Integration and Synthesis Summary for Plants

Monocot flowering plants in terrestrial or flowing wetland habitats

This Integration and Synthesis Summary includes our jeopardy analysis for plant 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.

The species in this I&S appendix were grouped together as they occur in similar types of habitats (i.e., terrestrial or flowing wetlands) and were predicted by EPA to be exposed to similar concentrations of simazine from agricultural or non-agricultural uses. 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). We anticipate agricultural exposures in the terrestrial or flowing wetland habitats where these species occur are at low enough levels where the label measures (including the 15-foot spray drift buffer and three runoff points) adequately reduce simazine concentrations to levels where effects are expected to be low.

Monocot flowering plants are placed together simply for ease of organization. Dicot and non-flowering plants with similar exposure profiles are found in a separate I&S (Appendix C-B2).

Vulnerability

For the plant species that we or EPA determined are "likely to be adversely affected" by the proposed action, we considered several factors for each listed plant 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).

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

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 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 listed plant species will be exposed to simazine primarily through direct contact, 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 on the market, indicating that off-site transport, particularly through runoff, may result in exposure to listed plant species in areas far from use sites.

[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.

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

Exposure to Agricultural Uses

Simazine has several registered agricultural uses (see Appendix 1-4 of EPA's Biological Evaluation) in the conterminous United States. 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 or soil preferences), 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 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 agricultural 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 agricultural exposure ranking the same score (e.g., if both overlap and usage is high, the agricultural 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 agricultural 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 agricultural exposure ranking of medium. For species where there are additional exposure considerations, we adjust the agricultural 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, Christmas trees, grapes, and other orchards only within the conterminous 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.

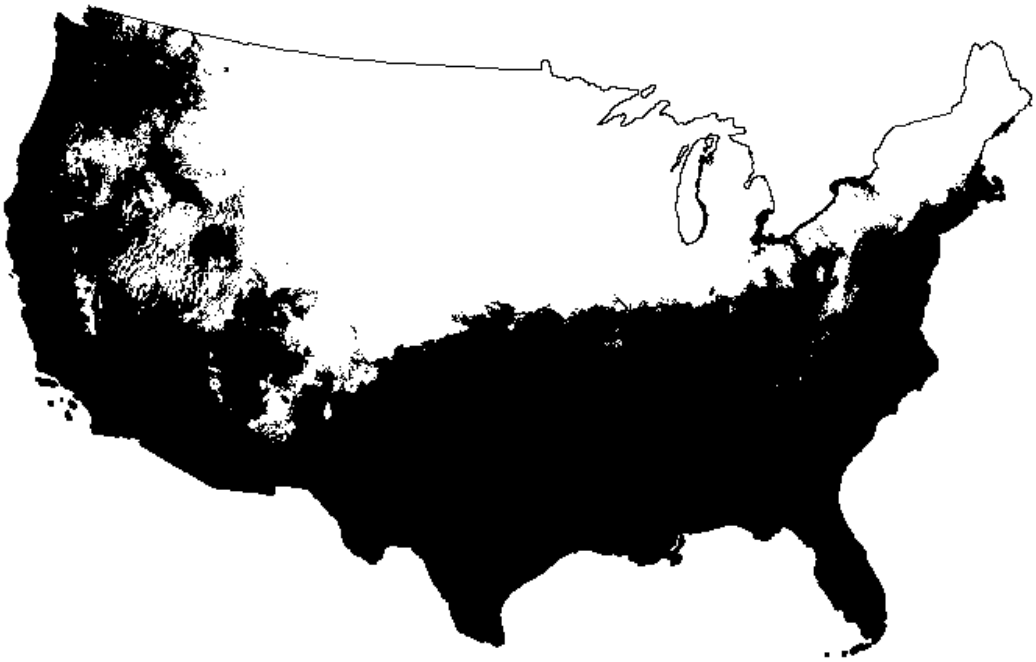

Figure 1. Map showing where cool-season grasses (white areas) and warm-season grasses (black areas) are used on turf across the continental U.S.

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.

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 more than low levels of adverse effects to most listed plants 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 near 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) likely to occur in exposed individuals. Indirect effects are based on the impact a listed species is

[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.

likely to experience when the organisms they rely on, such as those that act as pollinators or seed dispersers, are exposed to simazine and experience adverse effects.

Given that herbicides like simazine are designed to control plants, we assume listed plant species are sensitive to simazine exposure. In general, we anticipate individuals exposed to simazine are likely to experience direct adverse effects in the form of reduced biomass and growth, which, in severe cases, would result in mortality of individuals. Based on the available toxicity data in plants for simazine, we use the HC_{05} (i.e., the exposure concentration where we expect more than 95% of plant species would not experience measurable impacts) for biomass at seedling emergence and compare that to the estimated environmental concentration (EEC) of simazine for each listed species to determine the anticipated level of adverse effects simazine. In contrast, available toxicity data indicate that animal species, including potential pollinators and seed dispersers of listed plant species, are not likely to die from simazine exposure, suggesting that indirect adverse effects are not likely to occur to listed plant species.

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.

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,

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

- 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-site transport of simazine from spray drift to a level where no more than low levels of effects are likely to occur to listed 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 conservation 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

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

general label requirement of three 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).

For all the species in this document, we expect the spray drift and runoff measures, including the 3 runoff points and 15-spray drift buffers required under the Herbicide Strategy, 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. We anticipate this level of mitigation will protect listed plant species by reducing the number of individuals exposed (by reducing the extent of off-site transport of simazine residues) and reducing the level of adverse effects that will occur to exposed individuals (by reducing estimated exposure concentrations).

Summary of conclusions for monocot flowering plants in terrestrial or flowing wetland habitats with low exposure achieved through conservation measures on the general label

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed registration of simazine with conservation measures, and the cumulative effects, it is the Service's biological opinion that the registration of simazine, as proposed, is not likely to jeopardize the continued existence of the 10 plant species in this appendix.

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 indicated that effects could be different, would have had an individual discussion to provide additional explanation; we did not have any species that warranted individual discussions in this appendix. This approach allowed us to streamline our discussion in this Opinion by avoiding repeating our findings when we expected species in the respective groupings would 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 detailed process for each species-specific analysis remained the same, including for species for which we summarized our findings in tables below.

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

The species in Table 1 occurs completely within California, and very little of its range has been treated with simazine in the past (0.2%) according to California Department of Pesticide Regulation's Pesticide Use Reporting data (CalPUR). 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 account can be found in Appendix B.

Table 1. Species with low exposure informed by low past 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	Exposure Ranking	Toxicity Ranking	% Range Treated (CalPUR)	Determination
Thread-leaved brodiaea	*Brodiaea filifolia*	Medium	Low	High	0.2	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 of the species in Table 1 is medium. Thread-leaved brodiaea typically occurs on gentle hillsides, valleys, and floodplains in association with valley needlegrass grassland, valley sacaton grassland, non-native grassland, alkali playa, vernal pools soils and in the interstitial spaces within coastal sage scrub. Over half of the species occurrences (75 of 141) benefit from some level of conservation through a Habitat Conservation Plan or similar conservation plan. On Marine Corps Base Camp Pendleton, three of 51 occurrences are in protected or managed areas (USFWS 2023). It is not known to occur on agricultural simazine use sites.

Based on an individual review of available life history information for the species, we expect non-agricultural use sites do not provide necessary habitat for thread-leaved brodiaea (e.g., grasslands and vernal pools), therefore, the species is unlikely to be exposed to non-agricultural simazine uses.

Toxicity is expected to be high, mainly due to expected toxic effects that will occur if the plant is directly exposed to simazine. However, we anticipate very little of the species' range will be treated with simazine based on past simazine usage. CalPUR simazine usage data indicate that very little simazine was used within the sections where this species' range occurs from 2013-2022. Given that this usage reporting is mandated by the state of California and that these data are provided regularly at a relatively high spatial resolution (i.e., at the section level, which is per

square mile), 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. Private residential pesticide use is not required for reporting to CalPUR, but we expect this use is minimal near the thread-leaved brodiaea.

In summary, while the species in Table 1 has a medium vulnerability ranking and is likely to e reduced growth and possibly mortality if exposed to simazine, we expect the thread-leaved brodiaea to experience no more than low levels of exposure to simazine based on the low level of agricultural overlap within the species' range and low exposure resulting from non-agricultural uses. Given that we expect exposure is low for all simazine uses across the species' range, we have high confidence that, at most, only very small numbers of thread-leaved brodiaea are likely be exposed to simazine and either die or experience sublethal effects (e.g., reduced growth). We do not expect indirect adverse effects through reductions in pollinators or seed dispersers from simazine 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 the proposed action is not expected to appreciably reduce survival and recovery of this 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 1.

References:

U.S. Fish and Wildlife Service. 2023. *Brodiaea filifolia* (Thread-leaved brodiaea) 5-Year Review: Summary and Evaluation. Carlsbad, California. 51 pp.

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

For the species in Table 2, very little of its range has been treated with herbicides, potentially including simazine, for agriculture in the past (1.2%) 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 account 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
Western lily	*Lilium occidentale*	High	Low	High	1.2	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 of the species in Table 2 is medium. Western lily is restricted to a narrow strip along the Pacific coast between Coos Bay, Oregon and Eureka, California. It is an early successional species found in freshwater wetlands, coastal prairie and scrub, and edges of Sitka spruce forest. In 2006, potential habitat on a golf course was destroyed, and presence of the lily was not confirmed there (USFWS 2009, 2024). It is not known to occur on agricultural simazine use sites.

Based on individual review of available life history information for the western lily, we expect non-agricultural use sites do not provide the species' necessary habitat (e.g., freshwater wetlands, coastal prairie), therefore, this species is unlikely to be exposed to non-agricultural uses of this herbicide. Western lily could occur near golf courses, but we do not expect the species to occur on areas of a golf course where simazine would be applied. With the standard practices used for turf management (i.e., no till, continuous cover), we expect that any plants exposed to simazine from golf course runoff will experience no more than low levels of adverse effects to growth..

Toxicity is expected to be high, mainly due to expected toxic effects that will occur if the plant is directly exposed to simazine. However, we anticipate very little of the species' range will be treated with simazine because low levels of herbicides, potentially including simazine, have occurred in the past across its range. Low CoA usage indicates that very little agricultural herbicide usage occurred in the past in the counties where the species range occurs. Given that this reporting broadly includes all herbicide usage on agriculture, we consider CoA data to be

conservative estimates of simazine usage that indicate very little of the species' range is likely to be treated.

In summary, while the species in Table 2 has a high vulnerability ranking and is likely to die or experience reduced growth if exposed to simazine, we expect the western lily to experience no more than low levels of exposure to simazine based on the low level of agricultural overlap within the species' range and limited potential for exposure from non-agricultural uses. Given that we expect exposure is low for all simazine uses across the species' range, we have high confidence that, at most, only very small numbers of western lilies are likely to be exposed to simazine and either die or experience sublethal effects (e.g., reduced growth). We do not expect indirect adverse effects through reductions in pollinators or seed dispersers from simazine 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 the proposed action is not expected to appreciably reduce survival and recovery of this 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 2.

References:

U.S. Fish and Wildlife Service. 2024. 5-Year Review Western lily (*Lilium occidentale*). Arcata, California. 7 pp.

U.S. Fish and Wildlife Service. 2006. *Lilium occidentale* (Western lily) 5-Year Review: Summary and Evaluation. Arcata, California. 50 pp.

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

The species in Table 3 were grouped together because we expect low agricultural exposure after incorporating spray drift and runoff conservation measures on the simazine label and low likelihood of non-agricultural exposure. We expect off-site transport to be low, and 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. Plant species with low agricultural exposure with conservation measures from spray drift and runoff conservation measures and low likelihood of non-agricultural exposure.

Common Name	Scientific Name	Vulnerability Ranking	Agricultural Exposure Ranking	Toxicity Ranking	Habitat Description	Determination
Chinese Camp brodiaea	*Brodiaea pallida*	Medium	Low	High	Rocky seasonal intermittently wet creek beds (USFWS, 2012)	No Jeopardy
Dwarf lake iris	*Iris lacustris*	Medium	Low	High	Lake shorelines (USFWS, 2024)	No Jeopardy
Kral's water-plantain	*Sagittaria secundifolia*	Medium	Low	High	Fast-flowing streams (USFWS, 2020a)	No Jeopardy
Munz's onion	*Allium munzii*	High	Low	High	Terrestrial (NatureServe, 2015)	No Jeopardy
Navasota ladies-tresses	*Spiranthes parksii*	High	Low	High	Intact post oak savannas that are influenced by periodic wildfire (USFWS, 2020b)	No Jeopardy
Sonoma alopecurus	*Alopecurus aequalis var. sonomensis*	High	Low	High	Wetland (NatureServe, 2015)	No Jeopardy
Texas wild-rice	*Zizania texana*	High	Low	High	Riverine (NatureServe, 2015)	No Jeopardy
White fringeless orchid	*Platanthera integrilabia*	Medium	Low	High	Seeps, bogs, swamps (USFWS, 2021)	No Jeopardy

C-B1. Monocot Plants with Low Exposure Achieved Through Conservation Measures on the General Label: Integration and Synthesis Summaries

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 rankings of the species in Table 3 are high or medium.

EPA's Herbicide Strategy requires a minimum of three runoff mitigation points and a 15-foot spray drift buffer on all agricultural simazine applications, which will reduce estimated environmental concentrations of simazine from agricultural uses by up to 90% (or an order of magnitude) for the species in this group. Applicators must select runoff and erosion control practices from EPA's mitigation menu, which is designed to be flexible while ensuring site-level risk is reduced. These general conservation measures will both reduce the number of individuals exposed (by reducing the extent of off-site transport of simazine residues) and reduce the level of adverse effects that will occur to exposed individuals (by reducing estimated exposure concentrations). We expect these mitigations 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. We do not expect these species to occur on agricultural simazine use sites.

In addition, we qualitatively evaluated the potential for simazine exposure from non-agricultural use sites (i.e., nurseries and turf, including golf courses and lawns) to individual species based on information from recent Service documents, such as the Status of the Species (Appendix B), and 5-year Status Reviews, Species Status Assessments, Recovery Plans, and similar documents found on ECOS (https://ecos.fws.gov/ecp), pertaining to their preferred habitat and habitat use, occurrence information, and existing protections. Based on individual reviews of available life history information for 7 of the 8 species in Table 3, we expect 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. Though the dwarf lake iris may occur on or near golf courses, it occurs in Michigan and Wisconsin where cool-season grasses are grown on golf courses, and we do not expect simazine to be applied to cool-season grasses (Figure 1).

For species in more terrestrial areas such as Munz's onion and the Navasota ladies' tresses, we do not anticipate simazine will reach these areas from agricultural uses of simazine based on the spray drift buffer, or from non-agricultural uses of simazine based on the habitats where these species are found.

When an individual of these plant species is exposed to simazine, toxicity is expected to be high, mainly because they will either die or experience reduced growth. However, their habitats (e.g., wetlands, savannas) will be exposed to very low levels of simazine after incorporating conservation measures for both spray drift and runoff as part of the proposed action. We do not expect reductions in pollinators and seed dispersers of listed plant species from simazine exposure, and therefore, indirect adverse effects are not likely to occur for these species.

Given that we expect exposure is low for all simazine uses across the species' ranges, we have high confidence that, at most, only very small numbers of the species in Table 3 are likely to be

exposed to simazine and either die or experience sublethal effects (e.g., reduced growth). We do not expect indirect adverse effects through reductions in pollinators or seed dispersers from simazine 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 the proposed action is not expected to appreciably reduce 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.

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