Integration and Synthesis Summary for Plants, CONUS and NL48

Conifers and Cycads; Monocots and Dicots with Abiotic Pollination Vectors

Assessment Groups 3, 4, & 8

This Integration and Synthesis Summary includes our jeopardy analysis for any 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 our rankings (high, medium, low) for vulnerability, exposure, and toxicity. Data and information used to determine individual species' rankings is found in Appendix XX, and a template worksheet for how rankings were assessed and combined are in Appendix YY. Plants in this appendix are either conifers and cycads (Group 3), monocot flowering plants that use abiotic pollination vectors such as wind or water (Group 4), or dicot flowering plants that use abiotic pollination vectors (Group 8). The species in these plant assessment groups were grouped together as they all (with one exception, described below) use abiotic pollination vectors, such as wind or water, to reproduce sexually. In other words, wind or water transports pollen from male flowers or cones to female flowers or cones to produce seeds. Species in these assessment groups are found inside the conterminous United States (CONUS) or outside CONUS (non-lower 48 or NL48, which includes the State of Hawaii and Pacific and Caribbean U.S. territories).

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 summarize the current vulnerability of that species to additional stressors. This effort allows us to consider whether a species' current condition is moving toward recovery or further decline. In general, we expect the species' vulnerability to additional stressors to be higher if they are moving toward further decline than if their condition is improving. We also identify which species are most (and least) susceptible to additional stressors in general based on information that could be surmised from species listing and recovery documents, or other sources as cited and considered in the *Status of the Species* section of this biological opinion (Appendix B).

Our assessment of vulnerability focuses on seven factors: (1) the species listing status and recent 5-year status review recommendation (if available), (2) distribution, (3) number of populations, (4) species population trends, (5) if pesticides have been noted as a threat, (6) if pollinator loss has been noted as a threat, and (7) 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 XX), overarching Environmental Baseline section of this Opinion, five-year species status reviews, species recovery plans, species status assessments, and other sources containing the best available scientific information for the species.

We scored each of the seven vulnerability components with high, medium, or low scores. We assigned a high vulnerability ranking to a species if all vulnerability components were scored as medium or high. We assigned a medium vulnerability ranking if a species' scores were a mix of high and low (though exceptions were allowed for species that have a low status score or have an uplisting recommendation). We assigned a low vulnerability ranking to species with only low or medium scores. Considerations regarding specific aspects of the species vulnerability, or beyond what was included in the vulnerability ranking were applicable for some species depending on unique aspects of their life history. This information is reflected in the rationales for conclusion below.

Exposure

We anticipate plants and their pollinators will primarily be exposed to methomyl through direct contact, either as the result of exposure to pesticide applications on-field or through spray drift off-field. Methomyl degrades quickly in the environment (i.e., within a few days) and as such is not likely to persist on surfaces or in the air for prolonged periods of time.

We characterize the expected level of exposure using overlap data, past usage data, and any species-specific considerations such as life history information (e.g., habitat preferences, pollinator preferences) and existing protections or conservation actions. Species with greater than 10% overlap between their range and methomyl 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 with methomyl use sites, we considered past methomyl usage data within a species' range to determine how much of a species' range we expect to be treated with methomyl 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 biological opinion. Species that data indicate will have a large portion of their range (>10%) treated with methomyl each year are assigned a high usage score. Species that will have a medium portion of their range (5-10%) treated with methomyl each year are assigned a medium usage score, and species that data indicate will have a low portion of their range (<5%) treated with methomyl 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.

Toxicity

We characterize the expected toxic effect to species based on the anticipated level of direct and indirect[1] adverse effects to individuals. Our analysis of toxicity assumes individuals are exposed to methomyl 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 likely to experience when the organisms they rely on, such as those that act as pollinators or seed dispersers, are exposed to methomyl and experience adverse effects.

Available toxicity data indicate that plants will not experience any direct adverse effects to survival, growth, or reproduction with exposure to methomyl. In contrast, available toxicity data indicate that insects, including those that act as pollinators and seed dispersers for listed plants, are sensitive to methomyl at estimated environmental concentrations and are likely to experience mortality from exposure on both application sites and adjacent areas exposed via drift. However, we expect insect species to exhibit a range of sensitivities to methomyl and do not anticipate the entire insect pollinator community will experience mortality. Plants that rely on a select few species of pollinators or seed dispersers (i.e., specialists) are likely to experience high levels of indirect effect as high mortality in a few insect pollinator species can significantly reduce pollination and seed dispersal. In contrast, generalist plants that can use a wide range of insect species are likely able to recover more quickly from temporary losses of some insect species, resulting in lower levels of indirect effects from the proposed Action.

Bird and mammal pollinators/seed dispersers are less sensitive to methomyl exposure than insects. While methomyl exposure in birds and mammals can cause mortality under specific circumstances (i.e., by consuming exclusively contaminated food items on or adjacent to methomyl use sites) we do not expect methomyl use is likely to appreciably diminish the availability of bird or mammal pollinators or seed dispersers. For species where the relationship with pollinators and seed dispersers is unknown, we make the conservative assumption that the species has a specialist-type relationship exclusively with insect pollinators and seed dispersers.

We evaluate indirect effects by assessing (1) how critical biotic outcrossing is to the species, (2) the type of pollination vector required, (3) the type of seed dispersal vector required, and (4) how

[1] 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.

strict the pollinator and seed disperser requirement is for the species (e.g., can the species use a wide range of insect species or is the species a pollinator obligate or specialist?). Species that score the same on all toxicity factors are given the same overall toxicity ranking (e.g., species scores high on all factors has a high overall toxicity ranking). Species that only have medium or low scores are given a low overall toxicity ranking. Species that have a mix of high and low scores are given a medium overall toxicity ranking, and species with a mix of high and medium scores are given a high overall toxicity ranking.

Summary of Conclusions for Plants in Assessment Groups 3,4,&8, CONUS and NL48

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed registration of methomyl, and the cumulative effects, it is the Service's biological opinion that the registration of methomyl, as proposed, is not likely to jeopardize the continued existence of the 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, 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 concern of adverse effects

The species in Table 1 are grouped together as they have low concern of adverse effects due to low toxicity (with the exception of the fadang, see rationale below). While we present some specific information about the species in Table 1below, 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 1. Species with low concern of adverse effects due to low toxicity

Scientific Name	Common Name	Vulnerability Ranking	Exposure Ranking	Toxicity Ranking	Assessment Group	Determination
Cupressus abramsiana	Santa Cruz cypress	Medium	Low	Low	3	No Jeopardy
Cycas micronesica	Fadang	Medium	Low	Medium	3	No Jeopardy
Torreya taxifolia	Florida torreya	High	High	Low	3	No Jeopardy
Cupressus goveniana ssp.goveniana	Gowen cypress	High	Low	Low	3	No Jeopardy
Carex lutea	Golden sedge	High	High	Low	4	No Jeopardy
Ischaemum byrone	Hilo ischaemum	High	Medium	Low	4	No Jeopardy
Rhynchospora knieskernii	Knieskern's beaked rush	Low	High	Low	4	No Jeopardy
Panicum niihauense	Lau`ehu	High	Low	Low	4	No Jeopardy
Poa napensis	Napa bluegrass	High	High	Low	4	No Jeopardy
Carex specuicola	Navajo sedge	Low	Low	Low	4	No Jeopardy
Aristida chaseae	No Common Name	High	Medium	Low	4	No Jeopardy
Cyperus trachysanthes	Pu`uka`a	High	Medium	Low	4	No Jeopardy
Tuctoria mucronata	Solano grass	High	High	Low	4	No Jeopardy
Aolpercurus aequalis var. sonomensis	Sonoma alopecurus	High	Medium	Low	4	No Jeopardy

C-B1. Non-flowering and Abiotic Pollination Plants (Groups 3, 4, and 8)

Scientific Name	Common Name	Vulnerability Ranking	Exposure Ranking	Toxicity Ranking	Assessment Group	Determination
Carex albida	White sedge	High	High	Low	4	No Jeopardy
Poa atropurpurea	San Bernardino bluegrass	High	Low	Low	4	No Jeopardy
Aristida portoricensis	Pelos del diablo	High	Medium	Low	4	No Jeopardy
Cyperus fauriei	No Common Name	High	Low	Low	4	No Jeopardy
Calamagrostis expansa	Maui reedgrass	High	Low	Low	4	No Jeopardy
Digitaria pauciflora	Florida pineland crabgrass	High	Medium	Low	4	No Jeopardy
Ambrosia pumila	San Diego ambrosia	High	Medium	Low	8	No Jeopardy
Quercus hinckleyi	Hinckley oak	High	Low	Low	8	No Jeopardy
Amaranthus pumilus	Seabeach amaranth	Medium	Medium	Low	8	No Jeopardy
Ambrosia cheiranthifolia	South Texas ambrosia	High	High	Low	8	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 low, medium, or high. Our evaluation of the effects of the proposed Action on these species indicates a low, medium, or high extent of exposure due to overlap of the action area within the range of these species. Toxicity is expected to be low for the plant species in this group, due to their reliance on wind and/or water as pollination vectors. Many also rely on wind and/or water for seed dispersal, and some use birds or mammals to disperse their seeds. As such, we anticipate no adverse reproductive effects to plants using wind and/or water for pollination and seed dispersal. Those that use mammals and/or birds for seed dispersal are anticipated to experience very minimal adverse reproductive effects as we do not expect methomyl exposure to birds and mammals will appreciably diminish their availability as seed dispersers (as explained above in the *Toxicity* section).

One exception is the fadang (*Cycas micronesia*), a cycad species endemic to the island of Guam. This species can use wind for pollination but also attracts butterflies to its strong-smelling cones where these insects pick up pollen and transfer it to other individuals, thus assisting in pollination and reproduction for the species. However, the overlap of methomyl use sites in the species range is low (2.1%), so we anticipate minimal exposure to butterfly pollinators. Furthermore, as mentioned, the cycad can also use wind for pollination, in addition to its ability to propagate vegetatively through basal suckers or cycad ‘pups’ (vegetative outgrowths). As a result, the species can continue to reproduce via wind pollination and/or vegetative reproduction even in the temporary absence of butterfly pollinators in a small portion of its range. As such, we anticipate minimal adverse reproductive effects to the species.

While these species have medium or high vulnerability and/or exposure rankings, given their use of abiotic mechanisms for pollination and their use of either abiotic or animal seed dispersers that are not likely to experience high levels of adverse effects, we do not anticipate any or very minimal adverse reproductive effects to the species. After adding the effects of the action and cumulative effects to the environmental baseline, and in light of the status of the species, 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 1.