

## EXECUTIVE SUMMARY

This final Biological Opinion (Opinion) evaluates the effects of the Environmental Protection Agency's (EPA's) proposed national registration review of carbaryl on endangered and threatened species and designated critical habitat under U.S. Fish and Wildlife Service (Service) jurisdiction, in accordance with section 7(a)(2) of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 et seq.). This Opinion also serves as a conference report for proposed species and proposed critical habitats.

Current product labels authorize carbaryl for use on a wide variety of terrestrial food and feed crops, as well as in turf management, forestry, ornamental production, rangeland, and residential settings. Additionally, carbaryl is authorized for use to thin fruit in orchards to enhance fruit size and enhance repeat bloom, and to control mud and ghost shrimp and in commercial shrimp ponds in Texas. As stated in EPA's final biological evaluation, there are two technical registrants of carbaryl that are considered applicants in this consultation: Tessengerlo Kerley Inc. (TKI), with 61 active product registrations for use on agriculture (60 Section 3 general registrations under FIFRA and 1 24c Special Local Needs registration under FIFRA), and Drexel Chemical Company and Loveland Product Inc., which hold registrations for non-agricultural uses. Carbaryl can be applied in liquid (i.e., flowable concentrate, emulsifiable concentrate, wettable powder, water soluble powder), bait, granular, or dust forms. Aerial and ground application methods are allowed, as are pressure sprayers, dust applicators, spreaders and shank applicators, and baits. Before issuance of our biological opinion, registrants committed to and EPA incorporated measures outlined in the 2022 Proposed Interim Decision or 2024 National Marine Fisheries Service biological opinion on carbaryl.

Our analysis of the effects of the action considered the information on the carbaryl label and supplemental information that we received from EPA and TKI. In this Biological and Conference Opinion, we addressed 1,179 candidate, proposed, and listed species and 485 designated and proposed critical habitats. EPA also requested concurrence with their determinations that the proposed action may affect, but is not likely to adversely affect, 69 listed species and 21 designated and proposed critical habitats. EPA determined there would be no effect from the proposed action for 421 listed and proposed species and 377 designated and proposed critical habitats. In an associated Concurrence Appendix, we described our concurrence and agreement with EPA's not likely to adversely affect and no effect determinations. We also explained our reasonings behind including two species (i.e., Great Lakes piping plover and desert tortoise) in our Biological Opinion instead of concurring with EPA's "not likely to adversely affect" determinations for the species.

### Analysis and Methods

We followed an ecological risk assessment framework to determine effects to species and their critical habitats. We used information presented in EPA's Biological Evaluation (BE) (e.g., pesticide exposure estimates and toxicological response data) and from TKI, when applicable, to predict the resulting effects to species and critical habitats. We assessed anticipated toxicological effects related to the action, including anticipated general pathways of exposure to listed species taxa groups and their designated critical habitats (i.e., physical and biological features, or PBFs). We then describe specific aspects of carbaryl (e.g., chemical properties, applications rates, routes

of exposure), its use on the landscape (e.g., different types of usage data), and how it will impact species and critical habitats based on these properties. We describe factors that influence exposure and toxicity and how we incorporated them into our analysis. Within the Integration and Synthesis section of the Opinion, we describe our approach to the analysis for each of the taxa groups, which includes incorporating all aspects of the potential exposure to carbaryl for the different taxonomic groups within the context of the status of the species and critical habitat, environmental baseline, and cumulative effects.

For species that EPA determined were “likely to be adversely affected” by the proposed action or that the EPA determined were “not likely to be adversely affected” that we did not concur with, we assessed the species’ overall vulnerability and conducted a risk analysis. The risk analysis included metrics of exposure and expected magnitude of adverse effects. We used the percent overlap between the species’ ranges and the action area (i.e., carbaryl use sites and areas of off-site transport through spray drift or runoff). When available, we used metrics for past insecticide usage (i.e., U.S. Department of Agriculture’s Census of Agriculture, CoA; and California’s Department of Pesticide Registration’s California Pesticide Use Report, CalPUR) and estimated carbaryl usage (i.e., EPA’s National and State Summary Use and Usage Matrix, SUUM) to assess potential future exposure to carbaryl. Finally, we compared estimated environmental concentrations that EPA generated to reference toxicity thresholds to determine what expected magnitude of adverse effects to individuals and necessary resources, including critical habitat PBFs when applicable. Depending on the species, toxicological effects could be mortality, growth inhibition, reproduction loss, reduction in habitat, or prey loss. We used this information to generate the anticipated risk of adverse effects for each species considered in this Opinion.

Following the release of our draft Opinion, we worked collaboratively with EPA, USDA, and TKI to discuss the draft Opinion, particularly those species and critical habitats for which we made preliminary conclusions of “is likely to jeopardize” or “is likely to destroy or adversely modify”. We also analyzed newly listed species and critical habitats that were not included in the draft Opinion and incorporated additional data that were not available in performing our preliminary analyses, such as usage data for some species and critical habitats. In some cases, consideration of new data resulted in a change of our determinations between the draft and final, which we describe in further detail for each affected species and critical habitat in our final Opinion.

In cases where general conservation measures proposed as part of the action did not avoid jeopardy or adverse modification, additional species-specific or critical habitat-specific measures were developed and incorporated as part of the action to avoid jeopardy and destruction or adverse modification. Examples of such measures include the establishment of buffers to off-field habitat, requirement of measures to further reduce runoff, and restriction from application when certain crops are in bloom. Carbaryl users will access these species- and critical habitat-specific measures through mandatory label instructions that direct them to EPA’s Bulletins Live! Two website, where any relevant restrictions will be identified based on the geographic location in which the user plans to apply carbaryl.

## **Results**

### *Animals*

In total, we considered 604 candidate, proposed, and listed animals and 303 proposed and designated animal critical habitats in our Opinion that either EPA determined were likely to be adversely affected by the proposed action or that the EPA determined were "not likely to be adversely affected" and we did not concur. We expect direct adverse effects to animals if they occur on carbaryl use sites or consume contaminated food items. We expect relatively high levels of mortality for aquatic and terrestrial invertebrates where exposure occurs. For other taxa groups, we expect variable levels of mortality, sublethal, and indirect effects based on their life history, food base, and other considerations. For more detail, see the *Effects of the Action on Animals* section of the Opinion. After considering the extent of exposure, magnitude of expected impacts to individuals and their resources, vulnerability analysis, status, environmental baseline, cumulative effects, and both general and species-specific conservation measures where needed, we conclude that the proposed action is not likely to jeopardize listed animals or adversely modify their critical habitats.

### *Plants*

In total, we considered 575 listed plants and 182 proposed and designated plant critical habitats in our Opinion that either EPA determined were likely to be adversely affected by the proposed action or that the EPA determined were "not likely to be adversely affected" and we did not concur. We expect effects to plants will occur for those that rely on insect pollinators or seed dispersers. We do not expect direct effects to plants and we do not anticipate any appreciable reductions in the availability of mammalian or avian pollinators or seed dispersers. After considering the extent of exposure, magnitude of expected impacts to individuals and their resources, vulnerability analysis, status, environmental baseline, cumulative effects, and both general and species-specific conservation measures where needed, we conclude that the proposed action is not likely to jeopardize listed plants or adversely modify their critical habitats.

### **Conclusions**

In our draft Opinion, we preliminarily concluded that the proposed action was likely to jeopardize 78 proposed or listed species and destroy or adversely modify 14 proposed or designated critical habitats. However, after considering newly proposed general and species-specific conservation measures that were incorporated into the action, we conclude that the registration of carbaryl is not likely to jeopardize the listed species or destroy or adversely modify the critical habitats in our final Opinion.