exposed to simazine applications at some of the highest application rates on use sites. We expect this is unlikely to occur because individuals of this species are unlikely to exclusively encounter and consume prey species that have been recently exposed to simazine on-field because simazine use sites do not represent preferred foraging habitat and agriculture makes up a small portion of the species' range. EPA's exposure modeling indicates that foraging off treated sites or consuming prey that have only been exposed through spray drift or runoff is not likely to result in direct mortality of these species, but sublethal effects are anticipated for some exposed individuals. Sublethal effects, and reductions in prey abundance, can lead to mortality, reduced growth, and reduced fitness. However, we expect the Least bell's vireo to have limited exposure to simazine due to low past simazine usage in the species' range.

Least Bell's vireo occurs entirely in the state of California. Mandatory pesticide usage reporting data collected by the state of California indicates very little simazine was used in agricultural areas where the least Bell's vireo occurs between 2013-2022, with 0.1% of the range treated for simazine. Most of the least Bell's vireo population occurs in southern California, with 54% of the total population occurring in San Diego County and 30% occurring in Riverside County. Similar usage was reported in these counties, with just 0.2% of the ranged treated with simazine.

Given that this usage data is mandated by the state of California and that this data is reported with relatively high spatial resolution, we have high confidence that the likelihood of exposure to simazine associated with agricultural uses as a result of the proposed action is low.

In addition to agricultural uses, the least Bell's vireo and their prey may be exposed to simazine from non-agricultural uses on lawns and turf. CalPUR data include all agricultural usage and certain non-agricultural uses, such as those performed by professional commercial applicators. While these data do not capture residential applications by private consumers, we expect limited exposure from lawn or turf uses because overall simazine usage in California is low, existing conservation measures on the label limit spray drift, and best practices for lawn and turf applications further limit off-site exposure. We anticipate localized exposure, especially where riparian habitat occurs near lawns or turf during feeding, breeding, and migration. While some individuals in these areas may be exposed to simazine, we have high confidence that only a small percent of the species' range is likely to be exposed to agricultural and most non-agricultural uses of simazine.

Therefore, we expect a very small number of individuals will experience sublethal effects that lead to reductions in fitness, growth, or reproductive capacity from agricultural exposure to simazine because of very low past usage of simazine in the species' range. Similarly, we do not expect reductions in prey availability from this low level of exposure. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined that the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the least Bell's vireo.

Species with low agricultural exposure informed by low past usage of all herbicides from the USDA's Census of Agriculture and low likelihood of non-agricultural exposure

We anticipate that the Mississippi sandhill crane The species in Table 2 were grouped because very little of their ranges have been treated with herbicides in the past according to data from USDA's Census of Agriculture. Our concern for adverse effects is low. While we present some specific information about the species below, we provide additional information on vulnerability (including environmental baseline and cumulative effects), exposure, and toxicity in Appendix E. The status of the species accounts can be found in Appendix B.

Table 2. Species with low agricultural exposure informed by low past usage of all herbicides from the USDA's Census of Agriculture (CoA) and low likelihood of non-agricultural exposure.

Common Name	Scientific Name	Vulnerability Ranking	Agricultural Exposure Ranking	Toxicity Ranking	% Range Treated (CoA)	Determination
Mississippi sandhill crane	*Antigone canadensis pulla*	High	Low	Medium	4.2	No Jeopardy

In our review of the current status of the species and the environmental baseline and cumulative effects for the action area, we determined that the vulnerability ranking of the Mississippi sandhill crane is high. The Mississippi sandhill crane has a medium toxicity ranking because sublethal effects and/or loss of prey items are likely when exposure occurs. We anticipate adverse effects are most likely for individuals that primarily forage on items that have been recently exposed to simazine applications at some of the highest application rates on use sites. EPA's exposure modeling indicates that foraging off treated sites or consuming prey that have only been exposed through spray drift or runoff is not likely to result in direct adverse effects to these species or reduction in prey abundance, but individual loss of prey items may occur.

Mississippi sandhill cranes primarily occur in wet pine savannas on Mississippi Sandhill Crane National Wildlife Refuge, where we do not expect simazine to be used based on past usage data for the refuge. However, they forage on nearby agricultural fields in autumn, winter, and early spring (USFWS, 2019). Specifically, cranes are known to forage on planted corn kernels in the spring (USDA, 2017); estimated environmental concentrations for seeds are below all thresholds from which we expect any adverse effects to birds. In addition, we expect limited exposure to Mississippi sandhill cranes from agricultural uses of simazine because past herbicide usage in the counties where the species' range occurs is low (up to 4.2% of the range treated) according to CoA data. Given that CoA reporting broadly includes all herbicides, we consider CoA data to be a conservative estimate of simazine usage. Therefore, we expect very little of the species' range is likely to be treated with simazine and individual Mississippi sandhill cranes are unlikely to experience adverse effects associated with agricultural exposure.

In addition to agricultural uses, the Mississippi sandhill crane may occasionally forage on developed areas. While some individuals may be exposed to simazine through non-agricultural uses, we have high confidence that this foraging behavior will be rare because a nearby golf course and residential areas are not considered suitable habitat for the species (USFWS, 2019).

Therefore, we do not expect Mississippi sandhill cranes will experience adverse effects from simazine exposure. We also do not expect reductions in forage availability from this low level of exposure. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined that the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Mississippi sandhill crane.

References:

U.S. Department of Agriculture. 2017. Sandhill and Whooping Cranes. Wildlife Damage Management Technical Series. 16 pp. Accessed at ://www.aphis.usda.gov/sites/default/files/Cranes-WDM-Technical-Series.pdf.

U.S. Fish and Wildlife Service. 2019. Mississippi Sandhill Crane (*Grus canadensis pulla*) 5-Year Review: Summary and Evaluation. Jackson, Mississippi. 46 pp.

Species with low agricultural exposure achieved through spray drift and runoff conservation measures and low likelihood of non-agricultural exposure

For the species in Table 3, we expect they will have low exposure after incorporating general label measures (e.g., measures already on the label, including three runoff points and a ground and aerial buffers determined through implementation of the Herbicide Strategy, and rate reductions and other restrictions to particular registered uses). Therefore, our concern for adverse effects is low. While we present some specific information about the species below, we provide additional information on vulnerability (including environmental baseline and cumulative effects), exposure, and toxicity in Appendix E. The status of the species accounts can be found in Appendix B.

Table 3. Bird species with low agricultural exposure achieved through spray drift and runoff conservation measures and low likelihood of non-agricultural exposure.

Common Name	Scientific Name	Vulnerability Ranking	Agricultural Exposure Ranking	Toxicity Ranking	Conservation Measures	Determination
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	High	Low	Low	General label measures	No Jeopardy
California least tern	*Sternula antillarum browni*	Medium	Low	Low	General label measures	No Jeopardy
Eskimo curlew	*Numenius borealis*	High	Low	Medium	General label measures	No Jeopardy
Greater sage-grouse	*Centrocercus urophasianus*	Medium	Low	Low	General label measures	No Jeopardy
Wood stork	*Mycteria americana*	Low	Low	Medium	General label measures	No Jeopardy

In our review of the current status of the species and the environmental baseline and cumulative effects for the action area, we determined that the vulnerabilities of the species in Table 3 are mostly medium or high. In 2023, we proposed the wood stork for delisting due to recovery (i.e., population increases and habitat loss mitigations) and determined its vulnerability is low (USFWS 2023).

The species in Table 3 have low or medium toxicity rankings because sublethal effects and/or loss of prey items are likely when exposure occurs. We anticipate adverse effects are most likely for individuals that primarily forage on items that have been recently exposed to simazine applications at some of the highest application rates on use sites. EPA's exposure modeling indicates that foraging off treated sites or consuming prey that have only been exposed through spray drift or runoff is not likely to result in direct adverse effects to these species or reduction in prey abundance, but individual loss of prey items may occur. Though they were known to forage on Rocky Mountain grasshoppers in agricultural fields of the central and western U.S., the Eskimo curlew has not been observed in the wild since the 1990s and the grasshopper is extinct

(USFWS, 2016). Therefore, we expect any exposure to simazine and subsequent effects for this species are, at most, very low through agricultural or non-agricultural uses of simazine.

Wood storks feed on fish and crustaceans in natural and artificial wetlands, including agricultural ditches and freshwater and saltwater wetlands on or near golf courses (USFWS 2021). However, we do not anticipate direct impacts to wood storks that consume aquatic prey on or near treated sites because simazine does not bioaccumulate from prey to predator species (i.e., we expect dietary exposures to be low for species that feed on aquatic prey). We expect indirect impacts to the wood stork from losses of some sensitive prey items (i.e., crustaceans and fish) that are exposed to simazine from runoff or drift. However, we anticipate most individuals will be able to locate alternative prey because they are known to travel 75 km or more in search of food (USFWS 2021).

For the other three species in this group, we do not anticipate they will occur on simazine use sites where exposures to individuals would be highest. The cactus ferruginous pymgy-owl occurs in shrubscrub habitats, and the California least tern is primarily coastal; neither of them is expected to occur on agricultural lands. The greater sage-grouse may forage on alfalfa fields, but alfalfa is not a labeled use for simazine. We expect the general label measures for agricultural uses (including the 15-foot spray drift buffer and three runoff mitigation points) will reduce off-field exposures by an order of magnitude (i.e., a 90% reduction), which we do not expect to cause direct adverse effects to exposed individuals and will not result in more than low levels of adverse effects to the plant communities that provide habitat and food resources to individuals (or to any animal food resources required). Therefore, due to the effectiveness of the conservation measures required under the action, we expect these species to be exposed to only low levels of simazine through off-site transport from agricultural use sites to their habitats.

In addition to agricultural exposure, the species in Table 3 may be exposed to simazine through non-agricultural uses (i.e., nurseries and turf, including lawns and golf courses). Based on individual reviews of available life history information for each of the five species in Table 3, we expect that they are unlikely to occur on or near non-agricultural use sites of simazine and therefore are unlikely to be exposed to non-agricultural uses of this herbicide.

Thus, given the implementation of the conservation measures and the expectation that any exposure will occur at levels below which we expect direct adverse effects to birds and only low levels of effects to food resources, we anticipate that adverse effects, if they occur, will be limited to a small number of individuals for these species. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of these species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the species in Table 3.

References:

U.S. Fish and Wildlife Service. 2023. Endangered and Threatened Wildlife and Plants; Removal of the Southeast U.S. Distinct Population Segment of the Wood Stork From the List of Endangered and Threatened Wildlife. Proposed Rule. Federal Register 88: 9830-9850.

U.S. Fish and Wildlife Service. 2021. Species status assessment report for the wood stork (*Mycteria americana*) U.S. breeding population Distinct Population Segment. Version 1.0. Atlanta, Georgia. 181 pp.

U.S. Fish and Wildlife Service. 2016. Eskimo Curlew (*Numenius borealis*) 5-Year Review: Summary and Evaluation. Fairbanks, Alaska. 16 pp.

Species with Individual Integration and Synthesis Summaries

The species in Table 4 have individual Integration and Synthesis summaries. We expect Herbicide Strategy conservation measures to reduce pesticide loading into aquatic habitats by 90-99% (i.e., one to two orders of magnitude) compared to unmitigated runoff and reduce spray drift from entering species' terrestrial habitats by >95%. We anticipate that this reduction will minimize off-site transport and reduce the likelihood, magnitude, and frequency of exposure of simazine to a level where no more than low levels of adverse effects are likely to occur to plants through this exposure route. While the conservation measures are expected to reduce the extent of off-field exposure and reduce exposure concentrations, we anticipate simazine residues on use sites could remain at levels high enough to cause greater than low levels of adverse direct and/or indirect effects to these species. They may occur on simazine use sites, either agricultural or non-agricultural. For each species, we provide additional information on vulnerability (including environmental baseline and cumulative effects), exposure, and toxicity in Appendix E. The status of the species accounts can be found in Appendix B.

Table 4. Species with individual Integration and Synthesis summaries

Common Name	Scientific Name	Determination
Attwater's greater prairie-chicken	*Tympanuchus cupido attwateri*	No jeopardy
Crested caracara (Audubon's) [FL DPS]	*Caracara plancus audubonii*	No jeopardy
Florida scrub-jay	*Aphelocoma coerulescens*	No jeopardy
Gunnison sage-grouse	*Centrocercus minimus*	No jeopardy
Northern aplomado falcon	*Falco femoralis septentrionalis*	No jeopardy
Piping plover (Great Lakes DPS)	*Charadrius melodus*	No jeopardy
Piping plover (Atlantic Coast and Northern Great Plains populations)	*Charadrius melodus*	No jeopardy
Red-cockaded woodpecker	*Picoides borealis*	No jeopardy
Whooping crane	*Grus americana*	No jeopardy
Yellow-billed cuckoo	*Coccyzus americanus*	No jeopardy

Integration and Synthesis Summary: Attwater's greater prairie-chicken

Scientific Name:	Common Name:	Entity ID:
Tympanuchus cupido attwateri	Attwater's greater prairie-chicken	83

Conclusion: No Jeopardy

Species Range

Based on range map dated: 3/19/2018; Wherever found; *States within the range:* TX

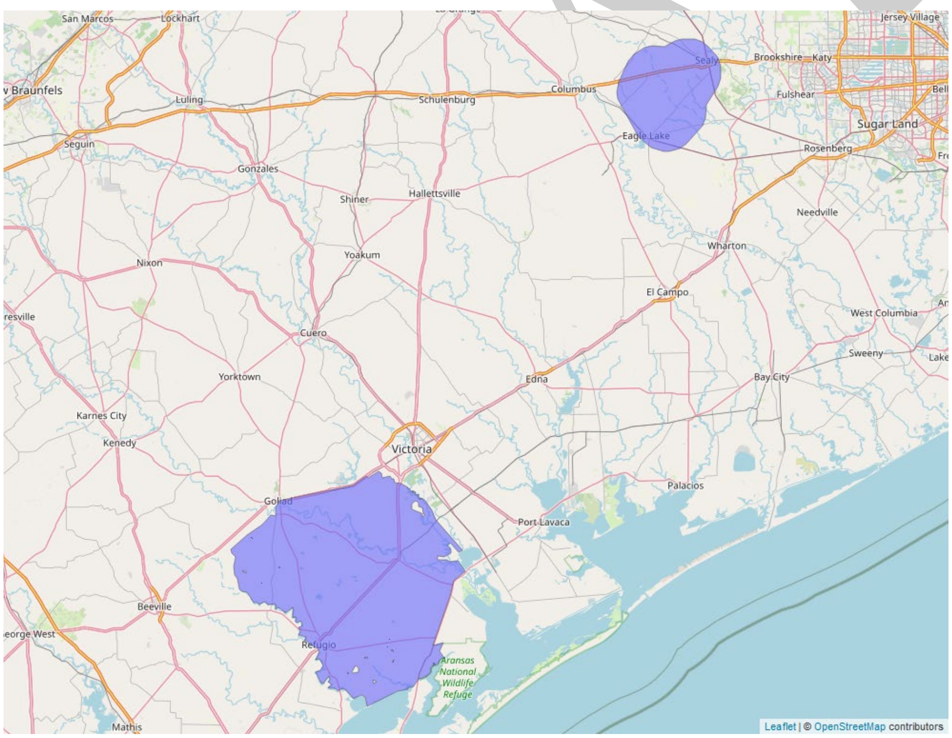

Figure 2. Range map of Attwater's greater prairie-chicken (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/7259.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Endangered

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 6/1/2021

Distribution: Small, endemic, constrained, and/or isolated population(s)

Number of populations: Multiple populations (few)

Species trends: Declining population(s) - one or more populations declining

Pesticides noted in Service documents as a threat to the species: No

Environmental Baseline/Cumulative Effects (EB/CE) Summary

The Attwater's prairie-chicken represents the southern-most subspecies of Tympanuchus cupido, and currently occurs in the wild at only two locations - the Attwater Prairie Chicken National Wildlife Refuge (Colorado County, Texas) and on private ranchlands in Goliad County, Texas. Free-ranging Attwater's prairie-chicken populations have remained on the precipice of extinction since 1996 following years of population declines. Breeding birds are maintained at four facilities: Fossil Rim Wildlife Center, Houston Zoo, Caldwell Zoo, and Sutton Avian Research Center. Continued supplementation of wild populations with releases of captive-reared stock from a breeding program established in 1992 has kept the Attwater's prairie-chicken from extinction in the wild. Over the last five years (as of 2021), breeding facilities produced an average of over 300 captive reared prairie-chickens for release back into the wild. Populations at the Attwater Prairie Chicken National Wildlife Refuge and private ranchlands in Goliad County continue to be supplemented with captive-reared birds. Captive birds have also been released at the Texas City Prairie Preserve, but none have been released since 2010 and Attwater's prairie-chickens have not been observed at this site since 2012. Periods of population growth between 2007-2011 and 2012-2016 were ended by a near-historic drought and catastrophic flooding followed by impacts of hurricane Harvey, respectively. However, while numbers remain low, populations have shown continued growth since 2017, and in 2021 reached numbers not seen since 1993. Analyses point to invertebrate abundance and fire ant treatment, along with favorable rainfall conditions, particularly in May when most chicks hatch, for recent population growth (USFWS 2021).

Primary threats to Attwater's prairie chickens are habitat loss (e.g., grassland loss from woody species encroachment and expansion of urban centers), disease (e.g., reticuloendotheliosis virus, avian pox, cryptosporidiosis in captive populations), predation, inbreeding and loss of evolutionary potential, husbandry issues, and poor brood survival. Poor survival of chicks produced by released captive-reared Attwater's prairie-chickens was found to be the single-most factor limiting significant progress toward recovery in the 2010 revision of the Attwater's Prairie-Chicken Recovery Plan (USFWS 2010). Invertebrate abundance at Attwater's prairie-chicken brood sites was directly related to brood survival during the critical first two weeks post-hatch and invasive red imported fire ants (Solenopsis invicta) reduced invertebrate abundance by 26–27%. It is likely that invasion by fire ants contributed, at least in part, to the precipitous declines of Attwater's prairie-chicken populations toward near extinction. The ubiquitous distribution and rapid colonization potential of fire ants means that annual biological control measures are necessary to maintain suppression (USFWS 2021).

Considerable grassland restoration and maintenance has been accomplished, particularly in Goliad County. The Goliad County Study Site retains the greatest extent of potential high-quality habitat to evaluate as potential future introduction sites. Despite good nest success, survival of chicks has been consistently poor across release sites. Populations remain small and threats from imported fire ants, stochastic weather events, and continued loss and fragmentation of habitat from woody species encroachment are expected to continue into the future. Until fire ants are removed and are no longer a threat in grasslands used by Attwater's prairie-chickens, we expect the species to remain in imminent danger of extinction (USFWS 2021).

Overall Vulnerability: High

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 10.4% of the species' range overlaps with agricultural use sites and 89.6% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff) (Table 5). In total, there is up to 100% overlap[7] between the species' range and the agricultural footprint of simazine use sites.

[7] Total overlap is capped at 100%.

Table 5. Agricultural use overlap and annual usage data (% Range Treated) for the Attwater's greater prairie-chicken.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	<0.1	1.2	1.2	<0.1	<0.1	<0.1
Corn	4.9	43.8	48.7	4.5	39.7	44.2
Grapes	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Other Crops	5.2	37.6	42.8	<0.1	<0.1	<0.1
Other Orchards	0.2	29.9	30.1	0.2	29.9	30.1
Vegetables and Ground Fruit	<0.1	2.1	2.1	<0.1	2.1	2.1
Christmas Trees	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total	**10.4**	**89.6**	**100[7]**	**4.7**	**71.7**	**76.5**

Usage

Past usage data indicate that up to 76.5% of the species' range has been treated with simazine annually from agricultural uses, with 4.7% occurring on agricultural fields and 71.7% resulting from off-site transport.

Additional Exposure Considerations

We expect some individuals of the Attwater's greater prairie-chicken will occur and forage on agricultural fields, and thus, are at risk of dietary exposure to simazine through ingestion of contaminated food items.

Exposure from Non-Agricultural Uses

We do not anticipate that the Attwater's greater prairie-chicken will occur in developed, open space developed, or nurseries use sites. As such, we do not expect non-agricultural uses of simazine will significantly contribute to the overall exposure of the species.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals. We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to Attwater's greater prairie-chickens. We do not expect Attwater's greater prairie-chickens that are exposed to simazine as a result of off-site transport will experience adverse effects and thus focus our analysis to use sites within the range.

Of the use sites that occur within the range of the species (i.e., Corn, Other Crops, and Other Orchards), we do not expect that Attwater's greater prairie-chicken will forage in Other Crops (for use on sod) or Other Orchards use sites, either due to their lack of proximity to these sites or because they do not contain suitable foraging habitat. We expect some individuals will forage on corn fields, and that concentrations of simazine on plants and arthropods can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we only anticipate these effects if individuals forage on plants and arthropods with maximum estimated concentrations of simazine on recently treated fields. We expect this to occur infrequently, at most, as Attwater's greater prairie-chickens are expected to consume a varied diet that will also include seeds, which are expected to result in lower dosages of simazine that are not associated with adverse effects in birds, and resources that occur off treated corn fields. However, an individual Attwater's greater prairie-chicken feeding exclusively in treated crops for even a short period of time, such as a single day, may still accumulate a significant body burden of pesticides, despite this species having a generally varied diet.

Indirect Effects

Available toxicity data suggests that arthropods are not likely to experience mortality with simazine exposure. While we anticipate off-site transport of simazine can negatively impact the growth and survival of sensitive plant species, we do not anticipate spray drift or runoff of simazine will destroy or limit the availability of grassland communities that the species requires for its habitat. Furthermore, we anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will further minimize impacts to the species' necessary plant resources. As such, we do not anticipate the proposed action will result in measurable levels of indirect adverse effects to the species.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a large percentage of the species range will be treated with simazine. However, we do not anticipate effects to individuals from simazine exposure from off-site transport, and of simazine use sites within the range, we only expect Attwater's prairie-chicken to forage in the 5% of the range overlapping with corn. We do not expect individuals will be present on-field during spray application, however, some individuals are likely to be exposed to contaminated food sources as the species is known to forage in corn fields. Of those individuals that forage on-field, we expect individuals that exclusively eat contaminated leaves and arthropods in use sites recently treated with simazine will experience reproductive effects. Due to the variable diet of the Attwater's prairie-chicken and limited scenarios that we expect to result in adverse effects (i.e., foraging exclusively on vegetation and arthropods with maximum estimated simazine residues within recently treated fields), we anticipate that few individuals will experience reproductive effects from simazine use.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance of arthropod prey that the species relies on as food resources, nor will it reduce the availability of grassland communities that Attwater's prairie-chicken use for foraging and habitat.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The Attwater's greater prairie chicken is a narrow endemic species, found in only two locations in Texas. After years of population declines due to the threats faced from habitat loss, disease, predation and invasive fire ants, the species regressed to the brink of extinction in 1996. A breeding program established in 1992 has produced captive-reared individuals that are released into the wild to supplement endemic populations, preventing them from succumbing to extinction. The success of the breeding program is tempered, however, by the high mortality rate of chicks born to captive-bred-and-released individuals. In recent years, the species has been susceptible to the impacts of an historic drought and catastrophic flooding. While wild population numbers remain low, there has been continued growth in the past decade, due mainly to an abundant invertebrate prey base, fire ant treatment programs and several seasons of favorable rainfall conditions.

The species range for the Attwater's greater prairie chicken overlaps nearly 100% with simazine agricultural use sites, although past usage data indicates that only 4.7% of annual simazine usage occurs on agricultural use sites within the species' range. We do not expect the Attwater's greater prairie chicken to experience effects from off-field (runoff or spray drift) exposure to simazine. In addition to the infrequency at which individuals would exclusively eat contaminated food sources, required product label mitigation is expected to further reduce any potential risk to the species. Therefore, both direct effects (sublethal effects like reduction in reproductive success) and indirect effects (reduction in arthropod prey and plants in prairie habitat) from on-site exposure remain low.

External pressures continue to place the Attwater's greater prairie chicken at risk of extinction. While on-field exposure (through a dietary route) to simazine poses risks of sublethal effects to reproduction for individuals that forage directly on use sites (primarily corn fields), we expect this to occur infrequently and to impact very few individuals, based on the species' variable diet which would likely preclude individuals consuming only contaminated food sources. We do not anticipate direct mortality will occur to individuals that forage in any exposed areas. We also do not anticipate losses of arthropod prey will occur on use sites or in off-site areas, and we do not expect impacts to plants will affect food availability due to the variable diet of this species that includes plant-based (including seeds) and arthropod foods. We anticipate no more than a very small number of individuals that at times forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Attwater's greater prairie chicken.

References

U.S. Fish and Wildlife Service. 2021. Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*) 5-year review: Summary and Evaluation. Houston, Texas. 20 pp.

U.S. Fish and Wildlife Service. 2010. Attwater's Prairie-Chicken Recovery Plan, Second Revision. Albuquerque, New Mexico. 117 pp.

Integration and Synthesis Summary: Crested caracara (Audubon's) [FL DPS]

Scientific Name:	Common Name:	Entity ID:
Caracara plancus audubonii	Crested caracara (Audubon's) [FL DPS]	125

Conclusion: No Jeopardy

Species Range

Based on range map dated: 4/26/2022; U.S.A. (FL); *States within the range:* FL

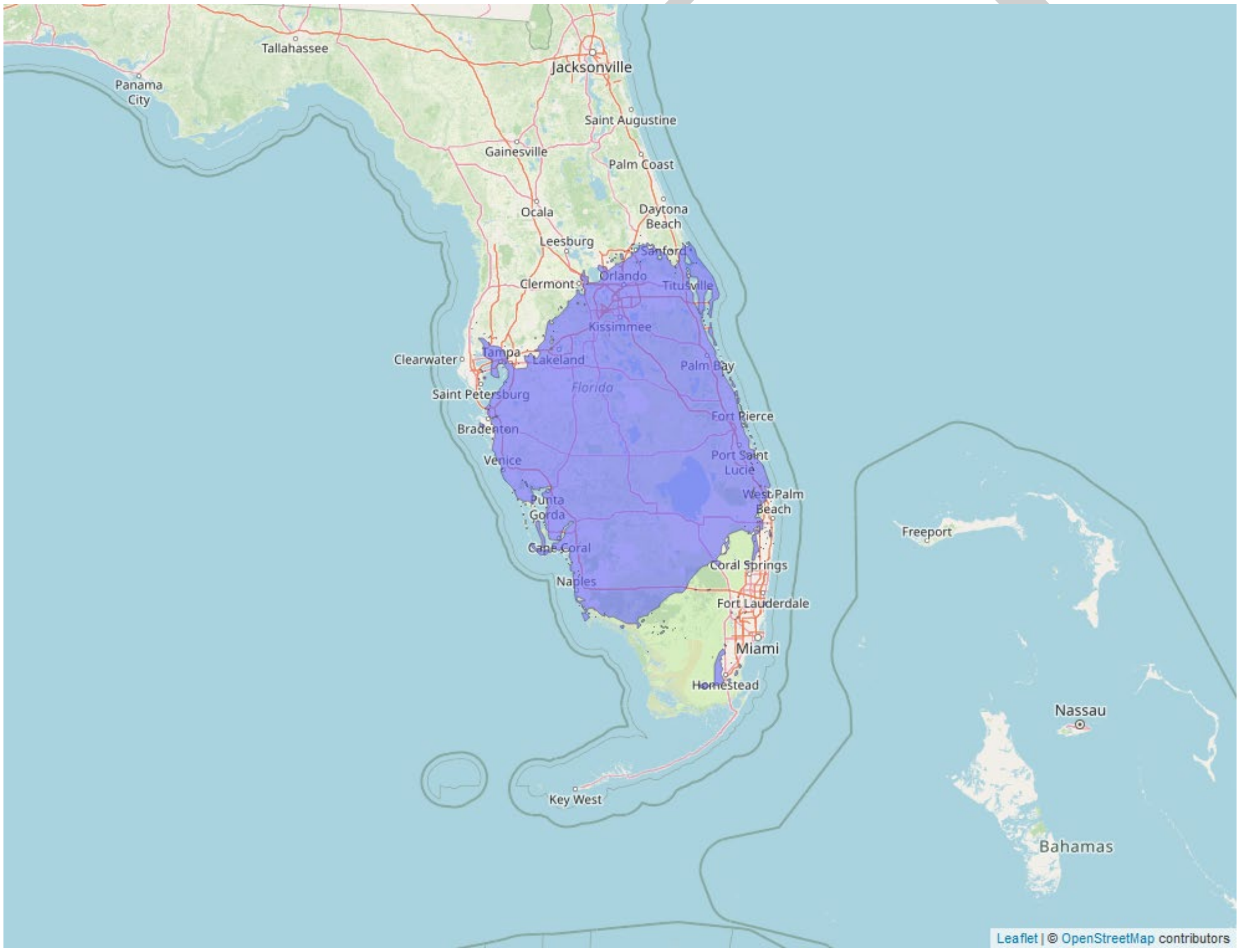

Figure 3. Range map of crested caracara (Audubon's) [FL DPS] (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/8250.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Threatened

Most recent 5-Year Review recommendation: Delist: The species does not meet the definition of an endangered species or a threatened species

Most recently completed 5-Year Review: 4/30/2025

Distribution: Species/Populations neither constrained nor widespread

Number of populations: Single population

Species trends: Increasing population(s)

Pesticides noted in Service documents as a threat to the species: No

Environmental Baseline/Cumulative Effects (EB/CE) Summary

The Florida Distinct Population Segment (DPS) of the Audubon's crested caracara (*Caracara plancus audubonii*) was listed in 1987. Since that time, the population has increased and expanded its range, effectively using human-made analogues of its natural and historical habitats. Caracara have expanded their range from a core of five counties of documented nesting in 1987 to 22 counties of documented nesting in 2022. Among these are observation records of caracara in the Florida panhandle indicating that caracara are expanding their range northward. The caracara population has increased from an estimated 100 adults in 1978 to an estimated 800 adults (400 breeding pairs) in 2007. Estimates of population growth is also supported by population expansion in numbers and range.

Audubon's crested caracara demonstrates resiliency to loss of natural habitats and has been shown to be adaptable to new habitats and foods. For example, they are found in human-modified habitats such as pastures, fields, orchards, and low-density urban areas, and are known to successfully forage and breed in pastures, roadside areas, low intensity or open developed spaces, row crops, and orchards. Caracaras are highly opportunistic in their feeding habits, eating carrion and capturing live prey, including insects and other invertebrates, fish, snakes, turtles, birds, and mammals. Nesting territories of the species in Florida have been found to contain higher proportions of improved pasture and lower proportions of forest, woodland, oak scrub, and marsh. The Service has also confirmed numerous accounts of caracara successfully nesting or roosting in busy residential communities, on communications towers, and billboards while foraging along roadsides, in restaurant parking lots, in residential neighborhoods, on buildings, and in citrus orchards.

The species faces conservation challenges, including ongoing habitat changes and degradation as a result of commercial and residential development; individual mortality from vehicle collisions; the perception by some homeowners and landowners that they are a nuisance; exposure to contaminants; and human disturbance of nesting. Many of these stressors are already present and impacting Audubon's crested caracara but the continued range expansion and population increases show that these threats appear to not be significant impacts to the species in Florida. For this reason, we do not believe these challenges are sufficient to cause the species to become threatened with extinction, and that these can be addressed by other conservation mechanisms in place at the state level. We believe the species has demonstrated the redundancy, adaptability (representation), stability, and resiliency to sustain ongoing population growth and range expansion despite the described threats, and based on these observations, we found that Audubon's crested caracara no longer meets the definition of threatened or endangered species pursuant to the Act. As such, we recommended delisting in the 2025 five-year review for the population.

Overall Vulnerability: Low

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 13.6% of the species' range overlaps with agricultural use sites and 86.4% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 100% overlap [8] between the species' range and the agricultural footprint of simazine use sites (Table 6).

Table 6. Agricultural use overlap and annual usage data (% Range Treated) for the crested caracara.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	8	41.7	49.7	1.2	6.2	7.4

[8]Total overlap is capped at 100%.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Corn	0.4	6	6.4	0.4	6	6.4
Grapes	<0.1	2.3	2.3	<0.1	2.3	2.3
Other Crops (FL sod)	4.6	30.5	35.1	<0.1	<0.1	<0.1
Other Orchards (Olives and avocados)	0.4	7.5	7.9	0.4	7.5	7.9
Vegetables and Ground Fruit	0.6	14.3	14.8	<0.1	0.2	0.2
Christmas Trees	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total	**13.6**	**86.4**	**100**[8]	**1.6**	**12.9**	**14.5**

Usage

Past usage data indicate that up to 14.5% of the species' range has been treated with simazine annually from agricultural uses, with 1.6% occurring on agricultural fields and 12.9% resulting from off-site transport.

Additional Exposure Considerations

While the species' range map encompasses a large portion of the state, the fragmentation and degradation of habitat from land use changes has resulted in patchy suitable areas where individuals occur in a clustered distribution. Core habitat lies within the Kissimmee Prairie, located northwest of Lake Okeechobee, and includes less than 1000 km^2 of suitable habitat. However, non-breeding caracaras range more widely than breeding caracaras and may occur more broadly through the range.

Primary crested caracara habitat in Florida consists of prairies interspersed with marshes and cabbage palm hammocks. Current habitat use includes (ranked highest to lowest proportion): improved pasture, dry prairie, freshwater marsh, mixed upland hardwoods, shrub swamp, shrub and brushland, grassland, pinelands, bare soil, urban, other agriculture, citrus, and scrub. The Audubon's crested caracara could enter agricultural areas, including orchards, to forage, roost, or breed (Pers. comm. 2016 co-occurrence information, USFWS field office request). Though these areas represent a smaller proportion of use by caracaras than other habitats, non-breeding caracaras have been shown to use citrus groves based on availability, particularly those adjacent to pasture (Dwyer et al., 2013).

As stated above, caracaras are highly opportunistic in their feeding habits. Several authors have noted that caracaras may consume unusual items, including turtle and other eggs as well as coconut meat. Caracaras are diurnal and hunt on the wing, from perches, and on the ground. In pastures, caracaras forage on foot, which typically support small vertebrate prey as well as invertebrates associated with cattle, including those under cattle feces. They will also regularly patrol sections of highway in search of carrion.

Audubon's crested caracaras are resident and non-migratory. Home ranges may encompass an area of up to 2,389 ha with an average of 1,552 ha. However, in recent years, more observations of caracara are occurring along the Atlantic Coast as far north as Nova Scotia; it is unclear if this is a new phenomenon or not. If these are Florida birds, then they will still be protected under the ESA. The assumption is that these birds are transitory and may return to Florida annually (Pers. comm. 2016 biological information, USFWS field office request).

Exposure from Non-Agricultural Uses

As discussed, Audubon's crested caracaras may forage or roost in a variety of habitat types, including those that may be within or adjacent to non-agricultural use sites for simazine. In particular, Audubon's crested caracaras may forage in and adjacent to developed areas. However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the Audubon's crested caracara to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

In addition to label measures, the Audubon's crested caracara is in a Pesticide Use Limitation Area (PULA) that requires an additional three runoff mitigation points (i.e., six points total) for Florida citrus only. We anticipate these additional runoff points will further reduce simazine residues in runoff by another order of magnitude (i.e., up to 99% reduction in simazine runoff residues in total).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals.

We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to Audubon's crested caracaras. We do not expect Audubon's crested caracaras that are exposed to simazine as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

Of the use sites that occur within the range of the species, we expect that if individuals forage on-field for contaminated prey items such as arthropods, small birds, or small mammals, concentrations of simazine can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we expect a range of concentrations to be associated with contaminated prey species, and we only anticipate these effects if individuals forage on prey with maximum estimated concentrations of simazine on recently treated fields. We expect this to be a rare occurrence, as Audubon's crested caracaras are expected to consume a varied diet that will also include resources off treated areas. However, an individual Audubon's crested caracara feeding exclusively on prey in treated use sites for even a short period of time, such as a single day, may still accumulate a significant body burden of pesticides, despite this species having a generally varied diet.

Indirect Effects

Available toxicity data suggests that prey items of Audubon's crested caracaras are not likely to die from exposure to simazine. While individual terrestrial vertebrates may experience growth or reproductive effects if exposed to simazine use sites, we anticipate the required conservation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will preclude off-site concentrations of simazine from reaching levels where we expect effects to occur. As such, we do not anticipate simazine use is likely to reduce the availability or abundance of prey that the species relies on as food resources.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a large percentage of the species range will be treated with simazine on agricultural fields annually. However, we only expect simazine concentrations to reach concentrations where adverse effects to the Audubon's crested caracaras and its prey will occur on simazine use sites. While 13.6% of the range overlaps with simazine use sites, we expect annual simazine applications on-field in just 1.6% of the species' range. Most of these treated areas (1.2%) are associated with citrus, which is known to be a habitat occasionally used by the species. We do not expect individuals will be present on-field during spray application, however, some individuals are likely to be exposed to contaminated food sources as the species is known to forage in simazine use sites. In addition, while the Audubon's crested caracara may be exposed to simazine in non-agricultural use areas, we expect non-agricultural usage of simazine within the range of the species to be low.

We expect individuals that exclusively eat prey contaminated on use sites recently treated with simazine will experience reproductive effects. However, given the low extent of the species' range expected to be treated with simazine, the variable diet of the Audubon's crested caracara, and the limited scenarios that we expect to result in adverse effects (i.e., foraging exclusively on prey with maximum estimated simazine residues from recently treated use sites), we anticipate that few individuals will experience reproductive effects from simazine use.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance prey that the Audubon's crested caracara relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The Audubon's crested caracara has a single distinct population segment that occurs throughout several counties in Florida. The population grew 8-fold from 1978 to 2007, and has likely continued to increase, though challenges in field sampling make getting an accurate estimate of the current size difficult. However, field investigations of documented nests over the past 35 years have confirmed that the species has expanded its range from an initial five counties in 1987 to 22 counties in 2022. While the species has confronted a loss of its natural habitat due to encroaching agricultural and urban areas, the Audubon's crested caracara is highly resilient, as evidenced by it roosting and nesting in human-modified habitats and foraging on a wide variety of food sources. Despite a number of stressors, they do not appear to be of significant impact to the persistence of the Audubon's crested caracara, which recently has been recommended for delisting.

There is up to 100% overlap between the Audubon crested caracara's range and the footprint of simazine agricultural use sites (on-field and adjacent use sites); however, past usage data indicates that 14.5% of the species' range has been treated with simazine annually from agricultural uses, with only 1.6% occurring directly on agricultural fields. Since only on-field exposure to simazine is a concern for birds, this relatively low level of usage would suggest that the species is unlikely to have significant exposure to the chemical. Similarly, any affected food items the Audubon's crested caracara forages on will likely be part of a larger variety of prey items (most of which are not from simazine agricultural use sites) and therefore will not present significant exposure the species. Non-agricultural simazine use sites are not expected to be of concern for the Audubon crested caracara because its occurrence on turf will likely be limited. Additionally, indirect effects from both agricultural and non-agricultural use sites are not expected, as the prey base for the species will likely not be affected.

The Audubon's crested caracara's low vulnerability and low on-field exposure suggest that the risk of adverse effects from simazine use is low for this species. While on-field exposure to simazine poses risks of sublethal effects to reproduction for individuals that forage directly on use sites recently treated with simazine, we expect this to impact a small number of individuals due to the low usage in the range and likelihood that most individuals will not consume only contaminated food sources, especially given their varied diet. We do not anticipate direct mortality will occur to individuals that forage in exposed areas. We also do not anticipate prey availability will impacted on use sites or in off-site areas. We anticipate no more than a very small number of individuals that frequently forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Audubon's crested caracara.

References

U.S. Fish and Wildlife Service. 2025. Audubon's Crested Caracara [Florida DPS] (*Caracara plancus audubonii*) 5-Year Review: Summary and Evaluation. Very Beach, Florida. 27 pp.

U.S. Fish and Wildlife Service. 1987. Endangered and Threatened Wildlife and Plants; Threatened Status for the Florida Population of Audubon's Crested Caracara. Final Rule. Federal Register 52(128):25229-25234.

Integration and Synthesis Summary: Florida scrub-jay

Scientific Name:	Common Name:	Entity ID:
Aphelocoma coerulescens	Florida scrub-jay	140

Conclusion: No Jeopardy

Species Range

Based on range map dated: 1/28/2022; Wherever found; *States within the range:* FL

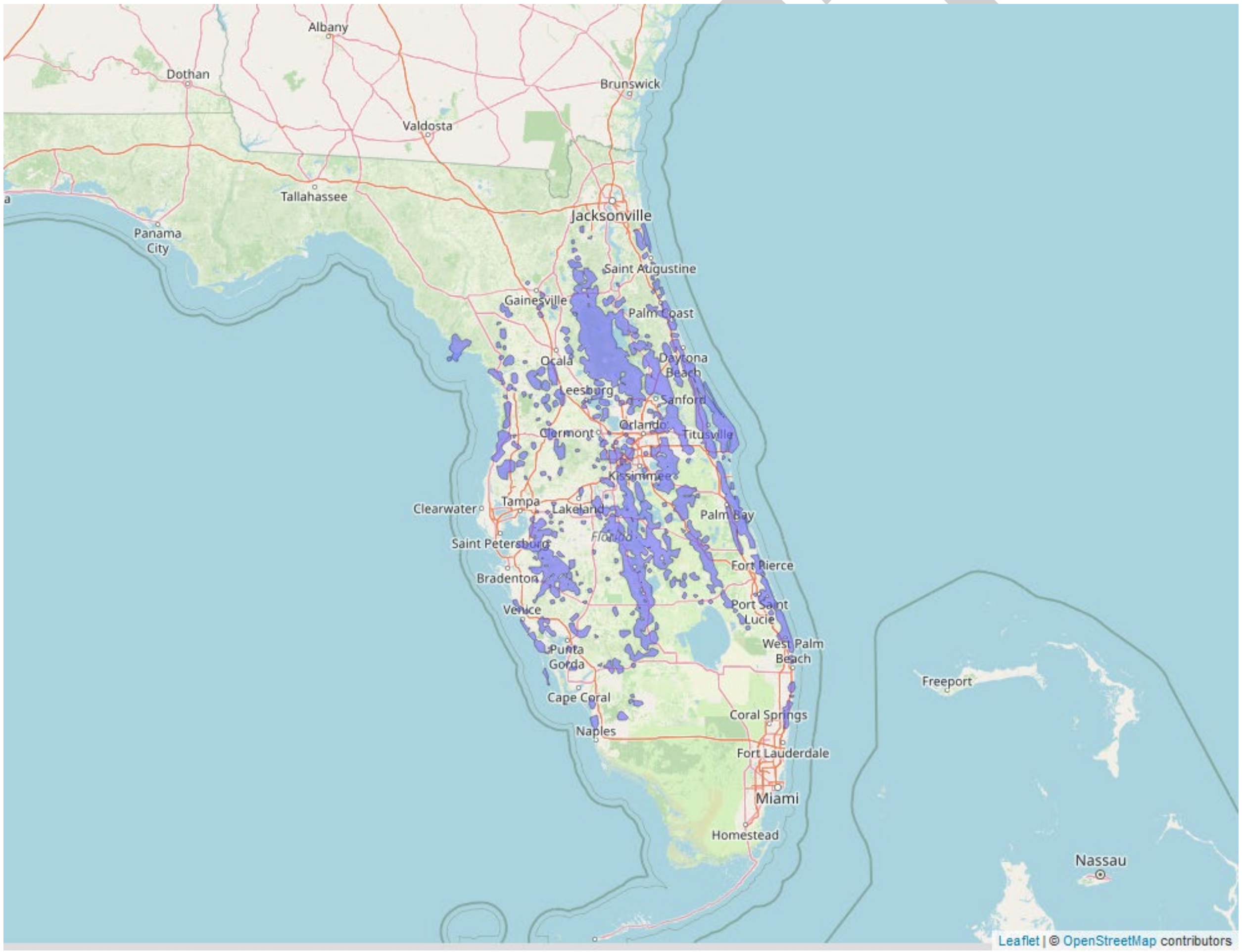

Figure 4. Range map of Florida scrub-jay (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/6174.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Threatened

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 8/27/2025

Distribution: Small, endemic, constrained, and/or isolated population(s)

Number of populations: Multiple populations (numerous)

Species trends: Declining population(s) - one or more populations declining

Pesticides noted in Service documents as a threat to the species: No

Environmental Baseline/Cumulative Effects (EB/CE) Summary

Florida scrub-jays are non-migratory, extremely sedentary, and restricted to scrub and shrubby flatwoods, primarily concentrated along both the Atlantic and Gulf coasts of Florida on central ridges. They inhabit areas with low densities of pine trees. Woodlands and forests are not suitable for the scrub-jay and they decrease habitat suitability of nearby scrub. Florida scrub-jays interact as metapopulations made up of multiple local populations that are relatively isolated, spatially distributed, and bound together by occasional dispersal between populations. Pairs occupy year-round, multi-purpose territories averaging 9 to 10 ha, with a minimum of about 5 ha in size. Given the size of Florida scrub-jay territories and the short dispersal distances exhibited by the species, it is critical to maintain large, contiguous blocks of Florida scrub-jay habitat to support local populations that are relatively resistant to local extinction and to avoid loss of connectivity with other populations. Florida scrub-jays are endemic to Florida and once occupied 39 out of 40 counties in the peninsula. Historically, many counties would have had hundreds or even thousands of breeding pairs, but extant populations have declined to less than 10% of their historic numbers. A comparative study between 1992-93 and 2009-10 analyzing populations on managed conservation lands showed a 25% decline during this timeframe, with extant populations at less than 50% of the potential carrying capacity. As of 2015, post-breeding surveys suggested 13 of the original 39 counties lacked occupancy on public conservation lands. A total of 21 metapopulations with 10 genetic units based on genetic similarity between individuals have been described. Still, the Service’s 2020 5-year review found the Florida scrub-jay remains secure on many managed conservation lands throughout its historical range. A statewide mapping exercise in 2015 (unpubl.) estimated that there were approximately 139,716 ha in conservation, which includes roughly 78% of the potential remaining scrub habitat in peninsular Florida. At the time of the 2019 SSA, there were 65 Florida scrub-jay populations on conservation lands, spanning the entire width and nearly the length of the Florida peninsula. Of those, there were four very highly resilient populations that support 73% of known family groups on conservation lands (1,580 out of 2,160) (USFWS 2019, 2020).

Road mortality, supplemental food, changes in habitat, stochastic events, and exotic plants and animals pose risks to some scrub-jay populations, although fire suppression and the resulting degradation in habitat represents the most significant and widespread man-made threat affecting the scrub-jay's continued existence. Demographic instability resulting from human development is another significant threat. Florida scrub-jay populations in suburban landscapes are declining and disappearing across Florida. Habitat destruction is difficult to quantify but is anticipated to continue based on past and projected human population growth and development in Florida. The recovery strategy for the Florida scrub-jay emphasizes creating and maintaining viable populations across most of the species' remaining geographic subpopulations and distinct genetic units, with priorities around the need for large landscapes that provide optimal opportunities for long-term persistence of Florida scrub-jay populations and maintaining and improving connectivity to facilitate dispersal among local populations (USFWS 2019, 2020).

Many partners have worked together towards recovery of the species since the publication of the 1990 Florida Scrub-Jay Recovery Plan. Land acquisitions by public entities (local, state and federal) and conservation non-profits have reduced habitat degradation, destruction, and fragmentation threats to some scrub-jay populations. Effective land management is essential for maintaining suitable habitat. Boughton and Bowman (2011) found that even on conservation lands, most populations are smaller and more isolated from one another than they were historically, and restoration and (they emphasize) effective management of potential habitat in core areas is necessary to prevent the extirpation of scrub-jay populations. Losses have continued through the present, with populations declining on both protected and unprotected lands, especially in unmanaged and suburban areas. The Service has developed Florida scrub-jay mitigation guidance to be used when assessing minimization and mitigation needs for the species for actions under section 10 and section 7 of the ESA (USFWS 2009), and some mitigation involving scrub habitat acquisition and management has occurred through Habitat Conservation Plans such as Brevard County's Scrub Conservation and Development Plan.

Overall Vulnerability: Medium

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 5.7% of the species' range overlaps with agricultural use sites and 85.2% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 90.9% overlap between the species' range and the agricultural footprint of simazine use sites (Table 7).

Table 7. Agricultural use overlap and annual usage data (% Range Treated) for the Florida scrub-jay.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	4.8	38	42.8	2.9	23.1	26
Corn	<0.1	4.8	4.9	<0.1	4.8	4.9
Grapes	<0.1	3.1	3.2	<0.1	3.1	3.2
Other Crops	0.5	26.2	26.7	<0.1	<0.1	<0.1
Other Orchards	0.2	8.7	8.8	0.2	8.7	8.8
Vegetables and Ground Fruit	0.3	16.2	16.4	<0.1	0.8	0.9
Christmas Trees	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total	**5.7**	**85.2**	**90.9**	**3**	**28.8**	**31.8**

Usage

Past usage data indicate that up to 31.8% of the species' range has been treated with simazine annually from agricultural uses, with 3% occurring on agricultural fields and 28.2% resulting from off-site transport.

Additional Exposure Considerations

Florida scrub-jays are restricted to scattered and often small, isolated patches of scrub in peninsular Florida. The Florida scrub-jay is opportunistic, consuming about 60 percent animal matter including invertebrates, small terrestrial and aquatic vertebrates, and carrion, as well as nuts, fruits, and seeds.

Exposure from Non-Agricultural Uses

Some populations of Florida scrub-jays are known to occur in rural and suburban residential communities where simazine is registered for use on residential turf and golf courses. They forage on the ground on acorns and insects and will use human supplemented food also. However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the Florida scrub-jay to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

In addition to label measures, the Florida scrub-jay is in a Pesticide Use Limitation Area (PULA) that requires an additional three runoff mitigation points (i.e., six points total) for Florida citrus only. Because the species is not found in Washington or California, the strawberry exception is relevant for the Florida scrub-jay. We anticipate these additional runoff points will further reduce simazine residues in runoff by another order of magnitude (i.e., up to 99% reduction in simazine runoff residues in total).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals.

We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to Florida scrub-jays. The Florida scrub-jay consumes invertebrates, small terrestrial and aquatic vertebrates, and carrion, as well as nuts, fruits, and seeds. We do not expect Florida scrub-jays that are exposed to simazine as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

We expect that if Florida scrub-jays forage on prey items such as insects and small terrestrial vertebrates that have been exposed on use sites, concentrations of simazine can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we expect a range of concentrations to be associated with contaminated prey species, and we only anticipate these effects if individuals forage on prey with maximum estimated concentrations of simazine on recently treated use sites. We anticipate this will be a rare occurrence, as Florida scrub-jays are opportunistic and expected to consume a varied diet that will also include fruit and seeds, which are expected to result in lower dosages of simazine that are not associated with adverse effects in birds, and food resources that occur off treated use sites. However, an individual Florida scrub-jay feeding exclusively on prey exposed on treated use sites even a short period of time, such as a single day, may still accumulate a significant body burden of pesticides, despite this species having a generally varied diet.

Indirect Effects

Available toxicity data suggests that prey items of the Florida scrub-jay are not likely to die from exposure to simazine, though individual terrestrial vertebrates may experience growth or reproductive effects if exposed to simazine on use sites. However, we anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will preclude off-site concentrations of simazine from reaching levels where we expect effects to occur. As such, we do not anticipate simazine use is likely to reduce the availability or abundance of prey that the species relies on as food resources. In addition, while we anticipate exposure to simazine, including through off-site transport, can negatively impact the growth and survival of sensitive plant species, we do not anticipate spray drift or runoff of simazine will destroy or limit the availability of plant resources that the species requires for food.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a large percentage of the species' range will be treated with simazine on agricultural fields annually. However, we only expect simazine concentrations to reach concentrations where adverse effects impact the Florida scrub-jay on simazine use sites. While 5.7% of the range overlaps with agricultural use sites of simazine, we expect simazine applications to occur on-field in just 3.0% of the species' range, primarily in citrus. While the Florida scrub-jay prey may be exposed to simazine from use in non-agricultural areas, particularly on residential lawns, we expect non-agricultural usage of simazine within the range of the species to be low.

We expect individuals that exclusively eat prey contaminated on use sites recently treated with simazine will experience reproductive effects. However, given the small extent of overlap with simazine use sites within the range of the Florida scrub-jay, the limited extent of usage on these sites, the variable diet of the Florida scrub-jay, and the limited scenarios that we expect to result in adverse effects (i.e., foraging exclusively on prey with maximum estimated simazine residues from recently treated use sites), we anticipate that very few individuals will experience reproductive effects from simazine use.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance prey or plant resources that the Florida scrub-jay relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The Florida scrub-jay is a threatened, narrow endemic species, restricted to the scrub-shrub flatwoods of the Florida coast. The Florida scrub-jay has a metapopulation structure, made up of multiple local populations that are isolated, spatially distributed and bound together by occasional dispersal amongst them. In recent years, populations have declined to less than a tenth of their historic numbers, and the species now occupies only 26 of the original 39 counties once part of its range. Threats to the species include habitat degradation due primarily to fire suppression, and demographic instability resulting from human development. Conservation partners have worked in recent decades to recover the species through habitat acquisition and management.

Simazine agricultural use sites overlap with 5.7% of the Florida scrub-jay's range. Adjacent areas that are likely to be exposed due to off-site transport overlap with 85.2% of the species' range. Past usage data suggests that up to 31.8% of the species' range has been treated with simazine annually from agricultural uses, with 3% occurring on agricultural fields and 28.2% resulting from off-site transport. The majority of the exposure from agricultural uses is from citrus, which overlaps with 4.8% of the range and data indicates there has been usage on 2.9% of the range annually from this use. The species has been known to occur in citrus groves. However, in addition to general label measures, the Florida scrub-jay is in a Pesticide Use Limitation Area (PULA) that requires an additional three runoff mitigation points (i.e., six points total) for Florida citrus only. We anticipate these additional runoff points will further reduce simazine residues in runoff by another order of magnitude (i.e., up to 99% reduction in simazine runoff residues in total). The Florida scrub-jay is also known to occur in rural and suburban communities where simazine is registered for use on residential turf and golf courses. Based on our knowledge of simazine application to turf and nursery areas, we expect non-agricultural simazine exposure within the range of the Florida scrub-jay to be low.

We do not anticipate direct adverse effects to Florida scrub-jays from off-site exposure, although we expect individuals that exclusively eat prey contaminated on use sites recently treated with simazine will experience reproductive effects (reduction in eggs laid, hatchling survival, etc.). However, given the small extent of overlap of simazine use sites with the range of the Florida scrub-jay, the limited amount of usage on these sites, and the limited scenarios that we expect to result in adverse effects, we anticipate that reproductive effects will be limited to a small number of individuals. In addition, the Florida scrub-jay is an opportunistic species whose diet comprises a wide range of food sources, including invertebrates, small vertebrates, carrion and nuts, fruits and seeds. Based on the varied diet of this species, we do not expect most individuals are likely to exclusively consume simazine-exposed food items. We also do not expect that simazine usage will reduce the availability or abundance of prey items the Florida scrub-jay relies on for food, nor do we expect that exposure on use sites or off-site from spray drift or runoff will destroy or limit the availability of plant resources that the species requires for food. Direct mortality of individuals is not anticipated on use sites or in off-site areas. We anticipate no more than a very small number of individuals that at times forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Florida scrub-jay.

References

U.S. Fish and Wildlife Service. 2025. Florida Scrub-Jay (*Aphelocoma coerulescens*) 5-Year Review: Summary and Evaluation. Gainesville, Florida. 25 pp.

U. S. Fish and Wildlife Service. 2020. Florida Scrub-Jay (*Aphelocoma coerulescens*) 5-Year Review: Summary and Evaluation. Jacksonville, Florida. 45 pp.

U.S. Fish and Wildlife Service. 2019. Species Status Assessment, Florida Scrub-Jay (*Aphelocoma coerulescens*), Version 1.0. Jacksonville, Florida. 140 pp.

Integration and Synthesis Summary: Gunnison sage-grouse

Scientific Name:	Common Name:	Entity ID:
Centrocercus minimus	Gunnison sage-grouse	4064

Conclusion: No Jeopardy

Species Range

Based on range map dated: 2/01/2024; Wherever found; *States within the range:* CO, UT

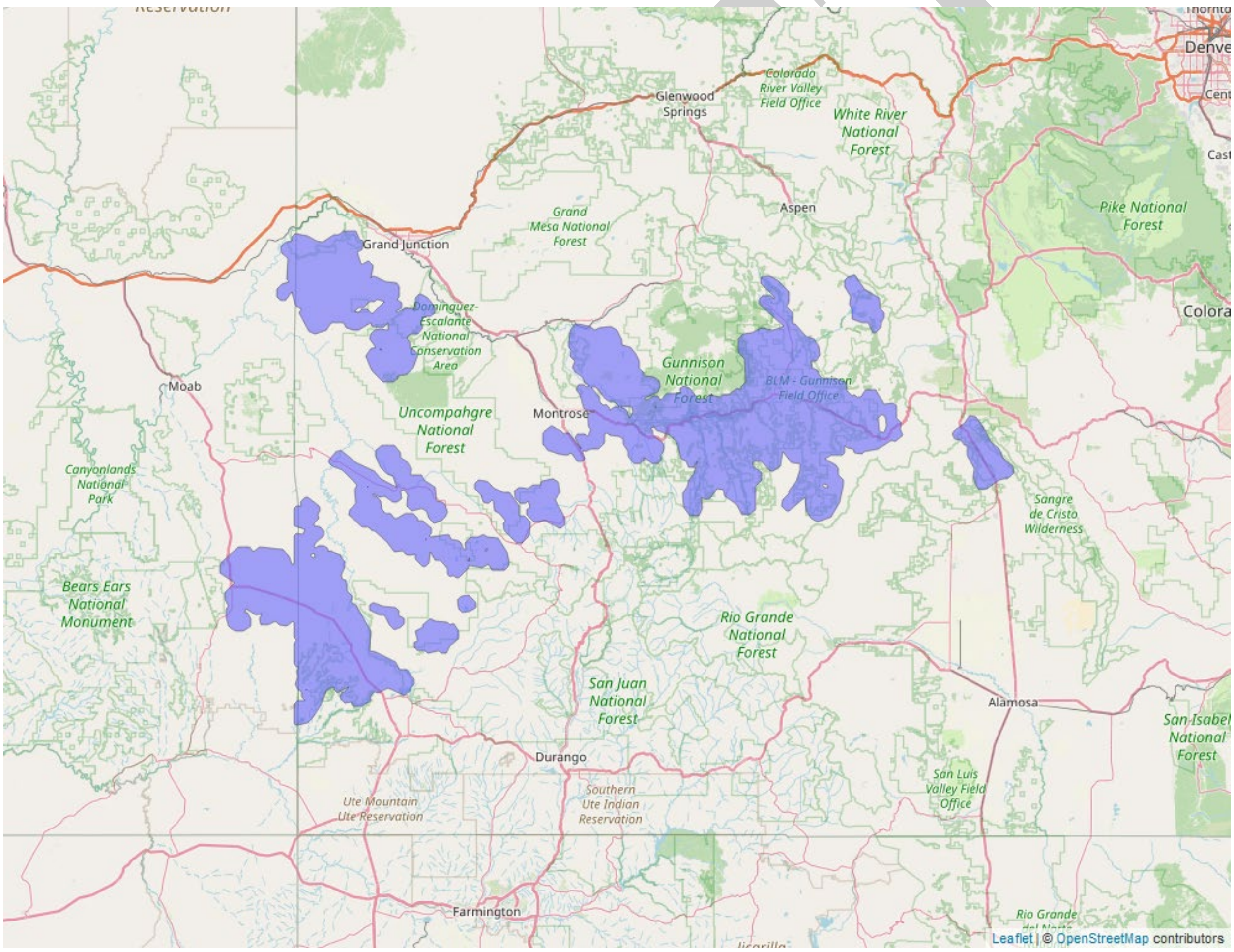

Figure 5. Range map of Gunnison sage-grouse (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/6040.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Threatened

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 7/26/2024

Distribution: Species/Populations widespread or wide-ranging

Number of populations: Multiple populations (few)

Species trends: Declining population(s) - one or more populations declining

Pesticides noted in Service documents as a threat to the species: No

Environmental Baseline/Cumulative Effects (EB/CE) Summary:

Throughout their life cycle, grouse depend on a variety of shrub-steppe habitats and are obligate users of several sagebrush species to breed, feed, and shelter. They feed on invertebrates and forbs in their sagebrush habitats. Gunnison sage-grouse were formerly native to southwestern Colorado, northern New Mexico, southeastern Utah, and possibly northeastern Arizona. Since the 1900s, the species' occupied range contracted, and it now occupies an estimated 10% of its historical range. Currently occupied habitat is managed by the Bureau of Land Management (42%), private landowners (43%), the U.S. Forest Service (10%), the National Park Service (2%), and the states of Colorado and Utah (2%). As of 2019, Gunnison sage-grouse are found in seven populations in western Colorado (Gunnison Basin, Poncha Pass, Crawford, Cerro Summit-Cimarron-Sims Mesa (Cerro Summit), Piñon Mesa, San Miguel Basin, and Dove Creek) and one population in Utah (Monticello). The eight Gunnison sage-grouse populations occupy six different ecoregions, each with distinct ecological differences (USFWS 2019). The Gunnison Basin population is the largest population with the most occupied habitat, covering approximately 239,641 hectares. The Poncha Pass population, located to the east of the Gunnison Basin population, is the smallest population and has the least amount of occupied habitat (approximately 11,234 hectares). All Gunnison sage-grouse in the Poncha Pass population were translocated from the Gunnison Basin population in the 1970s after the population was considered extirpated in the 1950s, with additional translocations in the 2000s. The Gunnison Basin population supports approximately 85% of breeding Gunnison sage-grouse and 65% of the occupied habitat. The remaining 15% of individuals are distributed among the remaining seven populations, which comprise approximately 35% of the overall occupied habitat. Based on the analysis documented in our Species Status Assessment, one of the eight grouse populations had critically low resilience (Dove Creek), three had low resiliency (Crawford, Poncha Pass, Monticello), two had moderate resiliency (Cerro Summit and San Miguel Basin), and two had high resiliency (Gunnison Basin and Piñon Mesa). By 2020, most populations, including the Gunnison Basin population, decreased from their 2019 levels (USFWS 2020).

Although the exact reasons for population declines are unknown, stochastic environmental and demographic changes have likely contributed. The primary reason for the decline is believed to be habitat loss associated with the conversion of sagebrush habitat to agriculture and residential and commercial development. As discussed in the 2014 listing rule, we determined that the most substantial threats to Gunnison sage-grouse include habitat decline due to human disturbance, small population size and structure, drought, climate change, and disease. Other threats that are impacting Gunnison sage-grouse to a lesser degree or in localized areas include grazing practices inconsistent with local ecological conditions, fences, invasive plants, fire, mineral development, pinion-juniper encroachment, large-scale water development, predation (primarily in association with anthropogenic disturbance), habitat decline due to human disturbance, and recreation (USFWS 2014, 2020).

Overall Vulnerability: Medium

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 6.7% of the species' range overlaps with agricultural use sites and 25.6% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 32.3% overlap between the species' range and the agricultural footprint of simazine use sites.

Table 8. Agricultural use overlap and annual usage data (% Range Treated) for the Gunnison sage-grouse.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	0	0	0	0	0	0
Corn	0.2	4.6	4.8	0.2	4.6	4.8
Grapes	<0.1	0.1	0.1	<0.1	0.1	0.1

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Other Crops	5.4	12.8	18.2	0	0	0
Other Orchards	<0.1	0.3	0.3	<0.1	0.3	0.3
Vegetables and Ground Fruit	1.1	7.8	8.9	0.2	1.4	1.6
Christmas Trees	0	0	0	0	0	0
Total	**6.7**	**25.6**	**32.2**	**0.4**	**6.4**	**6.8**

Usage

Past usage data indicate that up to 6.8% of the species' range has been treated with simazine annually from agricultural uses, with 0.4% occurring on agricultural fields and 6.4% resulting from off-site transport.

Additional Exposure Considerations

Though the Gunnison sage-grouse may lek on agricultural fields, they prefer grassy areas like alfalfa, fallow crop lands, and areas with similar grassy cover (pers. comm., Western Colorado Field Office, 2025). We do not expect Gunnison sage-grouse to be exposed to simazine through on-field contact.

Exposure from Non-Agricultural Uses

We do not expect the Gunnison sage-grouse to occur on non-agricultural simazine use sites. As such, we do not expect non-agricultural uses of simazine will significantly contribute to the overall exposure of the species.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals.

We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to Gunnison sage-grouse. We do not expect the Gunnison sage-grouse to be exposed to simazine on use sites, and nor do we expect that individuals exposed to simazine on food items as a result of off-site transport will experience adverse. As such, we do not anticipate any direct adverse effects to the Gunnison sage-grouse from the proposed action.

Indirect Effects

Available toxicity data suggests that arthropods are not likely to experience mortality with simazine exposure. While we anticipate off-site transport of simazine can negatively impact the growth and survival of sensitive plant species, we do not anticipate spray drift or runoff of simazine will destroy or limit the availability of grassland communities that the species requires for its habitat. Furthermore, we anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will further minimize impacts to the species' necessary plant resources. As such, we do not anticipate the proposed action will result in measurable levels of indirect adverse effects to the Gunnison sage-grouse.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a medium percentage of the species' range will be treated with simazine on agricultural fields annually. However, we do not expect the Gunnison sage-grouse to lek or otherwise be exposed to simazine on use agricultural or non-agricultural use sites, nor to experience adverse effects from consumption of food resources exposed to simazine via off-site transport.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance arthropod prey that the species relies on as food resources, nor will it reduce the availability of grassland communities that Gunnison sage-grouse use for foraging and habitat.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The Gunnison sage-grouse is a threatened species with multiple, widespread populations, all of which are currently in decline. The Gunnison sage-grouse inhabits shrub-steppe habitats and is an obligate user of sagebrush species for reproduction, foraging and shelter. They forage primarily on invertebrates and forbs in these sagebrush habitats. There are currently eight sage-grouse populations throughout Utah and Colorado, occupying an estimated 10% of its historical range, which once also included New Mexico and Arizona. The eight populations are in varying states of resiliency, ranging from critically low to high. Primary threats to the Gunnison sage-grouse include habitat loss due to human disturbance, small population size and structure, drought, climate change and disease.

The agricultural footprint of simazine use sites overlaps with 32.3% of the Gunnison sage-grouse range, though we expect only on-field agricultural exposure to be of concern to the species. Data indicate that 6.7% of the species' range overlaps with simazine agricultural use sites. However, past usage data demonstrate that in practice, simazine usage is only likely to occur on up to 0.4% of the range annually. We do expect sage-grouse to occur on agricultural sites for lekking and feeding activities. However, sage-grouse prefer grassy areas such as alfalfa and fallow crop lands, which are not simazine use sites, therefore we do not expect exposure to simazine from these activities. Because Gunnison sage-grouse forage exclusively in sagebrush habitats, we do not expect that they will have any dietary exposures to simazine on agricultural use sites. Similarly, we do not expect that arthropod prey items are likely to experience mortality, nor will the off-site transport of simazine destroy or limit the availability of grassland communities that the species requires for its habitat. We do not expect the Gunnison sage-grouse to occur on non-agricultural simazine use sites, and therefore those uses will not contribute to the overall exposure of the species.

The Gunnison sage-grouse's medium vulnerability ranking and medium percentage of the species' range treated (low percentage on-field) annually suggests the risk of adverse effects from simazine use is low for this species. We anticipate no more than a very small number of individuals that might infrequently lek on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Gunnison sage-grouse.

References

U.S. Fish and Wildlife Service. 2024. 5-Year Status review, Gunnison sage-grouse (*Centrocercus minimus*). Western Colorado Field Office, Grand Junction, Colorado. 11 pp.

U.S. Fish and Wildlife Service. 2020. Final recovery plan for Gunnison sage-grouse (*Centrocercus minimus*). Lakewood, Colorado. 36 pp.

U.S. Fish and Wildlife Service. 2019. Species Status Assessment for the Gunnison Sage-Grouse (*Centrocercus minimus*). Lakewood, Colorado. 96 pp.

U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Threatened Status for Gunnison Sage-Grouse. Final Rule. Federal Register 79:69191-69310.

Integration and Synthesis Summary: Northern aplomado falcon

Scientific Name:	Common Name:	Entity ID:
Falco femoralis septentrionalis	Northern aplomado falcon	126

Conclusion: No Jeopardy

Species Range

Based on range map dated: 1/27/2018; Wherever found; *States within the range:* TX

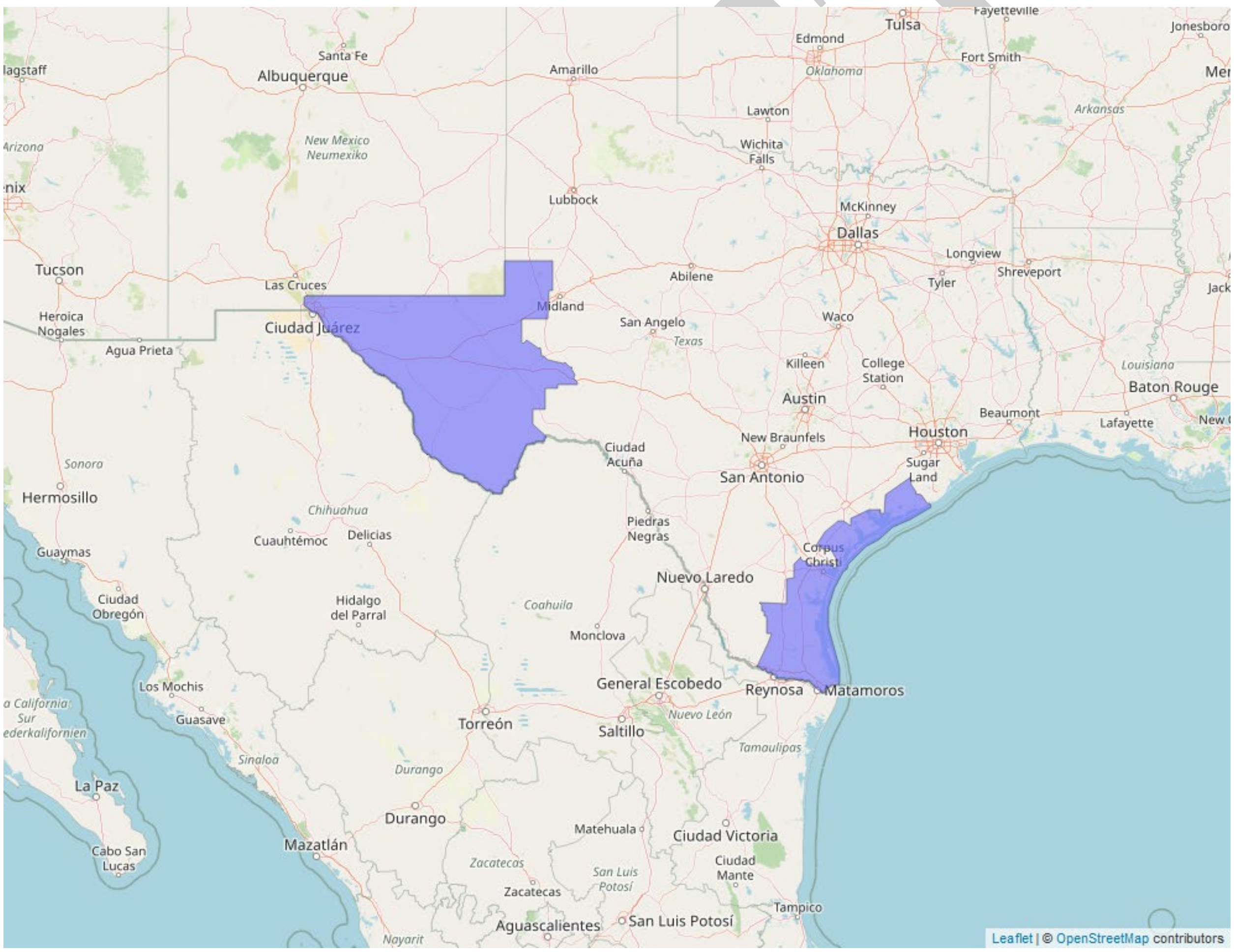

Figure 6. Range map of northern aplomado falcon (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/1923.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Endangered

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 11/12/2024

Distribution: Small, endemic, constrained, and/or isolated population(s)

Number of populations: Multiple populations (few)

Species trends: Declining population(s) - one or more populations declining

Pesticides noted in Service documents as a threat to the species: Yes

Environmental Baseline/Cumulative Effects (EB/CE) Summary:

The northern aplomado falcon is one of three subspecies of the aplomado falcon and is the only subspecies recorded in the United States. Aplomado falcons feed on a variety of prey, including birds, insects, rodents, small snakes, and lizards. They depend on nest structures built by large raptors or corvids, typically found in large multi-stemmed yuccas and mesquite trees. Historically, it was found from Trans-Pecos, Texas, southern New Mexico, and southeastern Arizona to Chiapas and the northern Yucatan along the Gulf and along the Pacific slope of Central America north of Nicaragua (USFWS 1990). The population declined through the early 1900s and by the 1930s, the subspecies was uncommon. By the 1950s, the subspecies was absent from most of its range in the United States; the last known nesting in Texas was in 1941 and the last known nesting in New Mexico was in 1952. From 2010 to 2014, the known number of breeding pairs of aplomado falcons in the United States varied between 28 and 36 pairs, almost all of which were using artificial nesting towers in southern coastal Texas. In 2013 and 2014, intensive surveys conducted throughout the subspecies' historical range in the United States resulted in the observation of 29 pairs in south coastal Texas and 1 pair in New Mexico (USFWS 2014).

Causes for the historical decline of the northern aplomado falcon included widespread shrub encroachment that resulted from control of range fires, intense overgrazing, and agricultural development in grassland habitats. Pesticide exposure was likely a significant cause of the subspecies' decline and eventual disappearance from the U.S. with the initiation of widespread use of organochlorines (e.g., DDT and dieldrin) after World War II. Organochlorines are no longer considered a threat to the species. The Service continues to evaluate, monitor, and minimize threats including other pesticides and contaminants to extant populations of northern aplomado falcons. As of 2014, recovery of this subspecies may be limited by long-term drought, shrub encroachment in areas of Chihuahuan grasslands, and increased presence of the great-horned owl (Bubo virginianus), which preys upon aplomado falcons. Perhaps more significant are the effects of degraded grasslands and drying climatic conditions on avian prey populations. Habitat loss and degradation (e.g., overgrazing, periods of drought, among other causes) on both breeding and wintering grounds negatively impact important avian prey species for aplomado falcons, such as meadowlarks (Sturnella spp.) and mourning doves (Zenaida macroura). In addition, between 140,000 and 328,000 (mean = 234,000) birds are killed annually by collisions with monopole turbines used for wind power generation in the contiguous U.S. (USFWS 2014).(Note: This species has an experimental population, EXPN Entity ID 9122.)

Overall Vulnerability: High

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 4.0% of the species' range overlaps with agricultural use sites and 39.0% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 43.0% overlap between the species' range and the agricultural footprint of simazine use sites (Table 9).

Table 9. Agricultural use overlap and annual usage data (% Range Treated) for the northern aplomado falcon.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	0.2	2.2	2.4	0	0	0
Corn	1.9	12.8	14.7	0.4	3.1	3.5
Grapes	<0.1	0.3	0.3	<0.1	0.3	0.3
Other Crops	1.3	15.3	16.6	0	0	0
Other Orchards	0.2	3.5	3.7	<0.1	0.5	0.5

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Vegetables and Ground Fruit	0.4	4.9	5.3	<0.1	0.2	0.2
Christmas Trees	0	0	0	0	0	0
Total	**4.0**	**39.0**	**43.0**	**0.4**	**4.1**	**4.5**

Usage

Past usage data indicate that up to 4.5% of the species' range has been treated with simazine annually from agricultural uses, with 0.4% overlapping with the use sites themselves.

Additional Exposure Considerations

Northern aplomado falcons may forage on cultivated fields interspersed within their preferred savanna/grassland habitat, therefore we expect them to forage on agricultural simazine use sites.

Exposure from Non-Agricultural Uses

While we do not expect the northern aplomado falcon to occur on non-agricultural simazine use sites, prey species of the falcon, particularly small birds, could be exposed to simazine used on turf, including residential areas and golf courses. However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the falcon to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals. We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to northern aplomado falcon. The northern aplomado falcon feeds primarily on birds (up to rock dove size), to a lesser extent on insects (moths, beetles, cicadas, orthopterans); uncommonly on small mammals, lizards, and snakes. We do not expect northern aplomado falcons that are exposed to simazine on prey items as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

We expect that if northern aplomado falcons forage on prey items such as small birds, arthropods, reptiles, or mammals that have been exposed on use sites, concentrations of simazine can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we expect a range of concentrations to be associated with contaminated prey species, and we only anticipate these effects if individuals forage on prey with maximum estimated concentrations of simazine on recently treated fields. We anticipate this will be a rare occurrence, as northern aplomado falcons are expected to consume a varied diet that will also include resources off treated fields. However, an individual northern aplomado falcons feeding exclusively on prey exposed on treated use sites even a short period of time, such as a single day, may still accumulate a significant body burden of pesticides, despite this species having a generally varied diet.

Indirect Effects

Available toxicity data suggests that prey items of northern aplomado falcons are not likely to die from exposure to simazine. While individual terrestrial vertebrates may experience growth or reproductive effects if exposed to simazine on use sites, we anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will preclude off-site concentrations of simazine from reaching levels where we expect effects to occur. As such, we do not anticipate simazine use is likely to reduce the availability or abundance of prey that the species relies on as food resources.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a small percentage of the species' range will be treated with simazine on agricultural fields annually. However, we only expect simazine concentrations to reach concentrations where adverse effects to the northern aplomado falcon and its prey will occur on simazine use sites. While 4.0% of the range overlaps with agricultural use sites of simazine, we expect simazine applications to occur on-field in just 0.4% of the species' range. We do not expect individuals will be present on-field during spray application, however, some individuals are likely to be exposed to contaminated food sources as the species is known to forage in simazine use sites. While prey species of the northern aplomado falcon may be exposed to simazine in non-agricultural use areas, we expect non-agricultural usage of simazine within the range of the species to be low.

We expect individuals that exclusively eat prey contaminated on use sites recently treated with simazine will experience reproductive effects. However, given the low extent of the species' range expected to be treated with simazine, the variable diet of the northern aplomado falcon, and the limited scenarios that we expect to result in adverse effects (i.e., foraging exclusively on prey with maximum estimated simazine residues from recently treated use sites), we anticipate that very few individuals will experience reproductive effects from simazine use.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance prey that the northern aplomado falcons relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The northern aplomado falcon is a narrow endemic endangered species, whose populations have been in decline for decades. The northern aplomado falcon is one of three subspecies of aplomado falcon, and the only one currently found in the United States. Its historical range encompassed the southwest United States through the Yucatan south to Nicaragua. Its population began to decline in the early 1900s likely due to pesticide exposure, shrub encroachment resulting from fire suppression, overgrazing and agricultural development in grassland habitats. The northern aplomado falcon has a variable diet, consuming a wide range of prey including birds, insects, rodents and reptiles. The subspecies inhabits scrubland and grassland habitats and depend on nest structures built by other raptors or corvids, typically found in large yuccas and mesquite trees. More recently, most individuals have been found to use artificial nesting towers. Current threats to the subspecies' recovery include degraded grassland habitats, the impacts of drying climatic conditions on avian prey populations, shrub encroachment, and great horned owl predation.

The agricultural footprint of simazine use sites (on-field and areas adjacent subject to off-site transport) overlaps with 39% of the northern aplomado falcon range, though we expect only on-field agricultural exposure to be of concern to the species. We do anticipate the northern aplomado falcon to occur on-field to forage, and in that regard, data indicate that 4% of simazine agricultural use sites overlap with the species' range. However, past usage data demonstrate that in practice, simazine usage is only likely to occur on up to 0.4% of the falcon's range annually. The falcon is not anticipated to occur on non-agricultural sites, though it may be exposed to prey species that accessed these sites. However, we expect simazine usage on non-agricultural use sites within the range of the falcon to be limited. Dietary exposure to the falcon from on-field foraging is not anticipated to result in adverse effects because its wide-ranging diet precludes the likelihood that it will feed exclusively on prey exposed to maximum concentrations of simazine, for several hours a day, in a recently treated field. We do not anticipate that dietary exposure to the northern aplomado falcon through prey as a result of off-site transport will result in any adverse effects. We expect conservation measures required on the label to reduce exposure through off-site transport. Finally, indirect effects are not anticipated, as simazine exposure is not likely to result in a loss of the falcon's prey base. We anticipate no more than a very small number of individuals that frequently forage on simazine use sites will experience reductions in fitness related to growth and reproduction.

After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the northern aplomado falcon.

References

U.S. Fish and Wildlife Service. 2024. Northern Aplomado Falcon (*Falco femoralis septentrionalis*) 5-Year Review: Summary and Evaluation. Corpus Christi, Texas. 25 pp.

U.S. Fish and Wildlife Service. 2014. Northern Aplomado Falcon (*Falco femoralis septentrionalis*) 5-Year Review: Summary and Evaluation. Albuquerque, New Mexico. 46 pp.

U.S. Fish and Wildlife Service. 1990. Northern Aplomado Falcon Recovery Plan. Albuquerque, New Mexico. 65 pp.

Integration and Synthesis Summary: Piping plover

Scientific Name:	Common Name:	Entity ID:
Charadrius melodus	Piping plover (Great Lakes DPS)	130

Conclusion: No Jeopardy

Species Range

Based on range map dated: 6/06/2025; Wherever found; *States within the range:* IL, IN, MI, MN, NY, OH, PA, WI

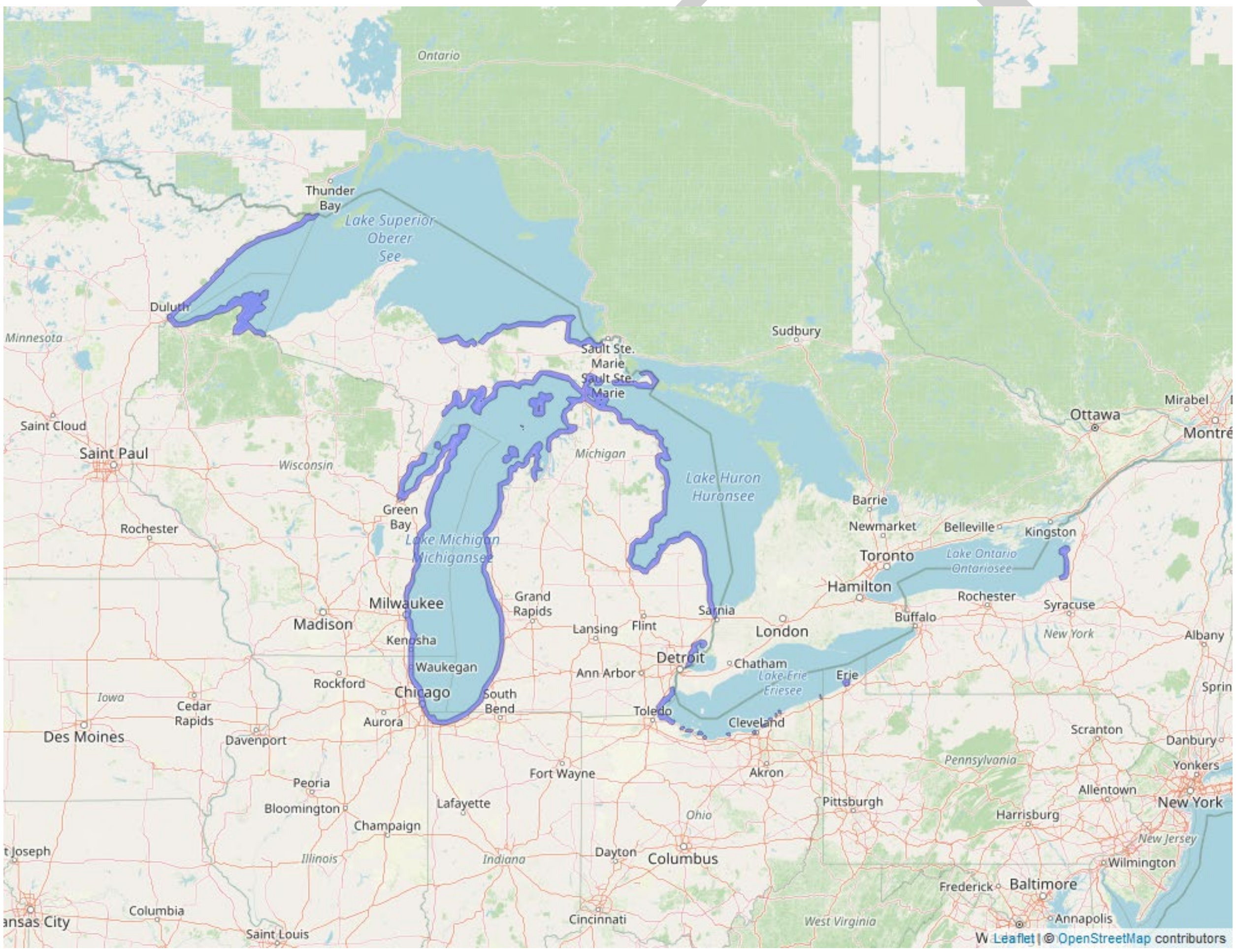

Figure 7. Range map of piping plover (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/6039.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Endangered

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 1/6/2025

Distribution: Species/Populations widespread or wide-ranging

Number of populations: Unknown number of populations

Species trends: Declining population(s) - one or more populations declining

Pesticides noted in Service documents as a threat to the species: Yes

Environmental Baseline/Cumulative Effects (EB/CE) Summary:

Piping plovers are small shorebirds that feed on macroinvertebrates and nest above the high tide line on coastal beaches, sandflats, gently sloping foredunes, blowout areas behind foredunes, sparsely vegetated dunes, and washover areas. Endangered Species Act (ESA) actions are recognized in three separate breeding populations of piping plovers: Atlantic Coast (threatened), Great Lakes (endangered), and Northern Great Plains (threatened). Although a recent analysis shows strong patterns in the wintering distribution of piping plovers from different breeding populations, partitioning is not complete and major information gaps persist (USFWS 2009). The survival and recovery of all piping plover breeding populations are dependent on the continued availability of sufficient habitat in their coastal migration and wintering range, where the species spends more than two-thirds of its annual cycle. Although there is no exclusive partitioning of the wintering range, piping plovers from the Atlantic Coast (i.e., eastern Canada) and the Great Lakes are most prevalent during migration and winter along the southern Atlantic Coast; while those breeding on the Northern Great Plains predominate in coastal Mississippi, Louisiana, and Texas; wintering ranges of all three breeding populations overlap on the Gulf Coast of Florida. Piping plovers demonstrate high fidelity to winter regions where they use a mosaic of habitats within their home ranges.

Great Lakes piping plovers winter from North Carolina to Texas and the Bahamas, with the majority (75%) wintering in Georgia and Florida. Population counts have been conducted annually since 1984. As of 2016, approximately 81% of breeding adults were uniquely color-banded (98% had a partial band combination). The population has shown significant growth, from approximately 17 pairs at the time of listing in 1986 to 76 pairs in 2017, representing just over 50% of the current recovery goal of 150 breeding pairs for the Great Lakes population. However, they dropped to 67 pairs in 2018. The number of non-nesting individuals also has increased annually since 2009. Annual fledgling rates vary annually, but there appeared to be an increase between 2014-2016 (USFWS 2020). The average fledging rate has been 1.7, above the recovery goal of 1.5 fledglings per breeding pair, although analysis of banded plovers suggests that after-hatch year survival (adult) rates may be declining. In response to potential nest losses, a captive-rearing program started in 1997 by the University of Minnesota and subsequently managed by the Detroit Zoological Society and partners. Abandoned eggs are collected, artificially incubated, and hatched. Chicks are then hand-reared and released once they reach fledging age. The captive rearing program has increased the annual number of chicks fledged by about 12% on average. Through 2018, 289 captive-reared chicks have been released. In 2013, University of Minnesota calculated an 11.7% return rate, the percentage of captive releases that returned to breed. While the Great Lakes DPS of piping plovers is small in numbers, they are spread out over a relatively large geographic area and data suggests they are increasing in number (USFWS 2020).

All piping plover populations are inherently vulnerable to even small declines in their most sensitive vital rates (i.e., adult and fledged juvenile survival). Some piping plover population declines are believed to be caused by low reproductive rates and low first year survival. Some nests are lost from predation (mostly merlins), storms and flooding, consistent cold or rain, and human encroachment (USFWS 2020). Most early-season nest abandonments result from death of attendant adults; predation remains a major threat to Great Lakes piping plovers and predation by other birds has increased in recent years. Shoreline development continues as the leading cause of habitat destruction in the Great Lakes. Cumulative habitat loss is of grave concern for piping plovers. Review of threats to piping plovers and their habitat in their migration and wintering ranges indicates a continuing loss and degradation of habitat due to sand placement projects, inlet stabilization, sand mining, groins, seawalls and revetments, exotic and invasive vegetation, and wrack removal. Habitat improvement and protection through acquisition has occurred, but not at rates which offset the impacts of development. However, artificial shoreline stabilization also impedes the processes by which coastal habitats adapt to accelerating sea-level rise, thus setting the stage for compounding future losses. In the 2020 5-Year Review, we mentioned a study that showed a negative correlation between killdeer abundance and the amount of land in an area treated with neonictinoids. Neonictinoids are insecticides that may affect the density and diversity of insects in affected wetlands; they are believed to potentially impact bird species in the areas of use and further study is needed (USFWS 2020). We are unaware of any studies that evaluated the risk of secondary poisoning (impact to plovers from eating contaminated insects), but the widespread use of neonictinoids, tendency to accumulate in wetlands, persistence in the soil, and potential adverse effects on the species' prey, neonictinoids may have a negative effect on piping plovers in the Great Lakes. The magnitude of the threats regarding climate change is yet unknown, but the impact of regional changes will have to be monitored closely to ensure the piping plover's persistence. Disease has emerged as a potential new threat in the Great Lakes population, although currently the threat level remains low. This could change rapidly, however, as disease outbreaks in the vicinity of piping plover breeding areas are increasing. Human recreational disturbance is a major threat to coastal migration and wintering range for piping plovers; interactions with dogs elicit a strong response from shorebirds. Shorebirds are more likely to flush from a dog, especially off-leash, than a person. Elevated stress levels in the nonbreeding season can carry over into the breeding season and impact future reproductive success by reducing survival and fecundity rates. Piping plover populations, including the Great Lakes population, are inherently vulnerable to even small declines in their most sensitive vital rates (i.e., survival of adults and fledged juveniles) (USFWS 2009, 2020).

Overall Vulnerability: Medium

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 11.8% of the species' range overlaps with agricultural use sites and 100% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 100% overlap[9] between the species' range and the agricultural footprint of simazine use sites (Table 10).

Table 10. Agricultural use overlap and annual usage data (% Range Treated) for the piping plover.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	0	0	0	0	0	0
Corn	5.3	27.6	32.9	5.3	27.6	32.9
Grapes	0.3	4.0	4.3	0.3	4.0	4.3
Other Crops	2.0	31.9	33.9	0	0	0
Other Orchards	1.4	13.4	14.8	1.3	12.7	14.0

[9] Total overlap is capped at 100%.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Vegetables and Ground Fruit	2.8	20.3	23.1	0.4	3.1	3.5
Christmas Trees	<0.1	4.0	4.0	<0.1	4.0	4.0
Total	**11.8**	**100**[9]	**100**[9]	**7.3**	**51.4**	**58.7**

Usage

Past usage data indicate that up to 58.7% of the species' range has been treated with simazine annually from agricultural uses, with 7.3% occurring on agricultural fields and 51.4% resulting from off-site transport.

Additional Exposure Considerations

Piping plovers forage by gleaning invertebrates from the substrate or running and pecking on the substrate with short runs between pecks. Piping plovers utilize numerous areas within breeding and wintering habitats for foraging, including wet sand in the wash zone, intertidal ocean beach, wrack lines, washover passes, mud, sand and algal flats, and shorelines of streams, ephemeral ponds, lagoons, and salt marshes. Primary prey for wintering plovers includes polychaete marine worms, various crustaceans, insects, and occasionally bivalve mollusks. Several studies on the Atlantic Coast indicate that foraging habitat and food resources ultimately affect piping plover survival.

Piping plovers return to their breeding grounds in late April to early May and initiate nesting by mid- to late May. Hatching begins in late May to early June, generally peaking in June and early July. The young leave the nest within hours of hatch and begin to forage almost immediately. Piping plovers migrate July through September in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico. Piping plovers spend three to five months on the breeding grounds annually, and the rest of the year on the wintering or in migration. Piping plovers are sparsely distributed across their Atlantic Coast breeding range.

Piping plovers are unlikely to enter simazine sites during breeding but may migrate through agricultural, golf courses, and other areas with the open space developed land use category (USFWS field office request, pers. comm. 2016 co-occurrence information).

Exposure from Non-Agricultural Uses

Piping plovers are not expected to occur in non-agricultural use sites of simazine during breeding but may migrate through and stopover at sites containing turf, such as golf courses and other areas within the open space developed land use category. These inland migratory stopover sites have not been found to contain large concentrations of piping plovers, rather most reports of birds at inland sites were single individuals. Individuals appear to stop opportunistically along the migratory route rather than show fidelity to specific sites, with duration typically lasting no longer than one day (Pompei and Cuthbert 2004). However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the piping plover to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals. We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to the piping plover. The piping plover feeds primarily on benthic invertebrates and arthropods. We do not expect piping plovers that are exposed to prey items as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

Piping plovers are not expected to forage on simazine use sites during breeding but may stopover on turf sites during migration. We expect that if piping plovers forage on arthropods that have been exposed on these sites, concentrations of simazine can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we expect a range of concentrations to be associated with contaminated arthropods, and we only anticipate these effects if individuals forage on arthropods with maximum estimated concentrations of simazine on recently treated fields. Furthermore, while an individual piping plover feeding exclusively on contaminated arthropods on treated turf during migration may accumulate a significant body burden of pesticides, we do not expect this exposure to occur during the breeding season of the piping plover, and thus, will be unlikely to result in reproductive effects.

Indirect Effects

The piping plover relies on benthic invertebrates and arthropods for food resources, gleaning prey from the substrate or running and pecking on the substrate. We anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will preclude off-site concentrations of simazine from reaching levels where we expect effects to occur. As such, we do not anticipate simazine use is likely to reduce the availability or abundance of prey that the species relies on as food resources.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a small percentage of the species' range will be treated with simazine on agricultural fields annually. However, we do not expect that breeding piping plovers will forage on simazine use sites, and we do not expect concentrations of simazine resulting from off-site transport to reach levels associated with adverse effects. While migrating piping plovers may be exposed to simazine on turf sites, we expect this to be rare occurrence based on low usage on these use sites and piping plover migration behavior. Furthermore, we anticipate that simazine residues on arthropods exposed turf sites will reach concentrations associated with reproductive effects, but not mortality in birds. As piping plovers are not expected to enter these sites during breeding, we expect that reproductive effects following exposure to be unlikely.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance prey that the piping plover relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The piping plover (Great Lakes DPS) population has increased from approximately 17 pairs at the time of listing in 1986 to 76 pairs in 2017, to a high of 80 breeding pairs in 2023. Data indicates they remain vulnerable to major threats that remain persistent and pervasive, including habitat degradation, predation, and human disturbance. The piping plover DPS is inherently vulnerable to even small declines in their most sensitive vital rates, i.e., survival of adults and fledged juveniles. The survival and recovery of breeding populations of piping plovers in the Great Lakes DPS is fundamentally dependent on the continued availability of sufficient habitat in their coastal migration and wintering range, where the species spends more than two-thirds of its annual life cycle. While the population in the DPS is few in number, they are spread out over a relatively large geographic area and were never very abundant. The species has a medium vulnerability ranking.

The piping plover Greate Lakes DPS has a high exposure ranking. Based on the species range map, there is 100% overlap between the species' range and the agricultural footprint of simazine use sites (use sites and areas adjacent that are likely exposed through off-site transport), with 11.8% of the species range overlapping directly with agricultural use sites. Based on a recent update to the range map, we anticipate the overlap and usage will both be less due to the removal of areas in Illinois that contained agricultural use sites, although we still expect overlaps and usage to be high based on the very high levels associated with the prior range map. We do not expect that exposure from consuming benthic invertebrate prey along shorelines will result in adverse effects under any exposure scenario, since required label conservation measures are expected to reduce off-site transport (spray drift and runoff) of simazine. Similarly, we do not expect a reduction of the prey base where exposure to simazine from spray drift occurs. Past usage data indicate that 58.7% of the species' range has been treated with simazine, with 7.3% occurring on-field and 51.4% resulting from off-site transport. Piping plovers are only expected to use simazine use sites (agricultural fields and turf) during migration. While an individual feeding on contaminated arthropods in these use sites could consume a concentration of simazine that reach levels associated with reproductive effects, we expect that contaminated prey would be associated with a range of concentrations, and we only expect adverse effects to the piping plover if it was consuming arthropods with the maximum estimated concentration of simazine on recently treated fields. We further anticipate that since this foraging on simazine use sites would occur outside of the breeding season, reproductive effects would not likely occur.

In summary, the species DPS has a medium vulnerability, and the overall risk to the species is low. We do not expect reduced fitness or the loss of individuals due to simazine exposure over the duration of the proposed action. As such, we do not expect the effects from simazine exposure will likely reduce the reproduction, numbers, and distribution of the species to an extent that will cause species-level effects. We anticipate no more than a very small number of individuals that at times forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the piping plover (Great Lakes DPS).

References

Pompei, V.D., and F.J. Cuthbert. 2004. Spring and fall distribution of piping plovers in North America: Implications for migration stopover conservation. Report to the U.S. Army Corps of Engineers. University of Minnesota; St. Paul, Minnesota.

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U.S. Fish and Wildlife Service. 2009. Piping plover (*Charadrius melodus*) 5-year review: Summary and evaluation. Hadley, Massachusetts. 214 pp.

Integration and Synthesis Summary: Piping plover

Scientific Name:	Common Name:	Entity ID:
Charadrius melodus	Piping plover (Atlantic Coast and Northern Great Plains populations)	131

Conclusion: No Jeopardy

Species Range

Based on range map dated: 10/15/2024; [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.; *States within the range:* AL, AR, CO, CT, DE, FL, GA, IA, KS, LA, MA, MD, ME, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NY, OK, RI, SC, SD, TN, TX, VA, WY

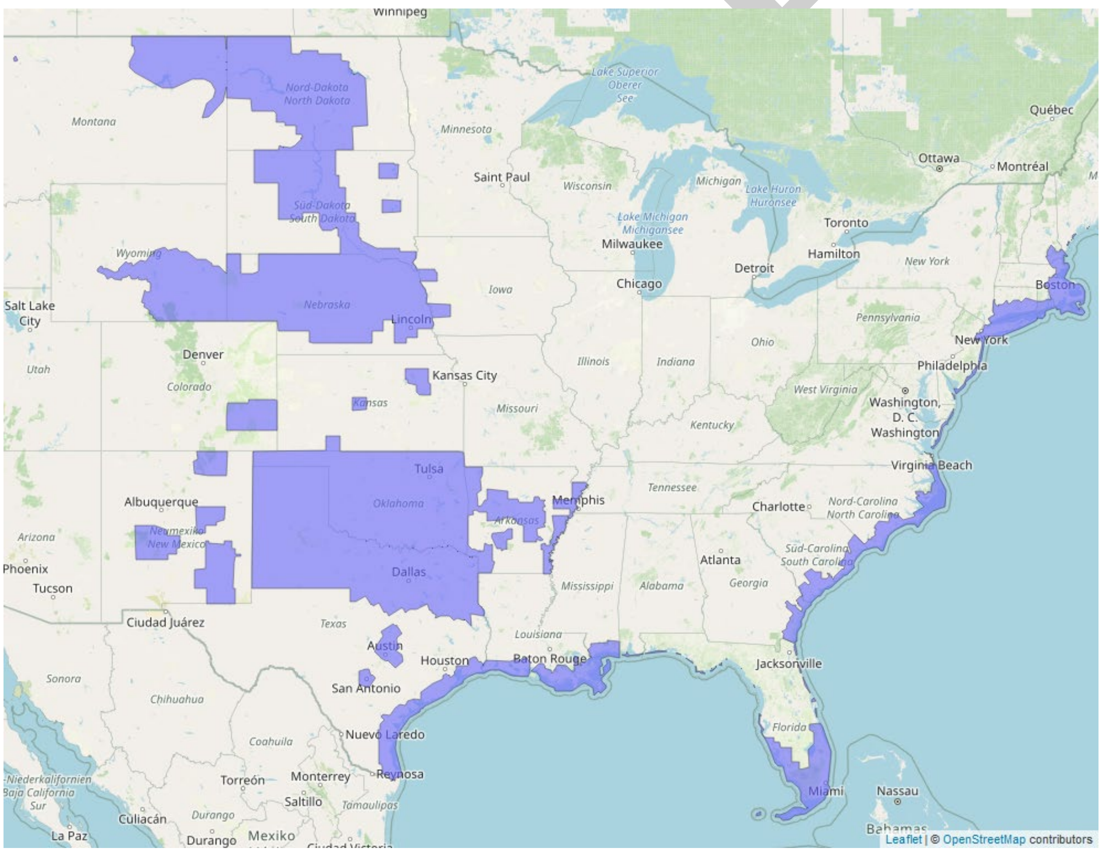

Figure 8. Range map of piping plover (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/6039.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Threatened

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 1/6/2025

Distribution: Species/Populations widespread or wide-ranging

Number of populations: Multiple populations (few)

Species trends: Increasing population(s)

Pesticides noted in Service documents as a threat to the species: Yes

Environmental Baseline/Cumulative Effects (EB/CE) Summary:

Piping plovers are small shorebirds that feed on macroinvertebrates and nest above the high tide line on coastal beaches, sandflats, gently sloping foredunes, blowout areas behind foredunes, sparsely vegetated dunes, and washover areas. Endangered Species Act (ESA) actions are recognized in three separate breeding populations of piping plovers: Atlantic Coast (threatened), Great Lakes (endangered), and Northern Great Plains (threatened). Although a recent analysis shows strong patterns in the wintering distribution of+H95 piping plovers from different breeding populations, partitioning is not complete and major information gaps persist (USFWS 2009). The survival and recovery of all piping plover breeding populations are dependent on the continued availability of sufficient habitat in their coastal migration and wintering range, where the species spends more than two-thirds of its annual cycle. Although there is no exclusive partitioning of the wintering range, piping plovers from the Atlantic Coast (i.e., eastern Canada) and the Great Lakes are most prevalent during migration and winter along the southern Atlantic Coast; while those breeding on the Northern Great Plains predominate in coastal Mississippi, Louisiana, and Texas; wintering ranges of all three breeding populations overlap on the Gulf Coast of Florida. Piping plovers demonstrate high fidelity to winter regions where they use a mosaic of habitats within their home ranges (USFWS 2016, 2020).

The breeding population of the Northern Great Plains piping plover extends from Nebraska north along the Missouri River through South Dakota, North Dakota, and eastern Montana, and on alkaline (salty) lakes along the Missouri River Coteau (a large plateau extending north and east of the Missouri River) in North Dakota, Montana, and extending into Canada. Most piping plovers from Prairie Canada winter along the south Texas coast, while breeding piping plovers from the U.S. Great Plains are more widely distributed along the Gulf Coast from Florida to Texas. In the Northern Great Plains, piping plovers breed and raise young on sparsely vegetated sandbars, reservoir shorelines on river systems, and on the shorelines of alkaline lakes. On the wintering grounds, piping plovers forage and roost along barrier and mainland beaches, sand, mud, and algal flats, washover passes, salt marshes, and coastal lagoons. The Northern Great Plains population is geographically widespread, with many birds in areas with small human populations. Rough estimates of adult piping plover numbers in the Great Plains population (U.S. & Canada combined) varied from about 3,500 in 1991, 4,600 in 2006, and 2,250 in 2011 (USFWS 2016). Due to difficulty in surveying the species, the population trend seen in Northern Great Plains abundance data is unreliable (USFWS 2020).

The Atlantic Coast piping plover population breeds from Newfoundland to South Carolina and winters along the Atlantic Coast from North Carolina south along the Gulf Coast and in the Caribbean. The population was estimated to be 790 pairs at listing in 1986, nearly 1,350 pairs in 1995, and 1,849 pairs in 2008 (USFWS 1996, Service 2009). The population is unevenly distributed and there have been several documented declines in sub-populations over this time period (i.e., plovers in Maine decreased from 66 pairs in 2002 to 24 pairs in 2008). Substantially higher productivity rates were observed in New England than elsewhere in the population's range (USFWS 1996).

All piping plover populations are inherently vulnerable to even small declines in their most sensitive vital rates (i.e., adult and fledged juvenile survival). Cumulative habitat loss is of grave concern for all piping plovers. Major threats to the Northern Great Plains population include changes in the quality and quantity of riverine habitat due primarily to damming and water withdrawals. For the Atlantic Coast population, primary threats include development and shoreline stabilization. Artificial shoreline stabilization impedes the processes by which coastal habitats adapt to accelerating sea-level rise, thus setting the stage for compounding future losses. Human disturbance, predation, invasive plants, and pesticides further reduce breeding and wintering habitat quality and affect survival for all plover populations (USFWS 2016). Human activities affect activity patterns, types, and numbers of predators, exacerbating natural predation in many areas. In areas where predation appeared to drive extremely low productivity in the Great Plains, predation control (i.e., great horned owl, gulls, mammal trapping) was implemented with limited success. Predation control was effective to improve interim productivity, but because high predation rates were a symptom of insufficient available habitat, ensuring that sufficient high-quality habitat was available was more effective for plover recovery. Sandbar islands were mechanically created in South Dakota and Nebraska from 2004-2011; birds readily used them for nesting, but breeding success declined with sandbar age (USFWS 2016). Human recreational disturbance is a major threat to coastal migration and wintering range for piping plovers; interactions with dogs elicit a strong response from shorebirds. Shorebirds are more likely to flush from a dog, especially off-leash, than a person (USFWS 2020). Elevated stress levels in the nonbreeding season can carry over into the breeding season and impact future reproductive success by reducing survival and fecundity rates for plovers. In the 2020 5-Year Review, we mentioned a study that showed a negative correlation between killdeer abundance and the amount of land in an area treated with neonictinoids. Neonictinoids are insecticides that may affect the density and diversity of insects in affected wetlands; they are believed to potentially impact bird species in the areas of use and further study is needed. We are unaware of any studies that evaluated the risk of secondary poisoning (impact to plovers from eating contaminated insects), but the widespread use of neonictinoids, tendency to accumulate in wetlands, persistence in the soil, and potential adverse effects on the species' prey, neonictinoids may have a negative effect on piping plovers. The magnitude of the threats regarding climate change is yet unknown, but the impact of regional changes will have to be monitored closely to ensure the piping plover's persistence (USFWS 2020).

Overall Vulnerability: Medium

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 16.6% of the species' range overlaps with agricultural use sites and 71.4% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 88% overlap between the species' range and the agricultural footprint of simazine use sites (Table 11).

Table 11. Agricultural use overlap and annual usage data (% Range Treated) for the piping plover.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	<0.1	0.7	0.7	<0.1	0.3	0.3
Corn	9.9	23.1	33.0	1.3	3.2	4.5
Grapes	<0.1	0.2	0.2	<0.1	0.2	0.2
Other Crops	5.0	33.9	38.9	0	0	0
Other Orchards	0.1	4.6	4.7	<0.1	0.6	0.6
Vegetables and Ground Fruit	1.6	8.8	10.4	<0.1	0.4	0.4

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Christmas Trees	<0.1	0.1	0.1	<0.1	0.1	0.1
Total	**16.6**	**71.4**	**88**	**1.3**	**4.8**	**6.1**

Usage

Past usage data indicate that up to 6.1% of the species' range has been treated with simazine annually from agricultural uses, with 1.3% occurring on agricultural fields and 4.8% resulting from off-site transport.

Additional Exposure Considerations

Piping plovers forage by gleaning invertebrates from the substrate or running and pecking on the substrate with short runs between pecks. Piping plovers utilize numerous areas within breeding and wintering habitats for foraging, including wet sand in the wash zone, intertidal ocean beach, wrack lines, washover passes, mud, sand and algal flats, and shorelines of streams, ephemeral ponds, lagoons, and salt marshes. Primary prey for wintering plovers includes polychaete marine worms, various crustaceans, insects, and occasionally bivalve mollusks. Several studies on the Atlantic Coast indicate that foraging habitat and food resources ultimately affect piping plover survival.

Piping plovers return to their breeding grounds in late April to early May and initiate nesting by mid- to late May. Hatching begins in late May to early June, generally peaking in June and early July. The young leave the nest within hours of hatch and begin to forage almost immediately. Piping plovers migrate July through September in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico. Piping plovers spend three to five months on the breeding grounds annually, and the rest of the year on the wintering or in migration. Piping plovers are sparsely distributed across their Atlantic Coast breeding range.

Piping plovers are unlikely to enter simazine sites during breeding but may migrate through agricultural, golf courses, and other areas with the open space developed land use category (USFWS field office request, pers. comm. 2016 co-occurrence information). Given the broad nature of the range map for this species in certain areas, it is unlikely that the entire area of overlap adjacent to these use sites represents piping plover habitat.

Exposure from Non-Agricultural Uses

Piping plovers are not expected to occur in non-agricultural use sites of simazine during breeding but may migrate through and stopover at sites containing turf, such as golf courses and other areas within the open space developed land use category. These inland migratory stopover sites have not been found to contain large concentrations of piping plovers, rather most reports of birds at inland sites were single individuals. Individuals appear to stop opportunistically along the migratory route rather than show fidelity to specific sites, with duration typically lasting no longer than one day (Pompei and Cuthbert 2004). However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the piping plover to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals. We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to the piping plover. The piping plover feeds primarily on benthic invertebrates and arthropods. We do not expect piping plovers that are exposed to prey items as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

Piping plovers are not expected to forage on simazine use sites during breeding, but may stopover on turf sites during migration. We expect that if piping plovers forage on arthropods that have been exposed on these sites, concentrations of simazine can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we expect a range of concentrations to be associated with contaminated arthropods, and we only anticipate these effects if individuals forage on arthropods with maximum estimated concentrations of simazine on recently treated fields. Furthermore, while an individual piping plover feeding exclusively on contaminated arthropods on treated turf during migration may accumulate a significant body burden of pesticides, we do not expect this exposure to occur during the breeding season of the piping plover, and thus, will be unlikely to result in reproductive effects.

Indirect Effects

The piping plover relies on benthic invertebrates and arthropods for food resources, gleaning prey from the substrate or running and pecking on the substrate. We anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will preclude off-site concentrations of simazine from reaching levels where we expect effects to occur. As such, we do not anticipate simazine use is likely to reduce the availability or abundance of prey that the species relies on as food resources.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a small percentage of the species' range will be treated with simazine on agricultural fields annually. However, we do not expect that breeding piping plovers will forage on simazine use sites, and we do not expect concentrations of simazine resulting from off-site transport to reach levels associated with adverse effects. While migrating piping plovers may be exposed to simazine on turf sites, we expect this to be rare occurrence based on low usage on these use sites and piping plover migration behavior. Furthermore, we anticipate that simazine residues on arthropods exposed turf sites will reach concentrations associated with reproductive effects, but not mortality in birds. As piping plovers are not expected to enter these sites during breeding, we expect that reproductive effects following exposure to be unlikely.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance prey that the piping plover relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The piping plover (Atlantic Coast and Northern Great Plains DPS) is widely distributed across many states. All piping plover populations are inherently vulnerable to even small declines in their most sensitive vital rates, i.e., survival of adults and fledged juveniles. A review of threats to piping plovers and their habitat in their migration and wintering range indicates a continuing loss and degradation of habitat due to sand placement projects, inlet stabilization, sand mining, groins, seawalls and revetments, exotic and invasive vegetation, and wrack removal, as well as other threats. Several studies on the Atlantic Coast indicate that foraging habitat and food resources ultimately affect piping plover survival. The species has a medium vulnerability ranking.

The piping plover has a high exposure ranking. Based on the species range map, there is 88% overlap between the species' range and the agricultural footprint of simazine use sites (use sites and areas adjacent that are likely exposed through off-site transport), with 16.6% of the species range overlapping directly with agricultural use sites, and 71.4% of the species range exposed through off-site transport from agricultural use sites. However, past usage data indicate that 6.1% of the species range has been treated, with only 1.3% occurring on agricultural fields, where concern for adverse effects to the species exists. Plovers are not expected to occur in agricultural or non-agricultural simazine use sites during breeding season but may stopover opportunistically during migration.

We anticipate that any adverse effects to the species from exposure to simazine will occur through the dietary route. Potential adverse effects include reproduction effects, including a reduction in the number of eggs laid and hatchling survival. However, we do not expect significant adverse effects to occur, because the piping plover feeds primarily on benthic invertebrates and arthropods and does not routinely occur in simazine use sites to forage. Additionally, the piping plover's diet is varied, and we would anticipate it would include a range of food items with varying levels of simazine contamination. Adverse effects to the piping plover are only expected when exclusively consuming food items with maximum estimated concentrations of simazine on recently treated fields, which we expect to be a rare occurrence. We do not expect a reduction of the prey base where exposure to simazine on adjacent areas occurs. We anticipate that required label mitigation language will reduce off-site transport (spray drift, runoff) by up to an order of magnitude

In summary, the species DPS has a medium vulnerability, and the overall risk to the species is low. We do not expect reduced fitness or the loss of individuals due to simazine exposure over the duration of the proposed action. As such, we do not expect the effects from simazine exposure will likely reduce the reproduction, numbers, and distribution of the species to an extent that will cause species-level effects. We anticipate no more than a very small number of individuals that at times forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the piping plover (Atlantic Coast and Northern Great Plains DPS).

References

Pompei, V.D., and F.J. Cuthbert. 2004. Spring and fall distribution of piping plovers in North America: Implications for migration stopover conservation. Report to the U.S. Army Corps of Engineers. University of Minnesota; St. Paul, Minnesota.

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U.S. Fish and Wildlife Service. 1996. Piping Plover (*Charadrius melodus*) Atlantic Coast Population Revised Recovery Plan. Hadley, Massachusetts. 236 pp.

Integration and Synthesis Summary: Red-cockaded woodpecker

Scientific Name:	Common Name:	Entity ID:
Dryobates borealis	Red-cockaded woodpecker	107

Conclusion: No Jeopardy

Species Range

Based on range map dated: 9/13/2023; Wherever found; *States within the range:* AL, AR, FL, GA, LA, MS, NC, OK, SC, TX, VA

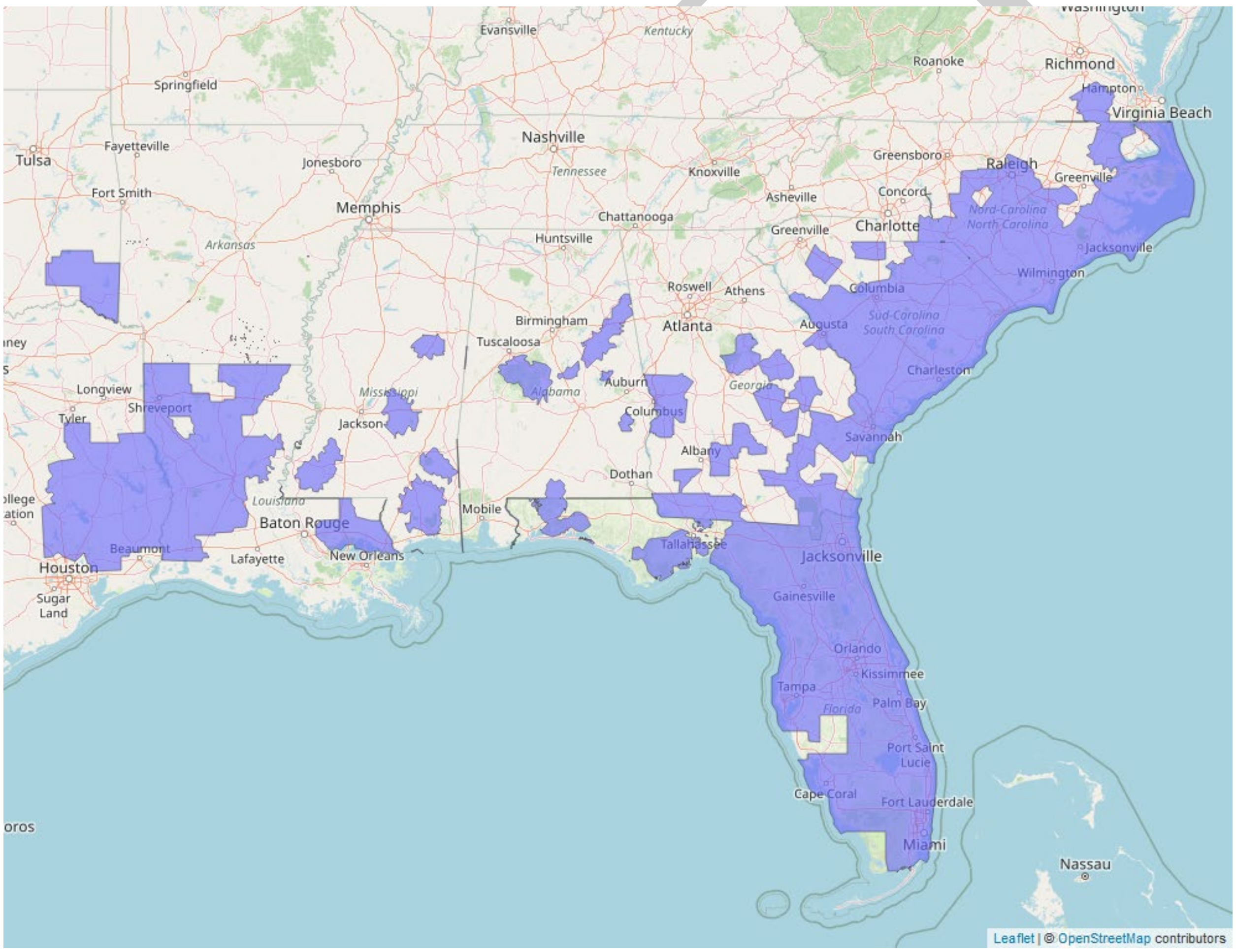

Figure 9. Range map of red-cockaded woodpecker (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/7614.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Threatened

Most recent 5-Year Review recommendation: Downlist to Threatened

Most recently completed 5-Year Review: 10/25/2024 (Reclassification of the Red-Cockaded Woodpecker From Endangered to Threatened With a Section 4(d) Rule, Final Rule)

Distribution: Species/Populations widespread or wide-ranging

Number of populations: Multiple populations (numerous)

Species trends: Increasing population(s)

Pesticides noted in Service documents as a threat to the species: Yes

Environmental Baseline/Cumulative Effects (EB/CE) Summary

Red-cockaded woodpeckers were once considered a common bird across the southeastern U.S. They are found in open pine woodlands and savannahs with large old pines for nesting and roosting. Red-cockaded woodpeckers rely on cavities to breed and compete intensely for openings in high-quality habitat rather than excavate new cavities in poor quality habitat. When artificial cavities are added to unoccupied but otherwise suitable habitat, it immediately becomes high-quality habitat and is occupied. Number of high-quality territories depends on the number and distribution of suitable cavities, which then determines breeding population size. Even after listing, the species continued to decline. However, new restoration techniques, such as artificial cavities, along with changes in silvicultural practices and wider use of prescribed fire to recreate open pine parkland structure, has led to stabilization of the species' viability and resulted in an increase in the number and distribution of populations. As of 2020, there were 124 populations across 13 ecoregions and the species had not lost any representative populations since the 2003 revised recovery plan. While most populations are still small and vulnerable to stochastic events, many populations for which we were able to determine trends were stable or increasing, and 13% were declining. We believe the species' viability, habitat conditions, and population numbers are improving (USFWS 2020). The Service recommended reclassification from endangered to threatened in a proposed rule published on October 8, 2020.

At the time of listing in 1970, the species was severely threatened by lack of adequate habitat due to historical logging, incompatible forest management, and conversion of forests to urban and agricultural uses. Fire-maintained old growth pine savannahs, on which the species depends, were extremely rare. What little habitat remained was mostly degraded due to fire suppression and silvicultural practices that hindered the development of older, larger trees needed by the species for cavity development and foraging. Population declines were largely due to gradual abandonment of territories due to loss of cavities (i.e., tree death, cavity enlargement, encroachment by hardwood midstory) rather than poor survival or reproduction. As of 2020, the primary threats to red-cockaded woodpeckers were hurricanes and other storm events (i.e., foraging habitat loss and degradation, cavity loss, and direct mortality), southern pine beetles (i.e., loss of cavity trees), development, and wildfire. Kleptoparasites (i.e., red-bellied woodpeckers and southern flying squirrels) may threaten smaller, more isolated populations than larger ones. Cavity enlargement by other species (i.e., pileated woodpeckers, red-bellied woodpeckers, red-headed woodpeckers, northern flickers) may deem them unusable by red-cockaded woodpeckers (USFWS 2020). Other factors unrelated to habitat loss may threaten the species, including pesticides, but their importance has not been determined (USFWS 2003). In 2024, the species was downlisted to threatened (USFWS 2024).

All Army, Air Force, and Marine Corps installations have red-cockaded woodpecker management plans and guidelines to limit adverse effects of military training. Red-cockaded woodpecker populations are highly dependent on active conservation management with prescribed fire, beneficial and compatible silvicultural methods to regulate forest composition and structure, the provision of artificial cavities where natural cavities are insufficient, translocation to sustain and increase small vulnerable populations, and effective monitoring to identify limiting biological and habitat factors for management (USFWS 2020).

Overall Vulnerability: Low

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 7.3% of the species' range overlaps with agricultural use sites and 73.4% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 80.7% overlap between the species' range and the agricultural footprint of simazine use sites (Table 12).

Table 12. Agricultural use overlap and annual usage data (% Range Treated) for the red-cockaded woodpecker.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	0.8	6.1	7	0.1	1.1	1.2
Corn	3.9	25.4	29.3	0.6	6.9	7.5
Grapes	<0.1	1	1	<0.1	0.9	0.9
Other Crops	2.1	27.8	29.8	<0.1	<0.1	<0.1
Other Orchards	0.4	9.7	10.1	0.2	6	6.3
Vegetables and Ground Fruit	0.5	11	11.5	<0.1	0.4	0.4
Christmas Trees	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total	**7.3**	**73.4**	**80.7**	**0.8**	**13.4**	**14.2**

Usage

Past usage data indicate that up to 14.2% of the species' range has been treated with simazine annually from agricultural uses, with 0.8% occurring on agricultural fields and 13.4% resulting from off-site transport.

Additional Exposure Considerations

The red-cockaded woodpecker is endemic to open, mature, and old growth pine ecosystems and is not expected to forage or roost in agricultural fields, row crops, or orchards and vineyards. (pers. comm. 2016 co-occurrence information, USFWS field office request). Though simazine can enter these habitats via spray drift and runoff, given the broad nature of the range map for this species, it is unlikely that the entire area of overlap adjacent to agriculture represents red-cockaded woodpecker habitat. Therefore, it is expected the area of red cockaded woodpecker habitat exposed to simazine through off-site transport is lower than the 73.4% overlap and 13.4% treated. In addition, though red-cockaded woodpeckers prefer open pine systems, spray drift is still expected to be reduced to some extent by interception with the forested habitat, further lowering the extent of habitat likely to be exposed.

Exposure from Non-Agricultural Uses

The red-cockaded woodpecker primarily occurs in open, mature, and old growth pine ecosystems, but may also use golf courses, residential areas, and other developed areas with sufficient residual large or old pines. As such, we anticipate individuals are likely to occur in proximity to sites where simazine is registered for non-agricultural use. However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the red-cockaded woodpecker to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals.

We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to red-cockaded woodpeckers. However, we do not expect the red-cockaded woodpecker to be exposed to simazine on agricultural use sites, nor do we expect that individuals exposed to simazine on food items as a result of off-site transport will experience adverse effects. Where sufficient residual large or old pines occur, red-cockaded woodpeckers are expected to nest and forage in areas where simazine is registered for use on turf (i.e., residential areas and golf courses). However, we do not expect red-cockaded woodpeckers to forage directly on treated turf where simazine residues will reach maximum concentrations. Rather, invertebrates consumed by red-cocked woodpeckers are captured on trees on and under tree bark. While some invertebrates could be exposed on turf and move to trees where red-cockaded woodpeckers forage, we expect that most invertebrates consumed by red-cockaded woodpeckers within these use sites would not contain simazine residues, even after an application, due to application methods which limit spray drift or because they were under bark at the time of spray. As such, we do not anticipate that red-cockaded woodpeckers will be exposed to concentrations of simazine high enough to result in adverse effects. As such, we do not anticipate any direct adverse effects to the red-cockaded woodpecker from the proposed action.

Indirect Effects

Available toxicity data suggests that arthropods are not likely to experience mortality with simazine exposure. As such, we do not anticipate the proposed action will result in measurable levels of indirect adverse effects to the red-cockaded woodpecker.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a large percentage of the species' range will be treated with simazine on agricultural fields annually. However, we do not expect the red-cockaded woodpecker to be exposed to simazine on agricultural use sites, nor to experience adverse effects from consumption of food resources exposed to simazine via off-site transport.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance arthropod prey that the species relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The red-cockaded woodpecker was once considered a common bird across the southeastern U.S. At the time of listing in 1970, the species was severely threatened by lack of adequate habitat due to historical logging, incompatible forest management, and conversion of forests to urban and agricultural uses. However, new restoration techniques, such as artificial cavities, along with changes in silvicultural practices and wider use of prescribed fire to recreate open pine parkland structure, has led to stabilization of the species' viability and resulted in an increase in the number and distribution of populations. This species continues to have a wide distribution. There are currently at least 124 populations across 13 ecoregions. While most populations are still small and vulnerable to stochastic events, the majority are stable or increasing and the species was reclassified from endangered to threatened in 2024 due to its improvement in status. The species has a low vulnerability ranking.

The red-cockaded woodpecker has a high exposure ranking. Species range data indicates that 80.7% of the species' range overlaps with the overall simazine agricultural footprint (use sites adjacent areas exposed through off-site transport). Past annual usage data demonstrates that up to 14.2% of the species' range has been treated with simazine annually, with 0.8% occurring on agricultural fields and 13.4% resulting from off-site transport. Because the woodpecker occurs in open pine woodlands and savannahs and is not expected to forage in agricultural use sites, and exposure from non-agricultural uses is expected to be minimal, we do not expect that individuals will experience direct effects from simazine exposure from these use sites. Given that areas adjacent to agriculture in the species' range are unlikely to all be red-cockaded woodpecker habitat, we expect that the species' forested habitat will have reduced spray drift, and we do not expect exposure levels to result in direct effects to the red-cockaded woodpecker. Required label mitigation language should further reduce the instances of spray drift into off-site areas. We do not expect a reduction of the arthropod prey base where exposure to simazine from spray drift occurs, and most red-cockaded woodpeckers, as generalist feeders that are highly mobile, will consume a diversity of dietary items with varying levels of simazine contamination.

In summary, the species has a low vulnerability, and the overall risk to the species is low. While overlap with use sites is high and usage in the range is high, this species is not expected to occur on agricultural sites. Therefore, the most likely route of exposure to the species is from exposure from consuming arthropods or plant material, but adverse effects are not anticipated at predicted exposure levels. Exposure from non-agricultural uses is expected to be minimal, with no direct effects to individuals from these uses. We do not expect the proposed action will likely reduce the reproduction, numbers, and distribution of the species to an extent that will cause species-level effects. We anticipate no more than a very small number of individuals that infrequently forage on simazine use sites (or forage on arthropods contaminated in use sites) will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the red-cockaded woodpecker.

References

U.S. Fish and Wildlife Service. 2024. Endangered and Threatened Wildlife and Plants; Reclassification of the Red-Cockaded Woodpecker From Endangered to Threatened With a Section 4(d) Rule. Final Rule. Federal Register 89: 85294-85338.

U.S. Fish and Wildlife Service. 2020. Species Status Assessment Report for the Red-cockaded Woodpecker (*Picoides borealis*) Version 1.3. Atlanta, Georgia. 590 pp.

U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Reclassification of the Red-Cockaded Woodpecker from Endangered to Threatened with a Section 4(d) Rule. Proposed Rule. Federal Register 85: 63474-63499.

Integration and Synthesis Summary: Whooping crane

Scientific Name:	Common Name:	Entity ID:
Grus americana	Whooping crane	67

Conclusion: No Jeopardy

Species Range

Based on range map dated: 10/15/2024; Wherever found, except where listed as an experimental population; *States within the range:* KS, LA, MT, ND, NE, OK, SD, TX

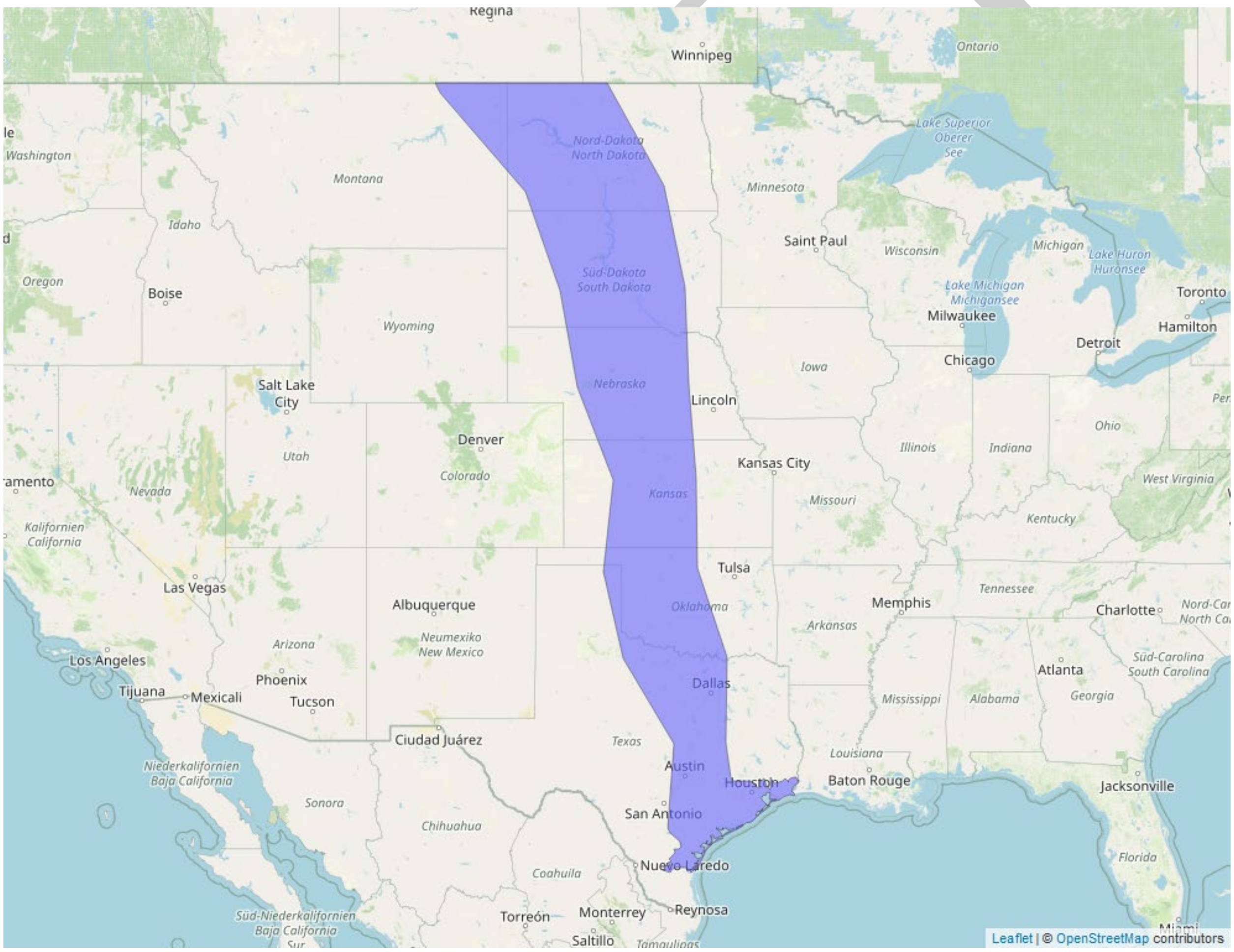

Figure 10. Range map of whooping crane (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/758.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Endangered

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 2/13/2012

Distribution: Small, endemic, constrained, and/or isolated population(s)

Number of populations: Multiple populations (few)

Species trends: Unknown population trends

Pesticides noted in Service documents as a threat to the species: Yes

Environmental Baseline/Cumulative Effects (EB/CE) Summary

The whooping crane is a long-lived migratory wetland bird formerly found from the Arctic coast south to central Mexico, from Utah east to New Jersey, South Carolina, Georgia, and Florida. They migrate between Canada and the northern US to Mexico and the southern US each year. Historically, over 10,000 whooping cranes populated North America. By the mid-1800s, an estimated 1,400 whooping cranes remained. By the mid-1900s, a few birds remained; they nested in Aransas-Wood Buffalo National Park (Wood Buffalo) in Canada and wintered in South Texas at what is now the Aransas National Wildlife Refuge (Aransas). Approximately 2/3 of the genetic material of the species was lost when the whooping crane went through a bottleneck of only 15 birds in 1941 (CWS and Service 2007). Since then, the Wood Buffalo/Aransas population has slowly increased to an estimated 279 individuals (April 2011) due to conservation efforts, including strict legal protection, habitat preservation, and continuous international cooperation between Canada and the United States. As of 2012, four geographically distinct populations existed in the wild; the only natural population remains at Wood Buffalo/Aransas (n=279), a reintroduced experimental non-migratory population in central Florida (n=20), an experimental population that migrates between Wisconsin and Florida (n=106), and a non-migratory flock in Louisiana (n=4, with an additional 2 individuals of unknown status). None of the reintroduced populations are self-sustaining (USFWS 2012).

Whooping crane population declines were caused primarily by shooting and destruction of habitat in the prairies from agricultural development (CWS and USFWS 2007). Significant portions of the migratory corridor were impacted by development, conversion to non-compatible land uses, or on-going land management resulting in habitat loss, degradation and fragmentation caused by draining of wetlands for conversion to croplands, urbanization, construction of roads and power lines, and most recently wind farms. Reintroduced whooping crane flocks lack large blocks of suitable habitat in which the species could prosper. Human population growth continues to expand into formerly suitable wintering habitat for whooping cranes, including development of homes, power lines, cell towers, and roads. As of 2012, 60% of wintering whooping cranes used the Aransas and Matagorda Island National Wildlife Refuges. With development occurring on private lands as people move to the Texas coast, potential for future flock expansion may be limited unless there is a large effort to protect additional lands.

Freshwater inflows starting hundreds of kilometers inland from the Guadalupe and San Antonio rivers flow into whooping crane habitat and critical habitat at and adjacent to Aransas. Inflows are needed to maintain proper salinity gradients, nutrient loadings, and sediments that produce an ecologically healthy and productive estuary, and they are essential to produce foods used by whooping cranes, especially blue crab populations. Collisions with power lines are a substantial cause of whooping crane mortality in migration.

Global warming and associated climate changes constitute a potential threat to whooping crane recovery. Rising temperatures could increase evaporation and dry up wetlands that whooping cranes use throughout the year. If the warmer temperatures are not counter-balanced by increased precipitation, the species would struggle facing increased drought-like conditions. Warming temperatures could also reduce the number and severity of winter freezes at Aransas, allowing black mangrove (Avicennia germinans) to spread its range northward into the crane area, an event that has been occurring over the past decade. Dense mangrove shrubs reduce visibility for cranes and would make the area unusable for cranes. Sea level rise and flooding of coastal wetlands are major threats. Since whooping cranes mostly only use water < 20 inches deep, projected sea level rise that could exceed 39 inches by the end of the century would make the current whooping crane winter range unusable.

There is no evidence that pesticide contamination has ever been a significant threat to whooping cranes. Whooping crane egg and tissue specimens examined for pesticide residues have shown concentrations well below those encountered in most other migratory birds. Eggshell thickness, a measure of contaminant exposure, was measured in eggs taken from the wild and captivity from the 1970s to 2012; no evidence of shell thinning was detected. One confirmed whooping crane chick and potentially other cases of acetylcholinesterase inhibition were associated with the experimental Eastern Migratory Population on Necedah National Wildlife Refuge. Acetylcholinesterase inhibition is suggestive of organophosphate exposure, though pesticides were not tested for in these cases. The refuge is downstream of cranberry bogs, and runoff from these sites is a suspected cause of any pesticide exposure (Pers. comm., Midwest Regional Office

2020). As carbaryl is not registered for use on cranberry bogs, we do not suspect carbaryl exposure in these cases.

(Note: This species has three experimental populations: EXPN Entity IDs 4679, 7342, and 10124.)

Overall Vulnerability: High

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

The species range map presented above represents migratory and wintering grounds of the Aransas-Wood Buffalo National Park population of the whooping crane. No individuals from this population breed in the action area. Data indicate that 23.4% of the species' range overlaps with agricultural use sites and 76.6% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 100% overlap [10] between the species' range and the agricultural footprint of simazine use sites (Table 13). As the species winters in the Aransas and Matagorda Island National Wildlife Refuges and surrounding areas, most of this overlap represents the migratory pathway.

Table 13. Agricultural use overlap and annual usage data (% Range Treated) for the whooping crane.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	<0.1	0.2	0.2	<0.1	<0.1	<0.1
Corn	15.2	36.2	51.4	0.9	2.5	3.4
Grapes	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Other Crops	7.5	44.5	52.1	<0.1	<0.1	<0.1
Other Orchards	0.1	6.5	6.6	<0.1	0.3	0.3

[10] Total overlap is capped at 100%.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Vegetables and Ground Fruit	0.5	5	5.5	<0.1	0.2	0.2
Christmas Trees	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total	**23.4**	**76.6**	**100**[10]	**0.9**	**3**	**3.9**

Usage

Past usage data indicate that up to 3.9% of the species' range has been treated with simazine annually from agricultural uses, with 0.9% occurring on agricultural fields and 3.0% resulting from off-site transport.

Additional Exposure Considerations

During winter, we expect that exposure to simazine use sites and adjacent areas will be minimal, as most foraging occurs in the brackish bays, marshes, and salt flats on the edge of the mainland and on barrier islands. Some whooping cranes use upland sites frequently in most years, but agricultural croplands adjacent to Aransas National Wildlife Refuge are rarely visited (CWS and Service 2007). The winter diet consists predominately of animal foods, especially blue crabs, clams, and the plant wolfberry. Furthermore, 60 percent of whooping cranes winter within the Aransas and Matagorda Island NWRs (USFWS 2012).

Whooping cranes are omnivorous and do feed on agricultural crops during migration, although they have not adapted to agricultural production because most of their life cycle is wetland-dependent. Although many important parts of their range have been protected through public ownership (refuges, parks, and wetland management areas), the cranes use migration habitat opportunistically and frequently use private lands (USFWS 2012). Uplands are particularly attractive when partially flooded by rainfall, burned to reduce plant cover, or when food is less available in the salt flats and marshes.

Agricultural areas, including corn and grain fields, are important stopover sites for whooping cranes during migration. Cranes have been known to consume seeds from recently planted fields in spring, and forage in agricultural fields after harvest during the fall and winter forage. Corn, wheat, barley, rice, and sunflower seeds are desirable foods. Given the timing of migration during spring and fall, we expect that exposure to simazine through pre-emergent applications made in the fall and winter is likely to occur.

Exposure from Non-agricultural Uses

We do not anticipate the whooping crane will occur in developed, open space developed, or nursery use sites. During winter, we expect that exposure to non-agricultural use sites for simazine will be minimal as most foraging occurs in the brackish bays, marshes, and salt flats on the edge of the mainland and on barrier islands.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals. We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to whooping cranes. We do not expect whooping cranes that are exposed to simazine as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

Of agricultural crops for which simazine is registered for use, whooping cranes are known to forage opportunistically in corn fields, where seeds are a preferred dietary item. Consumption of seeds on treated fields is not expected to result in adverse effects to whooping cranes, though concentrations of simazine on plants and arthropods can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we only anticipate these effects if individuals forage on plants and arthropods with maximum estimated concentrations of simazine on recently treated fields. Furthermore, we anticipate any exposure to simazine will be during migration, and not during breeding, when we would expect any reproductive effects to manifest. Thus, we expect a low likelihood of direct adverse effects of simazine to the whooping crane.

Indirect Effects

Available toxicity data suggests that arthropods are not likely to experience mortality with simazine exposure. While we anticipate off-site transport of simazine can negatively impact the growth and survival of sensitive plant species, we do not anticipate spray drift or runoff of simazine will destroy or limit the availability of vegetative communities that the species requires for its habitat. Furthermore, we anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will further minimize impacts to the species' necessary plant resources. As such, we do not anticipate the proposed action will result in measurable levels of indirect adverse effects to the species.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a small percentage of the species' range will be treated with simazine on agricultural fields annually. However, we only expect simazine concentrations to reach concentrations where adverse effects to the whooping crane will occur on simazine use sites. While 23.4% of the range overlaps with agricultural use sites of simazine, we expect simazine applications to occur on-field in just 0.9% of the species' range. We do not expect individuals will be present on-field during spray application, however, some individuals are likely to be exposed to contaminated food sources as the species is known to forage in simazine agricultural use sites during migration. We do not expect the whooping crane to be exposed to simazine as a result of non-agricultural use.

We expect individuals that consume arthropods or plants contaminated on use sites will contain simazine concentrations associated with reproductive effects. However, we expect simazine concentrations on seeds, a preferred food item of migrating whooping cranes on agricultural fields, to be lower and not associated with adverse effects in birds. Furthermore, we anticipate any exposure to simazine will be during migration, and not during breeding, when we would expect any reproductive effects to manifest. Thus, given the limited extent of simazine usage on agricultural fields within the range, the variable diet of the whooping crane, the lack of exposure to simazine during breeding, and the limited scenarios that we expect to result in adverse effects (i.e., foraging exclusively on food items with maximum estimated simazine residues from recently treated use sites), we do not anticipate whooping cranes will experience direct adverse effects.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance of food resources or vegetative habitat for the whooping crane.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The whooping crane historically once numbered over 10,000 individuals. It is currently comprised of four geographically distinct populations in the wild. Only one is a natural population numbering 279 individuals in 2011, located at the Aransas National Wildlife Refuge. There are also three experimental non-migratory populations. One was reintroduced to an area in central Florida (n=20), one migrates between Wisconsin and Florida (n=106), and on is a non-migratory flock in Louisiana (n=4, with an additional 2 individuals of unknown status). None of the reintroduced populations are self-sustaining. Threats to the species include impacts to significant portions of the migratory corridor from habitat degradation and fragmentation caused by draining of wetlands for conversion to croplands, urbanization, construction of roads and power lines, and more recently wind farms. Collisions with power lines are a substantial cause of crane mortality during migration. A big problem for reintroduced whooping crane flocks may be the lack of large blocks of suitable habitat. With development continuing on private lands, the potential for future flock expansion may become more limited unless there is a large effort to protect additional lands. The species has a high vulnerability ranking.

The whooping crane has a medium exposure ranking. While we expect 76.6% of the migratory and wintering grounds of the Aransas National Wildlife Refuge population (the non-experimental population) to overlap with agricultural use sites and off-site transport areas, and we anticipate up to 23.4% of this portion of the species' range will be treated with simazine, we expect simazine exposure to be low. Annual past usage data indicate that 3.9% of the species' range is treated with simazine, but only 0.9% occurs on agricultural fields. Whooping cranes wintering in coastal Texas are unlikely to forage on or near agriculture sites. Migrating whooping cranes are likely to forage in agricultural areas during stopovers. . Whooping cranes are not expected to occur or forage in most non-agricultural use sites of simazine. Additionally, no individuals from the Aransas-Wood Buffalo population breed in the action area. As such, we expect a small number of individuals will experience exposure from the proposed action.

The whooping crane has a medium toxicity ranking. Individuals exposed to simazine may experience direct effects such as reproductive effects (reduction in number of eggs, hatchling survival). However, we only anticipate these effects if individuals are feeding on plants and arthropods with maximum estimated concentrations of simazine on recently treated fields. Contextually, we expect exposure to simazine will occur during migration, not during breeding, when reproductive effects would typically occur. Furthermore, we do not anticipate indirect effects to the whooping crane, as impacts to vegetative and arthropod communities are not expected to limit their availability as food sources.

In summary, the species is highly vulnerable, its range overlap with simazine use sites is medium, and the percent of the species range and migratory pathway treated annually is low, and so we expect exposure to whooping cranes will be low. Migrating whooping cranes are not expected to forage in use sites during times when exposure will be most likely. While there may be contamination of some prey items, the species is a generalist feeder and is not expected to consume food items at the maximum estimated concentration, and prey availability is not expected to be impacted. We do not expect the effects from the proposed action will likely reduce the reproduction, numbers, and distribution of the species to an extent that will cause species-level effects. We anticipate no more than a very small number of individuals that at times forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the whooping crane.

References

U.S. Fish and Wildlife Service. 2012. Whooping Crane (*Grus americana*) 5-Year Review: Summary and Evaluation. Aransas National Wildlife Refuge, Austwell, Texas and Corpus Christi Ecological Service Field Office, Texas. 44 pp.

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. International Recovery Plan for the Whooping Crane (*Grus americana*). Ottawa: Recovery of Nationally Endangered Wildlife (RENEW) and Service Region 2. 162 pp.

Integration and Synthesis Summary: Yellow-billed Cuckoo

Scientific Name:	Common Name:	Entity ID:
Coccyzus americanus	Yellow-billed Cuckoo	6901

Conclusion: No Jeopardy

Species Range

Based on range map dated: 6/12/2023; Western DPS: U.S.A. (AZ, CA, CO (western), ID, MT (western), NM (western), NV, OR, TX (western), UT, WA, WY (western)); Canada (British Columbia (southwestern); Mexico (Baja California, Baja California Sur, Chihuahua, Durango (western), Sinaloa, Sonora); *States within the range:* AZ, CA, CO, ID, MT, NM, NV, OR, TX, UT, WA, WY

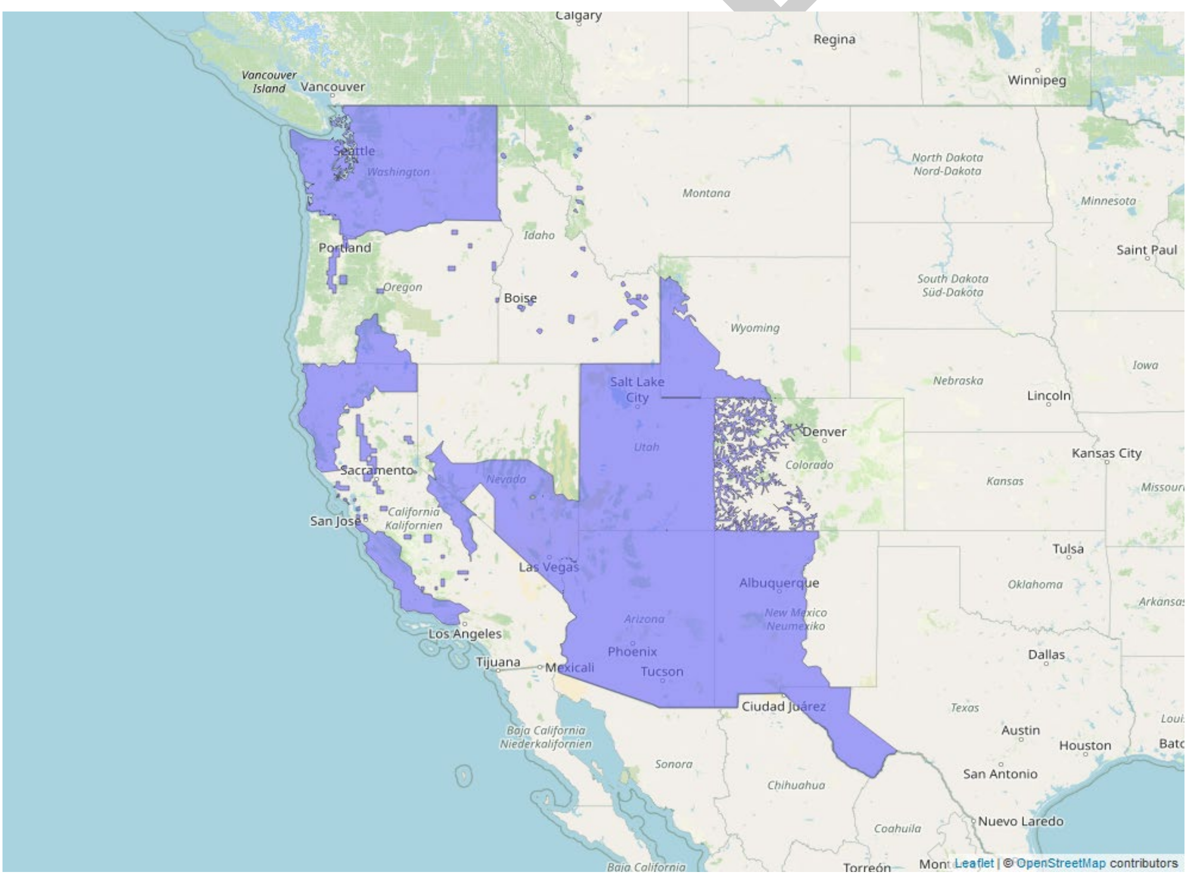

Figure 11. Range map of yellow-billed cuckoo (blue polygons). Range map accessed at https://ecos.fws.gov/ecp/species/3911.

Vulnerability

As mentioned in the Introduction, vulnerability considers the present and likely future condition of the species to determine its vulnerability to additional stressors. In making our jeopardy determination, vulnerability of the species is a function not only of its status, but also the environmental baseline and cumulative effects. These are summarized below for this species.

Summary of Status

Listing status: Threatened

Most recent 5-Year Review recommendation: No change in status

Most recently completed 5-Year Review: 9/16/2020

Distribution: Species/Populations neither constrained nor widespread

Number of populations: Multiple populations (few)

Species trends: All populations stable, with none known to be increasing or decreasing

Pesticides noted in Service documents as a threat to the species: Yes

Environmental Baseline/Cumulative Effects (EB/CE) Summary

The western yellow-billed cuckoo is a migratory bird species, traveling between its wintering grounds in Central and South America and its breeding grounds in North America (Continental U.S. and Mexico) each spring and fall, often using river corridors as travel routes. They breed in large tracts of dense riparian woodlands along low-gradient streams with riparian trees present (i.e., cotton wood (*Populus* spp.) and willow (*Salix* spp.)) and more arid riparian woodlands, desert scrub, desert grasslands drainages, and Madrean evergreen woodland drainages. The western yellow-billed cuckoo's breeding range is known from 12 states in the U.S. (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming) and six states in Mexico. Current western yellow-billed cuckoo breeding populations are fragmented and geographically isolated. They used to be found in British Columbia; they are believed to be extirpated in Canada and breeding was last documented in Oregon and Washington in the 1930s-1940s. The last statewide assessment in ID (2003-2005) estimated the breeding population was limited to 10-20 breeding pairs in the Snake River Basin. As of 2019, very few breeders (<5 breeding pairs) were believed to be in Wyoming. Yellow-billed cuckoos are uncommon in Utah and Nevada (<10 breeding pairs each) and extremely rare in Colorado. Yellow-billed cuckoos used to be widespread and locally common in California; numbers have declined 99% from historical levels and are estimated to be 18% of levels observed in the late 1970s. As of 2019, nesting numbers continue to decline and numbers were estimated at 40-50 breeding pairs during the last statewide survey. In Arizona, the species used to be widespread and locally common but has been declining for the last several decades. There may be 350-450 territories (breeding pairs or single birds) in the state as of 2019. In New Mexico, 190-235 pairs were estimated to breed by 2019 in the state. The most recent estimates of total population size were 800 pairs in the U.S. and 500 pairs in Mexico (USFWS 2019).

In 2020, we found that delisting of the western yellow-billed cuckoo was not warranted because the threats identified in the final listing rule are still acting on the species and continue to affect the cuckoo's viability. The primary factors threatening the western DPS of the yellow-billed cuckoo are the loss and degradation of habitat for the species from altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture, and conversion of native habitat to predominantly nonnative vegetation. Additional threats to the species include the effects of climate change, pesticides, wildfire, and small and widely separated habitat patches. Threats associated with habitat destruction, modification, and degradation are related to dam construction and operations, water diversions, riverflow management; stream channelization and stabilization; conversion to agricultural uses, such as crops and livestock grazing; urban and transportation infrastructure; and increased incidence of wildfire. Continuing ramifications of actions that caused habitat loss in the past have resulted in ongoing curtailment of the habitat of the western yellow-billed cuckoo throughout its range. These factors also contribute to fragmentation and promote conversion to nonnative plant species, particularly tamarisk. Loss of riparian habitat leads not only to a direct reduction in western yellow-billed cuckoo numbers but also leaves a highly fragmented landscape, which in combination with other threats, can reduce breeding success through increased predation rates and barriers to dispersal by juvenile and adult western yellow-billed cuckoos. Threats associated with habitat rarity and small and isolated population sizes make the remaining western yellow-billed cuckoo populations increasingly susceptible to further declines through lack of immigration, reduced populations of prey species (food items), pesticides, and collisions with tall vertical structures during migration. The serious and ongoing threat of small overall population size, which is the result of other threats in combination, leads to an increased chance of local extirpations. Patch size, when coupled with habitat loss and other threats facing the species, including proximity to incompatible land uses, which increases exposure to predators and pesticides, is a significant cumulative threat to the western yellow-billed cuckoo now and in the future. In addition, minerals mining projects negatively impact recently identified occupied habitat in central and southern Arizona (USFWS 2020, 2019).

Overall Vulnerability: Medium

Effects of the Action: Exposure

Overlap with Agricultural Use Sites

Data indicate that 4% of the species' range overlaps with agricultural use sites and 21% of the species' range overlaps with areas adjacent to use sites that are likely exposed through off-site transport (e.g., through spray drift or runoff). In total, there is up to 25% overlap between the species' range and the agricultural footprint of simazine use sites (Table 14).

Table 14. Agricultural use overlap and annual usage data (% Range Treated) for the yellow-billed cuckoo.

Use Layer	Use Site Overlap (% range)	Off-Site Overlap (% range)	Total Overlap (% range)	% Range Treated On-Site	% Range Treated Off-Site	% Total Range Treated
Citrus	<0.1	0.5	0.5	<0.1	<0.1	<0.1
Corn	0.4	3.4	3.8	0.1	1.2	1.4
Grapes	0.2	1.6	1.8	<0.1	0.6	0.7
Other Crops	2.3	9.8	12.0	0.5	1.3	1.8
Other Orchards	0.5	3.6	4.1	0.1	0.9	1.1
Vegetables and Ground Fruit	0.8	3.6	4.5	<0.1	0.3	0.3
Christmas Trees	<0.1	0.6	0.6	<0.1	0.5	0.5
Total	**4**	**21.0**	**25.0**	**0.9**	**4.2**	**5.1**

Usage

Past usage data indicate that up to 5.1% of the species' range has been treated with simazine annually from agricultural uses, with 0.9% occurring on agricultural fields and 4.2% resulting from off-site transport.

Additional Exposure Considerations

The primary dietary item of the yellow-billed cuckoo is large insects such as cicadas, katydids, and caterpillars. They may also take frogs and lizards. In summer and fall, cuckoos forage on small wild fruits, including elderberries, blackberries and wild grapes. In winter, fruit and seeds become a larger part of the diet.

Yellow-billed cuckoos may forage, roost, and breed in orchards, managed forests, right of ways, and golf courses where trees are present. They also may forage in right of ways, golf courses, rangeland, and developed open spaces adjacent to riparian, mesquite, or mixed oak woodland where large insects are available. Cuckoos are likely to forage in crop edges, but not within the crop. Use of developed areas with impervious surfaces above 50% is unlikely. (Pers. comm. 2016 co-occurrence information, USFWS field office request).

Exposure from Non-Agricultural Uses

Yellow-billed cuckoos use developed and open-space developed areas if suitable habitat conditions exist and as such may be exposed to non-agricultural uses of simazine. However, given our knowledge of simazine application to turf and nursery areas (see *Exposure to Non-Agricultural Uses*, above), we expect simazine usage within the range of the yellow-billed cuckoos to be limited.

Conservation Measures

There are several conservation measures on the simazine label that apply to all uses and are intended to reduce spray drift to off-site areas, including a 15-foot spray drift buffer and ground use only restriction. In addition, three runoff mitigation points are required for all simazine uses to reduce simazine concentrations in runoff. We expect these measures will reduce the concentration of simazine entering terrestrial and aquatic habitats by up to an order of magnitude (i.e., up to a 90% reduction in simazine residues in spray drift and runoff).

Effects of the Action: Toxicity

Direct Effects

For listed terrestrial animal species, we anticipate dietary exposure will result in the highest levels of exposure. While individuals may be exposed through other routes (e.g., dermal exposure, inhalation, drinking water), we anticipate these routes of exposure will result in much lower levels of exposures to individuals and will not significantly contribute to the overall exposure and resulting effects to individuals.

We expect consumption of food items in and around simazine use sites to be the primary route of simazine exposure to yellow-billed cuckoos. The yellow-billed cuckoo feeds primarily on insects, small terrestrial vertebrates such as amphibians and lizards, and fruits and sees. We do not expect yellow-billed cuckoos that are exposed to simazine on food resources as a result of off-site transport will experience adverse effects and thus focus our analysis to effects on use sites within the range.

We expect that if yellow-billed cuckoos forage on prey items such as insects, amphibians, and lizards that have been exposed on use sites, concentrations of simazine can reach levels associated with reproductive effects such as reduction in in number of eggs laid, viable 3-week embryos, hatchling survival, and 4-day old chick survival. However, we expect a range of concentrations to be associated with contaminated prey species, and we only anticipate these effects if individuals forage on prey with maximum estimated concentrations of simazine on recently treated fields. We anticipate this will occur infrequently, as yellow-billed cuckoos are expected to consume a varied diet that will also include fruits and sees, which are not expected to reach concentrations that will result in adverse effects if consumed, as well as resources off treated fields. However, an individual yellow-billed cuckoo feeding exclusively on prey exposed on treated use sites even a short period of time, such as a single day, may still accumulate a significant body burden of pesticides, despite this species having a generally varied diet.

Indirect Effects

Available toxicity data suggests that prey of the yellow-billed cuckoo are not likely to experience any mortality with simazine exposure. While individual terrestrial vertebrates may experience growth or reproductive effects if exposed to simazine on use sites, we anticipate the required mitigation measures on product labels (including mandatory spray drift buffers and three points of runoff mitigation) will preclude off-site concentrations of simazine from reaching levels where we expect effects to occur. As such, we do not anticipate simazine use is likely to reduce the availability or abundance of prey that the species relies on as food resources. While we anticipate off-site transport of simazine can negatively impact the growth and survival of sensitive plant species, we do not anticipate spray drift of runoff of simazine will destroy or limit the availability of complex vegetative structure that the species requires for its habitat, nor limit the availability of food resources, especially in light of the required mitigation measures. As such, we do not anticipate the proposed action will result in measurable levels of indirect adverse effects to the species.

Effects of the Action Summary

There is a large extent of overlap between the species' range and the action area, and pesticide usage reporting indicates that a moderate percentage of the species' range will be treated with simazine on agricultural fields annually. However, we only expect simazine concentrations to reach concentrations where adverse effects to the yellow-billed cuckoo and its prey will occur on simazine use sites. While 4% of the range overlaps with agricultural use sites of simazine, we expect simazine applications to occur on-field in just 0.9% of the species' range. While the yellow-billed cuckoo and its prey may be exposed to simazine from use in non-agricultural areas, we expect non-agricultural usage of simazine within the range of the species to be low.

We expect individuals that exclusively eat prey contaminated on use sites recently treated with simazine will experience reproductive effects. While yellow-billed cuckoo are not expected to forage within crops, they may forage on the edge of fields where simazine concentrations are likely to be similar to on-field values. However, given the small extent of overlap with simazine use sites within the range of the species, the limited extent of usage on these sites, the variable diet of the yellow-billed cuckoo, and the limited scenarios that we expect to result in adverse effects (i.e., foraging exclusively on prey with maximum estimated simazine residues from recently treated use sites), we anticipate that very few individuals will experience reproductive effects from simazine use.

In addition, with implementation of required conservation measures on product labels, we do not anticipate simazine use is likely to reduce the availability or abundance prey or plant resources that the yellow-billed cuckoo relies on as food resources.

Thus, we conclude the overall risk of adverse effects to the species is low.

Species Conclusion

The yellow-billed cuckoo is a threatened species, with multiple stable populations ranging twelve western states and Central and South America. The cuckoo inhabits large, dense riparian woodlands, desert scrub and Madrean evergreen woodlands during its breeding season. Their primary food items are cicadas, katydids, caterpillars, frogs, lizards and wild fruits and seeds. The populations are fragmented and geographically isolated, and while historically common, they are now rare and have only small numbers of breeding individuals. The primary threat to the species is the loss and degradation of habitat, namely from altered watercourse hydrology, livestock overgrazing, and agricultural encroachment. Additional threats include climate change, pesticides, wildfire, and habitat fragmentation. The ongoing threat of overall population size increases the chance of local extirpations.

Species range data indicate that the species range overlaps with 25% of the agricultural footprint of simazine use sites (use sites and adjacent areas exposed to simazine by off-site transport), four percent of which overlaps directly with use sites. Annual past usage data demonstrate that 5.1% of the species' range has been treated annually with simazine, but only 0.9% of that has occurred directly on agricultural fields. Cuckoos are likely to forage in crop edges, but not the crop itself, and they may forage, roost and breed in golf courses, right of ways and developed open spaces adjacent to riparian or mixed woodlands where insect prey are available. Yellow-billed cuckoos may be exposed to simazine while occurring on non-agricultural use sites, however based on our knowledge of turf and nursery areas, we expect this exposure to be limited.

We anticipate that the dietary route will be the highest level of exposure. If the yellow-billed cuckoo forages on prey items such as arthropods, reptiles and amphibians that have been contaminated by simazine on use sites, the cuckoo will be exposed to those concentrations, which could reach levels associated with reproductive effects (reduction in eggs laid, hatchling survival). However, because the cuckoo's diet is varied, and we expect prey species to be associated with a range of concentrations, we anticipate that the chances of adverse effects to the cuckoo will be low. We expect adverse effects to the cuckoo when it exclusively consumes prey items contaminated with the maximum estimated concentration of simazine on recently treated fields, and we anticipate this scenario will be infrequent. We also do not expect simazine use is likely to reduce the availability or abundance of food items (animal or vegetative), especially with the required label mitigation language that we anticipate will reduce spray drift and runoff to adjacent areas by an order of magnitude.

In summary, the yellow-billed cuckoo is a moderately vulnerable species with high overlap with simazine use sites, though past usage data indicates that the percent of species range treated is low. We do not expect direct or indirect effects to the species from its exposure to the action. While there may be contamination of some prey items, the species is a generalist feeder and is not expected to consume food items at the maximum estimated concentration, and prey availability is not expected to be impacted. We do not expect the effects from the proposed action will likely reduce the reproduction, numbers, and distribution of the species to an extent that will cause species-level effects. We anticipate no more than a very small number of individuals that frequently forage on simazine use sites will experience reductions in fitness related to growth and reproduction. After reviewing the current status of the species, environmental baseline for the action area, cumulative effects, and effects of the action (including the conservation measures that are incorporated into the proposed action), we have determined the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of the species in the wild. Thus, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the yellow-billed cuckoo.

References

U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Findings on a Petition To Delist the Distinct Population Segment of the Western Yellow-Billed Cuckoo and a Petition To List the U.S. Population of Northwestern Moose. Final Rule. Federal Register 85: 57816-57818.

U.S. Fish and Wildlife Service. 2019. Species Assessment and Listing Priority Assignment Form for the Yellow-billed Cuckoo. Albuquerque, New Mexico. 28 pp.

U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*). Final Rule. Federal Register 79: 59991-60038.

Species requiring further analysis

In our draft Biological Opinion, we focused our analyses on 1) species with low expected exposure to simazine (due to low overlap, usage, or conservation measures adopted prior to consultation), and 2) species with more than low levels of exposure that benefited from conservation measures identified through the Herbicide Strategy that aimed to reduce off-site transport of simazine (i.e., listed plants and listed animals that depend on plant resources). For the species in Table 15, we identified the need for further coordination. We expect Herbicide Strategy conservation measures to reduce pesticide loading into aquatic habitats by up to 90% (i.e., one order of magnitude) compared to unmitigated runoff, and reduce spray drift from entering species' terrestrial habitats by >95%. We anticipate that this reduction will minimize off-site transport of simazine to a level where no more than low levels of adverse effects are likely to occur to mammals through this exposure route. However, these species are highly vulnerable, and while the required mitigations are expected to reduce the extent of off-field exposure and reduce exposure concentrations, we anticipate simazine residues on use sites could remain at levels high enough to cause greater than low levels of adverse direct and/or indirect effects to these species. They may occur on simazine use sites, either agricultural or non-agricultural. We intend to continue coordinating with EPA and simazine registrants between the release of this draft Opinion and the transmission of the final Opinion to gain information regarding the exposure and effects of this species to simazine. As such, we have not yet made a determination for this species.

Table 15. Species requiring further analysis

Common Name	Scientific Name	Vulnerability Ranking	Exposure Ranking	Toxicity Ranking
Streaked horned lark	*Eremophila alpestris strigata*	High	High	Medium